



JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



**MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT (MONRE)
SOCIALIST REPUBLIC OF VIETNAM**

**THE PROJECT
FOR
STRENGTHENING CAPACITY
OF
WATER ENVIRONMENTAL MANAGEMENT
IN
VIETNAM**

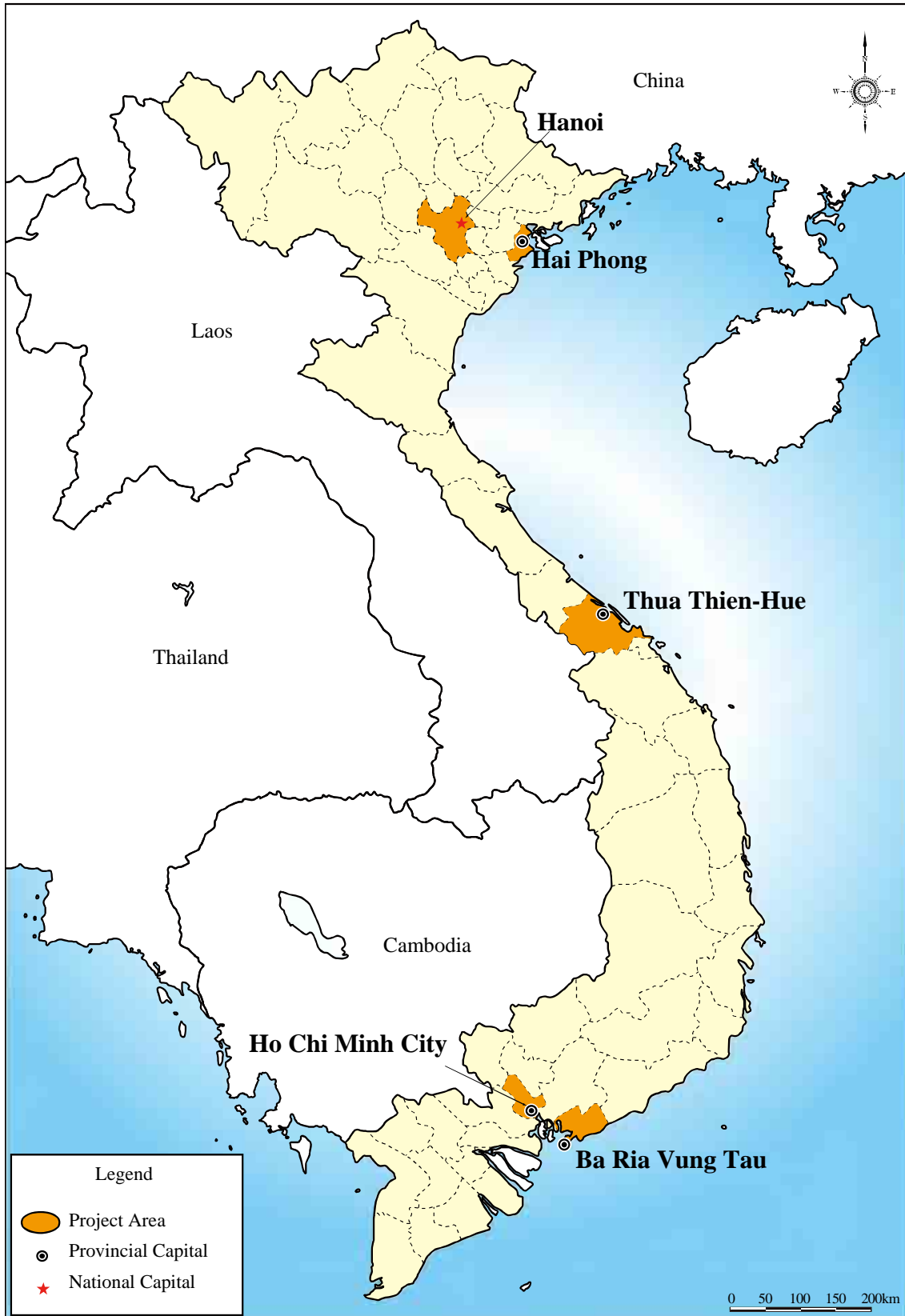
PROJECT COMPLETION REPORT

JUNE 2013

**JAPAN INTERNATIONAL COOPERATION AGENCY
JICA EXPERT TEAM (LONG-TERM EXPERTS AND
SHORT-TERM EXPERTS: NIPPON KOEI CO., LTD.)**

GE
JR
13-140

Exchange Rate (As of 31 May 2012)
State Bank of Vietnam
USD1.00 = EUR0.775 = JPN102.2 = VND20,850



Locations of the Project Area

SUMMARY

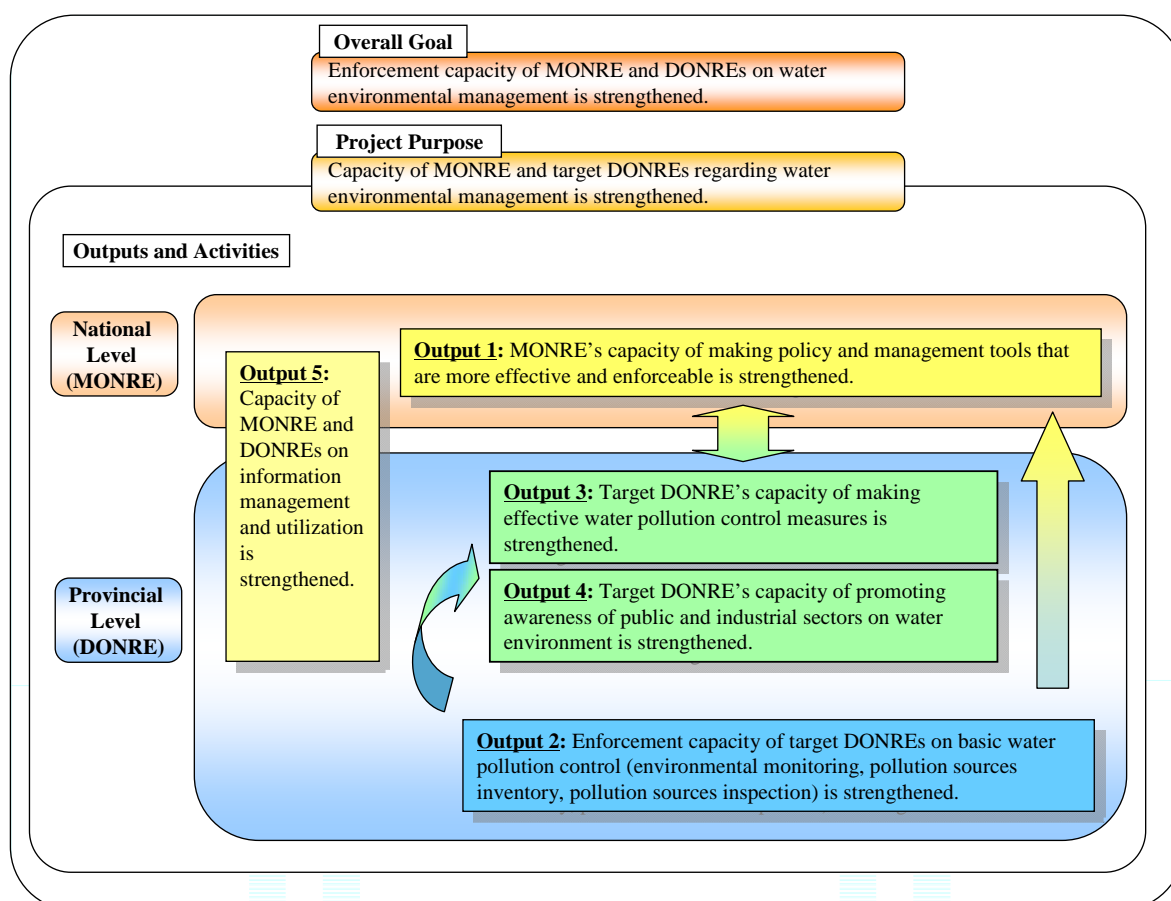
1.1 Overall Structure of the Project

(1) Project Design Matrix

Figure 1 summarizes the overall design of the Project, which has the following “Project purpose” that would be achieved through the Project and “Overall goal” that would be achieved by utilizing the achievements of the Project within several years after its completion:

- (i) Project purpose: Capacity of MONRE and target DONREs regarding water environmental management is strengthened; and
- (ii) Overall goal: Enforcement capacity of MONRE and DONREs on water environmental management is strengthened.

In order to achieve the Project purpose and the overall goal, the Project Design Matrix (PDM) establishes five outputs, i.e.: Output 1 which is designed to strengthen MONRE’s capacity to develop policies and policy tools for water environmental management; Outputs 2 to 4 which aim to strengthen DONREs’ capacities to enforce such policies in the five local cities and provinces of Hanoi City, Hai Phong City, Thua Thien-Hue Province, Ho Chi Minh City, and Ba Ria-Vung Tau Province; and Output 5 which aims to strengthen the activities of MONRE and DONREs through information sharing. The PDM also defines, for each output, the indicators of achievements, means of verification of the achievements, important assumptions, specific activities to be implemented, and inputs to the Project.

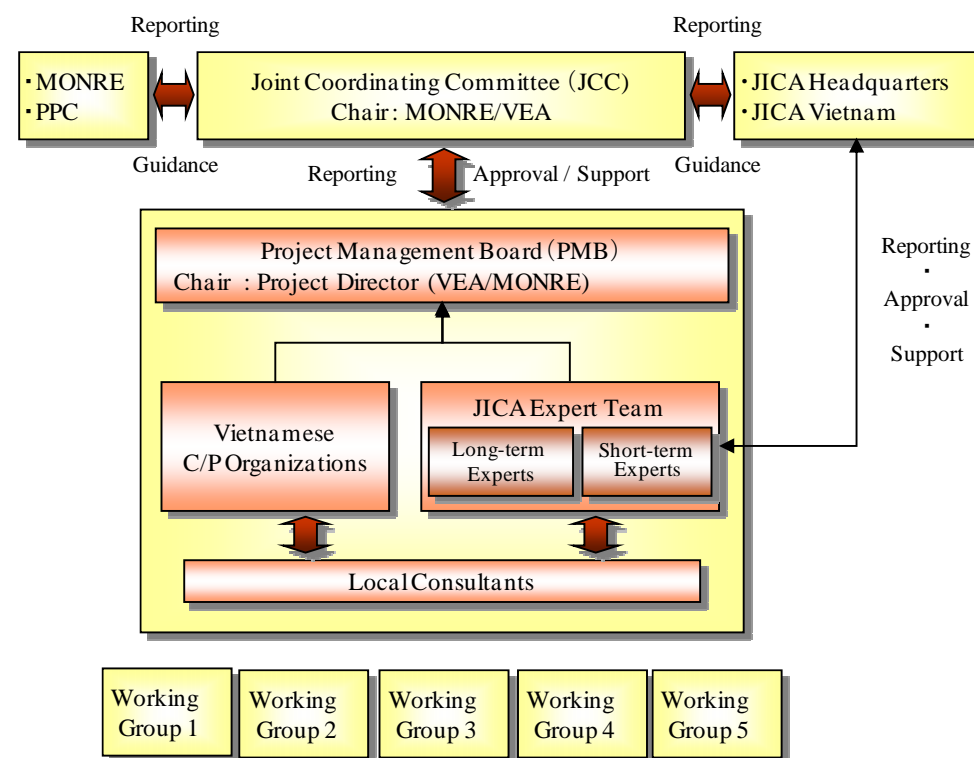


Source: Prepared by JET based on R/D and M/M agreed on 8 January, 2010

Figure 1 Overall Structure of PDM

(2) Organization of the Project

Figure 2 shows the implementation structure of the Project. The overall direction of the Project was coordinated by the Joint Coordinating Committee (JCC). Under the JCC, the Project Management Board (PMB) was established to manage project activities and report progress to JCC. The project activities were carried out by Vietnamese counterpart (C/P) organizations, which established working groups (WGs) to implement the activities. The JICA Expert Team (JET) provided technical support and guidance to the C/P organizations, and facilitated implementation of the project activities.



Source: JET

Figure 2 Project Implementation Structure

1.2 Evaluation of the Project

(1) Mid-term Review

The mid-term review was carried out by the mid-term review team from 8 to 22 December 2011. Based on the results of the questionnaire survey and discussions with the C/P members, the mid-term review team made a series of general suggestions as well as recommendations on each output of the Project in order to make project implementation more effective. Among the key suggestions are the following:

- It is important to make a detailed work plan as early as possible to ensure sufficient inputs of ideas and opinions from staff of MONRE and DONREs, and to come up with practical work plans while maintaining some flexibility to respond to changes in needs and so forth.
- Exchanging and sharing of experiences and findings among DONREs are very important and effective to increase the level of performance of the Project.
- The linkage between Output 1 and Outputs 2 and 3 needs to be ensured.

These suggestions were duly followed in the subsequent phase of the Project.

(2) Terminal Evaluation

The joint terminal evaluation of the Project was conducted during the period of 24 February to 20 March 2013 by the joint evaluation team consisting of four Vietnamese members from MONRE and five Japanese members from JICA. The joint evaluation team concluded that almost all the activities had been done at the time of evaluation and that the Project purpose as well as the five outputs were likely to be achieved by the end of the Project. Judging in terms of the five evaluation criteria, the team found out that the relevance and effectiveness of the Project were high, while its efficiency was satisfactory. The team observed a lot of unintended positive impacts resulting from the Project, and sustainability was considered moderate to high. Sustainability of the Project would be secured and the overall goal of the Project would be achieved through continuous and cooperative efforts by both MONRE and the five DONREs.

The joint evaluation team made a set of general and specific recommendations to the Director General and Deputy Director General of VEA/MONRE in order to achieve the Project purpose and the overall goal. Some of the important suggestions include the following:

- The DONREs are recommended to implement the “challenges and actions” and the “way forward” which they presented at the terminal evaluation workshop in TT-HUE, as they are very important in developing further tools and capacities for water environmental management. The VEA is encouraged to analyze the “challenges and actions” and the “way forward” in an integrated manner and provide proper assistance to DONREs.
- Under the Project, policy review has been made in a comprehensive manner and several important specific policy outputs have been generated. Considering the need for their implementation, VEA is recommended to elaborate these outputs further by utilizing the enhanced policy review capacity gained through the Project.

1.3 Activities

(1) Output 1 (WG 1): Environmental Policy

1) Whole picture on the relation of each "overall issues of current policy" and their countermeasures

In taking consideration of the background of "overall issues of current policy", the necessary countermeasures against overall issues can be summarized into following 4 items

No.1: To make "Overall water environmental management policy", which correlate/coordinate among the relevant individual policies.

No.2: To make individual policy (or policy-tools) more effective and enforceable.

No.3: To establish information collection/management system in order to find policy issue.

No.4: To strengthen the basis* of policy enforcement which every water environmental management policy depends when it was put into practice.

*"basis" means that "necessary resources to enforce law and sub-laws properly such as human resources, financial resources, environmental technology etc.

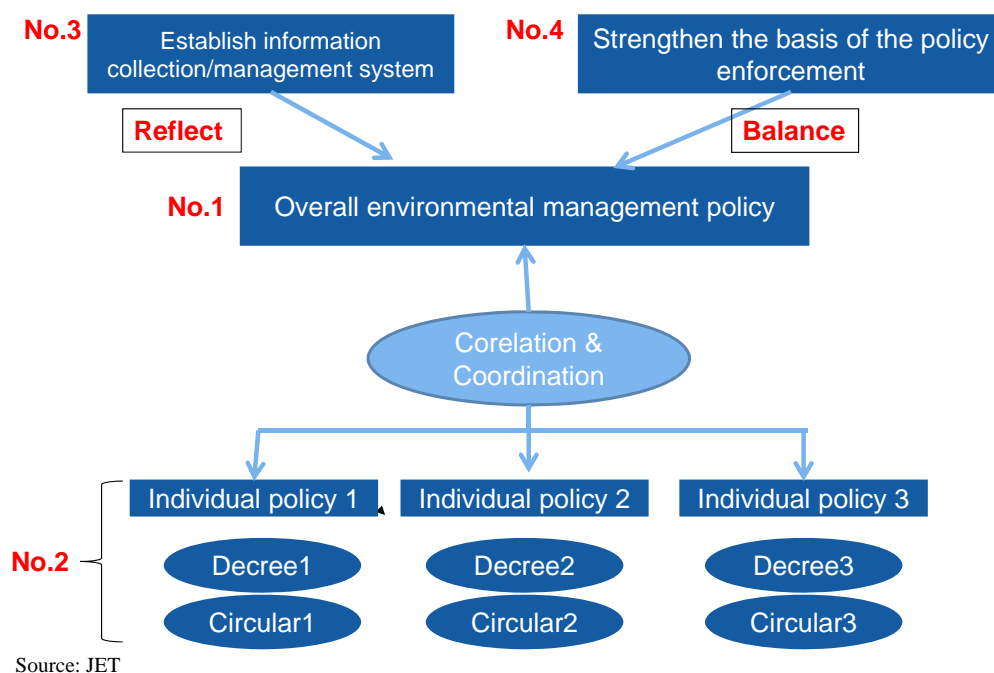


Figure 3 The Whole Picture about "Overall Issues of Current Policy"

2) Activities of Output 1 in order to tackle with "the issues of current policy"

Based on the whole picture of "issues of current polities", the activities of Output 1 were divided and implemented as below.

- a) To conduct the training course to master skill and knowledge necessary for making water environmental management policy. <corresponds to No.1, No.2 in Figure 3>

The objective of this training course was firstly "to introduce "international rules related to water environmental management policies" and "the trend of the Japanese water environmental policies", and secondly "to consider how water environmental policies, which is suitable to the socio-economics in Vietnam, can be developed from now on".

This program consists of "the lectures on the basic skills and knowledge" as well as "participatory case studies", which let all the participants to discuss the policies to lead the solutions by setting a case as an example.

- b) To propose new water environmental management policy based on the review of current policy <corresponding to mainly No.2, but including No.1, No.4 in Figure 3>

In total, 13 topics from 7 departments in VEA/MONRE (PCD, CEM, WENID, ISD, DAEIA, ISEM, and ID) and 1 department in MONRE (DWRM) 7 were selected.

(Note)

No.3 in Figure 3(Grasping the policy issues in the fields) was mainly conducted in the activities of Output 5

(2) Output 2-1 (WG 2-1): Monitoring

This component of the Project aimed to strengthen the enforcement capacity of the five target DONREs in environmental monitoring. The main focuses of the activities were on the development of draft revised monitoring plans of key rivers, and on the revision of monitoring reports in 2012. With regard to the monitoring plans, each DONRE picked one key river, and based on historical data and other relevant information, revised the existing plan following the systematic steps of Data Quality Objectives (DQO). With regard to the revision of monitoring reports, DONREs learned techniques on

interpreting longitudinal and historical trends of water quality, using statistics to test the significance of their findings, and effectively presenting their data using maps and graphs. Thereafter, DONREs prepared their own monitoring report in 2012. The achievements are summarized in Table 1.

Table 1 Achievements of Output 2-1 (WG 2-1): Monitoring

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
2-1-1 Draft revised monitoring plans of key rivers are prepared.	In order to learn the detailed processes of developing a scientific and logically structured monitoring plan, each DONRE would develop a draft revised monitoring plan for the following rivers under the guidance of JET: - Red River (HNI) - Re River (HPG) - Huong River (TT-HUE) - Saigon River (HCMC) - Dinh River (BRVT)	<ul style="list-style-type: none"> DONREs did not understand clearly the objectives of monitoring, and have no experience in developing monitoring plans by themselves. The status of each DONRE is as follows: <ul style="list-style-type: none"> HNI: The monitoring plan of the Red River was just combined from former plans of former Hanoi City (urban area) and Ha Tai Province (rural area); therefore, it should be reviewed and revised. HPG, TT-HUE, HCMC, and BRVT: The monitoring plans of key rivers were not developed by DONREs themselves but by local consultants for PPCs or under an international cooperation project; therefore, they need to clarify the objectives of monitoring, as the first step, in order to get basic skill and knowledge of developing a monitoring plan and revise it by themselves. 	<ul style="list-style-type: none"> All target DONREs have prepared the draft revised monitoring plans of their respective key rivers by January 2013. Therefore, this indicator has been achieved. Some DONREs are ready to start the new monitoring based on the revised plans. The status of the revised monitoring plan of each DONRE's key river is as follows: <ul style="list-style-type: none"> HNI: CENMA completed preparing the draft revised monitoring plan of the Red River in August 2012. The draft plan was approved in December 2012. CENMA started its first monitoring campaign from March 2013. HPG: HACEM completed preparing the draft revised monitoring plan of the Re River in January 2013, and implemented the new monitoring plan from 2013. TT-HUE: EPA completed preparing the draft revised monitoring plan of the Huong River in January 2013, and implemented the new monitoring plan from 2013. HCMC: CEMA completed preparing the draft revised monitoring plan of the Sai Gon River in December 2012. Also, CEMA is preparing a proposal for budget request by June 2013 to upgrade the new monitoring plan in 2014. BRVT: CEMAB completed preparing the draft revised monitoring plan of the Dinh River in January 2013. CEMAB distributed the revised plan to relevant organizations in order to upgrade the new monitoring plan for 2016-2020.
2-1-2 Draft revised monitoring reports in 2012 are prepared by DONREs, and shared with concerned organizations.	In order to improve skills on report writing, all DONREs would prepare their respective draft monitoring reports in 2012 under the guidance of JET, and then share such reports with concerned organizations.	<ul style="list-style-type: none"> The monitoring reports in the target DONREs described just compliance with QCVN (all DONREs), historical trend for the last two years, and longitudinal trend (only a few DONREs); thus, they needed to improve their skills and knowhow on data analysis and reflect them on their monitoring reports. The monitoring reports of the target DONREs did not describe data interpretation based on interaction among water environment, pollution sources, impact on water sources, and so on; therefore, they also need to improve their skills and knowhow on data interpretation. 	<ul style="list-style-type: none"> All DONREs have worked on improving their respective monitoring reports in 2012, and the target DONREs have shared their reports with concerned organizations. The status of improvement and preparation of monitoring report in 2012 at each DONRE are as follows: <ul style="list-style-type: none"> HNI: Added the objectives of monitoring; date of sampling; improved data interpretation; and comparison of dry and wet seasons. (Submitted in December 2012) HPG: Improved data interpretation; comparison between seasons; analyzed the impacts of hydrological and climate conditions to river water quality; and WQI calculation. (Submitted in March 2013) TT-HUE: Added maps of sampling locations; added an overview of the monitoring plan to the report; improved data interpretation; spatial comparison of water quality along the river; temporal comparison. (Prepared technical monitoring report in April 2013) HCMC: Improved data interpretation (taking into account the distance between stations) by spatial trend analysis; and WQI calculation. (Submitted in February 2013) BRVT: Added map of monitoring stations; added environmental baseline data such as pollution sources, hydrological characteristics; added an outline of the monitoring program; longitudinal trend analysis, historical trend analysis; WQI calculation. (Submitted in February 2013)

Source: JET

(3) Output 2-1 (WG 2-2): Water Quality Analysis

Because water quality analysis requires highly specialized skills, a series of training programs were designed and implemented according to the specific needs for capacity development in the areas of surface water sampling, basic and advanced water quality analysis, laboratory design, laboratory management, and quality control (QC) of contract work.

DONREs have strived to achieve the technical goals set for each DONRE and for each parameter. For example, if the staff is capable of quantifying the concentration of a selected pollutant at or lower than the environmental water standard value with enough statistical confidence, its competency for the parameter is considered Level 5, which is the highest rating. By the end of the Project, all DONREs managed to achieve the expected goals set for each DONRE as summarized in Table 2 below.

Table 2 Achievements of Output 2-1 (WG 2-2): Water Quality Analysis

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
2-1-3 Accuracy of monitoring is improved.	<ul style="list-style-type: none"> Each DONRE achieves specific level of improvement of analytical precision in selected target parameters considering the technical capacity of each monitoring center. The goal of each DONRE in this output is as follows: <ul style="list-style-type: none"> - Lab staff measure POPs with QC (HNI) - Lab staff measure basic parameter with QC (HPG) - Lab staff measure basic parameters based on standard methods (TT-HUE) - Monitoring section staff outsource water quality analysis with QC (HCMC) - Lab staff measure some parameters by GC and AAS with QC (BRVT) 	<ul style="list-style-type: none"> The accuracy of analytical results is limited or questionable depending on the QC practices of each laboratory and target parameters. 	<ul style="list-style-type: none"> Based on the criteria designed in the Project, the achievement level of water quality analysis of each DONRE was evaluated by JET and C/Ps as follows, and the overall achievement was evaluated as “mostly achieved” at the end of the Project: <ul style="list-style-type: none"> - HNI: Lab staff can now measure chlorinated pesticides using the finalized analytical method, and have reached the expected goal. - HPG: The goal levels for all training target parameters (eight parameters) have been reached. - TT-HUE: The goal levels for all training target parameters (14 parameters) have been reached. - HCMC: QC training was implemented. - BRVT: The goal levels for all training target parameters (11 parameters) have been reached.

Source: JET

(4) Output 2-2 (WG 2-3): Pollution Source Inventory

This component aimed at designing and developing a pollution source inventory (PSI) at each DONRE. The PSI is an inventory of information on pollution sources that covers the status of compliance with different environmental regulations (e.g., EIA, wastewater discharge fee, and wastewater discharge license), volume and quality of effluent, and other information essential for water pollution control by DONRE.

In order to collect information, DONREs reviewed related documents available in DONRE and carried out questionnaire surveys and sampling/analysis of wastewaters. All DONREs managed to develop PSIs for 50 to over 200 pollution sources, and also prepared pollution source maps using GIS. Using the PSIs, DONREs analyzed the collected data and information, and prepared a small report on the status of pollution sources in their respective territory. Table 3 shows the achievements for this output.

Table 3 Achievements of Output 2-2 (WG 2-3): Pollution Source Inventory

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
2-2-1 Primary water pollution sources are duly filled in the revised inventory formats.	<ul style="list-style-type: none"> DONRE revised the inventory formats, and information on primary water pollution sources were filled in the revised inventory formats as PSIs. The area and the number of target enterprises to be investigated for PSI in each province are as follows: <ul style="list-style-type: none"> HNI: 50 enterprises in Long Bien District as part of inspection activities. HPG: 109 enterprises in the Re River basin, and 148 enterprises in the Da Do River basin. TT-HUE: 204 enterprises in the whole TT-HUE Province. HCMC: 20 enterprises in the Tan Quy Industrial Cluster, and 25 enterprises in the Phuoc Long Industrial Cluster. BRVT: 188 enterprises in the whole BRVT Province (83 enterprises in seven industrial zones and one industrial cluster, and 105 enterprises outside) 	<ul style="list-style-type: none"> There was no PSI system except at HCMC. Primary water pollution sources in all DONREs were yet to be identified, though in general DONREs had good ideas about important industries in their respective territory. There was no regulation specific to PSI development. There were no section and human resources dedicated to PSI development. 	<ul style="list-style-type: none"> All DONREs could develop PSIs that cover primary water pollution sources, and this indicator was achieved. <ul style="list-style-type: none"> HNI: 48 enterprises in Long Bien District as part of inspection activities and investigation of 1,161 + 60 enterprises by WG 3. HPG: 109 enterprises in the Re River basin, and 148 enterprises in the Da Do River basin. TT-HUE: 217 enterprises in the whole TT-HUE Province. HCMC: 20 enterprises in the Tan Quy Industrial Cluster, and 25 enterprises in the Phuoc Long Industrial Cluster. BRVT: 188 enterprises in the whole BRVT Province.
2-2-2 Information in the inventory is adequately added and the following information becomes available for DONREs' pollution control activities: (i) information on compliance with respect to EIA, industrial wastewater fee, water discharge license, wastewater quality standard, sanction based on inspection; (ii) information on pollution load of COD.	<ul style="list-style-type: none"> PSI covers all the information/parameters specified in the PDM indicator. 	<ul style="list-style-type: none"> All DONREs maintained lists of industries that had EIA approval and paid wastewater discharge fees, but not all items specified in the PDM indicator. HCMC DONRE's PSI covered about 1,500 industries, and information similar to the ones envisioned in the Project. All DONREs had limited experience of using PSI including estimation of pollution load. 	<ul style="list-style-type: none"> All DONREs could develop PSI which covered information specified in the PDM indicator, and this indicator was achieved. Pollution load of COD and other pollutants were estimated at each DONRE. All DONREs prepared a short report on status of pollution sources in each province. After completion of the Project, DONRE shall implement inventory surveys without JET's assistance.

Source: JET

(5) Output 2-3 (WG 2-4): Inspection

This component focused on strengthening the capacities of DONREs to carry out environmental inspections and environmental checks, which are important administrative activities to ensure environmental compliance by industries. The Project emphasized practical aspects of inspection and environmental check, and implemented various training activities to develop the capacities of DONRE officers on detecting poor wastewater management practices, measuring wastewater flow and simple water quality parameters on site, and providing appropriate guidance on proper wastewater management and cleaner production technologies. Moreover, efforts were made to streamline the processes of planning and preparation of inspection and check activities by documenting the criteria for selecting industries to be inspected, and by identifying important data and information to be reviewed before on-site work. The achievements are summarized in Table 4.

Table 4 Achievements of Output 2-3 (WG 2-4): Inspection

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
2-3-1 The results of the capacity assessment on preparation work, on-site inspection, and follow-up work of inspection show improvement, compared with the initial stage of the Project.	<ul style="list-style-type: none"> Through the capacity assessment (CA) planned in November 2012, the improvements of relevant officers' capacities are to be evaluated. The CA would be implemented considering the requirements in several inspection guidelines prepared by MONRE, OECD, US-EPA, and Japan's MOE. The main points for assessment are as follows: <ul style="list-style-type: none"> Preparation work of inspection: Accessibility to relevant information to be referred to is increased. On-site inspection: Capacities to collect information and check issues on wastewater management by site survey are increased. Follow-up work of inspection: Full cooperation among different departments or sections of DONRE to ensure that violators follow administrative orders and guidance. 	<ul style="list-style-type: none"> Regarding preparation work, each DONRE had difficulties referring to the required information in order to understand the conditions of environmental management of target enterprises with regard to inspection and environmental check in preparation work. Regarding on-site work, many relevant officers requested to improve their knowledge on how to assess wastewater treatment systems and their operating conditions, and recording identified issues in the minutes of on-site inspection. Regarding follow-up work, relevant officers requested to improve their knowledge on key points for guiding enterprise for improving wastewater management. 	<ul style="list-style-type: none"> On preparation work, each DONRE clarified the necessary information to be reviewed and the section to be contacted. The improvement of relevant capacities through the Project was confirmed by the out-of-five scores in the internal evaluation. On on-site inspection, HPG DONRE, TT-HUE DONRE, HCMC DONRE and BRVT DONRE have implemented OJTs on: (i) on-site flow measurement, and (ii) visual check of wastewater treatment system and its operating conditions. For HNI DONRE, on-site visual check of wastewater treatment system and its operating condition was taught through the training on wastewater treatment techniques. On follow-up work, relevant officers shared knowledge on key points for guiding enterprise for improving wastewater management. The improvement of relevant capacities was confirmed in the internal evaluation. The knowledge and experiences obtained through the Project were reflected on the Handbook for Improving Inspection and Environmental Check Performance in order to be shared among officers in charge of inspection and environmental check.
2-3-2 Criteria for selecting primary/crucial pollution sources in each DONRE's inspection plan are clarified.	<ul style="list-style-type: none"> Each DONRE establishes criteria for selecting primary/crucial pollution sources. 	<ul style="list-style-type: none"> Before the Project, all DONREs did not have any document describing the criteria for selecting primary pollution sources with regard to wastewater issues. 	<ul style="list-style-type: none"> All DONREs have identified the criteria for selecting primary/crucial pollution sources through preparation of the inspection plan for 2012. Each DONRE is examining what actions are needed to select primary/crucial pollution sources in the post-project phase using the criteria developed, and the required actions were documented. HNI DONRE, HPG DONRE, TT-HUE DONRE, and BRVT DONRE prepared the inspection plan in 2013.
2-3-3 Number of officers who have capacities for on-site inspection, such as field measurement and wastewater treatment facility checking, is increased.	<ul style="list-style-type: none"> The training records would show an increase in the number of officers who know the key points in checking wastewater treatment facility conditions on site, and have knowledge on field work. 	<ul style="list-style-type: none"> Based on the results of initial CA, the following capacities should be improved: <ul style="list-style-type: none"> Capacity and knowledge on measuring wastewater flow Knowledge on on-site wastewater quality measurement. 	<ul style="list-style-type: none"> HPG DONRE, TT-HUE DONRE, HCMC DONRE and BRVT DONRE have implemented OJT, and gained experience of checking wastewater treatment facilities, and implementing field work, such as water flow measurement and field analysis. The knowledge and experiences obtained through the Project were reflected on the Handbook for Improving Inspection and Environmental Check Performance in order to be shared among officers in charge of inspection and environmental check.
2-3-4 Number of officers who have capacities to assess situation of wastewater management of polluting industries and make recommendations for improvement from perspectives of giving administrative order and administrative guidance, is increased.	<ul style="list-style-type: none"> The training records would show an increase in the number of officers with capacities to assess the situation of wastewater management, and to prepare recommendations for improvement in terms of giving administrative orders and administrative guidance. 	<ul style="list-style-type: none"> Each DONRE requested to improve their knowledge on appropriate diagrams of wastewater treatment systems by main industrial sectors, and key factors for operating wastewater treatment systems under suitable conditions. Knowledge on cleaner production technique was relatively a new concept to relevant offices for reducing the impacts of wastewater. Knowledge on such was expected to be enhanced. 	<ul style="list-style-type: none"> In each DONRE, workshops on how to assess wastewater treatment facilities were organized in November 2011 and in February 2012. Also, a series of training activities on wastewater treatment and cleaner production technique on the seafood processing, textile and dyeing, and paper industries were held in October 2012 and January 2013. The answers to the questionnaire distributed after the training on wastewater treatment and cleaner production technique showed improvement of the participants' knowledge on wastewater treatment and cleaner production technique, as reflected in the out-of-five scores, as follows: <ul style="list-style-type: none"> Wastewater treatment and cleaner production technique on the seafood

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
			processing industry: from 2.7 to 3.7 - Wastewater treatment and cleaner production technique on the textile and dyeing industry: from 2.8 to 4.0 - Wastewater treatment and cleaner production technique on the paper industry: from 2.7 to 4.1 • The knowledge and experiences obtained through the Project were reflected in the Handbook for Improving Inspection and Environmental Check Performance in order to be shared among officers in charge of inspection and environmental check.

Source: JET

(6) Output 3 (WG 3): Water Pollution Control Measures

This component was implemented in order to strengthen DONREs' capacity to formulate a plan to improve water pollution control. Because formulating such plan is not part of DONREs' routine work, the activity was implemented only by Hanoi DONRE, which is one of the leading DONREs in Vietnam. Manufacturing industries in Ha Dong and Tu Liem districts were selected as the target area/industries. Based on the review of water pollution control activities of DONRE, detailed field investigations of industrial entities in the area, and analysis of the problem structure, the Outline of Improvement Plan for Water Pollution Control in Hanoi City was drafted. The plan proposed various actions to address the following four challenges, which are essential to the improvement of industrial wastewater control by DONRE:

- To consolidate environmental check and inspection in order to promote compliance of entities;
- To enhance the awareness of operators of entities and citizens on compliance;
- To strengthen government support measures in order to promote the entities' industrial wastewater measures; and
- To streamline inefficient provisions in the regulation systems.

Table 5 shows a comparison of the achievements and indicators set in the PDM.

Table 5 Achievements of Output 3 (WG 3): Water Pollution Control Measures

Indicators	Status to be Achieved by each Organization	Status at the Beginning of the Project	Status at the End of the Project
3-1 A working group that work specifically on studying and making water pollution control measures are established and continues its activities, holding 10 times periodical meeting during the project period with more than 70% attendance rate.	Same as the indicator.	- The WG is yet to be organized.	- Since April 2011, discussion meetings have been held 17 times in total. Among them, 11 meetings had more than 70% attendance rate. - Through these discussion meetings, related technology transfer has been provided to the Vietnamese side.
3-2 Progress status of Output-3 is reported to the Director of DONRE every 6 months.	Same as the indicator.	- The activity of WG 3 is yet to be implemented.	- EPA has reported quarterly the progress status of Output-3 in its periodical working report.
3-3 The draft outline for effective water pollution control measure is submitted to PPC through Director of DONRE.	Same as the indicator.	- The Outline of Improvement Plan of Water Pollution Control is yet to be drafted. - Since data/information were limited, it was difficult to evaluate the status of industrial water measures implemented by industrial entities and the enforcement of water pollution control regulations by DONRE.	- The draft of the Outline of Improvement Plan of Water Pollution Control has been prepared in October 2013. - During the discussion meeting nos. 16 and 17, WG 3 members have examined and completed the draft of the outline of the improvement plan in March. - The draft outline is to be submitted to PPC from DONRE.

Source: JET

(7) Output 4 (WG 4): Environmental Awareness

This component was implemented to improve DONREs' capacity to deliver effective environmental awareness activities. In 2011, DONREs identified key stakeholders for activities and organized workshops to exchange opinions with them. By May 2012, DONREs elaborated a new plan for awareness raising activities. Then in 2012 and 2013, the activities have been successfully implemented. Such activities involved developing various tools (e.g., handbooks for industries, reportages and videos, water testing kit for citizens, etc.), organizing events (workshops with stakeholders, garbage clean-up events, etc.), and getting feedback from participants in order to improve activities in the future. Shown in Table 6 are the achievements of Output 4.

Table 6 Achievements of Output 4 (WG 4): Environmental Awareness

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
4-1 The results of questionnaire survey to target groups such as industries, district/commune/ward officers and social organizations, on environmental awareness show improvement, compared with the initial stage of the Project (consider the environmental awareness events as opportunities to conduct surveys)	<ul style="list-style-type: none"> The target groups (industries, district/commune/ward officers and social organizations) show improvement in environmental awareness through the results of the questionnaire surveys answered after the events. 	<ul style="list-style-type: none"> DONREs have been conducting many awareness raising events, but they do not target specific areas and/or pollution sources, and do not directly contribute to the improvement of the water environment. 	<ul style="list-style-type: none"> The status of achievement was evaluated as completely achieved at the end of March 2013. In the first year, 98% of the target groups showed improvement in environmental awareness through the workshops conducted in the target provinces, according to the results of the questionnaire survey. In the second year, the workshops for enterprises in HPG and TT-HUE, the events for residents in TT-HUE and HCMC, and production of signboards and TV reportage in HPG have been conducted so far.
4-2 Tools (e.g., film for the public and introductory guidance for industries) to promote environmental awareness targeting public and industries are developed.	<ul style="list-style-type: none"> Tools would be developed at each DONRE as follows: <ul style="list-style-type: none"> HNI: Workshop materials, guidebook on environmental laws and regulations for enterprises. HPG: Workshop materials, signboards, TV reportages. TT-HUE: Workshop materials, materials and goods for simple water quality test and clean-up events (manual, T-shirts, and banners). HCMC: WS materials on introductory guidebook on environmental laws and regulations for enterprises, goods for clean-up events (hand fans). BRVT: Workshop materials, and environmental film. 	<ul style="list-style-type: none"> DONREs already have various tools developed through its activities, but they have not necessarily been developed considering specific targets or objectives in mind. 	<ul style="list-style-type: none"> The status of achievement is evaluated as completely achieved at the end of Mar. 2013. Workshop materials for enterprises, government officers and/or residents were developed in each DONRE in the first year. The following tools were developed in the second year: <ul style="list-style-type: none"> HNI: An introductory guidebook on environmental laws and regulations for enterprises and materials for sector seminar is being developed. HPG: Signboards and TV reportages for the public and enterprises were developed. Materials for workshop on raising the awareness of enterprises were prepared. TT-HUE: Materials and goods for simple water quality test and clean-up events and for workshops on raising the awareness of enterprises were prepared HCMC: Goods for a clean-up event was developed. An introductory guidebook on environmental laws and regulations for enterprises is being developed. BRVT: An environmental film for the public and enterprises is being developed.
4-3 Environmental awareness events with target groups are conducted, making use	<ul style="list-style-type: none"> Each DONRE would conduct the following events by utilizing the tools developed in 4-2 above: 	<ul style="list-style-type: none"> DONREs have been conducting awareness events, but most of them are targeting social organizations. 	<ul style="list-style-type: none"> The status of achievement has been evaluated as mostly achieved at the end of March 2013. In the first year, environmental

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
of newly developed tools.	<ul style="list-style-type: none"> - HNI: Workshop and seminar on guidance on environmental laws and regulations - HPG: Workshop, and broadcasting TV reportages - TT-HUE: Workshop, and simple water quality test, and clean-up events - HCMC: Workshop, clean-up events, and distribution of an introductory guidebook on environmental laws and regulations for enterprises - BRVT: Workshop, and broadcasting of TV films 		<p>workshops for enterprises were organized in HNI and HCMC. Environmental workshops for the public and stakeholders were organized in HPG, TT-HUE and BRVT.</p> <ul style="list-style-type: none"> • In the second year, the following activities were carried out utilizing the tools developed: awareness workshops for enterprises in HPG and TT-HUE, clean-up events for residents in TT-HUE and HCMC, and production of signboard and TV reportage in HPG.
4-4 The results of the capacity assessment targeting DONRE officers show improvement, compared with the initial stage of the Project.	<ul style="list-style-type: none"> • Needs for capacity development are assessed at the initial stage of the Project. • Based on the assessment, capacity development plans are developed and environmental awareness activities are conducted. • Target DONRE officers are expected to implement a series of activities and show improvement in their capacity at the end of the Project. 	<p>The levels of the following capacities that were considered to be relatively lower than other capacities, and needed to be developed:</p> <ul style="list-style-type: none"> - Formulation of environmental awareness activity plan; - Identification of stakeholders and target group for environmental awareness activity; - Estimation and acquisition of budget for environmental awareness activity; - Evaluation of environmental awareness activity by setting indicator and monitoring method; - Report preparation of environmental awareness activity; and - Improvement of environmental awareness activity based on past activities. 	<ul style="list-style-type: none"> • The status of achievement was evaluated as completely achieved at the end of March 2013. • Needs assessment was conducted and the capacity development plans were developed in the first year. Environmental awareness activities, such as on-the-job training, were implemented in the first year. • Environmental awareness activities, such as on-the-job training, were implemented continuously in the second year. Besides, training on environmental awareness, such as off-the-job training, was conducted at each DONRE. The DONRE officers which attended the training improved basic knowledge and acquired skills on environmental awareness.

Source: JET

(8) Output 5 (WG 5): Environmental Information Management and Utilization

The component of Output 5 is to strengthen the capacity of management and utilization of water environmental information. Water environmental information such as monitoring data of river water or wastewater from factories is essential for the creation or enforcement of water environmental policy. In general, water environmental information is divided into two categories from the aspect of its utilization. That is, the first of is that utilized inside governmental sector and the second one is that utilized outside of governmental sector such as public awareness. Output 5 mainly focused on information (1) Information from DONRE to MONRE and (2) Information utilized within MONRE. The table below shows a comparison of the achievements and indicators set in the PDM.

Table 7 Achievements of Output 5 (WG 5): Environmental Information Management and Utilization

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
Output 5: Environmental Information Management and Utilization			
5-1 MONRE and the target DONREs realize more smooth communication between the both than before in terms of frequency and contents	For making the relevant people understood more, based on the project results, it is expected to disseminate the better way of collecting, managing and utilizing the water environmental information and bring it into practice.	(1) MONRE was collecting the necessary information by issuing the official written letter to DONRE. (2) There was no regular information collection system between MONRE and DONRE except CEM and ID. (3) Both MONRE and DONRE seemed not fully aware the necessity of the information collection, management and utilization for their duties.	(1)The survey to understand the current status of water environmental information collection, management and utilization has been done by the end of 2012. (2)Throughout the surveys, the expert meeting and the workshop with MONRE and DONRE, it became clear for the relevant departments in MONRE and DONRE that current communication is neither sufficient nor smooth and need to be improved.
5-2 The draft of "water environmental information procedure in terms of collection, management and utilization (including dissemination)" is prepared	(1)Based on the Project results, the legal procedure to send the information from DONRE to MONRE on regular basis should be re-arranged. (2)In order to mobilize the draft procedure, it would be needed to issue a circular and disseminate it.	(1) There was no guideline regarding water environmental information collection, management and utilization (2) There were no existing nationwide uniformed formats (except CEM and ID) to collect information. (3) There was no regular information collection mechanism (except CEM and ID)	(1)Based on the survey results, the draft procedure in terms of collection, management and utilization was made (2) By referring to Japanese experiences, 10 formats for regular reporting from DONRE to MONRE were developed. (2)The 10 reporting formats were examined and revised through the trial in Hai Phong DONRE (3)Based on the trial, the workshop was conducted and the draft of "water environmental information procedure in terms of collection management and utilization" including the 10 regular reporting formats was prepared

Source: JET

1.4 Lessons Learned

(1) Action Plans Prepared by DONREs

The preparation of the draft action plan for Output 2 by each target DONRE during the project design stage was one significant input for the actual implementation of the Project. This action plan urged the participation of frontline staff of DONREs in the Project, guided the preparation of the work plan with C/Ps, and contributed to setting the actual and concrete targets of the Project. It should be noted that the same effects could have been expected for Outputs 3 and 4 if such action plans had been considered also by C/Ps in advance. Therefore, this successful approach should be repeated in similar technical assistance projects in the future.

(2) Capability of VEA/MONRE to Coordinate with DONREs

The Project consisted of five components ranging from policy matters in the departments of VEA/MONRE to daily routine works in DONREs. Moreover, the Project targeted five DONREs which had different capacity levels and capacity development directions. This situation brought about fairly difficult and complicated coordination works to ISD/VEA. The efforts of ISD/VEA have been highly appreciated. If ISD/VEA had been vested with more powers and resources to solve issues, such as project approval, preparation of counterpart fund, provision of office space for the Short-term Expert Team (SET), and the approval of the A4 form for equipment procurement, project implementation should have been smoother.

(3) Planning Stage of the Project

The SET was assigned to the Project around a half year after the arrival of the Long-term Expert Team (LET). This made it difficult for LET and units under MONRE to have detailed discussions with participating DONREs on how to implement the Project together in the early phase of the Project, and

how to integrate the five components of the Project, especially Outputs 1 and 3. As a matter of fact, it was after the arrival of SET and the commencement of the DONRE-led components (Outputs 2, 3 and 4) in April 2011 that the inception report was finally agreed at the second JCC meeting and all the project activities started to move smoothly. The MONRE-led and DONRE-led components of the Project could have been started at the same time from the initial planning stage of the Project.

(4) Project Period for Achievement

In general, the achievement level of a technical assistance project accelerates rapidly from the third year of the project period. However, the actual period of Project implementation given to the DONRE-led components was less than 2.5 years. It means that many activities had to be stopped before entering the period of accelerated achievement, leaving the important activities, such as further capacity development based on experiences gained, integrating the outcomes of the five project components, and disseminating important outcomes to other DONREs in Vietnam, largely to the hands of the Vietnamese side without support by JET. This is another reason why the MONRE-led and DONRE-led components should have been started at the same time, allowing full use of the three year project period.

(5) Target Stakeholders of Output 4

The component of Output 4 on capacity development for enhancing environmental awareness has targeted largely C/Ps belonging to each DONRE. Considering that much wider stakeholders are involved in water environmental management, the target stakeholders, however, should not have been limited only to DONRE staff, but extended to other organizations such as the Youth Union, Women's Union, and Farmers Union. The capacity development of these stakeholder groups in total could have achieved more effective and efficient outcomes, and generated more powerful impacts to pollution sources.

1.5 Recommendations

(1) Institutionalizing and Extending the Outcomes of the Project

The Project produced many useful outcomes, such as knowledge on basic framework for policy development, systematic monitoring plans that became models for other monitoring plans, practical approaches to improve QC in the laboratory, PSIs for water pollution management, inspectors' knowledge on wastewater management, outline of strategies to improve water pollution control, various tools for awareness building, and template to collect information from DONREs to MONRE for policy improvement. All organizations are strongly encouraged to take further steps to make such outcomes part of their own capacities, and extend them to those individuals and organizations which did not participate in the Project. These include junior or new members of organizations, district and commune level officers, and DONREs in other provinces.

(2) Strong Commitment and Leadership of Provincial Peoples Committee (PPC)

As the Project started to produce various achievements, it became clearer that the strong commitment and leadership of PPCs in target provinces are crucial to improve enforcement of environmental regulations by DONREs. This is because their commitment and leadership drive the C/Ps to acquire more knowledge and skills through the project activities, and ensure actual and sustainable implementation of the measures obtained through the Project. Similarly, directions and guidance of PPCs are important to other provincial departments, Industrial Zone Management Board, district and commune level governments, industries, and the general public. They are important stakeholders involved in water environmental management. This is why the PDM of the Project explicitly stated that "PPCs in target provinces make commitments to cooperate with the Project" as an important assumption. PPCs are encouraged to give further support to DONREs as well as other stakeholders to improve water environmental management in each province.

(3) Training in Japan

In the Project, JICA provided three training courses in Japan in February-March 2012, in August 2012 and in April 2013. These training courses became valuable opportunities for the Vietnamese C/Ps not only to learn how water environmental management has evolved in Japan but also to exchange experiences and opinions among the participants from various units under MONRE, five DONREs, and PPCs. It is recommended that similar training programs in Japan be provided widely to C/P organizations as an integral part of similar technical assistance projects in the future.

(4) Involvement of Directors

In Output 1, the most of directors from each relevant department were not directly involved as main focal points in the activities. However, considering the fact that those directors are the decision makers, it is necessary to arrange well the working structures that all the outputs would surely be conveyed to the directors.

(5) Tasks of ISD

The working tasks of ISD (the main C/P) were overloaded. As a result, the logistic arrangements seemed quite ineffective and time consuming. The better way to manage projects should be considered.

(6) Physical Distance of Working Places

The working places between the experts and C/Ps (mainly each relevant department in MONRE for Output 1) were physically distant. Therefore it caused lack of intensive cooperation, while, at the same time, the Japanese experts for Output 1 and 5 were only two people. The implementing structure for each output should be well considered before a project starts.

*The Project for Strengthening Capacity of Water
Environmental Management in Vietnam*

Project Completion Report

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Contributors

Long-term Expert Team (LET): Chapters 1, 3, 4 and 5 and Sections 2.1 and 2.8

Short-term Expert Team (SET): Chapters 1, 3, 4 and 5 and Sections 2.2 to 2.7

Attachments

- Attachment 1: Record of Discussions
- Attachment 2: Minutes of Receipt of Equipment/Assets
- Attachment 3: Minutes of Joint Coordination Committee Meetings (No.1-6)
- Attachment 4*: Handbook for Improving Monitoring Performance
- Attachment 5*: Handbook for Improving Performance of Inspection
- Attachment 6*: Manual for Procedures for Development of Pollution Source Inventory
- Attachment 7*: Pollution Source Maps
- Attachment 8*: Outline of Improvement Plan for Water Pollution Control in Hanoi City
- Attachment 9*: Reference for Water Environmental Awareness Activities

* Note: Attachments 4 to 9 are available only in electronic version and are enclosed in the DVD.

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List of Abbreviations

AAS	Atomic Absorption Spectrometer
ADB	Asian Development Bank
AP	Action Plan
BoA	Bureau of Accreditation
BOD	Biochemical Oxygen Demand
BRVT	Ba Ria Vung Tau
CA	Capacity Assessment
CD	Capacity Development
CEID	Center of Environmental Information and Data
CEM	Center for Environmental Monitoring (in VEA)
CEMA	Center for Monitoring and Analysis (in Ho Chi Minh City)
CEMAB	Center for Environmental Monitoring and Analysis of Ba Ria Vung Tau
CENMA	Center for Environmental and Natural Resources Monitoring and Analysis (in Hanoi)
CETAC	Center for Environment Training and Communication
CETHCM	Centre of Environment and Technology in Ho Chi Minh
COD	Chemical Oxygen Demand
CP	Cleaner Production
C/P	Counterpart
CWWTF	Central Wastewater Treatment Facilities
DAEIA	Department of Appraisal and Environmental Impact Assessment
DANETC	Da Nang Environmental Technology Center
DARD	Department of Agriculture and Rural Development
DB	Database
DDT	Dichloro-Diphenyl-Trichloro-Ethane
DM	Discussion Meetings
DO	Dissolved Oxygen
DOIT	Department of Industry and Trade
DONRE	Department of Natural Resources and Environment
DQO	Data Quality Objectives
DWRM	Department of Water Resource Management
EC	Electric Conductivity
EIA	Environmental Impact Assessment
EMD	Environmental Management Division (in HCMC DONRE)
EPA	Environmental Protection Agency
EPC	Environmental Protection Commitment
EPP	Environmental Protection Project
GC	Gas Chromatography
GC-ECD	Gas Chromatography - Electron Capture Detector
GC/MS	Gas Chromatography/ Mass Spectrometry
GIS	Geographic Information System
GOJ	Government of Japan
GOV	Government of Vietnam
HACEM	Hai Phong Center for Environmental Monitoring
HEPA	Ho Chi Minh City Environmental Protection Agency
HCMC	Ho Chi Minh City
HPG	Hai Phong
HNI	Hanoi
Ic/R	Inception Report
ICD	International Cooperation Department
ID	Inspection Department
IDL	Instrument Detection Limits
ISEM	Institute of Science for Environmental Management
ISD	Department of International Cooperation and Science, Technology (in VEA)
ISO	International Organization for Standardization
IWCR	Industrial Wastewater Compliance Rating
IWMR	Industrial Wastewater Management Rating
IWTP	Industrial Wastewater Treatment Plant
IZMB	Industrial Zone Management Board
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
JET	JICA Expert Team
LEP	Law on Environmental Protection
LET	Long-term Expert Team
MDL	Method Detection Limit
M/M	Minutes of Meetings

MONRE	Ministry of Natural Resources and Environment
MLs	Method Quantification Limits
MPI	Ministry of Planning and Investment
NGO	Non-governmental Organization
OJT	On-the-Job Training
ORP	Oxidation Reduction Potential
PBDEs	Polybrominated Diphenyl Ethers
PC	People's Committee
PCD	Pollution Control Department
PC/R	Project Completion Report
PDCA	Plan-Do-Check-Act
PDM	Project Design Matrix
PMB	Project Management Board
PO	Plan of Operation
POPs	Persistent Organic Pollutants
PPC	Provincial People's Committee
PPP	Polluter Pay Principle
P/R	Progress Report
PSD	Pollution Source Database
PSI	Pollution Source Inventory
PSM	Pollution Source Map
PST	Pollution Source Table
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
QCVN	Vietnamese National Technical Regulation
R/D	Record of Discussion
RM	Regular Meetings
SEA	Strategy Environmental Assessment
SET	Short-term Expert Team
SOPs	Standard Operating Procedures
SS	Suspended Solid
STAMEQ	Directorate for Standards, Methodology, and Quality
TDS	Total Dissolved Solid
TCVN	Vietnamese National Standard
TSS	Total Suspended Solid
TT-HUE	Thua Thien-Hue
UV-VIS	Ultra Violet-Visible Detector
VAST/IET	Vietnam Academy of Science and Technology/Institute of Environmental Technology
VCCI	Vietnam Chamber of Commerce and Industry
VEA	Vietnam Environment Administration
VEPF	Vietnam Environmental Protection Fund
VILAS	Vietnam Laboratory Accreditation Scheme
VNCPC	Vietnam National Cleaner Production Center
WEIND	Waste Management and Environment Improvement Department
WG	Working Group
WP	Work Plan
WQD	Water Quality Database
WQES	Water Quality Environmental Standard
WQI	Water Quality Index
WS	Workshop
WWTP	Waste Water Treatment Plant

CHAPTER 1 GENERAL

1.1 Introduction

1.1.1 Background of the Project

With rapid industrialization and urbanization in recent years, water qualities of rivers, lakes, and canals in Hanoi, Ho Chi Minh, and other cities in Vietnam are deteriorating due to the discharge of untreated industrial and domestic wastewaters. In order to deal with such problems, the Government of Vietnam (GOV) has taken a series of steps to strengthen its pollution control, such as amendment of the Law on Environmental Protection in 2005, revisions of industrial wastewater standard and environmental standards on water, air, and solid waste, enactment of Decree No.67/2003/ND-CP to mandate wastewater fee as an economic disincentive to decrease pollution loads, and enactment of Decision No. 64/2003/QĐ-TTg to control pollution in selected industries with environmental priorities.

Despite such efforts, enforcement of environmental regulations is still lagging behind due to the limited resources available for those in charge of enforcement in the Department of Natural Resources and Environment (DONRE), and also limited support from regulated communities and civil society to promote environmental protection.

Under these circumstances, the GOV has requested technical assistance from the Government of Japan (GOJ) to strengthen the administrative capacities for water environmental management. Subsequently, the GOV represented by Japan International Cooperation Agency (JICA), which is an official agency in charge of Japanese international cooperation, discussed and agreed to implement The Project for Strengthening Capacity of Water Environmental Management in Vietnam (hereinafter referred to as the Project) in accordance with the Record of Discussions (R/D) and minutes of meetings (M/M) signed by the GOV and JICA on 8 January 2010 (shown in Chapter 1.2.1).

1.1.2 Overall Structure of the Project

(1) Purpose of the Project

In accordance with the R/D, the Project has the “Project purpose”, which would be achieved through the Project, and the “overall goal”, which would be achieved by utilizing the achievements of the Project within a few years after its completion, as follows:

- (i) Project purpose: Capacity of MONRE and target DONREs regarding water environmental management is strengthened; and
- (ii) Overall goal: Enforcement capacity of MONRE and DONREs on water environmental management is strengthened.

(2) Work Flow

The work flow of the Project updated in March 2013 is shown in Figure 1.1-1.

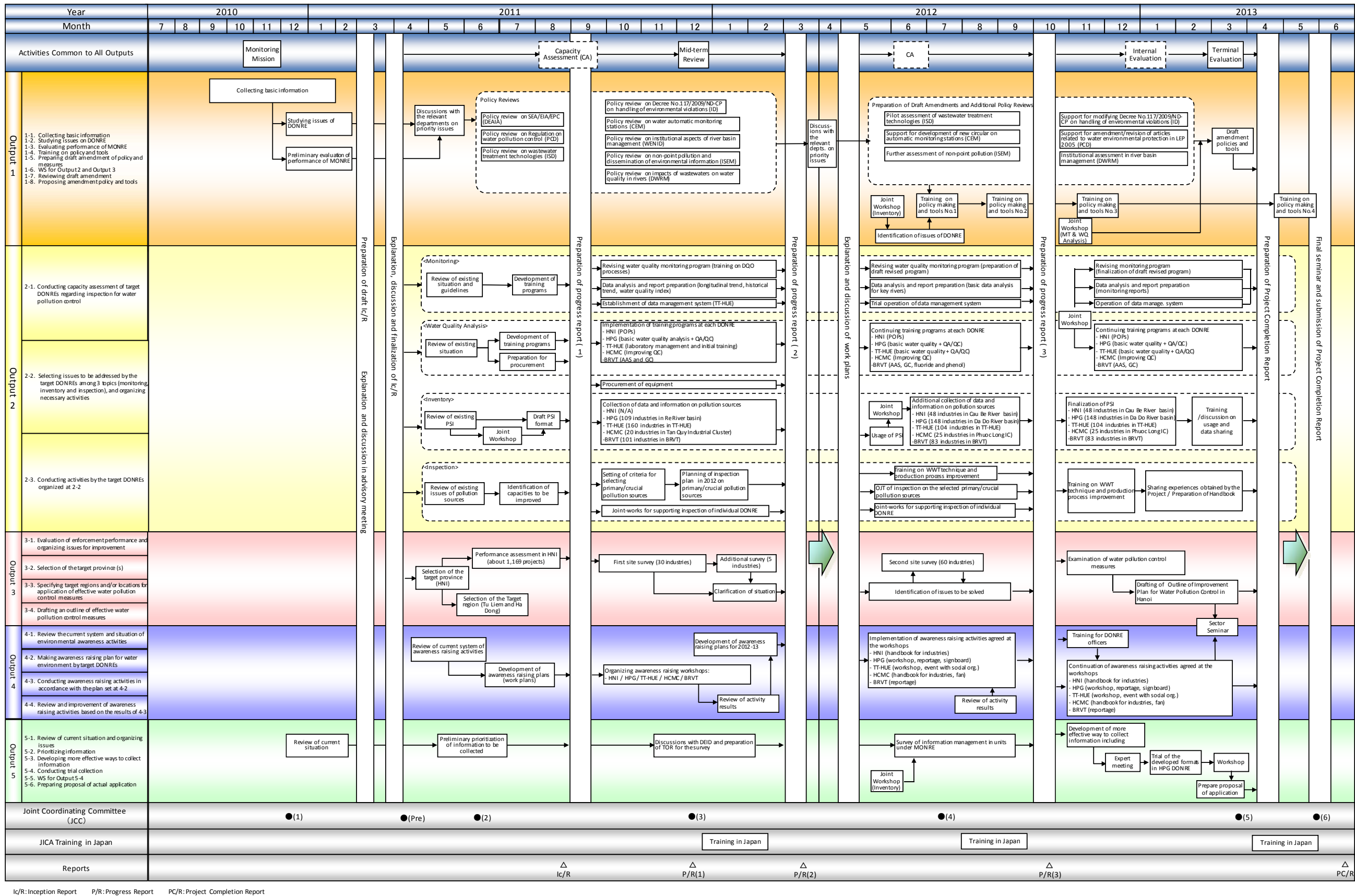


Figure 1.1-1 Work Flow of the Project

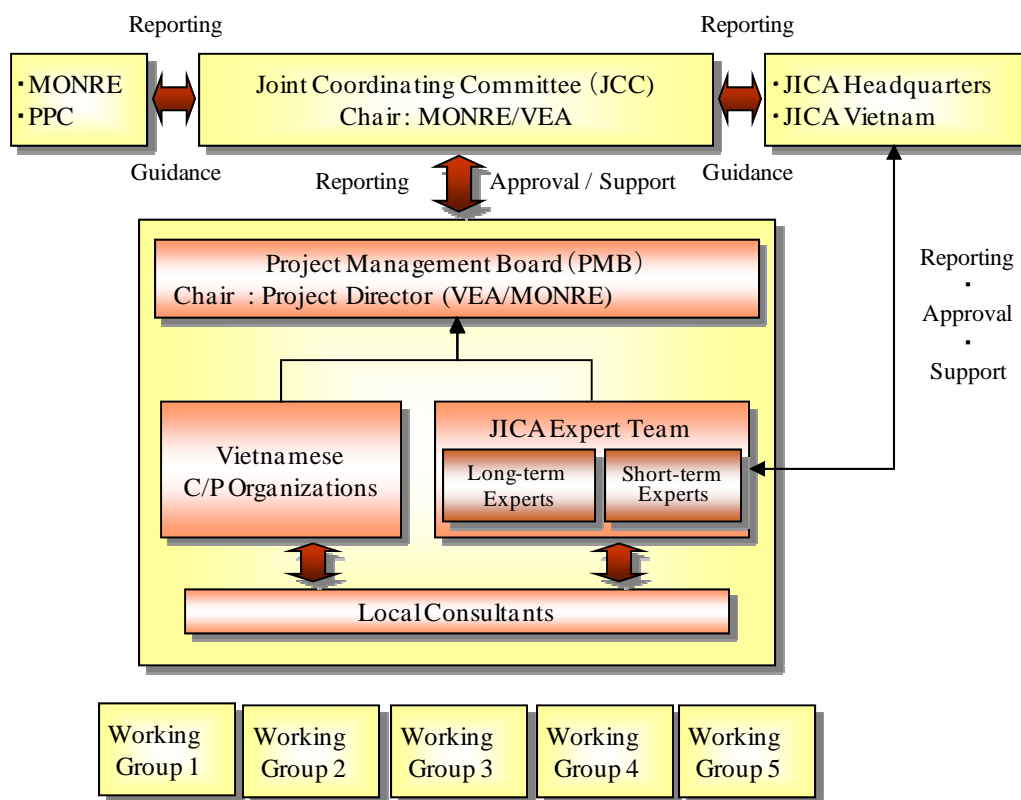
1.1.3 Project Area

The Project area covers Hanoi City, Hai Phong City, Thua Thien-Hue Province, Ho Chi Minh City, and Ba Ria-Vung Tau Province as shown in the cover page of this report.

1.1.4 Organization of the Project

(1) Overall Implementation Structure

Figure 1.1-2 shows the implementation structure of the Project. The overall direction of the Project was coordinated by the Joint Coordinating Committee (JCC). Under the JCC, the Project Management Board (PMB) was established to manage project activities and to report work progress to JCC. The project activities were carried out by Vietnamese counterpart (C/P) organizations, which established working groups (WGs) to implement the activities. The JICA Expert Team (JET) provided technical support and guidance to the C/P organizations, and facilitated implementation of the project activities. Details of the JCC, PMB, WGs, C/Ps, relevant departments in MONRE, JET, and local experts are explained below.



Source: JET

Figure 1.1-2 Project Implementation Structure

(2) JICA Expert Team

The JICA Expert Team (JET) comprises teams of JICA long-term experts (LET) and JICA short-term experts (SET) as listed in Table 1.1-1. The assignment schedule of JET is presented in Table 1.1-2. Among the five outputs of the Project, the LET was in charge of Output 1 and Output 5, and the SET was in charge of Outputs 2, 3, and 4.

Table 1.1-1 JICA Expert Team

Team	Name	Position
Long-term Experts (LET)	Mr. Shigenobu Obayashi	Leader/Water Environmental Policy
	Ms. Saori Ushimi	Coordinator/Water Environment Management
Short-term Experts (SET)	Mr. Yoichi Iwai	Chief Advisor
	Mr. Itaru Okuda	Deputy Chief Advisor/Water Environmental Management
	Mr. Derek Johnson	Water Environmental Monitoring (1)
	Mr. Yoshiharu Shirane	Water Quality Analysis/QAQC (1)
	Mr. Shinsuke Sato	Pollution Source Inventory (1)
	Mr. Hiroyuki Ooi	Pollution Source Inspection (1)
	Mr. Tomoyuki Hosono	Environmental Awareness (1)
	Mr. Tadashi Shoji	Water Pollution Measure (1)
	Mr. Shunsuke Hieda	Water Environmental Monitoring (2)
	Mr. Yoshiki Yamamoto	Water Quality Analysis/QAQC (2)
	Mr. Naoki Hosotani	Pollution Source Inventory (2)
	Mr. Kengo Naganuma	Pollution Source Inspection (2)
	Mr. Masahiro Ibayashi (- March 2012)	Environmental Awareness (2)
	Mr. Shinichi Fukasawa (April 2012 -)	
	Mr. Yasuharu Matayoshi	Water Pollution Measure (2)
	Ms. Tomoe Takeda	Coordinator (1)/Water Quality Analysis/QAQC Assistant
	Mr. Hiroshi Nakano	Coordinator (2)/Workshop Assistance/Pollution Source Inventory (3)

Source: JET

Table 1.1-2 Assignment Schedule of the JICA Expert Team (JET)

No.	Position	Name	2011												2012												Jun. 2010 ~ Feb. 2011	Mar. 2012 ~ Mar. 2013	April 2012 ~ Jun. 2013	Total																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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1	Leader/Water Environmental Policy	Shigenobu Obayashi	Since Jan. 2010																								9.00	13.00	15.00	37.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
2	Coordinator/Water Env. Management	Soori Ushimi	Since Aug. 2010																								7.00	13.00	15.00	35.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
3	Chief Advisor	Yoichi Iwai																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												</

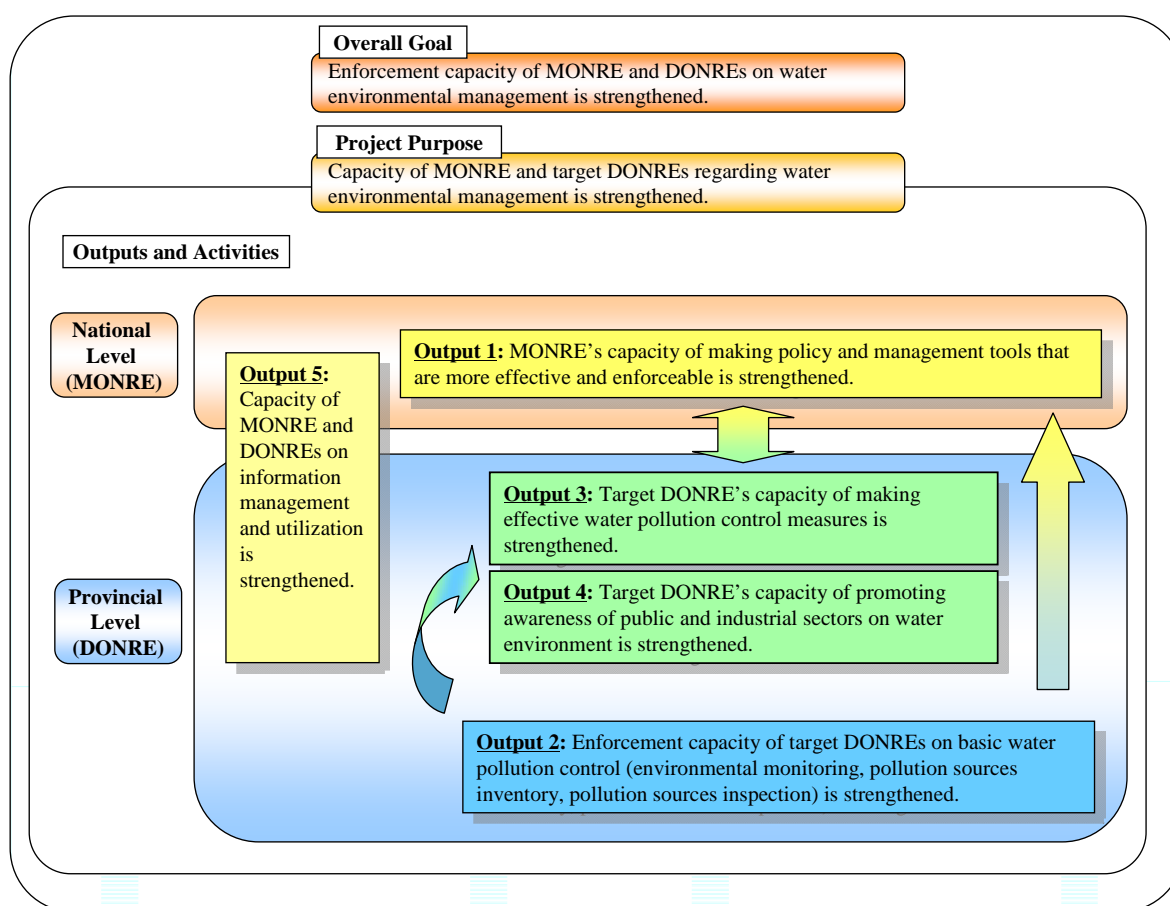
1.2 Project Design Matrix (PDM) and Plan of Operation (PO)

1.2.1 Original PDM

Figure 1.2-1 summarizes the overall framework of the Project in accordance with the PDM which was originally agreed between the GOV and JICA as part of the R/D, and revised further by both parties in August 2012.

In order to achieve the project purpose and overall goal, the PDM set five outputs. Output 1 is designed to strengthen MONRE's capacity to develop policies and policy tools for water environmental management. Outputs 2 to 4 aim to strengthen DONREs' capacities to enforce such policies in the five local cities and provinces of Hanoi City, Hai Phong City, Thua Thien-Hue Province, Ho Chi Minh City, and Ba Ria-Vung Tau Province; and Output 5 aims to strengthen the activities of MONRE and DONREs through information sharing. To achieve these outputs, the PDM also defined, for each output, the indicators of achievements, means of verification of the achievements, important assumptions, specific activities to be implemented, and inputs to the Project.

The Plan of Operations (PO) supplements the PDM, and describes the schedule of each activity in the PDM. In accordance with the PO, the project activities started in August 2010 and ended in June 2013.



Source: Prepared by JET based on R/D and M/M agreed on 8 January 2010

Figure 1.2-1 Overall Structure of PDM

The original PDM and PO are shown in Table 1.2-1 and Table 1.2-2, respectively.

Table 1.2-1(1) Original Project Design Matrix

PROJECT DESIGN MATRIX (PDM)

Project Name : The Project for Strengthening Capacity of Water Environmental Management in Viet Nam
Duration of Project : 2010–2013 (3 years)
Project Target Area : Hanoi, Hai Phong, Thua Thien-Hue, Ho Chi Minh, Ba Ria-Vung Tau
Target Group : Ministry of Natural Resources and Environment (MONRE) and target Departments of Natural Resources and Environment (DONREs)

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Enforcement capacity of MONRE and DONREs on water environmental management is strengthened.	<ol style="list-style-type: none"> The rate of levying environmental protection charge for waste water increases. The rate for industries to follow orders / administrative guidance increases. The rate for industries to comply with the effluent standards increases. 	Data at MONRE and DONREs	Drafted amendments that would be developed in the Project are officially issued.
Project Purpose Capacity of making policy and management system of MONRE and enforcement capacity of target DONREs regarding water environmental management is strengthened.	<p>Evaluation results show improvement, compared with the initial stage of the project as follows:</p> <ol style="list-style-type: none"> MONRE conducts self-evaluation on their own capacity of policy and system making regarding water environmental management; and 2) target DONREs conduct self-evaluation on their own enforcement capacity of water environmental management. 	Questionnaire survey for MONRE and target DONREs at the initial, mid-term, and final stage of the project	The results of activities and lessons are properly extended and applied to other DONREs nationwide.
Outputs <ol style="list-style-type: none"> MONRE's capacity of making policy and management tools that are more effective and enforceable is strengthened. Enforcement capacity of target DONREs on basic water pollution control (environmental monitoring, pollution sources inventory, pollution sources inspection) is strengthened. Target DONRE's capacity of making effective water pollution control measures is strengthened. Target DONRE's capacity of promoting awareness of public and industrial sectors on water environment is strengthened. Capacity of MONRE and DONREs on information management 	<ol style="list-style-type: none"> 1-1 More than XX draft amendments to improve water environmental management policy and systems are developed among XX issues extracted as necessary issues to improve. 1-2 The amendments are received and authorized by MONRE. 1-3 The process and methods for making more effective policies and systems are improved, compared 	<ol style="list-style-type: none"> 1-1 Hearing from MONRE 1-2 Hearing from MONRE 1-3 Working products from Activity 1-3 and follow-up survey 	<p>PPCs at target provinces make commitments to cooperate the project.</p> <p>Related organizations such as environmental police, DOIT and etc., cooperate the project.</p>

Table 1.2-1(2) Original Project Design Matrix

utilization is strengthened.	<p>with the initial stage of the project.</p> <p>(Monitoring) 2-1-1 The extent of fulfillment in required items is increased, which are the number of parameters, monitoring points, and frequencies etc., in accordance with monitoring guidelines.</p> <p>2-1-2 Accuracy of monitoring is improved.</p> <p>(Inventory) 2-2-1 Primary water pollution sources are duly filled in the revised inventory formats.</p> <p>2-2-2 Information on the inventory is adequately added and/or updated.</p> <p>(Inspection) 2-3-1 The results of the capacity assessment (individual and organization) show improvement, compared with the initial stage of the project.</p> <p>2-3-2 Among the targets of inspections, the ratio to capture the primary/crucial pollution sources is increased.</p> <p>2-3-3 The implementation rate of inspection on the basis of annual working plan is increased.</p> <p>2-3-4 The number of companies/organizations that follows improvement orders and/or administrative guidance is increased.</p> <p>3-1 Group(s) that work specifically on studying and making water pollution control measures are established and continued its activities in the target DONRE(s).</p> <p>3-2 The target DONRE(s) makes reports more than XX times a year to PPC regarding the progress and contents of the draft outline for effective water pollution control measures.</p>	<p>2-1-1 Monitoring reports 2-1-2 Reports of monitoring analysis and evaluation results on Activity 2-3-5</p> <p>2-2-1 Inventory 2-2-2 Inventory</p> <p>2-3-1 Results of capacity assessment 2-3-2 Inspection reports 2-3-3 Inspection plans and Inspection reports 2-3-4 Reports on improvement orders and administrative guidance</p> <p>3-1 Hearing from target DONREs 3-2 Reports to PPC and/or Project activity report 3-3 Outline of draft countermeasure and hearing</p>	
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Table 1.2-1(3) Original Project Design Matrix

		<p>3-3 The draft outline for effective water pollution control measures is submitted to PPC.</p> <p>4-1 The results of questionnaire survey to public and industries on environmental awareness shows improvement, compared with the initial stage of the project (consider the environmental awareness events as opportunities to conduct surveys)</p> <p>4-2 Tools to promote environmental awareness targeting public and industries are developed.</p> <p>4-3 Environmental awareness events are conducted, making use of newly developed tools.</p> <p>4-4 The implementation rate of events on the basis of annual working plan is increased.</p> <p>5-1 MONRE and the target DONREs realize more smooth communication between the both than before in terms of frequency and contents (Questionnaire survey at the initial stage and final stage of the project period is required).</p> <p>5-2 A working group to study the feasibility to apply the ways and means is established in MONRE.</p>	<p>4-1 Questionnaire survey (report showing the results)</p> <p>4-2 Tools to promote environmental awareness</p> <p>4-3 Record of event implementation</p> <p>4-4 Implementation plans and record</p> <p>5-1 Questionnaire survey</p> <p>5-2 Hearing from MONRE</p>	
	<p>Activities</p> <p>1) MONRE's capacity of making policy and management tools that are more effective and enforceable is strengthened.</p> <p>1-1 Collect basic information on water environmental management policy and tools at national level, and analyze as well as organize the necessary issues to improve.</p> <p>1-2 Study issues that target DONREs are faced, regarding implementation of water environmental management policy and tools.</p> <p>1-3 Based on the results of 1-1 and 1-2, review water environmental management policy and tools and conduct evaluation regarding effectiveness and enforceability of these water environmental policy and tools with focus on pollutions from industries.</p> <p>1-4 Train staff of MONRE and DONREs on studying, developing, reviewing, and revising policy and management tools.</p>	<p>Inputs</p> <p>Japanese side</p> <p>1) Long term experts</p> <ul style="list-style-type: none"> - Project Leader/Water Environmental Policy - Water Environment Management / Project Coordinator <p>2) Short term experts</p> <ul style="list-style-type: none"> - Water Environmental Policy at provincial level - Environmental Awareness - Information Management <p>3) Short term expert team(s)</p> <ul style="list-style-type: none"> - Leader - Water Environmental Management /Sub-Leader - Environmental Monitoring (1, 2) 		<p>Pre-conditions</p> <p>Vietnamese government keeps</p>

Table 1.2-1(4) Original Project Design Matrix

<p>1-5 Prepare the draft amendment on water environmental management policy and tools for their improvement.</p> <p>1-6 Organize workshops for sharing and collecting comments and opinions based on implementing activities in Output 2 and Output 3.</p> <p>1-7 Review the draft amendment prepared in 1-5.</p> <p>1-8 Propose the amendment on water environmental management policy and tools.</p> <p>2) Enforcement capacity of target DONREs on basic water pollution control (environmental monitoring, pollution sources inventory, pollution sources inspection) is strengthened.</p> <p>2-1 Conduct capacity assessment of target DONREs regarding enforcement of basic water pollution control.</p> <p>2-2 Select main component(s) from the list below and also select activities under the selected component(s) for each DONRE, and prepare activities plans for each DONRE.</p> <p>2-3 Conduct activities selected in 2-2 in each DONRE.</p> <p>【Component 1 Monitoring】</p> <p>C1-1 Review water quality monitoring guidelines/manuals⁽¹⁾.</p> <p>C1-2 Based on above guidelines/manuals (revised if necessary), prepare/improve a monitoring plan, taking into consideration of regional characters at target DONREs.</p> <p>C1-3 Implement regular monitoring in accordance with the plan above.</p> <p>C1-4 Conduct training on water quality monitoring including quality control for improving reliability of monitoring.</p> <p>(note: change training contents based on situations of target DONREs)</p> <p>C1-5 Interpret and evaluate results of monitoring and feedback to the monitoring plan.</p> <p>⁽¹⁾Guidelines/manuals prepared by the Study for Water Environment Management on River Basins and the Project for Enhancing Capacity of Vietnamese Academy of Science and Technology in Water Environment Protection Phase II are also included.</p> <p>【Component 2 Inventory】</p> <p>C2-1 Conduct capacity assessment of target DONREs regarding pollution sources inventory.</p> <p>C2-2 Review and modify existing inventory formats based on the current conditions of target DONREs.⁽²⁾</p> <p>C2-3 Conduct inventory survey with the revised inventory formats.</p> <p>C2-4 Organize collected information on main pollution sources.</p> <p>C2-5 Regularly conduct inventory survey and add/update information</p>	<ul style="list-style-type: none"> - Water Quality Analysis/QAQC (1, 2) - Pollution Sources Inventory (1, 2) - Pollution Sources Inspection (1, 2) - Environmental Education (1, 2) 3 <p>4) Workshop (overall : X time/year in Hanoi, regional: XXtime x 3 places (north, middle, south)</p> <p>5) Training in Japan : X time/ year (for DONRE & MONRE)</p> <p>6) Equipment : minimum equipment necessary for project activities</p> <p>7) Local Consultants</p> <p>Vietnamese side</p> <p>1) Counterpart MONRE : Output 1, 3 & 5 DONRE : Output 2, 3, 4 & 5</p> <p>2) Project Office Space at MONRE and each DONRE</p> <p>3) Necessary operation costs</p>	<p>the significance of water environmental protection within the governmental policies and strategies.</p> <p>MONRE and target DONREs assign counterpart personnel.</p>
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Table 1.2-1(5) Original Project Design Matrix

<p>on main pollution sources. (2)Inventory format prepared by the Study for Water Environment Management on River Basins is also included.</p> <p>【Component 3 Inspection】 C3-1 Conduct capacity assessment of target DONREs regarding inspection for water pollution control. C3-2 Review existing guidelines on inspection. C3-3 Prepare the inspection plan, based on the above guidelines (revised if necessary) and results of inventory survey. C3-4 Conduct training on more effective inspection. C3-5 Clarify criteria for taking administrative guidance and orders in accordance with the inspection results. C3-6 Conduct inspection based on activities C3-1 to C3-5 C3-7 Issue improvement order or administrative guidance based on activity C3-6 by target DONREs.</p> <p>3) Target DONRE's capacity of making effective water pollution control measures is strengthened. 3-1 Evaluate the enforcement performances of target DONREs on water pollution control, including the various systems implemented in the past, and organize issues for improvement. 3-2 Select target province(s) where the activities 3-3 and 3-4 would be conducted, after reviewing the feasibility of application of the draft amendment prepared in 1-5. 3-3 Specify target regions and/or industries for application of the effective water pollution control measures. 3-4 Draft an outline for effective water pollution control measures.</p> <p>4) Target DONRE's capacity of promoting awareness of public and industrial sectors on water environment is strengthened. 4-1 Review the current system and situation of environmental awareness activities at target provinces. 4-2 Make awareness raising plans for water environment to be conducted by target DONREs*. 4-3 Conduct awareness raising activities in accordance with the plan set at 4-2. 4-4 Review and improve awareness raising activities based on the result of 4-3.</p> <p>5) Capacity of MONRE and DONREs on information management and utilization is strengthened.</p>		
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Table 1.2-1(6) Original Project Design Matrix

<p>5-1 Review the current situation of information collection and management regarding water environment, and organize issues for improvement.</p> <p>5-2 Prioritize information necessary for MONRE and DONREs to come up with administrative measures and their implementation.</p> <p>5-3 Develop more effective ways and means (formats, reporting modes, frequencies, etc.) to collect information from all the DONREs.</p> <p>5-4 Conduct trials to collect information from target DONREs by use of the ways and means developed in 5-3, and utilize information at MONRE.</p> <p>5-5 Conduct workshops to share the results of 5-4.</p> <p>5-6 Prepare a proposal of actual application of the ways and means at MONRE.</p>		
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Table 1.2-2(1) Original Plan of Operation

Annex IV Plan of Operations		1st Year												2nd Year												3rd Year											
Project Name : The National Water Environment Management Capacity Strengthening Project Duration of Project: June, 2009 – June, 2012 (3 years)																																					
Project Target Area : Hanoi, Hai Phong, Thua Thien-Hue, Ho Chi Minh, Ba Ria-Vung Tau																																					
Target Group : Ministry of Natural Resources and Environment (MONRE) and target Departments of Natural Resources and Environment(DONREs)																																					
Output: MONRE's capacity of making policy and management tools that are more effective and enforceable is strengthened.																																					
Output & Activity Contents		Counterpart Personnels in charge												Japanese side input																							
1-1	Collect basic information on water environmental management policy and tools at national level, and analyze as well as organize the necessary issues to improve.																																				
1-2	Study issues that target DONREs are faced, regarding implementation of water environmental management policy and tools.	CPs of VEA												Long term expert+ Local consultant																							
1-3	Based on the results of 1-1 and 1-2, review water environmental management policy and tools, and conduct evaluation regarding effectiveness and enforceability of these water environmental policy and tools with focus on pollutants from industries.	CPs of VEA												Long term expert+ Local consultant																							
1-4	Train staff of MONRE and DONREs on studying, developing, reviewing, and revising policy and management tools.	CPs of VEA												Long term expert+ Local consultant																							
1-5	Prepare the draft amendment on water environmental management policy and tools for their improvement.	CPs of VEA												Long term expert																							
1-6	Organize workshops for sharing and collecting comments and opinions based on implementing activities in Output2 and Output 3.	CPs of VEA												Long term expert																							
1-7	Review the draft amendment prepared in 1-5.	CPs of VEA												Long term expert																							
1-8	Propose the amendment on water environmental management policy and tools	CPs of VEA																																			
Output2: Enforcement capacity of target DONREs on basic water pollution control (environmental monitoring, pollution sources inventory, pollution sources inspection) is strengthened.																																					
【Determination of activities in each DONRE on the basis of capacity assessment】																																					
2-1	Conduct capacity assessment of target DONREs regarding enforcement of basic water pollution control.	CPs of DONREs												Short term expert																							
2-2	Select main component(s) from the list below and also select activities under the selected component(s) for each DONRE, and prepare activities plans for each DONRE.	CPs of DONREs												Short term expert																							
2-3	Conduct activities selected in 2-2 in each DONRE.	CPs of DONREs												Japanese expert team																							
【Component 1 Monitoring】																																					
C1-1	Review water quality monitoring guidelines/manuals.	CPs of monitoring division of DONRE												Japanese expert team																							
C1-2	Based on above guidelines/manuals (revised if necessary), prepare/improve a monitoring plan, taking into consideration of regional characters at target DONREs.	CPs of monitoring division of DONRE												Japanese expert team																							
C1-3	Implement regular monitoring in accordance with the plan above.	CPs of monitoring division of DONRE												Japanese expert team																							
C1-4	Conduct training on water quality monitoring including quality control for improving reliability of monitoring. (note: change training contents based on situations of target DONREs)	CPs of monitoring division of DONRE												Japanese expert team																							
C1-5	Interpret and evaluate results of monitoring and feedback to the monitoring plan.	CPs of monitoring division of DONRE												Japanese expert team																							
【Component 2 Inventory】																																					
C2-1	Conduct capacity assessment of target DONREs regarding pollution sources inventory.	CPs of EPA of DONRE												Japanese expert team																							
C2-2	Review and modify existing inventory formats based on the current conditions of target DONREs.	CPs of EPA of DONRE												Japanese expert team																							
C2-3	Conduct inventory survey with the revised inventory formats.	CPs of EPA of DONRE												Japanese expert team																							
C2-4	Organize collected information on main pollution sources.	CPs of EPA of DONRE												Japanese expert team																							
C2-5	Regularly conduct inventory survey and add/update information on main pollution sources.	CPs of EPA of DONRE												Japanese expert team																							

Table 1.2-2(2) Original Plan of Operation

Annex IV Plan of Operations			Project Name : The National Water Environment Management Capacity Strengthening Project Duration of Project: June, 2009 – June, 2012 (3 years)																																				
			1st Year												2nd Year												3rd Year												
			6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
【 Component 3 Inspection】																																							
C3-1	Conduct capacity assessment of target DONREs regarding inspection for water pollution control.	CPs of DONREs													Japanese expert team																								
C3-2	Review existing guidelines on inspection.	CPs of DONREs													Japanese expert team																								
C3-3	Prepare the inspection plan, based on the above guidelines (revised if necessary) and results of inventory survey.	CPs of inspection division													Japanese expert team																								
C3-4	Conduct training on more effective inspection.	CPs of inspection division (Environmental police, monitoring division)													Japanese expert team																								
C3-5	Clarify criteria for taking administrative guidance and orders in accordance with the inspection results.	CPs of DONREs													Japanese expert team																								
C3-6	Conduct inspection based on activities C3-1 to C3-5.	CPs of inspection division (Environmental police, monitoring division)													Japanese expert team																								
C3-7	Issue improvement order or administrative guidance based on activity C3-6 by target DONREs.	CPs of DONREs													Japanese expert team																								
Output3. Target DONRE's capacity of making effective water pollution control measures is strengthened.																																							
3-1	Evaluate the enforcement performances of target DONREs on water pollution control, including the various systems implemented in the past, and organize issues for improvement.	CPs of DONRE of Hanol													Japanese expert team																								
3-2	Select the target province(s) where the activities 3-3 and 3-4 would be conducted, after reviewing the feasibility of application of the draft amendment prepared in 1-5.	CPs of DONRE of Hanol													Japanese expert team																								
3-3	Specify the target regions and/or industries for application of the effective water pollution control measures.	CPs of DONRE of Hanol													Japanese expert team																								
3-4	Draft an outline for effective water pollution control measures.	CPs of DONRE of Hanol													Japanese expert team																								
Output4. Target DONRE's capacity of promoting awareness of public and industrial sectors on water environment is strengthened.																																							
4-1	Review the current system and situation of environmental awareness activities at target provinces.	CPs of DONREs													Japanese expert team																								
4-2	Make awareness raising plans for water environment to be conducted by target DONREs.	CPs of DONREs													Japanese expert team																								
4-3	Conduct awareness raising activities in accordance with the plan set at 4-2.	CPs of DONREs													Japanese expert team																								
4-4	Review and improve awareness raising activities based on the result of 4-3.	CPs of DONREs													Japanese expert team																								
Output5. Capacity of MONRE and DONREs on information management and utilization is strengthened.																																							
5-1	Review the current situation of information collection and management regarding water environment, and organize issues for improvement.	CPs of MONRE													Long term expert- Local consultant																								
5-2	Prioritize information necessary for MONRE and DONREs to come up with administrative measures and their implementation.	CPs of MONRE and DONRE													Long term expert- shortterm expert																								
5-3	Develop more effective ways and means (formats, reporting modes, frequencies, etc.) to collect information from all the DONREs.	CPs of MONRE													Long term expert- shortterm expert																								
5-4	Conduct trials to collect information from target DONREs by use of the ways and means developed in 5-3, and utilize information at MONRE.	CPs of MONRE and DONRE													(Long term expert)																								
5-5	Conduct workshops to share the results of 5-4.	CPs of MONRE and DONRE													(Long term expert)																								
5-6	Prepare a proposal of actual application of the ways and means at MONRE.	CPs of MONRE													(Long term expert)																								

1.2.2 Revised PDM

Since some of the objectively verifiable indicators in the original PDM had been left vague, the members pointed out the need to revise the indicators to further clarify expected outputs at the second JCC meeting in June 2011. The issue was revisited at the first PMB meeting in November 2011 and the third JCC meeting in December 2011. Subsequently, a draft version of the revised PDM was presented at the fourth JCC meeting in June 2012. The members discussed and agreed the proposed revision in principle. The main changes are as follows:

- For Output 1 (policy and management tools), objectively verifiable indicators for capacities to evaluate existing water environmental policy and proposed amendments were added to the PDM;
- For Output 2-1 (monitoring), development of draft monitoring plans of key rivers and revision of the monitoring report of each DONRE were selected as the indicators and the activities were amended to reflect these changes;
- For Output 2-2 (inventory), information related to environmental compliance and pollution load to be covered in the pollution source inventory were specified in the indicators;
- For Output 2-3 (inspection), indicators were revised considering different stages of inspection activities;
- For Output 3 (water pollution control measures), the minimum number of meetings and the attendance rate were specified in the indicators;
- For Output 4 (environmental awareness), capacity assessment targeting DONRE officers was added to evaluate capacity improvement of DONRE; and
- For Output 5 (information management and utilization), it was decided that a draft of the water environmental information procedure will be prepared.

The PO was revised twice at the second and fourth JCC meetings as discussed below:

- At the second JCC meeting in June 2011, the PO of Output 1 was revised slightly in order to accommodate the schedule for new surveys to investigate the situation of policy instrumentation; and
- At the fourth JCC meeting in June 2012, the schedule of activities of DONRE components (Outputs 2 to 4) were revised to reflect the fact that the DONRE components did not start until April 2011 because the dispatching of SET members was delayed.

After confirmation with JICA, the PDM and PO were finalized in August 2012 as shown in Table 1.2-3 and Table 1.2-4, respectively.

Table 1.2-3(1) Project Design Matrix (PDM) (Modified PDM on 27 August 2012)

Project Name : The Project for Strengthening Capacity of Water Environmental Management in Viet Nam
Duration of Project : 2010 – 2013 (3 years)
Project Target Area : Hanoi, Hai Phong, Thua Thien-Hue, Ho Chi Minh and Ba Ria-Vung Tau
Target Group : Ministry of Natural Resources and Environment (MONRE) and target Departments of Natural Resources and Environment(DONREs)

Version : 2012/08/27

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Enforcement capacity of MONRE and DONREs on water environmental management is strengthened.	<ol style="list-style-type: none"> 1. The rate of levying environmental protection charge for waste water increases. 2. The rate for industries to follow orders / administrative guidance increases. 3. The rate for industries to comply with the effluent standards increases. 	Data at MONRE and DONREs	Drafted amendments that would be developed in the Project are officially issued.
Project Purpose Capacity of making policy and management system of MONRE and enforcement capacity of target DONREs regarding water environmental management is strengthened.	<p>Evaluation results show improvement, compared with the initial stage of the Project as follows:</p> <ol style="list-style-type: none"> 1) MONRE conducts self-evaluation on their own capacity of policy and system making regarding water environmental management; and 2) target DONREs conduct self-evaluation on their own enforcement capacity of water environmental management. 	Questionnaire survey for MONRE and target DONREs in order to evaluate capacity at the initial, mid-term, and final stage of the Project	The results of activities and lessons are properly extended and applied to other DONREs nationwide.
Outputs <ol style="list-style-type: none"> 1) MONRE's capacity of making policy and management tools that are more effective and enforceable is strengthened. 2) Enforcement capacity of target DONREs on basic water pollution control (environmental monitoring, pollution sources inventory, pollution sources inspection) is strengthened. 3) Target DONRE's capacity of making effective water pollution control measures is strengthened. 4) Target DONRE's capacity of promoting awareness of public and industrial sectors on water environment is strengthened. 5) Capacity of MONRE and DONREs on information management and utilization is strengthened. 	<ol style="list-style-type: none"> 1-1 Through the training, basic skills on making and how to evaluate existing water environmental policy are mastered. 1-2 Based on the evaluation results of existing policy through the training described in 1-1, basic skills on how to propose the amendment of water environmental policy are mastered. 1-3 More than three (03) draft amendments and/or draft new policies of water environmental management are 	<ol style="list-style-type: none"> 1-1 Hearing from MONRE 1-2 Hearing from MONRE 1-3 Hearing from MONRE and the 	<ol style="list-style-type: none"> PPCs at target provinces make commitments to cooperate with the Project. Related organizations such as environmental police, DOJIT and etc., cooperate with the Project.

Table 1.2-3(2) Project Design Matrix (PDM) (Modified PDM on 27 August 2012)

	developed and agreed between JICA and VEA/MONRE as a result of the Project.	number of draft amendments and/or new policies	
	1-4 The process and methods for making more effective policies and system development are improved, compared with initial stage of the Project	1-4 Working products from 1-3 and follow up survey	
	(Monitoring) 2-1-1 Draft revised monitoring plans of key rivers are prepared.	2-1-1 Draft revised monitoring plans	
	2-1-2 Draft revised monitoring reports in 2012 are prepared by DONREs, and shared with concerned organizations.	2-1-2 Draft Monitoring reports	
	2-1-3 Accuracy of monitoring is improved.	2-1-3 Results of capacity assessment	
	(Inventory) 2-2-1 Primary water pollution sources are duly filled in the revised inventory formats.	2-2-1 Inventory	
	2-2-2 Information on the inventory is adequately added and the following information becomes available for DONREs' pollution control activities: (i) information on compliance with respect to EIA, industrial wastewater fee, water discharge license, wastewater quality standard, sanction based on inspection; (ii) information on pollution load of COD.	2-2-2 Inventory	
	(Inspection) 2-3-1 The results of the capacity assessment on preparation work, on-site inspection, and follow-up work of inspection show improvement, compared with the initial stage of the Project.	2-3-1 Results of capacity assessment	

Table 1.2-3(3) Project Design Matrix (PDM) (Modified PDM on 27 August 2012)

	<p>2-3-2 Criteria for selecting primary/crucial pollution sources in each DONRE's inspection plan are clarified.</p> <p>2-3-3 Number of officers who have capacities for on-site inspection, such as field measurement and wastewater treatment facility checking, is increased.</p> <p>2-3-4 Number of officers who have capacities to assess situation of wastewater management of polluting industries and make recommendations for improvement from perspectives of giving administrative order and administrative guidance, is increased.</p> <p>3-1 A working group that works specifically on studying and making water pollution control measures are established and continued its activities, holding 10 times periodical meetings during the project period with more than 70% attendance rate.</p> <p>3-2 Progress status of Output 3 is reported to the Director of DONRE every 6 months.</p> <p>3-3 The draft outline for effective water pollution control measures is submitted to PPC through Director of DONRE.</p> <p>4-1 The results of questionnaire survey to target groups such as industries, district/commune/ward officers and social organizations, on environmental awareness show improvement, compared with the initial stage of the Project (consider the environmental awareness events as opportunities to conduct surveys)</p> <p>4-2 Tools (e.g., film for the public and introductory guidance for industries) to promote environmental awareness targeting public and industries are developed.</p>	<p>2-3-2 Document explaining the criteria for selecting industries to be inspected/checked.</p> <p>2-3-3 Training records</p> <p>2-3-4 Training records</p> <p>3-1 Hearing from target DONREs</p> <p>3-2 Reports to PPC and/or project activity report</p> <p>3-3 Outline of draft countermeasure and hearing</p> <p>4-1 Questionnaire survey (report showing the results)</p> <p>4-2 Tools to promote environmental awareness</p>	
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Table 1.2-3(4) Project Design Matrix (PDM) (Modified PDM on 27 August 2012)

<p>Activities</p> <p>1) MONRE's capacity of making policy and management tools that are more effective and enforceable is strengthened.</p> <p>1-1 Collect basic information on water environmental management policy and tools at national level, and analyze as well as organize the necessary issues to improve.</p> <p>1-2 Study issues that target DONREs are faced, regarding implementation of water environmental management policy and tools.</p> <p>1-3 Based on the results of 1-1 and 1-2, review water environmental management policy and tools and conduct evaluation regarding effectiveness and enforceability of these water environmental policy and tools with focus on pollutions from industries.</p> <p>1-4 Train staff of MONRE and DONREs on studying, developing, reviewing, and revising policy and management tools.</p> <p>1-5 Prepare the draft amendment on water environmental management policy and tools for their improvement.</p> <p>1-6 Organize workshops for sharing and collecting comments and opinions based on implementing activities in Output 2 and Output 3.</p> <p>1-7 Review the draft amendment prepared in 1-5.</p> <p>1-8 Propose the amendment on water environmental management policy and tools.</p> <p>2) Enforcement capacity of target DONREs on basic water pollution control (environmental monitoring, pollution sources inventory,</p>	<p>4-3 Environmental awareness events with target groups are conducted, making use of newly developed tools.</p> <p>4-4 The results of the capacity assessment targeting DONRE officers show improvement, compared with the initial stage of the Project.</p> <p>5-1 MONRE and the target DONREs realize more smooth communication between the both than before in terms of frequency and contents.</p> <p>5-2 The draft of "water environmental information procedure in terms of collection, management and utilization (including dissemination)" is prepared.</p>	<p>4-3 Record of event implementation</p> <p>4-4 Results of capacity assessment</p> <p>5-1 Questionnaire survey</p> <p>5-2 Draft water environmental information procedure</p>	
<p>Inputs</p> <p>Japanese side</p> <p>1) Long term experts</p> <ul style="list-style-type: none"> - Project Leader/Water Environment Policy - Water Environment Management / Project Coordinator <p>2) Short term experts</p> <ul style="list-style-type: none"> - Water Environmental Policy at provincial level - Environmental Awareness - Information Management <p>3) Short term expert team(s)</p> <ul style="list-style-type: none"> - Leader - Water Environmental Management /Sub-Leader - Environmental Monitoring (1, 2) - Water Quality Analysis/QAQC (1, 2) - Pollution Sources Inventory (1, 2) - Pollution Sources Inspection (1, 2) - Environmental Education (1, 2) <p>4) Workshops</p> <p>5) Training in Japan : 3 times during the course of the Project (for DONRE & MONRE)</p> <p>6) Equipment : minimum equipment necessary for project activities</p> <p>7) Local Consultants</p>			

Table 1.2-3(5) Project Design Matrix (PDM) (Modified PDM on 27 August 2012)

<p>pollution sources inspection) is strengthened.</p> <p>2-1 Conduct capacity assessment of target DONREs regarding enforcement of basic water pollution control.</p> <p>2-2 Select main component(s) from the list below and also select activities under the selected component(s) for each DONRE, and prepare activities plans for each DONRE.</p> <p>2-3 Conduct activities selected in 2-2 in each DONRE.</p> <p>【Component 1 Monitoring】</p> <p>C1-1 Review water quality monitoring guidelines/manuals⁽¹⁾.</p> <p>C1-2 Based on above guidelines/manuals (revised if necessary), laws and regulations in Vietnam, and international guidance, prepare/improve a monitoring plan, taking into consideration of regional characters at target DONREs.</p> <p>C1-3 Implement regular monitoring in accordance with laws and regulations in Vietnam.</p> <p>C1-4 Conduct training on water quality monitoring including quality control for improving reliability of monitoring.</p> <p>C1-5 Interpret and evaluate results of monitoring and feedback to the annual/biannual monitoring reports.</p> <p>⁽¹⁾Guidelines/manuals prepared by the Study for Water Environment Management on River Basins and the Project for Enhancing Capacity of Vietnamese Academy of Science and Technology in Water Environment Protection Phase II are also included.</p>	<p>Vietnamese side</p> <p>1) Counterpart</p> <p>MONRE : Output 1, 3 & 5</p> <p>DONRE : Output 2, 3, 4 & 5</p> <p>2) Project Office Space at MONRE and each DONRE</p> <p>3) Necessary operation costs</p>	
<p>【Component 2 Inventory】</p> <p>C2-1 Conduct capacity assessment of target DONREs regarding pollution sources inventory.</p> <p>C2-2 Review and modify existing inventory formats based on the current conditions of target DONREs.⁽²⁾</p> <p>C2-3 Conduct inventory survey with the revised inventory formats.</p> <p>C2-4 Organize collected information on main pollution sources.</p> <p>C2-5 Regularly conduct inventory survey and add/update information on main pollution sources.</p> <p>⁽²⁾Inventory format prepared by the Study for Water Environment Management on River Basins is also included.</p> <p>【Component 3 Inspection】</p> <p>C3-1 Conduct capacity assessment of target DONREs regarding inspection for water pollution control.</p>		

Table 1.2-3(6) Project Design Matrix (PDM) (Modified PDM on 27 August 2012)

<p>C3-2 Review existing guidelines on inspection. C3-3 Clarify criteria for selecting primary/crucial pollution sources to be inspected as part of DONREs' inspection plans. C3-4 Based on the prepared plan, conduct environmental inspection and/or environmental check. C3-5 Conduct joint analysis on the results of environmental inspection. and/or environmental check in order to improve the related capacity of DONREs through the training. C3-6 Conduct training on wastewater management to improve DONREs' administrative order and/or administrative guidance. C3-7 Conduct training on on-site inspection.</p> <p>3) Target DONRE's capacity of making effective water pollution control measures is strengthened. 3-1 Evaluate the enforcement performances of target DONREs on water pollution control, including the various systems implemented in the past, and organize issues for improvement. 3-2 Select target province(s) where the activities 3-3 and 3-4 would be conducted, after reviewing the feasibility of application of the draft amendment prepared in 1-5. 3-3 Specify target regions and/or industries for application of the effective water pollution control measures. 3-4 Draft an outline for effective water pollution control measures.</p> <p>4) Target DONRE's capacity of promoting awareness of public and industrial sectors on water environment is strengthened. 4-1 Review the current system and situation of environmental awareness activities at target provinces. 4-2 Make awareness raising plans for water environment to be conducted by target DONREs. 4-3 Conduct awareness raising activities in accordance with the plan set at 4-2. 4-4 Review and improve awareness raising activities based on the result of 4-3.</p> <p>5) Capacity of MONRE and DONREs on information management and utilization is strengthened. 5-1 Review the current situation of information collection and management regarding water environment, and organize issues for improvement. 5-2 Prioritize information necessary for MONRE and DONREs to come up with administrative measures and their implementation.</p>		
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Table 1.2-3(7) Project Design Matrix (PDM) (Modified PDM on 27 August 2012)

<p>5-3 Develop more effective ways and means (formats, reporting modes, frequencies, etc.) to collect information from all the DONREs. 5-4 Conduct trials to collect information from target DONREs by use of the ways and means developed in 5-3, and utilize information at MONRE. 5-5 Conduct workshops to share the results of 5-4. 5-6 Prepare a proposal of actual application of the ways and means at MONRE.</p>	
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Table 1.2-4(1) Plan of Operation (Modified on 27 August 2012)

Plan of Operations

Project Name : The Project for Strengthening Capacity of Water Environmental Management in Vietnam

Duration of Project: June, 2010 – June, 2013 (3 years)

Project Target Area : Hanoi, Hai Phong, Thua Thien-Hue, Ho Chi Minh, Ba Ria-Vung Tau

Target Group : Ministry of Natural Resources and Environment (MONRE) and target Departments of Natural Resources and Environment (DONREs)

Joint Coordinating Committee

Joint Evaluation

Counterpart Personnels in charge

Japanese side input

Output & Activity Contents

Output1. MONRE's capacity of making policy and management tools that are more effective and enforceable is strengthened.

1-1

Collect basic information on water environmental management policy and tools at national level, and analyze as well as organize the necessary issues to improve.

CPs of VEA

Long term expert-consultant

Loc

1-2

Study issues that target DONREs are faced, regarding implementation of water environmental management policy and tools.

CPs of VEA

Long term expert-consultant

Loc

1-3

Based on the results of 1-1 and 1-2, review water environmental management policy and tools, and conduct evaluation regarding effectiveness and enforceability of these water environmental policy and tools with focus on pollutions from industries.

CPs of VEA

Long term expert-consultant

Loc

1-4

Train staff of MONRE and DONREs on studying, developing, reviewing, and revising policy and management tools.

CPs of VEA

Long term expert

1-5

Prepare the draft amendment on water environmental management policy and tools for their organization.

CPs of VEA

Long term expert

1-6

Organize workshops for sharing and collecting comments and opinions based on implementing activities in Output2 and Output3.

CPs of VEA

Long term expert

1-7

Review the draft amendment prepared in 1-5.

CPs of VEA

Long term expert

1-8

Propose the amendment on water environmental management policy and tools

CPs of VEA

Output2. Enforcement capacity of target DONREs on basic water pollution control (environmental monitoring, pollution sources inventory, pollution sources inspection) is strengthened.

Determination of activities in each DONRE on the basis of capacity assessment

2-1

Conduct capacity assessment of target DONREs regarding enforcement of basic water pollution control.

CPs of DONREs

Short term expert

2-2

Select main component(s) from the list below and also select activities under the selected component(s) for each DONRE, and prepare activities plans for each DONRE.

CPs of DONREs

Short term expert

2-3

Conduct activities selected in 2-2 in each DONRE.

CPs of DONREs

Japanese expert team

Component 1 Monitoring

C1-1

Review water quality monitoring guidelines/manuals.

CPs of monitoring division of DONRE

Japanese expert team

C1-2

Based on above guidelines/manuals (revised if necessary), laws and regulations in Vietnam, and international guidance, prepare/improve a monitoring plan, taking into consideration of regional characters at target DONREs.

CPs of monitoring division of DONRE

Japanese expert team

C1-3

Implement regular monitoring in accordance with laws and regulations in Vietnam.

CPs of monitoring division of DONRE

Japanese expert team

C1-4

Conduct training on water quality monitoring including quality control for improving reliability of monitoring.

CPs of monitoring division of DONRE

Japanese expert team

C1-5

Interpret and evaluate results of monitoring and feedback to the annual/biannual monitoring reports

CPs of monitoring division of DONRE

Japanese expert team

Component 2 Inventory

C2-1

Conduct capacity assessment of target DONREs regarding pollution sources inventory.

CPs of EPA of DONRE

Japanese expert team

C2-2

Review and modify existing inventory formats based on the current conditions of target DONREs.

CPs of EPA of DONRE

Japanese expert team

C2-3

Conduct inventory survey with the revised inventory formats.

CPs of EPA of DONRE

Japanese expert team

C2-4

Organize collected information on main pollution sources.

CPs of EPA of DONRE

Japanese expert team

C2-5

Regularly conduct inventory survey and add/update information on main pollution sources

CPs of EPA of DONRE

Japanese expert team

1st Year

2nd Year

3rd Year

6

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version: 2012/08/27

Table 1.2-4(2) Plan of Operation (Modified on 27 August 2012)

Plan of Operations															version: 2012/08/27																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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1.3 Evaluation of the Project

During the course of the Project, there were a mid-term review of the Project in December 2011 and a terminal evaluation of the Project in February-March 2013.

1.3.1 Mid-term Review

(1) Objectives

The objectives of the mid-term review are as follows:

- a) Grip the current status of the activities based on the Work Plan (WP) prepared by both the Vietnamese side and JET, and review these performance;
- b) Consider the necessary actions to be taken and make suggestions for the work forward; and
- c) Review the relevance, efficiency, and effectiveness of the Project as of now.

(2) Members and Schedule

The mid-term review was carried out by the mid-term review team consisting of the members shown in Table 1.3-1.

Table 1.3-1 Mid-term Review Team - Japanese Side (JICA)

Name	Role	Position
1)Mr. Senro Imai	Team Leader	Senior Advisor, JICA (Advisory Committee for the Project)
2)Mr. Mitsuhiro Yamamoto	Member	Senior Advisor, Overseas Environmental Cooperation Center (OECC), (Advisory Committee for the Project)
3)Mr. Koji Nishimiya	Member	General Manager, Overseas Environmental Cooperation Center (OECC), (Advisory Committee for the Project)
4)Ms. Ruri Hidano	Member	Deputy Assistant Director, Global Environment Department, JICA
5)Ms. Rie Fusamae	Member	Evaluation Consultant, Foundation for Advanced Studies on International Development (FASID)

Source: JET

A field work for the mid-term review in Vietnam was conducted from 8 to 22 December 2011, in which a series of interviews, meetings, and discussions were held among Vietnamese authorities, institutions relevant to the Project, Japanese experts, and the mid-term review team.

(3) General Suggestions to the Project

The process of project implementation was assessed from the viewpoint of project management applying the five evaluation criteria of JICA, namely: relevance, effectiveness, efficiency, impact, and sustainability. The team made the following general suggestions based on the results of the review exercise and shared them with relevant personnel and other stakeholders.

- a) DONREs play a crucial role in water environmental management at the provincial level and there are continuous needs for their capacity development. Through this Project, the water environmental management level in DONREs is expected to be enhanced by pursuing and ensuring strong linkages with related departments of Vietnam Environment Administration (VEA);
- b) The Project activities in 2012 are very important in terms of further development and utilization of the knowledge and skills gained in 2011. It is important to make a detailed work plan as early as possible to ensure the sufficient inputs of ideas and opinions of the staff of MONRE and DONREs, and to come up with practical work plans while maintaining some flexibility to respond to changes in needs and so forth. It is advisable to make work plans considering a rather short period left and limited budget of the Project so that the activities in 2012 can be implemented in an efficient and effective manner;
- c) Some DONREs requested that meetings and other activities under the Project be arranged well in advance so that they can be better prepared and more concerned officials can participate.

Therefore, it is desirable to make arrangements early enough to streamline meetings; and

- d) Exchanging and sharing of experiences and findings among DONREs are very important and effective to increase the level of performance of the Project. In this regard, it is advisable to consider study visits among DONREs with support from VEA.

(4) Specific Suggestions

The review team also made the following specific suggestions on each output of the Project.

1) Output 1 (Policy Review)

The concerned departments and institutions of MONRE in this Project are conducting reviews and studies to improve the effectiveness of the current environmental policies and regulations in Vietnam based on the recent environmental management trend: a) revision of the Law on Environmental Protection (LEP) in 2012 and b) correspondence to the National Target Program. During the abovementioned reviews and studies, available measures for DONREs are expected to be found from the outcomes of the Project.

- a) There are several subjects that detailed work plans are to be made from now on. With rather short duration left in the Project and its limited budget, it is desirable to set clear image of outputs in work plans in particular laws and regulations to which the results of the study would be reflected and incorporated.
- b) Several subjects are closely related to each other. In this connection, it is desirable to have opportunities to exchange and share the results of each study in order to create harmony, consistency and synergy.
- c) Through the Study, the Team reconfirmed that several issues at the DONRE level might be taken up in Output 1 activities. The linkage between Output 1 and Output 2 & 3 needs to be ensured and a substantial level of intervention of VEA is recommended under the appropriate supervision of the PMB.

2) Output 2

- a) It is advisable to have such opportunities that officials in charge of inspections and environmental check can participate in training under the Project for monitoring staff.
- b) With respect to PSI, collaboration among concerned sections is necessary. If good collaboration is ensured in developing and utilizing PSI, this will contribute much to the enhancement of the institutional capacity for environmental management of DONREs.

3) Output 3 (Water Pollution Control Measures)

The decision of Hanoi (HNI) DONRE (No.178/2011/QD-STNMT) have defined the participation of responsible officials for the Project from concerned divisions to develop a comprehensive and effective water pollution control plan in the model area aimed at strengthening the capacity of water pollution control in Hanoi city. The participation of concerned officials of HNI DONRE in the preparation stage of Output 3 so far has been measured rather insufficient because of their routine work and project activities as WG member while a certain level of efforts to participate in the project activities is recognized.

Since the successful implementation of activities of Output 3 is crucial for the entire Project in view of the integration of results of all relative activities, proactive participation of HNI DONRE is strongly required for further improvement of smooth project implementation to secure fruitful outcomes. In addition, since Vietnam is facing a turning point corresponding to the NTP (National Target Program) and the revision of the LEP, the achievement of Output 3 have the potential to create an innovative water pollution control model, which would be applicable to all DONREs in Vietnam. Taking the context into consideration, the strategic engagement of concerned officials of HNI DONRE in

activities for Output 3 with their responsibilities as the Vietnamese Capital City in collaboration with the VEA is indispensable to substantialize remarkable outcome of Output 3 consequently.

4) Output 4 (Environmental Awareness)

It is advisable to make in-depth analyses of the results of the first workshops and share them among DONREs and VEA to consider effective ways and means to enhance environmental awareness of industrial sectors, social organizations and so forth taking into account the socio-economic and environmental features of the target cities concerned.

5) Output 5 (Information Management and Utilization)

It is planned to undertake a study to identify issues regarding information management and utilization in VEA considering relations between VEA and DONREs. It is advisable to analyze the results of the study to come up with appropriate actions forward.

1.3.2 Terminal Evaluation

(1) Objectives

The joint terminal evaluation of the Project was conducted with the following objectives:

- i) To verify accomplishment of the planned activities and objectives of the Project in R/D and the latest PDM;
- ii) To review how the Project responded to the recommendations given by the mid-term review mission in December 2011;
- iii) To analyze the Project in terms of the five evaluation criteria (i.e.: relevance, effectiveness, efficiency, impact, and sustainability) with particular focus on impact and sustainability; and
- iv) To draw concrete recommendations and lessons learned from the evaluation findings¹.

(2) Members and Schedule

The terminal evaluation was carried out by the Joint Evaluation Team (hereinafter referred to as the Team) consisting of the following members from the Vietnamese government (VEA and MONRE) and JICA.

1) Vietnamese Side

Name	Position	Position in Current Organization and the Project
Mr Nguyen The Dong	Team Leader	- Deputy General Director of VEA - Project Director
Mr Nguyen Minh Cuong	Member	- Deputy Director of ISD, VEA - Project Manager
Mr Nguyen Viet Thang	Member	- Expert of ISD, VEA - Member of JCC and PMB
Ms Nguyen Thanh Nga,	Member	- Expert of ISD, VEA

Source: JET

2) Japanese Side (JICA)

Name	Role	Position
Mr Hideo Noda	Team Leader	Director, Environmental Management Division 1, Global Environment Department, JICA
Mr Senro Imai	Environmental Policy	Senior Advisor of Environmental Management, JICA
Ms Ruri Hidano	Environmental Management	Deputy Assistant Director, Environmental Management Division 1, Global Environment Department, JICA
Mr Ryuji Tomisaka	Water Environmental Policy	Policy Advisor to MONRE, JICA Expert
Mr Jiro Iguchi	Evaluation Analysis	Consultant, PADECO Co., Ltd.

Source: JET

¹ Recommendations are proposals that can be used for improvement of the project in the future, while lessons learned are recommendations for future or ongoing projects of similar nature.

The terminal evaluation study in Vietnam was conducted from 24 February to 20 March 2013 in which a series of interviews, meetings, and discussions were held between Vietnamese authorities, institutions relevant to the Project, the JICA experts, and the Team.

(3) Conclusion of the Project

From the findings of the joint evaluation study, the Team concluded that almost all activities have been completed at the time of evaluation and that the Project purpose as well as the five outputs are likely to be achieved by the end of the Project. The Team also concluded that the Project will be terminated in June 2013 as planned.

Judging from the viewpoint of the five evaluation criteria, the Team found that relevance and effectiveness were high, while efficiency was satisfactory. The Team observed a lot of unintended positive impacts of the Project, and sustainability was considered moderate to high. Sustainability of the Project would be secured and the overall goal of the Project would be achieved through continuous and cooperative efforts by both MONRE and the five DONREs.

(4) Recommendations

To secure achievement of the Project purpose and overall goal, the Team made the following recommendations to the director general and deputy director general of VEA/MONRE:

In the Workshop of the Terminal Evaluation held in Hue city on 14 March 2013, DONREs put forward “Challenges and Actions” and “Way Forward” based on the results of activities under Output 2, 3, and 4. The actions proposed are very important in developing further the tools and capacities for water environmental management. Therefore, it is recommended for DONREs to implement those that can be implemented in the remaining period and can be implemented by themselves.

“Challenges and Actions” and “Way Forward” contained suggestions and hints for the improvement of water environmental management at central government level. Also they contained issues that need proper assistance of VEA. Therefore it is recommended that VEA analyze “Challenges and Actions” and “Way Forward” in an integrated manner and provide proper assistance to DONREs.

Strong tools for water environmental management have been developed, namely water quality database (WQD) and pollution source inventory (PSI). Although PSI was an advanced tool for Vietnam, PSI has been developed successfully thanks to strong collaboration between 5 DONREs and JET. Further, pollution source map (PSM) utilizing PSI has also been developed. These tools are still at basic stage in terms of areas and enterprises covered, they are demonstrating that they are indeed strong administrative tools. Through expanding the areas and enterprises according to the necessity and priority, it is expected that DONREs can plan and conduct environmental management tasks in a more rational manner. Therefore, it is recommended that DONREs continue to update and improve databases and that VEA examine the possibility to apply those tools to other DONREs.

Under Output 3, HNI DONRE developed “Improvement Plan for Water Pollution Control in Hanoi”. 4 Challenges in this Plan reveal very effective course of actions to deal with difficult problems taking place in big cities like HNI. In particular Challenge 2 will contribute to enhance the motivation of enterprises for pollution control. Challenge 4 is an appropriate tactic in view of limited number of staff and budget in environmental administration and will contribute to efficient enforcement of management tasks since this places importance to those pollution sources with higher impacts. However, Action 2-1 under Challenge 2, publication of compliance situations, will need a sort of test before implementation and Action 4-1, minimum scale of management tasks, will need a time to find the appropriate minimum scale utilizing PSI for instance. These Challenges are indeed worth trying to implement and will have, if implemented successfully, considerable effect over other big cities and MONRE as well in improving the efficiency of environmental management tasks. In this regard, it is recommended that HNI, as a top runner, make efforts to actually take Actions under 4 Challenges and that VEA provide due assistance.

Various type of well considered awareness tools such as guidebook, TV reportage, environmental film, handbook etc. have been developed by active participations of WG members and strong support of DONRE' management. WG members demonstrated their creativity and presented ideas. Among those tools, there are such tools to assist enterprises to introduce Cleaner Production (CP) technologies that contribute for the reduction of pollutants through rational production. In particular the "Handbook on Guiding Environmental Management Work (water environment)" prepared by collaboration of HNI DONRE and JET presents a practical CP introduction process (6 steps and 18 tasks) with detailed explanations that will be very helpful for enterprises to actually examine and introduce CP technologies. These valuable and effective tools that help enterprises abide by environmental regulations and introduce CP technologies will have to be utilized not only by enterprises and other stakeholders in 5 DONREs but by other DONREs. Therefore it is recommended that VEA in cooperation with 5 DONREs examine and improve these tools and introduce them to other DONREs and line ministries.

The new water environmental information procedure including specific formats for data collection has been developed. With tremendous support by Hai Phong DONRE, this procedure was tested and improved. Through these works, the basis for actual utilization of the information procedure is being formed and it is expected that the procedure will help grasping the trend of environmental quality, status of enforcement of relevant laws and regulations, preparing new policies and so forth. With these in mind, it is recommended that VEA continue the works for full scale utilization of procedure in close collaboration with DONREs.

Under the Project, policy review has been made in a comprehensive manner and several important specific outputs have been generated such as a draft of a new chapter on water environmental management in the draft revised Law on Environmental Protection (LEP), a draft revised Decree 117 on fining of administrative violations in the field of environmental protection, the Operational Manuals and Standardization of an automatic water monitoring station, manuals on evaluation of appropriate technologies for the environment. On top of these, several important studies have been undertaken generating good bases for the review of the relevant laws and policies. Based on these development and considering the need for their implementation, it is recommended that VEA elaborate them further utilizing the enhanced policy review capacity gained through the Project.

(5) Lessons Learned

It was observed that the approval of the Project document by the Vietnamese government was delayed than expected due to much internal procedure in Vietnamese side, and which caused a few delayed inputs such as providing equipment. Vietnamese side is encouraged to complete such procedure before commencement of future projects.

This Project targets both central government and local governments together aiming better coordination in terms of creating more practical measures with relevant policies in water environmental management. For example, a series of workshops, seminars and other related occasions inviting the both governments were observed to promote their coordination. Both JICA and Vietnamese sides are encouraged to provide proper mechanism in case of future projects targeting both governments.

For future comprehensive cooperation between JICA and Vietnamese side in water environmental management sector in Vietnam, the outcome and lessons of the Project which is considered as one of the core projects in the sector, must be taken into consideration.

CHAPTER 2 ACTIVITIES AND ACHIEVEMENTS

2.1 Output 1 (WG 1): Environmental Policy

2.1.1 Introduction

2.1.1.1 Position of Output 1 in the Whole Project

The goal of the activities Output 1 is "Strengthening MONRE's capacity of making water environment management policy. In general, policy requires both "effectiveness" (it means to be effective in solving environmental problem arising in the field) and "enforceability" (it means to be enforceable from the viewpoint of human resources or financial resources). Therefore, in order to evaluate current policy, it is necessary to judge effectiveness by grasping whether current policy can contribute to solving environmental problems arising in the field or not, and also to judge enforceability by grasping whether current policy has been put into practice as it is stipulated by law (including sub-laws) or not". In order to judge above, MONRE has to collect information on "the current status of water environment in the fields" or "the current status on the enforcement of laws and regulations" from DONREs.

Collecting such information by MONRE is closely related to the activities of Output 5 (information management) of the project. Therefore, Output 5 may be regarded as important tools to attain the final goal of Output 1. In addition, since much information which is necessary for Output 1 and 5 can be obtained through daily activities by DONREs, we tried to link Output 1 and 5 with Output 2, 3, and 4.

2.1.1.2 Framework of Activity

According to the PDM, the goal of Output 1 is that "MONRE's capacity of making policy and management tools that are more effective and enforceable is strengthened".

The eight items are defined in the PDM as the activities to achieve this goal, and they can be summarized in the following 4 points.

- 1) To collect basic information on water environmental current policy, and to identify and analyse the issues. (the 1st item in PDM).
- 2) To study issues that target DONREs are faced, regarding implementation of water environmental management policy and tools. (the 2nd item).
- 3) To evaluate the current policies from the viewpoints of effectiveness and enforceability based on the above 1) and 2), and then to suggest an amendment of water environmental management policies. (the 3rd, the 5th and the 8th item).
- 4) To train staff of MONRE and DONREs on studying, developing, reviewing, and revising policy and management tools, in parallel with the 1) - 3). (the 4th item).

In addition, four following items are defined as "Objectively Verifiable Indicators" in the PDM.

Table 2.1-1 Objectively Verifiable Indicators

Narrative Summary	Objectively Verifiable Indicators
Outputs	
1) MONRE's capacity of making policy and management tools that are more effective and enforceable is strengthened.	1-1 Through the training, basic skills on making and how to evaluate existing water environmental policy are mastered. 1-2 Based on the evaluation results of existing policy through the training described in 1-1, basic skills on how to propose the amendment of water environmental policy are mastered. 1-3 More than three (03) draft amendments and/or draft new policies of water environmental management are developed and agreed between JICA and VEA/MONRE as a result of the Project. 1-4 The process and methods for making more effective policies and system development are improved, compared with initial stage of the Project

Source: JET

Therefore, in taking consideration of the above contents of PDM the activities for Output 1 is summarized into “To strengthen the capacity of making water environment management policies with high effectiveness and enforceability through training for governmental officers, and thereby to make several draft proposals of water environment management policy”.

2.1.1.3 Methods and Arrangements for Implementation of the Activities

(1) The Scope of Target Policy

In narrow sense, "water environment management policies" means the laws and sub-laws where mechanism to protect public water (river, lakes, seawater and groundwater) from pollution is built-in (hereinafter referred to as "policy in narrow sense").

However, in order to enforce the laws and sub-laws properly, both governmental sectors and private sectors are required to secure resources such as human resources and financial resources. In addition, in order that both governmental sectors and private sectors to perform necessary activities in line with laws and sub-laws, development/training of the third party such as "industry related to environment", "citizens", "NGO" as well as development of environmental technology such as "wastewater treatment facilities" and "water quality analysis equipment" are also required as resources. Therefore, resources above are also needed for making a policy (in narrow sense) to be effective and enforceable. Thus strengthening above resources such as development of human resources or development of environmental technology are also regarded as one of the water environment management policies (hereinafter referred to as “policy in broad sense Part 1”).

Moreover, in order to make a policy (in narrow sense) effective and enforceable, it is needed to collect necessary information in the fields to judge whether current policies are effective and enforceable or not. Therefore, the collection of information in the fields is also regarded as one of the water environment management policies (hereinafter referred to as “policy in broad sense Part 2”).

Thus, we targeted not only the “policy in a narrow sense” but also the "policy in broad sense" as the targets policy in output 1. However, “policy in broad sense Part 2” is mainly dealt in the activities of Output 5; therefore, only “policy in narrow sense” and “policy in broad sense Part 1” are fixed as the targets of Output 1.

(2) Viewpoints of Policy Evaluation

As we mentioned before, current policy should be evaluated from the viewpoints of effectiveness and enforceability. However effectiveness and enforceability are sometimes incompatible, because if we try to make policy more effective, we need more human resources or financial resources.

So, we added "rationality" as a viewpoint of policy evaluation, which means rational from the aspect of cost-performance in the enforcement of policy.

Therefore, the first activity should be done in Output 1 is to evaluate the current water environment management policies from the viewpoints of, "feasibility", "effectiveness" and "rationality", in order to find policy issues.

2.1.2 Outline of Activities

The description of “Outline of activities” is divided into the following 3 parts;

2.1.2.1 How to find "overall issues of current policy"

2.1.2.2 Overall issues of current policy

2.1.2.3 Whole picture of "overall issues of current policy" and their countermeasures

2.1.2.1 How to Find "Overall Issues of Current Policy"

(1) General Method for Finding Issues

Issues about water environmental management policy are divided into 2 categories. The 1st category lies in the contents of policy itself. Namely, despite the policy are enforced as planned, in fact, "water quality of public water has not improved as expected", or "number of damage caused by water pollution has not decreased". The 2nd category lies in the way of policy enforcement. Namely, "the policy is not enforced as planned, mainly because capacity /ability of governments or enterprises is not sufficient to enforce policy properly.

Measures to be taken are different according to policy issues lies in which category. If issue lies in the contents of policy, it is necessary only to revise the contents of policy. But if issue lies in the way of policy enforcement, there are two options in the methods to be taken: The 1st method is to enhance capacity/ability of governments or enterprises so that policy can be enforced properly. The 2nd method is to reconsider policy contents so that policy can be enforced properly within the actual capacity/ability of governments or enterprises

Thus, in the evaluation of current policy, it is important to distinguish whether policy issues lies in "policy contents" or in "the way of policy enforcement". And if policy issues lies in "the way of policy enforcement", it is necessary to judge which option should be taken between 2 methods mentioned above. For conducting this distinction or judgment properly, it is necessary to collect information on "actual water pollution problems in the fields" "cause and effect on water pollution in public water" and "actual status of the enforcement of current policy."

(2) Practical Method for Finding Issues

The information, which is needed for doing above "general method for finding issues", has not organized sufficiently yet at present. Thus, in Output 1, we tried to find "overall issues of current policy" from the fragmentary information on "problems caused by water pollution", "problems that policy was not enforced as expected" or "problems on the overlapping of the scope of legal documents". Moreover we survey "disadvantage in current legal structure" as well as "disadvantage in the current administrative structure" which sometimes lead to raise policy issues.

In taking above method for finding issues, the following documents in the past or the following information obtained during the period of this project were referred

(Information got from documents in the past)

- Reports of JICA related to water environment in Vietnam
- Reports published in MONRE

(Information obtained during the project period)

- Review of water for environmental policy in general (using local consultant)
- Interviews with each department of MONRE about issues and contents of the current policy

a) Information on "problems caused by water pollution".

Although lots of pollution control policies were already put into practice, water quality in many public water bodies don't meet WQES (water quality environmental standards) and thereby damage are caused by water pollution frequently.

(Concrete example)

- Water quality in many public water bodies exceed WQES, especially in the parameter related to organic substances

- In the industry using public water such as aquaculture industry or water supply industry, troubles originated in water pollution occur frequently in many water bodies.

b) Information on "problems that policy was not enforced as expected"

There is not a little case when regulations stipulated by laws and sub-laws are not observed by enterprises.

(Concrete example)

- In general, the compliance rate of effluent standards in enterprises is low.
- Administrative procedures such as those related to "EIA/EPC (Environmental Protection Commitment)/ EPP (Environmental Protection Project)" and "permission of waste water discharge" are not sufficiently conducted as they are stipulated in the regulations.

c) Information on "problems on the overlapping of the scope of legal documents"

As for the scope of each relevant law and regulation, some scopes are overlapped, while other scopes are not covered enough.

(Example of overlapping)

- "EIA approval system" and "Wastewater permission system" are quite similar system.
- Basic idea on "Information collection system from DONRE to MONRE" is not unified among relevant departments in MONRE

As for the river basin management system, one is stipulated under "the Water Resources Law", the other is stipulated under "the Environmental Protection Law" They are quite similar in the management of water quality in a river.

(Examples of not covered)

- Sub-laws against non-point pollution sources is inadequate.
- Sub-laws to promote "cleaner production" is inadequate.

<Note>

Even if we can find actual problems mentioned above a) and b), it may not possible to identify the reason why such problems have occurred, because generally the causes of these problems are not yet analyzed enough. Thus researches on "the causes of these problems" are needed to clarify "the overall issues of current policies" more clearly.

d) Disadvantage in the current legal structure

In general, overall water environmental management policy should be designed by the linkage of relevant individual policies (including policy-tools). And it should have logicity as a whole in order to attain its objective. Hence, such the linkage enables not only to promote synergy of each individual policy, but also to avoid duplication of the scope in each individual policy.

However, currently in Vietnam, there is no written law corresponding to overall water environmental management policy, and many sub-laws (Decree, Decision, Circulars etc.) are issued under the Environmental Protection Law. Thus, most of these sub-laws cover all of the environmental fields with focusing on some specific parts of environmental policy. Furthermore, as the Law on Environmental Protection has wide scope, so many concrete regulations are stipulated in the various sub-laws separately and that there is no commitment from law to sub-laws in the legal system.

* General method of commitment: If some points in the paragraph of law are needed to be detailed, the law stipulates which parts should be committed to sub-laws by the description of the paragraph of the law.

As a result, the relationship between the law and the sub-laws are not so clear, moreover, the mutual relationship between sub-laws does not fully sorted and the problem is that the many similar regulations coexist in many sub-laws. (This issue is considered not particular in environmental field, but common to all the administrative fields, because there is no commitment system from laws to sub-laws in the legal system in Vietnam)

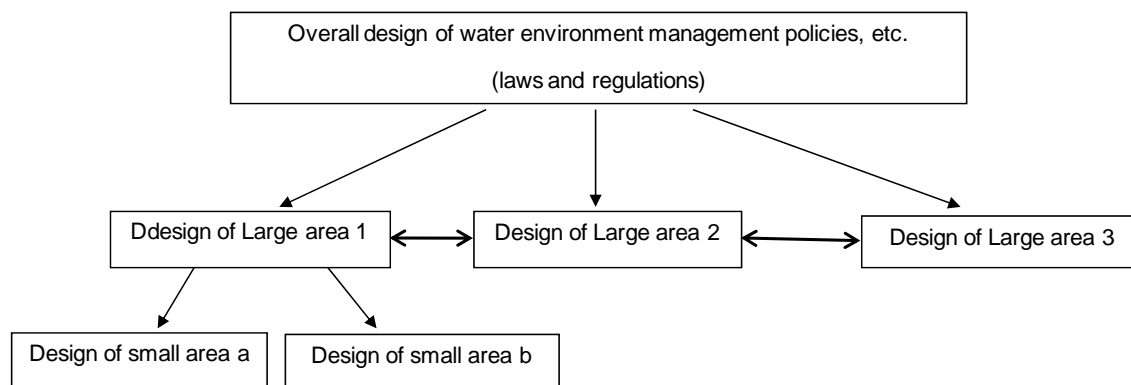
(Example: Necessity of the link between policies in Vietnam)

<e.g. Horizontal link (link between relevant policies/policy-tools) >

Regarding the policy "to get enterprises comply with effluent standards" and the policy "to impose waste water discharging fee" aim at reducing pollution in wastewater. So, both policies have to be linked each other.

<e.g. Vertical link (link between overall policies and individual policies) >

The policy "to get enterprises comply with effluent standards" is composed of several individual policies/policy-tools such as "EIA/EPC policy", "Inspection policy", "Penalty policy" and "Self-monitoring policy" etc. Thus the policy "to get enterprises comply with effluent standards" should be linked with individual policy/policy-tools concerned.



Source: JET

Figure 2.1-1 Horizontal/Vertical Link among Policies/Policy-tools (Image)

e) Disadvantage in the current administrative structure

a. Disadvantageous points in the organization of MONRE

Most of the individual policies or individual policy-tools are proposed by the relevant Departments in MONRE, and these individual policies/policy-tools are regarded as the basic elements of water environment policy. Therefore, these individual policies have to be linked each other. However, the Department is the largest organization unit in MONRE, thus, the organization structure of MONRE seems not so advantageous to link each relevant individual policy/policy-tool because there is no special permanent organization in MONRE to coordinate or link among relevant individual policies/policy-tools.

b. Disadvantageous points in the relation between DONREs and MONRE which is originated in the organizational structural system between central government and local government.

To make a policy effective and enforceable, it is necessary to gather nationwide information on "state of the policy enforcement". "status of water environment" or "status of damages caused by water pollution in public water" after the policy was enforced and then analyse them to evaluate current policy.

To do so, it is necessary that DONREs have to send such information to MONRE. However, the current relationship between MONRE and DONREs makes it time-consuming for DONREs to send

such information to MONRE periodically because of the organizational structural system between central government and local government. Namely, DONRE have to get approval of PPC when DONREs send information to MONRE in reply to MONRE's request.

2.1.2.2 Overall Issue of Current Policy

Basic issues of current policy can be assumed to be categorized into 2 groups, that is, the first is "The way how to design the framework of overall water environmental management policy" and the second is "The way how to design the individual policies based on the design of the framework of overall water environmental management policy"

(1) Issues Relating to the Way How to Design the Framework of the Overall Policy

Issues on this matter are mainly originated in the following sub-issues.

a) As there is a gap between "capability/capacity for required for enforcing policy" and "actual capability/capacity", so the policy is not enforceable.

(Main causes)

- Both in government and enterprises, human and financial resources are not so sufficient as to enforce policy properly (This matter lies in DONRE)
- In making policy, current situation on the capacity of human resources and financial resources, which are essential to enforce policy as planned, are not considered so well (This matter lies in MONRE)

b) As the policy does not fully reflect the problems arising in the fields, thus the policy is not so effective

(Main causes)

- information in the fields, which is essential to make effective policy, has not sent sufficiently from DONREs to MONRE and has not sufficiently utilized in MONRE

(2) Issues Relating to the Way How to Design Individual Policies

Issues on this matter are mainly originated in the following sub-issues.

a) Indeed many sub-laws were already set up but the linkage between LEP (Environmental Protection Law) and sub-laws or linkage among sub-laws is incomplete, so the policy cannot effectively function as a whole.

(Main cause)

- The administrative structure to promote coordination/linkage among relevant sub-laws in MONRE is weak (refer to Section 2.1.2.1- (2) e))
- In terms of the legal structure of the law, there is no commitment from law to sub-laws (refer to Section 2.1.2.1 (2) d))

b) As many sub-laws were already set up, but it is often the case when some sub-laws are not established yet even if they are needed to be established on the basis of the relevant law, while some existing sub-laws are overlapped in their covering area.

(Main cause)

Above (1) a), b) and -(2) a) in this Section

2.1.2.3 Whole Picture on the Relation of Each "Overall Issues of Current Policy" and Their Countermeasures

In taking consideration of the background of "overall issues of current policy", which are mentioned in the above (2), necessary countermeasures against overall issues can be summarized into following 4 items.

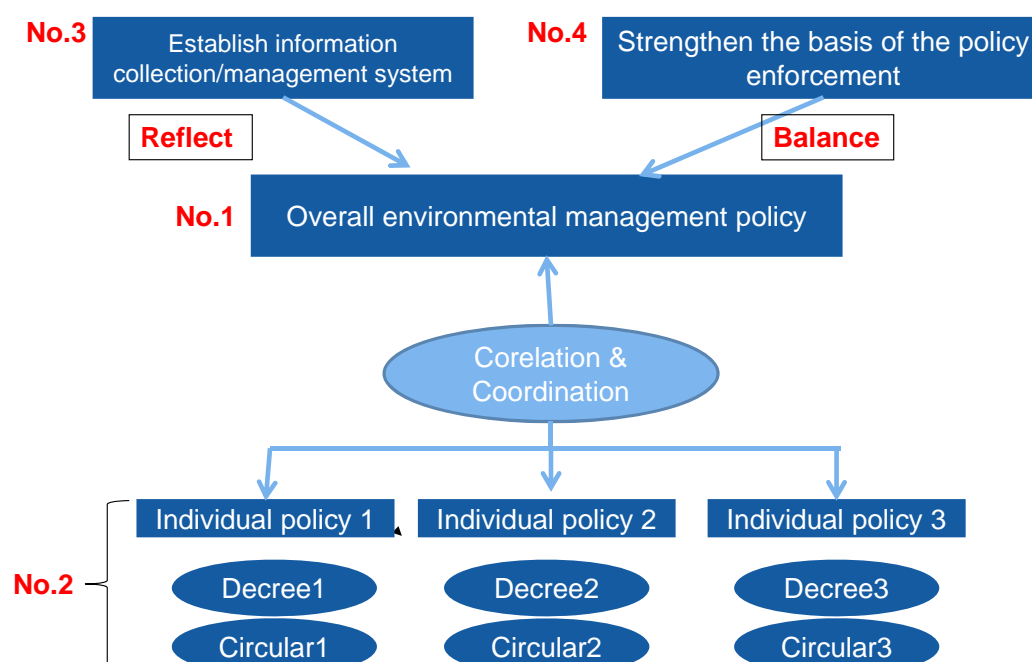
No.1: To make "Overall water environmental management policy", which correlate/coordinate among the relevant individual policies.

No.2: To make individual policy (or policy-tools) more effective and enforceable.

No.3: To establish information collection/management system in order to find policy issue.

No.4: To strengthen the basis* of policy enforcement which every water environmental management policy depends when it was put into practice.

*"basis" means that "necessary resources to enforce law and sub-laws properly such as human resources, financial resources, environmental technology etc.



Note: Establishment of information collecting/management system (No.3 in the Figure 2.1-2) is mainly conducted in the activities of Output 5

Source: JET

Figure 2.1-2 The Whole Picture about "Overall Issues of Current Policy"

2.1.2.4 Activities of Output 1 in Order to Tackle with "Basic Issue of Current Policy"

Based on the whole picture of "Basic issues of current polities", the activities of Output 1 were divided and implemented as below.

- 1) To conduct the training course to master skill and knowledge necessary for making water environmental management policy <corresponds to No.1, No.2 in Figure 2.1-2>
- 2) To propose new water environmental management policy based on the review of current policy <corresponding to mainly No.2, but including No.1, No.4 in Figure 2.1-2>

(Note)

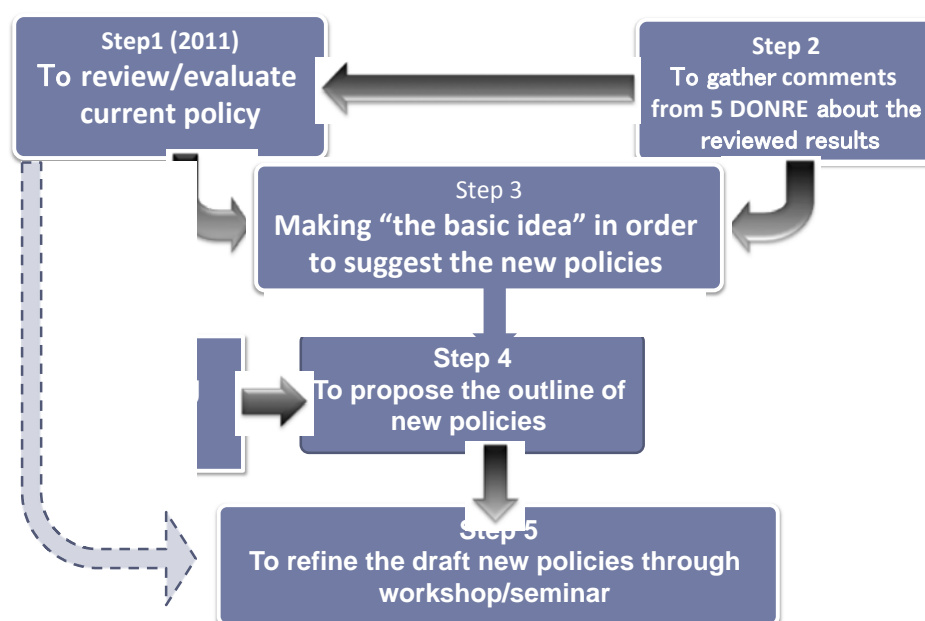
No.3 in Figure 2.1-2 (Grasping the policy issues in the fields) was mainly conducted in the activities of Output 5.

2.1.3 Activities

In taking consideration of "The whole picture about overall issues of current polities", the activities of Output 1 were composed of the following 2 key components.

- To carry out review of the existing policies in order to revise them and/or draft new policies (hereinafter referred to as "policy review") <This activity corresponds to mainly No.2, but some activity corresponds to No.1, No.4 in the Figure 2.1-2>
- To conduct training on policy making (hereinafter referred to as "policy training") <This activity aims to master knowledge and skill on policy-making which correspond to No.1, No.2 in the Figure 2.1-2>

The working flow of Output 1 is briefly shown in the Figure below:



Source: JET

Figure 2.1-3 Workflow of Output 1

2.1.3.1 Policy Review

(1) Target Topics of Policy Review

Various kinds of policy were the target of Output 1. The policies were classified as follow:

- **By policy tool:**
 - Regulatory system: effluent standard, EIA/EPC, inspection
 - Economic tool system: waste water charge
 - Self-Management system: self-monitoring by enterprise
 - Information-Based system: public disclosure
 - Supporting system: finance, technology, human resources
- **By pollution source*:**
 - Point Source
 - Non-Point Source

*Target pollution sources in Output 1 are assumed all of the pollution sources except households. However, waste landfill site, which is one of the major pollution sources, did not included in the target of Output 1, because problems concerning waste landfill site should be handled in the waste

management policy. Therefore, Main target pollution sources in Output 1 are "factories" "mining" and "non-point pollution sources such as agriculture, or aquaculture".

(2) How to Select the Topics of Policy Review

MONRE usually conducts policy reviews based on their own policy amendment plan. Therefore in the selection of the topics of the policy reviews in output 1, at first, each relevant department proposed the topics of policy review based on their own plan, and then discussed on the selection of topics between JICA and MONRE by taking consideration of the followings.

- Possibility of making concrete draft proposal of policy by the end of the project
- Urgency of the policy making
- Significance of the policy making

(3) Policy Review Selected by Each Relevant Department in MONRE

In total, 13 topics from 7 departments in VEA/MONRE (PCD, CEM, WENID, ISD, DAEIA, ISEM, and ID) and 1 department in MONRE (DWRM) were selected. In the selected 13 topics, various policy-approach tools such as "regulatory-approach", "information-based approach" and "self-management approach" are utilized.

In making the policy review, JICA and MONRE take note that current policy would become more effective and enforceable. So, in the policy review, JICA focused on 1) To utilize various kinds of policy-tool, 2) To transfer Japanese experience in policy-making 3) To collect various opinions of stake-holders.

The summary of all activities are briefly shown in the Table 2.1-2 and Table 2.1-3.

Table 2.1-2 Summary of Policy Review Activities of Output 1

Target Department	Title of the topics for review / workshop	Purposes	Outcome of the result
DAEIA(2011)	Workshop on draft circular of Strategy Environmental Assessment (SEA), Environmental Impact Assessment (EIA) and Environmental Protection Commitment (EPC)	To gather opinions/comments from the experts, DONRE, stakeholders and line agencies in order to finalize draft new circular of SEA, EIA, EPC	Workshop is conducted in June 2011. The Circular No. 26/2011/TT-BTNMT on Detailed Guidelines for some Articles of Decree No. 29/2011/ND-CP dated 18/4/2011 of the Government for Strategy Environmental Assessment (SEA), Environmental Impact Assessment (EIA) and Environmental Protection Commitments (EPC), was promulgated on 18th July, 2011
ID(2011,2012)	Modifying Decree 117/2009/ND-CP issued on 31 December 2009 by the government of the handling of law violations in the domain of environmental protection	Review of Decree No. 117/2009/ND-CP on Dec. 31, 2009 the Government's handling of law violations in the field of environmental protection and other current legal documents related to the field of water environment management, to survey the actual institutions involved in the execution of the decree to propose amendments and supplements consistent with the practice.	The draft revised Decree was reported. According to ID, some contents of the Decree are now under discussion within MONRE and it is planned to issue the revised Decree within the year of 2012.
	Employing the consultant to define penalty for violations in environmental protection	- General objectives: Modifying and supplementing Decree No. 117/2009/ND-CP on the handling of law violations in the domain of environment protection. - Specific objectives: Defining penalty frame and level for violations related to the water environment.	The Final Draft Report on "Defining Penalty for Violation Related to Water Environment" was prepared.
CEM(2011)	Developing new "Circular for Specification and the Basic Requirements for Water Automatic Monitoring Station (WAMS)"	- To instruct circulars prescribed specifications of the automatic water monitoring stations: station type, size, sampling method, observation and monitoring technology - To build regulations and circulars basic characteristics of the automatic monitoring - To provide guidance in choosing the set of monitoring stations, monitoring parameters, technology and monitoring equipment - To provide criteria for selection of equipment, technologies and methods of observation	The final draft Circular was made. It was published on MONRE website to collect comments for final approval.

Target Department	Title of the topics for review / workshop	Purposes	Outcome of the result
CEM(2012)	Developing “Technical guide book for management, operation and maintenance of automatic monitoring stations	<ul style="list-style-type: none"> - Build and guide how to management and operation of the station: build SOPs for management the station and SOPs for operation; - Construction and building rules, SOPs, reporting process...; - Building regulations and circulars basic characteristics of the automatic monitoring; - Provide guidance in the maintenance the station. It including the maintenance systems, maintenance probe, maintaining piping systems....; - Provide criteria for selection of equipment, technologies and methods of observation ...; - Given the guidance in the operation, maintenance and repair, fix minor damage and data sharing and reporting.... 	The draft guide book in technical for management, operation and maintenance for water automatic station was prepared.
PCD(2011)	Development of Regulation on Water Pollution Control in Vietnam	To develop new cycle management system for wastewater pollution control as a new chapter of revised LEP 2005.	The report of the survey and the draft “Regulation on Water Pollution Control” were submitted.
PCD(2012)	Reviewing, evaluating and amendment/revising articles related to water environmental protection in LEP 2005	The overall objective of this study is to propose a new chapter on water environmental protection in order to include in the new Law on Environmental Protection based on theory, reality in Vietnam and international experiences.	Report on “Some detail contents on water pollution control to be proposed to be included in revised LEP and recommendations for revision of some LEP articles related to water pollution control” will be prepared.
WENID(2011)	Review, synthesis, analysis and evaluation the overlapping and gaps in state management on environmental protection (water environment) at river basin/ (river basin management) and propose appropriate management solutions for the amendment of Decision No. 132/2008/QĐ-TTg	To propose appropriate management solutions for water environment protection in river basin/river basin management for revision/amendment of Decree 25/2008/ND-CP, Decision 132/2008/QĐ-TTg and relevant legal documents	The report of the survey has been made and submitted to VEA for river basin management practices.
ISEM, <No1> (2011,2012)	Assessment of non-point pollution source in Vietnam rural area and recommendations of measures to improve water quality control	<ul style="list-style-type: none"> -To review, evaluate the state of existing legislation system on water pollution control caused by nonpoint source pollution -To evaluate the management state and propose solutions to raise the efficiency of water pollution control on nonpoint source pollution in rural areas in Vietnam 	The report was made. The results from this survey is now editing for producing a guide book on control of non-point pollution source
ISEM,<No2> (2011)	Study solutions to enhance the role and responsibility of enterprises in provision and dissemination of environmental information	<ul style="list-style-type: none"> -To make clearly enterprises’ responsibility for disseminating environmental information to citizen -Assess the regulations of current legal and implementation processing 	The report was made and used to promote the role and responsibility of enterprises in provision and dissemination of environmental information
ISD(2011)	Assessment of status of application of wastewater treatment technologies in Vietnam and propose the genetic protocol for assessment of appropriate technology under Vietnam’s conditions	<ul style="list-style-type: none"> To initially assess the current status of employment of wastewater treatment technologies in Vietnam. To formulate and prepare a draft of genetic protocol for assessment of appropriate wastewater treatment technology under Vietnam’s condition 	The report was made. The result of the survey will be utilized for conducting the next step (pilot assessment)
ISD(2012)	Pilot/demonstration assessments of wastewater treatment technology	Improvement of generic protocol assessment of waste treatment technology	A final report for pilot/demonstration assessment of wastewater treatment technology in Slaughterhouse sector; And, a publication of user guide on selection of wastewater treatment technologies in selected sectors
DWRM(2011)	Impacts of water discharge on water quality in river basins in Vietnam	<ul style="list-style-type: none"> To identify the key impacts of water discharge on water quality in major river basins in Vietnam To enhance communication on the impacts of water discharge on water quality in river basins between stakeholders To develop a set of strategic policy recommendation 	<ul style="list-style-type: none"> 1) Report on the key impacts of water discharge on water quality in major river basins in Vietnam 2) Recommendations to improve the communication system on the impacts of water discharge on water quality in river basins between stakeholders. 3) Recommendations to develop a set of strategic policy recommendation.

Target Department	Title of the topics for review / workshop	Purposes	Outcome of the result
DWRM(2012)	The survey of impact of multi-stakeholder platforms in Vietnam: An institutional assessment in river basin management	This survey aims at a comprehensive institutional assessment of the impact of multi-stakeholder platforms in Vietnam with an institutional assessment in river basin management	The survey will result in the following outputs: - An in-depth analysis of the current stakeholder's relationship in water resources use and management to reveal the linkages and conflicts between the stakeholders to be solved for better water resources management; - An assessment of the impact of relationships between stakeholders in the water resources management and IWRM with reference to the new Law of Water Resources in order to support the implementation of the new Law. - Policy recommendations for the management authority to improve stakeholders participation in the water resources management and to establish a platform for better communication and information and experience sharing between the stakeholders.

Note: For selecting appropriate topics of policy review by each relevant department in MONRE, JET conducted following survey in advance
Source: JET

Table 2.1-3 Policy Review by LET

No	Title of the review	Purposes	Progress Status	Review period
1	Assessing Law related to industrial waste water management and status of its enforcement in Vietnam (2011)	1. To grasp the comprehensive regulations on industrial waste water management in Vietnam 2. To assess the actual status of the enforcement 3. To find out causes of insufficient enforcement in the fields	Complete in August, 2011	February11 to May 11 2011

Source: JET

2.1.3.2 Policy Training

(1) Overall Activity

Since Output 1 of the project aims at strengthening the MONRE's capacity of water environmental management, the Project is planned to organize the series of the training courses for mastering the basic skills and knowledge of policy making and evaluation of water environmental management.

The objective of this training course was firstly "to introduce "international rules related to water environmental management policies" and "the trend of the Japanese water environmental policies", and secondly "to consider how water environmental policies, which is suitable to the socio-economics in Vietnam, can be developed from now on".

This program consists of "the lectures on the basic skills and knowledge" as well as "participatory case studies", which let all the participants to discuss the policies to lead the solutions by setting a case as an example.

The overall training programs is presented in Table 2.1-4.

Table 2.1-4 Overall Training Programs in Output 1

Item	Contents
Title of training course	The Training Course for the Capacity Development on policy making
Language used in training	Vietnamese and Japanese (material in English)
Period	1-1.5 days for one training course Totally 4 times
Number of trainees	About 40-50 trainees for one training course (1 trainee from relevant department DONRE and 2 trainees from relevant department VEA/MONRE)
Expected trainees	DONRE/MONRE staffs in charge of making policies
Main place for training	Hai Phong, Hoa Binh, TT-HUE, and near HCMC

Source: JET

(2) Each activity in Training Course

1) The First Training Course

On 7 July 2012 June, the first training course was held in Hai Phong City. Brief information about the training is as follows;

<Summary>

In the morning, following 3 lectures were presented.

- Basic skills and knowledge to make the environmental law
- ASIAN water environment management and Japan Model
- Current status and issue on the water environmental management in Vietnam”

In the afternoon, there was a participatory session provided by an expert of human resource training from MDF Indochina Training and Consultancy. In the session, the participants were divided into 5 groups and based on the presentation of PCD; each group chose 1 topic to exercise to find causes and effects by making “Problem Tree”.

2) The Second Training Course

On 21 September 2012 June, the second training course for enhancing capacity of environmental policy making was held in Hoa Binh province. Brief information about the training is as follows;

<Summary>

In the morning, following 2 lectures were presented.

- "How to make overall legal framework of water pollution control" and "The Outline of Water Pollution Control Law”.
- The Inspection system of Japan – An example of prefectural government

In the afternoon, there was a participatory session. The section was guided by Mr. Tran Phong, an expert from Centre for Environmental Training and Communication, VEA.

In the session, the participants were divided into 2 groups. Each group chose 1 topic among following 2 topics and exercise to find out the causes of environmental problems and propose the idea or policy how to prevent environmental pollution.

<1st topic> Prevention of secret wastewater discharged pipe

<2nd topic> What survey/policy is needed when health damage caused by the pollution of a well for drinking water is suspected?

3) The Third Training Course

On 26-27 November 2012, the third training course was held in TT-HUE province. Brief information about the training is as follows;

<Summary>

In the morning, following 2 lectures were presented

- Outline of Legal Framework on Water Pollution Control in Japan
- “Management of Closed Water Area in Japan”.

In the afternoon, there was a participatory session. The section was guided by Mr. Tran Phong and Mr. Nguyen Dinh Dap, experts from Centre for Environmental Training and Communication, VEA.

In the session, the participants were divided into 2 groups. Each group chose 1 topic among following 2 topics and exercise to find out the causes of environmental problems and propose the idea or policy how to prevent environmental pollution.

<1st topic> How to prevent water pollution in islands whose pollution is mainly originated in the increase of tourists

<2nd topic> Measures to protect water pollution in the downstream of a big river whose pollution is mainly originated in upper stream.

Two topics, namely “How to prevent water pollution in islands which is suitable for tour” and “Measures to protect water pollution in the downstream of a big river” were chosen for discussion. In the session, the participants were divided into 2 groups and each group chose 1 of 2 topics mentioned above to exercise to find out the causes of environmental problems and propose the idea how to prevent environmental pollution on the viewpoint of policy making.

4) The Fourth Training Course

The fourth training course for enhancing capacity of environmental policy making was planned in 12-13 June, 2012, in Ho Chi Minh City. Expected contents of the training are as follow;

<Summary>

The lecture section will consist of 2 lectures.

The first lecture is about “Wastewater Management Tools in Japan”. The lecture will introduce 1) “sanction system in Japan”; 2) “classification of wastewater standards in Japan”; and 3) “measures for environmental pollution accidents in Japan”. This lecture will be given by Mr. Obayashi Shigenobu, Chief Advisor of the Project.

The second lecture was delivered by Mr. Maeda (a guest speaker from Japan). This lecture will explain to participants about “Water environmental pollution of coastal areas”.

The participatory session will be guided by Mr. Tran Phong and Mr. Nguyen Dinh Dap, experts from Centre for Environmental Training and Communication, VEA. Two topics, namely “How to prevent water pollution caused by agricultural chemicals” and “Measures for environmental pollution control at mining sites” will be used for participants to exercise to find out the causes of environmental.

2.1.4 Achievement and Recommendation about Output 1

2.1.4.1 Achievement

Achievement of Output-1 are as follows;

- 1). Understanding of policy formulation methods were deepened through "training" and “policy review”
- 2). Individual policy drafts (or prepare the draft policy) to solve the problems of the specific issues were established through “policy review” (Among 13 topics of policy review, draft legal documents were prepared in 6 topics)
- 3). "Resources for policy enforcement*", which every water environment management policy depends, were developed. (e.g. environmental technologies)

* "resources for policy enforcement" means "policy in broad sense part 1" which was mentioned in section 2.1.1.3 (1)

2.1.4.2 Recommendation

In order to make water environmental management policy to be effective and enforceable, it is necessary to correlate/coordinate among related individual policies. For the promotion of correlation/coordination among related individual policies, the most basic point is the link between "policy on the pollution management of public water body" and "policy on the pollution source management".

However, when looking at policies in Vietnam, the linkage between "pollution management of public water body" and "pollution source management policy" is still weak. Therefore, in post project, especially following 5 points are recommended in order to strengthen above linkage.

(1) Clarifying the Meaning of Environmental Standards in the Legal Documents so that all Stakeholders Involved in Water Environmental Management to Have Common Understanding of This Meaning

In general, "WQES (water quality environmental standard)" are regarded as acceptable targets in order to prevent various damages caused by using polluted water, thus they are considered to be the target that administrative sector have to attain through various kinds of policy. However, in Vietnam, indeed the value of environmental standard was already stipulated in the legal documents, but it is not so clear why and how this value was adopted as environmental standard. Thus such a vagueness makes it difficult to have common understanding of the meaning of environmental standard among stakeholders.

(2) Clarifying the Procedures How to Designate the Type of WQES in Each Public Water Bodies

In Vietnam, various type of WQES are decided by the classification of "water usages" and "category of public water bodies". It sometimes happened that the type of WQES is not clear even if monitoring of water quality was conducted. In such a case, monitoring data cannot be evaluated whether the water quality satisfies WQES or not. Moreover, since the procedure for the designation of the type of WQES is not stipulated in the legal documents. Thus, even if the designation of the type of WQES is set, it often happens that how and who decided the type of WQES.

In order to handle this problem, it is indispensable to clarify the legislation on procedures to designate WQES. And by clarifying the procedure to designate WQES, it is assumed that stakeholders can have consensus to regard WQES as targets of water environmental management policy.

(3) Clarification on Evaluation Methods of Monitoring Data, Especially the Method How to Compare Monitoring Data with WQES

Monitoring data have to be compared with WQES in order that each public water body satisfies WQES or not. Therefore, it should be made clear the way how to compare monitoring data with WQES. For instance, one way is that "each monitoring data is compared with WQES", and another way is that "annual average of monitoring data is compared with WQES" etc.

(4) Analyzing the Relation Between Pollution Source and Public Water Pollution When Public Water Exceed WQES, Especially When Damages by Water Pollution Happened

It sometimes happened that despite the damage was caused by the water pollution, the pollution source of water pollution was not clear. If pollution source is not identified, then it may be difficult to make effective policy. Therefore research on clarifying the relation between cause and effect of the water pollution should be developed.

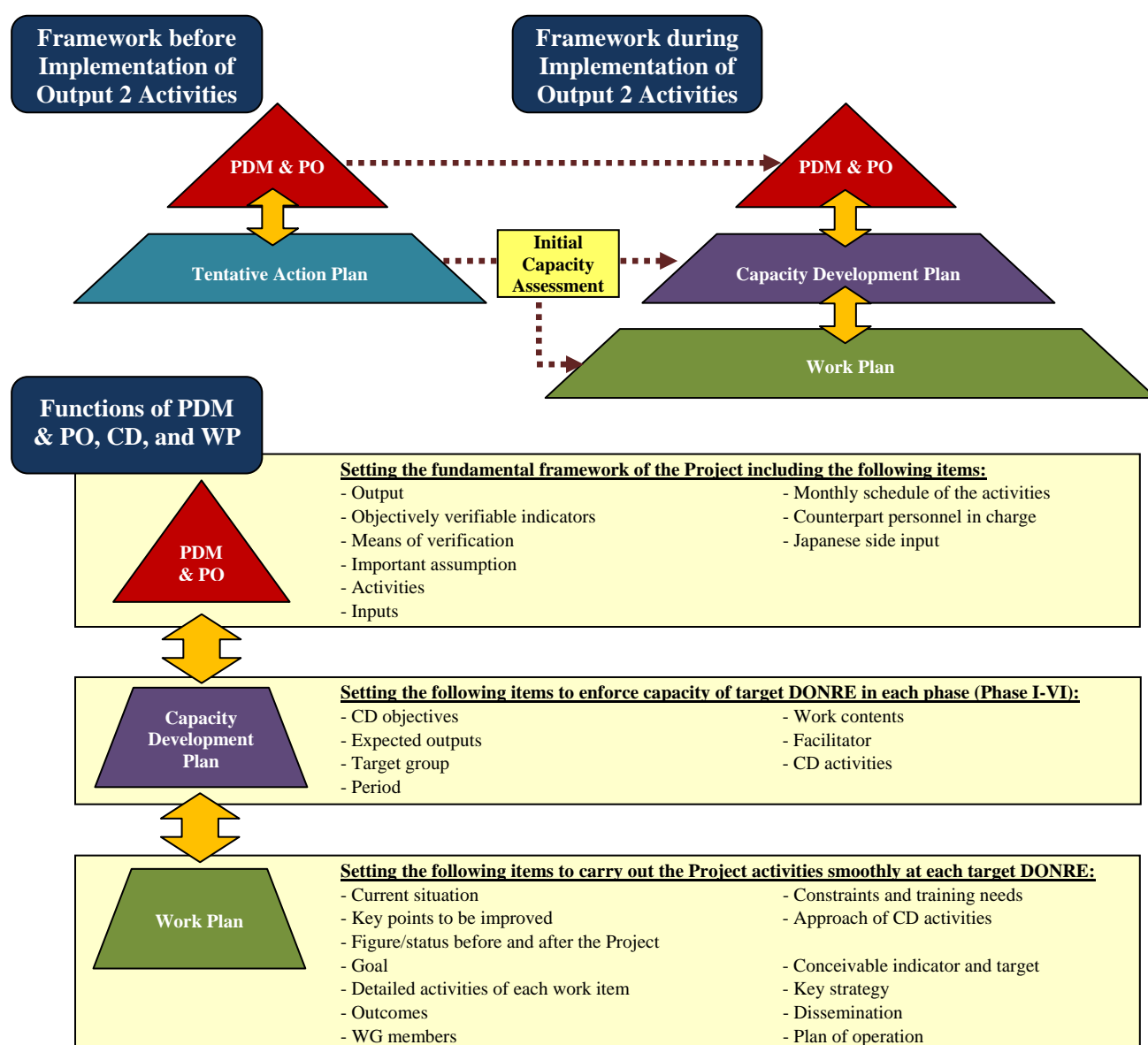
(5) The Results of the Outcome of Output 5 (Information Management System) Should be Put into Practice as Early as Possible

In the target information of output 5, both "monitoring data of public water bodies" and "information on the status of the regulation on pollution sources" are included. Therefore the results of Output 5 can be expected as one of the strong tool for strengthen the linkage between "pollution management of public water body" and "pollution source management policy".

2.2 Output 2-1 (WG 2-1): Monitoring

As the process of setting up the framework of Output 2 activities, each DONRE prepared tentative Action Plan (AP) in November 2010 before the start of Output 2 activities. The tentative APs include the present DONRE capacity, objective of DONREs' capacity development, capacity which DONRE wants to obtain through the project activities and its schedule, and so on. Upon the start of Output 2 activities in April 2011, each DONRE and JET held a series of discussions, and developed a capacity development (CD) plan and a work plan (WP) based on PDM and PO, the tentative AP, and the initial capacity assessment (CA) which JET conducted at the start of Output 2 activity from April to August 2011.

The CD plan was prepared in order to achieve the outputs described in PDM that should be consistent with the needs of capacity development identified in the APs and CA results. The CD plan is also a basic framework of WP which was prepared by JET and the WG members to carry out the project activities of each output concretely. Figure 2.2-1 shows the relationships among PDM, PO, the tentative APs, the CD plans, and the WPs and functions of PDM, PO, CD plan, and WP.



Source: JET

Figure 2.2-1 Framework of Output 2 Activities

2.2.1 Introduction

2.2.1.1 Water Quality Monitoring Activities in Vietnam

The basic framework of water quality monitoring in Vietnam is stipulated in LEP describing environmental monitoring at the national and provincial levels and private sector. According to LEP, the Provincial People's Committee (PPC) shall organize the environmental status monitoring within the province while the provincial-level specialized agencies shall work out plans on environmental monitoring network in their locations. Also, PPC shall have to submit provincial environmental status reports including status and changes in the quality of water environment to the People's Councils and MONRE once every five years.

The national monitoring network in Vietnam was approved by the Prime Minister's Decision on Master Plan Monitoring Network on National Natural Resources and Environment until 2020 in January 2007 (Decision No.16/2007/QD-TTg). The monitoring network coverage is divided into three categories: 1) environmental monitoring network, 2) water resources monitoring network, and 3) hydrometeorology monitoring network. There are three phases to create nationwide monitoring networks by 2020, namely, Phase 1: 2007-2010, Phase 2: 2011-2015, and Phase 3: 2016-2020. With respect to surface water quality, 60 monitoring stations comprise the environmental monitoring network while 270 monitoring stations comprise the water resource monitoring network. The water quality monitoring activities at provincial level have been mostly carried out by the monitoring section and/or monitoring centers as an extra-departmental body of DONRE.

2.2.1.2 PDM and PO

The PDM and PO were agreed between the Vietnamese side and JICA in January 2010. Based on discussions at the 4th JCC meeting in June 2012, it was revised in August 2012. Table 2.2-1 shows the items related to monitoring (WG2-1) in the revised PDM and PO.

Table 2.2-1 Items Related to Monitoring in PDM and PO

	Item	Contents
PDM	Output	Enforcement capacity of target DONREs on basic water pollution control (environmental monitoring, pollution sources inventory, and pollution sources inspection) is strengthened.
	Objectively Verifiable Indicators	2-1-1 Draft revised monitoring plans of key rivers are prepared. 2-1-2 Draft revised monitoring reports in 2012 are prepared by DONREs, and shared with concerned organizations.
	Means of Verification	2-1-1 Draft revised monitoring plans 2-1-2 Draft monitoring reports
	Activities	C1-1 Review of water quality monitoring guidelines/manuals ⁽¹⁾ . C1-2 Based on the above guidelines/manuals (revised if necessary), laws and regulations in Vietnam, and international guidance, prepare and improve a monitoring plan, taking into consideration the regional characters at target DONREs. C1-3 Implement regular monitoring in accordance with laws and regulations in Vietnam. C1-4 Conduct training on water quality monitoring including quality control to improve reliability of monitoring. (note: change training contents based on situations of target DONREs) C1-5 Interpret and evaluate results of monitoring and feedback to the annual and biannual monitoring reports. ⁽¹⁾ Guidelines/manuals prepared by the Study for Water Environment Management on River Basins and the Project for Enhancing Capacity of Vietnamese Academy of Science and Technology in Water Environment Protection Phase II are also included.
PO	C1-1	April 2011
	C1-2	May 2011
	C1-3	June 2011-April 2013 (continuous activities)
	C1-4	August 2011-April 2013 (continuous activities)
	C1-5	March-April 2012 and March-April 2013

Source: JET

2.2.1.3 Initial Capacity Assessment

As first step of the CD, JET implemented CA to determine the current capacities at the levels of individual (working level), organization and institution/society (managing level), and to set the baseline for the objectively verifiable indicators concerning monitoring described in PDM. Based on the gaps between the current capacity and the capacity necessary to fulfil the mandates given to DONRE as well as the objectively verifiable indicators, the Project prepared a CD plan. The CAs were

implemented through discussion meetings and preparation of WP with target DONRE. Table 2.2-2 shows the current capacity of monitoring and the capacity to be improved in each DONRE.

Table 2.2-2 Results of Initial Capacity Assessment of Monitoring

Item	HNI	HPG	TT-HUE	HCMC	BRVT
0) Framework of water quality monitoring	a) Organization - CENMA b) Staff for monitoring - 40 staff (including laboratory analysis) c) Annual budget - VND 18 billion/yr (USD 860,400/yr) d) Job description - Development of monitoring plan, sampling, and report preparation	a) Organization - HACEM b) Staff for monitoring - 7 staff c) Annual budget - VND 850 million/yr (USD 40,800/yr) d) Job description - same as HNI	a) Organization - Monitoring Division in EPA b) Staff for monitoring - 7 staff c) Annual budget - VND 290 million/yr (USD 15,000 in 2009, including surface water, coastal, and groundwater) d) Job description - same as HNI	a) Organization - Division of Environmental Quality Monitoring and Assessment in HEPA b) Staff for monitoring - 14 staff c) Annual budget - VND 8.3 billion/yr (USD 394,400/yr) d) Job description - same as HNI	a) Organization - Monitoring Division in CEMAB b) Staff for monitoring - 5 staff c) Annual budget - VND 1.6 billion/yr (USD 80,000 in 2010, including all of the activities in CEMAB) d) Job description - same as HNI
1) Development or updating of monitoring Plan	Yearly monitoring plan for 2013 by CENMA themselves	Five-year monitoring plan for 2012-2016 developed by the local consultant for PPC	Yearly monitoring plan for 2013 developed by the local consultant for PPC	same as HPG DONRE	Five-year monitoring plan for 2010-2015 developed by the local consultant for PPC
2) Implementation of regular monitoring for river water quality	a) Monitoring points - 500 points b) Frequency: - 2 times/yr (polluted stations: 12 times/yr) c) Substances: - 31 parameters d) Laboratory analysis - implemented by the Analysis Division of CENMA	a) Monitoring points - 15 points b) Frequency: - 6 times/yr c) Substances - 16 parameters d) Laboratory analysis - implemented by the Analysis Division of HACEM - pesticides, herbicides are analyzed in an external laboratory	a) Monitoring points - 32 points: b) Frequency: - 4 times/yr c) Substances - 12 parameters d) Laboratory analysis - outsourcing - laboratory under construction - to be analyzed by TT-HUE DONRE	a) Monitoring points - 20 points b) Frequency: - monthly c) Substances - 19 parameters d) Laboratory analysis - outsourcing	a) Monitoring points - 25 points b) Frequency: - 6 times/yr c) Substances - 13 parameters d) Laboratory analysis - implemented by the Analysis Division of CEMAB - pesticides are analyzed in an external laboratory
3) Quality control for monitoring data	No experience on statistical evaluation of monitoring data	same as HNI DONRE	same as HNI DONRE	same as HNI DONRE	same as HNI DONRE
4) Data management system for monitoring	Operating data management system including preparation of format of monitoring results will be stored, setting rules for data inputting, checking, sharing, and back-up.	same as HNI DONRE	No data management system such as preparation of format of monitoring results will be stored, setting rules for data inputting, data checking, data sharing, and data back-up.	same as HNI DONRE	same as HNI DONRE
5) Data analysis and report preparation	a) Data analysis - checking compliance with QCVN, historical trend - reflection data to the new monitoring plan b) Report preparation - annual report - semi-annual report c) Sharing with others - PPC and VEA d) Countermeasures - reporting to DONRE when unexpected pollution event has occurred	a) Data analysis - same as HNI DONRE b) Report preparation - annual report - semi-annual or quarterly report c) Sharing with others - PPC and VEA d) Countermeasures - same as HNI DONRE	a) Data analysis - checking compliance with QCVN b) Report preparation - annual report - semi-annual report c) Sharing with others - PPC and VEA d) Countermeasures - investigation by EPA when unexpected pollution event has occurred	a) Data analysis - same as HNI DONRE b) Report preparation - annual report - quarterly report - monthly report c) Sharing with others - PPC and VEA d) Countermeasures - same as HNI DONRE	a) Data analysis - checking compliance with QCVN b) Report preparation - annual report - by-monthly report c) Sharing with others - PPC and VEA d) Countermeasures - same as HNI DONRE
6) Main capacities to be improved	a) Improvement of skills for revising monitoring plan b) Improvement of skill for data analysis and report preparation to identify the characteristics of water pollution	a) Improvement of skills for understanding and reviewing the monitoring plan prepared by PPC b) Same as HNI DONRE	a) Improvement of skills for understanding and reviewing the monitoring plan prepared by PPC b) Same as HNI DONRE c) Lack of data management system	a) Improvement of skills for understanding and reviewing the monitoring plan prepared by PPC b) Same as HNI DONRE	a) Improvement of skills for understanding and reviewing the monitoring plan prepared by Swedish ODA Project (SEMLA) b) Same as HNI DONRE

Source: JET

2.2.1.4 Capacity Development (CD) Plan

A CD plan was prepared in order to achieve the outputs described in PDM and PO and check its progress based on capacity needs to be developed in the tentative APs and CA results. The CD plan consists of four phases: initial (Phase I), mid-term 1 (Phase II), mid-term 2 (Phase III), and final (Phase IV). Each phase sets CD objectives, work contents, expected outputs, facilitator, and target group.

The CD plan for WG2-1 (monitoring) was developed to attain the final objective of “strengthening the implementation capacity of target DONREs on environmental monitoring as a basic water pollution control measure”, as shown in Table 2.2-3. Among the five areas on technical aspect, all target DONREs requested JET to improve and develop their capacity on revising water quality monitoring plan (related to Indicator 2-1-1), the interpretation of water quality monitoring results and report preparation (related to Indicator 2-1-2) as shown in the table. In addition, TT-HUE DONRE requested for the establishment of a structured data management system.

Table 2.2-3 Capacity Development Plan for WG 2-1 (Monitoring)

Phases Items	Phase I (Initial)	Phase II (Mid-term 1)	Phase III (Mid-term 2)	Phase IV (Final)
CD Objectives	<ul style="list-style-type: none"> - Clarifying and sharing goals and objectives of the Project - Identification of current capacities and issues - Preparation of WP to strengthen C/P capacities for monitoring 	<ul style="list-style-type: none"> - To enhance the ability to review monitoring plan. - To enhance the ability on basic data analysis and report preparation such as analyzing long-term historical trend, longitudinal trend, etc. - To enhance the ability to establish data management system for monitoring (TT-HUE). 	<ul style="list-style-type: none"> - To enhance the ability to update reviewed monitoring plan. - To enhance the ability on advanced data analysis and report preparation such as statistical analysis. - To enhance the ability to use and maintain data management system for monitoring (TT-HUE). 	<ul style="list-style-type: none"> - To enhance the ability to monitor activities including review of monitoring plan, data analysis, report preparation, and data management system by DONRE themselves. - To enhance the ability to train District DONRE staff on the above monitoring activities.
Work Contents	<ol style="list-style-type: none"> 1) Assessment of existing capacities for monitoring 2) Analysis of gaps between required capacity and the situation at the beginning of the Project. 3) Development of WP based on the tentative action plan and analysis of capacity gaps 4) Initial training on the review of monitoring plan 5) Initial training on the operation of provisional data management system (only TT-HUE) 	<ol style="list-style-type: none"> 1) Workshop on the review of monitoring plan 2) Training on data analysis and report preparation at the selected area 3) Training on the operation of provisional data management system for monitoring and preparation of its manual (only TT-HUE) 	<ol style="list-style-type: none"> 1) Follow-up training on the review of monitoring plan 2) Training on data analysis and report preparation for the whole province 3) Training on the operation of data management system for monitoring and revision of the manual (only TT-HUE) 	<ol style="list-style-type: none"> 1) Review of monitoring plan by C/P themselves 2) Implementation of data analysis and report writing by C/P themselves 3) Operating data management system for monitoring by C/P themselves (only TT-HUE) 4) Holding workshops for dissemination of the outputs for monitoring
Expected outputs	<ul style="list-style-type: none"> - WP for monitoring 	<ul style="list-style-type: none"> - Draft revised monitoring plans - Revised annual monitoring report at selected area - Draft manual for data management system for monitoring (TT-HUE) 	<ul style="list-style-type: none"> - Draft handbook for improvement of water quality monitoring activities at the target DONRE 	<ul style="list-style-type: none"> - Revised monitoring plans - Revised annual monitoring report for the whole province - Manual for data management system for monitoring (TT-HUE) - Handbook for the improvement of water quality monitoring activities at the target DONRE
Facilitator	JET	JET	JET	JET
Target Group	Members of WG 2-1 and associated members	Members of WG 2-1 and associated members	Members of WG 2-1 and associated members	Members of WG 2-1 and associated members
CD activity	Joint work between C/Ps and JET	Joint work between C/Ps and JET	Joint work between C/Ps and JET	Joint work between C/Ps and JET
Period	April 2011-August 2011	September 2011-March 2012	April 2012-September 2012	October 2012-June 2013

Source: JET

2.2.1.5 Preparation of Work Plans (WPs)

The WPs for monitoring were prepared for each target DONRE through discussions between JET and C/Ps based on the tentative APs, CD plans, and results of CA. Table 2.2-4 summarizes the framework of WPs for the implementation of CD activities on monitoring. There are eight technical aspects for capacity development on monitoring in accordance with the five activities described in PDM. Between the eight technical aspects, only structured data management system was implemented for TT-HUE DONRE. The other seven technical aspects were commonly implemented in all target DONREs.

Table 2.2-4 Framework of WPs for the Implementation of CD Activities on Monitoring

Activities	Technical Aspects	Approach	Actual Activity	Target
C1-1 Review water quality monitoring guidelines/manuals.	1) Preparation of guidelines/manuals	There are many documents related to monitoring that were developed not only in Vietnam but also in foreign countries. JET reviewed the above documents and prepared the "Handbook for Improvement of Monitoring Performance" based on the documents and implemented project activities.	1. Discussion meetings and seminars were implemented as follows: a) Discussion meetings for the introduction of existing monitoring guidelines/manuals b) Seminars and discussion meetings to share the Handbook for Improvement of Monitoring Performance and change its opinions	1.Target organizations - HNI, HPG, TT-HUE, HCMC, BRVT DONRE 2.Target staff - Staff who are in charge of monitoring and water quality analysis 3.Target stakeholders -Water Resource Management Division and Pollution Control Division in DONRE
C1-2 Based on the above guidelines/manuals (revised if necessary), laws and regulations in Vietnam, and international guidance, prepare and improve a monitoring plan, taking into consideration the regional characters at target DONREs.	2) Preparation/revision of water quality monitoring plan	Most of the monitoring plans were developed by local consultants for PPCs and not by DONRE themselves, thus, they need to clarify the objectives of monitoring as the first step to get basic skills and knowledge for the development of monitoring plan. In this connection, JET provided the following training: 1. Utilization of the Data Quality Objective (DQO) process for revising water quality monitoring plan regarding the following items: a) Formalizing monitoring procedures b) Numbers and locations of sampling stations c) Frequency of sampling d) Parameter of measurements	1. Lectured training and workshop were implemented as follows: a) Introduction training for DQO Process (1 day training at each DONRE) b) Workshop for designing water quality monitoring plan based on DQO Process (3-day workshop at each DONRE) c) On-the-job-training (OJT) for development of the revised monitoring plans of key rivers	1.Target Organization - HNI, HPG, TT-HUE, HCMC, BRVT DONRE 2. Target staff - Staff who are in charge of monitoring 3.Target stakeholders - Analysis Division of Monitoring Center, Water Resource Management Division, and Pollution control Division in DONRE
C1-3 Implement regular monitoring in accordance with laws and regulations in Vietnam.	3) Implementation of regular monitoring	All DONREs have already implemented regular monitoring in accordance with their existing monitoring plans. Thus, JET followed up on the implementation of regular monitoring by DONRE as necessary.	1. Discussion meetings combined with other activities were implemented.	1.Target Organization - HNI, HPG, TT-HUE, HCMC, BRVT DONRE 2.Target staff - Staff who are in charge of monitoring 3.Target stakeholders - Analysis Division of Monitoring Center
C1-4 Conduct training on water quality monitoring including quality control for improving reliability of monitoring. (note: change training contents based on situations of target DONREs)	4) QA/QC in sampling and laboratory analysis	Establishment of QA/QC procedures that were applied to in-house laboratory analysis or to outsourced laboratory work (See details in WP of WG 2-2: Water Quality Analysis).	See detail in WP of WG 2-2	See detail in WP of WG 2-2
	5) QC for monitoring data by statistical techniques	Most of DONREs did not check the monitoring results from the view point of statistics; thus, they need to get techniques such as reliability of monitoring results of existing monitoring, number of sampling to get accurate results, and to interpret unexpected results. In this connection, JET provides the following training: 1. Introduction of basic statistical techniques for the quantitative assessment of differences and changes in water quality based on the existing monitoring results.	1. Lecture training and discussion meeting were implemented as follows: a) Lecture training on the introduction of statistic techniques (1-day training at each DONRE) b) Discussion meeting to share handbook for statistical analysis of water quality data	1.Target Organization - HNI, HPG, TT-HUE, HCMC, BRVT DONRE 2.Target staff - Staff who are in charge of monitoring 3.Target stakeholders - Analysis Division of Monitoring Center
	6) Structured data management	Only TT-HUE DONRE did not have structured data management system including preparation of format of	1. Group exercise and OJT courses were implemented as follows:	1.Target Organization - TT-HUE DONRE 2.Target staff

Activities	Technical Aspects	Approach	Actual Activity	Target
	systems	monitoring result to be stored, setting rules for data inputting, data checking, data sharing, and data-back up. Therefore, JET provided the following training to TT-HUE DONRE: 1. Development of structured data management system to facilitate access to water quality data for subsequent reporting and analysis through group exercises and its operation.	a) Group exercise for development of the data management system (1 day) b) OJT and trial operation of data management system (continuous training)	Monitoring Division of EPA, TT-HUE 3.Target stakeholders - Laboratory analysis Section of EPA
C1-5 Interpret and evaluate results of monitoring and feedback to the annual/biannual monitoring reports	7) Analysis of water quality monitoring results	Most of the monitoring reports in the target DONREs described compliance only with QCVN, historical trend for the last 2 years, and longitudinal trend, thus, they need to implement not only the above analysis but also to understand interaction between water environment, pollution sources, impact to water sources, pollution mechanism, and so on. In this connection, JET provided the following training: 1.Introduction of data analysis based on the existing monitoring data a) interaction between water environment and pollution sources b) relationships among contaminants c) water pollution mechanism	1. Lecture training and OJT courses were implemented. a) Basic data analysis training for checking standard, longitudinal trend, historical trend, water quality status mapping and so on (1-day training at each DONRE) b) OJT for data interpretation and application of basic statistical techniques for data evaluation	1.Target Organization - HNI, HPG, TT-HUE, HCMC, BRVT DONRE 2.Target staff - Staff who are in charge of preparing the monitoring report 3.Target stakeholders - Other divisions in Monitoring Center, Water Resource Management Division, and Pollution Control Division in DONRE
	8) Report preparation and dissemination	Besides the improvement of analysis of water quality monitoring results mentioned above, JET provided the following training for report preparation and dissemination: 1. Introduction of guidelines for writing environmental monitoring report to restructure its contents and make the objectives clear to the readers. 2. OJT for writing environmental monitoring report based on the above guidelines.	1. Lecture training and OJT courses were implemented. a) Lecture training on the introduction of guidelines (1-day training at each DONRE) b) OJT for report preparation based on the guidelines (1 or 2 days training at each DONRE)	1.Target Organization - HNI, HPG, TT-HUE, HCMC, BRVT DONRE 2.Target staff - Staff who are in charge of preparing monitoring report 3.Target stakeholders - Other divisions in Monitoring Center, Water Resource Management Division, and Pollution Control division in DONRE

Source: JET

2.2.2 Activities

2.2.2.1 Activities Compared with PO

Figure 2.2-2 shows the progress of the project activities of Component 1 of Output 2, namely, activities of both WG 2-1 on monitoring and WG 2-2 on water quality analysis, in comparison with PO. All of the five project activities of Component 1 are pertinent to WG 2-1, and are described in this section. The activity C1-4 is related to both WG 2-1 and WG 2-2, and details of C1-4 activity conducted by WG 2-2 are evaluated in Section 2.3.

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Source: JET

Figure 2.2-2 Progress of Project Activities

2.2.2.2 Activity C1-1: Review Water Quality Monitoring Guidelines/Manuals

(1) Summary of the Activity Compared with PO

Activity C1-1 was conducted from April to November 2011 by JET and each DONRE through several discussion meetings. The activity was completed in November 2011.

In April 2011, JET reviewed the existing guidelines/manuals related to water quality monitoring developed by the past JICA projects in Vietnam and by international organizations in foreign countries. Moreover, several discussion meetings between JET and each DONRE were carried out. However, the MONRE Circular for Regulation on Technical Process of Surface Water Monitoring (Circular No.29/2011/TT-BTNMT) was subsequently issued on 1 August 2011 and became effective on 15 September 2011. Consequently, JET reviewed the existing guidelines/manuals again together with the circular in November 2011.

(2) Results of the Activity

Among the guidelines/manuals in Table 2.2-5, the first priority of DONRE is to follow Circular No.29/2011/TT-BTNMT to implement surface water quality monitoring. In addition, the “Guideline for Designing Water Quality Monitoring System at River Basin Level” prepared by JICA and CEM/VEA is useful for DONRE staff to understand the design of monitoring system because the guideline was prepared based on actual monitoring activities by DONREs and regulations related to water quality in Vietnam. Furthermore, the “Guidance on Systematic Planning Using DQO Process” is a strong support tool for staff in DONRE to practically develop and review water quality monitoring plan.

In response to this, the activity on “C1-2: prepare and improve a monitoring plan taking into consideration the regional characters at target DONREs” was carried out based on the application of DQO process, and taking into account MONRE circular and the guidelines for designing water quality monitoring.

Table 2.2-5 Reviewing the Existing Guidelines for Water Quality Monitoring

No	Name of the Material	Source	Availability		Results of Review
			EN	VN	
1	Water quality monitoring manual (revision) “Monitoring Handbook for Water Quality Monitoring”	The Project for Enhancing Capacity of Vietnamese Academy of Science and Technology in Water Environment Protection Phase II (2009-2011)	OK	OK	Partially Useful Most of contents of the guidelines are based on WHO guidelines but parts of the analysis method follow the Vietnamese analysis method. The Vietnamese version of the handbook was prepared by VAST/IET.
		World Health Organization (WHO)	OK	N/A	
2	Guideline for Designing Water Quality Monitoring System at River Basin Level	The Study for Water Environment Management on River Basins in Vietnam (2008-2010)	OK	OK	Useful This guideline is prepared for river water monitoring. It includes procedure to design monitoring plan, and method of evaluating the monitoring results. By adding some information, the guidelines will be very useful for our project.
3	Guidance on Systematic Planning Using DQO Process	US Environmental Protection Agency (2006)	OK	N/A	Useful The DQO process is used to develop performance and acceptance criteria (or data quality objectives) that clarify study objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions. The process is a systematic approach which can be applied to all types of environmental monitoring, surface, ground and marine waters, air and noise quality, and contaminated land.
4	Circular for Regulation on Technical Process of Surface Water Monitoring (Circular No.29/2011/TT-BTNMT)	VEA/MONRE (2011)	N/A	OK	Very Useful This circular is the first regulation for the state management agencies on environment in the central and local governments in Vietnam to guide technical procedure on surface water monitoring.

Source: JET

2.2.2.3 Activity C1-2: Prepare and Improve a Monitoring Plan Taking into Consideration the Regional Characters at Target DONREs

(1) Summary of the Activity compared with PO

According to PO, activity C1-2 was scheduled to be in May 2011. However, after some trials, target DONREs decided to continuously conduct the activity on revising the monitoring plan of the key rivers in August 2011 because it is better for DONRE to take some time to get the actual skills and know-how on reviewing and revising monitoring plans by itself even after completion of the Project. Finally, all the activities related to activity C1-2 were completed in March 2013.

The following activities were carried out during the project period. The contents of the activities of each DONRE are shown in Table 2.2-6.

- Introduction to a DQO based monitoring plan (August 2011);
- Workshops on the development of a DQO based monitoring plans (November and December 2011);
- Identification of data and information to be collected for revising monitoring plans of key rivers (February 2012);
- Collection of necessary data and information for revising monitoring plans of key rivers (March to November 2012); and
- Preparation of draft revised monitoring plans of key rivers (March 2012 to March 2013).

Table 2.2-6 Activities for the Preparation and Improvement of Monitoring Plan (Activity C1-2)

DONRE	Contents of Training and Date	Status
HNI	Introduction to DQO based monitoring plan (August 2011) Workshops on development of DQO based monitoring plan (December 2011) Collection of necessary data and information for revising monitoring plan of the Red River (March to August 2012)	Completed in January 2013

DONRE	Contents of Training and Date	Status
	Preparation of revised monitoring plan of the Red River (March to October 2012) Approval of revised monitoring plan and its implementation (November 2012 to January 2013)	
HPG	Introduction to DQO based monitoring plan (August 2011) Workshops on development of a DQO based monitoring plan (November 2011) Collection of necessary data and information for revising monitoring plan of the Re River (March to October 2012) Preparation of revised monitoring plan of the Re River (October 2012 to January 2013) Budget adjustment of revised monitoring plan and its implementation (February to March 2013)	Completed in February 2013
TT-HUE	Introduction to DQO based monitoring plan (August 2011) Workshops on development of a DQO based monitoring plan (November and December 2011) Collection of necessary data and information for revising monitoring plan of the Huong River (March to October 2012) Preparation of revised monitoring plan of the Huong River (October 2012 to January 2013) Budget adjustment of revised monitoring plan and its implementation (February to March 2013)	Completed in March 2013
HCMC	Introduction to DQO based monitoring plan (August 2011) Workshops on development of a DQO based monitoring plan (November 2011) Collection of necessary data and information for revising monitoring plan of the Sai Gon River (March to October 2012) Preparation of revised monitoring plan of the Sai Gon River (May to December 2012)	Completed in December 2012
BRVT	Introduction to DQO based monitoring plan (August 2011) Workshops on development of a DQO based monitoring plan (November 2011) Collection of necessary data and information for revising monitoring plan of the Dinh River (March to October 2012) Field survey in Dinh River basin for revised monitoring plan (August 2012) Preparation of revised monitoring plan of the Dinh River (May to January 2012)	Completed in January 2012

Source: JET

(2) Overall Results of the Activity

In the first year (March 2011–March 2012), the target DONREs enhanced their technical knowledge and skills for preparation of systematic monitoring plans based on DQO process by means of one-day lectures and three-day workshops by JET from August to December 2012. The outline of DQO process is shown in Box 2.2.2-1. In the workshops, DONREs and JET selected a key river in each province as shown in Table 2.2-7 to practically and efficiently acquire technical knowledge and skills on revising monitoring plan.

Accordingly, DONREs started to collect necessary information for revising monitoring plan of key rivers such as water quality status, hydrological structure, water intake points, pollution sources, and available resources for monitoring with the support of JET from March 2012.

Table 2.2-7 Selected Key Rivers for the Preparation of Draft Revised Monitoring Plan

DONRE	River	Reason for Selection
HNI	Red River	The Red River functions as a major and important water supply for agriculture and water navigation not only for HNI but also for North Vietnam. Due to the fact that it is a transboundary and interprovincial river, it is important to monitor the water quality of the river before and after flowing through Hanoi City. The previous monitoring plan of the Red River just combined the plan of the old Hanoi City with the plan of Ha Tay Province in accordance with the expansion of Hanoi City area in 2008. HNI CENMA needs to optimize the monitoring plan based on the two old monitoring plans. In this connection HNI DONRE selected the Red River for the preparation of draft revised monitoring plan.
HPG	Re River	The Re River is the main river supplying drinking water to Hai Phong City. Every year, the Re River supplies roughly 45 million m ³ of water to An Duong Water Plant, serving 80% of the city's population. It also waters 10,000 ha of cultivated land in An Duong and Hong Bang districts. Recently from the monitoring results, it is shown that the pollution is becoming more and more severe. Some pollutants such as Fe, TSS, NO ₂ , Phenol are always exceeding the QCVN 08:2008 level A2. Besides, other outputs (inventory, inspection, and environmental awareness) also focused on the Re River. In this connection HPG DONRE selected the Re River for the preparation of draft revised monitoring plan.
TT-HUE	Huong River	The Huong River is the most important river in Thua Thien-Hue Province. There are a lot of water usages from upstream to downstream such as drinking water for approximately 300,000 residences in the center of Hue City, dams for hydropower supply and flood control, irrigation for vast area of cultivated land, and recreational activities by tourism boats. Besides, a new multi-purpose dam in the upstream of the Huong River (Ta Trach River) has been constructed and will be completed in 2014. Therefore, TT-HUE DONRE needs to revise the monitoring plan of Huong River in accordance with the construction of dam. In this connection, TT-HUE DONRE selected the Huong River for the preparation of draft revised monitoring plan.
HCMC	Sai Gon River	The Sai Gon River is the main water supply source for Ho Chi Minh City supplying water for 68% of the basin's population with a total volume of 330,000 m ³ /day, subject to increase to 930,000 m ³ /day in 2020. It also waters not

DONRE	River	Reason for Selection
		only for 12,000 ha of cultivated land in Ho Chi Minh City alone but also for water navigation and developing the aquaculture activities in the south of the city. However, water quality in the upstream of water intake point has been declined due to wastewater from the industrial zone of other provinces. So, HCMC DONRE needed to reconsider monitoring plan of the Sai Gon River to check water quality for drinking usage. In this connection, HCMC DONRE selected the Sai Gon River for the preparation of draft revised monitoring plan.
BRVT	Dinh River	The Dinh River is the most important river in Ba Ria-Vung Tau Province since the Da Den Reservoir in the upstream supplies drinking water to approximately 400,000 residences in Ba Ria and Vung Tau cities. In addition, the downstream area of Dinh River (Cua Lap River) is also important for fishery, aqua-farming, and conservation of mangrove forest. However, many mangrove areas have already changed to shrimp farms and water quality of the Cua Lap River is getting worse recently due to rapidly increase of waste and wastewater from seafood processing facilities, shrimp farming, and so on. In this connection, BRVT DONRE selected the Dinh River for the preparation of draft revised monitoring plan.

Source: JET

Box 2.2.2-1 Data Quality Objective (DQO) Process

The DQO process is used to establish performance or acceptance criteria, which serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the objectives of a monitoring plan. The DQO approach consists of seven interactive steps. Each step of DQO process defines criteria that are used to establish the final data collection design. The first five steps are primarily focused on identifying qualitative criteria, such as:

- the question to be answered by carrying out the monitoring plan and a conceptual model of the environmental to be monitored;
- the information about the environment and where in the environment the data are collected;
- the measurements to be made and the frequency that they are made; and
- the analytic approach or decision rule that is applies to the data to draw conclusions from the monitoring.

The sixth step establishes acceptable quantitative criteria on the quality and quantity of the data to be collected. These criteria are known as performance or acceptance criteria, or DQOs. For compliance with a water quality standard as set out in QCVNs, DQOs are typically expressed in terms of an estimate of the uncertainty interval around an estimate of the mean concentration. For situations which result in a decision to do or not do something, DQOs are typically expressed as tolerable limits on the risk of the collected data leading to the making of an incorrect decision. These DQO feed into the seventh step to determine the level of replication of sampling to achieve acceptable uncertainty or risk.

In the seventh step the data collection design is developed and provides data meeting the quantitative and qualitative criteria specified at the end of Step 6. A data collection design specifies the type, number, location, and physical quantity of samples and data, as well as QA/QC activities. This is to ensure that sampling design and measurement errors are managed sufficiently to meet the performance or acceptance criteria specified in DQO. The outputs of the DQO process are used to develop QA Project Plan for the monitoring plan.

Source: JET quoted and arrangement from USEPA

On the second year (April 2012–March 2013), DONREs continued to collect necessary information for revising monitoring plans of key rivers and started to prepare revised monitoring plans in the rivers from June 2012.

All DONREs set the direction to revise the monitoring plans of key rivers based on collected data and information as well as through discussion meetings. Accordingly, all DONREs completed the preparation of the draft revised monitoring plans of key rivers with the support of JET by March 2013. Among target DONREs, HNI, HPG, and TT-HUE DONRE have officially started the implementation of the new monitoring plans of 2013 from February 2013 based on the revised monitoring plans of the key rivers. The detailed results of activity of each DONRE are as follows:

(3) Results of the Activity of HNI DONRE

Unfortunately, the objective of the previous monitoring plan of the Red River was not clearly understood because the former deputy director of CENMA, who developed the monitoring plan of the Red River, has retired in December 2011. Therefore, CENMA and JET decided to develop a new monitoring plan in the Red River from the first principles while drawing information available from the previous monitoring program. In May 2012, CENMA started drafting the revised monitoring plan of the Red River for 2013 based on hydrological structure, water intake points, and distribution of pollution sources with support of JET. Then CENMA submitted the draft plan to HNI DONRE in the middle of August 2012 which was the deadline for budget request for 2013.

The main change from the previous monitoring plan of the Red River is the increase in monitoring frequency from two to four times per year to meet the new circular on surface water quality monitoring (Circular No.29/2011/TT-BTNMT). On the other hand, the number of monitoring stations was reduced from 40 stations to 20 stations to offset the effect of the cost increase due to the doubling of monitoring frequency. The 20 monitoring stations were strategically positioned along the Red River in order to understand water quality variation of the river. Table 2.2-8 shows the framework of the

revised monitoring plan of the Red River and Figure 2.2-3 shows the locations of the monitoring stations in the plan.

DWRM in HNI DONRE, in charge of technical assessment of monitoring plans, approved the revised monitoring plan from the technical viewpoint in August 2012. HNI DONRE finally approved the revised monitoring plan for 2013 in January 2012.

CENMA has started to review the monitoring plan of the To Lich River in the urban areas of Hanoi City by utilization of the experience on revising the monitoring plan of the Red River as an activity of post project.

Table 2.2-8 Framework of the Revised Monitoring Plan of the Red River

Target River	Expected Time to Start	Monitoring Plan in 2012	Revised Monitoring Plan	Key Points for Revising the Monitoring Plan
Red River	From 2013	1) No. of stations: 40 stations 2) Frequency: 2 times/yr 3) Parameters 31 parameters; COD, BOD ₅ , DO, CN ⁻ , NH ₄ ⁺ , Cl ⁻ , NO ₃ ⁻ , NO ₂ ⁻ , PO ₄ ³⁻ , F ⁻ , oil and grease, TSS, total phenol, As, Cu, Pb, Zn, Fe, Mn, Ni, Cr ³⁺ , Cr ⁶⁺ , pesticide, Hg, surface-active agent, and coliform	1) No. of stations: <u>20 stations</u> 2) Frequency: <u>4 times/yr</u> 3) Parameters 31 parameters (did not change); COD, BOD ₅ , DO, CN ⁻ , NH ₄ ⁺ , Cl ⁻ , NO ₃ ⁻ , NO ₂ ⁻ , PO ₄ ³⁻ , F ⁻ , Oil & Grease, TSS, total phenol, As, Cu, Pb, Zn, Fe, Mn, Ni, Cr ³⁺ , Cr ⁶⁺ , pesticide, Hg, surface-active agent, and coliform	1) To increase monitoring frequency to meet the circular on guideline of surface water quality monitoring (Circular No.29/2011/TT-BTNMT) 2) To relocate monitoring stations which can cover the understanding of water quality variations in comparison with the monitoring plan of 2012

Source: CENMA and JET

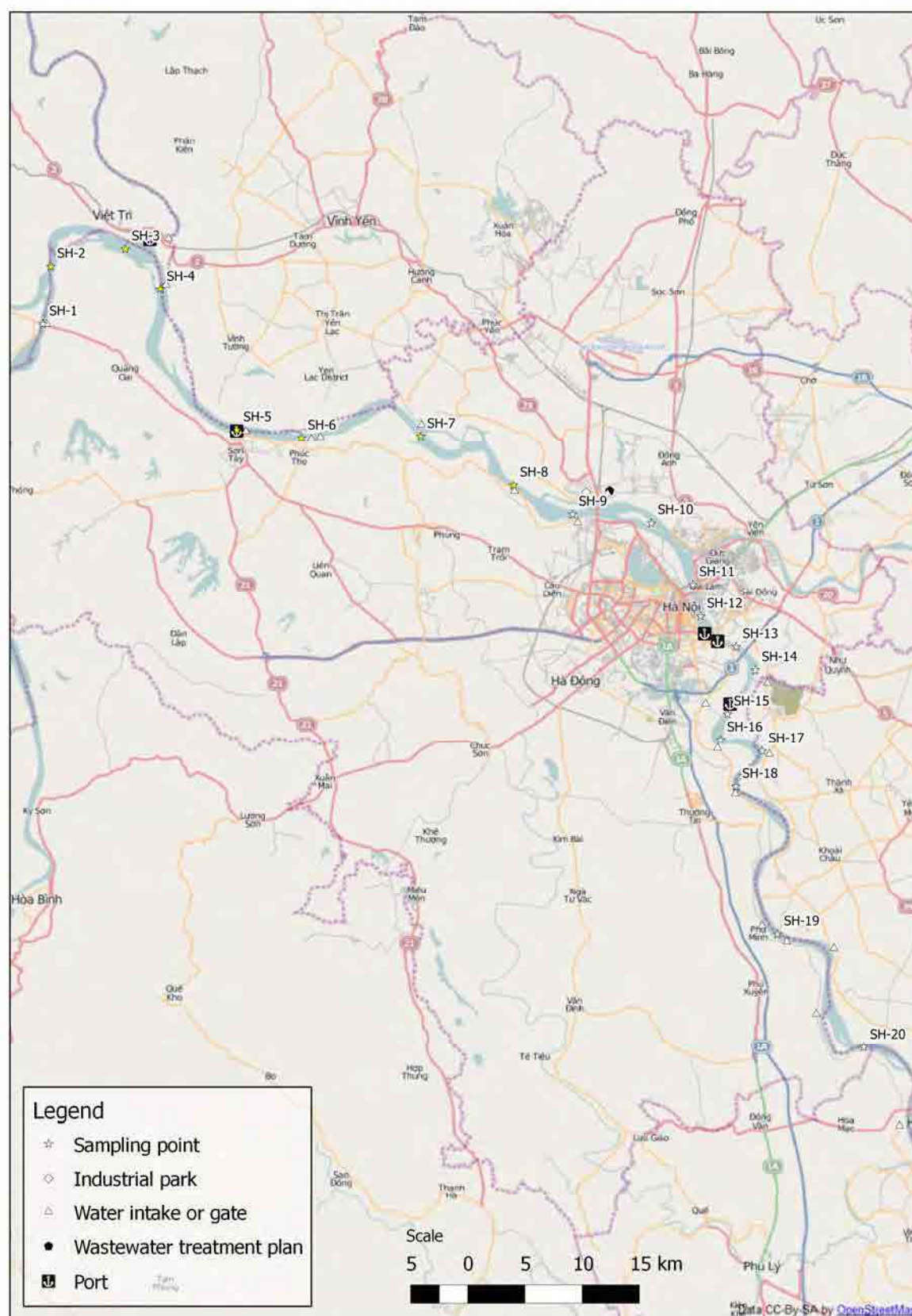
(4) Results of the Activity of HPG DONRE

HACEM has already increased the number of monitoring stations of the Re River from three to six stations within their existing budget since the 2011 monitoring plan. HACEM and JET held several discussion meetings on how to strengthen water quality monitoring of the Re River for pollution control and for protection of drinking water resources. Table 2.2-9 shows the framework of the revised monitoring plan of the Re River for 2013 and Figure 2.2-4 shows the locations of the monitoring stations in the plan.

There are two main points in the revised plan for 2013, as follows:

- First, HACEM added two more monitoring stations: 1) at the most upstream of the Re River (CT3 gate, SR-1) to check background water quality, and 2) at Sen Gate (SR-2) to check impact from pollution sources located in Hong Phong and Bac Son communes and water quality for irrigation use. Furthermore, if HACEM can get enough budget, two more stations for the monitoring plan of the Re River after 2013 will be added: 1) at the upstream of the An Duong Industrial Zone to be constructed for comparison of upstream and downstream water quality to check impact from the industrial zone and 2) at the end point of Bac Nam Hung Channel (An Tri gate) reaching the Re River including wastewater from pollution sources.
- As for the second point, HACEM added two more parameters, namely, turbidity and PO₄⁻, to meet the requirement of the decision on the calculation of water quality index (Decision 879/QD-TCMT). On the other hand, measurement of some heavy metal parameters at some stations where compliance with the standards had been more than 80% in the previous five years, would be reduced from six times/year to one to three times/year to compensate for the budget increase due to the increase of monitoring stations.

HACEM completed the preparation of the draft revised monitoring plan of the Re River in accordance with the above framework in December 2012. Accordingly, HACEM prepared an official monitoring plan of the Re River for 2013 based on the revised monitoring plan in February 2013. HACEM started to implement the Re River monitoring in accordance with the official monitoring plan of the river from February 2013.



Source: CENMA and JET

Figure 2.2-3 Location of the Revised Monitoring Stations in the Red River

Table 2.2-9 Framework of the Revised Monitoring Plan of the Re River

Target River	Expected Time to start	Monitoring Plan in 2012	Revised Monitoring Plan	Key Points for Revising the Monitoring Plan
Re River	From 2013	1) No. of stations: 6 stations 2) Frequency: 6 times/yr 3) Parameters 20 parameters; Temperature, pH, turbidity, EC, odor, color, salinity, DO, TSS, BOD ₅ , COD, NO ₃ ⁻ , NH ₄ ⁺ , Zn, Cu, Cd, Pb, T-Coliform, oil and grease, and total pesticides (Aldrin, Dieldrin, Endrin, DDT, Lindan)	1) No. of stations: <u>8 stations</u> 2) Frequency: <u>6 times/yr</u> (did not change) 3) Parameters <u>22 parameters (Maximum):</u> Temperature, pH, EC, odor, color, salinity, DO, TSS, <u>turbidity</u> , BOD ₅ , COD, NO ₃ ⁻ , NH ₄ ⁺ , <u>PO₄⁻</u> , Zn, Cu, Cd, Pb, T-Coliform, oil and grease, and total pesticides (Aldrin, Dieldrin, Endrin, DDT, Lindan)	1) To add two more monitoring stations for strengthening pollution control and conservation of drinking water resources 2) To increase monitoring parameters to comply with the decision on calculation of water quality index (Decision 879/QĐ-TCMT)

Source: HACEM and JET



Source: HACEM and JET

Figure 2.2-4 Location of the Revised Monitoring Stations in the Re River

(5) Results of the Activity of TT-HUE DONRE

TT-HUE DONRE EPA and JET had several discussion meetings about how to strengthen water quality monitoring of the Huong River especially for protection of drinking water resources. Table 2.2-10 shows the framework of monitoring plan of the Huong River for 2013 and Figure 2.2-5 shows the locations of the monitoring stations in the draft plan. There are two main points of modification in the revised plan as follows:

- As for the first point, EPA is going to add two monitoring stations; 1) at the downstream point of Ta Trach Reservoir to check impact from construction activities and 2) at the downstream of the Huu Trach River before confluence point with the Ta Trach River to check impact of water pollution from the Huu Trach River.

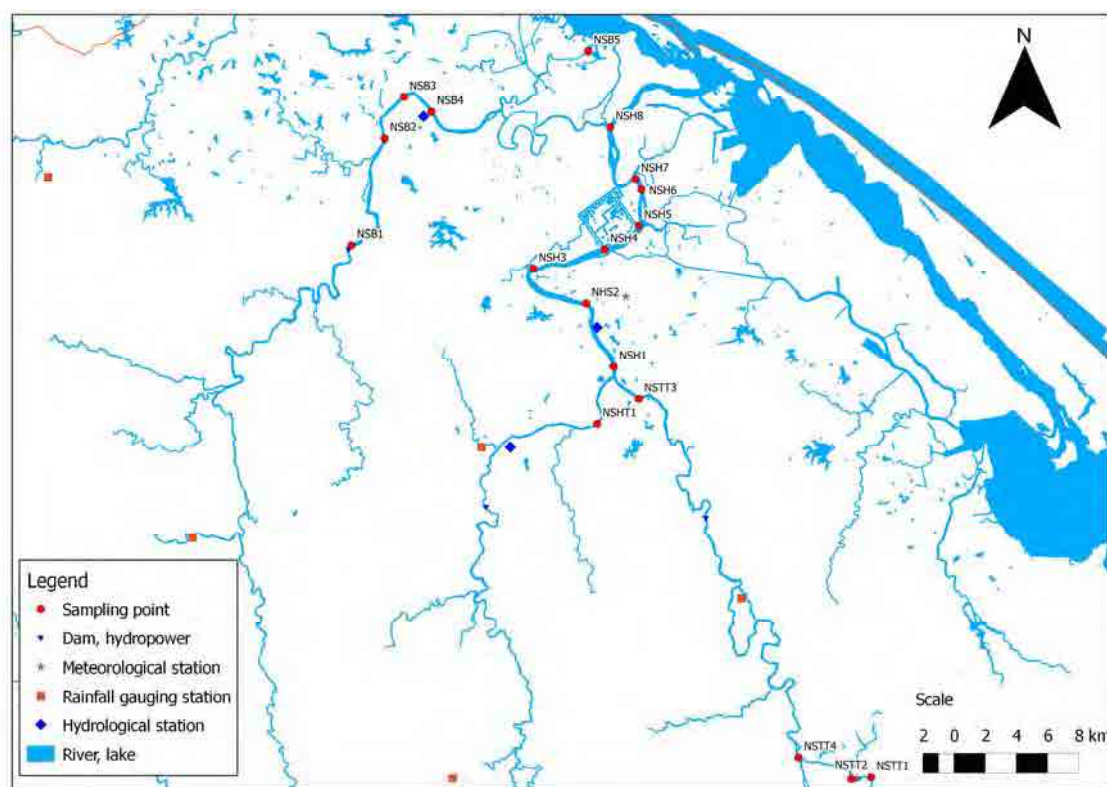
- As for the second point, the monitoring division added two more parameters, temperature and NH_4^+ , to meet the requirement of the decision on calculation of water quality index (Decision 879/QD-TCMT).

EPA completed preparation of the draft revised monitoring plan of the Huong River in accordance with the above framework in December 2012. EPA prepared an official monitoring plan of the Huong River for 2013 based on the revised monitoring plan in March 2013. Consequently, EPA also started to implement the Huong River monitoring in accordance with the official monitoring plan of the river from March 2013.

Table 2.2-10 Framework of the Revised Monitoring Plan of the Huong River

Target River	Expected Time to Start	Monitoring Plan in 2012	Revised Monitoring Plan	Key Points for Revising the Monitoring Plan
Huong River	From 2013	1) No. of stations 10 stations (Huong River) 6 stations (Tributaries) 2) Frequency 4 times/yr 3) Parameters: 12 parameters; pH, DO, COD, BOD_5 , TSS, turbidity, NO_3^- , PO_4^{3-} , Cl^- , Fe, EC, and total coliform	1) No. of stations 11 stations (Huong River) 8 stations (Tributaries) 2) Frequency 4 times/yr (did not change) 3) Parameters: 14 parameters; Temperature, pH, DO, COD, BOD_5 , TSS, turbidity, NH_4^+ , NO_3^- , PO_4^{3-} , Cl^- , Fe, EC, and total coliform	1) To add two more monitoring stations for checking water pollution impact from tributary and reservoir construction 2) To increase monitoring parameters to comply with the decision on calculation of water quality index (Decision 879/QD-TCMT)

Source: EPA and JET



Source: EPA and JET

Figure 2.2-5 Location of the Revised Monitoring Stations in the Huong River and Its Tributaries

(6) Results of the Activity of HCMC DONRE

HCMC CEMA under HEPA has already increased the number of monitoring stations of the Sai Gon River from 20 to 22 stations because of the request from PPC to check the river before and after construction of new urban area. CEMA and JET had several discussion meetings on how to strengthen water quality monitoring of the Sai Gon River for pollution control and protection of drinking water resources. Table 2.2-11 shows a framework of monitoring plan of the Sai Gon River for 2014 and Figure 2.2-6 shows the locations of the monitoring stations in the draft plan.

As the key point in the revised plan in 2014, CEMA added four more monitoring stations; 1) two stations at the upstream of Hoa Phu Water Pumping Station in the Sai Gon River to check the impact from pollution sources in the upstream area and the water quality for domestic use, 2) one station to check impact from pollution sources from other provinces, and 3) one station to strengthen monitoring network to estimate possible water quality changes from upstream to downstream in the urban area of Ho Chi Minh City.

Table 2.2-11 Framework of the Draft Revised Monitoring Plan of the Sai Gon River

Target River	Expected Time to Start	Monitoring Plan in 2012	Draft Revised Monitoring Plan	Key Points for Revising the Monitoring Plan
Sai Gon River	From 2014	1) No. of stations: 22 stations 2) Frequency 48 times /yr for basic parameters 12 times /yr for all parameters 3) Parameters 18 parameters pH, temperature, turbidity, salinity, TSS, DO, BOD ₅ , COD, NH ₄ ⁺ , PO ₄ ³⁻ , E-coli, coliform, Pb, Hg, Cd, Cu, Mn, oil and grease	1) No. of stations: <u>26 stations</u> 2) Frequency (did not change) 48 times /yr for basic parameters 12 times /yr for all parameters 3) Parameters 18 parameters (did not change) pH, temperature, turbidity, salinity, TSS, DO, BOD ₅ , COD, NH ₄ ⁺ , PO ₄ ³⁻ , E-coli, coliform, Pb, Hg, Cd, Cu, Mn, oil and grease	1) To add four more monitoring stations for strengthening pollution control and conservation of drinking water resources

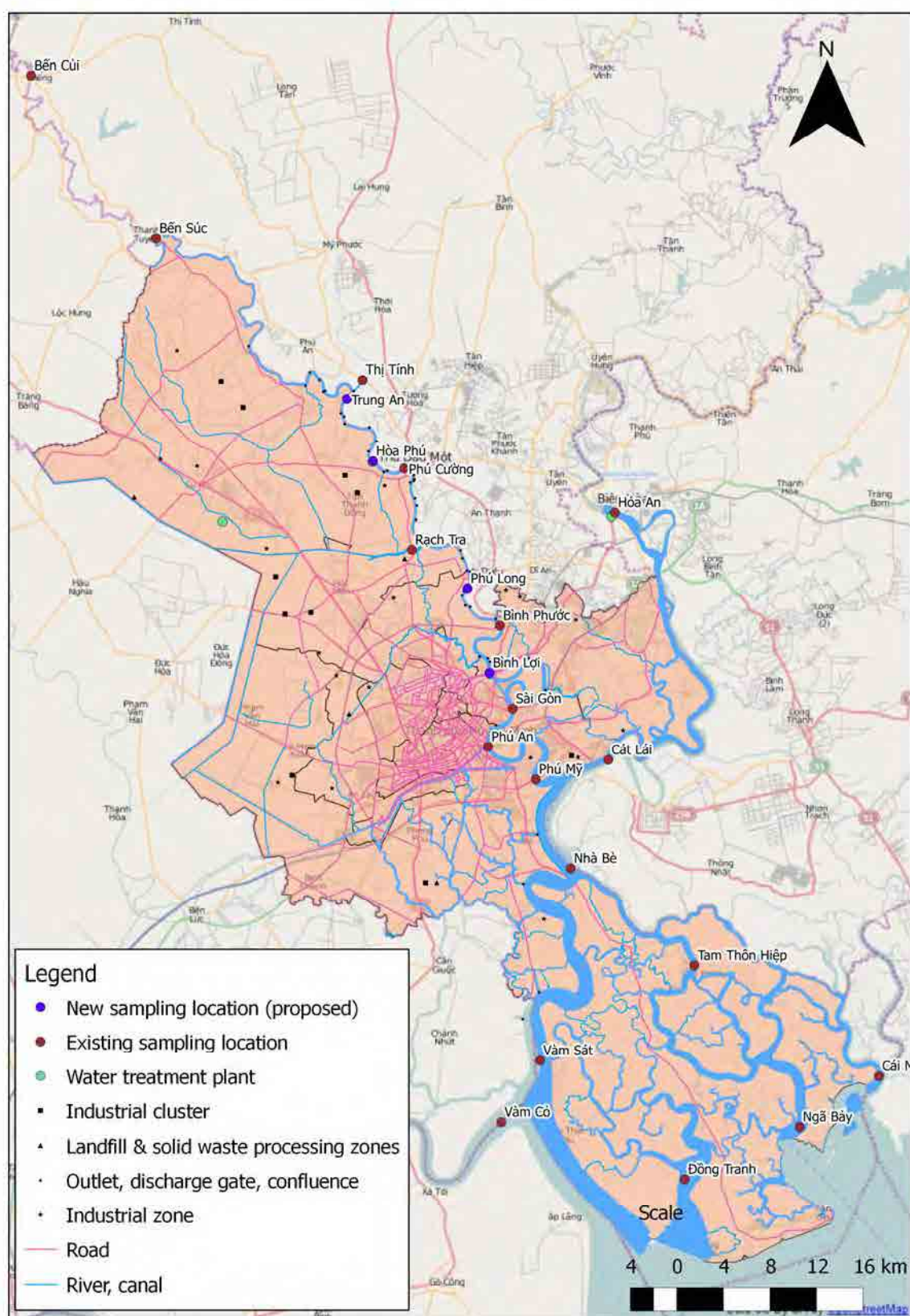
Source: CEMA and JET

CEMA completed preparation of the draft revised monitoring plan of the Sai Gon River in accordance with the above framework in December 2012. Accordingly, CEMA has been preparing a proposal for budget request for implementation of the Sai Gon River monitoring in 2014 in accordance with the draft revised monitoring plan of the river from January 2014.

(7) Results of the Activity of BRVT DONRE

Environmental monitoring plans until 2015 and from 2016 to 2020 in Ba Ria-Vung Tau Province have already been approved by BRVT PPC. In this connection, BRVT DONRE decided to review the monitoring plan in the Dinh River and prepare the draft revised monitoring plan after 2015.

CEMAB and JET had several discussion meetings about how to strengthen water quality monitoring of the Dinh River for protection of drinking water resources and for control of pollution especially from seafood processing. Table 2.2-11 shows a framework of monitoring plan of the Dinh River after 2015 and Figure 2.2-8 shows the locations of the monitoring stations in the draft plan. To revise the plan, CEMAB conducted a four-day field survey in August 2012 by car and by boat to check hydrological structure, water intake points, and distribution of pollution sources, and to look for appropriate sampling points to be added (See Figure 2.2-7).



Source: CEMA and JET

Figure 2.2-6 Location of the Draft Revised Monitoring Stations in the Sai Gon River



Source: CEMA and JET

Figure 2.2-7 Photos of Field Survey in the Dinh River (implemented in August 2012)

There are two main points in the revised plan after 2015 and beyond as follows:

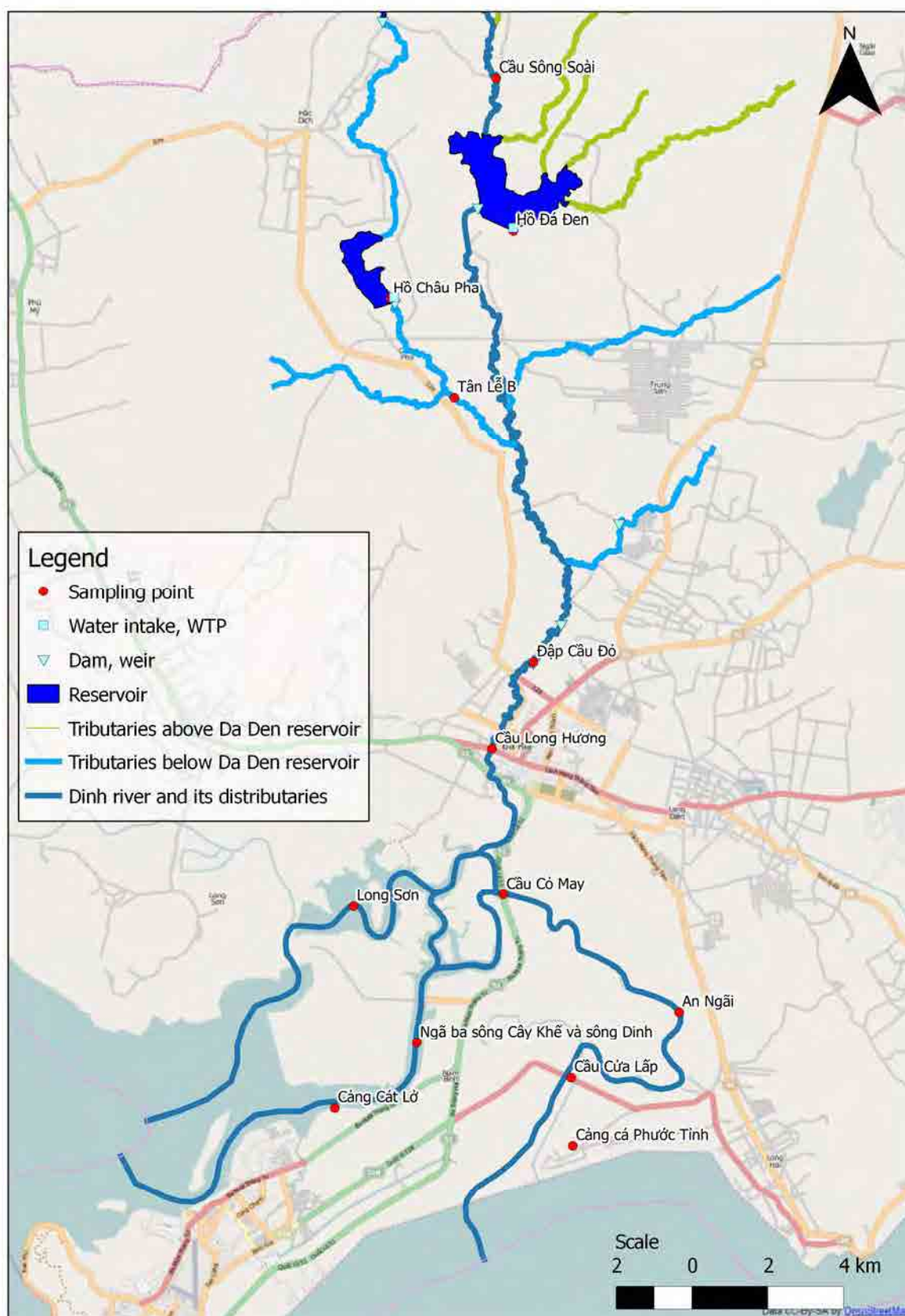
- First, CEMAB added three more monitoring stations: 1) at the downstream of Chau Pha reservoir to check impact from upstream area, 2) at the downstream of seafood processing factories zone to be constructed in the Cua Lap River to check impact on water pollution from the factories, and 3) at the downstream of the Mui Giui River to check impact on water pollution from aqua-farming. If the budget allows, CEMAB will add two more stations for the monitoring plan of the Re River from 2016: 1) at the inlet of Da Den Reservoir to check water quality for domestic use impact and 2) at the downstream of the Cua Lap River to check impact from small- and medium-scale seafood processing factories.
- Second, CEMAB is going to add two more parameters, namely, temperature and turbidity, to meet the requirement of the decision on calculation of water quality index (Decision 879/QD-TCMT).

CEMAB completed preparation of the draft revised monitoring plan of the Dinh River in accordance with the above framework in December 2012 and further improved the revised plan based on the feedback from the relevant organizations.

Table 2.2-12 Framework of the Draft Revised Monitoring Plan of the Dinh River

Target River	Expected Time to Start	Monitoring Plan in 2012	Draft Revised Monitoring Plan	Key Points for Revising the Monitoring Plan
Dinh River	After 2015	1) No. of stations 8 stations (River and brackish area) 3 stations (Lake) 2) Frequency: 6 times/yr 3) Parameters 12 parameters; pH, DO, SS, BOD ₅ , COD, PO ₄ ³⁻ , NO ₃ ⁻ , NO ₂ ⁻ , NH ₄ ⁺ , T-Fe, pesticides, and total-coliform (parameters are different from each monitoring station)	1) No. of stations 11 stations (River and brackish area) 3 stations (Lake) 2) Frequency: 6 times/yr 3) Parameters 14 parameters; <u>Temperature</u> pH, DO, SS, <u>turbidity</u> , BOD ₅ , COD, PO ₄ ³⁻ , NO ₃ ⁻ , NO ₂ ⁻ , NH ₄ ⁺ , T-Fe, pesticides, and total-coliform (parameters are different from each monitoring station)	1) To add three more monitoring stations for checking impacts from pollution sources 2) To increase monitoring parameters to comply with the decision on calculation of water quality index (Decision 879/QD-TCMT)

Source: CEMAB and JET



Source: CEMAB and JET

Figure 2.2-8 Location of the Draft Revised Monitoring Stations in the Dinh River Basin

2.2.2.4 Activity C1-3: Implement Regular Monitoring in Accordance with Laws and Regulations in Vietnam

(1) Summary of Activity Compared with PO

All target DONREs have implemented regular monitoring before the start of the Project based on their monitoring plans in accordance with laws and regulations in Vietnam. The Project activity on C1-3 started since May 2011 and completed on schedule in April 2013. The C1-3 activity is for DONREs themselves and the following activities were carried out during the project period. The contents of the activities of each DONRE are shown in Table 2.2-13.

- Implementation of regular monitoring in the key rivers based on the monitoring plans (all target DONREs)
- Strengthening of monitoring framework (HPG, TT-HUE, HCMC, and BRVT)
- Strengthening of function of organization (TT-HUE and HCMC)
- Improvement of sampling method (HNI)

Table 2.2-13 Activity on the Implementation of Regular Monitoring (Activity C1-3)

DONRE	Contents of Training and Date	Status
HNI	[Implementation of regular monitoring] 2011: Implementation of monitoring of the Red River (2 times/yr, 40 stations with 31 parameters) 2012: Same as 2011 2013: Implementation of monitoring of the Red River (4 times/yr, 20 stations with 31 parameters) [Improvement of sampling method] CENMA changes sampling method to "composite sampling" in the monitoring plan of 2013	Completed in April 2013
HPG	[Implementation of regular monitoring and strengthening of monitoring framework] 2011: Implementation of monitoring of the Re River (6 times/yr, 6 stations with 20 parameters) 2012: Same as 2011 2013: Implementation of monitoring of the Re River (6 times/yr, 8 stations with 22 parameters)	Completed in April 2013
TT-HUE	[Implementation of regular monitoring and strengthening of monitoring framework] 2011: Implementation of monitoring of the Huong River and its tributaries (4 times/yr, 16 stations with 12 parameters) 2012: Same as 2011 2013: Implementation of monitoring of the Huong River and its tributaries (4 times/yr, 18 stations with 14 parameters) [Strengthening the functions of the organization] TT-HUE DONRE newly established Environmental Monitoring and Analysis Station in the beginning of 2012.	Completed in April 2013
HCMC	[Implementation of regular monitoring and strengthening monitoring framework] 2011: Implementation of monitoring of the Sai Gon River (12 times/yr, 20 stations with 18 parameters) 2012: Implementation of monitoring of the Sai Gon River (12 times/yr, 22 stations with 18 parameters) 2013: Implementation of monitoring of the Sai Gon River (12 times/yr, 26 stations with 18 parameters) [Strengthening the functions of the organization] HEPA newly established Center for Environmental Monitoring and Analysis (CEMA) in March 2012.	Completed in April 2013
BRVT	[Implementation of regular monitoring and strengthening monitoring framework] 2011: Implement of monitoring of the Dinh River, its tributaries and lakes (6 times/yr, 11 stations with 12 parameters) 2012: Implement of monitoring of the Dinh River, its tributaries and lakes (6 times/yr, 11 stations with 14 parameters) 2013: Same as 2012	Completed in April 2013

Source: JET

(2) Results of the Activity of HNI DONRE

As for the implementation of regular monitoring in the key rivers, HNI CENMA has carried out regular monitoring of the Red River since 2006 and incorporated the monitoring plan of the Red River in old Ha Tay Province in the plan of old Hanoi City in accordance with the expansion of Hanoi City area in 2008. The framework of monitoring plan of the Red River has not changed since then as shown in Table 2.2-8.

With respect to the improvement of sampling method, CENMA previously took some samples from the river banks of the Red River at some stations. Therefore, water quality data at some monitoring stations were affected by local wastewater discharge and were not fully representative of the river water at those stations as a whole. In response to this, HNI DONRE EPA and DWRM suggested sampling method from grab sampling to composite sampling to monitor representative water quality at a station using by boat. CENMA has gradually changed the sampling method to composite sampling from 2013 in accordance with the suggestion.

(3) Results of the Activity of HPG DONRE

As for the implementation of regular monitoring and strengthening of monitoring framework in the key rivers, HACEM has carried out regular monitoring of the Re River since 2006. Furthermore, it increased the number of monitoring stations from three to six stations for pollution control and for protection of drinking water resources since the monitoring plan in 2011. Furthermore, HACEM strengthened the monitoring framework in 2013 by adding two more monitoring stations and two parameters through the activity on C1-2 as shown in Table 2.2-9.

(4) Results of the Activity of TT-HUE DONRE

As for strengthening the functions of the organization, TT-HUE DONRE EPA established a division known as the “Environmental Monitoring and Analysis Station” in November 2011 and assigned eight staff consisting of one head, one deputy head, five technical staff, and one accountant. The division is responsible for the preparation of a new monitoring plan and monitoring report.

With respect to the implementation of regular monitoring and strengthening of the monitoring framework in the key rivers, EPA has carried out regular monitoring of the Huong River since 2009. Moreover, it strengthened the monitoring framework in 2013 by adding to two more monitoring stations and two parameters for pollution control and for protection of drinking water resources through the activity on C1-2 as shown in Table 2.2-10.

(5) Results of the Activity of HCMC DONRE

As for strengthening the functions of the organization, HCMC EPA (HEPA) established CEMA in March 2012 to strengthen the function of environmental monitoring and analysis in HCMC. CEMA consists of one director and 35 technical staff with four divisions;

- i. Administrative Division;
- ii. Service and Consulting Division;
- iii. Analysis and Monitoring Division (12 staff); and
- iv. IT Division.

CEMA has been preparing a proposal for the establishment of a monitoring center and its operation. With respect to the implementation of regular monitoring and strengthening of monitoring framework in the key rivers, CEMA has carried out regular monitoring of the Sai Gon River since 2000. Moreover, it increased the number of monitoring stations for pollution control and for protection of drinking water resources year by year. During the project period CEMA strengthened the monitoring framework by adding to two more monitoring stations in 2012 and another four more in 2014 through the activity on C1-2 as shown in Table 2.2-11.

(6) Results of the Activity of BRVT DONRE

As for the implementation of regular monitoring and strengthening of monitoring framework in the key rivers, CEMAB has carried out regular monitoring of the Dinh River since 2007. Moreover, it increased the number of frequency of monitoring for pollution control and for protection of drinking water resources from four to six times per year since the monitoring plan in 2011. Furthermore, CEMAB strengthened the monitoring framework after 2013 by adding three more monitoring stations and two parameters through the activity on C1-2 as shown in Table 2.2-12.

2.2.2.5 Activity C1-4: Conduct Training on Water Quality Monitoring including Quality Control for Improving Reliability of Monitoring

(1) Summary of the Activity Compared with PO

Activity on C1-4 consists of activities related to WG 2-1 (monitoring) and WG 2-2 (water quality analysis). With respect to WG 2-1, the activities listed below have been conducted since August 2011. Finally, all the activities related to C1-4 were completed on schedule in March 2013.

The following activities were carried out during the project period. All activities are common activities among the target DONREs. The contents of the activities of each DONRE are shown in Table 2.2-14.

- QC for monitoring data by statistical techniques (September to December 2012);
- Establishment of data management system for water quality monitoring in TT-HUE (September 2011 to April 2013);
- Introduction of response to water quality incidents by monitoring sections through case study on water incidents in Japan (July 2012 and March 2013).

Table 2.2-14 Activity on the Improvement of Water Quality Monitoring (Activity C1-4)

DONRE	Contents of Training and Date	Status
HNI	QC for monitoring data by statistical techniques (September 2012) Introduction of countermeasures on water quality incident by monitoring sections (March 2013)	Completed in March 2013
HPG	Introduction of countermeasures on water quality incident by monitoring sections (July 2012) QC for monitoring data by statistical techniques (September to December 2012)	Completed in December 2012
TT-HUE	QC for monitoring data by statistical techniques (September to December 2012) Establishment of data management system for water quality monitoring (September 2011 to April 2013) Introduction of countermeasures on water quality incident by monitoring sections (July 2012)	Completed in April 2013
HCMC	QC for monitoring data by statistical techniques (September to December 2012) Introduction of countermeasures on water quality incident by monitoring sections (June 2012)	Completed in December 2012
BRVT	QC for monitoring data by statistical techniques (September to December 2012) Introduction of countermeasures on water quality incident by monitoring sections (June 2012)	Completed in December 2012

Source: JET

(2) Results of the Activity

1) QC for Monitoring Data by Statistical Techniques

In September 2012, a two-day training session on statistical data analysis were organized at each DONRE. The training is aimed to learn methodology of statistical data analysis for interpretation of monitoring data through lectures and hands-on practices.

In the first half of the training, JET introduced principal statistical techniques based on the Guidance for Data Quality Assessment prepared by US EPA. The WG2-1 members learned how to prepare dataset for various statistical tests, such as how to:

- i. Screen for outlier values;
- ii. Deal with values below detection limits;
- iii. Test for distributional assumptions;
- iv. Test for dispersion; and
- v. Transform data for statistical test, through lectures and self practices by the provided data.

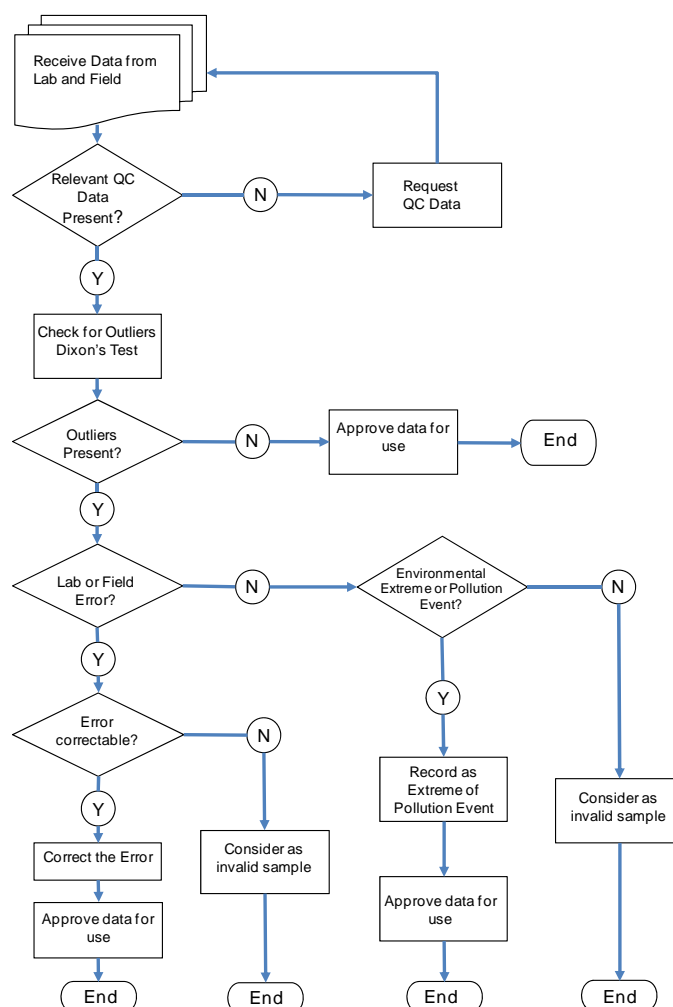
The WG 2-1 members also learned how to perform statistical test and interpret monitoring data statistically, such as how to compare measured values and how to compare measured values with standards. In the latter half of the training, the WG2-1 members practiced the above techniques using their own monitoring data to reflect the knowledge of statistical data analysis to their daily works. It was the first time for most of the DONREs' staff who are in charge of monitoring to verify assumptions of statistical test and carry out statistical analysis of temporal and spatial distributions.

After the training in September 2012, JET prepared "a Handbook for Statistical Analysis of Water Quality Data (statistical handbook)" to provide DONREs' staff with a step-by-step guide on how to use techniques to do the following:

- Identify extreme and outlier values;
- To maximize information where measurements indicate that environmental concentrations are below the limit of detection by the analytical method being used;
- To determine the confidence level of measured water quality meeting, or failing to meet, the relevant environmental water quality standard;
- To determine whether concentrations from two different locations or measured at two different times are different at a given level of confidence; and
- To determine whether a trend in concentration with respect to distance or time is significant at a given level of confidence.

The handbook is attached in the “Handbook for Improvement of Monitoring Performance” as the technical material for water quality monitoring and analysis. Furthermore, it also provides the flowcharts listed below to make DONREs’ staff use the statistical techniques easily. Figure 2.2-9 shows the flowchart on checking incoming data. Based on the statistical handbook, DONREs’ staff has conducted statistical data analysis to improve reliability of their monitoring data and reflecting it in the monitoring report. The flowcharts used are as follows:

- Checking incoming data;
- Managing non-detects;
- Testing for normality of data;
- Testing for compliance with a standard; and
- Testing for differences between two sets of data.
- Linear trend analysis



Source: JET

Figure 2.2-9 Flowchart on Checking Incoming Data

2) Training Activity for the Development of Data Management System

In the first year (March 2011 –March 2012), the monitoring section of TT-HUE DONRE EPA assembled past monitoring data into MS Excel format for data management and prepared a draft manual for the data management system in February 2012 with the support of JET. The draft manual was prepared based on the framework of data management system which TT-HUE EPA and JET defined in September 2011. The manual includes the data format of monitoring results to be stored, rules for data inputting, data checking, data sharing, and data back-up.

In the second year (April 2012–April 2013), TT-HUE DONRE EPA has implemented a trial operation of the data management system in accordance with “the draft manual for the data management system”. They stored past monitoring data from 2009 to March 2012 into the formatted MS Excel spread sheet. The stored data was used for basic data analysis and preparation of monitoring report in 2012.

The draft manual for data management system is also attached in the “ Handbook for Improvement of Monitoring Performance” as well as the statistical handbook.

3) Lecture Training on Water Incident and its Response of the Monitoring Section of the Local Government

Apart from the above activities, JET conducted the specific lecture training on water incident and response by the monitoring section of the local government in June and July 2012 at HPG, TT-HUE, HCMC, and BRVT DONRE and in March 2013 at HNI DONRE. JET introduced a drinking water incident in Tone River basin in Japan in May 2012 as a case study as summarized below:

- i. Outline and impact of the incident;
- ii. Response of the Monitoring Sections of the local governments; and
- iii. Collaboration with other sections (Pollution Control and Water Supply sections) of the local government, neighboring local government, and national government organizations.

At the end of the lecture training, JET and DONREs discussed the following implications of this case in Japan for daily activities of DONREs:

- Importance of the role of water quality monitoring before confluence point to detect polluted areas;
- Establishment of coordination mechanism among sections in DONRE, inter-DONREs, and water supply companies;
- Development of pollution source inventory and its utilization; and
- Continuous review of laws and regulations.

2.2.2.6 Activity C1-5: Interpret and Evaluate Results of Monitoring and Feedback to the Annual/Biannual Monitoring Reports

(1) Summary of the Activity Compared with PO

All target DONREs have prepared the annual/biannual monitoring reports including results of interpretation and evaluation of monitoring data to some extent as described in the results of the initial CA shown in Table 2.2-2. JET focused mainly on two components as follows:

- Improvement of capacities on technical skills and know-how for the interpretation and evaluation of monitoring data; and
- Improvement of structure and contents of existing monitoring report for readers.

The Project activity on C1-5 started in February 2012 and completed on schedule in April 2013. The activities listed below were carried out during the project period. The contents of the activities of each DONRE are shown in Table 2.2-13.

- Evaluation of current monitoring reports and identification of the contents to be improved in the reports (February and March 2012);

- Trainings on temporal-longitudinal trend analysis and calculation of water quality index (WQI) (February and March 2012);
- OJT for the preparation of monitoring report in 2012 (November 2012 to April 2013); and
- Training on advanced data training to understand chemical behavior from pollution source to environment (February and March 2013).

Table 2.2-15 Activity on Data Analysis and Report Preparation (Activity C1-5)

DONRE	Contents of Training and Date	Status
HNI	Evaluation of reports and identification of the contents to be improved in the reports (March 2012) Training on temporal-longitudinal trend analysis and calculation of WQI (March 2012) OJT for the preparation of monitoring report in 2012 (November 2012 to December 2012) Training on advanced data training to understand chemical behavior from pollution source to environment (March 2013)	Completed in March 2013
HPG	Evaluation of reports and identification of the contents to be improved in the reports (February 2012) Training on temporal-longitudinal trend analysis and calculation of WQI (February 2012) OJT for the preparation of monitoring report in 2012 (December 2012 to January 2013) Training on advanced data training to understand chemical behavior from pollution source to environment (February to March 2013)	Completed in March 2013
TT-HUE	Evaluation of reports and identification of the contents to be improved in the reports (February 2012) Training on temporal-longitudinal trend analysis and calculation of WQI (February 2012) OJT for the preparation of monitoring report in 2012 (December 2012 to April 2013) Training on advanced data training to understand chemical behavior from pollution source to environment (February 2013)	Completed in April 2013
HCMC	Evaluation of reports and identification of the contents to be improved in the reports (February 2012) Training on temporal-longitudinal trend analysis and calculation of WQI (February 2012) OJT for the preparation of monitoring report in 2012 (November 2012 to January 2013) Training on advanced data training to understand chemical behavior from pollution source to environment (March 2013)	Completed in March 2013
BRVT	Evaluation of reports and identification of the contents to be improved in the reports (February 2012) Training on temporal-longitudinal trend analysis and calculation of WQI (February 2012) OJT for the preparation of monitoring report in 2012 (November 2012 to January 2013) Training on advanced data training to understand chemical behavior from pollution source to environment (March 2013)	Completed in March 2013

Source: JET

(2) Overall Results of the Activity

1) Interpretation and Evaluation of Monitoring Data

In the first year (March 2011–March 2012), a one-day training session on basic data analysis were organized at each DONRE in February and March 2012. The training covered the initial stage of data analysis and report preparation. JET lectured on three topics on data analysis: 1) basic data analysis methods such as checking longitudinal and historical trend, 2) calculation of WQI stipulated in Decision No. 879/QĐ-TCMT, and 3) basic data analysis in brackish water areas. The outlines of each topic in the training are shown below:

(i) Longitudinal and Historical Trend Analysis

Longitudinal trend analysis is primarily intended to identify polluted areas in a river from upstream to downstream and identify critical areas to be controlled. Historical or time-trend analysis is to identify water quality variation over an extended period of time and to evaluate effects of water pollution control measures.

JET lectured DONREs' staff on basic data analysis methods such as longitudinal and historical trends based on the DONRE's monitoring data. Accordingly, DONRE carried out longitudinal and historical trends based on their monitoring data with the support of JET. Figure 2.2-10 shows four years historical data at representative monitoring points of the Dinh River in BRVT as an example. The data show that there is no clear trend on water quality change improvement or deterioration during the four years of monitoring. However, the target DONREs have only begun carrying out water quality monitoring since the latter half of the last decade and consequently, the data covered a

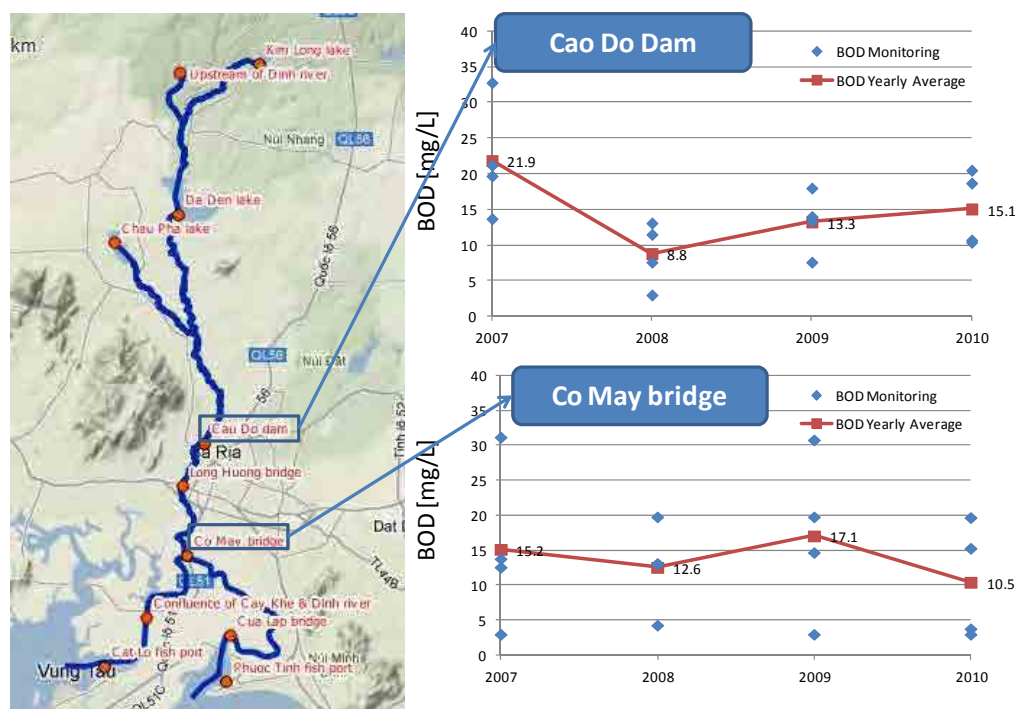
relatively short time period. The inclusion of additional years in the data sets will improve the ability to identify temporal changes more effectively.

(ii) Calculation of WQI

The VEA Decision No. 879/QĐ-TCMT Guideline on Calculation of WQI of Surface Water Environmental Monitoring was issued in July 2011. JET introduced the outline of the Decision, together with WQI methods in foreign countries, and examples of WQI calculation in Vietnam based on the decision and guidance handout prepared by CEM/VEA.

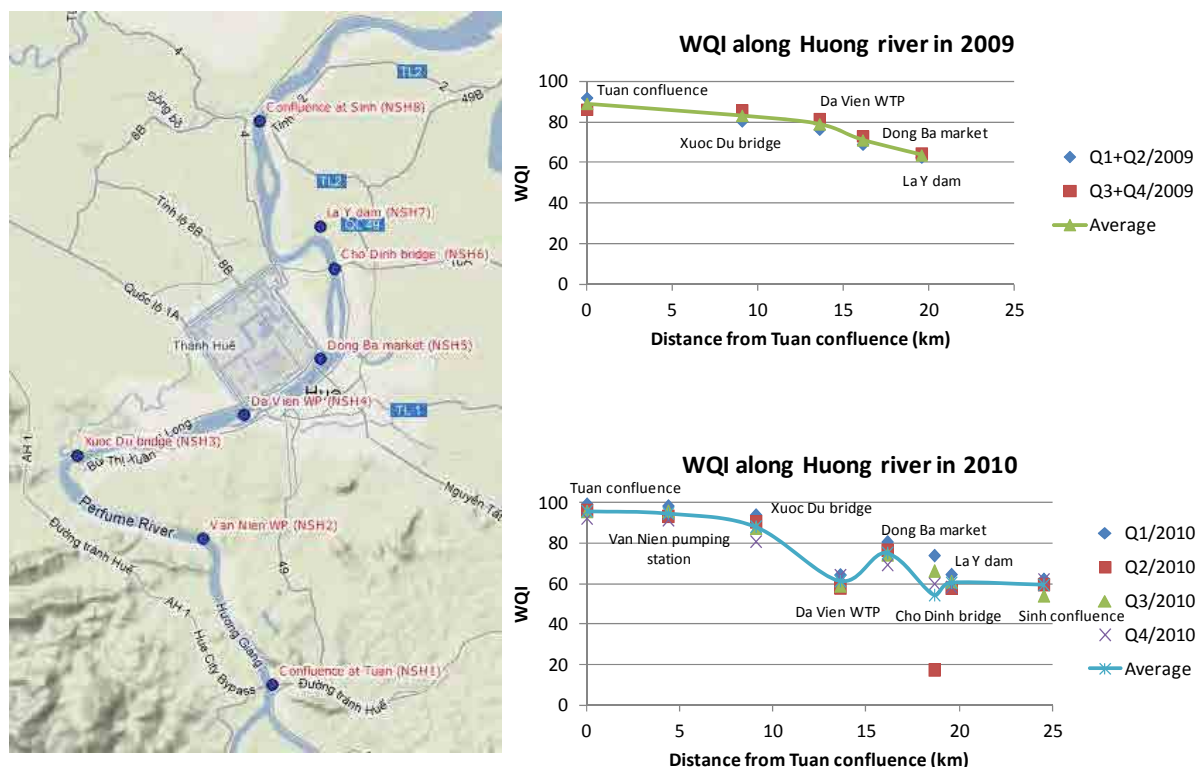
It appeared that the monitoring plans of all target DONREs did not cover all the parameters that the decision requires: BOD₅, COD, N-NH₄, P-PO₄, turbidity, TSS, coliform, DO, pH, and temperature. Consequently, DONRE have added the additional monitoring parameters for calculation of WQI to the monitoring plan of key rivers for the year 2013 (See activity on C1-2 in detail).

Figure 2.2-11 shows an example of the adoption of WQI of the Huong River in Thua Thien-Hue Province. The WQI score decreases from upstream to downstream because pollution load from domestic and urban areas reach to the river.



Source : JET quoted from Monitoring Report of BRVT DONRE

Figure 2.2-10 Four-year Historical Water Quality Trend of the Dinh River in Ba Ria-Vung Tau Province (BOD, Cao Do Dam and Co May Bridge)



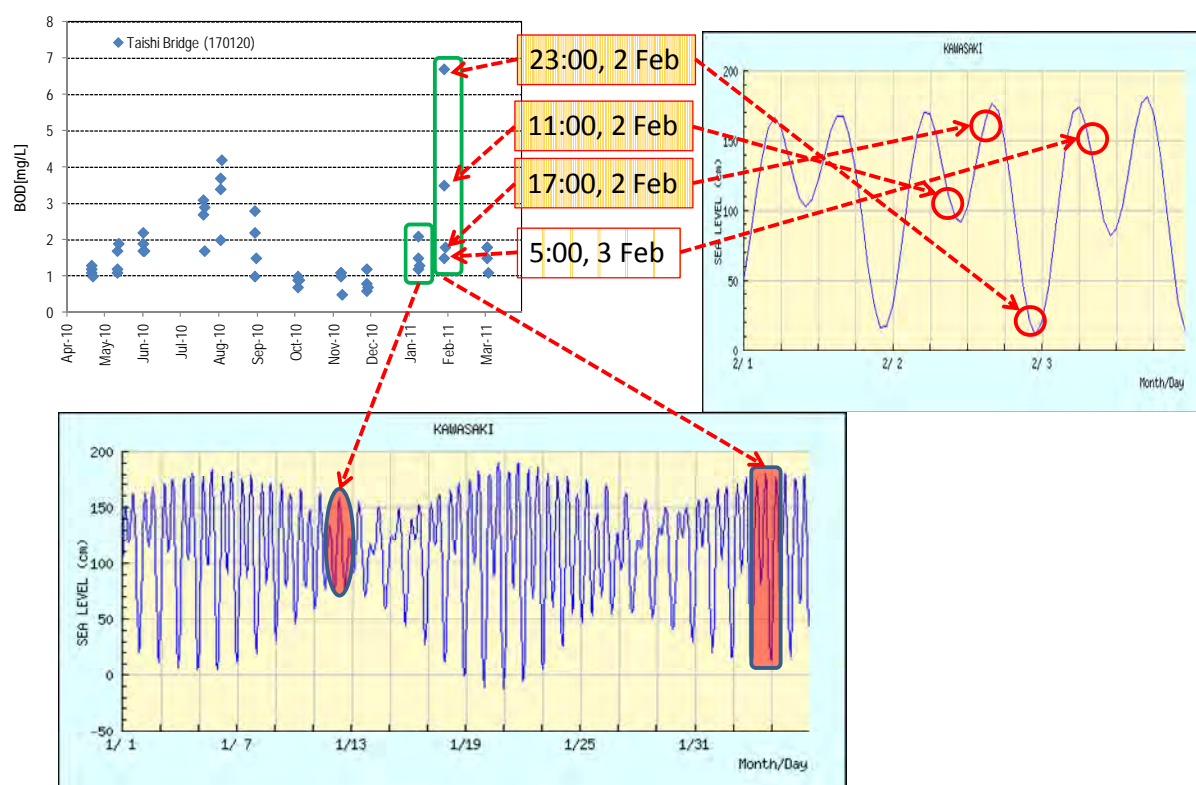
Source : JET quoted from Monitoring Report of TT-HUE DONRE

Figure 2.2-11 Longitudinal WQI Trend of the Huong River in Thua Thien-Hue Province

2) Basic Data Analysis in Brackish Water Area

Most of the rivers in the target provinces, except for Hanoi City, have downstream sections that lie partially within a tidal zone. Consequently, water quality varies depending on tidal state. JET lectured DONREs' staff to illustrate typical features of water quality in tidal zone. In the lecture, examples of data analysis were introduced based on monitoring data in the mouth of the Tama River, Tokyo. This provided an understanding of water quality variation affected by rainfall events, water quality fluctuations affected by sea level pattern, and vertical water quality profile at salt wage condition. DONRE checked availability of hydrometrological information and tidal information related to water quality.

As an example of data analysis in brackish water area, Figure 2.2-12 shows that the variation of BOD concentration during the monitoring day in January 2011 is smaller than that of February. It is because the sea level variation on monitoring in January 2011 was around neap tide and the fluctuation in February 2011 was around spring tide. Furthermore, it appeared that BOD concentration around the low tide (at 11:00 and 23:00 in February 2011) increased from the high tide period because organic matter in seabed was disturbed and moved to surface. Other examples are described in the "Handbook for Improvement of Monitoring Performance".



Source: JET quoted from database in Environmental Department of Tokyo Metropolitan Government and database in Japan Meteorological Agency

Figure 2.2-12 BOD Concentration in the Mouth of the Tama River Reaching Tokyo Bay and Sea Levels near the Monitoring Station in Tokyo Bay

3) OJT for the Preparation of Monitoring Report

In the first year (March 2011-March 2012), the target DONREs reviewed the contents of their monitoring report in 2011 and gave suggestions as to how the contents could be improved for the monitoring reports of 2012 through discussion meetings from March 2011 to March 2012.

In the second year (April 2012–April 2013), JET organized OJT for the preparation of the monitoring report of 2012 at each DONRE in November and December 2012. The OJT included how to prepare monitoring reports based on the guidelines for writing environmental monitoring reports, which JET prepared and is attached in the “Handbook for Improvement of Monitoring Performance”. The OJT also included restructuring of the contents of monitoring reports, and actual work on longitudinal and historical trend analysis, data interpretation, and other aspects of data presentation. The table of contents of the guidelines for writing environmental monitoring report is shown in Table 2.2-16. Accordingly, all DONREs completed the preparation of the monitoring report in 2012 with the support of JET in April 2013. The detailed results of the activity of each DONRE are shown in the section below:

Table 2.2-16 Contents of Guidelines for Writing Environmental Monitoring Report

Summary
1. Introduction
2. The Purpose and the Reader
2.1 Defining the Purpose
2.2 Identifying the Reader
2.3 Setting the Objective
3. Materials and Structure
3.1 Selecting our Material
3.2 Planning the Structure (Title Page, summary, table of contents, introduction, body of the text, conclusion,

recommendations, appendices, reference and/or bibliography, and glossary or nomenclature)
4. Style and Presentation
4.1 Style
4.2 Presentation of Data (Figures, graphs, drawings, photographs, tables, placement of tables and diagrams, references to figures and tables, numbering and labelling, figures and tables in appendices)
5. Finalization of the Report
5.1 Peer Review
5.2 Checklist
Appendices
Example structures for factual, instructive, and leading reports.

Source: JET

4) Understanding Chemical Behavior in the River

In February and March 2013, one-day trainings on advanced data analysis to understand chemical behavior from pollution source to environment were organized at each DONRE. The training is aimed to understand rivers and pollutants and how and why concentration changes.

The training on the use of quantitative statistical techniques enabled the DONRE staff to identify significant decreases or increases in the concentration between two successive sampling locations along a river or significant trends extending over a series of sampling locations. Having identified that a change in water quality exists, effective water quality management requires a cause to be associated with the observed effect. Over the period of training, it had become evident that the understanding of the basic physical, chemical, and biological process occurring in rivers were not clearly understood by many of the DONRE staff. In order to bring the staff to a level of basic understanding of the processes a one-day lecture program was developed to cover the key processes which included the following:

- i. River hydraulics
- ii. Pollution sources and techniques for
 - a. predicting occurrence pollutants based on type of pollution source
 - b. identifying possible sources based on 'fingerprint' pollutant combinations
- iii. Oxygen - its dynamics in the river driven by demands and replenishment from the atmosphere
- iv. BOD – from BOD₅ measurement to prediction of environmental concentrations
- v. The Simplified Streeter-Phelps model to demonstrate the predictability of the DO sag downstream of an outfall discharging BOD
- vi. The Nitrogen cycle – transformations from ammonia, through nitrite to nitrate and the interpretation of their concentrations in river water.
- vii. Total Coliform and Faecal/E.coli measurements. What do they measure and what do changes signify.
- viii. Prediction of bacterial 'die off' within the environment.
- ix. Changes in correlated determinants:
 - a. Those chemically/physically correlated – Suspended solids/turbidity and dissolved solids/conductivity
 - b. Those correlated through source
 - Domestic Wastewater: BOD₅, COD, ammonia, suspended solids, faecal coliforms, E. coli.
 - Meat Processing: BOD₅, COD, ammonia, suspended solids, fats and oils, faecal coliforms, E. coli.

(3) Results of the Activity of HNI DONRE

HNI CENMA produces three kinds of monitoring reports of the Red River in a year:

- i. Monitoring report in the dry season;
- ii. Monitoring report in the rainy season; and
- iii. Summary of monitoring report.

CENMA submits the monitoring reports to EPA, DWRM, and other departments in HNI DONRE. HNI DONRE shares the monitoring reports with VEA/MONRE in accordance with request from them.

The structure of the monitoring report is fine and no need to be changed as shown in Table 2.2-17. As the results of the OJT organized in November and December 2012, which addressed the preparation of the summary of monitoring report of the Red River in 2012, CENMA improved the contents of the report, in particular data interpretation, with support of JET as follows:

- Adding to the objective of monitoring;
- Date of sampling;
- Improving data interpretation on temporal and spatial trend analysis; and
- Dry Season and Wet Season Comparison.

Finally, CENMA officially submitted the summary of monitoring report of the Red River in 2012 to EPA, DWRM, and other departments in HNI DONRE in December 2013.

Table 2.2-17 Structure of the Summary of Monitoring Report of the Red River in 2012

Summary
1. Introduction
2. Background
3. Objective of Monitoring and Analysis
4. Method of Sampling and Analysis
4.1 Methods for Sampling and Preservation of Samples
4.2 Analysis Methods
4.3 Description of Sampling Locations
4.4 Date of Sampling
5. Results of Analysis
6. Results and Discussion of Monitoring Results
6.1 pH
6.2 DO Concentration
6.3 BOD5 Concentration
6.4 COD Concentration
6.5 TSS Concentration
6.6 Total Inorganic Nitrogen
6.7 Phosphate Concentration
6.8 Cyanide Concentration
6.9 Total Oil and Grease
6.10 Fe Concentrations
6.11 Other Measured Water Quality Parameters
6.12 Dry Season and Wet Season Comparison
7. Conclusions
8. Recommendations
Appendices
Results of Monitoring in the Dry season
Results of Monitoring in the Rainy season
Method of Analysis
References

Note: Table of Contents of the Monitoring Report in 2011 and 2012 are the same.

Source: HNI CENMA

(4) Results of the Activity of HPG DONRE

The HACEM produces two kinds of monitoring reports of three rivers in Hai Phong City in a year including the Re River”

- i. Monitoring report for each sampling time (six times/year); and
- ii. Annual monitoring report.

HACEM submits the monitoring reports to the vice chairman of PPC, EPA, DWRM, and other departments in HPG DONRE. HPG DONRE shares the monitoring reports with VEA/MONRE in accordance with the request from them.

The structure of the monitoring report is fine and there is no need for substantial changes as shown in Table 2.2-18. As the results of OJT organized in December 2012, which addressed the preparation of the annual monitoring report of three rivers in Hai Phong Province covering the period 2012,

HACEM, with support of JET, improved the contents of the report, in particular data interpretation, as follows:

- Improve data interpretation on spatial and temporal analysis;
- Comparison between seasons, analyze the impacts of hydrological and climate conditions to river water quality; and
- WQI calculation.

Finally, HACEM officially submitted the annual monitoring report of three rivers in Hai Phong City including the Re River in 2012 to EPA, DWRM, and other departments in HPG DONRE in March 2013. In addition, HACEM prepared another monitoring report of three rivers in Hai Phong City for 2008-2012 to disclose to public including introduction of activities of the Project.

Table 2.2-18 Structure of the Monitoring Report of Three Rivers in Hai Phong City in 2012

Introduction
I. Monitoring Plan
1.1. Monitoring Location
1.2. Monitoring Parameters
1.3. Frequency
II. Monitoring and Analysis
2.1. Methods and Equipment
2.2. Preservation of Samples
2.3. Quality Assurance Monitoring and Analysis
2.4. Results of Analysis
III. Evaluation Results
3.1. pH
3.2. Dissolved Oxygen (DO)
3.3. Biochemical Oxygen Demand (BOD5)
3.4. Chemical Oxygen Demand (COD)
3.5. Suspended solids (TSS)
3.6. Nitrate (NO ₃ ⁻)
3.7. Ammonium (NH ₄ ⁺ -N)
3.8. Coliform
3.9. Oil and Grease
3.10. Heavy Metals (Cd, Pb, Cu, Zn)
3.11. Pesticides
IV. Compassion of Monitoring Results in the Previous Years
V. Conclusions
VI. Recommendations
Appendix
Appendix 1: Map of Monitoring Locations
Appendix 2: Picture of Monitoring and Analysis Activities
Appendix 3: Record of Monitoring and Analysis

Note: Table of Contents of the Monitoring Report in 2011 and 2012 are the same.
Source: HACEM

(5) Results of the Activity of TT-HUE DONRE

The TT-HUE EPA produces two kinds of monitoring report for river, lagoon, and groundwater in Thua Thien-Hue Province in a year including the Huong River:

- i) Monitoring report in the first half of the year (results of 1st and 2nd sampling); and
- ii) Monitoring report in the last half of the year (results of 3rd and 4th sampling and summarizing the annual data).

Currently, the preparation of these reports is outsourced to an external consultant. The EPA submits the monitoring reports to the leader of TT-HUE DONRE. TT-HUE DONRE shares the monitoring reports with VEA/MONRE in accordance with request from them.

The OJT for report preparation of monitoring report was organized in December 2012. At that time EPA had not finished the work for improving monitoring report in 2012. During the OJT, EPA decided to officially share the monitoring report of 2012 which the outsourced consultant was in the process of preparing in TT-HUE DONRE.

In order to avoid unnecessary duplication of efforts involved in producing a second monitoring report for 2012, JET and TT-HUE DONRE decided to prepare a technical monitoring report of the Huong

River of 2012. This would improve the skills and know-how of DONRE staff on preparing effective monitoring reports for water quality management. The draft improved monitoring report was completed in April 2013 with support of JET. The structure of the draft improved monitoring report prepared by EPA is shown in Table 2.2-19. The EPA also added and improved the contents of the report especially data interpretation with support of JET as follows:

- Adding maps of sampling locations;
- Adding the overview of monitoring plan to the report;
- Improving data interpretation;
- Spatial comparison of water quality along the river; and
- Temporal comparison.

**Table 2.2-19 Improvement of Structure of the Monitoring Report in 2012
in Thua Thien-Hue Province**

Monitoring Report in 2011	Technical Monitoring Report in 2012
Preface	Summary
1. Objectives	1. Introduction
2. Objects and Study Methods	2. Background (Status of river, lake, lagoon, groundwater)
2.1 Scope of Study	3. Method
2.2 Objects of Study	3.1 Map of Monitoring Station
2.3 Study Methods	3.2 Sampling Time
3. Evaluation and Conclusion	3.3 Parameters
3.1 River and Lake Water Quality	3.4 Sampling Method
3.2 Lagoon Water Quality	3.5 Field Measurement
3.3. Groundwater Quality	3.6 Analysis in Laboratory
References	3.7 Data Processing Method
Appendices	4. Results
Laboratory Analysis Record	4.1 River Water
	4.2 Lake Water
	4.3 Lagoon Water
	4.4 Groundwater
	5. Conclusions and Recommendations
	5.1 Conclusion
	5.2 Recommendations
	References
	Appendices
	Laboratory Analysis Results
	Applied Water Quality Standard (QCVNs)
	List of Monitoring Stations
	Photograph for sampling

Source: JET

(6) Results of the Activity of HCMC DONRE

HCMC CEMA produces two kinds of monitoring reports for air, surface water, canal water, groundwater, and coastal water in Ho Chi Minh City including the Sai Gon River in a year;

- i. Monthly monitoring report at each sampling time; and
- ii. Annual monitoring report.

The CEMA submits the monitoring reports to HEPA, DWRM, department of finance, and other departments under HCMC DONRE. HCMC DONRE shares the monitoring reports with VEA/MONRE in accordance with request from them.

As the results of OJT, organized in November 2012, for report preparation of annual monitoring report for 2012, CEMA improved the structure of the monitoring report for readers as shown in Table 2.2-20. With support of JET, CEMA also improved the contents of the report especially data interpretation as follows:

- Improving data interpretation (taking into account the distance between stations) by spatial trend analysis;
- WQI calculation.

Finally, CEMA officially submitted the annual monitoring report in 2012 to HEPA, DWRM, Inspection Department, and other departments under HCMC DONRE in February 2013.

Table 2.2-20 Improvement of Structure of the Annual Monitoring Report in 2012 in HCMC

Monitoring Report in 2011	Monitoring Report in 2012
<p>I. Introduction of Environmental Monitoring System in Ho Chi Minh City</p> <p>1.1 Air Quality Monitoring System</p> <p>1.2 Water Quality and Hydrological Monitoring System</p> <p>1.3 Canal Water Quality Monitoring System</p> <p>1.4 Groundwater Quality Monitoring System</p> <p>1.5 Coastal Water Quality Monitoring System</p> <p>II. Results of Environmental Quality Monitoring in HCMC in 2011</p> <p>2.1 Results of Air Quality Monitoring</p> <p>2.2 Results of Hydrological Monitoring in Sai Gon and Dong Nai River Systems</p> <p>2.3 Results of Water Quality Monitoring in Sai Gon and Dong Nai River Systems</p> <p>2.4 Canal Water Quality Monitoring</p> <p>2.5 Groundwater Quality Monitoring</p> <p>2.6 Coastal Water Quality Monitoring</p> <p>3. Conclusion</p> <p>References</p> <p>Appendices</p> <p>Laboratory Analysis Record</p>	<p>I. Introduction of Environmental Monitoring System in HCMC</p> <p>1.1. Air quality Monitoring Network</p> <p>1.2. Surface Water Monitoring and Hydrological stations</p> <p>1.3. Water Quality Monitoring System for Inner-city Canals</p> <p>1.4. Groundwater Monitoring System</p> <p>1.5. Coastal Water Monitoring System</p> <p>II. Results of Environmental Quality Monitoring in HCMC in 2012</p> <p>2.1 Vehicle Emission Quality in Semi-real Time Monitoring Stations</p> <p>2.2 Conclusion</p> <p>III. Results of Hydrological Monitoring in Sai Gon-Dong Nai River Basin</p> <p>3.1 Status of Weather, Hydrology in Ho Chi Minh City</p> <p>3.2 Results of Measurement and Calculation of River Flow</p> <p>3.3 Conclusion</p> <p>IV. Results of Water Quality Monitoring in Sai Gon–Dong Nai River</p> <p>4.1 At Stations Supplying Water for HCMC</p> <p>4.2 Other Monitoring Stations</p> <p>4.3 Conclusion</p> <p>V. Results of Coastal Water Monitoring</p> <p>5.1 Results of Coastal Water Monitoring in Aquaculture Areas</p> <p>5.2 Results of Coastal Water Monitoring in Bathing Beaches</p> <p>5.3 Results of Coastal Sediments</p> <p>5.4 Results of Biodiversity Monitoring</p> <p>5.4 Conclusion</p> <p>VI. Results of Water Quality Monitoring of Inner City Canals in HCMC</p> <p>6.1 Nhieu Loc – Thi Nghe Canal System</p> <p>6.2 Tham Luong – Vam Thuat Canal System</p> <p>6.3 Tan Hoa – Lo Gom Canal System</p> <p>6.4 Tau Hu - Ben Nghe Canal System</p> <p>6.5 Doi – Te Canal System</p> <p>6.6 Conclusion</p> <p>VII. Results of Groundwater Monitoring in Ho Chi Minh City</p> <p>7.1 Results of Groundwater Level in 2012</p> <p>7.2 Results of Groundwater Monitoring in 2012</p> <p>7.3 Conclusion</p> <p>VIII. General Conclusion</p>

Source: JET

(7) Results of the Activity of BRVT DONRE

CEMAB produces two kinds of monitoring reports for air, river, coastal, urban wastewater, groundwater, lake, and soil in BRVT Province in a year including the Dinh River:

- i. Bi-monthly monitoring report at each sampling time; and
- ii. Annual monitoring report.

CEMAB submits the monitoring reports to EPA and the leader of BRVT DONRE. BRVT DONRE shares the monitoring reports with VEA/MONRE in accordance with request from them.

As the results of OJT, organized in November 2012, for report preparation of annual monitoring report in 2012 CEMAB improved the structure of the monitoring report for readers as shown in Table 2.2-21. With the support of JET, CEMAB also added and improved the contents of the report especially data interpretation as follows:

- Adding map of monitoring station;
- Adding environmental baseline data regarding pollution sources;
- Adding outline of monitoring program;
- Adding longitudinal and historical trend analysis with data interpretation; and
- WQI calculation.

Finally, CEMAB officially submitted the annual monitoring report in 2012 to EPA and the leader of BRVT DONRE in March 2013.

Table 2.2-21 Improvement of Structure of the Annual Monitoring Report in 2012 in BRVT Province

Monitoring Report in 2011	Monitoring Report in 2012
I. General	Summary
1.1 Time of Monitoring	PART I Water
1.2 Coordinate of Monitoring Stations (Air, River, Coastal, Urban wastewater, Groundwater, Lake, Soil)	1. Introduction
1.3 Sampling and Analysis Method	2. Background (River, Lake, Coastal, Groundwater, Wastewater)
II. Assessment of Environmental Monitoring Results in 2011	3. Method
2.1 Assessment of Air Quality Monitoring Results	3.1 Map of Monitoring Station
2.2 Assessment of River Water Quality Monitoring Results	3.2 Sampling Time
2.3 Assessment of Urban Wastewater Quality Monitoring Results	3.3 Parameters
2.4 Assessment of Coastal Water Quality Monitoring Results	3.4 Sampling Method
2.5 Assessment of Lake Water Quality Monitoring Results	3.5 Field Measurement
2.6 Assessment of Groundwater Quality Monitoring Results	3.6 Analysis in Laboratory
2.7 Assessment of Soil Monitoring Results	3.7 QA/QC Procedure
3. General Evaluations and Conclusions	3.8 Data Processing Method
1.2 General Evaluations (Air, River, Coastal, Urban wastewater, Groundwater, Lake, Soil)	4. Results
3.2 Conclusions	4.1 River Water
Appendices	4.2 Lake Water
Laboratory Analysis Record	4.3 Coastal Water
	4.4 Groundwater
	4.5 Wastewater
	5. Conclusions and Recommendations
	5.1 Conclusions (River, Lake, Coastal, Groundwater, Wastewater)
	5.2 Recommendations
	References
	Appendices
	Record of Laboratory Analysis
	QA/QC Results
	Description of Monitoring Station
	PART II Air
	PART III Soil

Source: JET

2.2.2.7 Joint Seminar on Water Quality Monitoring and Analysis

A joint seminar on water quality monitoring and analysis was organized in November 2012. Thirty-five people from monitoring centers/stations in the target DONREs, BRVT DONRE EPA, CEM/VEA, and DWRM/MONRE were participated in the seminar. The main aims of the workshop were as follows:

- i. To share the experiences on project activities on water quality monitoring and analysis; and
- ii. To exchange opinions on improving monitoring and water quality analysis in Vietnam.

In the first session, the target DONRE presented on the project activities related to water quality monitoring (WG2-1) and analysis (WG2-2) and summarized and evaluated the activities.

In the second session, CEM/VEA introduced the “Regulations on basic requirements and technical specifications of real-time water monitoring stations” as one of MONRE’s activities related to Output 1. JET also introduced outline of the “Handbook for Improvement of Monitoring Performance (See Table 2.2-22)” and guidance for preparation of effective monitoring report as a key activity for the target DONREs in the remaining project period.

In the third session, a panel discussion chaired by the director of CEM/VEA, the following topics relating to better water quality monitoring and analysis activities were discussed as follows:

- i. Establishment of coordination mechanism for monitoring in a basin among the provinces;
- ii. Utilization of automatic monitoring system;
- iii. Sustainability of monitoring and laboratory management.

2.2.2.8 Preparation of Handbook for Improvement of Monitoring Performance

A Handbook for Improvement of Monitoring Performance (1st year version) was prepared for the target DONRES in March 2012. The handbook was based on the outputs of the project activities

related to water quality monitoring and analysis. The objective of the handbook was to provide a source of ‘best practice’ procedures for water quality monitoring and analysis that provides an information source:

- i. to which DONRE staff can refer for technical skills and know-how on monitoring and analysis in their daily activities;
- ii. which can be used to train new staff who is not familiar with monitoring and analysis; and
- iii. could, when provided to all the DONRE in Vietnam, provide a common methodology for the conduct of water quality, thereby enabling more effective comparison between data provided by different DONRE.

The handbook was revised in November based on the outputs in the second year and comments on DONREs and CEM/VEA. Accordingly, the handbook was finalized in April 2013 as shown in Table 2.2-22.

Table 2.2-22 Handbook for Improvement of Monitoring Performance

Title	Handbook for Improvement of Monitoring Performance
Preparer	JET and HNI, HPG, TT-HUE, HCMC, and BRVT DONRE
Completion	April 2013
Objective	- To refer technical skills and know-how on monitoring and analysis in their daily activities - To train new staff who is not familiar with monitoring and analysis.
Contents	Chapter 1 Chapter 1 Outline of Improving Monitoring Performance Chapter 2 Legal Framework related to Monitoring in Vietnam Chapter 3 Development of Monitoring Plan Chapter 4 Water Sampling and On-Site Measurement Chapter 5 Water Quality Analysis and QA/QC Chapter 6 Data Analysis Chapter 7 Report Preparation Chapter 8 Establishment of Data Management System <u>Appendices</u> Appendix 1 Draft Revised Monitoring Plan in the Key Rivers Appendix 2 Standard Operating Procedure of Basic Water Quality Analysis Appendix 3 Handbook for Statistical Analysis of Water Quality Data Appendix 4 Guidelines for Writing Environmental Monitoring Reports Appendix 5 Draft Manual for Water Quality Data Management System in Thua Thien–Hue, Vietnam

Source: JET

2.2.3 Achievements

In this Project, activities of Component 1 (Monitoring) of Output 2 were implemented by the following two working groups:

- WG2-1 - WG for monitoring and focusing on development and implementation of environmental monitoring plans and analysis and interpretation of monitoring data; and
- WG2-2 - WG for water quality analysis focusing on laboratory and on-site analysis of water samples.

Because their activities are quite different, they are described separately in Section 2.2 and Section 2.3, respectively.

2.2.3.1 Overall Achievements

Table 2.2-23 summarizes:

- PDM indicators related to activities of WG2-1 (monitoring);
- Status to be achieved by each organization;
- Status at the beginning and end of the Project; and
- Completion month.

As for “Indicator 2-1-1: Draft revised monitoring plans of key rivers are prepared”, as a first step each DONRE decided the direction of revising the monitoring plan of a key river based on the collected

data and discussions with JET. Then, the draft plans of the target DONREs were finalized by March 2013. Finally, all target DONREs prepared the draft revised monitoring plan of key rivers with the support of JET and are able to update the plans and prepare the monitoring plans of the other rivers by themselves at the end of the Project.

As for “Indicator 2-1-2: Draft revised monitoring reports in 2012 are prepared by DONREs, and shared with concerned organizations”, as a first step each DONRE identified the contents of the monitoring report to be improved. Moreover, DONRE received lectures on data analysis so they can reflect results of the data analysis in the monitoring report. Then, the target DONREs prepared and improved the monitoring reports in 2012 through the implemented OJT. Finally, all DONREs completed the preparation of monitoring reports by April 2013 and can update and improve continuously the monitoring reports by themselves.

Table 2.2-23 Statuses of PDM indicators at the end of the Project (WG2-1: Monitoring)

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
2-1-1 Draft revised monitoring plans of key rivers are prepared.	In order to learn detailed processes of developing a scientific and logically-structured monitoring plan, each DONRE develops a draft revised monitoring plan for the following rivers under the guidance of JET: - Red River (HNI) - Re River (HPG) - Huong River (TT-HUE) - Sai Gon River (HCMC) - Dinh River (BRVT)	<ul style="list-style-type: none"> No DONREs understood clearly the objective of monitoring and had experiences on developing the monitoring plan by themselves. The status of each DONRE is as follows: <ul style="list-style-type: none"> HNI: Monitoring plan of the Red River was just combined between former plans of former Hanoi City (Urban area) and Ha Tai Province (Rural area), thus they needed to review and revise it. HPG, TT-HUE, HCMC, BRVT: The monitoring plans of key rivers were developed by local consultants for PPCs or under international cooperation project and not by DONREs themselves, thus, they needed to clarify the objectives of monitoring as the first step to get basic skills and knowledge for the development of monitoring plan and revise it by themselves. 	<ul style="list-style-type: none"> All target DONREs have prepared the draft revised monitoring plan of the key river by January 2013. Therefore, this indicator was achieved. Some DONREs are ready to start the new monitoring based on the revised plans. The status of the revised monitoring plan of key rivers at each DONRE is as follows: <ul style="list-style-type: none"> HNI: CENMA completed preparing the draft revised monitoring plan of the Red River in August 2012. The draft plan was approved in December 2012. The CENMA started the 1st monitoring campaign in March 2013. HPG: HACEM completed preparing the draft revised monitoring plan of the Re River in January 2013 and implemented the new monitoring plan from 2013. TT-HUE: EPA completed preparing the draft revised monitoring plan of the Huong River in January 2013 and implemented the new monitoring plan from 2013. HCMC: CEMA completed preparing the draft revised monitoring plan of Sai Gon River in December 2012 and will prepare a proposal for budget request by June 2013 to upgrade the new monitoring plan in 2014. BRVT: CEMAB completed preparing the draft revised monitoring plan of the Dinh River in January 2013 and distributed the revised plan to relevant organizations to upgrade the new monitoring plan for 2016-2020.
2-1-2 Draft revised monitoring reports in 2012 are prepared by DONREs, and shared with concerned organizations.	In order to improve skills for report writing, all DONREs under the guidance of JET prepares a draft monitoring report in 2012, and shares the reports with concerned organizations.	<ul style="list-style-type: none"> The monitoring reports in the target DONREs described only the compliance with QCVN (all DONREs), historical trend for the last 2 years and longitudinal trend, (only a few DONREs) thus, they needed to improve skills and know-how on data analysis and reflect it in the monitoring report. Monitoring reports in the target DONREs did not describe data interpretation based on interaction between water environment, pollution sources, impact to water sources, and so on, therefore, they also needed to improve skills and know-how on data interpretation. 	<ul style="list-style-type: none"> All DONRE has worked on the improvement of monitoring reports in 2012 and target DONREs and share with concerned organizations. The statuses of improvement and preparation of monitoring report in 2012 at each DONRE are as follows: <ul style="list-style-type: none"> HNI: Adding objectives of monitoring, date of sampling, improving data interpretation, dry season and wet season Comparison (Submitted in December 2012) HPG: Improving data interpretation, comparison between seasons, analyze the impacts of hydrological and climate conditions to river water quality, WQI calculation (Submitted in March 2013) TT-HUE: Adding maps of sampling locations, adding the overview of monitoring plan to the report, improving data interpretation, spatial comparison of water quality along the river, temporal comparison (Prepared technical monitoring report in April 2013) HCMC: improving data interpretation (taking into account the distance between stations) by spatial trend analysis and WQI calculation (Submitted in February 2013) BRVT: Adding map of monitoring station, adding environmental baseline data such as pollution sources, hydrological characteristics, adding outline of monitoring program, longitudinal trend analysis, historical trend analysis, and WQI calculation (Submitted in February 2013)

Source: JET

2.2.3.2 Achievements by Each Organization

Table 2.2-24 summarizes the statuses of achievement of indicators by each organization related to activities of WG2-1 (monitoring) at the end of the Project. As for Indicator 2-1-1, all target DONREs achieved the indicator by January 2013 and some DONREs implemented activities more than the requirement of both indicators such as implementation of new monitoring in the key rivers based on the revised monitoring plan. As for Indicator 2-1-2, all target DONREs achieved the indicator by January 2013 and officially submitted to relevant organizations.

Table 2.2-24 Statuses to Achieve Indicators by Each Organization at the end of the Project

DONRE	Indicators	Timing of Completion	Status at the End of the Project
HNI	Indicator 2-1-1	Completed in August 2012	At the beginning of the Project, monitoring plan of the Red River was just combined between former plans of former Hanoi City (Urban area) and Ha Tai Province (Rural area). Besides, no one clearly knows the objective of the previous monitoring plan of the Red River because the former deputy director of CENMA who developed the monitoring plan of the Red River has retired. Through the project activities, CENMA drafted the revised monitoring plan of the Red River for 2013 based on hydrological structure, water intake points, and distribution of pollution sources with support of JET. Then CENMA submitted the draft plan to Hanoi DONRE in August 2012. Therefore, Hanoi DONRE achieved the indicator 2-1-1. Furthermore, DWRM of HNI DONRE, in charge of the technical assessment of monitoring plans, approved the revised monitoring plan from the technical view point in August 2012. HNI DONRE finally approved the revised monitoring plan for 2013 in January 2012. CENMA has started to review monitoring plan of the To Lich River urban in the area of Hanoi City by utilization of the experiences on revising the monitoring plan of the Red River as an activity of post project.
	Indicator 2-1-2	Completed in January 2013	At the beginning of the Project, monitoring report of the Red River have covered most of the basic contents such as monitoring plan, compliance with QCVN, historical trend, but were not described in detailed data interpretation very much. Through the project activities, CENMA improved contents of the monitoring report such as adding monitoring objective, date of sampling, improving data interpretation on temporal and spatial trend analysis, and dry season and wet season comparison. Based on the above improvement, CENMA prepared the draft monitoring report of 2012 in January 2013. Therefore, HNI DONRE achieved the indicator 2-1-2. Furthermore, CENMA officially submitted the monitoring report of 2012 to EPA, DWRM, and other departments in HNI DONRE in January 2013.
HPG	Indicator 2-1-1	Completed in December 2012	At the beginning of the Project, monitoring plan of the Re River was developed by local consultants for PPCs and not by DONRE themselves, thus, they don't have enough information on the objectives of monitoring. Through the project activities, HACEM drafted the revised monitoring plan of the Re River for 2013 for pollution control and for protection of drinking water resources based on hydrological structure, water intake points, and distribution of pollution sources with support of JET. Then, HACEM completed the draft plan in December 2012. Therefore, HPG DONRE achieved the indicator 2-1-1. Furthermore, HACEM prepared an official monitoring plan of the Re River for 2013 based on the revised monitoring plan in February 2013. The HACEM started to implement the Re River monitoring in accordance with the official monitoring plan of the river from February 2013.
	Indicator 2-1-2	Completed in March 2013	At the beginning of the Project, monitoring report of three rivers in Hai Phong City has covered most of the basic contents such as monitoring plan, compliance with QCVN, historical trend, but were not described in detailed data interpretation very much. Through the project activities, HACEM improved contents of the monitoring report such as adding WQI calculation and comparison between seasons, analyze the impacts hydrological and climate conditions to river water quality. Based on the above improvement, HACEM prepared the draft monitoring report of 2012 in March 2013. Therefore, HPG DONRE achieved the indicator 2-1-2. Furthermore, HACEM officially submitted monitoring report in 2012 to the vice chairman of PPC, EPA, DWRM, and other departments in HPG DONRE in March 2013.
TT-HUE	Indicator 2-1-1	Completed in December 2013	At the beginning of the Project, monitoring plan of the Huong River was developed by hiring consultants. And, objectives of monitoring were not clearly mentioned in the plan. Through the project activities, TT-HUE DONRE EPA drafted the revised monitoring plan of the Huong River for 2013 especially for protection of drinking water resources based on hydrological structure, water intake points, and distribution of pollution sources with support of JET. Then, EPA completed the draft plan in December 2012. Therefore, TT-HUE DONRE achieved the indicator 2-1-1. Furthermore, EPA prepared an official monitoring plan of the Huong River for 2013 based on the revised monitoring plan in March 2013. The EPA also started to implement the Huong River monitoring in accordance with the official monitoring plan of the river in March 2013.
	Indicator 2-1-2	Completed in January 2013	At the beginning of the Project, monitoring report in Thua Thien-Hue Province was prepared by outsourced consultants. The contents are described only the compliance with QCVN and its evaluations. Through the project activities, EPA prepared the technical monitoring report of the Huong River of 2012 to get skills and know-how of preparing effective monitoring report for water quality management. The EPA improved contents of the monitoring report such as adding maps of sampling locations, adding overview of the monitoring plan to the report, improving data interpretation with spatial and temporal comparison. Based on the above improvement, EPA prepared the technical monitoring report of the

DONRE	Indicators	Timing of Completion	Status at the End of the Project
			Houng River in 2012 and shared it with relevant sections in EPA in April 2013. Therefore, TT-HUE DONRE achieved the indicator 2-1-2.
HCMC	Indicator 2-1-1	Completed in December 2012	At the beginning of the Project, monitoring plan of the Sai Gon River was developed by local consultants for PPCs more than 10 years ago and not by DONRE themselves. Even though they have some information on the objective of monitoring they don't clearly understand it. Through the project activities, CEMA in HEPA drafted the revised monitoring plan of the Sai Gon River for 2014 for pollution control and for protection of drinking water resources based on the hydrological structure, water intake points, and distribution of pollution sources with support of JET. Then, CEMA completed the draft plan in December 2012. Therefore, HCMC DONRE achieved the indicator 2-1-1. Furthermore, CEMA has been preparing a proposal for budget request for the implementation of the Sai Gon River monitoring in 2014 in accordance with the draft revised monitoring plan of the river from January 2014.
	Indicator 2-1-2	Completed in February 2013	At the beginning of the Project, monitoring report of Ho Chi Minh City has covered most of the basic contents such as monitoring plan, compliance with QCVN, historical trend, and longitudinal trend, but was not described in detailed data interpretation very much. Through the project activities, CEMA improved contents of monitoring report such as adding WQI calculation, improving data interpretation (taking into account the distance between stations) by spatial trend analysis. Based on the above improvement, CEMA prepared the draft monitoring report of 2012 in February 2013. Therefore, HCMC DONRE achieved the indicator 2-1-2. Furthermore, CEMA officially submitted the monitoring report of 2012 to HEPA, DWRM, Inspection Department, and other departments under HCMC DONRE in February 2013.
BRVT	Indicator 2-1-1	Completed in January 2013	At the beginning of the Project, BRVT DONRE already had an environmental monitoring plan for 2011-2015 and 2016-2020 including the Dinh River. However, the environmental monitoring plan was developed by local consultants under SEMLA project (Project on Strengthening Environmental Management and Land Administration) funded Sweden and not by DONRE themselves, thus, they don't have enough information on the objectives of monitoring. Through the project activities, CEMAB drafted the revised monitoring plan of the Dinh River after 2015 for protection of drinking water resources and for control of pollution especially from seafood processing based on hydrological structure, water intake points, and distribution of pollution sources. Then, CEMAB completed the draft plan in December 2012. Therefore, BRVT DONRE achieved the indicator 2-1-1. Furthermore, CEMAB improved the revised plan based on the feedback from relevant organizations.
	Indicator 2-1-2	Completed in February 2013	At the beginning of the Project, monitoring report of Ba Ria-Vung Tau Province was only the compliance with QCVN and its evaluations. Through the project activities, CEMAB improved the contents of the monitoring report such as adding map of monitoring station, environmental baseline data regarding pollution sources, outline of monitoring program, longitudinal and historical trend analysis with data interpretation, and WQI calculation. Based on the above improvement, CEMAB prepared the draft monitoring report of 2012 in February 2013. Therefore, BRVT DONRE achieved the indicator 2-1-2. Furthermore, CEMA officially submitted the monitoring report of 2012 to the annual monitoring report in 2012 to EPA and the leader of BRVT DONRE in February 2013.

Source: JET

2.2.3.3 Capacity Assessment

(1) Results of the Internal Evaluation

Based on the results of the internal evaluation conducted in January 2013, Figure 2.2-13 shows the questions related to each objectively verifiable indicator in PDM and the overall results of the five-level, semi-quantitative self-evaluation for monitoring component (Output 2-1) marked by all DONREs. The scores represent the average scores of all respondents. Before starting the Project, all of the capacities were evaluated as between "little" and "satisfactory". As of January 2013, all of these capacities were evaluated as "good". Especially that all questions regarding indicator 2-1-3 were evaluated more than "good".

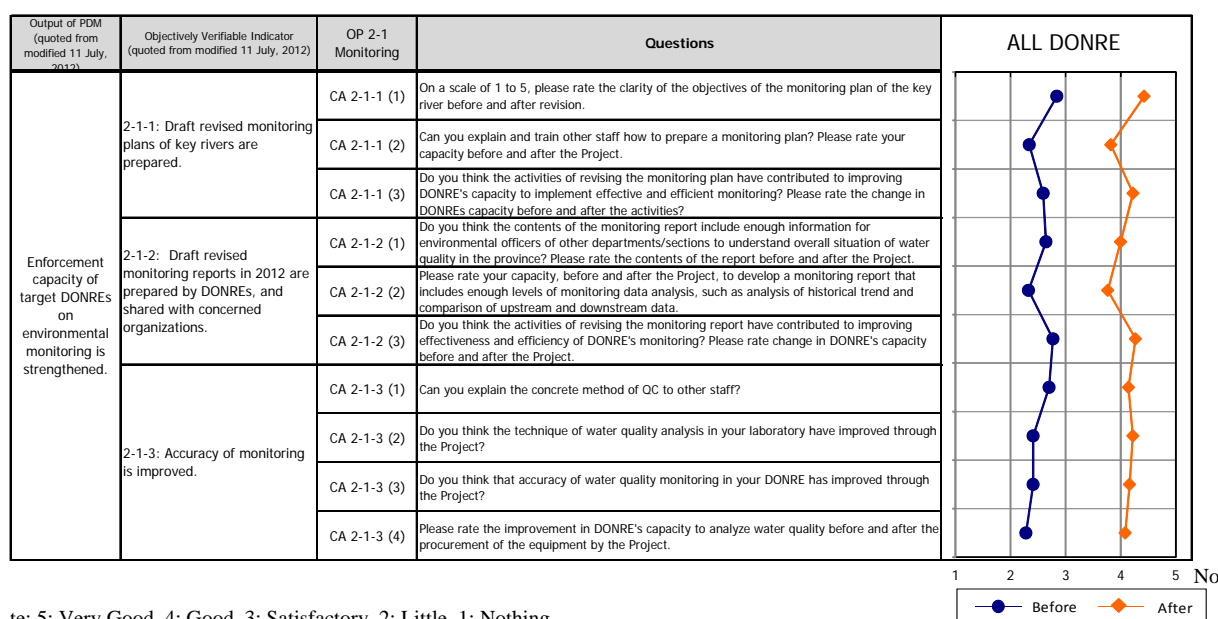


Figure 2.2-13 Overall Results of Questionnaire for Output 2-1 (Average of all DONREs)

(2) Capacity Development through the Project

1) Indicator 2-1-1: Monitoring Plan

Before the Project, most of the monitoring plans have been developed by local consultants for PPCs and not by DONRE themselves, thus, DONRE did not know clearly the objectives of the monitoring they were carrying out.

In response to this, JET provided a series of lecture training and workshops in the first year (March 2011–March 2012) to clarify the objectives of monitoring and to obtain basic skills and knowledge for the development of monitoring plan. In the second year (April 2012–April 2013), all DONREs set the direction to revise the monitoring plan of key river based on collected data and information as well as through discussion meetings with JET. Accordingly, by January 2013 all DONREs have completed the preparation of the draft revised monitoring plans of key rivers with support of JET. Among the target DONREs, HNI, HPG, and TT-HUE DONRE officially started the new monitoring from 2013 based on the revised monitoring plans of key rivers.

As the results of CA 2-1-1 (1) and (2) in the answered questionnaires indicated in Figure 2.2-13, DONRE staff has acquired technical skills and know-how on the development of monitoring plan such as identification of objective of monitoring clearly, and is now able to train other staff on how to develop a monitoring plan. Thus, DONRE staff has improved their capacities on the individual level. Besides, as the results of CA 2-1-2 (3) in the answered questionnaires suggested, DONRE staff recognized that the activities of revising the monitoring plan had contributed to improving DONRE's capacity to implement effective and efficient monitoring. This implies that DONREs have improved their capacities regarding development of monitoring plan on the organization level. Some DONREs have already started revising monitoring plans of other rivers in their city or province (e.g., To Lich River monitoring plan in Hanoi City).

2) Indicator 2-1-2: Data Interpretation and Monitoring Report

At the beginning of the Project, most of the monitoring reports in the target DONREs described only compliance with QCVN, historical trend for the most recent two years, and longitudinal trend. They needed, in addition to the above analysis, analyses of interaction between water environment, situation of pollution sources, pollution mechanism, impact of pollution to water sources, and so on.

In response to this, in the first year JET provided the lecture training on data analysis such as analysis of historical trend and comparison of upstream and downstream data in the first year. In the second year, JET provided the lecture training on statistic data analysis for water monitoring data and writing environmental monitoring report to restructure contents and make the objective clear to readers. Based on these training programs, by April 2013, target DONREs prepared their own monitoring report in 2012 with some improvements.

As the results of CA 2-1-2 (1) and (2) indicated in Figure 2.2-13, DONRE staff have clearly acquired technical skills and know-how on data interpretation and preparation of monitoring report, such as analysis of historical trend and comparison of upstream and downstream data, and identification of contents of monitoring report. Thus, DONRE staff has improved their capacities at the individual level to some extent. Besides, as the results of CA 2-1-3 (3) indicated, DONRE staff recognized that the activities on improving the monitoring report has contributed to improving DONRE's capacity to implement effective and efficient monitoring. This implies that DONREs have improved their capacities regarding preparation of monitoring report on the organization level.

2.2.3.4 Recommendations for Post Project Activities

(1) Recommendations for Activities within DONRE

1) Expansion of DQO-based Surface Water Monitoring Plan to the Whole Provinces and Other Environmental Elements

In the Project, the entire target DONREs gained experience of reviewing and revising surface water quality monitoring plan of key rivers by application of the DQO process. The DQO process can be used not only on surface water quality monitoring but also on lakes, marine monitoring, and monitoring on other environmental elements such as air, noise, and soil. Thus, it is advisable that DONRE should expand the DQO-based surface water quality monitoring plan and other environmental elements based on the experiences on reviewing and revising surface water quality monitoring plan of key rivers to the whole province.

2) Adoption of the Plan-Do-Check-Act (PDCA) Cycle for the Improvement of the Monitoring Plan and Report

The environmental situation in Vietnam will be changed rapidly in accordance with socioeconomic condition year by year. As a result, monitoring plans might not cover the impact of changing pollution sources and protection of water resources. To tackle these issues, it is advisable to adopt PDCA cycle for the improvement of monitoring plan and report. For example, DONRE sets an opportunity to make a presentation of the monitoring plan and important reports, talks to the readers about what they want to get from the monitoring report, introduces follow-up after issuing the reports, and puts in a receipt and comments slip in each report. Based on the mentioned feedbacks, monitoring plans and reports can be updated and revised as necessary.

3) Start of the Screening of the Results of Each Monitoring Event

As far as improvement of the QA/QC activities allow, it is advisable to start screening of the results of each monitoring event to avoid transcription error and inputting error, etc. The following screening methods to check the results of monitoring are proposed:

- Use data for year 2012 as the 'expected range'. If there is a suspected outlier in 2012 flag it and use the remaining data. If it was a pollution event or environmental extreme, it will quite likely turn up again;
- Set up a rubber stamp with boxes for date received and approved for use. No data will be put into the database unless the "approved for use" box has been signed off.

4) Focusing on the Marginal Parameters

In the monitoring plan of some DONREs, maximum parameters are analyzed in all of the monitoring stations. Those that are significantly meeting the standard and those that are grossly failing to meet the standard need little attention from a statistical point of view. It is recommendable to check the confidence of failure or meeting of the standard of those whose annual means are within say $\pm 20\%$ of the requisite standard. If a previously compliant mean crosses the limit, it is appropriate to determine the level of confidence that it was meeting the standard and similarly find out the level of confidence that it is failing the standard. Based on checking of the failure or meeting of the standard, DONRE will be able to optimize their budgets to focus on key parameters at important stations. Moreover, they can increase monitoring stations or frequency by reducing the monitoring parameters that are significantly meeting the standard.

(2) Recommendations for Activities Outside of DONRE

1) Official Decision on Target Surface Water Class of QCVN 08/2008

In the target DONREs, it is rarely the case that PPC decides officially on the target surface water class of QCVN 08/2008 to some important rivers in their province. It may cause difficulties in the evaluation of the achievement rate of environmental standard and create conflict between DONRE and polluting entities with regard to whether the entities comply with the wastewater discharge standard or not. In addition, it may be difficult to make a decision on selecting polluted areas to be improved and proper actions to control measures. Therefore, it is recommended that PPC should issue official decision on target surface water class of QCVN 08/2008 to important areas in the rivers to avoid above difficulties. The decision will help policy makers to decide proper water pollution control policies and measures. In the event that PPC do not have the relevant experience to specify the appropriate QCVN class themselves, they should formally endorse any recommendation made by the specialist staff to the respective DONRE.

2) Adoption of Indicators for Evaluation of Water Quality in the Nationwide

The MONRE Decision No. 879/QD-TCMT guideline on the calculation of Water Quality Index (WQI) of surface water environmental monitoring was issued in July 2011. The purpose of the WQI is to summarize in a single value the combined information contained in the measurement of nine defined water quality parameters. The advantages of the adoption of WQI are as follows:

- i) Provide an understanding of water quality for non-technical people;
- ii) Identify polluted areas in Vietnam by comparison of WQI between provinces; and
- iii) Publish the ten best and ten worst pollution locations in Vietnam.

These advantages may lead to emphasizing water pollution control policies by the government and PPCs, to monitoring of effectiveness of the policies, and to a better movement of public for improvement of water quality.

3) Establishment of Coordination Mechanism to Monitor Water Quality in a Basin

In Vietnam, there are many interprovincial rivers because some rivers are used as boundary of provinces. This occurs where a river forms a boundary between two provinces or where a river crosses from one province into a second one. However, there are few, if any, cooperation mechanisms to support the monitoring of water quality in a basin among provinces such as sharing information, monitoring data, pollution source inventory, and emergency responses to tackle water incidents.

Establishment of cooperation mechanisms may lead to advantages on reducing monitoring cost through optimization of monitoring plans, on understanding of pollution mechanism in a basin, on basic information for contribution to development of water pollution measures by provinces jointly, on identifying pollution sources which causes water incidents by shared pollution source inventory and

joint emergency water quality monitoring, etc. Therefore, it is recommended that cooperation mechanism to monitor water quality in a basin should be established.

2.3 Output 2-1 (WG 2-2): Water Quality Analysis

2.3.1 Introduction

2.3.1.1 Background

The Output 2-1 (Monitoring) activities were divided into two components, namely, monitoring and water quality analysis. This section describes the activities under the water quality analysis component. This component has focused on the development of C/P's capacity in water quality analysis, which includes surface water sampling, basic and advanced water quality analysis, laboratory designing, laboratory management, and quality control of contract work. Among the activities of Output 2-1 defined in PDM, the water quality analysis component took charge of "C1-4 Conduct training on water quality monitoring including quality control for improving reliability of monitoring" in the activities mentioned in PDM.

In the beginning of the Project, C/Ps implemented the initial capacity assessment to identify training needs, and narrowed down the targets of capacity development. Then, JET with C/Ps prepared a capacity development (CD) plan, a work plan (WP), and criteria to evaluate the capacity of each DONRE. During the Project, JET conducted training in water quality analysis for a total of 205 days according to the WP. The total cumulative number of trainees were 798 (as of 30 April 2013). The capacity of the C/Ps was evaluated periodically based on some criteria and questionnaires.

Moreover, JICA procured the equipment necessary for the project activities as requested by DONREs.

2.3.1.2 PDM and PO

The items of the revised PDM and PO related to water quality analysis (WG2-2) are shown in Table 2.3-1.

Table 2.3-1 Items Related to Water Quality Analysis in PDM and PO

	Item	Contents
PDM	Output	Enforcement capacity of target DONREs on basic water pollution control (environmental monitoring, pollution sources inventory, pollution sources inspection) is strengthened.
	Objectively Verifiable Indicators	2-1-3 Accuracy of water quality analysis is improved
	Means of Verification	2-1-3 Analysis record on Activity C1-4
	Activities	C1-4 Conduct training on water quality monitoring including quality control for improving reliability of monitoring. (Note: change training contents based on situations of target DONREs)
PO	C1-4	August 2011 - April 2013 (continuous activities)

Source: JET

2.3.1.3 Initial Capacity Assessment

In May 2011, JET and C/Ps had a series of meetings to evaluate the status of analytical capacities of each DONRE, and to clarify the contents of water quality analysis training to be implemented in the Project. The results of the assessment are shown in Table 2.3-2.

**Table 2.3-2 Review of the Activities of DONREs Related to Water Quality Analysis
(as of May 2011)**

Item	HNI	HPG	TT-HUE	HCMC	BRVT
1) Polity and planning on water quality analysis and laboratory	-CENMA -high priority on lab analysis	-CEM -high priority on lab analysis	-EPA -Lab be set up in 2011	-No practical plan to develop a lab by DONRE -No lab and outsourcing policy -HEPA outsources water quality and analysis to an external lab	-CEMAB -high priority on lab analysis
2) Lab management	a) Accreditation -VILAS -ISO17025	a) Accreditation -VILAS -ISO17025	a) Accreditation -plan to get VILAS accreditation in 2012	No lab	a) Accreditation -VILAS -ISO17025 in 20 parameters.
3) Lab	a) Substances	a) Substances	a) Lab is under	No lab	a) Substances analyzed

Item	HNI	HPG	TT-HUE	HCMC	BRVT
facility	analyzed -basic parameters (pH, EC, COD, BOD, nutrients) -heavy metals -pesticides -biological b) Facility and equipment -GC/MS, AAS	analyzed -basic parameter (pH, EC, COD, BOD, nutrients) -heavy metals -pesticides -biological b) Facility and equipment - AAS	construction. b)The Project will supply some equipment		-basic parameter (pH, EC, COD, BOD, nutrients) -heavy metals (not accurate in low concentration) -biological b) Facility and equipment -GC, AAS
4) Constraints	-Knowledge of POPs -Skill of POPs analysis -QA/QC of POPs analysis	-Knowledge of Circular 10 -Knowledge of TCVN's analysis method	-Skilled staff -Equipment for basic water quality analysis -Knowledge of lab management and QA/QC	-QC for outsourced lab	-AAS needs an additional device to measure low concentration -No staff in lab has experience of using GC -Knowledge of TCVN's analysis method

Source: JET

2.3.1.4 Capacity Development (CD) Plan

Considering the need for training in each DONRE, C/Ps have set the goals and indicators of the training activities, as summarized in Table 2.3-3.

Table 2.3-3 Initial Capacity Assessment of Each DONRE

Item	HNI	HPG	TT-HUE	HCMC	BRVT
(1) Key points for improvement	Improvement of POPs analysis	Improvement of basic water quality analysis	DONRE does not have know-how on operating the lab, sampling, and analyzing basic parameters.	Lack of QA/QC of results from outsourced labs	Improvement of advanced water quality analysis, such as AAS and GC
(2) Approach of CD activity	Lecture, training, and OJT	Lecture, training, and OJT	Lecture, training, and OJT	Lecture and training	Lecture, training, and OJT
(3) Figures/status before the Project	Lab has not yet established the method in analyzing POPs.	Lab conducts water quality analysis based on their SOP. However, they want to confirm their analysis method.	DONRE does not conduct water quality analysis, and the lab is under construction	The quality of results from other labs is checked by using simple methods (e.g. comparison with last data, etc.)	Lab conducts water quality analysis based on their SOP. However, they face difficulty in AAS and GC analysis. Lab does not measure F and Phenol with QC
(4) Figures/status after the Project	Ensure reliability of monitoring results on POPs analysis.	Achieve capability of water quality analysis and lab management in order to achieve accurate results	Establish a system of water sampling and analysis that would ensure reliability of data.	Achieve capability of checking water quality analysis results from external labs.	Have the capability to conduct water quality analysis using AAS and GC in order to achieve accurate analysis results.
(5) Expected outcome	a) Improved water quality analysis results b) SOPs for POPs analysis	a) Improved water quality analysis results	a) Water quality analysis results b) Records for laboratory management	a) Water quality monitoring report	a) Improved water quality analysis results
(6) Goal	Several staff would be able to measure POPs (pesticides) with QC	Lab staff would be able to measure basic parameters (BOD, COD, NO ₂ , NO ₃ , NH ₄ , Kjeldahl-N, PO ₄ , and phenol) with QC	Lab staff would be able to measure basic parameters (pH, conductivity, salinity, DO, TSS, TDS, BOD, COD, NO ₂ , NO ₃ , NH ₄ , PO ₄ , oil and phenol) based on standard methods	DONRE outsources water quality analysis with QC	Lab staff would be able to use GC and AAS with QC (Pesticides, Cu, As, Zn, Mn, Ni, Cr, Cd, and Pb) regularly. Lab staff would be able to measure F and phenol with QC

Item	HNI	HPG	TT-HUE	HCMC	BRVT
(7) Conceivable indicators and targets	a) Linearity of each analytical parameter meet the provided criterion, in principle $R^2 > 0.98$. b) Limit of quantization of each analytical parameter calculated from the MDL test is less than 1/10 of the limit value shown in Table 1, A1 grade in QCVN 08: 2008/BTMNT. c) Difference of duplicate analysis is less than 30%.	a) Linearity of each analytical parameter meet the provided criterion, in principle $R^2 > 0.99$. b) Limit of quantization of each analytical parameter calculated from the MDL test is less than 1/10 of the limit value shown in Table 1, A1 grade in QCVN 08: 2008/BTMNT. c) Difference of duplicate analysis is less than 20%.	a) Linearity of each analytical parameter meet the provided criterion, in principle $R^2 > 0.98$. b) Limit of quantization of each analytical parameter calculated from the MDL test is less than the limit value shown in Table 1, A1 grade in QCVN 08: 2008/BTMNT. c) Difference of duplicate analysis is less than 20%.	DONRE controls the quality of data from outsourced lab.	a) Linearity of each analytical parameter meet the provided criterion, in principle $R^2 > 0.99$ ($R^2 > 0.98$ in GC). b) Limit of quantization of each analytical parameter calculated from the MDL test is less than 1/10 of the limit value shown in Table 1, A1 grade in QCVN 08: 2008/BTMNT. c) Difference of duplicate analysis is less than 20% in AAS, and $\leq 30\%$ in GC.

Source: JET

With these goals and indicators, the general directions of CD activities were summarized as the CD plan. It describes the objectives of capacity development, general work contents, expected outputs, and other aspects of the activities.

Table 2.3-4 Capacity Development Plan for WG 2-2 (Water Quality Analysis)

Phases Items	Phase I (Initial)	Phase II (Mid-Term 1)	Phase III (Mid-Term 2)	Phase IV (Final)
CD Objectives	<ul style="list-style-type: none"> - To clarify and share the goals and objectives of the Project - To identify the current capacities and issues - To prepare the WP to strengthen C/P's capacity on water quality analysis 	<ul style="list-style-type: none"> - To enhance the ability of implementing water quality analysis for target parameters - To enhance the ability of checking analysis data from external laboratories (only for HCMC) 	<ul style="list-style-type: none"> - To enhance the ability of conducting water quality analysis with QA/QC of which quality can be accepted by VILAS - To enhance the ability of laboratory management (only for TT-HUE) 	<ul style="list-style-type: none"> - To enhance the sustainability of the water quality analysis by supporting the DONRE's regular activities
Work Contents	1) Assessment of existing capacities for laboratory management and water quality analysis including QA/QC 2) Confirming the condition of existing equipment in the laboratory 3) Development of the WP based on discussions with C/Ps 4) Initial training for laboratory designing and field works (only for TT HUE)	1) Training on targeted water quality analysis parameters following tentative analysis method 2) Training on QA/QC through the training of water quality analysis 3) Training on checking analysis data from other laboratory (only for HCMC)	1) Training on targeted water quality analysis parameter to finalize SOP 2) Training on QA/QC through the training of water quality analysis 3) Training on laboratory management (only for TT-HUE)	1) Follow-up water quality analysis in DONRE 2) Implementation of water quality analysis and laboratory management by C/P themselves 3) Revising SOP by C/P themselves, if necessary
Expected Outputs	- WP for water quality analysis	<ul style="list-style-type: none"> - Materials used in the training including tentative analysis method - Calibration curve and analysis results 	<ul style="list-style-type: none"> - SOP for target parameters - Calibration curve and analysis results 	<ul style="list-style-type: none"> - Revised SOP for target parameters - Calibration curve and analysis results
Facilitator	JET	JET	JET	JET
Target Group	Members of WG 2-2 and associate members	Members of WG 2-2 and associate members	Members of WG 2-2 and associate members	Members of WG 2-2 and associate members
CD Activity	Joint working between VN-C/Ps and JET	Joint working between VN-C/Ps and JET	Joint working between VN-C/Ps and JET	Joint working between VN-C/Ps and JET
Period	April 2011 - August 2011	September 2011- March 2012	April 2012 - September 2012	October 2012 - June 2013

Source: JET

2.3.1.5 Preparation of Work Plans

In August 2011, in order to put the CD plan into effect, the work plan (WP) for WG2-2 was prepared with the following objectives:

- To clarify actual capacity development activities and scheduling,
- To identify indicators and targets of the activities for evaluation,
- To conduct activities in accordance with the WP, and
- To reflect results and lessons to the WP for the next working period.

The WP has been formulated over the project period from April 2011 to March 2013, including a series of activities, as tabulated in Table 2.3-5 and Table 2.3-6. The framework of the activities is summarized in Table 2.2.1-4. Some activities are overlapping among DONREs, though the target and actual schedules were set individually by each DONRE.

Table 2.3-5 Activities of WG 2-2

DONRE	Target Point/ Field of CD	Implementation Schedule	Outcomes	Dissemination
HNI	1. Training on POPs analysis i) Training on POPs analysis method ii) Training to identify unknown peak	2011 -May: Review and planning of POPs analysis. -Sep-Dec: OJT on POPs analysis (pesticides) by GC-ECD. Capacity on QC is increased to achieve the targets shown in Table 2.3-3. 2012: -Feb-May: Continue OJT on POPs analysis (pesticides) by GC-ECD. -May-Dec: Lectures and OJT on POPs analysis (PBDEs) by GC-MS. -Nov-Dec: OJT to identify unknown peaks and to analyze real samples of water.	1) Improved water quality analysis results 2) SOPs on POPs analysis	SOPs and training contents will be used in the lab
HPG	1. Improving basic water quality analysis and QA/QC activity i) Sampling and on-site measure ii) Basic water quality analysis	2011: -May: Review current status and planning of training program . -Nov: Lectures and OJT on sampling and on-site measurement. -Oct-Dec: OJT for basic water quality analysis (BOD, PO ₄ , NO ₂). 2012: -June-July: OJT for basic water quality analysis (COD, T-N, NH ₄ , NO ₃ , phenol).	1) Water quality analysis results in HACEM	Training contents will be used in the lab
TT-HUE	1. Improving water quality analysis and QA/QC activity i) Operation of the laboratory ii) Sampling and on-site measurement iii) Basic water quality analysis	2011: -May-Jul: Capacity assessment, comment for new laboratory design, and requesting self-study of the TCVN and circular, procuring equipment for on-site measurement (pH, EC, DO meter). -Sep: OJT on sampling and on-site measurement. -May-Aug: Lecture and OJT for laboratory management. 2012 -Feb: Procurement of equipment for lab, and installation of equipment. -Feb: Initial training on registration and storage of glassware and chemicals. -Feb-Dec: OJT on basic water quality analysis based on TCVN (pH, EC, salinity, DO, COD, BOD, TSS, TDS, NO ₃ , NO ₂ , NH ₄ , SO ₄ , and PO ₄). Capacity of QC is increased to achieve the targets shown in Table 2.3-3. 2013 -Jan: OJT on basic water quality analysis of COD, BOD, TDS, and NH ₄ .	1) Water quality analysis results in the lab 2) Records for laboratory management	Training contents will be used in the lab
HCM	1. Improving QC activity in the water quality monitoring	2011: -May: Review current status and planning of training program. 2012: -Jun-Aug: Lecture on checking the water quality analysis results from external laboratories.	1) Water quality monitoring report of HEPA	Training contents will be used in the department
BRVT	1. Improving water quality analysis and QA/QC activity i) Water quality analysis by GC and AAS ii) Basic water quality analysis	2011: -May: Review current status and planning of training program. -Sep: Check the status of AAS and GC. Then rearrange the training plan for BRVT lab. 2012 -Feb-Dec: OJT for GC and AAS, if possible capacity on QC is increased to achieve the targets shown in Table 2.3-3. -Jun-Aug: OJT on fluoride and phenol analysis. 2013 -Jun-Feb: Support on inspection of additional equipment procured by JICA. -Feb: OJT for GC and AAS.	1) Water quality analysis results	Training contents will be used in the lab

Source: JET

Table 2.3-6 Training Contents of WG 2-2

	HNI	HPG	TT-HUE	HCM	BRVT
POPs analysis (Lecture and OJT)	O	-	-	-	-
Pesticide analysis (Lecture and OJT)	O	-	-	-	O
Basic water quality analysis (OJT)	-	O	O	-	-
Heavy metal analysis (Lecture and OJT)	-	-	-	-	O
Laboratory design (Lecture)	-	-	O	-	-
Lab management and data management (Lecture)	-	-	O	-	-
Water sampling (Lecture and OJT)	-	O	O	-	-
Quality control (Lecture)	-	-	O	O	O

Source: JET

2.3.2 Activities

2.3.2.1 Activities Compared with PO

The progress of the activities is compared with the PO as shown in Figure 2.2.2 in the previous section. Overall, the training activities were implemented on schedule, except for the procurement of equipment for BRVT DONRE and the construction of a new lab in TT-HUE, which were delayed significantly. The WG members made various adjustments to accommodate the delays.

2.3.2.2 Procurement of Equipment

(1) First Set of Equipment for TT-HUE DONRE

In accordance with the minutes of the first JCC meeting on 1 November 2010, JICA approved to provide the equipment and other materials listed below which were necessary for the project activities in TT-HUE. Then, the list was confirmed in the second JCC meeting on 10 June 2011. The equipment were inspected and delivered in February 2012.

Table 2.3-7 List of First Set of Equipment Procured by the Project for TT-HUE DONRE

Item	Quantity	Purpose of use
(1) Water purifier	1	Water purification for laboratory grade
(2) COD digester	1	COD
(3) pH meter	1	pH
(4) EC meter	1	Electric conductivity
(5) Portable multi analyzer	1	pH, DO, EC, salinity, temperature, etc.
(6) UV-VIS spectrophotometer	1	NO ₃ , NO ₂ , PO ₄ , NH ₄ , etc.
(7) Analytical balance	1	SS, TDS, etc.
(8) Balance	1	Weighing
(9) Magnetic stirrer	1	Preparation of reagent
(10) Vacuum pump	1	Filtration
(11) Incubator	1	BOD
(12) BOD (DO) meter	1	BOD, DO
(13) Dry oven	1	SS, TDS, etc.
(14) Fume hood	1	Chemical analysis
(15) Glassware	1	General
(16) Reagents	1	General

Source: JET

(2) Additional Equipment Procured by JICA

In response to the request by DONREs in the second JCC meeting, JICA agreed to procure the following set of equipment in addition to the equipment for TT-HUE that had been agreed in the first JCC meeting in November 2010. The additional equipment were delivered to DONREs in March 2012, except farness-device of AAS and parts of GC. These two items were planned to be delivered to BRVT DONRE in April 2012. However, due to the delay of approval of A4 form which was needed for tax exemption, the procurement of the two items had been delayed. Since A4 form was released in November 2012, the two items were finally delivered in January 2013. After the inspection conducted from January to February, these items were handed over to BRVT DONRE.

Table 2.3-8 List of Equipment Additionally Procured by JICA

DONRE	Section	Item	Reason
HNI (POPs analysis)	Lab	POPs standard solution	POPs analysis training
		Extraction apparatus	POPs analysis training
		Cartridge for solid-phase extraction	POPs analysis training
		Micro syringe (10 µL, 25 µL, 50 µL, 100 µL, 250 µL)	POPs analysis training
		GC column	POPs analysis training
		Mixing machine	POPs analysis training
HPG (Basic WQ analysis)	Lab	Multi-parameter water quality analyzer	Monitoring training
		Draft chamber	It is out of order. Repair is necessary for analysis
		Reagent for analysis	WQ analysis training
		COD digester	WQ analysis training
		Decomposition analysis kit for Kjeldahl nitrogen	WQ analysis training
		Water distilling machine (two stages)	WQ analysis training
		Refrigerator	WQ analysis training
	Other department	Flow meter	Inspection training
		Multi-parameter water quality analyzer	Inspection training
TT-HUE (Basic WQ analysis)	Lab and inspection department	Flow meter	Inspection training
		Hot plate with stirrer	WQ analysis training
		Refrigerator with freezer	WQ analysis training
		Dehumidifiers	WQ analysis training
		Water bath	WQ analysis training
		Micropipette set	WQ analysis training
HCMC (Sampling and on-site measurement)	Lab	Multi-parameter water quality analyzer	Monitoring training
		Van Dorn sampler	Monitoring training
	Other department	Flow meter	Inspection training
		Multi-parameter water quality analyzer	Inspection training
BRVT (AAS and GC)	Lab	Reagent for analysis	WQ analysis training
		Farness device of AAS	WQ analysis training
		Micropipette set	WQ analysis training
		Parts of GC	WQ analysis training
	Other department	Multi-parameter water quality analyzer	Inspection training
		Flow meter	Inspection training

Source: JET

2.3.2.3 Activity C1-4: Conduct Training on Water Quality Monitoring including Quality Control for Improving Reliability of Monitoring

(1) HNI DONRE

Table 2.3-9 summarizes the results of the training in HNI DONRE during the project period. The target laboratory of the training belongs to CENMA. Based on the discussion meeting in the beginning of the Project, the subject of the training in CENMA was set as water quality analysis of POPs, in particular organochlorine pesticides and polybrominated diphenyl ethers (PBDEs). The specific target compounds of POPs and the instrument to be used for the hands-on training were selected through discussions. Chlorinated pesticides using GC-ECD and PBDEs using GC/MS were considered the first priority in the POPs training. Operation and maintenance techniques for GC-ECD and GC/MS and internal QC were key issues in the training. Discussions were repeated whenever key persons in CENMA changed. The final WP was agreed upon in November 2011.

JET started training on chlorine pesticides analysis using GC-ECD. When JET reviewed the operating procedures and analytical conditions that had been used in CENMA, JET found that CENMA's procedures and analytical conditions had not been consistent with the standard methods. When the hands-on training started in September 2011, it was difficult for C/P to identify peaks on the chromatogram of chlorinated pesticides in the standard mixture because the pattern of the chromatogram was much different from a typical chromatogram of standard mixture. The data indicated that some compounds in the solution, such as 4,4'-DDT and methoxychlor, had partly been decomposed. There were many unknown peaks in the blank and standard solutions which indicated that sample preparation, analytical conditions of GC system, or maintenance of the GC system in CENMA had not been properly conducted. These problems as well as unexpected electricity problems

and limitation of skills on using the software for quantification delayed the progress of the training. Moreover, the quality of analysis was still low at the end of February 2012.

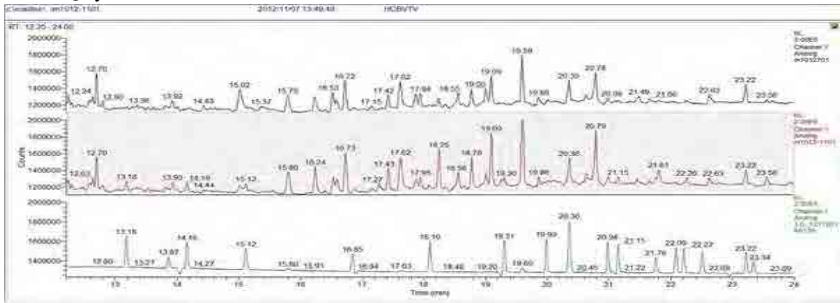
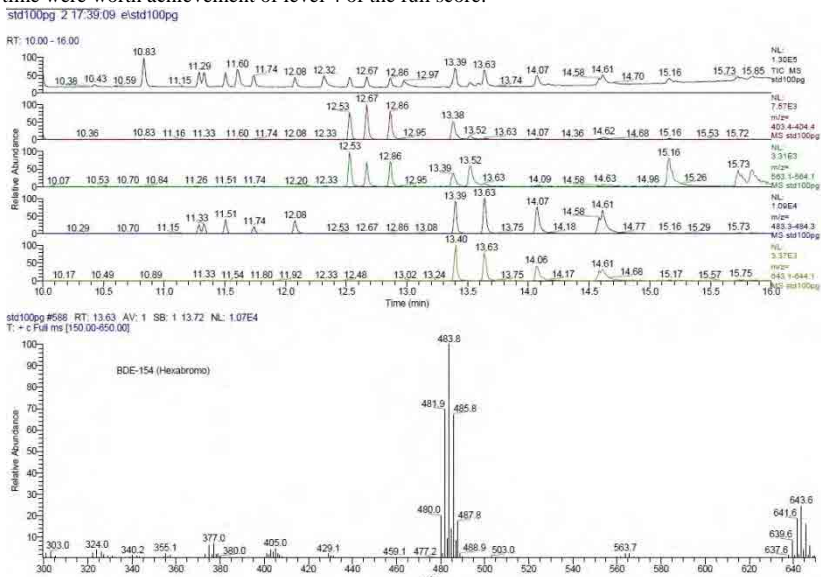
A new standard mixture of chlorinated pesticides was provided in June 2012. A new operator who was a GC beginner also became the main trainee of the hands-on training, and the training was restarted from the first stage (sample preparation). Through the training, the C/Ps improved each step of the analytical procedure by experimenting with different alternatives, e.g., 1) increasing the sample volume to 500 mL in order to improve reliability at lower concentration range, 2) adding a filtration step before C18 cartridge extraction to make the extraction easy, and 3) changing the carrier gas of GC from nitrogen to helium to improve separation. Then, C/Ps wrote down all steps into the draft analytical Standard Operating Procedure (SOP). By applying the newly established method, they were able to quantify all target pesticides with good linearity at a low concentration range of 0.05-5.0 pg/ μ L, the method quantification limits (MQLs) of 9 of 13 target pesticides became lower than the B1 grade values of QCVN08:2008/BTNMT, and 9 of 13 target pesticides showed satisfied difference in the duplicate analysis, which means that the C/P has achieved level 5. Furthermore, C/P has completed writing the draft SOP. However, additional practices and considerations are recommended to assure quality of all target pesticides. Also, because many interference peaks still exist, C/P needs to check how to reduce contamination at the lowest cost possible.

The hands-on training on PBDEs analysis using GC/MS started from November 2012. After reviewing the analytical methods used in other countries, C/P decided to follow the method established by the Centre of Environment and Technology in Ho Chi Minh (CETHCM). At first, C/P assigned peaks of PBDEs (number of bromine = 4 to 7) on the chromatogram, made necessary operating files for GC/MS measurement, drew calibration curves, and calculated instrument detection limits (IDL). Secondly, C/P prepared samples for MDL/MQL test and conducted duplicate analysis, and injected them into GC/MS. All 18 target congeners showed satisfactory linearity. Although the values of MQL were more than ten times higher than those obtained at CETHCM, half of the target parameters passed the criteria of the duplicate analysis. Thus, C/P has reached the level 4 of their goal.

Table 2.3-9 Training Results of WG2-2 in HNI

Training	Theme and Material	Contents and Results of Training
1st training (TG) on pesticides analysis (30/05/2011, HNI CENMA)	Basic knowledge related to POPs analysis and QA/QC (lecture and discussion)	1) Six to sixteen staff from CENMA attended the training 2) Contents of the training - Review of POPs Analysis - Confirmation of reagents and apparatus used in experiments - Preparation and plan for POPs analysis - Presentation on quality management for environmental analyses - Explanation on some terminologies used in QA/QC - Free discussion on GC conditions and others
2nd TG on pesticides analysis (7-9/09/2011, 3days, HNI CENMA)	OJT to establish analytical methods for POPs – preparation and experiments (to be continued)	1) Five staff from CENMA attended the training 2) Contents of the training - Revision of training plan - Confirmation of target POPs - Selection of analytical methods - Optimization of GC conditions (to be continued)
3rd TG on pesticides analysis (15-16, 19-23, 26-30/9/2011, 11days, HNI CENMA)	OJT to establish analytical methods for POPs – preparation and experiments (to be continued)	1) Three staff from CENMA attended the training 2) Contents of the training - Maintenance of GC - Optimization of GC conditions - Drawing calibration curves - Optimization of pretreatment (to be continued)
4th TG on pesticides analysis (12-16/12/ 2011, 5days, HNI CENMA)	OJT on pesticides analysis	1) Three staff from CENMA attended the training 2) Contents of the training - Optimization of GC conditions - Finalizing GC method files - Drawing calibration curves - Confirmation of IDL and IQL
5th TG on pesticides analysis (13-17/2, 2/27-3/2/2012, 10days, HNI CENMA)	OJT on pesticides analysis	1) Three staff from CENMA attended the training 2) Contents of the training - Establishment of analytical procedures on pretreatment - Establishment of criteria on QA/QC - Tentative finalization of analytical method

Training	Theme and Material	Contents and Results of Training
6th TG on pesticides analysis (07-22/06/2012, 11 days, HNI CENMA)	Hands-on training on pesticides analysis <u>Material</u> - Table: Revised WP for pesticide analysis (in Vietnamese) - Document: Example of SOP for pesticides drafted at the VAST Project Phase 1 (in Vietnamese) - Slides, tables, data, figures, and references related to PBDEs analysis	1) Three staff, including one operator, from CENMA attended the training 2) Contents of the training - Hands-on training on pesticide analysis: peak assignment, calibration curves, calculation of IDL/IQL - Hands-on training on pesticide analysis using real samples: experiments and calculation of recovery, MDL/MQL and duplicate analysis - Introduction and discussion on experiments for PBDEs analysis 3) Progress of training - C/P reached the “achieved level 4” for chlorinated pesticide analysis by GC-ECD, as one of the targets of POPs analysis, up by 0.5 point from the previous evaluation at the end of March 2012. - Since the experiments done in the last fiscal year were of low quality due to low recoveries and unreliability of concentrations of the stock standard mixture, JET decided to purchase an ample amount of standard mixture solution related to EPA Method 8081 for proper training. - New calibration curves of pesticides were successfully drawn by using a new standard mixture provided by JET, and excellent values of IDL were obtained. - However, MQL calculation training was not finished by the end of this time because of unexpected electricity problems and long extraction procedure. - At the final meeting on June 22, 2012, JET and C/P agreed on the following items: i) C/P will conduct remaining experiments until the middle of July. ii) C/P starts to write down the analytical procedure referring to an example handed by JET. iii) At the next training in July and August, the first priority is put on completing the analytical SOP of chlorinated pesticides. iv) Hands-on training for PBDEs analysis will start after the completion of above.
7th TG on pesticides analysis (06-29/08/2012, 11 days, HNI CENMA)	Hands-on training on pesticide analysis <u>Material</u> - Document: Discussion on the direction of pesticide analysis (in Vietnamese) - Many sheets of GC chromatogram acquired in CENMA during this training	1) Three staff, including one operator, from CENMA attended the training 2) Contents of training - Hands-on training on pesticide analysis: peak separation, calibration curves, calculation of IDL/IQL - Hands-on training for pesticide analysis using real samples: experiment and calculation of recovery rates, MDL/MQL, and duplicate analysis - Discussion on experiments for PBDE analysis 3) Progress of training - C/P was able to reach the “achieved level 5” by the end of September 2012 - C/P fixed the operating procedures for chlorinated pesticides based on their experimental results. - C/P has changed carrier gas from nitrogen to helium to obtain better separation of pesticides, which means C/P has returned to one of normal conditions. - C/P wrote a draft document of analytical procedures established through the Project. 4) JET and C/P agreed with the following items upon getting the final data in August: - C/P should improve some procedures not to minimize contamination; in particular, washing or rinsing glassware by a suitable solvent before use. - C/P will submit the analytical SOP for chlorinated pesticides by the end of September 2012. - Hands-on training for PBDEs analysis will start from November 2012.

Training	Theme and Material	Contents and Results of Training
8th TG on pesticides analysis (05-27/11/2012, 11days, HNI CENMA)	Hands-on training on PBDEs analysis	<p>1) Three staff, mainly one operator, from CENMA attended the training</p> <p>2) Contents of training</p> <ul style="list-style-type: none"> - Review of current analysis - Hands-on training for PBDEs analysis - Hands-on training on unknown compounds <p>3) Progress of training</p> <ul style="list-style-type: none"> - JET confirmed the “achieved level” of C/P at the end of November on pesticides analysis using GC-ECD, while evaluating C/P’s self-experiments done in September and October, in response to the estimated level 5 for some pesticides at the end of September 2012. It was found that the successful number of pesticide has been increased from 4 to 9 of 13 peaks. C/P has reached the “achieved level 5”. C/P will continue some experiments to fix their analytical SOP. - GC/MS was operated to confirm the elution turn of pesticides in ECD and to identify unknown peaks appeared in chromatograms. It was found by mass spectra that most peaks were included in plastics or rubbers such as plasticizers and siloxanes including in caps or septa. - PBDEs analysis by GC/MS as the other target of POPs analysis could not find time to operate such as injecting standard solution, because it took too much time to start up GC/MS due to the first time of operation this year. JET will give C/P some kind of home tasks so as to calculate LOQ by the end of March 2013.  <p>Chromatograms of Chlorinated Pesticides as Analyzed by GC-ECD (Top: lake water, middle: standard-spiked lake water, bottom: standard 2 pg injection)</p>
9th TG on pesticides analysis (11-28/03/2013, 11days, HNI CENMA)	Hands-on training on PBDEs analysis	<p>1) Three staff, including one operator, from CENMA attended the training</p> <p>2) Contents of training</p> <ul style="list-style-type: none"> - Hands-on training on PBDEs analysis using GC/MS - C/P decided to follow the method established by CETHCM. - Peak assignment of PBDEs on GC/MS chromatogram: Target peaks were focused on the number of bromine from 4 to 8. - C/P made files for processing setup for quantification - C/P drew calibration curves, of which linearity were satisfactory. - The values of IDL test were obtained. - The results of MQL test were more than ten times higher than those obtained by CETHCM due to the difference of GC/MS sensitivity. - In the duplicate analysis, half of target peaks showed good results. <p>3) In consideration that the main operator of GC/MS was a beginner, the obtained results in this time were worth achievement of level 4 of the full score.</p>  <p>Mass Spectrum of Hexa- BDE (BDE-154) as Analyzed by GC/MS</p>

Source: JET

(2) HPG DONRE

Table 2.3-10 summarizes the results of the training activities implemented during the project period. The target laboratory of the training is HACEM. The laboratory had obtained VILAS accreditation before the Project started. However, during the discussion on setting the subject of the training, HACEM requested JET to confirm their basic water quality analysis skills. Therefore, the object of the training in HACEM was set as basic water quality analysis (a total of eight parameters, i.e., BOD, COD, NH₄-N, NO₂-N, NO₃-N, Kjeldahl-N, PO₄-P, and phenols) and sampling skill of environmental water monitoring.

The training on sampling, including on-site measurement of water quality of rivers, was held on 8-9 November 2011. The training on BOD, NO₂-N and PO₄-P analysis was held on 15-23 November 2011. In the training on these parameters, C/Ps were able to produce good results.

In March 2012, JICA procured equipment, such as water purifier, COD digester, Kjeldahl-N digester, distillation apparatus, and refrigerator, which are necessary for measuring the other parameters selected for the training.

Then, JET held the training on COD, NH₄-N, NO₃-N, Kjeldahl-N, and phenols analysis in June 2012. Through the training, C/Ps obtained knowledge and skills on measuring basic water quality, and finally they produced accurate results except for COD and phenols analysis. Although HACEM's laboratory staff are qualified, the standard methods for COD and phenols specified in QCVN08: 2008/BTMNT can hardly be used to measure concentration lower than the environmental standard value listed in the QCVN.

As for phenols analysis, JET held additional training using organic solvent extraction method. The procedure is longer and requires a higher level of technique compared with the commonly used method. Through the training, the accuracy of phenols analysis doubled (MDL, which shows the accuracy of the analysis, decreased from 0.02 mg/L to 0.01mg/L).

Table 2.3-10 Training Results of WG 2-2 in HPG

Training	Theme and Material	Contents and Results of the Training
1st TG for UV/Vis (19/08/ 2011, HPG CEM)	OJT to check the accuracy of UV/Vis	1) Three staff from HACEM attended the training 2) Contents of the training - Checking the accuracy of the UV/Vis through the equipment detection limit test
2nd TG for briefing of the training and sampling skill (08-09/11/2011,HP G CEM)	1. Contents of the training series 2. Water sampling skill	1) 23 staff from HACEM attended the lecture training 2) Contents of the training series (lecture) -Contents, goal, evaluation method, and schedule of the training -Water quality analysis method for NO ₂ , PO ₄ , T-P, and BOD 3) Water sampling skill (lecture) - Useful idea for water sampling and on-site measurement, especially water discharge measurement 4) OJT for water sampling and on-site measurement including OJT on water discharge measurement in a river
3rd TG for NO ₂ and PO ₄ analysis (15-16/11/2011, HPG CEM)	1. OJT on NO ₂ analysis 2. OJT on PO ₄ analysis	1) Five staff from HACEM attended the training 2) OJT of NO ₂ -N analysis -Calibration curve was prepared in the training. R2=1.000 -MDL is 0.002 mg/L -Difference of Duplication analysis is 0%. 3) OJT of PO ₄ -P analysis -Calibration curve was prepared in the training. R2=0.9997 -MDL is 0.02 mg-P/L -Difference of Duplication analysis is 0%. -Recovery is 87% (in 0.04mg-P/L)
4th TG for BOD analysis (18,23/11/2011, HPG CEM)	1. OJT on BOD analysis 2.Training plan during absence of JET	1) Three staff attended the training 2) OJT of BOD analysis -MDL is 0.002 mg/L -Difference of duplication analysis is 0%. 3) Training plan during absence of JET -C/P will study NO ₃ , NH ₄ , and phenols analysis by themselves in cooperation with VAST/IET
5th TG for quality management (24/2/2012, HPG CEM)	Quality management in environmental analysis	1) Three staff attended the training 2) Lecture on quality management in environmental analysis
6th TG for basic	Hands-on training on basic	1) Five staff from HACEM attended the training

Training	Theme and Material	Contents and Results of the Training
water quality analysis (12-15/06/2012, 4days, HPG CEM)	water quality analysis - COD, NH ₄ -N, NO ₃ -N, Kjeldahl-N, and phenols	2) Hands-on training on COD analysis - Coefficient of determination (R ²) was 0.999 in the range of 100 – 400 mg/L - It was difficult to measure concentration lower than 100mg/L 3) Hands-on training on NH ₄ -N analysis - Difference of duplication analysis was 17% 4) Hands-on training on NO ₃ -N analysis - Coefficient of determination (R ²) was 0.9988 in the range of 0.2 – 4.8 mg/L - MDL of the analysis was 0.024 mg/L which is lower than environmental standard value (1mg/L). - Difference of duplication analysis was 9% 5) Hands-on training on Kjeldahl-N analysis - MDL of analysis was 1.2 mg/L. - Difference of duplication analysis was 10% 6) Hands-on training on phenols analysis - Coefficient of determination (R ²) was 0.9997 in the range of 0.05 – 5 mg/L - MDL of the analysis was 0.02 mg/L which is higher than environmental standard value (0.005 mg/L).
7th TG for basic water quality analysis (6,8/11/2012, 2days, HPG CEM)	Hands-on training on basic water quality analysis - Phenol (organic solvent extraction method)	1) Five staff from HACEM attended the training 2) Hands-on training on phenol analysis applying organic solvent extraction method - Coefficient of determination (R ²) was 0.992 in the range of 0.004 – 0.100 mg/L - Difference of duplication analysis was 6% - MDL of the analysis was 0.01 mg/L which is higher than environmental standard value (0.005 mg/L).



Analysis training in HPG

Source: JET

(3) TT-HUE DONRE

Table 2.3-11 summarizes the results of the training activities. In the beginning of the Project, the laboratory, which belongs to EPA, was still under construction, and some staff were just newly recruited. Hence, when C/Ps and JET discussed the subjects of the training, those essential to start the operations of the laboratory, namely: water sampling, basic water quality analysis (a total 14 parameters, i.e.: pH, conductivity, salinity, DO, BOD, COD, TSS, TDS, NH₄-N, NO₂-N, NO₃-N, PO₄-P, phenols, and oil), and laboratory management were chosen.

When JET visited the construction site of the laboratory in May 2011, JET checked the blueprint and the frame of the building, and suggested the following points considering theory of laboratory design:

- A water line was located at the corner of one room in the blueprint. JET suggested increasing the number of water lines. Otherwise, it would be difficult to run the laboratory.
- Equipment for water quality analysis consumes a lot of electricity. Therefore, increasing the capacity of electricity in the laboratory is necessary.
- For the safety of the laboratory staff, a ventilation system to control air flow from the inside to the outside of the building is required.

In August 2011, C/Ps agreed on the list of equipment to be procured by JICA. In the same month, JET conducted training on water sampling and on-site measurement for two days.

In February 2012, JET held a 15-day training course on laboratory design and basic water quality analysis in the Da Nang Environmental Technology Center (DANETC). This was the first time for the C/Ps to try water quality analysis. However, they measured ten parameters in the training and gained basic knowledge of laboratory design.

JET asked TT-HUE DONRE many times to install the water line at the laboratory but they could not install it until July 2012 due to the shortage of their budget. Although equipment procured by JICA was delivered in February and March 2012, they could not start the operations of the laboratory. In June 2012, JET held training on water quality analysis of oil, phenols, and COD, and

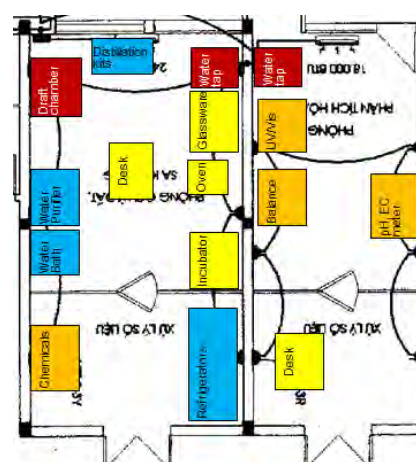


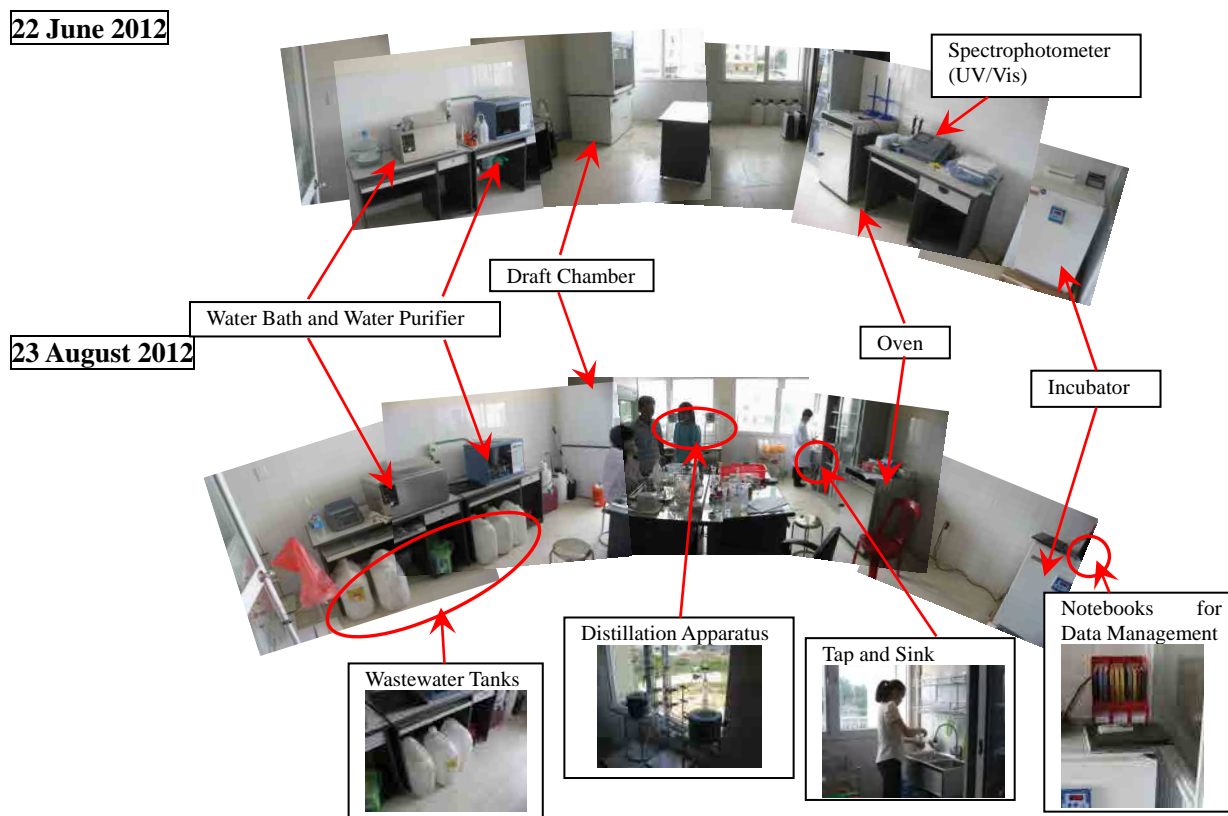
Figure 2.3-1 Final Design of EPA/TT-HUE laboratory

laboratory management in DANETC for four days.

Figure 2.3-2 compares TT-HUE's laboratory set up in June and August 2012. In the middle of July 2012, TT-HUE finally installed the water line. Then, JET held a three day training course on pH, conductivity, DO, TSS, and TDS analysis in the laboratory. In August, JET participated in DONRE's environmental monitoring activities, and held a nine day OJT on sampling, on-site measurement, water quality analysis (pH, conductivity, DO, BOD, COD, TSS, TDS, $\text{NH}_4\text{-N}$, $\text{NO}_2\text{-N}$, $\text{NO}_3\text{-N}$, $\text{PO}_4\text{-P}$, phenols, and oil), and data management. In the training, C/Ps used most of the equipment in the laboratory. The OJT also covered laboratory management, such as safe storage of chemicals, separation and storage of wastewaters, and data management. In November 2012, JET held a five day hands-on training on basic water quality analysis (BOD, COD, TDS, and oil) and lecture on QC of results from external laboratories. In January and April 2013, JET continued the training on basic water quality analysis ($\text{NH}_4\text{-N}$, BOD, COD, and TDS). A total of 11 parameters have been achieved in terms of the expected level of the Project.

Since the laboratory became operational in July 2012, JET has conducted a series of training activities at the laboratory, and C/Ps' capacity on water quality analysis has been improving continuously. The capacity evaluated periodically through discussion with C/Ps is given in Section 2.3.3.

In order to obtain VILAS accreditation, EPA should gain more experience on water quality analysis and secure the budget for the training of the Bureau of Accreditation (BoA) under the Directorate for Standards, Methodology, and Quality (STAMEQ), which is required to obtain VILAS accreditation.



In March and April of 2012, JET installed equipment. However, due to lack of a tap and sink in the lab, JET could not conduct the training. During the period of lacking the water line, JET held the training in DANETC and taught water quality analysis, lab design and management including data management. After TT-HUE DONRE installed the tap and sink in July 2012, the capacity of C/Ps has been developing constantly.

Source: JET

Figure 2.3-2 Progress of Laboratory Management in TT-HUE

Table 2.3-11 Training Results of WG 2-2 in TT-HUE

Training	Theme and Material	Contents and Results of the Training
1st WG2-2 24 May 2011	1. Laboratory designing (Lecture-1) 2. Visiting an established laboratory	-Designing rooms of the laboratory. -Equipment in the laboratory -Other issues such as laboratory safety management
2nd WG2-2 22 August 2011	1. Sampling and on-site measurement (Lecture-2) 2. OJT on calibration of water quality meter such as pH meter	-Reminding the contents of 1st lecture -Preparation for sampling -Sampling -On-site measurement including measurement of water flow -Transportation and Preservation
3rd WG2-2 23 August 2011	Sampling and on-site measurement (OJT)	-Sampling -On-site water quality measurement -Water flow measurement -Showing movie relating water sampling
4th TG on laboratory management and basic water quality analysis (2/2- 3/3/2012, total of nine days, DANETC)	OJT of laboratory management and basic water quality analysis	1) Five staff from TT-HUE DONRE attended the training 2) Lecture on laboratory management 3) Laboratory tour of DANETC 4) Lecture and OJT on basic water quality analysis (pH, EC, temperature, salinity, DO, BOD, TSS, TDS, NO ₃ -N, and NO ₂ -N)
5th TG on laboratory management and initial training of equipment (13-17,27/2/2012, five days)	1.List of equipment and chemicals 2. Operating instructions of equipment	1) Five staff from TT-HUE DONRE attended the training 2) OJT on making lists of equipment and chemicals for their management 3) Instruction on operation of equipment for water quality analysis
6th TG on laboratory design, data management, and basic water quality analysis (18-21/06/2012 , four days, DANETC)	Hands-on training on laboratory management and basic water quality analysis	1) Five staff from TT-HUE DONRE attended the training 2) Lecture on laboratory design and data management 3) Lecture and hands-on training on water quality analysis (COD, oil, and phenols) In the training, design of EPA lab was discussed.
7th TG on basic water quality analysis (18-21/07/2012 , four days, TT-HUE/ EPA)	Hands-on training on basic water quality analysis (pH, conductivity, DO, TSS, and TDS)	1) Three to five staff from TT-HUE DONRE attended the training 2) Hands-on training on pH analysis - pH meter was calibrated by standard solutions - Difference of duplication analysis was 1.5-2.3% 3) Hands-on training on conductivity and salinity analysis - Conductivity meter was not calibrated in the training - Difference of duplication analysis was 0.3-1.9% 4) Hands-on training on DO analysis - DO meter was calibrated by solution and air - Difference of duplication analysis was 1.6% 5) Hands-on training on TSS analysis - Difference of duplication analysis was 3-4% 6) Hands-on training on TDS analysis - Difference of duplication analysis was over 20% 7) Lecture on data management - Significant figures was discussed in the lecture
8th TG on data management, and basic water quality analysis (13-24/08/2012 , ten days, TT-HUE/ EPA)	1.OJT on environmental monitoring activities including field work and basic water quality analysis (pH, conductivity, DO, BOD, COD, NO ₃ -N, PO ₄ -P, NH ₄ -N, NO ₂ -N, and phenols) 2. Getting used to the new laboratory and equipment	1) Two to five staff from TT-HUE DONRE attended the training 2) OJT on preparation of sampling activities - C/Ps and JET prepared tools for field work using the list of field tools developed in the training last year. - Kinds of bottles and washing procedure of the bottles are to be changed by parameter. C/Ps and JET prepared a 2 L plastic bottle for general parameters and two glass bottles for oil and phenols analysis per one monitoring station. 3) OJT on sampling along the Huong River. - C/Ps and JET took samples and measured water quality (pH, conductivity, water temperature, DO, TDS, and turbidity) on-site at eight monitoring stations along the Huong River. - DO was fixed with reagents for Winkler method as well. 4) OJT on pH and conductivity analysis - pH and EC meters were calibrated by standard solutions.

Training	Theme and Material	Contents and Results of the Training
		<ul style="list-style-type: none"> - There was a big error in the EC meter (more than ten times difference), thus it was corrected. 5) OJT on COD analysis <ul style="list-style-type: none"> - COD was measured using ready-made reagents. The reagents will be prepared by C/Ps in the next training. - It was the first time for C/Ps to use their spectrometer. - Detection limit of the analysis was 10 mg/L and COD of every sample is lower than the limit. 6) OJT on BOD analysis <ul style="list-style-type: none"> - BOD was measured applying Winkler method. 7) OJT on DO analysis <ul style="list-style-type: none"> - Winkler method was applied to measure DO. Contamination of iodide was found in a reagent, but by subtracting the contamination value, accurate results were obtained using the method. 8) OJT on NO₃-N analysis <ul style="list-style-type: none"> - Coefficient of determination (R²) was 0.9997 in the range of 0.4 – 4 mg/L - MDL of the analysis was 0.025 mg/L which is lower than environmental standard value (1 mg/L). - Difference of duplication analysis was 2% 9) OJT on PO₄-P analysis <ul style="list-style-type: none"> - Coefficient of determination (R²) was 0.9984 in the range of 0.04 – 0.4 mg/L - MDL of the analysis was 0.01 mg/L which is lower than environmental standard value (0.1 mg/L). - Difference of duplication analysis was 8% 10) OJT on NO₂-N analysis <ul style="list-style-type: none"> - Coefficient of determination (R²) was 0.9991 in the range of 0.01 – 0.1 mg/L - MDL of the analysis was 0.00 mg/L which is lower than environmental standard value (0.01 mg/L). - Difference of duplication analysis was 0.0% - 11) OJT on phenols analysis <ul style="list-style-type: none"> - Coefficient of determination (R²) was 0.9880 in the range of 0.005 – 0.1 mg/L - MDL of the analysis was 0.02 mg/L which is higher than environmental standard value (0.005 mg/L). - Difference of duplication analysis was 7-18% 12) OJT on data management <ul style="list-style-type: none"> - Notebooks for putting down raw data were prepared in the laboratory.
9th TG on basic water quality analysis (18,19/10/2012, two days, TT-HUE/ EPA)	Hands-on training on basic water quality analysis (oil, salinity)	<ol style="list-style-type: none"> 1) Three to four staff from TT-HUE DONRE attended the training 2) Hands-on training on salinity analysis <ul style="list-style-type: none"> - Difference of duplication analysis was less than 3.9% 3) Hands-on training on oil and grease analysis <ul style="list-style-type: none"> - Difference of duplication analysis was more than 100% (not good result)
10th TG on basic water quality analysis (9-16/11/2012, five days, TT-HUE/ EPA)	<ol style="list-style-type: none"> 1. Hands-on training on basic water quality analysis (BOD, COD, oil, and TDS) 2. Lecture on QC of external laboratory results 	<ol style="list-style-type: none"> 1) Three to five staff from TT-HUE DONRE attended the training 2) Hands-on training on BOD analysis <ul style="list-style-type: none"> - Difference of duplication analysis was 3-37%. 3) Hands-on training on COD analysis <ul style="list-style-type: none"> - Coefficient of determination (R²) was 0.9981 in the range of 100 mg/L – 500 mg/L (high concentration range). - Difference of duplication analysis was 1.7% 4) Hands-on training on oil and grease analysis <ul style="list-style-type: none"> - Difference of duplication analysis was 7-19% 5) Hands-on training on TDS analysis <ul style="list-style-type: none"> - Difference of duplication analysis was 30% (not good) 6) Lecture on QC of external laboratory results <ul style="list-style-type: none"> - Procedure on contract, such as screening, preparing specification, ordering, inspection, and data check was discussed in the lecture



First data written on their datasheet

Training	Theme and Material	Contents and Results of the Training
11th TG on basic water quality analysis (23-25, 28-30/01/2013, six days, TT-HUE/ EPA)	Hands-on training on basic water quality analysis (NH ₄ , BOD, COD, and TDS)	<p>1) The four parameters were analyzed again because the results during the OJT in 2012 were not good. In this OJT, the distilled water with the addition of standard solution was used for the measurement at first in order to confirm the accuracy of every step. As a result, all data showed a good repeatability and recovery rate at this condition.</p> <p>2) Seven staff from TT-HUE DONRE attended the training</p> <p>3) Hands-on training on NH₄ analysis</p> <ul style="list-style-type: none"> - The spectrometer method was newly applied. - Coefficient of determination (R²) was 0.9988 in the range of 0.05 – 2.0 mg/L - CV was 2.7-5.3% and recovery rate was 102-104%. - There is no problem with the analysis of standard solution. The next step is to analyze a natural water sample with the distillation process. <p>4) Hands-on training on COD analysis</p> <ul style="list-style-type: none"> - Coefficient of determination (R²) was 0.9978 - 0.9984 in the range of 0.05 mg/L – 2 mg/L (low concentration range). - CV of 50 mL -standard sample was 3.8% and its recovery rate was 102%. - CV of the river water sample was 5.5%. <p>5) Hands-on training on TDS analysis</p> <ul style="list-style-type: none"> - CV of standard sample was 2.3% and recovery rate was 106%. - There is no problem with the analysis with standard solution. The next step is to analysis natural water samples. <p>6) Hands-on training on BOD analysis</p> <ul style="list-style-type: none"> - The recovery rate of was 95-97%. - There is no problem with the analysis with standard solution. The next step is to analyze natural water sample.
12th TG on basic water quality analysis (17-23/04/2013, five days, TT-HUE/ EPA)	<p>1. Hands-on training on basic water quality analysis (NH₄ and BOD)</p> <p>2. Lab management</p>	<p>1) Six staff from TT-HUE DONRE attended the training</p> <p>2) The two parameters were analyzed again because natural water analysis was required at the last training. In this training, river water was used for the measurement. As a result, all data showed good repeatability.</p> <p>3) Hands-on training on NH₄ analysis</p> <ul style="list-style-type: none"> - The spectrometer method was applied. - Coefficient of determination (R²) was 0.9951 in the range of 0.1 – 1.0 mg/L - CV was 1.0-23% and recovery rate was 101-104%. <p>4) Hands-on training on BOD analysis</p> <ul style="list-style-type: none"> - River water sample was measured.

Source: JET

(4) HCMC DONRE

Table 2.3-12 summarizes the results of the training activities implemented at HCMC DONRE. The HCMC DONRE does not have any laboratory and they outsource water quality analysis to external laboratories. In response to HCMC DONRE's request, JET held lectures on QC of contracted work in December 2011 and November 2012.

In the lectures on QC, JET emphasized the importance of preparing the specifications which requires the contractor to submit a WP including not only the contents of the monitoring activities but also detailed information relating to QA/QC. By checking the WPs submitted by the contractors, DONRE can evaluate the capacity of the contractor and grasp the quality of the laboratory. The contents of the lectures are summarized in the handbook prepared through the Project.

Table 2.3-12 Training Results of WG 2-2 in HCMC

Training	Theme and Material	Contents and Results of the Training
1st TG on laboratory management and QA/QC (19/12/2011, CETHCM)	Lecture on laboratory management and QA/QC	<p>1) Three staff from HCMC DONRE attended the training</p> <p>2) Lecture on laboratory management</p> <p>3) Laboratory tour of CETHCM</p> <ul style="list-style-type: none"> - Activities based on VILAS accreditation - Environmental analyses using modern instruments
2nd TG on QC of contract work (02/11/2012, CETHCM)	Lecture on QC of contract work	<p>1) Twelve staff from HCMC DONRE attended the training</p> <p>2) Lecture on QC of contract work</p> <ul style="list-style-type: none"> - Procedure of contract, such as screening, preparing specifications, ordering, inspection, and data check, was discussed in the lecture. - Data management, such as significant figures, was trained practically in the lecture. - Check points to inspect the external laboratory's work were explained.



Lecture at HCMC

Source: JET

(5) BRVT DONRE

Table 2.3-13 summarizes the results of the training activities. In the first meeting, the target parameters selected for water quality analysis training were heavy metals and pesticides. However, since issuing of the A4 form had been delayed, the equipment required for the training, namely GC-ECD and furnace-AAS, had not been procured until January 2013. While waiting for the procurement of equipment, a set of lecture-type training on basic matters of general water quality analysis, QA/QC, AAS, and GC, and hands-on training on heavy metal and phenols analysis were held from December 2011 to December 2012.


Since understanding the method for calculating MDL from standard deviation is crucial for QC, basic theories of statistics were taught during the training held in February 2012. In the same period, lecture on GC analysis was also held in order for C/Ps to obtain basic knowledge of QA/QC on the analysis of organochlorine pesticides.

JET started the training on phenols and fluoride analysis in July 2012, which was additionally requested by C/Ps. Through the training, C/Ps obtained knowledge and skills for analysis of phenols and fluoride, and learned how to check and evaluate their accuracy. Phenols analysis by the standard method did not yield sufficient MDL considering the environmental standard value. C/Ps tried to get a lower MDL using an improved method. Regarding fluoride analysis, lectures and the hands-on training were given, and C/Ps achieved accurate results in the training.

In the middle of November 2012, the A4 form was finally approved. Accordingly, the equipment were delivered to BRVT DONRE in January 2013. After the installation, JET held additional training on heavy metal analysis and pesticides analysis using the equipment. For heavy metal analysis using AAS, all of the eight target heavy metals passed all criteria of level 5, while repeating the preparation of standard solutions and taking various precautions to minimize possible contamination. As for pesticide analysis using GC-ECD, C/Ps followed the procedures described in TCVN 7876. Eight of the 13 target chlorinated pesticides passed all criteria of level 5. The C/Ps have learned how to validate the analytical procedures on heavy metals and chlorinated pesticides, and have produced accurate results in consideration of QA/QC.

Table 2.3-13 Training Results of WG 2-2 in BRVT

Training	Theme and Material	Contents and Results of the Training
1st TG on heavy metals analysis (19/12/2011, CETHCM)	Lecture on laboratory management and QA/QC	1) Eight staff from CEMAB attended the training 2) Lecture on laboratory management 3) Laboratory tour of CETHCM - Activities based on VILAS accreditation - Environmental analyses using modern instruments
2nd TG on heavy metal analysis (20-21/12/2011, BRVT CEMAB)	Lecture on heavy metal analysis	1) Thirteen staff from CEMAB attended the training 2) Contents of the lecture training - Design of training in BRVT DONRE - Introduction of AAS: principle, analysis method, mentions - Guidance on how to analyze metals in water by TCVN - Guidance on how to write SOPs
3rd TG on quality management and GC analysis (22-23/2/2012, BRVT CEMAB)	Lectures on quality management and on GC analysis	1) Eight staff from CEMAB attended the training 2) Contents of the Lecture training - Quality management in environmental analysis - Guidance on how to calculate uncertainty - Introduction of GC: principle, analysis method, mentions

Training	Theme and Material	Contents and Results of the Training
4th TG on phenols analysis (02-04/07/ 2012, BRVT CEMAB)	1. Checking methods and preparing the apparatus/reagents for phenols and fluoride analyses 2. Hands-on training on phenols analysis	<p>1) Nine staff from CEMAB attended the training</p> <p>2) OJT on phenols analysis</p> <ul style="list-style-type: none"> - Coefficient of determination (R^2) was 0.999 in the range of 0.5 – 5 mg/L - MDL of the analysis was 0.080 mg/L, which is higher than A1 class of the environmental standard value (0.005 mg/L), calculated by only four blank tests. - Difference of duplication analysis was 0.18%. The recovery rate was 100%. - SOP for phenols analysis was prepared by staff from CEMAB after the training. - CEMAB staff tried to analyze phenols by themselves and got 0.019 mg/L of MDL calculated by eight blank tests after the training. <p>3) Contents of the lecture on fluoride analysis</p> <ul style="list-style-type: none"> - The procedure on and the principle of fluoride analysis were explained.  <p style="text-align: right;">Lecture at BRVT</p>
5th TG on phenols analysis (30-31/07/ 2012, two days, BRVT CEMAB)	Hands-on training on phenols analysis	<p>1) Three to five staff from CEMAB attended the training</p> <p>2) Hands-on training on phenols analysis by chloroform extraction method</p> <ul style="list-style-type: none"> - To get lower MDL of phenols, chloroform extraction method was applied. - Coefficient of determination (R^2) was 0.9983 in the range of 0.004 – 1 mg/L - MDL of the analysis was 0.022 mg/L, which is lower than the MDL by only distillation method at the 4th training. Though, it was still higher than A1 class of the environmental standard value (0.005 mg/L), the trainees learned of an additional method for phenols analysis.
6th TG on heavy metal analysis (01/08/2012, BRVT CEMAB)	Lectures on pesticide analysis and on QA/QC concepts necessary for the establishment of methods	<p>1) Ten staff from CEMAB attended the training</p> <p>2) Contents of the lecture training</p> <ul style="list-style-type: none"> - Presentation was based on the “Guidance of POPs Analysis” by UNEP - Purpose of the guidance is how to produce reliable data in various matrices - Key steps of analysis from set-up and infrastructure, each analytical operation to reporting - Further important issues to be considered such as maintenance of equipment and training of laboratory staff <p>3) It seemed some of the new concepts were difficult for C/P to learn. C/P will have to study hard the definition of technical terms used in the field of QA/QC.</p>
7th TG on heavy metal analysis (15-17/08/2012, three days, BRVT CEMAB)	Hands-on training for heavy metal analysis	<p>1) Two staff from CEMAB attended the training.</p> <p>2) Hands-on Training:</p> <p>2-1) Optimization of instruments’ parameters was explained by a local expert, and C/P could reconfirm these operations.</p> <ul style="list-style-type: none"> - Position of burner and ratio of fuel gas and oxidant for flame - Time of signal in flame mode - Choose slit width, choose wavelength - Linear range and working range - Characteristic concentration, and concentration check value - Estimation of limit of detection <p>2-2) Review of procedures to determine Cr, Cu, Zn, Ni, and Mn</p> <ul style="list-style-type: none"> - Calibration curve - Repeatability and recovery rate - Estimation of MDL using standard deviation obtained from a repeated test
8th TG on fluoride analysis (3,4/10/ 2012, two days, BRVT CEMAB)	Hands-on training on fluoride analysis	<p>1) Five staff from CEMAB attended the training</p> <p>2) Hands-on training on fluoride analysis by electrochemical probe method</p> <ul style="list-style-type: none"> - The calibration curve between 0.2 mg/L and 100 mg/L showed linearity of $R^2=0.9983$. - MDL was 0.045 mg/L which was lower than A1 grade (1 mg/L) of the environmental standard. CV was only 2.1 %. - SOP on fluoride analysis was prepared by staff from CEMAB after the training.
9th TG on heavy metal and pesticide analyses (19-21/11/ 2012, three days, CETHCM)	Hands-on training on AAS	<p>1) One staff from CEMAB attended the training.</p> <p>2) Hands-on training on heavy metal analysis</p> <ul style="list-style-type: none"> - All calibration curves of Ni, Cu, Fe, Zn and Cr showed larger than $R^2=0.991$ mg/L. - Repeatability of Ni, Cu, Fe, Zn and Cr showed 0-6.3%. <p>MDL was 0.05 mg/L for Ni, 0.03 mg/L for Cu, 0.22 mg/L for Fe, 0.19 mg/L for Zn, and 0.04 mg/L for Cr.</p>
	Hands-on training on GC	<p>1) One staff from CEMAB attended the training.</p> <p>2) Hands-on training on pretreatment</p> <ul style="list-style-type: none"> - Preparing standard solution - Optimization of GC conditions - Drawing calibration curves <p>The calibration curve between 0.05 mg/L and 1.0 mg/L showed linearity of $R^2>0.995$.</p>
10th TG on heavy metal and pesticide analyses (4-6/12/2012, three days,	Hands-on training on AAS	<p>1) One staff from CEMAB attended the training.</p> <p>2) Hands-on training on heavy metal analysis</p> <ul style="list-style-type: none"> - The calibration curve of As showed $R^2=0.990$ mg/L. - The sample was not measured because of instrument problem. <p>The staff has understood the method for analyzing As by using AAS.</p>

Training	Theme and Material	Contents and Results of the Training
CETHCM)	Hands-on training on GC	1) One staff from CEMAB attended the training. 2) Hands-on training on pretreatment - Extraction with blank and spike samples - The calibration curve between 0.05 mg/L and 0.5 mg/L showed linearity of $R^2 = -0.98 - 0.995$. The staff has understood the method for analyzing pesticides in water by using GC/ECD and practiced procedure of analysis such as: preparing standard solution, making calibration curves, and pretreatment sample.
11th TG on heavy metal and pesticide analyses (16-30/01/2013, five days, CETHCM)	Initial training on AAS and GC by supplier of new equipment	1) Three staff from CEMAB attended the training. 2) Initial training on the newly installed furnace AAS and GC-ECD was implemented by the supplier. - The fundamental procedures for using both instruments were explained, and C/P started to learn their operations.
12th TG on heavy metal and pesticide analyses (12-26/03/2013, ten days, BRVT CEMAB)	Hands-on training on AAS	1) One staff from CEMAB attended the training. 2) Hands-on training on heavy metals - Validation of methods for analyzing As, Pb, Cd, Ni, Mn, Cr, Cu, and Zn - Calibration curves of As, Pb, Cd, Ni, Mn, Cr, and Cu were larger than $R^2 = 0.997$. - Repeatability of the following parameters was less than 20%: Pb 11%, Ni 6.2%, Mn 3.6%, Cr 4.2%, and Cu 18% - MDL of the following parameters was less than 1/10 of the environmental water standard value specified in QCVN08: As 0.0019 mg/L, Pb 0.0025 mg/L, Cd 0.0001 mg/L, Ni 0.0031 mg/L, Mn 0.0005 mg/L, Cr 0.0019 mg/L, and Cu 0.0043 mg/L. <div> </div>
	Hands-on training on GC	1) One staff from CEMAB attended the training. 2) Hands-on training on GC-ECD for pesticides - Practicing the procedures of pretreatment sample - QA/QC of the method, and prepare the SOPs <div> </div>

Source: JET

2.3.3 Achievements

2.3.3.1 Overall Achievements

The objectively verifiable indicator of PDM pertinent to the water quality analysis component of Output 2-1 (Monitoring) is “Indicator 2-1-3: Accuracy of monitoring is improved”. Table 2.3-14 below summarizes the indicator, status to be achieved by each organization, and the status at the end of the Project.

Table 2.3-14 Status of PDM Indicator

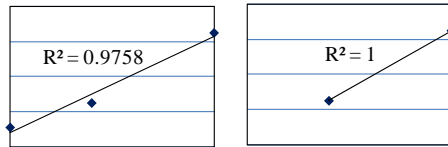
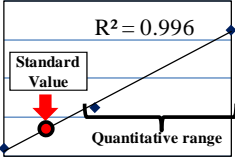
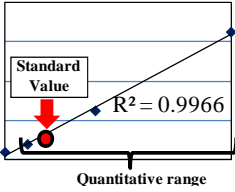
Indicator	Status to be Achieved by Each Organization	Status at the End of the Project
2-1-3 Accuracy of monitoring is improved.	<ul style="list-style-type: none"> Each DONRE achieves a set of the levels for improvement of analytical precision in the selected target parameters considering the technical capacity of each monitoring center. The goal of each DONRE in this output is as follows: <ul style="list-style-type: none"> Lab staff measure POPs with QC (HNI) Lab staff measure basic parameters with QC (HPG) Lab staff measure basic parameters based on standard methods (TT-HUE) Monitoring section staff outsources water quality analysis with QC (HCMC) Lab staff measure some parameters by GC and AAS with QC (BRVT) 	<ul style="list-style-type: none"> Based on the criteria designed in the Project, the achievement levels of water quality analysis at the end of the Project were evaluated by JET and C/Ps as follows (see Table 2.3-15 and Figure 2.3-3). The overall achievement is evaluated as “mostly achieved”. <ul style="list-style-type: none"> HNI: Lab staff can now measure chlorinated pesticides by the finalized analytical method and have reached the expected goal. HPG: All training target parameters (eight parameters) have reached the goal level. TT-HUE: All training target parameters (14 parameters) have reached the goal level. HCMC: QC training was implemented. BRVT: All training target parameters (11 parameters) have reached the goal level.

Source: JET

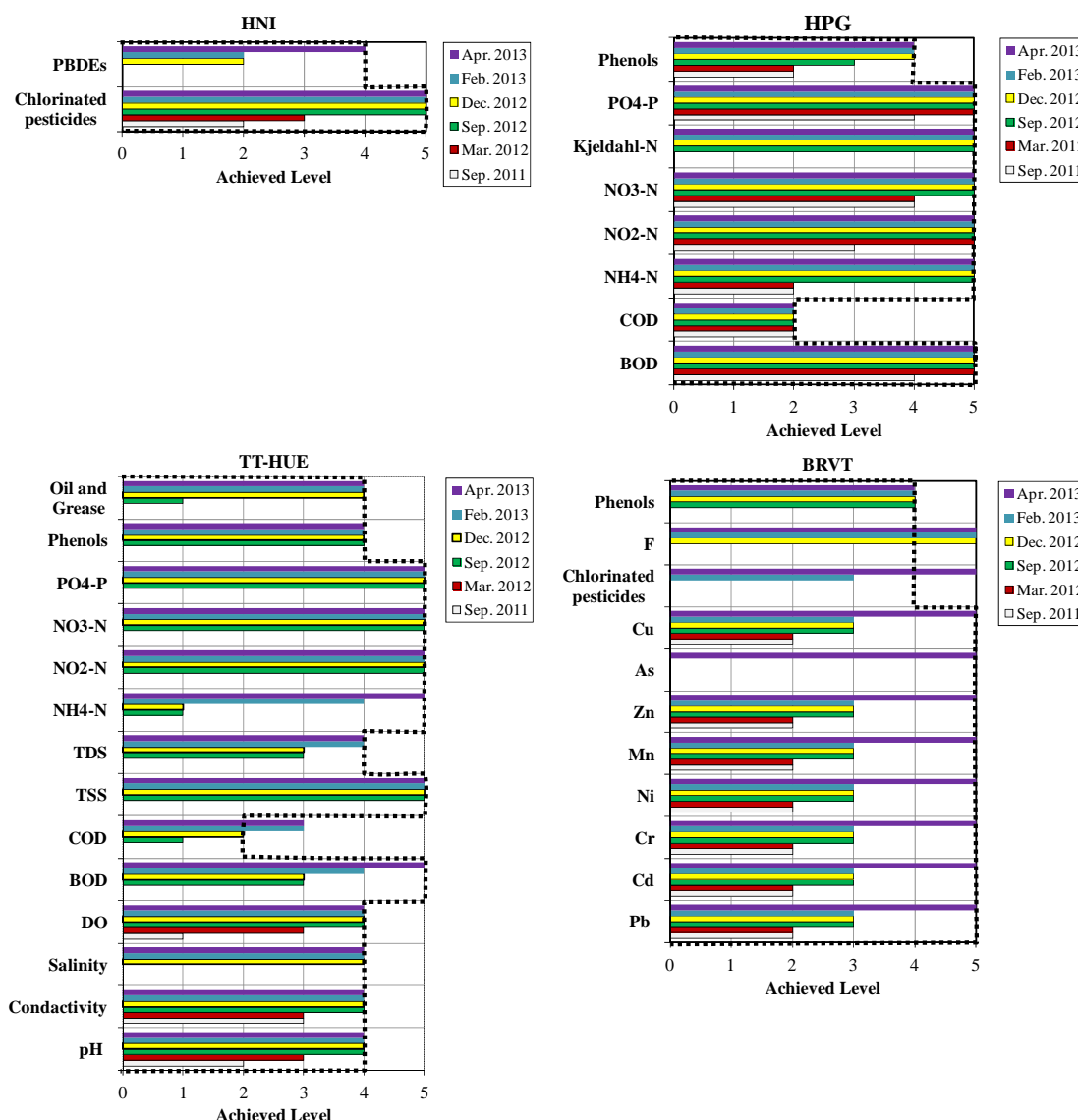
In order to evaluate the achievement of the indicator, the Project prepared a set of criteria specially designed for each DONRE considering the technical capacity of each monitoring center. Then, the criteria were monitored periodically by JET and the progress discussed with C/Ps. The criteria are shown in Table 2.2.2-14. Basically, each DONRE is expected to achieve level 5 competency for each parameter selected, by demonstrating that the staff of the laboratory is capable of quantifying concentration at or lower than the environmental water standard values mentioned in the ‘National Technical Regulation on Surface Water: QCVN08: 2008/BTNMT’, using its methodology and equipment and with enough statistical certainty. For some parameters, however, it was difficult to achieve level 5 due to technical reasons, and for these parameters, the goals were set to levels 2 to 4, as mentioned in the remarks in Figure 2.3-3.

The levels of achievements in the relevant DONREs have been evaluated as “mostly achieved”. The progress of BRVT DONRE was slower than other DONREs in November 2012 because equipment for training (GC-ECD and furnace-AAS) had not been procured until January 2013 due to the delay in the release of the A4 form. However, through the efforts of the C/Ps and JET, BRVT DONRE caught up with the other DONREs through additional trainings in 2013.

Table 2.3-15 Level of Water Quality Analysis in the Project

Level	Explanation	Example
-	Not available without equipment or installation.	
0	No measurement ever.	
1	Measurement is conducted but without sufficient reliability. Calibration curve is drawn with two or less calibration points and/or $R^2 < 0.99$.	 (Example of “1”)
2	Calibration curves can be drawn (with three or more calibration points, $R^2 \geq 0.99$) but not available for the A1 grade of the Standard for Surface Water (SSW). This condition is not accurate enough.	 (Example of “2”; a quantitative range is between the lowest and highest calibration excluding zero)
3	Calibration curves can be drawn (with three or more calibration points, $R^2 \geq 0.99$) and SSW concentration can be measured accurately.	 (Example of “3”; quantitative range includes SSW concentration so that it can be measured)
4	Difference of duplicate analysis using natural water sample is less than 20%.	-
5	MDL is less than A1 grade of SSW.	

Source: JET



Source: JET; The dotted line shows the expected goal of each parameter.

Remark: Reasons for setting target level lower than level 5

PBDE (polybrominated diphenyl ether)	PBDEs, a group of compounds that belong to POPs, are chemical flame retardants used in plastics, upholstery fabrics, and foams in products such as computers, televisions, furniture, and carpet pads. PBDEs show up in the environment in food, in household dust, and in workplaces. PBDEs are found at increasing levels in human blood, fat and breast milk, in the world. However, there is no environmental standard of PBDEs in Vietnam. Therefore, MDL cannot be compared with the standard value. Therefore, level 4 was set as the goal in the Project.
Phenols	Value of "A" grade of surface water standard of phenols is 0.005 mg/L. The value is lower than the detection limit of the analysis method applied in Vietnam. In case of applying the method, it is impossible to get MDL less than the value. Therefore, level 4 was set as the goal in the Project.
COD	Value of "A" grade of surface water standard of COD is 10 mg/L. The value is almost the same as the detection limit of the analysis method applied in Vietnam. It is impossible to get an accurate calibration curve applying 10 mg/L as the lowest standard. Therefore, level 2 was set as the goal in the Project.
Oil and grease	Value of "A" grade of surface water standard of oil and grease is 0.01 mg/L. In case of using GC-FID, it is possible to measure the value. However, the Project did not procure GC for TT-HUE DONRE. JET will conduct training on oil and grease by applying another method, the Hexane Extractable Gravimetric Method, which has a detection limit higher than the standard value. Therefore, level 4 was set as the goal in the Project.
TDS, salinity, conductivity	There is no surface water quality standard for these parameters. Therefore, MDL cannot be compared with the standard value. Therefore, level 4 was set as the goal in the Project.
DO, pH	The standard values for DO and pH are not the maximum value allowed in the environment. Therefore, it is meaningless to measure detection limit of both parameters. Therefore, level 4 was set as the goal in the Project.
Fluoride	Value of "A" grade of surface water standard of fluoride is 1 mg/L. It is necessary to use steamed distillation apparatus in order to measure accurately. However, JET did not procure the apparatus because fluoride analysis training was added after the equipment to be procured have been decided. Therefore, level 4 was set as the goal in the Project.
Chlorinated pesticides in BRVT CEMAB	Detector of GC which is necessary for the pesticide analysis has not yet been delivered to BRVT. Considering the training schedule, it is impossible to achieve level 5 until the end of the Project. Therefore, the level expected to achieve was decreased to level 4.

Figure 2.3-3 Level of Water Quality Analysis in Each DONRE

2.3.3.2 Capacity Assessment and Achievement

The results of the capacity assessment and achievement were summarized in Section 2.2.3.

2.3.3.3 Recommendations for Post Project Activities

(1) Stability of Budget System

Although DONREs devoted their time and efforts to successfully achieve the objectives of the Project, some obstacles due to insufficient budget were often encountered. For instance, TT-HUE DONRE faced difficulty when they tried to set up their laboratory. Most equipment necessary for water quality analysis were procured by JICA. However, it took an additional half year for them to buy a sink in the laboratory. Due to the delay of setting up the laboratory, JET had to rearrange the training schedule.

Appropriate budget planning and allocation are indispensable in sustaining not only the Project outcomes but also the daily duties of DONREs, which include regular maintenance of laboratory facilities, machine, and replenishment of glassware and chemical. For such purposes, not only the annual budget plan but also a medium- or long-term strategy for budget planning is recommended for MONRE and DONREs.

(2) Sustainability of QA/QC

Through the training on water quality analysis, JET focused on three approaches of internal quality control, namely: preparation of calibration curves, conduct of duplication analysis, and checking of the MDL. These three approaches are fundamental techniques for quality control in water quality analysis. JET highly recommends that DONREs apply such QC approaches into their regular activities in order to increase the reliability of their water quality analysis results. The Handbook for Improving Monitoring Performance prepared through the Project includes additional practical techniques on quality control.

In order to sustain a certain level of QA/QC, the role of the quality manager in the laboratory is important. The quality manager is expected to set up QA/QC regulations in the laboratory and check whether or not all activities in the laboratory follow the regulation. If there is no quality manager in the laboratory, it is recommendable to assign appropriate personnel to the position.

The role of the director and/or the head of the laboratory is also very important. The atmosphere of the laboratory is strongly influenced by the character of the superiors. In order to develop a refined laboratory, the director should encourage the staff to make continuous efforts. Such attitude contributes to quality improvement of the laboratory.

2.4 Output 2-2 (WG 2-3): Inventory

2.4.1 Introduction

2.4.1.1 Objectives of Inventory Activity

According to the tentative action plans (APs) prepared by DONREs, none of the target DONREs conduct unified management of information on pollution sources, and information has been managed separately by different departments in DONRE. Also, information such as EIA and wastewater discharge fees exist in hard copies and in different forms. Thus, all DONREs required a pollution source inventory (PSI) which unifies all information in one form and assists planning and implementation of water pollution control measures. The PSI, whose structure is shown in Figure 2.4-1, should have the following functions:

- To grasp compliance status of polluters with environmental requirements, and identify pollution sources and/or pollutants to be controlled,
- To integrate data and information stored separately, and redistribute them to the relevant sections in charge of water pollution control,
- To accumulate data for the officers of relevant sections in charge of pollution control, and
- To provide data for planning and reviewing water pollution control measures.

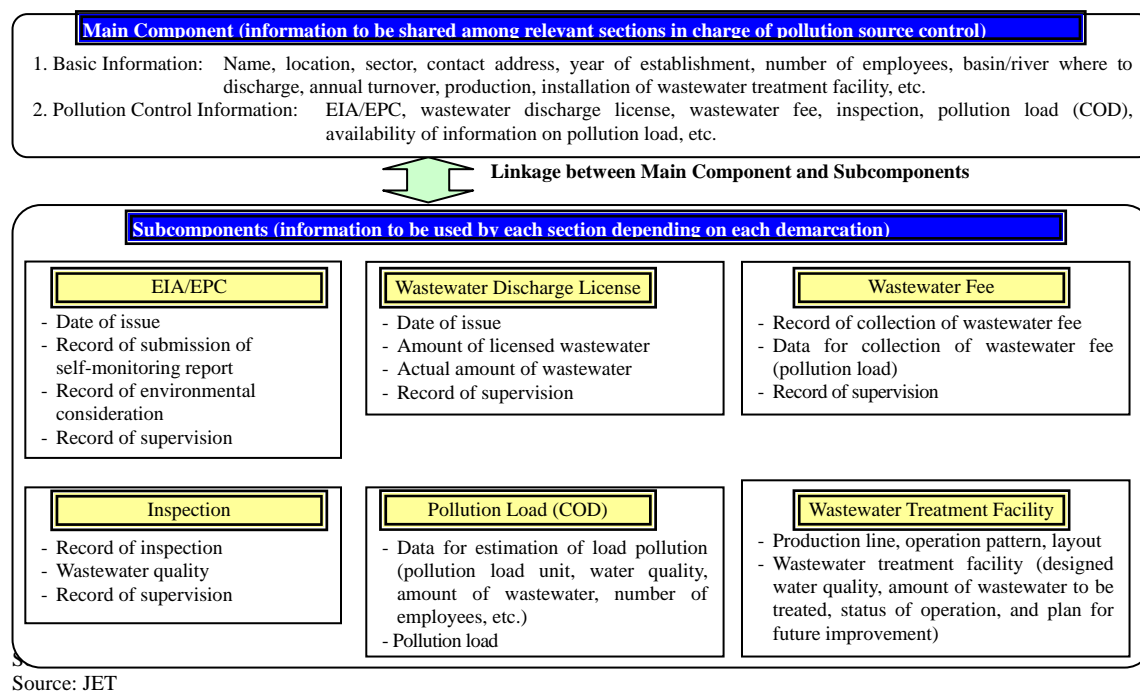


Figure 2.4-1 Structure of PSI

2.4.1.2 PDM and PO

The activities of PSI development and related capacity development were implemented based on PDM and PO. Table 2.4-1 shows the items related to inventory (WG 2-3) in the revised PDM and PO.

Table 2.4-1 Output, Indicator, and Activities of Inventory Component in PDM and PO

	Item	Contents
PDM	Output	Enforcement capacity of target DONREs on basic water pollution control (environmental monitoring, pollution sources inventory, and pollution sources inspection) is strengthened.
	Objectively Verifiable Indicators	2-2-1: Primary water pollution sources are duly filled in the revised inventory formats. 2-2-2: Information on the inventory is adequately added and the following information becomes available for DONREs' pollution control activities: (i) information on compliance with respect to EIA, industrial wastewater fee, water discharge license, wastewater quality standard, sanction based on inspection; (ii) information on pollution load of COD.

	Item	Contents
PO	Activities	C2-1: Conduct capacity assessment of target DONREs regarding pollution sources inventory. C2-2: Review and modify existing inventory formats based on the current conditions of target DONREs. C2-3: Conduct inventory survey with the revised inventory formats. C2-4: Organize collected information on main pollution sources. C2-5: Regularly conduct inventory survey and add/update information on main pollution sources.

Source: JET

2.4.1.3 Activity C2-1: Conduct Capacity Assessment of Target DONREs regarding Pollution Source Inventory

In order to evaluate the current status of PSI development and the capacities of each DONRE, an initial capacity assessment was conducted on the following five key items:

- Vietnamese regulations related to PSI,
- Workshop on data management of PSI,
- Status of PSI development in the beginning of the Project,
- CD plan, and
- Preparation of WPs.

At first, capacity assessment (CA) was conducted from May to August 2011 in accordance with the PDM. Based on the results of CA and the draft CD plans developed by DONREs, the WG members of each DONRE drafted the detailed WPs.

2.4.1.4 Vietnamese Regulations related to PSI

Table 2.4-2 shows the Vietnamese regulations related to PSI. The current conditions and major issues of Vietnamese regulations are summarized below.

- 1) There are no existing laws and regulations which directly regulate the development and usage of a water PSI,
- 2) The system of regulations related to water pollution control is not functioning as expected due to “unrealistic requirements” and subsequent difficulties on enforcement, as is the case of industrial wastewater fee, and
- 3) Regarding management resources, DONRE lacks enough human resources, budget, and equipment relative to the large number of pollution sources.

Table 2.4-2 Vietnamese Regulations related to PSI

No	Law/Regulation	Date	Contents
1	Law NO. 52, Order No. 29/2005/L-CTN	November 2005	Vietnamese basic environmental protection law (New LEP, LEP 2005)
2	Law No. 8	May 1998	Law on Water Resources
3	Decision No. 16/2007/QD-TTg	January 2007	Overall scheme on national resources and environmental monitoring system until 2020
4	Decree No. 175/CP	October 1994	Providing guidance for the implementation of the Law on Environmental Protection. Appendix 1.2 (THE CONTENT FOR DETAILED EIA REPORT)
5	Decree No. 61/1998/ND-CP	August 1998	On the inspection and control work with regard to enterprises
6	Decision No. 64/2003/QD-TTg	April 2003	The National Action Plan on strictly handling establishments that cause serious environmental pollution
7	Decree No. 67/2003/ND-CP	June 2003	Environmental protection fees for wastewater
8	Decree No. 34/2005/ND-CP	July 2003	Regulation for administrative penalties for pollution of water resources
9	Decree No. 121/2004/ND-CP	May 2004	Regulations on sanctioning of administrative violations in the field of environmental protection
10	Decree No. 149/2004/ND-CP	June 2004	Licensing of wastewater discharge in water resources
11	Decree No. 80-2006/ND-CP	August 2006	Detailed stipulation and implementing instruction of some articles of the Law on Environment Protection. Amended to Decree 29/2011/ND-CP
12	Decree No. 81/2006/ND-CP	August. 2006	Sanctioning of administrative violations in the domain of environmental protection
13	Decree No. 102/2008/ND-CP	September 2008	On the Collection, Management, Exploitation and Use of Natural Resources and Environmental Data

No	Law/Regulation	Date	Contents
14	Decree No. 117/2009/ND-CP	December 2009	On the Handling of Law Violations in the Domain of Environmental Protection
15	Circular No. 2781/1996/TT-KCM	December 1996	Guidance on procedures for the Grant, Renewal and Withdrawal of Certificates of Environmental Standards for Industrial Facilities
16	Circular No. 08/2006/TT-BTNMT	September 2006	Guideline for EIA and EPC
17	Circular No.07/2007/TT-BTNMT	July 2007	Guiding the classification and decision of list of units causing environmental pollutants that need sanction
18	Circular No.07/ 2009/TT-BTNMT	July 2009	Regarding the collection, management, exploitation and use of data on natural resources and environment
19	Circular No. 08/2009/TT-BTNMT	July 2009	Providing for the environmental management and protection of economic zones, hi-tech parks, industrial parks and industrial complexes
20	Circular No. 26/2011/TT-BTNMT	July 2011	Detailed guide of SEA, EIA and EPC (Follow Decree No. 29/2011/ND-CP)
21	Circular No. 48/2011/TT-BTNMT	February 2011	Amendment and supplement to some Articles of Circular No. 08/2009/TT-BTNMT, providing for the environmental management and protection of Economic Zones (EZs), Hi-Tech Parks (HTPs), Industrial Parks (IDPs) and Industrial Complexes (ICs)
22	Decree No. 29/2011/ND-CP ^(*)	April 2011	Provision of the Strategic Environmental Assessment (SEA), EIA, and EPC
23	Decision No. 10/2007/QĐ-TTg	January 2007	The system of economic sectors in Vietnam (Industrial classification code)

Source: JET

2.4.1.5 Workshop on Data Management of PSI

A workshop on data management for the establishment of PSI was held on 27 July 2011. The objectives were to share the experiences and objectives of PSI development in target DONREs, and to unify the direction of PSI development with each DONRE and MONRE. This workshop was facilitated through a discussion of problems on information management in target DONREs. The results are summarized in Table 2.4-3.

Table 2.4-3 Program and Conclusions of Workshop on Data Management of PSI

Item	Contents
Program	<p>[Morning Session]</p> <ul style="list-style-type: none"> - Status of environmental protection in HNI (HNI DONRE) - Database development of pollution sources management (HPG DONRE) - Management and development of environmental database in TT-HUE (TT-HUE DONRE) - Report on PSI in HCMC (HCM DONRE) - SOE and environmental data inventory and management in BRVT (BRVT DONRE) <p>[Afternoon Session]</p> <ul style="list-style-type: none"> - Orientation of PSI for water environmental management in river basin (CEID) - Comments on inventory carried by 5 DONREs and VEA, and instruction of development of PSI (JET) - Development of database, software to manage, share and exchange information on wastewater (IER)
Conclusion	<ul style="list-style-type: none"> - The responsible agency for information management in province shall be clarified. - Regulation obligating the collection of database and information on pollution sources must be developed. - Participation of grassroots level such as communes is very necessary in information inventory, research and contribution. - It is necessary to strengthen the staff's capacity on inventory and statistics through training courses and OJT. - A common database, model and method on information sharing inside and outside DONRE shall be developed. - The workshop will not discuss about technology because MONRE has developed its guidelines on technology.

Source: JET

2.4.1.6 Initial Status of PSI Development

Table 2.4-4 summarizes the current status, weak points, and improvement methods of PSI development. After reviewing the data available in DONREs, it became evident that some data were readily available. On the other hand, other data, such as concentrations of wastewaters and its flow rate, were scarce or not reliable. Additionally, it was confirmed that DONREs had some experiences in compiling information on pollution sources, but their capacities and experiences to develop a comprehensive dataset and to control pollution sources using information were limited.

Table 2.4-4 Current Status, Weak Points, and Improvement Methods of PSI Development

Current Status of PSI Development by DONREs	Weak Points in DONREs	Improvement Methods for DONREs
There was no PSI system except at HCMC, but basic data was available. HCMC had a basic PSI which included available industries data.	No department, shortage of budget and few human resources in the environmental field for PSI development	To instruct method for data collection and form considering required information, and instruct procedure for preparing and updating PSI
Each section in DONRE collected necessary data. HNI: Refer to Output-3 activity HPG: List of wastewater discharge fee and priority entities TT-HUE: List of EIA, EPP, and wastewater discharge fee, etc BRVT: List of EIA, EPC, and wastewater discharge fee	Few experiences to input collected data to PSI and usage of PSI including estimation of pollution loads	To instruct the procedure for pollution load estimation
There would be environmental database planning for HNI, HPG and HCMC DONRE.	Little understanding on why it is important to share necessary information within DONRE	To grasp importance of information sharing in DONRE by holding a WS

Source: JET

Taking into consideration the current status of DONREs, their training needs were identified as follows:

- Information sharing within DONRE,
- Instruction of procedures and methods for PSI development (data collection methods and form, input of data to PSI, and updating methods),
- Instruction of pollution load estimation methods, and
- PSI usage for decision making for planning water pollution control measures.

2.4.1.7 Capacity Development (CD) Plan

Considering the status of PSI development in the beginning of the Project, the need for CD, tentative action plan developed by each DONRE, and requirements of PDM and PO, each DONRE and JET developed CD plans. Table 2.4-5 summarizes the objectives of CD, general work contents, expected outputs, and other aspects of CD activities.

Table 2.4-5 Capacity Development Plan for WG 2-3 (Inventory)

Phase Item	I (Initial Stage)	II (Midterm Stage 1)	III (Midterm Stage 2)	IV (Final Stage)
CD Objectives	1) Clarifying and sharing the goals and objectives of the Project 2) Identification of current capacities and issues	1) To enhance the ability of preparation of PSI.	1) To enhance the ability of usage of PSI for pollution control activities	1) To enhance the ability of updating and revising PSI and its dissemination to district DONRE and relevant organizations for effective pollution control
Work Contents	1) Assessment of existing capacities for PSI 2) Analysis of gaps between required capacity and the situation at the beginning of the Project 3) Development of a detailed WP based on a tentative AP, and analysis of capacity gaps 4) Review of existing information on PSI	1) Assisting evaluation of existing data and information for development of PSI 2) Assisting development of PSI format based on actual conditions of DONRE	1) Further support for development and update of PSI 2) Supporting the DONRE's activity by usage of PSI 3) Supporting development of pollution source map and pollution loads estimate	1) Sharing experiences in controlling pollution sources with other DONREs as well as district level officers. 2) Assisting analysis of collected information on PSI 3) Assisting development of PSI guiding documents
Expected outputs	1) CA results (baseline) 2) WP	1) Training record 2) Collected data	1) OJT records 2) Set of analyzed data	1) OJT records 2) CA results 3) Set of analyzed data
Facilitator	1) JICA Expert Team (JET) 2) JCC	1) JICA Expert Team (JET)	1) JICA Expert Team (JET)	1) JET 2) Vietnamese counterparts
Target Group	Vietnamese counterparts	Vietnamese counterparts	Vietnamese counterparts	Relevant stakeholders
CD activity	Joint working between VN-CPs and JET	Joint working between CPs and JET	Joint working between CPs and JET	Joint working between CPs and JET
Period	May to Aug. 2011	Sep. 2011 to Mar. 2012	Apr. to Sep. 2012	Oct. 2012 to Jun. 2013

Source: JET

2.4.1.8 Preparation of Work Plans (WPs)

Then, as shown in Table 2.4-6, each DONRE prepared its own WP to implement its activities. The WPs consist of three technical aspects, i.e.: preparation, usage, and data sharing, and were designed to reflect the contents of the CD plan.

Table 2.4-6 Framework of WPs for Implementation of CD Activities on PSI

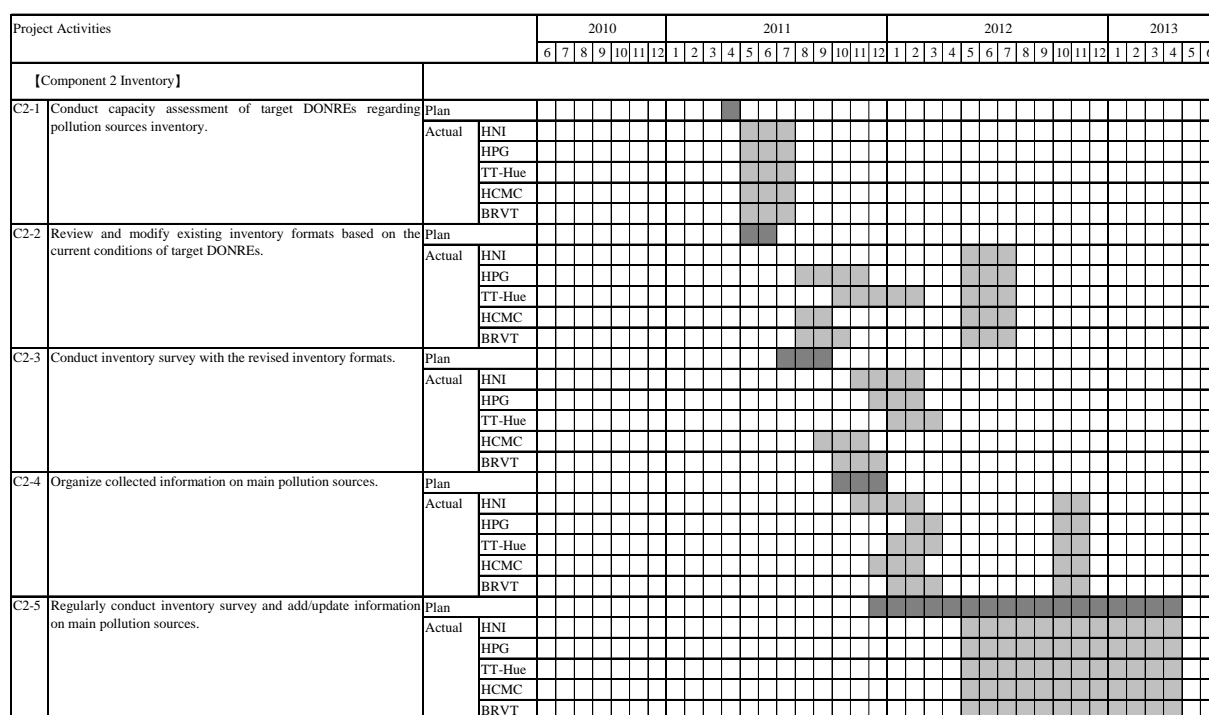
Activities	Technical Aspects	Approach	Actual activity	Target
<p>C2-2 Review and modify existing inventory formats based on the current conditions of target DONREs.</p> <p>C2-5 Regularly conducting inventory survey and add/update information on main pollution sources.</p>	(1) Preparation of PSI	<p>1. Concept for development of PSI: DONRE discuss the following contents to prepare PSI: objectives, target area, and selection of priority data and information</p> <p>2. Preparation of PSI: DONRE implements the following activities:</p> <ul style="list-style-type: none"> i) Grasp the current data condition ii) Preparation of PSI format iii) Preparation of source survey format iv) Collection of data in the first year v) Input collected data to PSI vi) Preparation of pollution source map <p>3. Review of practicability of updated PSI: DONRE implements the following activities:</p> <ul style="list-style-type: none"> i) Additional collection of data and information in the second year ii) Improvement of updated PSI 	<p>1) OJT on preparation of PSI, including instruction on the procedure for preparing the inventory</p> <p>2) WG meetings to instruct the method for updating PSI continually</p> <p>3) Subcontract works or local experts to support the collection of data from enterprises or within DONRE</p>	All DONREs
<p>C2-3 Conduct inventory survey with the revised inventory formats.</p> <p>C2-4 Organize collected information on main pollution sources.</p> <p>C2-5 Regularly conducting inventory survey and add/update information on main pollution sources.</p>	(2) Usage of PSI	<p>1. Trial usage</p> <ul style="list-style-type: none"> i) Understanding of simple analysis training (EIA, wastewater discharge fee, wastewater permission and inspection): ii) Preparation of pollution source map based on GPS coordinates of target enterprises: iii) Workshop on usage of PSI <p>2. Summarization of short report</p>	<p>1) WG meetings and OJT for trial usage of PSI, and instruction on use of GIS software</p> <p>2) Training on analysis methods, GIS software, and pollution source map</p> <p>3) Holding a workshop to share the progress of the developed PSI and pollution source maps with all DONREs</p>	HNI, HPG, TT-HUE and BRVT DONRE
		<p>1. Pollution load estimation</p> <ul style="list-style-type: none"> i) Explanation of the priority data and information to be collected ii) Method for planning field survey to grasp regional water environment condition, questionnaire survey, and to collect accurate data iii) Analysis of the collect data iv) Calculation of the pollution load v) Impact evaluation on the target area <p>2. Summarization of short report</p>	<p>1) WG meetings and OJT including instruction on the procedure for pollution load estimation</p> <p>2) Training on the method of pollution load estimation based on industrial activities and other factors</p> <p>3) Holding a workshop same as with other DONREs</p>	HCMC DONRE
<p>C2-1 Conduct CA of DONREs regarding pollution sources inventory.</p> <p>C2-5 Regularly conducting inventory survey and add/update information on main pollution sources.</p>	(3) Data sharing	<p>1. Basic understanding of data sharing</p> <p>2. Instruction on the method of data sharing</p> <ul style="list-style-type: none"> i) Information sharing in DONRE through OJT for the development of PSI ii) Discussion on data sharing in daily work 	<p>1) Holding a workshop to grasp the importance of sharing information within DONRE</p> <p>2) WG meetings and OJT on data sharing</p>	All DONRE

Source: JET

2.4.2 Activities

2.4.2.1 Activities Compared with PO

Figure 2.4-2 shows the progress of activities compared with PO. Due to the long time for CA, Activity C2-2 and Activity C2-3 were delayed for about four months. The original schedule envisioned the PSI to be developed in the first year and to be updated in the second year, but C/Ps decided to develop the dataset in two stages, i.e., August 2011 to March 2012, and May 2012 to April 2013, due to the availability of reliable information. After the development in the first year, the WG members reviewed the outputs, and revised the format from May to July 2012.



Source: JET

Figure 2.4-2 Progress of Project Activities

2.4.2.2 Activity C2-2: Review and Modify Existing Inventory Formats based on the Current Conditions of Target DONREs

(1) Objectives and Expected Output of Development of PSI

At first, the objectives and expected outputs were discussed with C/Ps. Table 2.4-7 shows the objectives and expected outputs of each DONRE in the first and second year activities. HPG and BRVT DONREs were interested in developing their own standard PSI covering a wide range of data on industries with similar objectives. TT-HUE DONRE was interested in developing a standard PSI, although the approach of data collection was different. HNI DONRE had just started developing a large-scale environmental database by itself; therefore, they requested JET only to provide technical advice for the development of their database. However, this was delayed, and in the second year, HNI DONRE decided to develop a small-scale PSI similar to the ones in HPG and BRVT. When the Project started, HCMC DONRE already had a PSI of about 1,500 industries, and decided to focus on estimating pollution load from industrial clusters.

Table 2.4-7 Objectives and Expected Output of Each DONRE

DONRE	Objectives	Expected Output
HNI HPG TT-HUE BRVT	<p>First and second years</p> <p>1) To acquire data and information on basic water pollution control activities.</p> <p>2) To confirm environmental registration such as EIA/EPC/EPP, and wastewater discharge permit.</p> <p>3) To understand the status of collected environmental protection charge, and self-monitoring by enterprises.</p> <p>4) To understand the features of wastewater discharge conditions by enterprise.</p>	<p>First and second years</p> <p>1) PSI including results of questionnaire survey, wastewater sampling survey, and GPS coordinates.</p> <p>2) Pollution source maps including statuses related to water pollution control of each enterprise.</p> <p><u>Second year</u></p> <p>3) Report summarized the above activities.</p>
HCMC	<p>First and second years</p> <p>1) To acquire data and information on basic water pollution control activities.</p> <p><u>First year</u></p> <p>2) To conduct pollution control activities by analyzing wastewater from the Tan Quy Industrial Cluster and regional surface water, and to collect information related to pollution load analysis.</p> <p><u>Second year</u></p>	<p>First and second years</p> <p>1) PSI including results of questionnaire survey, wastewater sampling survey, and GPS coordinates.</p> <p><u>First year</u></p> <p>2) Results of examination to check the impact of water pollution in the Tan Quy Industrial Cluster and its surrounding area.</p> <p><u>Second year</u></p> <p>2) Results of examination to check the impacts of water</p>

DONRE	Objectives	Expected Output
	2) To conduct pollution control activities by analyzing wastewater from the Phuoc Long Industrial Cluster and regional surface water, and to collect information related to pollution load analysis.	pollution in the Phuoc Long Industrial Cluster and its surrounding area up to the Binh Tho channel. 3) Pollution source maps including the status of each enterprise related to water pollution control. 4) Report summarizing the above activities.

Source: JET

(2) Development of PSI Format and Source Survey Form

In the first year, HCMC DONRE had discussions about the PSI format (general format of the database) and the source survey form (a questionnaire for industries). HCMC DONRE already had its own forms to build its PSI, although it applied to revise the current form. These forms also became the templates for the forms of other DONREs where C/Ps revised the forms considering the specific objectives of PSI development in each DONRE.

In the second year, DONREs updated the forms based on the results of the first year activity. JET instructs the sector classification of data storage to secure reliability of data, and expand the PSI to a database. Especially, JET provided the PSI format and source survey form to HNI and TT-HUE DONREs and requested to revise them. Table 2.4-8 shows the characteristics of the PSI format throughout the Project.

Regarding the layout and software of the PSI format, JET recommended DONREs to prepare a PSI form by using one sheet in Excel software. The main reasons for this were as follows: 1) convenient to manage the PSI so as to achieve the PSI objectives, 2) easy to understand the situation of stored information, 3) easy maintenance in the future, and 4) easy to perform simple analysis using Excel. It was noted that BRVT DONRE had adopted a multiple sheets format in Excel in order to conduct desk works conveniently in environmental management and pollution control activity.

Table 2.4-8 Characteristics of PSI Format

DONRE	First Year	Second Year
All DONREs	a) PSI included basic information on enterprises, such as name, address, GPS coordinates, and so on b) PSI included basic information to be collected from the following related departments: - EPA: EIA, Environmental checking, wastewater discharge fee and monitoring - Inspection Department: Inspection - Water Resources: Wastewater discharge license c) PSI included wastewater volume and wastewater quality data needed for estimating pollution load d) Detail information depend on the situation in each DONRE e) The source survey form was finalized based on conditions a) to d) above, and the inventory survey implemented a questionnaire survey from target enterprises usage its data collection form. f) "PSI format" to data input after the inventory survey was reflected the dataset one, which was satisfied with the contents of a) to d) above.	a) DONREs tried to modify the PSI format and the source survey form based on the results of the first year activities, in parallel with subcontract work.
HNI	No activity	a) DONRE reviewed the PSI format and source survey form based on the results of the first year activities made by other DONRE, in parallel with inspection activities with local expert.
HPG	a) DONRE made some comments, regarding wastewater from the production process, and domestic usage, and revised the questionnaire by them.	a) DONRE had modified the PSI format and source survey form based on the results of first year activity, in parallel with subcontract work.
TT-HUE	a) EPA requested JET to design a data collection format that can cover data dating back from ten years or more. b) DWRM found that the information in the current data collection form is sufficient, and had no comments. c) The Inspection Department made some comments on the data collection format, and asked JET to refer to Decree No 117/2009/ND-CP during the revision of the format.	a) Same as HPG.
HCMC	a) Source survey form was applied for the EPA survey sheet in DONRE, and was focused on items that were pertinent to water environmental monitoring (e.g. gas emissions, waste, etc. were excluded).	a) Same as HPG.
BRVT	a) Regarding the preliminary sheet of PSI, DONRE would like to supplement it with monitoring results, wastewater analysis results, and inspection information.	a) Same as HPG.

Source: JET

2.4.2.3 Activity C2-3: Conduct Inventory Survey Using the Revised Inventory Formats

The target areas and enterprises selected, considering the objectives of PSI, location, environmental impact, operation size, and sectors, through discussion with target DONREs are summarized in Table 2.4-9. Table 2.4-10 summarizes the methods for data collection.

Table 2.4-9 Outline of Preparation of PSI at Each DONRE

DONRE	Target Area	No. of Target Enterprises
HNI	<u>Second year</u> Cau Bay River basin in Long Bien District in HNI	<u>Second year</u> 50 enterprises
HPG	<u>First year</u> Re River basin, especially An Duong and Hong Bang District <u>Second year</u> Da Do River basin	<u>First year</u> 109 enterprises <u>Second year</u> 148 enterprises / Total 257 enterprises
TT-HUE	<u>First and second years</u> Whole province	<u>First year</u> 160 enterprises belonging to 100 owners <u>Second year</u> 100 enterprises / Total 215 enterprises
HCMC	<u>First year</u> Tan Quy Industrial Cluster <u>Second year</u> Phuoc Long Industrial Cluster and surrounding area	<u>First year</u> 20 enterprises <u>Second year</u> 25 enterprises / Total 45 enterprises
BRVT	<u>First and second years</u> Whole province	<u>First year</u> 100 enterprises (four are nonoperational) <u>Second year</u> 92 enterprises (83 from industrial zones and industrial clusters, and nine from individual enterprises) / Total 192 enterprises

Source: JET

Table 2.4-10 Methods for Data Collection

DONRE	First Year	Second Year
HNI	Not implemented	Implementation of surveys as a part of inspection activities by HNI DONRE with support from local experts. Such activities are expected to help sustainability of PSI development in the future.
HPG	Implementation of surveys as subcontract work	Implementation of surveys as subcontract work
TT-HUE	C/Ps tried to collect and enter into PSI by their staff, but it revealed not enough data and information currently available.	Implementation of surveys as subcontract work
HCMC	Implementation of surveys as subcontract work	Implementation of surveys as subcontract work
BRVT		

Source: JET

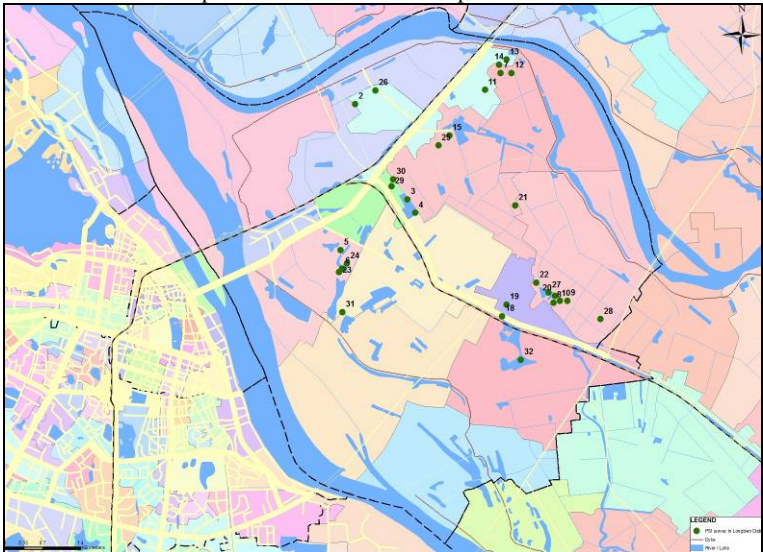
2.4.2.4 Activity C2-4: Organize Collected Information on Main Pollution Sources

(1) HNI DONRE

Since HNI DONRE planned to develop a large-scale environmental database (DB) utilizing its own fund, it requested JET only for technical advice on DB design in the first year. But in the second year, HNI DONRE requested to develop a PSI similar to the ones prepared by other DONREs in the first year. The target area was the Cau Bay River basin in Long Bien District wherein about 50 enterprises are located. The target pollution sources to be surveyed were selected based on a tentative list of industries to be inspected. Because the collected data related to pollution sources in the target area were very limited, a supplemental survey was conducted in the second year, as shown in Table 2.4-11.

Table 2.4-11 Summary of Outputs in the Second Year of HNI DONRE

Contents	Second Year
1. Target area	Cau Bay River basin in Long Bien District
2. Target Enterprises Investigated	48 enterprises
1) Quantity	
2) Reasons for selection of target area and enterprises	Due to insufficient data and information on primary pollution sources, the target enterprises to be inspected by HNI DONRE were selected in the Cau Bay River basin, Long Bien District
3) Questionnaire survey	It was implemented with the inspection activity.
4) No. of sampling	A total of 34 sampling data from enterprises (19 enterprises to be implemented wastewater sampling and 15 enterprises to hold an actual monitoring report).

Contents	Second Year
3. Pollution source map	<p>GIS application software (Arc GIS ver10.0)</p> <ul style="list-style-type: none"> - Distribution of target enterprises - Conditions related to water pollution control at each enterprise 
4. Analysis of PSI	There are 39 enterprises with environmental authorization, (19 approvals of EIA, 7 of EPP, and 13 certificate environmental standards or EPC registration).
1) Approval/permit of EIA, EPP, EPC	
2) Wastewater treatment system	There are 21 enterprises with wastewater treatment systems. However, 27 enterprises are not confirmed on their wastewater treatment.
3) Wastewater discharge fee	There are 18 enterprises that have paid wastewater discharge fees; however, there are 18 that have not paid, and 12 with no information on their payment of the wastewater discharge fee.
4) Wastewater discharge license	There are 21 enterprises with this permit, and the remaining 27 lacks this permit.
5) Self-monitoring	There are 36 enterprises that carry out self-monitoring periodically, while the remaining 12 do not conduct self-monitoring.
6) Environmental checking	Ten enterprises have been inspected and were selected for interview in the Cau Bay River basin until the end of 2011.
7) Inspection	Refer to 6) above.
8) Pollution loads estimate	Pollution loads were estimated for 34 enterprises implemented for wastewater sampling with instruction from JET.
9) Pollutant concentration	The numbers of target facilities which exceed VN regulations (QCVN40:2011/BTNMT/B (K=1, Industrial WW)) concentrations were BOD: 11, COD: 6, SS: 5, T-N: 3, and T-P: 3.

Source: JET

In order to demonstrate how to use PSI for environmental management, C/Ps calculated the pollution loads in the target area under various scenarios. The results are shown in Table 2.4-12. At first, the total pollution loads from the target area were calculated for different pollutants (denoted as “A” in the table). Then, the pollution loads in a hypothetical case that all enterprises control wastewater quality within the VN standards QCVN40:2011/BTNMT/B were calculated (“B” in the table). Next, they focused on pollution loads of nine major enterprises whose wastewater quality exceeded VN national regulation QCVN40:2011/BTNMT/B for several parameters (“C” in the table). Then the pollution loads in case that these industries suppressed their wastewater qualities to the QCVN level were calculated (“D” in the table). It was found that if the wastewater of these nine industries were controlled, the total pollution loads in the target area would be reduced by 36.9% for BOD, 34.2% for COD, and 27.8% for TSS.

Table 2.4-12 Analysis Results of PSI in the Target Area

Item	Mark	Volume (m ³ /day)	1. BOD	2. COD	3. TSS	4. Mn	5. Fe	6. Oil and Grease	7. N-NH4	8. N-total	9. P-total
Total pollution loads in the target area (kg/day)	A	4,968	184.5	354.8	154.3	0.29	2.53	6.34	25.3	28.9	8.22
QCVN40:2011/BTNMT/(mg/L)		-	50	150	100	1	5	10	10	40	6
Total pollution loads after QCVN pollution control activity (kg/day)	B	4,968	148.9	262.3	127.6	0.26	2.47	6.15	25.3	27.0	7.80
Reduction rate by QCVN pollution control activity (%)	1-B/A		19.3	26.1	17.3	11.5	2.6	3.1	0.0	6.7	5.2

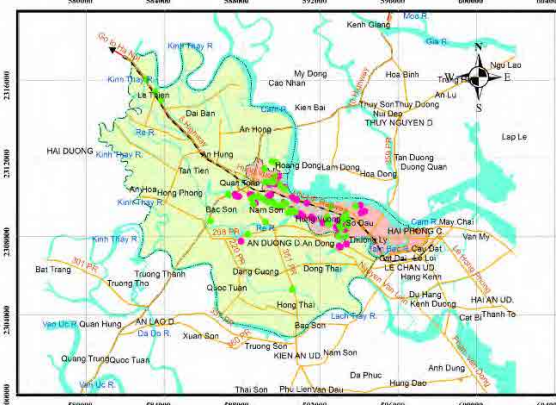
Item	Mark	Volume (m ³ /day)	1. BOD	2. COD	3. TSS	4. Mn	5. Fe	6. Oil and Grease	7. N-NH4	8. N-total	9. P-total
Total pollution loads of nine target enterprises (kg/day)	C	1,218	96.5	270.5	96.2	0.22	0.60	1.17	7.5	15.7	1.84
Rate of total pollution loads in target nine enterprises (%)	C/A	24.5	52.3	76.2	62.3	75.6	23.6	18.4	29.6	54.1	22.3
Total pollution loads of nine target enterprises after QCVN pollution control activity (kg/day)	D	1,218	60.9	178.0	69.5	0.19	0.60	1.06	7.5	13.8	1.44
Reduction rate by QCVN pollution control activity (nine target enterprises) (%)	1-D/C	0.0	36.9	34.2	27.8	15.2	0.0	9.0	0.0	11.8	21.5

Source: JET

(2) HPG DONRE

HPG DONRE selected the Re River basin as the target area of PSI and carried out a preliminary field investigation. Then, a site survey was implemented under the supervision of HPG DONRE as shown in Table 2.4-13.

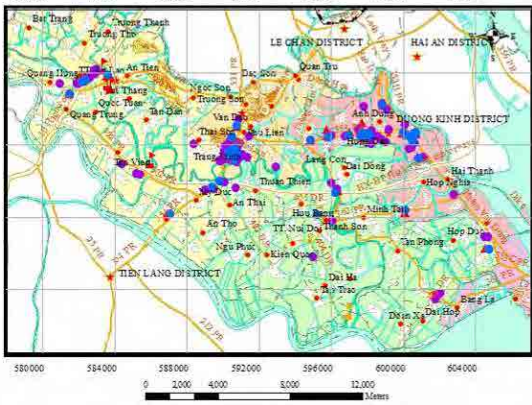
Table 2.4-13 Summary of Outputs in the First Year of HPG DONRE

Contents	First Year
1. Target area	Re River basin
2. Target enterprises investigated	109 enterprises
1) Quantity	
2) Reasons for selection of target area and enterprises	DONRE selected 109 enterprises in the Re River basin which may affect the water environment. The Re River is used as a drinking water source covering 80% of the population of HPG City
3) Questionnaire survey	109 enterprises
4) No. of sampling	A total of 70 wastewater samplings from the target enterprises (35 by subcontractor, 35 by DONRE, and 12 samplings were implemented by the subcontractor and DONRE)
3. Pollution source map	<p>GIS application software (Arc GIS ver10.0)</p> <ul style="list-style-type: none"> - Distribution of target enterprises (along the Re River) - Conditions related to water pollution control at each enterprise 
4. Analysis of PSI	There are 46 enterprises with environmental authorization, (12 approvals of EIA, 7 of EPP, and 27 certificate environmental standards or EPC registration).
1) Approval/permit of EIA, EPP, EPC	
2) Wastewater treatment system	There are 32 enterprises with wastewater treatment systems. However, 77 do not treat their produced wastewater.
3) Wastewater discharge fee	There are 13 enterprises that have paid wastewater discharge fees; however, 42 that have not paid, and 54 with no information on their payment of the wastewater discharge fee.
4) Wastewater discharge license	Three enterprises are waiting for this permit, one enterprise has this permit, and the remaining 105 lack this permit.
5) Self- monitoring	There are 46 enterprises that carry out self-monitoring periodically, one to four times a year; however, the remaining 63 do not conduct self-monitoring.
6) Environmental checking	There are 43 enterprises that have been inspected by the district DONREs, HPG DONRE, environmental polices branch office of environmental protection, and inspection team of Haiphong PC, etc. from 2009 to 2011.
7) Inspection	Refer to 6) above.
8) Pollution loads estimate	Pollution loads were estimated for 58 enterprises implemented for wastewater samplings with instruction from JET.
9) Pollutant concentration	The numbers of target facilities which exceed VN regulations (QCVN40:2011/BTNMT/B (K=1, Industrial WW)) concentrations were BOD: 14, COD: 9, SS: 6, T-N: 8, and T-P: 3.

Source: JET

In the second year, the target area for development of PSI was the Da Do River basin and C/Ps carried out a preliminary field survey as shown in Table 2.4-14.

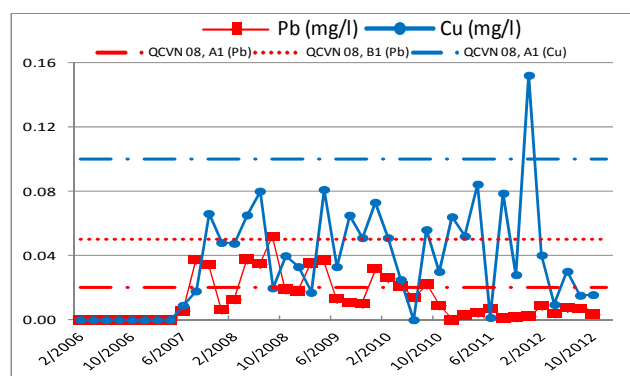
Table 2.4-14 Summary of Outputs in the Second Year of HPG DONRE

Contents	Second Year	First + Second Year
1. Target area	Da Do River basin	
2. Target enterprises investigated		
1) Quantity	148 enterprises	257 enterprises
2) Reasons for selection of target area and enterprises	DONRE selected 148 enterprises in the Da Do River basin which may affect the water environment within/along the river. The Da Do River is used as a water source for domestic purposes, same as the Re River in HPG City.	-
3) Questionnaire survey	148 enterprises	257 enterprises
4) No. of samplings	A total of 40 wastewater samplings from the target enterprises	98 enterprises
3. Pollution source map	GIS application software (Arc GIS ver10.0) - Existing map on land use in Haiphong City (Da Do River basin) with scale of 1:50,000 - To set up an Excel table to summarize the data collected from enterprises	GIS application software (Arc GIS ver10.0)
		
4. Analysis of PSI		
1) Approval/permit of EIA, EPP, EPC	There are 49 enterprises have environmental authorization, (9 approvals of EIA, 8 of EPP, and 29 certificate environmental standards or EPC registration).	95 enterprises (21 approvals of EIA, 15 of EPP and 56 certificate environmental standards or EPC registration).
2) Wastewater treatment system	Following the activities for EIA approval, two enterprises have acceptance certificate of wastewater treatment systems.	34 enterprises
3) Wastewater discharge fee	There are 11 enterprises that have paid wastewater discharge fees; however, the remaining 138 have not paid.	24 enterprises
4) Wastewater discharge license	Two enterprises have this permit, and the remaining 146 lack this permit.	5 enterprises
5) Self-monitoring	There 38 enterprises that carry out self-monitoring periodically, one to four times a year; however, the remaining 110 do not conduct self-monitoring periodically.	84 enterprises
6) Environmental checking	There are 63 enterprises that have been inspected by the district DONREs, HPG DONRE, environmental polices branch office of environmental protection, and inspection team of Haiphong PC, etc. from 2009 to 2011.	106 enterprises
7) Inspection	The implemented enterprises are included in 6) above. Eight enterprises have been sanctioned for violating environmental regulations.	Refer to 6) above.
8) Pollution loads estimate	Pollution loads were estimated for 40 enterprises implemented for wastewater samplings	98 enterprises
9) Pollutant concentration	The numbers of target facilities which exceed VN regulations (QCVN40:2011/BTNMT/B (K=1, Industrial WW)) concentrations were BOD: 13, COD: 12, SS: 7, T-N: 10, and T-P: 4.	BOD: 27, COD: 21, SS: 13, T-N: 18, and T-P: 7 enterprises

Source: JET

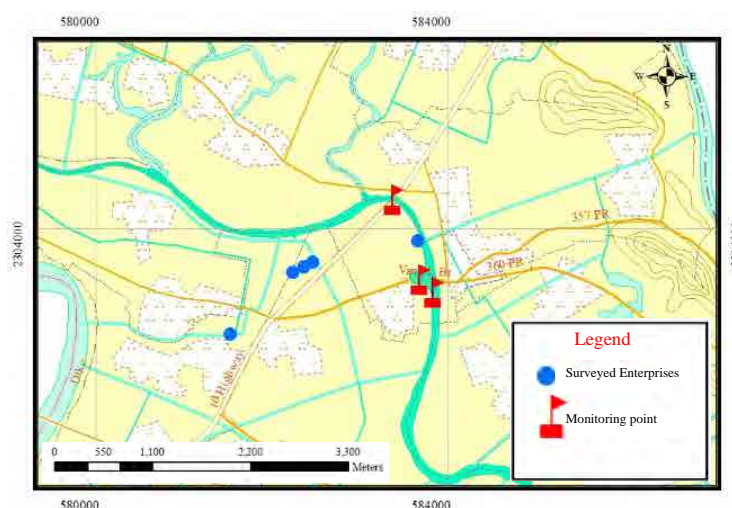
In order to demonstrate how to use the PSI and pollution map, DONRE and JET used these tools to examine the reasons for the elevated levels of heavy metals. Figure 2.4-3 shows the fluctuation of Pb and Cu concentrations at Vang Bridge in the Da Do River from June 2006. Until May 2007, the concentrations of Pb and Cu were below detection levels, but from June 2007, the levels became high. Figure 2.4-4 shows a pollution source map around the monitoring point of Vang Bridge. Within 5 km from Vang Bridge, there are five enterprises, and according to PSI, these enterprises started operations

around 2007, and the three of them are steel industries. Although more detailed investigation is needed, this exercise clearly demonstrated the power of these tools in exploring pollution source data.



Source: JET

Figure 2.4-3 Pb and Cu Concentration Levels at the Da Do River (Vang Bridge) from June 2006



Source: JET

Figure 2.4-4 Pollution Source Map around the Monitoring Point of Vang Bridge

(3) TT-HUE DONRE

TT-HUE DONRE reviewed and inputted the current available data into its PSI by itself, selecting 160 priority enterprises as shown in Table 2.4-15. Through the work, TT-HUE DONRE found out that a large part of data and information required for PSI development were not available, although C/Ps have a lot of experience in gathering and compiling data and information for PSI.

Table 2.4-15 Summary of Outputs in the First Year of TT-HUE DONRE

Contents	First Year
1. Target area	TT-HUE Province
2. Target enterprises investigated	160 enterprises belong to 100 owners
1) Quantity	
2) Reasons for selection of target area and enterprises	DONRE selected 160 enterprises from the list of submitted EIA in order to grasp the overall situation of pollution control activities carried out by DONRE themselves to enterprises in the whole area of the province.
3) Questionnaire survey	Not implemented
4) No. of sampling	Not implemented
3. Pollution source map	GIS application software (Arc GIS ver10.0) - Distribution of target enterprises

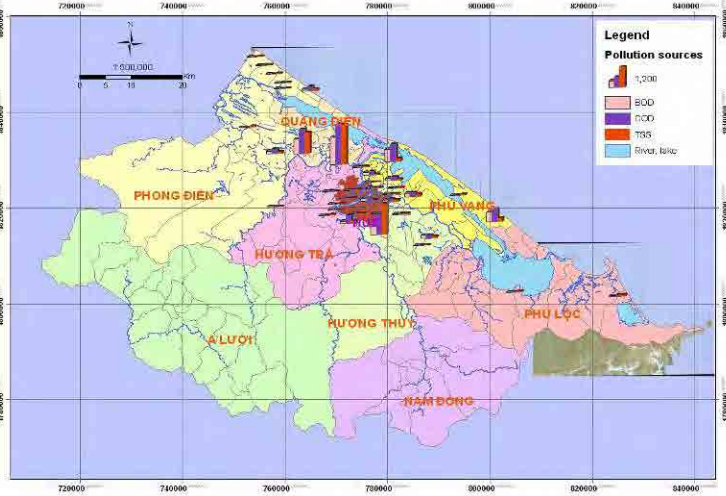
Contents	First Year
4. Analysis of PSI	There are 153 enterprises have environmental authorization. However, hard copies of 30 EIA are not available at DONRE.
1) Approval/permit of EIA, EPP, EPC	Not confirmed.
2) Wastewater treatment system	Ten enterprises kept records of wastewater discharge fee, but the remaining 150 have no information.
3) Wastewater discharge fee	Only 5 of 160 projects have wastewater discharge permits.
4) Wastewater discharge license	There are 19 enterprises that carry out self-monitoring; however, the remaining 141 do not conduct self-monitoring.
5) Self-monitoring	There are 21 enterprises that have carried out environmental checking, but the remaining 139 have not.
6) Environmental checking	Five enterprises have carried out inspection, but the remaining 155 have not.
7) Inspection	

Source: JET

In the second year, TT-HUE DONRE conducted a renewed inventory survey through a subcontractor in order to collect additional data. The target area of PSI was the entire province, and the total number of target pollution sources in the second year were 104. Forty-seven primary water pollution sources investigated in the first year were included in the survey. The remaining 57 enterprises were newly selected by TT-HUE DONRE as shown in Table 2.4-16.

Table 2.4-16 Summary of Outputs in the Second Year of TT-HUE DONRE

Contents	Second Year	First + Second Year
1. Target area	TT-HUE Province same as in the first year	TT-HUE Province
2. Target enterprises investigated	104 enterprises	217 enterprises belonged to 100 owners
1) Quantity		
2) Reasons for selection of target area and enterprises	In the first year, there were not much information and data on the target enterprises. It is necessary to have a supplemental survey. This leads to pollution source map is not updated adequate attribute database. In this situation, DONRE selected 104 enterprises in the province including primary pollution sources.	-
3) Questionnaire survey	104 enterprises by the same method as other DONREs	Same as left column
4) No. of sampling	A total of 40 wastewater samplings from the target enterprises	Same as left column
3. Pollution source map	GIS application software (Arc GIS ver10.0) - Existing map is a base map of TT-HUE with 1:500,000 scale, same as the first year activity - To set up an Excel table to summarize the data collected from enterprises	Same as left column

Contents	Second Year	First + Second Year
		
4. Analysis of PSI	There are 93 enterprises with environmental authorization, (77 approvals of EIA, 3 of EPP, and 13 certificate environmental standards or EPC registration).	202 enterprises have environmental authorization
1) Approval/permit of EIA, EPP, EPC		
2) Wastewater treatment system	There are 62 enterprises with operating wastewater treatment systems, and four enterprises have acceptance certificate of wastewater treatment systems from following activities of EIA approval	Same as left column
3) Wastewater discharge fee	There are 19 enterprises that have paid wastewater discharge fees; however, there 25 that have not paid, and 60 with no information on their payment of the wastewater discharge fee.	25 enterprises
4) Wastewater discharge license	Five enterprises are waiting for this permit, 18 enterprises have this permit, and the remaining 81 lack this permit.	22 enterprises
5) Self-monitoring	There are 61 enterprises that carry out self-monitoring periodically, while the remaining 43 do not conduct self-monitoring periodically.	69 enterprises
6) Environmental checking	There are 53 enterprises that have implemented environmental checking by DONRE (almost EPA in TT-HUE DONRE).	64 enterprises
7) Inspection	There are 28 enterprises that have implemented inspection by DONRE; however, 19 enterprises have been sanctioned for violating environmental regulations.	33 enterprises
8) Pollution loads estimates	Pollution loads were estimated for 40 enterprises implemented for wastewater sampling.	Same as left column
9) Pollutant concentration	The numbers of target facilities which exceed VN regulations (QCVN40:2011/BTNMT/B (K=1, Industrial WW)) concentrations were BOD: 16, COD: 14, SS: 12, T-N: 14, and T-P: 4.	Same as left column

Source: JET

In order to demonstrate how PSI will be used for environmental management, C/Ps calculated the pollution loads from the enterprises investigated under different scenarios. At first, the total pollution loads from the enterprises were calculated (denoted as “A” in Table 2.4-17), and then the loads in a hypothetical case that all enterprises reduced their concentrations of pollutants to levels permitted by VN standards QCVN40:2011/BTNMT/B were calculated (“B” in the table). Next, they tried to focus on pollution loads of nine major enterprises, whose wastewater qualities are exceeding the QCVN in several parameters (“C” in the table). Then, the pollution loads were calculated for the case that these eight enterprises suppress their wastewater qualities within the permitted levels of QCVN (“D” in the table). It was found that if the wastewater of these nine industries were controlled, the total pollution loads in the target area would be reduced by 75.1% for BOD, 45.9% for COD, and 34.0% for TSS.

Table 2.4-17 Analysis Results of PSI in the Target Area

Item	Mark	Volume (m ³ /day)	1. BOD	2. COD	3. TSS	4. N-NH ₄	5. N-total	6. P-total
Total pollution loads in target area (kg/day)	A	4,962.4	608.7	866.9	520.0	100.7	264.8	15.5
Standards of National Technical Regulation on Industrial Wastewater (QCVN 40:2011/BTNMT) (mg/L)		-	50	150	100	10	40	6
Total pollution loads after QCVN pollution control activity (kg/day)	B	4,962.4	171.7	499.2	372.4	42.0	156.6	8.3
Reduction rate by QCVN pollution control activity (%)	B/A	0.0	71.8	42.4	28.4	58.3	40.9	46.4
Total pollution loads of the eight target enterprises (kg/day)	C	2,827.5	567.2	784.4	428.5	85.7	217.9	13.3
Rate of total pollution loads of the eight target enterprises (%)	C/A	57.0	93.2	90.5	82.4	85.1	82.3	86.0
Total pollution loads in eight target enterprises after QCVN pollution control activity (kg/day)	D	2,827.5	141.4	424.1	282.8	28.2	112.6	6.1
Reduction rate by QCVN pollution control activity (eight target enterprises) (%)	1-D/C	0.0	75.1	45.9	34.0	67.0	48.3	53.9

Source: JET

(4) HCMC DONRE

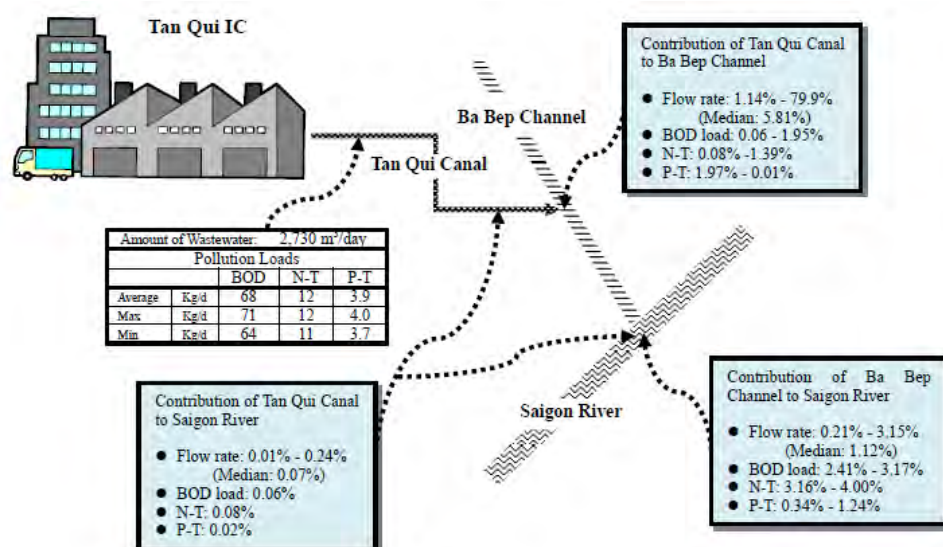
Since HCMC DONRE already had an environmental database of about 1,500 industries similar to the PSI in this Project, they conducted a detailed investigation of about 20 industries in the Tan Quy Industrial Cluster to update relevant data and evaluate impacts on the water quality of the Saigon River. Table 2.4-18 shows the output summary.

Table 2.4-18 Summary of Outputs in the First Year of HCMC DONRE

Contents	First Year
1. Target area	Tan Quy Industrial Cluster
2. Target enterprises investigated	
1) Quantity	20 enterprises
2) Reasons for selection of target area and enterprises	DONRE selected 20 enterprises in the Tan Quy Industrial Cluster to check their impact on the Saigon River, which is connected through the Ba Bep Channel, including their impact on the Hoa Phu water treatment plant.
3) Questionnaire survey	20 enterprises
4) No. of sampling	Wastewater sampling from enterprises: 20 enterprises. Surface water sampling: five points (Ba Bep and other channels), and two points (Saigon River).
3. Pollution source map	Not implemented
4. Analysis/permit of PSI	There are 15 enterprises with environmental authorization (13 certificate environmental standards, 6 approvals of EIA, 4 of EPP, and 3 of EPC).
1) Approval of EIA, EPP, EPC	
2) Wastewater treatment system	Seven enterprises have wastewater treatment systems. However, 13 ones don't treat wastewater from production process.
3) Wastewater discharge fee	Not implemented
4) Wastewater discharge license	There are 14 enterprises with this permit, but the remaining six lack this permit.
5) Self-monitoring	Not implemented
6) Environmental checking	Not implemented
7) Inspection	Not implemented
8) Pollution loads estimate	Pollution loads were estimated for 20 enterprises implemented for wastewater sampling.
9) Pollutant concentration	The numbers of target facilities which exceed VN regulations (QCVN40:2011/BTNMT/B (K=1, Industrial WW)) concentrations were BOD: 6, COD: 3, SS: 2, T-N: 1, and T-P: 1.

Source: JET

In order to demonstrate how to use PSI for pollution control, HCMC DONRE calculated the pollution loads from the industrial cluster and evaluated the relative contributions to water qualities of the Ba Bep Channel and the Saigon River, as shown in Figure 2.4-5. Throughout this process of evaluation of pollution loads, C/Ps could analyze and evaluate the environmental impacts on the surrounding watercourses caused by the effluents discharged from the Tan Quy Industrial Cluster for the management and control of pollution sources.



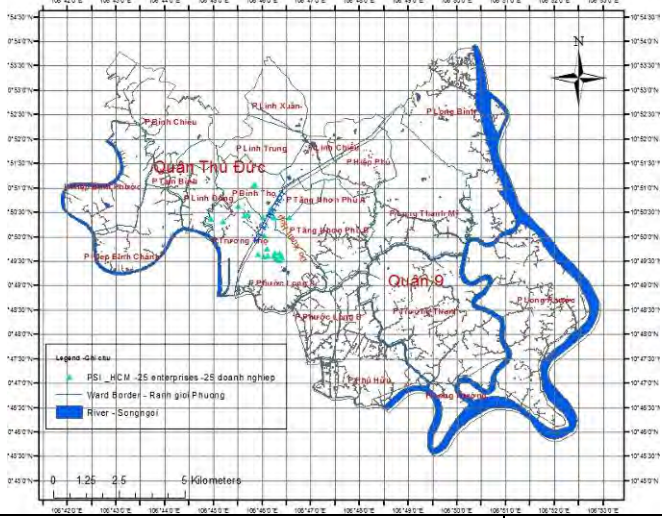
Source: JET

Figure 2.4-5 Results of Calculation and Evaluation of Pollution Loads

In the second year, HCMC DONRE conducted another site survey as part of the activities of PSI which focused on the industries located in and around the Phong Phu Industrial Cluster in Phuoc Long B Ward of District 9, and Binh Tho Ward of Thu Duc District as the target industries. The main objective of the activity was to examine the status of discharge from the target industries and to evaluate impacts on the Bin Tho Channel which is connected to the Saigon River. In order to achieve this, site surveys were conducted for 25 target industries, and water sampling in both the target industries and the drainage network in the Phong Phu Industrial Cluster and the Binh Tho Channel were conducted. Based on the data and information collected, pollution loads, both discharged from the target industries and the drainage network, and the Binh Tho Channel, were calculated as shown in Table 2.4-19. In addition, the sharing of PSI information between EPA and the Inspection Department was facilitated through the Project.

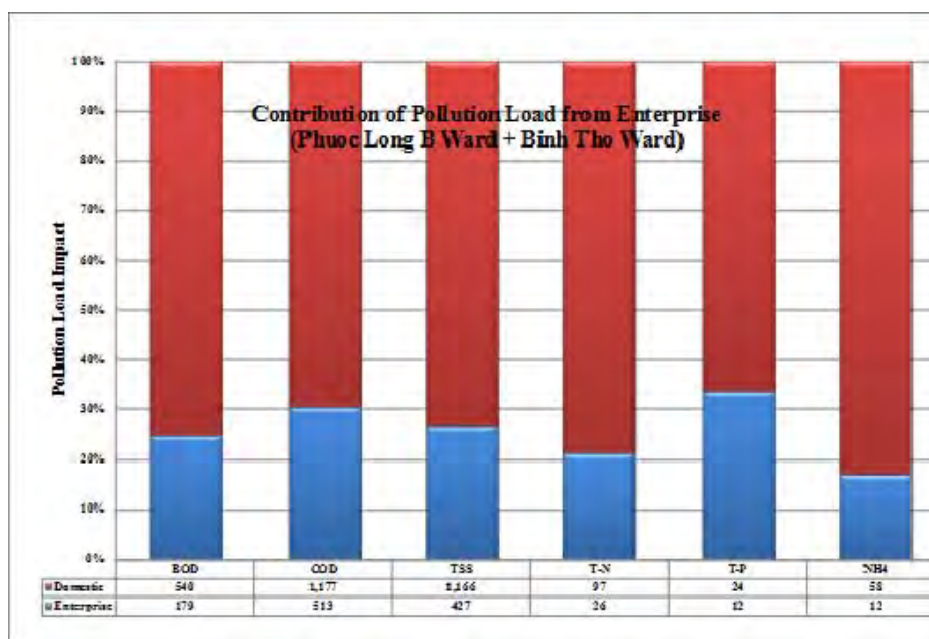
Table 2.4-19 Summary of Outputs in the Second Year of HCMC DONRE

Contents	Second Year	First + Second Year
1. Target area	Phuoc Long Industrial Cluster	-
2. Target enterprises investigated	25 enterprises with wastewater discharges, inclusive of 13 enterprises with wastewater treatment plants (WWTP)	45 enterprises
1) Quantity		
2) Reasons for selection of target area and enterprises	To understand the degree of impact caused by the effluents from the enterprises located in the target area on the Binh Tho Channel	-
3) Questionnaire survey	25 enterprises	45 enterprises
4) No. of sampling	Enterprises: 23 enterprises (two enterprises with negligible amount of wastewater), Drainage network in Phong Phu IC: four points, Binh Tho Channel: three points	43 wastewater samplings from the target enterprises and 14 surface water samplings
3. Pollution source map	GIS application software (Arc GIS ver10.0) - Existing map is a base map of HCMC with 1:50,000 scale - To set up an Excel table to summarize the data collected from the enterprises	GIS application software (Arc GIS ver10.0)

Contents	Second Year	First + Second Year
		
4. Analysis of PSI 1) Approval/permit of EIA, EPP, EPC	There are 18 enterprises with environmental authorization, (1 approval of EIA, 11 of EPP, and 6 certificate environmental standards or EPC registration).	33 enterprises, (approvals of 7 EIA, 15 EPP, and 22 EPC & certificate environmental standards).
2) Wastewater treatment system	Ten enterprises have wastewater treatment systems.	17 enterprises have wastewater treatment systems
3) Wastewater discharge fee	There are 11 enterprises that have paid wastewater discharge fees; however, 14 have not paid or have no information on their payment of the wastewater discharge fee.	11 enterprises
4) Wastewater discharge license	Ten enterprises are waiting for this permit, and the remaining 15 lack this permit.	24 enterprises
5) Self-monitoring	There are 15 enterprises that have carried out self-monitoring periodically; however, the remaining ten do not conduct self-monitoring periodically.	15 enterprises
6) Inspection	There are three enterprises that have been inspected by DONRE. The wastewater discharges of four enterprises have exceeded QCVN many times.	3 enterprises
7) Pollution loads estimate	Pollution loads were estimated for the 23 enterprises from which wastewater samples were taken.	45 enterprises
8) Pollutant concentration	The numbers of target industries which exceed VN regulations concentrations (QCVN40:2011/BTNMT/B (K=1, Industrial WW)) were BOD: 12, COD: 9, SS: 15, T-N: 1, and T-P: 7.	BOD: 18, COD: 12, SS: 17, T-N: 2, and T-P: 8 enterprises

Source: JET

HCMC DONRE also evaluated the pollution levels of wastewater and watercourses in the area from the results of the survey, and then estimated the pollution loads from both industrial and domestic sources at various places in the target area. Figure 2.4-6 shows the overall pollution loads generated in the Phong Phu Industrial Center, and other sources along the Binh Tho Channel. The total impacts of pollution loads of industrial wastewater in this area were evaluated from 20% to 30% for the parameters investigated, which are significant, but it is evident that the contribution of domestic wastewater is larger.



Source: JET

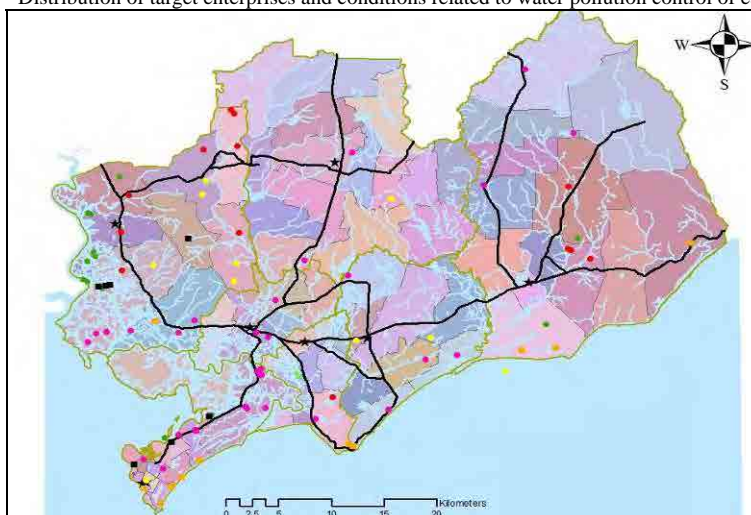
Figure 2.4-6 Results of Pollution Loads Generated in the Phong Phu Industrial Center and Other Sources Along the Binh Tho Channel

(5) BRVT DONRE

BRVT DONRE selected 100 individual enterprises in the whole province to implement a PSI survey, which involved a questionnaire survey and sampling of 44 wastewater samples, and pollution control activities of enterprises, as shown in Table 2.4-20.

Table 2.4-20 Summary of Outputs in the First Year of BRVT DONRE

Contents	First Year
1. Target area	BRVT Province
2. Target enterprises investigated	100 enterprises (four were nonoperational)
1) Quantity	
2) Reasons for selection of target area and enterprises	DONRE selected 100 enterprises related to water pollution from their list of primary pollution sources to understand the overall situation of pollution control activities of the enterprises in the whole area of the province.
3) Questionnaire survey	96 enterprises
4) No. of sampling	44 wastewater samplings from the target enterprises
3. Pollution source map	GIS application software (Arc GIS ver10.0) - Distribution of target enterprises and conditions related to water pollution control of each enterprise



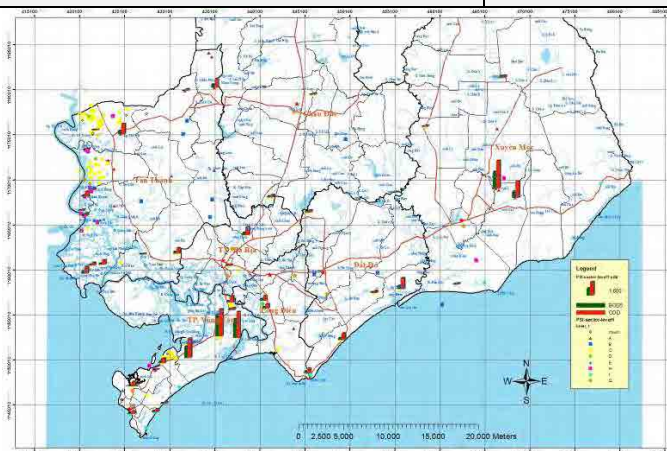
Contents	First Year
4. Analysis of PSI 1) Approval/permit of EIA, EPP, EPC	There are 68 enterprises with environmental authorization (9 certificate environmental standards, 52 approvals of EIA, 2 of EPP, and 6 of EPC).
2) Wastewater treatment system	There are 65 enterprises with registration of wastewater treatment plant, but the remaining 31 do not have.
3) Wastewater discharge fee	There are 12 enterprises that have paid wastewater discharge fees; however, 84 have not paid or have no information on their payment of the wastewater discharge fee.
4) Wastewater discharge license	Nine enterprises have this permit.
5) Self-monitoring	There are 76 enterprises that carry out self-monitoring, while the remaining 19 do not conduct self-monitoring.
6) Environmental checking	Not confirmed
7) Inspection	There are 65 enterprises that have carried out inspection, but the remaining 31 have not.
8) Pollution loads estimate	Pollution loads were estimated for the 40 enterprises implemented for wastewater sampling.
9) Pollutant concentration	The numbers of target facilities which exceed VN regulations (QCVN40:2011/BTNMT/B (K=1, Industrial WW)) concentrations were BOD: 28, COD: 32, SS: 10, T-N: 20, and T-P: 16.

Source: JET

In the second year, BRVT DONRE expanded the target enterprise to not only individual enterprises but also enterprises in industrial zones and industrial clusters for checking environmental activities in accordance with the newly enacted Circular No. 48/2011/TT-BTNMT to amend and supplement some articles of Circular No.08/2009/TT-BTNMT. In 2012, there were a total of 14 industrial zones having land area of 8,800 ha in BRVT. Among these, five industrial zones were equipped with central wastewater treatment facilities (CWWTF). Besides industrial zones, there were 30 industrial clusters in the province that are under planning or development. The Hac Dich 1 Industrial Cluster was the only one that had already started operations with a CWWTF. Another concern on environmental management in the province was wastewater from hospitals. Through the discussion with C/Ps, 92 enterprises (83 enterprises from seven industrial zones and one industrial cluster, and nine from outside as primary pollution sources) were selected for the PSI survey as shown in Table 2.4-21.

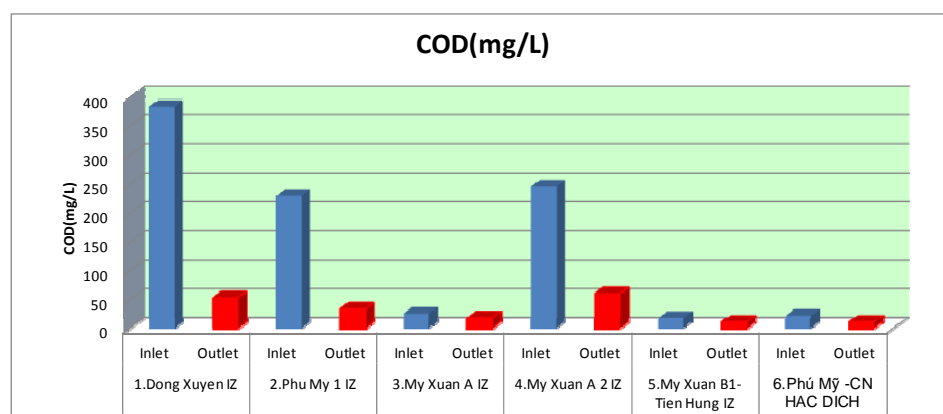
Table 2.4-21 Summary of Outputs in the Second Year of BRVT DONRE

Contents	Second Year	First & Second Year
1. Target area	BRVT Province.	-
2. Target enterprises investigated 1) Quantity	83 enterprises in seven industrial zones and one industrial cluster, and nine enterprises from outside as primary pollution sources	196 enterprises (including seven industrial zones and one industrial cluster)
2) Reasons for selection of target area and enterprises	DONRE selected enterprises mentioned in 2) above to check the environmental activities in the industrial zones and industrial clusters in association with Circular No. 48/2011/TT-BTNMT.	-
3) Questionnaire survey	There are 83 enterprises in seven industrial zones and one industrial cluster, and nine enterprises outside as primary pollution sources.	196 enterprises (including seven industrial zones and one industrial cluster)
4) No. of sampling	83 enterprises in seven industrial zones and one industrial cluster, and nine enterprises outside	144 wastewater samplings (including seven industrial zones and one industrial cluster)
3. Pollution source map	GIS application software (Arc GIS ver10.0): - Existing map is a base map of BRVT with 1:50,000 scale, which is the same as the first year activity area - To set up an Excel table to summarize the data collected from the enterprises	GIS application software (Arc GIS ver10.0)

Contents	Second Year	First & Second Year
		
4. Analysis of PSI		
1) Approval/permit of EIA, EPP, EPC	There are 90 enterprises with environmental authorization (37 certificate environmental standards, 47 approvals of EIA, 20 of EPP, and 26 of EPC).	158 enterprises (46 certificate environmental standards, approvals of 99 EIA, 22 EPP, and 32 EPC).
2) Wastewater treatment system	Six industrial zones and clusters have central wastewater treatment plants, but the remaining two ones do not have.	65 enterprises and six industrial zones
3) Wastewater discharge fee	All enterprises paid wastewater discharge fee.	104 enterprises (including seven industrial zones and one industrial cluster)
4) Wastewater discharge license	There are 13 enterprises with this permit.	13 enterprises
5) Self-monitoring	There are 70 enterprises that carry out self-monitoring, while the remaining 28 do not conduct self-monitoring.	146 enterprises (including seven industrial zones and one industrial cluster)
6) Environmental checking	Not implemented	Not implemented
7) Inspection	Not implemented	65 enterprises
8) Pollution loads estimate	Pollution loads were estimated for 83 enterprises in seven industrial zones and one industrial cluster, and nine enterprises outside.	144 enterprises (including seven industrial zones and one industrial cluster)
9) Pollutant concentration	The number of target facilities which exceed VN regulations concentrations (QCVN40:2011/BTNMT/B (K=1, Industrial WW)) were BOD: 31, COD: 22, SS: 14, T-N: 0, and T-P: 9.	BOD: 59, COD: 54, SS: 24, T-N: 20, and T-P: 25 enterprises.

Source: JET

In order to demonstrate how PSI could be used for pollution control, BRVT DONRE tried to evaluate the pollution loads and wastewater qualities in the industrial zones. Figure 2.4-7 shows COD concentrations at influent and effluent points of six CWWTFs, which are managed by the management board of each industrial zone. The concentrations of other parameters, such as BOD, SS, T-N and T-P, were also evaluated. All CWWTFs satisfied the QCVN standards (below 150 mg/L COD) in terms of management in the industrial zones.



Source: JET

Figure 2.4-7 Results of Comparison of Water Quality at Influent and Effluent Points of the CWWTFs

2.4.2.5 Situations of Key Indicators

The situations of key pollution control indicators at each province investigated in the Project are summarized in Table 2.4-22 below.

Table 2.4-22 Situations of Key Indicators throughout the Project

Contents	HNI	HPG	TT-HUE	HCMC	BRVT
1. Target enterprises investigated 1)Qty	48 enterprises	257 enterprises	217 enterprises	45 enterprises	Total 196 (188 enterprises, 7 industrial zones and 1 industrial cluster)
2) Questionnaire survey	48 enterprises with inspection activity.	257 enterprises	104 enterprises	45 enterprises	Total 196 (188 enterprises, 7 industrial zone, and 1 industrial cluster)
3) No. of sampling	34 sampling data	98 enterprises	40 enterprises	45 wastewater samplings from enterprises	Total 144 (136 enterprises, 7, 7 industrial zone, and 1 industrial cluster)
2. Analysis of PSI 1) Approved EIA, EPP or EPC	39 enterprises (19 approvals of EIA, 7 of EPP and 13 certificate environmental standards or EPC registration).	92 enterprises (21 approvals of EIA, 15 of EPP and 56 certificate environmental standards or EPC registration).	202 enterprises (184 approvals of EIA, 5 of EPP, 13 certificate environmental standards or EPC registration)	33 enterprises (7 approvals of EIA, 15 of EPP and 22 of EPC & certificate environmental standards).	158 enterprises (46 certificate environmental standards, 99 approvals of EIA, 22 of EPP, and 32 of EPC).
2) Have wastewater treatment system	21 enterprises	34 enterprises	62 enterprises	17 enterprises	Total 71 (65 enterprises, 6 industrial zones)
3) Paid wastewater discharge fee	18 enterprises	24 enterprises	25 enterprises	11 enterprises	Total 104 (96 enterprises, 7 industrial zone, and 1 industrial cluster)
4) Have wastewater discharge license	21 enterprises	5 enterprises	22 enterprises	24 enterprises	13 enterprises
5) Submitted self-monitoring report	36 enterprises	84 enterprises	69 enterprises	14 enterprises	Total 146 (138 enterprises, 7 industrial zone, and 1 industrial cluster)
6) Received environmental checking	10 enterprises	106 enterprises	64 enterprises	3 enterprises	65 enterprises
7) Received inspection	Refer to 6) above	Refer to 6) above	33 enterprises	Refer to 6) above	Refer to 6) above
8) Pollution load estimated	34 enterprises	98 enterprises	40 enterprises	45 enterprises	Total 144 (136 enterprises, 7 industrial zone, and 1 industrial cluster)
9) Cases of pollutant concentration exceeds regulation (QCVN40:2011/BTN MT/B	BOD: 11, COD: 6, SS: 5, T-N: 3, and T-P: 3 enterprises	BOD: 27, COD: 21, SS: 13, T-N: 18, and T-P: 7 enterprises	BOD: 16, COD: 14, SS: 12, T-N: 14, and T-P: 4 enterprises	BOD: 18, COD: 12, SS: 17, T-N: 2, and T-P: 8 enterprises	BOD: 59, COD: 54, SS: 24, T-N: 20, and T-P: 25 (Enterprises: BOD: 56, COD: 51, SS: 22, T-N: 20, and T-P: 23 industrial zones: BOD: 3, COD: 3, SS: 1, T-N: 0, and T-P: 2)
3. No. of registered businesses in province*	59,938	6,112	3,030	96,000	3,282

Note: *: Data from Statistical Year Book of Vietnam in 2011, General Statistical Office of Vietnam

Source: JET

a) EIA, EPC, and EPP: The percentage of enterprises that have planning stage authorization such as EIA, EPC, EPP was approximately 80%. In HPG, the percentage in the second year was lower than any other. It should be pointed out that the enterprises investigated in the Project tended to be large in size, and thus the rate must be much higher than the average rate in the province. The status of post-EIA certification was not thoroughly examined in the Project. It was confirmed that four enterprises in TT-HUE received certification, but in general the number was very few.

b) Wastewater discharge fee: The payment rates were roughly 10% in HPG and TT-HUE, 40% in HNI and about half in HCMC and BRVT. It is evident that many enterprises do not pay the wastewater

discharge fee. This fee is calculated from the actual amount of wastewater and concentrations of pollutants. However, because DONRE was not able to collect sufficient independent data on target enterprises, the fee is often determined by self-declaration by the enterprises.

c) Wastewater discharge license: The rates of acquirement were less than 10% in HPG and TT-HUE, and about half in HNI and HCMC. Many enterprises discharge wastewater to the environment without a license.

d) Self-monitoring report: The rates of enterprises that carry out self-monitoring reports were more than half in HPG, TT-HUE, and BRVT, and less than half in HNI and HCMC. Carrying out a self-monitoring report is a valuable opportunity to gather information from enterprises. However, DONREs do not trust information from enterprises much.

e) Inspection and environmental checking: The rates of implementation were about 40% in HPG, TT-HUE, and BRVT, and 25% in HNI and HCMC.

f) Pollutant concentration: The rates of exceeding the QCVN effluent standard for COD were 30-40% in HCMC and BRVT, and 20% in HNI, HPG, and TT-HUE.

2.4.2.6 Usage of Pollution Source Map (PSM)

A short training program on the usage of PSM was offered to DONREs. The objectives of this program were: a) to understand the concept of GIS and PSM, b) to get hands-on experience on their use, and c) to share usage and effective ways. In the training, DONRE staff learned the basic concepts of GIS and PSM based on the manual, Volume I: User's Guideline and Volume II: Operational Manual. Table 2.4-23 summarizes the results of the training in HPG, TT-HUE and BRVT DONRE. As for HNI and HCMC DONRE, JET accommodated questions from DONREs as required because they had certain experiences to operate GIS software in their daily works.

Table 2.4-23 Summary of Training on the Usage of PSM

DONRE	Summary
HPG	Since one of the staff of HASEM has knowledge of GIS, C/Ps could develop a new PSM. Through this training, HPG DONRE staff just learned important and basic applications, but they may have difficulty in using GIS. In general, however, DONRE staff understood that GIS/PSI is very useful for their daily works on pollution control especially for inspection. DONRE requested JET to continuously support them when they encounter some difficulties in using GIS and PSM.
TT-HUE	EPA and inspection staff realized that PSM is useful for their daily works. They have are applying simple GIS functions. During the training, C/Ps made a PSM and uses mathematical tool for spatial analysis.
BRVT	JET used a PSM with 200 target enterprises located in BRVT surveyed in the first and second year works, and conducted hands-on training. Participants from district and provincial DONREs, and EPA, learned how to display PSM. C/Ps commented that "We can manage and display DB easier than printed copy, and that the important thing is the PSI excel format to input including X and Y coordinator".

Source: JET

2.4.2.7 Workshop on Practical Usage of PSI

The workshop on practical PSI usage was held in HPG on 5 July 2012. The objectives of the workshop were to share their experiences and to understand PSI's effective use. In total, 55 people from VEA and DONREs participated. In the morning session, each DONRE presented outputs of PSI development as well as the planned activities. In the afternoon session, two effective examples related to environmental DB development were presented by CEM and CEID. After both presentations, participants discussed PSI usage and information sharing between central and provincial levels, as summarized in Table 2.4-24.

Table 2.4-24 Outline and Results of the Workshop on Practical Usage of PSI

Item	Contents
Objective	<ul style="list-style-type: none"> - To share experiences in the first year activities and usage of PSI among five target DONREs - To understand the effective usage/sharing of PSI
Participants	<p>[MONRE] Pollution Control Department, Department of International Cooperation and Science Technology, Center for Environmental Monitoring, Center for Environmental Information and Data, Department of Waste Management and Environmental Promotion, Department of Inspection, Department of Policy and Legislation, Institute of Science and Environmental Management, General Administrative Office</p> <p>[DONRE] HNI DONRE (EPA, Department of Inspection), HPG DONRE (EPA, HACEM, Sub- Department of Ocean and Island, Department of Inspection), TT-HUE DONRE (EPA, Inspection Division, Division of Water Resources and Hydrometeorology), HCMC DONRE (HEPA, Department of Pollution Control, Inspection Division), BRVT DONRE (EPA, Inspection Division, Department of Water Resources and Management, Pollution Control Division)</p>
Program	<p>[Morning Session]</p> <ul style="list-style-type: none"> - Water PSI along the Re River in HPG City 2011 (HPG DONRE) - Output 2-3: PSI in TT - HUE (TT-HUE DONRE) - The implementation of Output – 3 “Water Pollution Control Measures” (HNI DONRE) - PSI results in the Tan Quy Industrial Cluster (HCM DONRE) - Results of PSI implementation in BRVT Province (BRVT DONRE) <p>[Afternoon Session]</p> <ul style="list-style-type: none"> - Environmental database development as effective example (CEID) - Sharing experience in collection, development and management of pollution source database as effective example (CEM)
Conclusions	<p>1) Based on experiences of developing PSI, all DONREs recognized the importance of PSI in managing information on pollution sources, sharing information with other sections and divisions in DONRE for state management, developing strategic local and regional plans to control pollution, and communicating with decision makers, industries, local residents and other stakeholders.</p> <p>2) Some DONREs already have good capacity to use PSI including PSM. Evidently the steep learning curve of GIS implied that DONREs with staff who knows how to use GIS could quickly move on to the next level.</p> <p>3) One of the obstacles is data sharing technology. All DONREs want technology (e.g., web-based DB) to share information and DB beyond the boundary of section and division, but lack of knowledge in advanced information technology is making it difficult to envision the next steps.</p> <p>4) Although there are numerous attempts to build sophisticated data management systems by HNI DONRE, VEA, and VPEG, most of these efforts are still experimental, isolated and uncoordinated.</p> <p>5) CEID is trying to develop guiding documents for environmental data management by relevant organizations. This is very much needed right now to develop information systems that are compatible with others. To facilitate this, the Project provided CEID with the PSI format developed. Information exchange among DONREs and MONRE is very important to prepare laws and regulations that reflect the reality at the local levels for MONRE, and to implement uniform state management across the country for DONREs. Such issue will be discussed under Output 5.</p>

Source: JET

2.4.2.8 Activity C2-5: Regularly Conduct Inventory Survey and Add/Update Information on Main Pollution Sources

(1) Drafting of Short Report on Situations of Pollution Source

Each DONRE prepared a short report summarizing the situation of enforcement of pollution control regulations, characteristics of different industrial sectors, enterprises with significant pollution loads, and other aspects. The main objectives of this short report were to understand how to use PSI for water environmental management activities within DONRE, to share data/information within DONRE, and to submit this report to higher authorities including PPC leaders, DONRE, and relevant departments. Table 2.4-25 shows the outline of the short reports prepared by DONREs.

Table 2.4-25 Outline of Short Report by DONREs

Title	Contents
1. Preparation of PSI and PSM	<p>Several meetings were hold between JET and DONRE to discuss and identify the procedures of PSI development. Although PSI development required many tasks, it consists of the following four main components:</p> <ol style="list-style-type: none"> 1. Identify target area 2. Setting format of PSI 3. Preparation of PSM 4. Method of data collection from target enterprises
2. Usage of PSI	<p>The main outputs of PSI development consisted of the following components. Also, the characteristics of each output were summarized.</p> <ol style="list-style-type: none"> 1. Information on compliance with respect to EIA, industrial wastewater fee, water discharge license, wastewater quality standard, and sanction based on inspection 2. PSM 3. Pollution loads estimate
3. Direction of Next Step	<ol style="list-style-type: none"> 1. Comments on PSI development: DONRE summarized the 1) lessons, 2) issues, and 3) future actions, throughout the Project 2. Issues to be solved to develop PSI in terms of sustainability: DONRE summarized the appropriate methods for sustainability of PSI development.

Source: JET

(2) Approaches to Sustainable Data Collection and Maintenance of PSI

The DONREs and JET had a series of discussions to look for appropriate methods for further development and maintenance of PSI after the completion of the Project. Below are the major constraints and positive effects identified.

Major constraints:

a) Budget to collect new data and information: It is either limited or has to be newly acquired from PPC and other sources.

b) Human resources to maintain database: It is limited, and some DONREs do not have in-house GIS experts.

c) Specific legal basis: There are no bases requiring DONREs to develop PSI. Also, the motivation and instruction of the DONRE leader is essential to initiate inventory activities.

d) Difficulty of data sharing: PSI as it is now is a standalone data table, and it is still difficult to share data among different sections of DONRE simultaneously. Also, PSI does not contain information on air, solid waste, and other domains of DONRE's duties.

Positive effects:

a) Capacity strengthening on data compilation: Even before the Project, all DONREs had maintained lists of industries that have paid wastewater discharge fees and industries that have been approved. Through the Project, most DONREs also learned to use GIS.

b) Recognition of importance of PSI: Many DONRE leaders and other managers recognized the importance of developing and maintaining a PSI for their management of activities, planning of future activities, and communications with decision makers and other stakeholders.

c) Data collection as part of inspection activity: The experience of HNI DONRE in the second year showed that it is possible to gather data and information as part of regular inspection activities. Though this is not the most efficient way to collect a large amount of data and information in a short period, it is still possible to collect data without a lot of extra expenditure.

c) Possibility of web-based management system: Some DONREs (e.g., HNI, HPG) have already started developing a comprehensive web-based environmental database/information management system. The effort of PSI development is highly compatible with such development, because through development of PSI, data on many pollution sources have already been collected, digitized, and stored in such a way that data can be easily transferred to large databases.

Considering these constraints and positive effects, the approaches summarized in Table 2.4-26 are suggested to enable further development and maintenance of PSI.

Table 2.4-26 Approaches to Sustainable Development and Maintenance of PSI in DONREs

Approaches	Specific Suggestions
1. Priority Activities	
Mandatory reporting of status of pollution sources	In this Project, all DONREs drafted reports on the situation of pollution sources. If this activity was mandatory, it would be facilitated to share data/information within DONRE.
DONRE leaders initiative	The information in the drafted reports can be used as "information tools" to convince PPCs/political leaders. DONRE leaders are urged to instruct DONRE staff to report annually, and to ask PPC and other organizations to support more initiatives such as on human resources and financial budgets.
Persons or organizations in charge of inventory activity	Persons or organizations in charge of inventory activities are urged to implement regular mandatory reporting of the status of pollution sources, to compile information into the PSI, and make use of the PSI for reporting.
Establishment of legal basis for PSI development	MONRE was suggested to develop related regulations/instructions on reporting the status of pollution sources and maintaining a PSI (database) to give these activities firm legal/administrative basis.
Collection of data and information through inspection and environmental check	As demonstrated in HNI DONRE in the second year, inspection and environmental check are good opportunities to collect data and information from pollution sources in operation. Also, the results of wastewater analysis by DONRE are likely more reliable than the ones reported by industries.

Approaches	Specific Suggestions
2. Medium- or Long-term Activities	
Development of mid-term strategy to collect data	DONRE needs to develop a mid-term strategy for collection of data from pollution sources, and minimize duplication of efforts and expenses under different regulatory mandates and initiatives (inspections, EIA, wastewater discharge license, planning for organized relocation of industries, reporting related to Circular No. 04/2012/TT-BTNMT, development of environmental database, etc.). Collected data should be pooled into a PSI (in the future, an environmental database).
Specialized survey	A more comprehensive survey may be implemented in connection with related initiatives (organized relocation of industries, development of environmental database, initiative under basin management, Circular No. 04/2012/TT-BTNMT, etc.). Such opportunities are important to collect a large or specialized set of information. It should be noted that such survey is often a onetime opportunity, and does not warrant continuous flow of information.
Self-monitoring report by industries	Though self-monitoring reports carried out by industries are not considered a reliable source of information right now, in the future, it will become one of the most important sources of information because DONRE cannot regularly survey every single pollution source. Furthermore, it is the responsibility of industries to monitor their activities and take necessary actions to comply with related laws and regulations. Thus, DONREs should encourage industries to submit reliable self-monitoring reports. Surveys coordinated with IZMB are an effective approach to gather information from industries within IZMB.
Development of environmental database and information management system	DONREs are encouraged to develop environmental databases and information management systems. This should be done in consultation with MONRE (e.g., CEID), PPC and perhaps other DONREs because there are similar developments in different units under MONRE (e.g., E-Inspector and EIA database) and other DONREs, and the compatibility of such systems would become an issue. Because it could take years to develop such system, and its development does not lead to steady inflow of relevant data and information on pollution sources, DONREs need to continue their efforts to collect data and information and maintain the PSI.

Source: JET

2.4.3 Achievements

2.4.3.1 Overall Achievements

Table 2.4-27 shows the PDM indicators, statuses to be achieved by each organization, and remarks. Indicator 2-2-1 was achieved through the activities of PSI development scheduled to be completed by the end of March 2013. In the first year, HPG, TT-HUE, and BRVT DONREs compiled information of over 100 primary pollution sources, and HCMC DONRE completed 20 enterprises in the Tan Quy Industrial Cluster. HNI DONRE pursued development of a large-scale environmental DB, and did not develop PSI in the first year, although they compiled information of over 1,000 enterprises as part of Output 3 activity.

During the second year, HPG and BRVT DONRE collected information of more than 100 enterprises same as the first year activity. HCMC DONRE was investigating 25 industries in the Phuoc Long Industrial Cluster, and HNI DONRE was investigating about 50 enterprises in Long Bien District as planned. TT-HUE DONRE collected information of 104 enterprises, in which 47 enterprises were defined as important pollution sources related to water pollution in the first year to complement empty information, and 57 enterprises were newly selected by TT-HUE DONRE.

With respect to Indicator 2-2-2, the activities were designed to cover all information specified in the indicator. In the first year, most information/parameters specified in the indicator were collected, especially in HPG, HCMC, and BRVT. In the second year, all DONREs were collecting necessary information through subcontract works and inspection activities.

Table 2.4-27 Statuses of PDM Indicators at the End of the Project (WG2-3: Inventory)

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
2-2-1 Primary water pollution sources are duly filled in the revised inventory formats.	<ul style="list-style-type: none"> The DONRE revised the inventory formats and information of primary water pollution sources were filled in the revised inventory formats as PSIs. The area and number of target enterprises to be investigated for PSI in each province are as follows: <ul style="list-style-type: none"> HNI: 50 enterprises in Long Bien District as part of inspection activities HPG: 109 enterprises in the Re River basin, and 148 enterprises in the Da Do River basin TT-HUE: 204 enterprises in the whole TT-HUE Province HCMC: 20 enterprises in the Tan Quy Industrial Cluster, and 25 enterprises in the Phuoc Long Industrial Cluster BRVT: 188 enterprises in the whole BRVT Province (83 enterprises within seven industrial zones and one industrial cluster, and 105 enterprises outside) 	<ul style="list-style-type: none"> There was no PSI system except in HCMC. Primary water pollution sources in all DONREs were yet to be identified, though in general DONREs have good ideas about important industries in its territory. There were no regulations specific to PSI development. There were no section and human resources dedicated to PSI development. 	<ul style="list-style-type: none"> All DONREs could develop PSIs that covered primary water pollution sources, and this indicator was achieved. <ul style="list-style-type: none"> HNI: 48 enterprises in Long Bien District as part of inspection activities and investigation of 1,161 +60 enterprises by WG 3. HPG: 109 enterprises in the Re River basin, and 148 enterprises in the Da Do River basin TT-HUE: 217 enterprises in the whole TT-HUE Province HCMC: 20 enterprises in the Tan Quy Industrial Cluster, and 25 enterprises in the Phuoc Long Industrial Cluster BRVT: 188 enterprises in the whole BRVT Province
2-2-2 Information in the inventory are adequately added and the following information become available for DONREs' pollution control activities: (i) information on compliance with respect to EIA, industrial wastewater fee, water discharge license, wastewater quality standard, sanction based on inspection; (ii) information on pollution load of COD.	<ul style="list-style-type: none"> PSI covers all of the information/parameters specified in the PDM indicator. 	<ul style="list-style-type: none"> All DONREs had maintained lists of industries that have EIA approval and paid wastewater discharge fee, but not all items specified in the PDM indicator. HCMC DONRE's PSI covered about 1,500 industries, and information similar to the ones envisioned in this Project. All DONREs had limited experiences of usage of PSI including estimation of pollution load. 	<ul style="list-style-type: none"> All DONREs could develop PSI which covered information specified in the PDM indicator, and this indicator was achieved. Pollution load of COD and other pollutants were estimated in each DONRE. All DONREs prepared a short report on status of pollution sources in each province. After completion of this Project, DONRE shall implement inventory surveys without JET's assistance (refer to Table 2.4-26).

Source: JET

2.4.3.2 Achievements by Each Organization

Table 2.4-28 shows the statuses of achievement of indicators by each organization related to Output 2-3 in each DONRE at the end of the Project.

Table 2.4-28 Statuses to Achieve Indicators by Each Organization at the End of the Project

DONRE	Indicator	Timing of Completion	Status at the End of the Project
HNI	Indicator 2-2-1	March 2013	<ul style="list-style-type: none"> DONRE developed PSI including 50 enterprises in Long Bien District as part of inspection activities, and prepared the short report which includes the situations of primary water pollution sources. After completion of the Project, DONRE shall try to implement inventory surveys as part of inspection activities same as in the second year activities.
	Indicator 2-2-2	March 2013	<ul style="list-style-type: none"> DONRE developed PSI including information/parameters specified in the indicator, and prepared the short report which includes information on the inventory of pollution control activities. After completion of the Project, DONRE shall try to implement inventory survey as part of inspection activities same as second year activity.
HPG	Indicator 2-2-1	March 2013	<ul style="list-style-type: none"> DONRE developed PSI including 109 enterprises in the Re River basin, and 148 enterprises in the Da Do River basin, and prepared the short report which includes the situations of primary water pollution sources. After completion of the Project, DONRE shall exchange useful information with other DONREs, and implement inventory surveys referring to advanced examples in other DONREs.
	Indicator 2-2-2	March 2013	<ul style="list-style-type: none"> DONRE developed PSI including information/parameters specified in the indicator, and prepared the short report which includes information on the inventory of pollution control activities. After completion of the Project, HPG DONRE shall exchange useful information with other DONREs, and implement inventory surveys referring to advanced examples in other DONREs.

DONRE	Indicator	Timing of Completion	Status at the End of the Project
TT-HUE	Indicator 2-2-1	March 2013	<ul style="list-style-type: none"> DONRE developed a PSI including 215 enterprises in the whole province, and prepared the short report which includes the situations of primary water pollution sources. After completion of the Project, DONRE shall study advanced examples in other DONREs, and apply for inventory survey in TT-HUE.
	Indicator 2-2-2	March 2013	<ul style="list-style-type: none"> DONRE developed PSI including information/parameters specified in the indicator, and prepared the short report which includes information on the inventory of pollution control activities. After completion of the Project, TT-HUE DONRE shall study advanced examples in other DONREs, and apply for inventory survey in TT-HUE.
HCMC	Indicator 2-2-1	March 2013	<ul style="list-style-type: none"> DONRE developed a PSI including 20 enterprises in the Tan Quy Industrial Cluster, and 25 enterprises in the Phuoc Long Industrial Cluster, estimated pollution loads and impacts in the target area, and prepared the short report which includes the situations of primary water pollution sources. After completion of the Project, DONRE shall study the methods of pollution loads estimates, and implement inventory surveys in other areas.
	Indicator 2-2-2	March 2013	<ul style="list-style-type: none"> DONRE developed a PSI including information/parameters specified in the indicator, and prepared the short report which includes information on the inventory of pollution control activities. After completion of the Project, HCMC DONRE shall study the methods of pollution loads estimates, and implement inventory surveys in other areas.
BRVT	Indicator 2-2-1	March 2013	<ul style="list-style-type: none"> DONRE developed a PSI including 188 enterprises in the whole BRVT Province (83 enterprises in seven industrial zones and one industrial cluster, and 105 enterprises outside), and prepared the short report which includes the situations of primary water pollution sources. After completion of the Project, DONRE shall study advanced examples in other DONREs, and implement inventory surveys in order to achieve a PSI of 300 target enterprises.
	Indicator 2-2-2	March 2013	<ul style="list-style-type: none"> DONRE developed a PSI including information/parameters specified in the indicator, and prepared the short report which includes information on the inventory of pollution control activities. After completion of the Project, BRVT DONRE shall implement inventory surveys with modified PSM.

Source: JET

2.4.3.3 Capacity Assessment

(1) Results of Internal Evaluation

The internal evaluation was implemented in December 2012 and January 2013 by conducting questionnaire surveys to C/Ps. A total of 17 director level officers of EPA, Inspection Department, and Water Resource Management Department in the target DONREs answered the questionnaires for internal evaluation. The number of answered questionnaires at each DONRE are shown in Table 2.4-29.

Table 2.4-29 Number of Answered Questionnaires at Each DONRE

DONRE	Numbers of Answered Questionnaires	
HNI	3	<ul style="list-style-type: none"> - One deputy director of HNI EPA - Two staff of HNI EPA
HPG	3	<ul style="list-style-type: none"> - One director of HACEM - One vice director of HPG EPA - Two chief inspectors of the Inspection Department
TT-HUE	4	<ul style="list-style-type: none"> - One director of TT-HUE EPA - Two staff of TT-HUE EPA - One inspector of the Inspection Department
HCMC	3	<ul style="list-style-type: none"> - One deputy director of HCMC HEPA - One EIA division member of HCMC HEPA - One pollution control division member of HCMC HEPA
BRVT	4	<ul style="list-style-type: none"> - One head of BRVT EPA - One staff of BRVT EPA - One inspector of the Inspection Department - One officer of Water Resource Management and Hydrometeorology
Total	17	

Source: Target DONREs compiled by JET

Figure 2.4-8 shows the questions related to each objectively verifiable indicator of PDM and the average scores of the five-level, semi-quantitative self-evaluation for inventory component (Output 2-2) marked by all DONREs. Before starting the Project, all of these capacities were evaluated as between “2: little” and “3: satisfactory”. As of January 2013, they were evaluated as around “4: good”

except for CA 2-2-2 (3), indicating the overall improvement of DONREs' capacities to develop and utilize PSI.

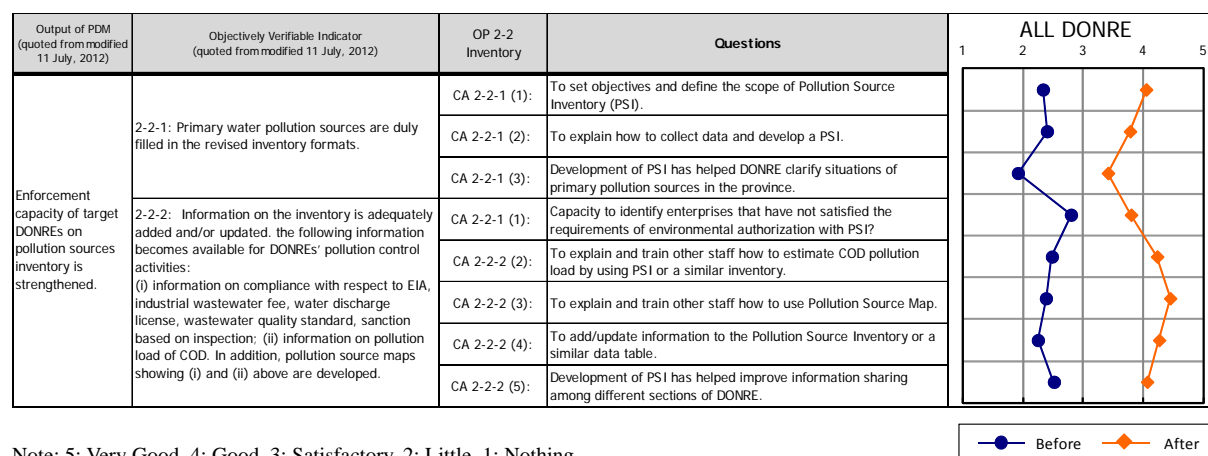


Figure 2.4-8 Overall Results of Questionnaire for Output 2-2 (Average of all DONREs)

Figure 2.4-9 shows the results of self-evaluation for the inventory component (Output 2-2) marked by each DONRE. The results showed that the officers of HNI, HPG and TT-HUE felt that they have made significant improvement in their capacities, while HCMC showed the least improvement among the five DONREs, perhaps because they already had a PSI in the beginning of the Project.

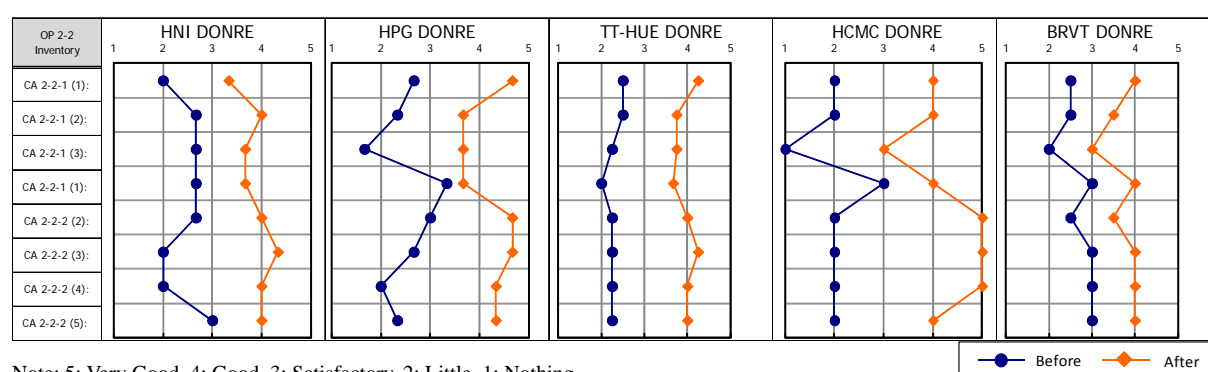


Figure 2.4-9 Results of Questionnaire for Output 2-2 (each DONRE)

(2) Capacity Development throughout the Project

In the beginning of the Project, the weak points in DONREs' capacities to develop PSI are the following:

- 1) Limited experience to collect and analyze data and information on pollution sources for systematic control of pollution, and
- 2) Limited recognition of the importance of sharing pollution source information within DONRE for concerted efforts to manage pollution sources.

In response to this situation, JET prepared a work plan to identify primary water pollution sources (Indicator 2-2-1), and to collect, analyze and share appropriate information on pollution sources (Indicator 2-2-2).

1) Indicator 2-2-1: Primary Water Pollution Sources

This indicator will be achieved through the activities of PSI development scheduled to be completed by the end of March 2013. In the first year, HPG, TT-HUE, HCMC and BRVT DONREs have compiled information of primary water pollution sources. HNI DONRE pursued development of a large-scale environmental database, and did not develop PSI in the first year. In the second year, all DONREs continued to collect information on primary water pollution sources. Indications of the answered questionnaires from CA 2-2-1 (1) to (3) are as follows:

CA 2-2-1 (1): Before the Project, many staff did not have a clear idea about what a PSI is, and they did not know how to set the objectives and scope of PSI development for their pollution source management. Now, many staff know what a PSI can do to support management of pollution sources, and thus understand how to set the objectives and scope of PSI development.

CA 2-2-1 (2): At the beginning of the activities, many staff did not know how to develop a PSI. However, through the Project, they learned the following: 1) method of data collection, 2) preparation of appropriate form, and 3) procedure of compiling data and information into PSI and updating them. Now, many staff have the capacity to not only develop a PSI by themselves, but also explain to others how to develop a PSI.

CA 2-2-1 (3): It was confirmed that PSI development has helped DONRE clarify situations of primary pollution sources in the province, and has significantly improved DONRE's capacity as an organization responsible for environmental management in the province. For example, DONRE staff commented, "the situation of target area is very clear, and information are easy to check using PSI", "information on present pollution status is normally stored in various sections/departments", and "present status of primary pollution sources can be defined".

2) Indicator 2-2-2: Information in the Inventory

The activities were designed to cover all information specified in the PDM indicator. In the first year, most information/parameters specified in the indicator were collected, especially in HPG, HCMC and BRVT. In the second year, all DONREs were collecting necessary information through subcontract works and inspection activities. Indications of the answered questionnaires from CA 2-2-2 (1) to (5) are as follows:

CA 2-2-2 (1): DONRE staff have acquired the capacity to identify enterprises that have not satisfied the requirements of environmental authorization with PSI. Before the Project, many DONREs checked the status of target enterprises one by one, without any database such as PSI. Through the Project, it became very easy for DONRE staff to check the status of any industry through the use of PSI.

CA 2-2-2 (2): DONRE staff have acquired the capacity to estimate pollution load of COD, and they are now able to explain and train other staff how to do such activity, although there remain some technical issues, such as estimating flow rate of wastewater that fluctuates significantly from time to time. Before the Project, there were little information on pollution load, partly because DONRE staff had not been certain in calculating pollution loads from concentration of pollutant and flow rate of wastewater. Based on the instruction on the methods of pollution loads analysis in the Project, the capacity of DONRE staff have improved.

CA 2-2-2 (3): DONRE staff have acquired the capacity to explain and train other staff how to use PSM. In the beginning of the Project, many DONRE staff knew about GIS but were not familiar with pollution map making procedures. In the Project, due to efforts on the usage of PSM, the capacity of DONRE staff has improved markedly. However, because GIS training requires a GIS expert and many staff members do not have frequent access to GIS software, the improvement is still limited.

CA 2-2-2 (4): DONRE staff have acquired the capacities to add/update information to a PSI or a similar database. The PSI was new to many DONRE staff, and in the beginning of the Project, many staff did not have enough capacity to maintain a PSI partly because their IT skills were limited to basic use of Excel, and most staff were not familiar with GIS. Through the development of the PSI

in the Project, their skills have improved, and now they are able to add/update information in the PSI, although advanced use of pollution maps will be a challenge for some DONREs as it requires an in-house GIS expert.

CA 2-2-2 (5): It was confirmed that the development of PSI has helped improve information sharing among different sections of DONRE, and hence improved environmental management capacity of DONREs at the organizational level. For example, DONRE staff commented, “previously, information sharing between different sections faced difficulties. After the Project, information sharing has been improved”, and “...PSI facilitated us in performing our tasks of environmental management. PSI is a basis for us to better share information between different units at the time of coordination in inventory work”.

Many DONREs have already expressed keen interest to continue the development of PSI after the Project, and JET will support DONRE identify the issues to be solved in the future.

2.4.3.4 Recommendations for Post Project Activities

(1) Recommendations on Activities Within DONRE

- a) Review effectiveness of the PSI developed in the Project according to the following aspects in order to improve the PSI: 1) relevance of data and information covered in the PSI, 2) actual usage of PSI in daily duties and planning for water pollution control, 3) maintenance of PSI, such as resources required to collect new data and update PSI, and 4) possible extension of PSI to different fields of DONRE’s tasks (e.g., waste, air pollution, toxic substances, etc.).
- b) Appoint persons in charge of PSI activities.
- c) Use inspection and environmental activities, if appropriate, to maintain and update PSI: 1) collect data and information using the source survey form, or a similar format, 2) compile results of wastewater analysis conducted as part of DONRE’s inspection or environmental check activities, 3) share PSI information among departments/units (EPA, Inspection Department, Water Resources Department, Monitoring Center, and possibly other stakeholders) that participate in inspection and environmental check activities.
- d) Collect data within DONRE: 1) check data availability within DONRE and evaluate whether it can be used for environmental management, and 2) appoint persons in charge of data summarization from other departments.
- e) Develop short- to medium-term strategies to implement different types of surveys using fixed budget, non-recurrent budget, and external funding: 1) surveys of different industrial sectors or different areas, 2) comprehensive survey of a broad range of pollution sources to develop environmental database, 3) specialized survey of industries that need attention (e.g., use of toxic substances), etc.
- f) PSI format modification: 1) improve software from Excel to Microsoft Access and web-based database, and 2) prepare a manual on how to input data.
- g) Regularly prepare a report on the status of pollution sources in the province (similar to the one prepared in the Project) and report the situation to the head of DONRE. Also, if it is appropriate and approved by higher authority, general information should be available to PPC, industries, the general public and other stakeholders (information on individual industries have to be handled carefully).
- h) Request industries to submit reliable information. Give incentives to good reporting (e.g., less frequent inspection), and penalize those that do not report or falsify documentation.
- i) Encourage data sharing within DONRE.

(2) Recommendations on Activities outside DONRE

- a) Formulation of laws/regulations as well as instructions to all DONREs regarding inventory activities, such as standard format for data collection, standard design of PSI or related environmental database, and protocols for dissemination of information.
- b) Allocation of enough budget and human resources to DONREs to maintain PSI.

- c) Development of mechanisms to ensure that industries submit reliable data and information based on their legal mandates (e.g., clarification of requirements on self-reporting and development of standard format, streamlining/consolidating different legal requirements for industries, improvement of reliability/impartiality of analytical results produced by VILAS laboratories, and pollution control studies targeting priority industries).

2.5 Output 2-3 (WG 2-4): Inspection

2.5.1 Introduction

2.5.1.1 Pollution Source Inspection in Vietnam

According to the Law on Inspection No. 56/2010/QH12, inspection is an administrative activity to evaluate the compliance of agencies, organizations, and individuals with orders as stipulated in relevant laws and regulations, and give administrative guidance and sanction on illegal cases. The fields handled by DONRE's inspection are not only environmental but also include others such as land management. A team for inspection on environmental management comprises several relevant sections such as EPA, Water Resources Management Department, and Center for Environmental Monitoring, and it is led by the Inspection Department.

Environmental checking is conducted based on the Law on Environmental Protection No. 52/2005/QH11 (LEP). The law prescribes that relevant state agencies should check the compliance of manufacturing, business, and other activities on requirements of LEP, such as compliance on EIA/EPC, permission to be obtained, and actions taken for environmental protection on wastewater discharge, solid waste disposal, and hazardous substance management. Environmental checking is conducted under the initiative of EPA. Serious issues found by environmental check are reported, and administrative guidance or sanction is provided by the Inspection Department.

Table 2.5-1 summarizes the legal framework related to environmental inspection and environmental check in the field of water environmental management.

Table 2.5-1 Legal Framework Related with Inspection in Vietnam

Law	Relevant Contents	Relevant Decrees, Decisions and Circulars
Law on Environmental Protection (No. 52/2005/QH11)	LEP stipulates the responsibilities given to enterprises that discharge pollutants in order to protect the environment, and for local administration to check the status of environmental management system/activities of enterprises.	<ul style="list-style-type: none"> ➢ Decree No. 80/2006/ND on Guidance for Implementation of LEP ➢ Decision No. 62/2002/QĐ-BKHCMNT on Regulation on Environmental Protection in Industrial Park: Applied in Inspection of Environmental Protection in Industrial Zone, and Industrial Park ➢ Decree No. 88/2007/ND-CP on Urban and Industrial Zone Drainage ➢ Decree No. 29/2011/ND-CP on Provisions of Strategic Environmental Assessment, Environmental Impact Assessment, and Environmental Protection Commitment ➢ Circular No. 26/2011/TT-BTNMT on Guidelines for Strategic Environmental Assessment, Environmental Impact Assessment, and Environmental Protection Commitment ➢ Circular No. 08/2009/TT-BTNMT on Provision for Environmental Management and Protection of Economic Zones, Hi-tech Parks, Industrial Zones and Industrial Clusters ➢ Circular No. 08/2010/TT-BTNMT on Preparation for National Environmental Report, Sector's EIA Report and Report on Provincial existing Environmental Situation
Law on Inspection (No. 56/2010/QH12)	The Law on Inspection is a fundamental law aimed at organizing an inspection team, and planning and implementation of inspection activities. The law stipulates two types of inspection activities, namely, administrative inspection, and specialized inspection. The inspection activities related to environmental issues are categorized as specialized inspection.	<ul style="list-style-type: none"> ➢ Decree No. 07/2012/ND-CP on Regulating agencies assigned with specialized inspection and operation of specialized inspection ➢ Decree No. 86/2011/ND-CP on Detail Guidance for Implementation of Law on Inspection ➢ Decree No. 117/2009/ND-CP on Handling of Violation for Environmental Protection ➢ Decision No. 2151/2006/QĐ-TTCT on Operation Rule of Inspection Team ➢ Decree No. 35/2009/ND - CP on Organization and Activities of Inspectorate in Charge of Natural Resources and Environment ➢ Circular No. 04/2012/TT-BTNMT on Guidance of Classification and Decision of List of Entities Causing Environmental Pollution Required Administrative Sanction

Source: JET

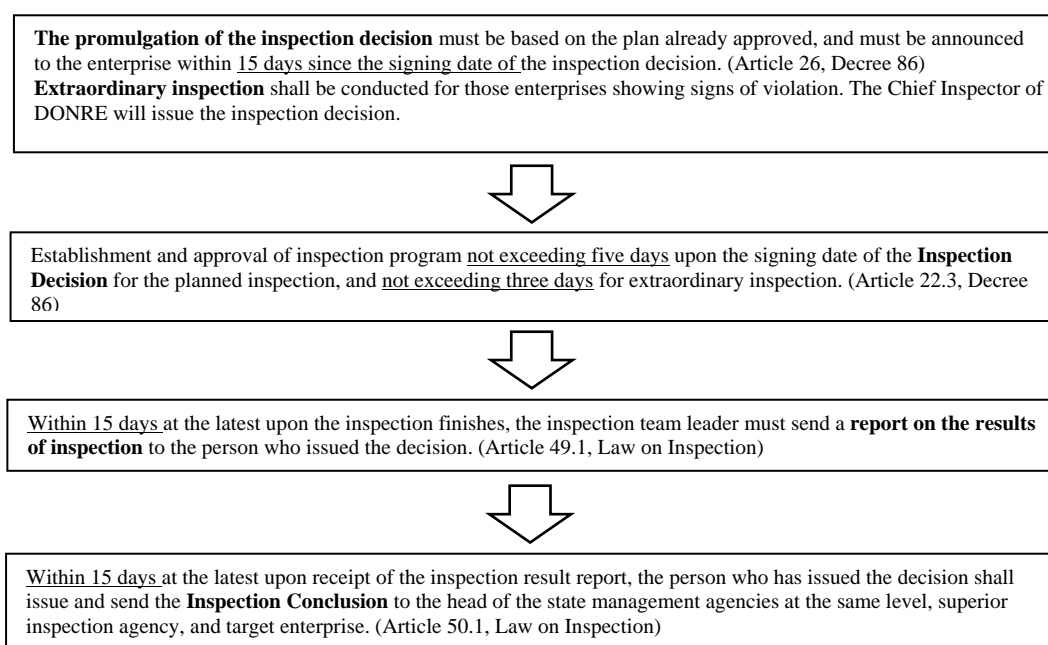
Regarding inspection and environmental check implemented at the provincial level, there are several relevant organizations, as shown in Table 2.5-2. Under the Project, capacity development activities were mainly implemented for the concerned sections in the provincial DONREs, such as the Inspection Department, EPA, DWRM, and Monitoring Center. In addition, relevant organizations such as district DONREs and the Environmental Police Department have been involved in the Project in order to increase the effectiveness of capacity development activities.

Table 2.5-2 Organizations Concerned with Inspection and Environmental Checking Activities at the Provincial Level

Organizations	Activities and Tasks
Inspection Department of DONRE	Carry out environment specialized inspection to give and impose administrative sanctions against violations, if any.
Environmental Protection Agency (EPA) of DONRE	Carry out environmental check for pollution sources and give recommendations to take appropriate protection measures.
Center for Environmental Monitoring of DONRE	Carry out sampling, field measurement, and analysis in order to check the compliance status to national wastewater standards.
Water Resources Management Department of DONRE	Attend environmental check and inspection related to wastewater discharge and water resources exploitation.
Environment Police Department	Carry out environmental check to impose administrative sanctions and to file criminal charges against violators.
District Level PCs	Carry out environmental check of EPC/EPP registration projects in order to give recommendations and to impose administrative sanctions to violators.

Source: JET

The general procedure of inspection as prescribed in Decree No. 86/2011/ND-CP on Detailed Guideline for Implementation of Law on Inspection is summarized in Figure 2.5-1.



Source: JET

Figure 2.5-1 General Procedure of Inspection

2.5.1.2 PDM and PO

The PDM and PO were agreed at the beginning of the Project in January 2010, and later revised in August 2012 based on actual activities of WGs. Table 2.5-3 shows the items related to inspection and environmental check (WG 2-4) in the revised PDM and PO. In the Project the word “inspection” generally refers to activities of both inspection and environmental check, unless specifically distinguished.

Table 2.5-3 Items Related to Pollution Source Inspection in PDM and PO

Document	Item	Contents
PDM	Output	Enforcement capacity of target DONREs on basic water pollution control (environmental monitoring, pollution sources inventory, pollution sources inspection) is strengthened.
	Objectively Verifiable Indicators	2-3-1 The results of the capacity assessment on preparation work, on-site inspection, and follow-up work of inspection show improvement, compared with the initial stage of the Project. 2-3-2 Criteria for selecting primary/crucial pollution sources in each DONRE's inspection plan are clarified. 2-3-3 Number of officers who have capacities for on-site inspection, such as field measurement and wastewater treatment facility checking, is increased. 2-3-4 Number of officers who have capacities to assess situation of wastewater management of polluting industries, and make recommendations for improvement from perspectives of giving administrative order and administrative guidance, is increased.
	Means of Verification	2-3-1 Results of capacity assessment 2-3-2 Document explaining the criteria for selecting industries to be inspected/checked. 2-3-3 Training records 2-3-4 Training records
	Activities	C3-1 Conduct capacity assessment of target DONREs regarding inspection for water pollution control. C3-2 Review existing guidelines on inspection. C3-3 Clarify criteria for selecting primary/crucial pollution sources to be inspected as part of DONREs' inspection plans. C3-4 Based on the prepared plan, conduct environmental inspection and/or environmental check. C3-5 Conduct joint analysis on the results of environmental inspection and/or environmental check in order to improve the related capacity of DONREs through the training. C3-6 Conduct training on wastewater management to improve DONREs' administrative order and/or administrative guidance. C3-7 Conduct training on on-site inspection.
PO	C3-1	May to August 2011
	C3-2	June to August 2011
	C3-3	August 2011 to November 2012
	C3-4	January 2012 to December 2012
	C3-5	October 2011 to November 2012
	C3-6	October 2011 to January 2013
	C3-7	June 2012 to January 2013

Source: JET

2.5.1.3 Activity C3-1: Conduct Capacity Assessment of Target DONREs Regarding Inspection for Water Pollution Control

In August 2011, JET prepared CA questionnaire sheets and distributed them to each DONRE to check initial capacities at the individual (working level) and organization (managing level) levels. A total of 23 answered sheets were collected from target DONREs. In the questionnaire, DONRE staff belonging to the departments related to inspection and environmental check, such as the Inspection Department, EPA, and DWRM, evaluated their own capacities using a five level evaluation method. The following capacity levels were considered to be relatively lower than other capacities, and have to be developed:

- Experience on accessing relevant information to be referred to during preparation work,
- Knowledge of assessing effluent treatment systems and operating conditions, and
- Experience on monitoring effluent quality and quantity using tools/equipment at sites.

Table 2.5-4 Summary of CA on Inspection and Environmental Checking

Stage	Knowledge/Experience/Skill	Answer on Level of Capacity						Average
		5 (Highest)	4	3	2	1 (Lowest)		
Preparation work	Experience on preparing inspection/environmental check plan	1	9	5	0	1	3.6	3.4
	Knowledge on the process of preparing inspection/environmental check plan	0	8	6	2	1	3.2	
	Knowledge on documents and equipment for preparation of inspection/environment check	1	8	5	1	1	3.4	
	Knowledge on latest environmental and effluent standards	4	8	8	0	1	3.7	
	Knowledge on what information need to be collected before implementing inspection or environmental check	1	9	6	0	1	3.5	
	Experience on referring to EIA/EPP/EPC reports in order to find key issues	3	9	8	1	1	3.5	

Stage	Knowledge/Experience/Skill	Answer on Level of Capacity						Average
		5 (Highest)	4	3	2	1 (Lowest)		
	Experience on referring to past inspection/environmental check reports	2	11	6	1	1	3.6	
	Experience on cooperation with other sections in order to collect information before implementing inspection/environmental check	2	11	6	1	1	3.6	
	Experience on accessing relevant information for reference in preparation work	1	3	11	4	1	3.0	
	Skill on identifying which industrial sectors need to be inspected carefully considering the characteristics of industrial activities in each province/city	1	5	10	0	1	3.3	
On-site work	Knowledge on what information need to be interviewed on-site	1	6	5	1	1	3.4	3.2
	Knowledge on which documents need to be checked on-site based on the Law on Inspection/LEP	1	6	8	0	1	3.4	
	Knowledge on which information need to be checked in the submitted self-monitoring reports prepared by the inspected enterprises	1	6	7	1	1	3.3	
	Knowledge on assessing effluent treatment systems and their operating conditions	0	4	8	4	2	2.8	
	Experience on providing recommendations to improve water pollution management system during fieldwork on-site	2	3	9	4	0	3.2	
	Experience on monitoring effluent quality and quantity using tools/equipment on-site	2	4	7	6	1	3.0	
Follow-up work	Experience on preparing inspection/environmental check reports	2	10	5	1	1	3.6	3.5
	Knowledge on what essential information need to be included in inspection/environmental check reports based on the Law on Inspection and the Environmental Inspection Manual by MONRE	0	8	7	1	1	3.3	
	Experience on referring to relevant past inspection/environmental check reports in order to prepare a new report	2	11	5	0	1	3.7	
	Experience on sharing information on water pollution sources obtained through inspection/environmental checking with other sections/organizations	1	9	9	0	1	3.5	
	Experience on giving administrative sanctions	2	8	6	3	1	3.4	
	Experience on preparing an annual summary report on inspection/environmental check	3	9	6	1	1	3.6	

Note: The 23 answered questionnaire sheets were collected from all DONREs. However, some staff did not answer all questions, thus the total number of answers for each question is lower than 23.

Highlighted capacities means that the level of capacity is relatively lower than other capacities.

Source: JET

Table 2.5-5 shows the initial capacities, and capacities to be improved thorough the Project activities in each DONRE, identified through the questionnaire survey, a series of discussions between each DONRE and JET, and data obtained from DONREs.

Table 2.5-5 Items Related to Pollution Source Inspection in PDM and PO

Item	HNI	HPG	TT-HUE	HCMC	BRVT
1) Number of officers in the Inspection Division	25 officers	13 officers	6 officers	20 officers	6 officers
2) Implementation of environmental check and inspection	No. of times inspection on environmental issues and environmental check were implemented: 2008: 110 times 2009: 216 times 2010: 256 times The sanctions given	No. of times inspection on environmental issues and environmental check were implemented: 2007: 50 times 2008: 33 times The sanctions given and fines collected	No. of times inspection on environmental issues and environmental check were implemented: 2010: 3 times In 2010, no sanctions and fines on environmental issues	No. of times inspection on environmental issues were implemented: 2010: 318 times The sanctions given and fines collected related to environmental issues	No. of times inspection on environmental issues were implemented: 2010: 78 times The sanctions given and fines collected related to environmental issues

Item	HNI	HPG	TT-HUE	HCMC	BRVT
	and fines collected related to environmental issues are as follows: 2008: 18 cases (Total fine: VND 308 million) 2009: 87 cases (Total fine: VND 1,217 million) 2010: 90 cases (Total fine: 3,948 million)	related to environmental issues are as follows: 2007: 8 cases (Total fine: VND 79 million) 2008: 9 cases (Total fine: VND 118 million)	were given.	are as follows: 2010: 160 cases (Total fine: VND 1,024 million)	are as follows: 2010: 21 cases (Total fine: VND 319 million)
3) On-site inspection skills	Format of M/M for inspection (on-site checklist): Exists Inspection process on-site: inspection and environmental check were conducted based on the regulated procedure.	Same as HNI DONRE	Format of M/M for inspection (on-site checklist): Exists Inspection process on-site: environmental check was conducted based on the regulated procedure by TT-HUE on shrimp farm.	Same as HNI DONRE.	Format of M/M for inspection (on-site check list): Exists Inspection process on-site: environment check was conducted based on the regulated procedure by BRVT on livestock facility.
4) Wastewater sampling and analysis	The Inspection Department cooperates with CENMA for analysis.	Same as HNI DONRE	Lab is under construction, and wastewater sampling and analysis is subcontracted.	DONRE does not have a laboratory, and wastewater sampling and analysis is subcontracted.	Same as HNI DONRE
5) Management of environmental check and inspection records and reports	Annual inspection and environmental check report is prepared, and submitted to PPC.	Same as HNI DONRE	Same as HNI DONRE	Same as HNI DONRE	Same as HNI DONRE
6) Plan of environmental check and inspection in 2011	Inspection plan: Environment check plan was prepared	Same as HNI DONRE	Same as HNI DONRE	Same as HNI DONRE	Same as HNI DONRE
7) Requirements on main capacities to be improved	[Individual capacity] - Technical information for preparation, on-site and follow-up works should be provided. - Knowledge on checking the appropriateness of a wastewater treatment system should be enhanced. [Organizational capacity] - There is no specific document on criteria for selecting primary/crucial pollution sources in the field of water environment management.	[Individual capacity] Same as HNI DONRE [Organizational capacity] - There is no specific document on criteria for selecting primary/crucial pollution sources on water environment management field. - Preparation of a tool to give assistance to field works of environmental check and inspection was proposed.	[Individual capacity] - Technical information for preparation, on-site and follow-up works should be provided. - Knowledge on checking the appropriateness of a wastewater treatment system should be enhanced. - Filed work capacity should be enhanced on the priority industrial sectors. [Organizational capacity] Same as HNI DONRE	[Individual capacity] Same as HNI DONRE [Organizational capacity] Same as HNI DONRE	[Individual capacity] - Technical information for preparation, on-site and follow-up works should be provided. - Knowledge on checking the appropriateness of a wastewater treatment system should be enhanced. - Capacity to propose countermeasures for wastewater management improvement should be enhanced. [Organizational capacity] Same as HNI DONRE

Source: JET

2.5.1.4 Capacity Development Plan

Based on the gaps between the initial capacity and the capacity necessary to fulfil the mandates given to DONRE, the WG 2-4 prepared a CD plan. This CD plan consists of four phases; initial (Phase I), mid-term 1 (Phase II), mid-term 2 (Phase III), and final (Phase IV). For each phase, CD objectives, work contents, expected outputs, facilitator, and target group were established. The CD plan is shown in Table 2.5-6.

Table 2.5-6 CD Plan for Output 2-4

Phases Items	Phase I (Initial)	Phase II (Mid-term 1)	Phase III (Mid-term 2)	Phase IV (Final)
CD Objectives	<ul style="list-style-type: none"> - To clarify and share goals and objectives of the Project - To identify current capacities and issues - To prepare the work plan to strengthening C/P capacities of monitoring 	<ul style="list-style-type: none"> - To prepare draft criteria on primary/crucial pollution sources - To enhance knowledge on wastewater treatment system 	<ul style="list-style-type: none"> - To enhance the ability of inspection in preparation work, on-site work and follow-up work for improving effectiveness on water environment management 	<ul style="list-style-type: none"> - To finalize draft criteria on primary/crucial pollution sources - To enhance the capacity to check appropriateness of wastewater treatment system and production process - To share lessons obtained through the activities
Work Contents	<ol style="list-style-type: none"> 1) Assessment of existing capacities on inspection and environment check 2) Analysis of gaps between required capacity and the status at the beginning of the Project. 3) Development of the work plan based on the tentative AP and analysis of capacity gaps 	<ol style="list-style-type: none"> 1) Preparing draft criteria on primary/crucial pollution sources 2) Improving knowledge to check operating conditions of wastewater treatment plan at sites 	<ol style="list-style-type: none"> 1) Improving wastewater sampling, , pretreatment, and field measurement skills 2) Improving knowledge on checking the operating conditions of wastewater treatment plants on-site 	<ol style="list-style-type: none"> 1) Assisting preparation of annual inspection plan 2) Assisting preparation of annual inspection report 3) Disseminating and sharing outputs under Output 2-4 in the final seminar
Expected outputs	- WP for Output 2-4	<ul style="list-style-type: none"> - Officers having improved knowledge on how to check the operating conditions of wastewater treatment facilities on-site - Document on draft criteria on primary/crucial pollution sources 	<ul style="list-style-type: none"> - Officers having improved skills on wastewater sampling, pretreatment, and field measurement - Officers having improved knowledge on analyzing found issues on administrative guidance on wastewater management system 	<ul style="list-style-type: none"> - Officers having improved knowledge on how to check the operating conditions of wastewater treatment facilities on-site, and to analyze found issues on administrative guidance - Document on criteria on primary/crucial pollution sources - Handbook for improving inspection and environmental check performance
Facilitator	JET	JET	JET	JET
Target Group	Members of WG 2-4 and associated members	Members of WG 2-4 and associated members	Members of WG 2-4 and associated members	Members of WG 2-4 and associated members
CD activity	Joint working between C/Ps and JET	Joint working between C/Ps and JET	Joint working between C/Ps and JET	Joint working between C/Ps and JET
Period	April 2011 - August 2011	September 2011- March 2012	April 2012 - September 2012	October 2012 - June 2013

Source: JET

2.5.1.5 Preparation of Work Plans

A WP for environmental inspection was prepared for each target DONRE based on the tentative APs prepared by DONREs, CD plans, results of initial CA, activities defined in the PDM and PO, and discussions with the target DONREs. Table 2.5-7 summarizes the framework of the WP for implementation of CD activities on inspection.

Table 2.5-7 Framework of WP for Implementation of CD Activities on Inspection

Activities	Technical Aspects	Approach	Actual activity	Target
C3-1 Conduct CA of target DONREs regarding inspection for water pollution control.	1) Identification of detail capacity on inspection and environmental check which need improvement	At first, through discussion with target DONREs from May 2011, initial CA was conducted. After that, to confirm detail capacity to be improved, questionnaire survey was implemented on preparation work, on-site work and follow-up work of inspection and environmental check.	1. Discussion meetings for reviewing current status of inspection and environmental check and conducting initial CA 2. Questionnaire survey for CA to staff of target DONREs	1.Target organizations: HNI, HPG, TT-HUE, HCMC, and BRVT DONRE 2.Target officers: Officer in charge of inspection and environmental check
C3-2 Review existing guidelines on inspection.	2) Identification of items to be included in the Handbook For Improving Inspection and Environmental Check Performance	The officers related with inspection and environmental check refer to the Environmental Specialized Inspection Manual prepared by MONRE. To identify the required capacity for improvement, the guideline was reviewed with target DONREs.	1. Discussion meetings for reviewing the Environmental Specialized Inspection Manual prepared by MONRE	Ditto
C3-3 Clarify criteria for selecting primary/crucial pollution sources to be inspected as part of DONREs' inspection plans.	3) Preparation of criteria for selecting primary/crucial pollution sources	At the beginning of the Project, all target DONREs did not have specific documents regarding criteria for selecting primary/crucial pollutions source. For better preparation of annual inspection and environmental check plan, documents on criteria were prepared considering pollution source characteristics in each area controlled by the target DONREs.	1. Discussion meetings on identifying required criteria for selecting primary/crucial pollution sources by each DONRE 2. Workshop for identifying required criteria for selecting primary/crucial pollution sources by each DONRE	Ditto
C3-4 Based on the prepared plan, conduct environmental inspection and/or environmental check.	4) OJT on inspection and environmental check	To identify issues for improvement and to improve capacities on inspection and environmental check, JET implements joint work of inspection and environmental check with target DONREs as OJT.	1. Discussion meetings for preparing OJT plans for inspection and environmental check 2. Joint work of target DONREs and JET for inspection and environmental check as OJT	Ditto
C3-5 Conduct joint analysis on the results of environmental inspection and/or environmental check in order to improve the related capacity of DONREs through the training.	5) Analytical results of inspection and environmental check to improve the related capacity of target DONREs	Based on experiences and results of joint work on inspection and environmental check, the issues to be solved for improving capacities of inspection and environmental check are analyzed by discussion between target DONREs and JET. Guidance to improve issues identified by joint analysis are described in the Handbook for Improving Inspection and Environmental Check Performance	1. Evaluation meeting of joint work of inspection and environmental check 2. Preparing of the Handbook for Improving Inspection and Environmental Check Performance including guidance to improve issues identified by joint analysis on inspection and environmental check	Ditto
C3-6 Conduct training on wastewater management to improve DONREs' administrative order and/or administrative guidance.	6) Analytical results of inspection and environmental check to improve the related capacity of target DONREs	Each target DONRE officers strongly requested to enhance knowledge on wastewater treatment system and cleaner production technique by the Project. JET holds workshops to provide relevant knowledge, and implements training cooperation with local experts, considering regional main industries.	1. Workshop on how to check wastewater treatment systems 2. Training on wastewater treatment systems and cleaner production techniques	1.Target organizations: HNI, HPG, TT-HUE, HCMC, and BRVT DONRE 2.Target officers: Officers in charge of inspection and environmental check in target DONREs and relevant organizations such as district DONRE officers
C3-7 Conduct training on on-site inspection.	7) Technical training on on-site inspection such as water flow measurement, water quality analysis by mobile water quality analyzer, and how to check wastewater treatment system on-site	On-site work is an important part of inspection and environmental check, and there are technical capacities related to such which need improvement, such as water flow measurement, water quality analysis by mobile water quality analyzer, and how to check wastewater treatment system on-site. Through joint work of target DONREs and JET, on-site, training is provided.	1. Joint work among target DONREs and JET for inspection and environmental check as OJT 2. Training on wastewater treatment systems and cleaner production techniques	1.Target organizations: HNI, HPG, TT-HUE, HCMC, and BRVT DONRE 2.Target officers: Officers who are in charges of inspection and environment check in target DONREs

Source: JET

2.3. Function and mandate of environmental police and cooperation with inspectorate at all levels
2.3.1. Function and mandates of environmental police
2.3.2. Scope of environmental police
2.3.3 The coordination between environmental inspection and environmental policies at all levels:
2.4. Environmental standards of Vietnam
2.4.1. Environmental standards imposed on land environmental protection
2.4.2. Environmental standards on water environmental protection
2.4.3. Environmental standards on air environmental protection
2.4.4. Environmental standards in noise
2.4.5. Environmental standards in solid waste
3. Environmental Inspection Work
3.1. General inspection procedures
3.1.1. Preparation of inspection
3.1.2. On-site inspection
3.1.3. End of inspection
3.2. Inspection skills
3.2.1. Preparation of inspection
3.2.2. On-site inspection
3.2.3. Report on inspection result
3.2.4 Inspection conclusion
3.2.5 Archives the inspection documents

Source: JET

Based on the results of review work, the issues shown in Table 2.5-8 were identified. CD activities in the Project were planned and implemented considering the issues.

Table 2.5-8 Main Findings from Review of the Inspection Manual

Category	Relevant Section	Main Findings	Approach to CD
Common	-	Instruction of the manual has general instruction on inspection of environmental field. For CD on inspection in the field of water environmental management, specific CD activities are necessary.	- CD activities on inspection and environmental check in the field of water environmental management were implemented. - A handbook for improving inspection and environmental check performance in the field of water environmental management field was prepared.
Legal requirement	Sections 2.1 and 2.4	The manual lists relevant regulations on inspection. However, the manual was prepared in 2008, and some regulations have been modified.	The latest relevant regulations on inspection are listed in the Handbook for Improving Inspection and Environmental Check Performance.
Procedure of inspection	Section 3.1	The manual describes the procedure on inspection in each phase of the work, preparation work, on-site work, and follow-up work.	Based on the results of CA, generally, officers related with inspection and environmental check know the required procedure on inspection and environmental check. Joint work is conducted in accordance with the procedure.
Institutional framework	Sections 2.2 and 2.3	The manual defines each organization's responsibility for inspection and environmental check.	The Project provides assistance to CD of provincial/city DONRE officers related with inspection and environmental check.
Capacity related with preparation work	Section 3.2.1	The manual describes necessary actions to be conducted in preparation work of inspection, and general information to be collected. However, there is no description on what particular information need to be collected for inspection related to the water environment management field.	In the Project, the information to be collected for inspection related to the water environment management field is clarified through joint work of inspection and environmental check.
Capacity related with on-site work	Section 3.2.2	The manual describes the documents to be checked particularly during on-site work. On the other hand, guidance on several technical matters, such as water flow measurement, wastewater quality monitoring and checking of wastewater treatment systems and their operating conditions were not mentioned in the manual.	In the Project, the following training was provided: ✓ Wastewater flow measurement ✓ Water quality measurement ✓ Assessment of wastewater systems and their conditions on-site
Capacity related with follow-up work	Section 3.2.3 to 3.2.5	The manual describes general approach on reporting and providing administrative sanctions. In order to improve wastewater management by enterprises themselves, it is expected for inspectors to have the capacity to instruct particular measures on solving found issues on wastewater systems and their operating conditions.	In the Project, knowledge on the following were provided: ✓ Appropriate wastewater treatment system by main industrial sector ✓ Key points to be improved for appropriate operation of wastewater treatment system ✓ Effectiveness of cleaner production techniques on reducing impacts on the water environment from wastewater discharge

Source: JET

2.5.2.3 Activity C3-3: Clarify Criteria for Selecting Primary/Crucial Pollution Sources

For preparing inspection and environmental check plans, one important matter is selecting what primary/crucial pollution sources need to be inspected and checked carefully. From October to December 2011, WG 2-4 of each DONRE and JET discussed how to select target pollution sources, and identified various viewpoints important for selecting primary/crucial pollution sources (see Table 2.5-9).

Table 2.5-9 Viewpoints on Selecting Primary Crucial Pollution Sources

No	Category	Examples of Viewpoints	Items to be Checked	Expected Information Source
1	Government strategy and instruction	Instruction for preparing inspection plan from the national and provincial government	<ul style="list-style-type: none"> ✓ Yearly instruction from MONRE for planning of yearly inspection plan ✓ Yearly instruction from PPC for planning of yearly inspection plan 	Instruction document
2	Follow-up on previous administrative guidance given to pollution sources	Listed pollution sources by relevant decisions and circulars, etc.	<ul style="list-style-type: none"> ✓ Circular No.04/2012/TT-BTNMT ✓ Other decisions and circulars, if any 	Record of countermeasures planned and implemented
3		History of penalties and administrative guidance given to pollution sources	<ul style="list-style-type: none"> ✓ Penalties given ✓ Administrative guidance given 	List of penalties and administrative guidance
4		History of countermeasures applied based on the administrative guidance given to pollution sources	<ul style="list-style-type: none"> ✓ Countermeasures adopted by pollution sources based on administrative guidance 	Record of follow-up inspection and environmental check on pollution sources given to enterprises Record from entity on how it rectified the situation based on the instruction/guidance
5		Record of complaints to pollution sources	<ul style="list-style-type: none"> ✓ Complaints on water environment issues 	Information from district DONRE
6	Feedback of information obtained by environmental check	Pollution sources to be inspected based on environmental check results	<ul style="list-style-type: none"> ✓ Pollution sources without required environmental registrations ✓ Pollution sources paying insufficient amount of environmental protection fee for wastewater discharge ✓ Pollution sources discharging wastewater illegally (checked by wastewater quality monitoring) ✓ Pollution sources having issues on their wastewater treatment system and its operation 	Environmental check report Record from entity on how it rectified the situation based on the instruction/guidance
7	Feedback of information obtained by inspection by the Environmental Police Department	Pollution sources to be inspected based on information from the Environmental Police Department	<ul style="list-style-type: none"> ✓ Pollution sources discharging wastewater illegally ✓ Pollution sources having issues on their wastewater treatment system and its operation 	Report of the Environmental Police Department
8	Industrial sectors and pollution sources on wastewater control	Type of industrial sectors to be checked	<ul style="list-style-type: none"> ✓ Each DONRE has own industrial sectors to be focused through the Project. 	List of pollution sources on industrial sectors to be focused
9		Amount of wastewater discharge/ designed capacity of wastewater treatment system	<ul style="list-style-type: none"> ✓ Annual amount of production by each enterprise ✓ Amount of collected environmental protection fee for wastewater discharge by each entity 	Basic statistical data of enterprises in each province Record of collected amount of environmental protection fee
10		Status of wastewater treatment facilities	<ul style="list-style-type: none"> ✓ Equipped condition of wastewater treatment facilities ✓ Operation condition of wastewater treatment facilities 	Minute of inspection and environment check
11	Others	Areas/zones to be focused	<ul style="list-style-type: none"> ✓ Areas seriously polluted ✓ Water bodies utilized for daily life/agriculture/fishery that receive wastewater from enterprises 	Environmental monitoring information Water pollution control plan in each province

Source: WG 2-4 of each DONRE and JET

There are two viewpoints, namely, a) viewpoint common to five DONREs such as government strategies, and b) that of specific in each DONRE such as type of industrial sectors distributed in the area. A common viewpoint can be adopted by any of the DONREs for selecting primary crucial pollution sources, but specific viewpoints should be set considering regional characteristics. For selecting the criteria, therefore, such factors were taken into account as summarized in Table 2.5-10.

Table 2.5-10 Availability of Information Sources for the Evaluation Criteria

No	Category	Examples of Viewpoints	Availability of Information	Key Factors for Collecting Required Information for the Evaluation Criteria
1	Government strategy and instruction	Instruction for preparing inspection plan from the national and provincial government	Available	National and provincial governments provide instructions.
2	Follow-up on previous administrative guidance given to pollution sources	Listed pollution sources in relevant decisions, circulars, etc.	Serious pollution sources list in circulars No.04/2012/TT-BTNMT is under preparation in each DONRE.	The enterprises should be identified by environmental check and inspection.
3		History of penalties and administrative guidance given to pollution sources	Available	Past inspection and environment check record should be referred.
4		History of countermeasures applied based on administrative guidance to pollution sources	Available	Past inspection and environment check record should be referred.
5		Record of complaints to pollution sources	Some complaints are kept in district DONRE, and it is not easy to collect all information.	Record of complaints should be collected from relevant organizations.
6	Feedback of information by environmental check	Pollution sources to be inspected based on environmental check results	Available	Past inspection and environmental check records should be referred. Record from entity on how to remediate/assured against the instruction/guidance given
7	Feedback of information by inspection by the Environmental Police Department	Pollution sources to be inspected based on information from the Environmental Police Department	Cooperation with the Environmental Police Department is essential to collect information.	Information should be collected from the Environmental Police Department.
8	Industrial sectors and pollution sources on wastewater control	Type of industrial sectors to be checked	List of pollution sources should be developed.	It is recommended to utilize a PSI.
9		Amount of wastewater discharge	Amount and reliability of information should be reviewed before utilization.	It is recommended to utilize a PSI. Past inspection and environmental check records should be also referred to.
10		Status of wastewater treatment facilities	Currently, the amount of information is limited. However, available information should be referred to.	It is recommended to utilize a PSI. Past inspection and environmental check records should be also referred to.
11	Others	Areas to be focused	Available	Relevant information, such as regional environmental management plan, distribution of pollution sources and so on should be referred to.

Source: WG 2-4 of each DONRE and JET

Table 2.5-11 summarizes the recommended criteria for selecting primary/crucial pollution sources in the water environment management field identified through the Project activities.

Table 2.5-11 Criteria for Selecting Primary/Crucial Pollution Sources

No	Criteria	Items to be Checked	Information Source	Organization/Section to be Contacted
1	Enterprises causing serious environmental pollution	Enterprises listed by Circular No. 04/2012/TT-BTNMT Enterprises given administrative guidance Pollution sources without required environmental registrations Pollution sources discharging wastewater illegally (checked by wastewater quality monitoring)	<ul style="list-style-type: none"> ➤ Circular No. 04/2012/TT-BTNMT ➤ List of given administrative guidance last year ➤ Records of inspection and environmental check last year 	<ul style="list-style-type: none"> ➤ Inspection Department ➤ EPA ➤ DWRM ➤ Monitoring Center ➤ Environmental Police Department
2	Enterprises confirmed complaints from local residents	Complaints on water environmental issues	<ul style="list-style-type: none"> ➤ Records of complaints 	<ul style="list-style-type: none"> ➤ Inspection Department ➤ EPA ➤ District DONREs ➤ Environmental Police Department

No	Criteria	Items to be Checked	Information Source	Organization/Section to be Contacted
3	Enterprises which do not have or are not currently operating a wastewater treatment system	Pollution sources having issues on their wastewater treatment systems and its operation	➤ Records of inspection and environmental check last year	➤ Inspection Department ➤ EPA
4	Enterprises which have not been inspected in recent years	Pollution sources which have not been inspected during the last three years	➤ Record of inspection	➤ Inspection Department
6	Primary industrial sectors and pollution sources on wastewater control	Seafood processing industry	[HNI DONRE] Food/beverage Restaurant and hotel Machinery Hospital Solid waste dumping site Livestock [HPG DONRE] Food/beverage/animal feed processing Paper/paper mill Machinery/shipbuilding Steel Leather [TT-HUE DONRE] Beverage Aquaculture Textile/garment Tourism facility/hotel [HCMC DONRE] Paper/paper mill Chemical Machinery [BRVT DONRE] Seafood processing industry	➤ EPA ➤ Department of Industry ➤ DWRM ➤ Monitoring Center ➤ Environmental Police Department ➤ Relevant management boards

Source: WG 2-4 of each DONRE and JET

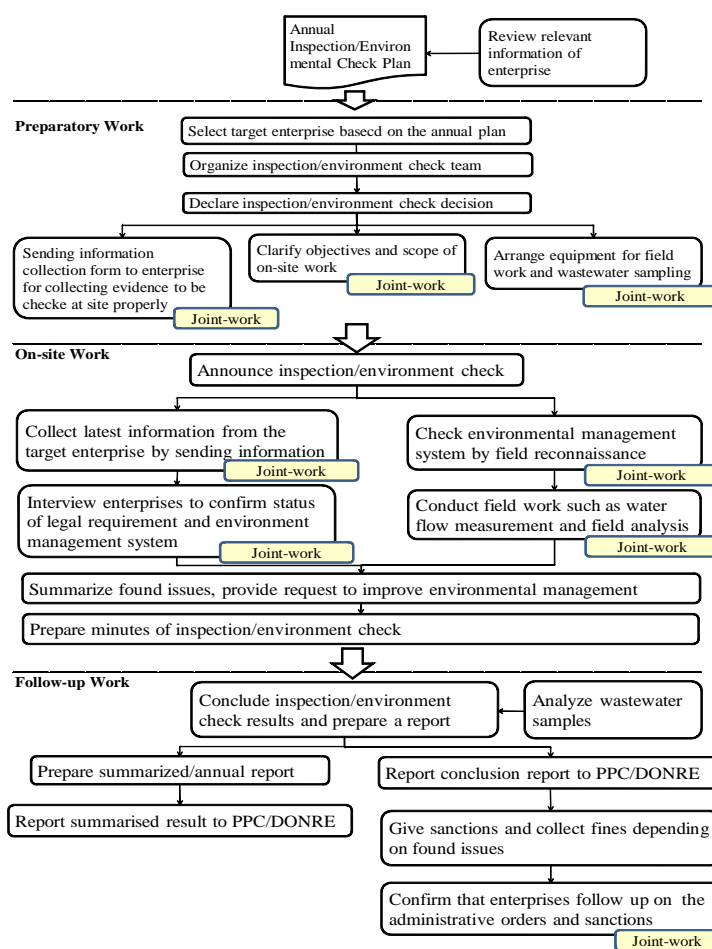
2.5.2.4 Activity C3-4: Conduct Environmental Inspection and/or Environmental Check

Activity C3-4 was started from January 2012. JET implemented a series of OJT activities on inspection and environmental check with DONRE in order to provide knowledge and recommendations on each work step on inspection and environmental check, namely preparation work, on-site inspection, and follow-up work, and to exchanging opinions so as to enhance their capacities. Figure 2.5-3 shows the main tasks in inspection and environmental check confirmed with DONREs. Among the tasks, DONREs selected the tasks for which capacity improvement through joint work is necessary based on the results of CA conducted in August 2011 and discussions. The selected tasks for joint work are shown in Figure 2.5-3 and Table 2.5-12.

Table 2.5-12 Tasks of Inspection/Environment for Joint Work and Necessity of Capacity

Work Phase	Tasks Selected for Joint Work	Necessity of Capacity Improvement
Preparation Work	Review relevant information such as past environmental check/inspection results, enterprise self-monitoring reports, and other related documents	Access to information to be reviewed and referred to during preparation work should be improved.
	Request latest information from the target enterprise by sending the information collection form	Existing information collecting form should be reviewed, and revised as necessary.
On-site Work	Check status of environmental management by field reconnaissance	Capacities to visibly check condition of wastewater treatment system should be enhanced.
	Conduct field work such as water flow measurement and field analysis	Capacities on wastewater flow measurement should be enhanced.
Follow-up Work	Confirm if enterprises follow up on the administrative orders and sanctions	In order to make sure that violators follow the administrative orders and sanctions, full cooperation among different sections of DONRE is desirable.

Source: JET



Note: Joint-work means that capacity improvement on the task was considered necessary, and DONREs and JET worked together to improve DONRE's capacity.

Source: JET

Figure 2.5-3 Main Tasks in Inspection and Environment Check

An outline of the implemented OJT is shown in Table 2.5-13. The experiences obtained through the OJT were reflected in the Handbook for Improving Inspection and Environmental Check Performance.

Table 2.5-13 Outline of the Implemented OJT on Inspection and Environmental Check

DONRE	Inspection/ Environmental Check	Target Enterprises	No. of Officers Who Joined the OJT	Implementing Period	Remark
HNI	Inspection	Five target enterprises including machinery, paint and manufacturing industries.	5	September 2012	Due to refusal by enterprise, JET does not join on-site inspection.
HPG	Inspection	Seven enterprises in the Re River include paper recycling, food processing and machinery industries	10	August to September 2012	-
TT-HUE	Inspection	Enterprises in the Phu Bai Industrial Zone	16	September 2012	The training for on-site inspection was implemented separately from official inspection work.
HCMC	Environment Check	Eight enterprises in the Tan Quy Industrial Cluster including paper recycling, dyeing, food processing and machinery industries	8	June, August and September 2012	Follow-up environmental check was planned, and implemented.
BRVT	Inspection	Thirty-one seafood industries in the Cua Lap area	4	June 2012	-

Source: JET

2.5.2.5 Activity C3-5: Conduct Joint Analysis on Results of Inspection and/or Environmental Check

After the joint activities, target DONREs and JET discussed the results of the inspections. The members pointed out several difficulties on obtaining effective inspection results during different phases of inspection, namely preparation work, on-site work, and follow-up work phase. Target DONREs and JET focused their efforts to address these difficulties.

(1) Necessity on Improvement of Accessibility to Required Information in Preparation Work

In principle, all technical and procedural documents submitted by the enterprise or collected by DONRE in relation to the case in question should be readily available and thoroughly reviewed. In reality, however, documents and information available for DONREs' inspection/environmental check works are often very limited, for various reasons, and without enough information, it is difficult to implement effective on-site inspection. In order to improve current conditions, target DONREs examined several factors for clarification.

a) Clarification of required information for reference: C/Ps in charge of inspection and environmental check identified key documents and information to be reviewed as shown in Table 2.5-14, even though there are large numbers of relevant regulations, documents, evidences, and suspected administrative violations. The clarified information to be referred to in the preparation work phase were listed in the Handbook for Improving Inspection and Environmental Check Performance.

b) Use of PSI to review required information timely and smoothly: DONRE used PSI to review relevant information on the target enterprises. DONRE officers commented that the PSI tables are useful for preparation work of inspection and environmental check.

c) Collecting missing information before on-site work: Not all information related to target enterprises are readily available in DONRE, especially information regarding wastewater management systems. Therefore, HNI and HPG DONREs used a supplemental form prepared in the Project.

d) Cooperation with the Environmental Police Department: Target enterprises selected in BRVT were small and medium sized seafood processing industries that were newly designated as inspection targets by PPC. However, DONRE did not have available information of them, so DONRE used data and information which the Environmental Police Department investigated and collected in recent years.

Table 2.5-14 Information to be Referred to During Preparation Work of Inspection/Environmental Check

Category	Example of Information to be Referred
General Facility Information	<ul style="list-style-type: none"> - Maps showing facility location, including location of wastewater discharge pipes, and wastewater sampling points - Plant layout and process - Description of processing operations and wastewater discharges - Production amount
Requirements, Regulations, and Limitations	<ul style="list-style-type: none"> - EIA/EPC document - Wastewater discharge license - Groundwater exploitation license - Status of environmental protection fee payment
Facility Compliance and Enforcement History	<ul style="list-style-type: none"> - Previous inspection reports - Correspondence among facility, local, State, and Federal agencies - Documentation on past compliance violations, exceedances, status of requested regulatory corrective action, if any - Previous administrative guidance and function issued to facility - Enforcement actions such as compliance schedules and consent orders
Pollution Control and Treatment Systems	<ul style="list-style-type: none"> - Description of wastewater treatment system - Self-monitoring data and reports - Pollution control units, treatment methods, and monitoring systems

Source: WG 2-4 and JET

(2) Necessity to Improve On-site Work Capacity

During on-site work, an inspection/environmental check team conducts two main tasks, confirmation of documents and evidences of compliance status on environmental management, and fieldwork to observe environmental management conditions of the target enterprise, as shown in Table 2.5-15. The main issues of on-site work identified are: a) capacity to check wastewater discharge amount, b) visual check of wastewater treatment system including operations and maintenance conditions, and c) capacity on field measurement to check wastewater quality. Therefore, training on on-site inspection, as described in Section 2.5.2.7, was designed to take care of these issues. Training matters in the on-site work phase were described in the Handbook for Improving Inspection and Environmental Check Performance.

Table 2.5-15 On-site Work of Inspection/Environmental Check

Type	Activities	Found Strong Points and Issues
Confirmation of documents and evidences of compliance	The inspection/environmental check team checked the following documents: - EIA report/EPC document - Wastewater discharge license - Hazardous waste disposal license - Groundwater exploitation license - Evidence of wastewater discharge fee payment Based on the results of checking documents and observing environmental management conditions, the minutes on inspection/environment check is prepared.	<u>Strong points</u> Each DONRE has a form listing documents to be checked, and officers conduct desk work smoothly. <u>Issues</u> The time is too limited to thoroughly review documents especially when the team has not reviewed relevant documents during the preparation phase. It is difficult to evaluate appropriateness of wastewater discharge amount described in documents due to lack of capacity to check wastewater discharge amount.
Field work	The inspection/environmental check team observed the following environmental management conditions of the enterprise: - Operating conditions of production process - Storage conditions of hazardous substances and hazardous wastes - Operating conditions of emission treatment and wastewater treatment system - Wastewater and storm water discharge system - Outlet of wastewater discharge - Sampling of wastewater	<u>Strong points</u> Officers have experience on checking the appropriateness of storage conditions of hazardous substances and hazardous wastes. <u>Issues</u> - Capacity to check the amount of wastewater discharge should be enhanced. - Knowledge on visual check of wastewater treatment system flow and operating condition should be enhanced. - Capacity on field measurement to check wastewater quality should be enhanced.

Note: When it is difficult to check wastewater discharge amount, 0.8 times of water usage amount is adopted as wastewater discharge amount based on the Decree No. 88/2007/ND-CP dated May 28, 2007

Source: JET

(3) Findings Related to Follow-up Work

The inspection team of DONRE is responsible for preparing a conclusion report including inspection results and conceivable sanctions to target enterprises just after actual inspection and to submit it to DONRE and PPC for final approval. Even in this process, there are several issues to be improved as described below:

- a) Sanctions are given to enterprises in accordance with Decree No. 117/2009/ND-CP. However, this does not always contribute to improvement of wastewater management due to several issues related to the enterprise, such as low awareness of enterprise on wastewater management and lack of budget for treatment/management of wastewater.
- b) Priority targets for improving water environment management should be clarified, and intense follow-up inspection and environmental checks should be directed to such enterprises.
- c) Information collected by inspection and environmental check are not always used for preparing policies or plans to improve water environmental management. Such information should be used not only in giving sanctions to enterprises, but also for planning for better water environmental management.
- d) Cooperation activities among concerned departments in DONRE and PPC are crucial to ensure and to improve actual environmental performance of sanctioned enterprises. Therefore, information collected through inspection should be used for improvement of water environmental management of enterprises, and for awareness raising activities for enterprises.

2.5.2.6 Activity C3-6: Conduct Training on Wastewater Management to Improve DONRE's Administrative Order and/or Administrative Guidance

(1) Internal Workshop

Internal WSs were organized, as summarized in Table 2.5-16, to provide information on Japanese water pollution control legislation and inspection system, technical knowledge on wastewater treatment systems of certain industrial sectors, and to discuss how to select primary/crucial pollution sources.

Table 2.5-16 Internal WSs on Inspection and Environmental Check

DONRE	Title	Contents	Participants
HNI	1st Internal WS (14 November 2011)	Presentation on knowledge and skills on how to assess environment protection measures on-site on food/beverage industries	12 participants from the Inspection Department and EPA of HNI DONRE
HPG	2nd WS (17 February 2012)	1) Lecture on production process, wastewater management, wastewater characteristics and case studies of wastewater treatment systems of pulp and paper industries 2) Discussions on revision of handy reference cards as tools for checking wastewater management on-site	33 participants from the Inspection Department, EPA, DWRM and HACEM of HPG DONRE, the Inspection Department of HNI DONRE and TT-HUE DONRE, and the Environmental Police Department
TT-HUE	1st Internal WS (1 December 2011)	Technical information on wastewater treatment on food/beverage industries and aquaculture	16 participants from the Inspection Department, EPA, DWRM with district DONRE and Environmental Police Department officers
HCMC	2nd Internal WS (13 January 2012)	1) Knowledge and skills on how to assess environmental protection measures on-site 2) Field work at selected enterprises in The an Quy Industrial Cluster	18 participants from Inspection Department, EPA, Water Resource and EMD
BRVT	1st Internal WS (23 February 2012)	1) Presentation on possible wastewater treatment system for seafood processing industry 2) Presentation on production process, wastewater treatment system of local seafood processing industry, and how to inspect seafood industrial sector	14 participants from the Inspection Department, EPA, DWRM of BRVT DONRE and the Environmental Police Department

Source: JET

(2) Technical Training on Wastewater Treatment and Cleaner Production Techniques

Through discussion with target DONREs, JET confirmed that all target DONREs have training needs on wastewater treatment and production process improvement. Therefore, technical trainings on wastewater treatment and cleaner production (CP) techniques were planned and implemented. The basic framework of the technical training is shown in Table 2.5-17.

Table 2.5-17 Basic Framework of Technical Training on Wastewater Treatment and CP Techniques

Item	Contents
Objectives	- To obtain knowledge on key points to be checked to confirm appropriateness of wastewater treatment system and its operating condition on the target industrial sector during field work in inspection/environmental check, and - To obtain knowledge on the CP process for target industries, and its applicability in Vietnam
Target Industry	Paper/paper mill industry Textile and dyeing industry Seafood processing industry
Period of Program	Two days
Contents	Characteristics of wastewater in target industry Wastewater treatment technology in target industry Evaluation criteria for wastewater treatment procedures and operating conditions Evaluation method of operational conditions Exercise on how to assess wastewater treatment process and its operating conditions Introduction of CP technology Site training

Source: JET

Based on the framework mentioned above, the training was conducted as shown in Table 2.5-18.

Table 2.5-18 Training on Wastewater Treatment and Production Process

Item	Contents		
Venue	HNI DONRE	HCMC DONRE	BRVT DONRE
Date	2013.1.10 - 11	2012.11.06 - 07	2012.10.02 - 03
Number of participants	37	39	15
Contents of training	<ul style="list-style-type: none"> - Measures to evaluate adequateness of wastewater treatment process and identify issues of the process - Knowledge on how to instruct improvement of wastewater treatment system - Knowledge on production process improvement including introduction of CP technology - Knowledge on pollution load calculation - Site visit on focused industrial sectors 		
Industrial sectors focused	Paper/paper mill	Textile and dyeing	Seafood processing
Note	Officers of other DONREs were invited		

Source: JET

a) On-Site Visual Check of Operating Conditions of Wastewater Treatment Facilities

At the site, officers need to check the operating conditions of wastewater treatment plant by visual check and review of operation records. Examples of viewpoints for checking are shown in Table 2.5-19.

Table 2.5-19 Viewpoints for On-Site Visual Check

Item	Contents
Physical Treatment Process	<ul style="list-style-type: none"> - High levels of noise may indicate improper maintenance of mechanical equipment. - If serious cogging or cracks are found, the facility is not well-maintained.
Chemical Treatment Process	<ul style="list-style-type: none"> - By reviewing documents, the type and amount of chemicals used should be checked. - Record of generated sludge treatment should be checked. - pH level should be checked whether chemical treatment process is operated well.
Biological Treatment Process	<ul style="list-style-type: none"> - An extremely dark brown color with the odor of hydrogen sulfide in aeration tanks of activated sludge treatment indicates poor oxidation. A dark brown color with an earthy smell of oxidized wastewater in the aeration tank is an indication of proper functioning of the system. - When air bubbles on the surface of the aeration tank is observed, activate sludge tank is considered to be operated properly. - Thick, dark, greasy, scummy layers of deep tan with brown foam covering surface of aeration tanks indicates that sludge is too old and may be over oxidized. - Excessive, billowing, white foam in aeration tanks may be due to young sludge.

Source: JET

b) Operating Conditions of Activated Sludge Systems

If the target enterprise has an activated sludge system, an officer should be able to confirm whether the operating conditions are good or not by checking operation records, pH level, water temperature, dissolved oxygen concentration, and inflowing untreated wastewater quality. Examples of appropriate figures of pH level, water temperature, dissolved oxygen concentration are shown in Table 2.5-20.

Table 2.5-20 General Appropriate Figures on Several Parameters Related to Operations of Activated Sludge System

Factor	General Appropriate Figure
pH	6-8
Water temperature	20-30 °C
DO	2-5 mg/L
Inflowing untreated wastewater quality	As stable as possible

Source: JET

c) Concept on Production (CP) Process Improvement

Regarding production process improvement, introduction of CP technology is one of the ways to be adopted. In 2012, lectures on how to introduce CP technology were provided in accordance with the requests from DONREs. CP is a pollution prevention approach in production line, concentrating on optimizing efficiency of production and minimizing pollution. CP can be realized by employing several steps, such as the following:

- Process design/redesign to eliminate or reduce emissions to air, water and to reduce formation of waste and energy consumption;
- Substitution of fuels, chemicals, raw materials, etc. by means of environmentally less harmful ones; and

- Minimization and reduction of pollution by means of process control, maintenance, end-of-pipe technologies, etc.

The CP is a common scheme that can be applied to renovation of industrial production processes. It can be more beneficially used as a management tool, when it is applied together with the management of energy efficiency, hazardous waste management, occupational health and safety, end-of-pipe, and environmental management system (EMS) by means of ISO 14001 or equivalent. In general, CP technologies are adopted through rapid scan assessments and, then, full CP in-plant assessments made by specialized institutions in the fields, as shown in Box 2.2.4-2.

Box 2.2.4-2 Application Steps of CP Technologies

Step 1: Rapid Scans

Quick scans consist in a rapid review and evaluation of the CP improvement potential of a subject industry. During a short-time visit, the consultant evaluates in which processes of the production line a company has the most potential for economic and environmental improvement through the application of CP and gives a rough estimation of how much these improvements could be.

The idea is to show the industries the benefits it might get from the application of CP, in the hope that the management would then be ready to invest in a full CP assessment.

Step 2: Full CP Assessments

The objective of full CP assessment is to analyze the situation of a subject industry; develop ideas for potential improvements; determine technical and financial feasibility as well as environmental relevance; and develop an action plan for their implementation.

The assessment covers the whole company or focus on selected processes. While the company staff is carrying out the work under the responsibility of a CP team, the consultants visit the company on a regular basis to support the team and ensure that the assessment is progressing according to plan.

The ultimate objective is that the company is able to apply CP on a continuous basis even after the consultants have completed their support. This requires not only the acquisition of specific skills, but also significant changes of attitudes within the company staff and management.

Source: Vietnam Cleaner Production Center, Situation Analysis Paper on Cleaner Production In Vietnam (2005)

(3) Preparation of Tools for Supporting Officers to Assess Wastewater Treatment System On-site

As part of Output 2-3 activities, HPG DONRE decided to enhance capacity to evaluate conditions of wastewater management in field work for inspection and environmental check. For this, HPG DONRE and JET prepared a tool that provides technical information on wastewater characteristics and wastewater treatment systems, for officers in charge of inspection and environmental check in the field. The information in this tool should reflect the needs of officers, and be practical ones. In addition, such information should be easy to refer to. In order to satisfy the requirements mentioned above, HPG DONRE and JET decided to prepare information cards called “Handy Reference Cards” (hereinafter referred to as “Cards”), on which technical information is printed and can be referred to at the site. As compared with technical guidelines, the Cards are expected to have the following advantages:

- One Card is prepared for one topic, so officers can easily find information which they need on-site,
- Depending on the collected information through inspection and environmental check, information in the card can be improved and updated one by one.

The Cards are expected to provide the following information to officers in charge of inspection and environmental check;

- Wastewater characteristics (general and specific characteristics by target industrial sector)
- Wastewater treatment system (general flowchart and specific flowchart of wastewater treatment system)
- Items to be questioned, documents to be reviewed, and visible condition to be checked for evaluating suitability of the wastewater treatment system and its operating conditions
- Recommended record format that can be used on-site

Considering the industrial sectors operated in HPG City, the following industrial sectors were selected as target sectors of the Cards:

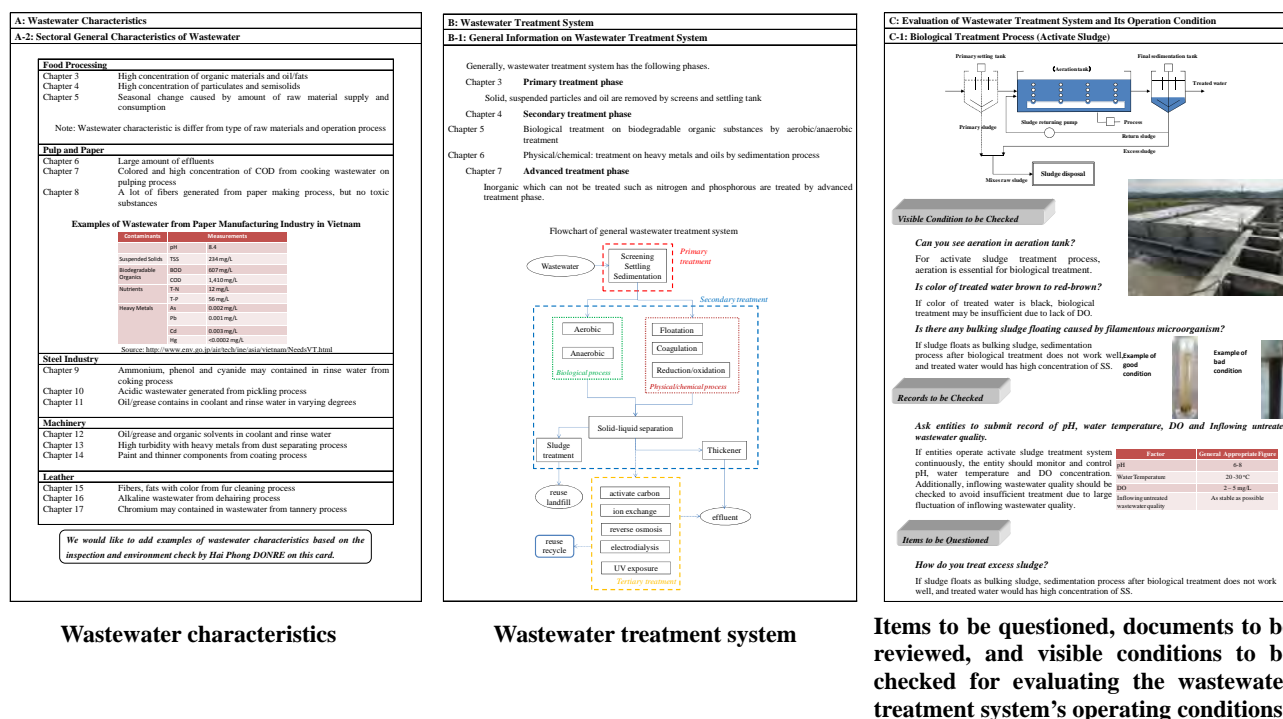
- Food/beverage/animal feed processing
- Paper/paper mill
- Machinery/shipbuilding

- Steel
- Leather
- Textile
- Livestock

Several examples of the Cards are shown as Figure 2.5-4. During the Mid-term Review, Hanoi and TT-HUE DONREs expressed their interest in the Cards, and in the second WS, the contents of the Cards were introduced to HPG, HNI, and TT-HUE DONREs. The following suggestions were collected during the WS:

- Information on production process, and the type and amount of chemicals used in production processes were recommended to be included in the Cards.
- Further study on actual wastewater treatment plant in each industrial sector should be implemented.
- Information on administrative guidance and sanctions were recommended to be included in the Cards.

These suggestions were later incorporated into the design of the Cards. In the final phase of the Project, the main contents of the Cards were reflected in the Handbook for Improving Inspection and Environmental Check Performance.



Source: JET

Figure 2.5-4 Examples of the Handy Reference Cards

2.5.2.7 Activity C3-7: Conduct Training on On-site Inspection

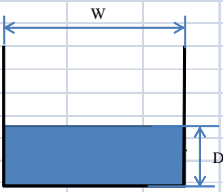
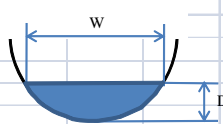
(1) Wastewater Flow Measurement

With the water flow rate meter procured in the Project, as shown in Table 2.5-21, hands-on training on wastewater flow measurement was organized for DONRE except at HNI DONRE. The water flow meter is very simple to use, and so officers of DONREs were able to practice measurement of water flow during the training. By using the reading of the meter and the shape of channel/drainage at the measured point, the officers measured volume of discharged wastewater during on-site work, and then the appropriateness of the figure was examined based on the planned water consumption in EIA or other evidences such as receipt of supplied water usage fee.

Table 2.5-21 Wastewater Flow Measurement

Type	Model	Target Enterprises
Flow meter	Global Water FP211	Sensor type: Turbo-prop propeller with magnetic pickup Measurement range: 0.1–6.1 m/s Length of supporting rod: 1.5–4.5 m

Source: JET

	$A (m^2) = W (m) \times D (m)$		
	W (m)	0.5	input measured value
	D (m)	0.05	
	V (m/s)	0.3	
	Q (m ³ /s)	0.0075	
	Q (m ³ /min)	0.45	
	Q (m ³ /hr)	27	
	Q (m ³ /day)	648	
	$A (m^2) = W (m) \times D (m) \times 0.71$		
	W (m)	0.5	input measured value
	D (m)	0.05	
	V (m/s)	0.3	
	Q (m ³ /s)	0.0053	
	Q (m ³ /min)	0.32	
	Q (m ³ /hr)	19	
	Q (m ³ /day)	460	

Source: JET



Figure 2.5-5 Experience on Wastewater Flow Rate Measurement and Calculation of Wastewater Discharge Amount

(2) Field Measurement by Mobile Water Quality Analyzer

Using the mobile water quality analyzer procured in the Project, as shown in Table 2.5-22, the officers of HPG DONRE, HCMC DONRE, and BRVT DONRE practiced field analysis of wastewater. Even though the mobile water quality analyzer cannot measure concentrations of parameters of wastewater quality standard for which fines are specified, officers were able to learn how on-site measurement can help them inspect conditions of wastewater treatment:

- By measuring pH, electrical conductivity and TDS at wastewater discharge point, the appropriateness of wastewater quality can be roughly evaluated.
- By measuring pH, electrical conductivity and TDS of wastewater before treatment and after treatment, the effectiveness of wastewater treatment system can be examined.
- By measuring DO in activated sludge process, the appropriateness of operations of the process can be examined.

Experiences obtained through OJT have contributed to enhancing capacity on checking the wastewater treatment system during on-site work.

Table 2.5-22 Field Measurement by Mobile Water Quality Analyzer

Type	Model	Target Enterprises
Multiparameter water quality analyzer	Horiba U-52	- pH: 0–14, resolution 0.01 pH - DO: 0–50 mg/L, resolution 0.01 mg/L - EC: 0–10 S/m, resolution 0.1 mS/m - Salinity: 0–70 ppt (‰), resolution 0.1 ppt - TSS: 0–100 g/L, resolution 0.1% of full scale - Temp: -10–55 °C, resolution 0.01 °C - Turbidity: 0–800 NTU, resolution 0.01 NTU - ORP: -2000–+2000 mV, resolution 1 mV

Source: JET



Figure 2.5-6 Experience on Field Measurement by Mobile Water Quality Analyzer

Visual check of Operation Condition of Wastewater Treatment System

Because some enterprises with wastewater treatment systems do not maintain their systems properly, the officers in charge of inspection and environmental check practiced during training how to check the operating conditions of the wastewater treatment system by visual check. Viewpoints adopted through the OJT are shown in Table 2.5-23.



Figure 2.5-7 Visual Check of the Operating Conditions of the Wastewater Treatment System

Table 2.5-23 Checkpoints on Maintenance of Wastewater Treatment Facilities

No	Facilities/Equipment		Checkpoints
1	General	Breakage of tank and attached equipment	Check cracks, deformities, or other damage.
		Separation of wastewater discharge line	Confirm condition of wastewater discharge line (whether industrial wastewater, domestic wastewater, and stormwater are mixed or not).
4	Flocculation tank	Amount of flocculating agent	Not enough aggregating agent may result in insufficient flocculation, whereas too much aggregating agent may disturb aggregation. Adjust equipment to attain an optimal concentration.
		Agitation speed	Too strong or weak stirring does not result in sufficient flocculation. It is necessary to adjust agitation speed.
		Appropriate pH range	Sufficient flocculation does not result if the pH value of the effluent is not adjusted in the range suitable for aggregation.
7	Biological treatment tank	Aeration tank	(1) Check fine flock or small pieces of sludge (in case such were observed, it is considered that treated water contains too little load or too much air).
			(2) Visually check the amount of SS in the treatment tank (in case that large amount of SS was observed, it is considered that treated water contains too much load or too little air).
			(3) Check water color in the treatment tank (if treated water color is brown, activate sludge process is considered to be operated well).
9	Filtration, sludge dewatering equipment	Filtration	(1) Check damage or clogging of filtering media (2) Check whether water level of treated wastewater exceeds the surface of the sand filter or not.

Source: Guideline of Industrial Wastewater Management, JICA, The Project for Enhancing Capacity of VAST in Water Environment Protection Phase II, March 2009.

2.5.3 Achievements

2.5.3.1 Overall Achievements

Table 2.5-24 below summarizes the PDM indicators related to Output 2-4 (inspection), status to be achieved by each organization, and related issues and actions to be taken at the end of the Project.

Table 2.5-24 Statuses of PDM Indicators at the End of Project (WG 2-4: Inspection)

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
2-3-1 The results of the capacity assessment on preparation work, on-site inspection, and follow-up work of inspection show improvement, compared the initial stage of the Project.	<ul style="list-style-type: none"> Through the CA planned in November 2012, the improvement of relevant officers' capacity were to be evaluated. The CA will be implemented considering requirements in several inspection guidelines prepared by MONRE, OECD, US-EPA, and Japan's MOE. The main points for assessment are as follows: <ul style="list-style-type: none"> Preparation work for inspection: More access to relevant information for reference is increased. On-site inspection: Increased capacities on collecting information and checking issues on wastewater management by site survey. Follow-up work of inspection: Full cooperation among different departments/sections of DONRE to ensure that violators follow administrative orders and guidance. 	<ul style="list-style-type: none"> Regarding preparation work, each DONRE had difficulties to get required information as reference for understanding environmental management of target enterprises such as on inspection and environmental check preparation works. Regarding on-site work, many relevant officers requested to improve their knowledge on how to assess wastewater treatment systems and its operating conditions, and for recording found issues in minutes of inspection on-site. Regarding follow-up work, relevant officers requested to improve knowledge on key points for guiding enterprises to improve wastewater management. 	<ul style="list-style-type: none"> On preparation work, each DONRE clarified the necessary information to be reviewed and the section to be contacted. The improvement of relevant capacities through the Project was confirmed as follows by the out-of-five scores in the internal evaluation. Details of the scores of each DONRE are shown in Table 2.5-25. Regarding on-site inspection, HPG DONRE, TT-HUE DONRE, HCMC DONRE and BRVT DONRE have implemented OJTs on: (i) on-site flow measurement, and (ii) visual check of wastewater treatment system and its operating conditions. For HNI DONRE, on-site visual check of wastewater treatment system and its operating conditions was trained using wastewater treatment techniques. Details of the scores of each DONRE are shown in Table 2.5-25. Regarding follow-up work, relevant officers shared knowledge on key points for guiding enterprises to improve wastewater management. The improvement of relevant capacities was confirmed as follows by internal evaluation. Details of the scores of each DONRE are shown in Table 2.5-25. The knowledge and experiences obtained through the Project were reflected on the Handbook for Improving Inspection and Environmental Check Performance so as to share among the officers in charge of inspection and environmental check.
2-3-2 Criteria for selecting primary/crucial pollution sources in each DONRE's inspection plan are clarified.	<ul style="list-style-type: none"> Each DONRE set the criteria for selecting primary/crucial pollution sources. 	<ul style="list-style-type: none"> Before the Project, there had been no document in all DONREs describing the criteria for selection of primary pollution sources on wastewater. 	<ul style="list-style-type: none"> All DONREs have identified the criteria on selecting primary/crucial pollution sources through the preparation of the inspection plan for 2012. Each DONRE is examining what actions are needed in selecting the primary/crucial pollution sources in the post project phase using the criteria developed. The required actions were documented by each DONRE. HNI DONRE, HPG DONRE, TT-HUE DONRE, and BRVT DONRE prepared the inspection plan for 2013.
2-3-3 Number of officers who have capacities for on-site inspection, such as field measurement and wastewater treatment facility checking, is increased.	<ul style="list-style-type: none"> The training records show an increase in the number of officers with knowledge on checking the conditions of wastewater treatment facilities on-site, and on field work. 	<ul style="list-style-type: none"> Based on the results of initial CA, the following should be improved: <ul style="list-style-type: none"> Capacity and knowledge to measure wastewater flow Knowledge on wastewater quality measurement on-site 	<ul style="list-style-type: none"> HPG DONRE, TT-HUE DONRE, HCMC DONRE and BRVT DONRE have implemented OJT, and gained experiences on checking wastewater treatment facilities, and implementing field work such as water flow measurement and field analysis. The number of participants and period of the OJT in each DONRE are shown in Table 2.5-25. The knowledge and experiences obtained by the Project were reflected in the Handbook for Improving Inspection and Environmental Check Performance so as to be shared among the officers in charge of inspection and environmental check.
2-3-4 Number of officers who have capacities to assess situation of wastewater management of polluting industries and make recommendations for improvement from perspectives of giving administrative order and administrative guidance, is increased.	<ul style="list-style-type: none"> The training records show an increase in the number of officers with capacities to assess situation of wastewater management, and prepare recommendations for improvement from the perspectives of giving administrative orders and administrative guidance. 	<ul style="list-style-type: none"> Each DONRE requested to improve their knowledge on appropriate diagram of wastewater treatment system by main industrial sectors, and key factors on operating wastewater treatment systems under suitable conditions. CP technique was relatively a new concept on reducing the impacts of wastewater to relevant officers; therefore, knowledge on such was expected to enhance. 	<ul style="list-style-type: none"> In each DONRE, a workshop on how to assess wastewater treatment facility was organized in November 2011 and in February 2012. Also, a series of training on wastewater treatment and CP techniques were implemented on the seafood processing industry, textile and dyeing industry, and paper industry in October 2012 and in January 2013. The numbers of the total participants in these workshops and training activities in each DONRE are shown in Table 2.5-25. The answers to the questionnaire distributed after the training on wastewater treatment and CP techniques showed improvement of participants' knowledge on wastewater treatment and CP technique in the following sectors: <ul style="list-style-type: none"> Wastewater treatment and CP technique on seafood processing industry Wastewater treatment and CP technique on textile and dyeing industry Wastewater treatment and CP technique on paper industry The knowledge and experiences obtained through the Project were reflected in the Handbook for Improving Inspection and Environmental Check Performance so as to be shared among the officers in charge of inspection and environmental check.

Source: JET

2.5.3.2 Achievements by Each Organization

Table 2.5-25 summarizes the status of achievement of PDM indicators by each organization related to the activities of WG 2-4 (inspection) at the end of the Project.

Table 2.5-25 Status of Achievement of Indicators by Each Organization at the End of the Project

DONRE	Indicators	Timing of Completion	Status at the End of the Project
HNI	Indicator 2-3-1	Completed in March 2013	<ul style="list-style-type: none"> On preparation work, DONRE clarified the necessary information to be reviewed and the section to be contacted. Regarding the collection of relevant information, DONRE used the supplemental data collection form. The out-of-five score in the internal evaluation has increased from 3.5 to 4.5 in CA2-3-1 (1) in Figure 2.5-8. On on-site inspection, on-site visual checking of wastewater treatment systems and their operating conditions was trained through the training on wastewater treatment techniques. The out-of-five score in the internal evaluation has increased from 3.5 to 4.5 in CA2-3-1 (2) in Figure 2.5-8. On follow-up work, C/Ps shared knowledge on key points on guiding enterprises to improve wastewater management. The out-of-five score in the internal evaluation has increased from 3.5 to 4.5 in CA2-3-1 (3) in Figure 2.5-8.
	Indicator 2-3-2	Completed in March 2013	<ul style="list-style-type: none"> Through the Project, a document for selecting primary/crucial pollution sources was prepared for the water environmental management field.
	Indicator 2-3-3	Completed in March 2013	<ul style="list-style-type: none"> DONRE implemented OJT, and have gained experiences on checking wastewater treatment facilities, and implementing field work, such as water flow measurement and field analysis, through lectures. Five officers from the Inspection Department participated in the OJT in September 2012. Additionally, four officers from the Inspection Department participated in the training on wastewater and CP techniques, and they have been trained on on-site work techniques in November 2012 and January 2013. There are ten environmental inspectors in DONRE, and more than half of them have been trained in the Project.
	Indicator 2-3-4	Completed in March 2013	<ul style="list-style-type: none"> In November 2011, HNI DONRE held a WS on how to assess wastewater treatment facilities. Also, a series of training activities on wastewater treatment and CP technique was carried out in November 2012 and in January 2013 on the textile and dyeing industry and the paper industry. There were a total of 20 participants in these training activities. There are ten environmental inspectors in HNI DORE, and more than half of them have been trained in the Project.
HPG	Indicator 2-3-1	Completed in March 2013	<ul style="list-style-type: none"> On preparation work, DONRE clarified the necessary information to be reviewed and the section to be contacted. Regarding the collection of relevant information, DONREs used PSI in the Red River, and the supplemental data collection form. The out-of-five score in the internal evaluation has increased from 3.3 to 4.8 in CA2-3-1 (1) in Figure 2.5-8. On on-site inspection, DONRE has implemented OJTs on: (i) on-site flow measurement, and (ii) visual checking of wastewater treatment systems and their operating conditions. The out-of-five score in the internal evaluation has increased from 3.3 to 4.3 in CA2-3-1 (2) in Figure 2.5-8. On follow-up work, C/Ps shared knowledge on key points on guiding enterprises to improve wastewater management. The out-of-five score in the internal evaluation has increased from 3.5 to 4.5 in CA2-3-1 (3) in Figure 2.5-8.
	Indicator 2-3-2	Completed in March 2013	<ul style="list-style-type: none"> A document for selecting primary/crucial pollution sources was prepared for the water environmental management field.
	Indicator 2-3-3	Completed in March 2013	<ul style="list-style-type: none"> DONRE implemented OJT, and have gained experiences on checking wastewater treatment facilities, and implementing field work, such as water flow measurement and field analysis. Fourteen officers from the Inspection Department and HACEM participated in the OJT in August and September 2012. There are 11 environmental inspectors in DONRE, and most of them have been trained in the Project.
	Indicator 2-3-4	Completed in March 2013	<ul style="list-style-type: none"> DONRE prepared Handy Reference Cards as a material to assist in assessing situations on wastewater management. The main information on the cards would be widely available in the Handbook for Improving Inspection and Environmental Check Performance. In February 2012, DONRE held a WS on how to assess wastewater treatment facilities. Also, a series of training activities on wastewater treatment and CP technique was carried out in November 2012 and January 2013 on the textile and dyeing industry and the paper industry. There were a total of 35 participants in these training activities. There are 11 environmental inspectors in DONRE, and most of them have been trained in the Project.
TT-HUE	Indicator 2-3-1	Completed in March 2013	<ul style="list-style-type: none"> On preparation work, DONRE clarified the necessary information to be reviewed, and the section to be contacted. Regarding the collection of relevant information, DONRE used the supplemental data collection form. The out-of-five score in the internal evaluation has increased from 3.5 to 4.8 in CA2-3-1 (1) in Figure 2.5-8. On on-site inspection, DONRE has implemented OJTs on: (i) on-site flow measurement, and (ii) visual checking of wastewater treatment systems and their operating conditions. The out-of-five score in the internal evaluation has increased from 4.0 to 4.8 in CA2-3-1 (2) in Figure 2.5-8. On follow-up work, C/Ps shared knowledge on key points on guiding enterprises to improve wastewater management. The out-of-five score in the internal evaluation has increased from 3.0 to 4.0 in CA2-3-1 (3) in Figure 2.5-8.
	Indicator 2-3-2	Completed in March 2013	<ul style="list-style-type: none"> Through the Project, a document for selecting primary/crucial pollution sources was prepared for the water environmental management field.
	Indicator 2-3-3	Completed in March 2013	<ul style="list-style-type: none"> TT-HUE has implemented OJT, and have gained experiences on checking wastewater treatment facilities, and implementing field work, such as water flow measurement and field analysis. Sixteen officers from the Inspection Department, EPA, and DWRM participated in the OJT in September 2012. There are three environmental inspectors in DONRE, and all of them have been trained in the Project.

DONRE	Indicators	Timing of Completion	Status at the End of the Project
	Indicator 2-3-4	Completed in March 2013	<ul style="list-style-type: none"> In December 2011, DONRE held a WS on how to assess wastewater treatment facilities. Also, a series of training activities on wastewater treatment and CP technique was carried out in November 2012 and January 2013 on the textile and dyeing industry and the paper industry. There were a total of 20 participants in these training activities. There are three environmental inspectors in DONRE, and most of them have been trained in the Project.
HCMC	Indicator 2-3-1	Completed in March 2013	<ul style="list-style-type: none"> On preparation work, DONRE clarified the necessary information to be reviewed, and the section to be contacted. Regarding collection of relevant information, DONRE used the PSI in the Tan Quy Industrial Cluster. The out-of-five score in the internal evaluation has increased from 4.0 to 5.08 in CA2-3-1 (1) in Figure 2.5-8. On on-site inspection, DONRE has implemented OJTs on: (i) on-site flow measurement, and (ii) visual checking of wastewater treatment systems and their operating condition. The out-of-five score in the internal evaluation has increased from 4.0 to 5.08 in CA2-3-1 (2) in Figure 2.5-8. On follow-up work, relevant officers shared knowledge on key points on guiding enterprises to improve wastewater management. HCMC DONRE selected the enterprises to be rechecked from the viewpoints of wastewater management, and they have implemented follow-up inspection. The out-of-five score in the internal evaluation has increased from 3.0 to 4.58 in CA2-3-1 (3) in Figure 2.5-8.
	Indicator 2-3-2	Completed in March 2013	<ul style="list-style-type: none"> Through the Project, a document for selecting primary/crucial pollution sources was prepared for the water environment management field.
	Indicator 2-3-3	Completed in March 2013	<ul style="list-style-type: none"> DONRE implemented OJT, and have gained experiences on checking wastewater treatment facilities, and implementing field work, such as water flow measurement and field analysis. Eight officers from the Inspection Department, EPA, and CEMA participated in the OJT in June, August, and September 2012. There are 11 environmental inspectors in DONRE, and more than half of them have been trained in the Project. DONRE had requested to conduct trainings on wastewater sampling and QC on sample analysis by subcontractor. The training was carried out in November 2012.
	Indicator 2-3-4	Completed in March 2013	<ul style="list-style-type: none"> In January 2012, DONRE held a WS on how to assess wastewater treatment facilities. Also, a series of training activities on wastewater treatment and CP technique was implemented in November 2012 and January 2013 on the textile and dyeing industry and the paper industry. There were a total of 18 participants in these training activities. There are 11 environmental inspectors in HCMC DONRE, and more than half of them have been trained in the Project.
BRVT	Indicator 2-3-1	Completed in March 2013	<ul style="list-style-type: none"> On preparation work, DONRE clarified the necessary information to be reviewed, and the section to be contacted. Regarding collection of relevant information, DONRE acquired information from the Environmental Police Department. The out-of-five score in the internal evaluation has increased from 3.0 to 4.08 in CA2-3-1 (1) in Figure 2.5-8. On on-site inspection, DONRE has implemented OJTs on: (i) on-site flow measurement, and (ii) visual checking of wastewater treatment systems and their operating conditions. The out-of-five score in the internal evaluation has increased from 3.0 to 4.08 in CA2-3-1 (2) in Figure 2.5-8. On follow-up work, C/Ps shared knowledge on key points on guiding enterprises to improve wastewater management. The out-of-five score in the internal evaluation has increased from 3.0 to 4.08 in CA2-3-1 (3) in Figure 2.5-8.
	Indicator 2-3-2	Completed in March 2013	<ul style="list-style-type: none"> Through the Project, a document on selecting primary/crucial pollution sources was prepared for the water environment management field.
	Indicator 2-3-3	Completed in March 2013	<ul style="list-style-type: none"> DONRE has implemented OJT, and have gained experiences on checking wastewater treatment facilities, and implementing field work, such as water flow measurement and field analysis. Four officers from the Inspection Department, DWRM, and CEMAB participated in the OJT in June 2012. There are two environmental inspectors in DONRE, and both of them have been trained in the Project. DONRE had requested training on using weir for wastewater flow measurement. The training was carried out in November 2012.
	Indicator 2-3-4	Completed in March 2013	<ul style="list-style-type: none"> In February 2011, DONRE held a WS on how to assess wastewater treatment facilities. Also, a series of training activities on wastewater treatment and CP technique was implemented in October 2012 and January 2013 on the seafood processing industry, the textile and dyeing industry, and the paper industry. There were a total of 42 participants in these training activities. There are two environmental inspectors in DONRE, and both of them have been trained in the Project.

Source: JET

2.5.3.3 Capacity Assessment

(1) Results of Internal Evaluation

Based on the results of internal evaluation conducted in January 2013, Figure 2.5-8 shows the questions related to each objectively verifiable indicator of PDM and the average scores of the five level, semi-quantitative self-evaluation for the pollution source inspection component (Output 2-3) marked by all DONREs. Before starting the Project, all of these capacities were evaluated as between “little” and “good”. As of January 2013, they were evaluated as between “satisfactory” and “very good”, indicating that the Project has contributed to improving DONREs’ capacities on inspection and environmental check.

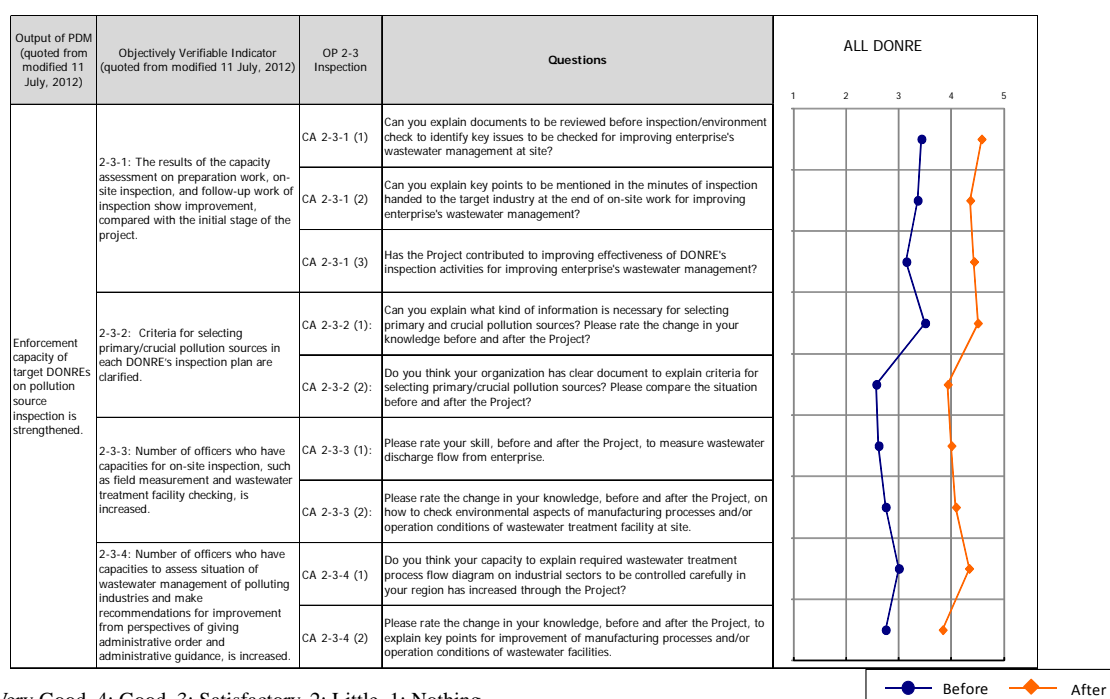


Figure 2.5-8 Overall Results of the Questionnaire for Output 2-3 (Average of All DONREs)

(2) Capacity Development at the End of the Project

1) Indicator 2-3-1: Capacity on Preparation, On-site Work and Follow-up of Inspection and Environmental Check

Considering the answers on CA 2-3-1 (1) to (3), it is considered that the Project has contributed to enhancing individual capacity of officers who carry out preparation, on-site, and follow-up work of inspection and environmental check activities.

Regarding preparation work, one of the activities focused on was the review of existing documents on target enterprises. Some of the key C/Ps described that even before the Project, they had regularly conducted review work, but there are a large number of relevant regulations, and the information for checking seemed substantial. Thus, the review of required information had not been so easy. In addition, they did not follow any specific procedure, thus they may have overlooked important information. The Project contributed in clarifying which points need to be reviewed carefully and which documents need to be checked.

Regarding on-site work, the C/Ps' evaluations have revealed that the Project has helped them gain knowledge on wastewater management. Accordingly, such knowledge assisted them in collecting required information on wastewater management, and in writing minutes of inspection including issues to be pointed out in the wastewater management field.

Regarding follow-up work, the Project has enhanced understanding on how to guide enterprises to improve their wastewater management. Especially, the training on wastewater treatment techniques and CP processes for the paper, textile and dyeing, and seafood processing industries has imparted knowledge on how to instruct enterprises in improving wastewater management during DONRE's inspection and environmental check.

In the post-project phase, it is expected that DONRE officers in charge of inspection and environmental check would share the knowledge and experience obtained through the Project in order to enhance their organizational capacity on inspection and environmental check. The knowledge imparted to the officers who participated in the Project have been recorded in the outputs of the Project, such as the Handbook For Improving Inspection and Environmental Check Performance or

the Handy Reference Cards, which describe wastewater treatment processes for different main industrial sectors, as proposed by HPG DONRE. These are expected to be utilized in the post-project phase as tools to share knowledge and experiences obtained through the Project.

2) Indicator 2-3-2: Criteria for Selecting Primary/Crucial Pollution Sources

Through the Project activity of identifying important data and information for the selection of industries to be inspected or checked, DONRE officers deepened their understanding of necessary information on selecting primary/crucial pollution sources. The answers to CA 2-3-2 (1) showed the officers' recognition of this improvement. Also the fact that all DONREs have prepared a document on selection criteria was considered a significant enhancement of DONREs' organizational capacity because the document would help DONREs make clear, less arbitrary decisions in selecting industries to be inspected or checked. This was evident in the answers to CA 2-3-2 (2). In the post-project phase, it is expected that each DONRE would share the prepared criteria among relevant sections for preparing the annual inspection/environmental check plan in identifying primary/crucial pollution sources in the water environment management field.

3) Indicator 2-3-3: Skills and Knowledge for On-site Work

Checking of wastewater discharge volume is an important issue in inspection and environmental check as enterprises' lack awareness and capability of wastewater flow measurement. In the Project, in order to improve such condition, wastewater flow measurement equipment were procured, and officers were given training. All DONREs evaluated that their capacity on wastewater flow measurement have improved through the Project based on the answers to CA 2-3-3 (1). BRVT DONRE was highly interested in setting criteria for wastewater volume measurement using a weir, therefore a lecture was provided for such. Through these activities, it was considered that DONRE's capacity to obtain reliable figures of wastewater flow was enhanced. It would contribute in enhancing DONRE's enforcement of wastewater management by enterprise through inspection and environmental check.

Regarding capacity to check environmental aspects of manufacturing processes and wastewater treatment facilities, the Project provided a series of training activities on wastewater treatment and CP techniques on the paper, textile and dyeing, and seafood industries, and joint activities during on-site work of inspection. Through these activities, all DONRE officers that participated in the Project replied that they have improved their capacity, as is evident from the answers to CA 2-3-3 (2).

It can be concluded that the Project has effectively improved the capacities of individual officers to carry out field work during inspection and environmental check. In the post-project phase, it is expected that the experiences of officers would lead to the overall improvement of organizational capacities. For this, DONRE was urged to implement regular training programs for their field officers. The officers who have participated in the Project can be trainers and cooperate with external experts as necessary.

4) Indicator 2-3-4: Capacity for Assessing Enterprise Wastewater Management System

The training on wastewater treatment and CP techniques on the paper, textile and dyeing, and seafood industries has contributed to enhancing officers' knowledge to instruct industries on how to improve wastewater management. Some of the key C/Ps confessed that before the Project their knowledge on wastewater treatment process had been basic. They knew the general differences among "primary, secondary, and tertiary treatment", but they had not been able to identify necessary processes, which differs depending on the type of industry. The Project has contributed to enhancing such knowledge on specific wastewater treatment processes, and it is expected that such knowledge would assist the officers to provide, during inspection and environmental check, detailed instructions to enterprises on improving wastewater management. The answers to CA 2-3-4 (1) and 2-3-4 (2) show the improvement of individual capacities on this matter. Especially, CP is a relatively new topic for many officers participating in the training, and effectiveness of raising the awareness about this topic was high.

It was noted that some C/Ps expressed the need for further training on wastewater treatment and CP techniques in the post-project phase, such as more detailed practical training on-site or training on sectors other than the ones dealt with in this Project. Regarding such matters, each DONRE was urged to prepare training programs, and hold trainings, considering the level of capacity of relevant officers, and regional characteristics of industrial activities and pollution issues in the area. JET will provide examples of training programs, and training items to be covered in such training in the post-project phase.

In the post-project phase, it is also expected that the organizational capacities for assessing enterprises' wastewater management systems would further improve. The implementation of training programs by DONRE themselves is one of the ideas to enhance their organizational capacity. The chief inspector of HCMC DONRE recommended that the organization would provide opportunities to relevant officers for their improvement of knowledge on manufacturing processes and wastewater treatment facilities. It was considered that OJT aimed at transferring knowledge from well-experienced officers to new officers would be a potential way to help officers improve their capacity within the organization. The officers who have participated in the Project were strongly encouraged to become trainers in OJT of new officers in the post-project phase.

2.5.3.4 Recommendations for Post Project Activities

(1) Utilization of the Handbook for Improving Inspection and Environmental Check Performance for Sharing Knowledge and Experience Acquired from the Project

The lessons and recommendations based on the OJT on inspection and environmental check were reflected in the Handbook for Improving Inspection and Environmental Check Performance. The handbook also includes key points for assessing appropriateness of wastewater treatment systems and their operating conditions. Therefore, it is recommended for DONRE to use the handbook to share knowledge and experience acquired from the Project among relevant officers related to inspection and environmental check in the post-project phase. MONRE can refer to the handbook should MONRE plan to revise the Environmental Specialized Inspection Manual in the future.

(2) Sharing Criteria for Selecting Primary/Crucial Pollution Sources with Relevant Section for Preparing Annual Inspection Plan

Even before the Project, each DONRE had its own criteria for selecting primary/crucial pollution sources, but the criteria had not been documented clearly. Under the Project, the criteria was reviewed, and documented in each DONRE. When each DONRE prepares an annual inspection plan, the Inspection Department requests the concerned sections to select targets to be inspected. In this process, the documented criteria can be used to have consensus among concerned sections on what pollution sources are given priority for inspection in the water environment management field. Thus, it was recommended to share such documented criteria for selecting primary/crucial pollution sources.

(3) Timing of Joint Preparation Work Related to Inspection/Environment Check

Currently, relevant sections joining inspection/environmental check have a preparation meeting before on-site work. However, such meeting is held after issuing the decision on inspection/environmental check, and the time for reviewing relevant information is limited. Because activities in the preparation phase largely determine the success/failure of inspection work, the whole process of the preparation work has to be streamlined, such as concentrating collection of primary information identified by the Project, previous announcement of collecting information to relevant sections, and stylizing of check items in preparation work.

(4) Utilization of Information Obtained by Inspection for Water Environmental Management

The main objectives of inspection are to evaluate compliance by Project proponents on orders prescribed by relevant laws and regulations, and give administrative guidance and sanctions on illegal cases. However, DONRE obtains information on the latest status of wastewater management and environmental compliance by enterprises through inspection, and such information can be used not only for the main objective of inspection but also for planning and evaluating administrative measures for water environmental management. In order to utilize information obtained by inspection for water environmental management, the following points should be considered:

- Currently, a regular summary report of inspection only includes the number of inspections implemented, the number of administrative sanctions given, and the amount of penalty fees given. In order to utilize information obtained through inspection for water environment management, it was expected that information on the latest status of wastewater management would also be included in the report, and
- Information obtained through inspection should be reflected into the PSI so as to improve and update the information stored in such.

(5) Holding Further Trainings on How to Assess Wastewater Treatment System in the Post-Project Phase

As mentioned in Section 2.5.3.3 Capacity Assessment, it was expected that organizational capacities for assessing enterprises' wastewater management systems would improve further in the post-project phase. In order to realize such improvement, it was recommended for DONREs to hold practical training on how to assess wastewater treatment systems. In the planning of training by DONREs, the following should be considered:

- The programs on technical training on wastewater treatment and CP techniques implemented in the Project can be referred to,
- Several training programs should be prepared considering the different levels of knowledge of each officer,
- Industrial sectors other than the ones dealt with in the Project should be focused on,
- DONRE can cooperate with local experts in the Project to carry out training, and
- The officers trained in the Project are expected to be the core members in the planning of training.

2.6 Output 3 (WG 3): Water Pollution Control Measures

2.6.1 Introduction

2.6.1.1 Background

In Vietnam, environmental protection measures against wastewater often have flaws. For example, effluent standards of industrial wastewater have been set in QCVNs and all industrial business owners have the responsibilities for treating wastewater appropriately to meet the national effluent standards before discharging it to the public water courses. However, many business owners fail to comply with the standards at the moment. Untreated wastewater being discharged has been causing pollution in the water environment. Appropriate administrative responses are required to address causes for such noncompliances.

Regarding the government's administrative management, MONRE has set up a series of environmental management instruments such as EIA system, designation of serious pollution facilities, wastewater fee system, etc., under the amended Law on Environmental Protection, to implement national policies and programs for environmental management. Meanwhile, DONRE, the lead agency of water pollution control in the locality, has the responsibility for supervising environment protection measures to be undertaken by business owners. It has been in the frontline in enforcing administrative management against pollution sources. While DONRE has diverse management systems for water pollution control, it is assessed that they are not functioning well or their impacts are still marginal as of now. This implies that water pollution control enforced by DONRE needs to be improved further for the preservation and betterment of water environment.

According to PDM, the objective of Output 3 is that "DONRE's capacity of making effective water pollution control measures is strengthened", and this objective is to be attained through an actual plan formulation in improving water pollution control. Along this objective and approach, the Outline of Improvement Plan for Water Pollution Control in Hanoi City (hereinafter called the Improvement Plan) has been drafted through a series of activities. These activities of Output 3 include review of existing environment management tools, examination of the amendment of policies, investigation of environment protection measures at pollution sites, and so forth.

In light of the urgent response to industrial pollution in Hanoi City, the Improvement Plan is dedicated to the strengthening of water pollution control, especially focusing on industrial wastewater discharged by manufacturing industries. To this end, Tu Liem and Ha Dong districts are chosen as model areas subject to precise site survey for data collection.

2.6.1.2 PDM and PO

Table 2.6-1 shows the items related to water pollution control measures (Output 3) in the revised and final PDM and PO.

Table 2.6-1 Output, Indicators, and Activities Related to Output 3 in PDM and PO

Item	Contents
Output	Target DONRE's capacity of making effective water pollution control measures is strengthened.
Objectively Verifiable Indicators	3-1 A working group that works specifically on studying and making water pollution control measures are established and continued its activities, holding 10 times periodical meetings during the project period with more than 70% attendance rate. 3-2 Progress status of Output 3 is reported to the Director of DONRE every 6 months. 3-3 The draft outline for effective water pollution control measures is submitted to PPC through Director of DONRE.
Activities	3-1 Evaluate the enforcement performances of target DONREs on water pollution control, including the various systems implemented in the past, and organize issues for improvement. 3-2 Select target province(s) where the activities 3-3 and 3-4 would be conducted, after reviewing the feasibility of application of the draft amendment prepared in 1-5. 3-3 Specify target regions and/or industries for application of the effective water pollution control measures. 3-4 Draft an outline for effective water pollution control measures.

Source: JET

2.6.1.3 Initial Capacity Assessment

(1) Major Roles of Constituent Units of WG-3

The WG-3 comprised representative members coming from Hanoi EPA, Division of Inspection, Division of Water Resources and Meteorology-Hydrology Management (DWRM) and district DONREs (Tu Liem and Ha Dong). Each unit has different management tasks in their regular duties, and therefore, it is expected for them to play different roles in WG-3 and to acquire different abilities, as shown in Table 2.6-2. Hanoi EPA has been working for a number of environment management tasks and is a lead unit of water pollution control.

Table 2.6-2 Management Tasks and Roles of Constituent Units of WG-3

Constituent Units	Management Tasks in Regular Duties	Major Roles in WG-3 Activities
1. Hanoi EPA	1. Environmental authorization (EIA, EPP), 2. Environmental check, 3. Serious pollution facilities, 4. IWW fee, and 5. Others	- To lead in drafting and proposing of water pollution control measures with the integrated pollution control approach, in support of other units. - To examine and propose the improvement of management tools (Environmental authorization, environmental check, serious pollution facilities, IWW fees and others.
2. Division of Inspection	Environmental inspection (including administrative sanctions)	- To examine and propose the improvement of environmental inspection, focusing on the effect to environmental management) - To support Hanoi EPA in drafting water pollution control measures.
3. DWRM	Wastewater Discharge License	- To examine and propose the improvement of WW Discharge License. - To support Hanoi EPA in drafting water pollution control measures.

Source: JET

(2) Initial Capacity Assessment (CA)

In the beginning stage of the Project, WG-3 has conducted self-assessment (by WG-3 members) on the capacity of enforcing environment management task to clarify the status of capacity before the Project. Series of questionnaires have been prepared by JET and the answer sheets filled in by WG-3 members were collected. Table 2.6-3 shows the summary results of the self-assessment on the capacities for enforcing environment management tasks.

Table 2.6-3 Overall Result of Self-Capacity Assessment on Environment Management Tasks

Management Tasks	Unit in Charge	Number of Person Subject to Assessment	Overall Effectiveness
Environmental Authorization	Hanoi EPA	3	3.3
Environmental Check	Hanoi EPA	3	3.7
Industrial Wastewater Fee	Hanoi EPA	3	2.7
Integrated Water Pollution Control Measure	Hanoi EPA	3	3.7
Wastewater Discharge License	DWRM	3	3.7
Environmental Inspection	Inspectorate	3	5.0

Note: The overall effectiveness is evaluated by using a ranking system, namely: 5: Very Good, 4: Good, 3: Satisfactory, 2: A little, 1: Not at all.

Source: JET

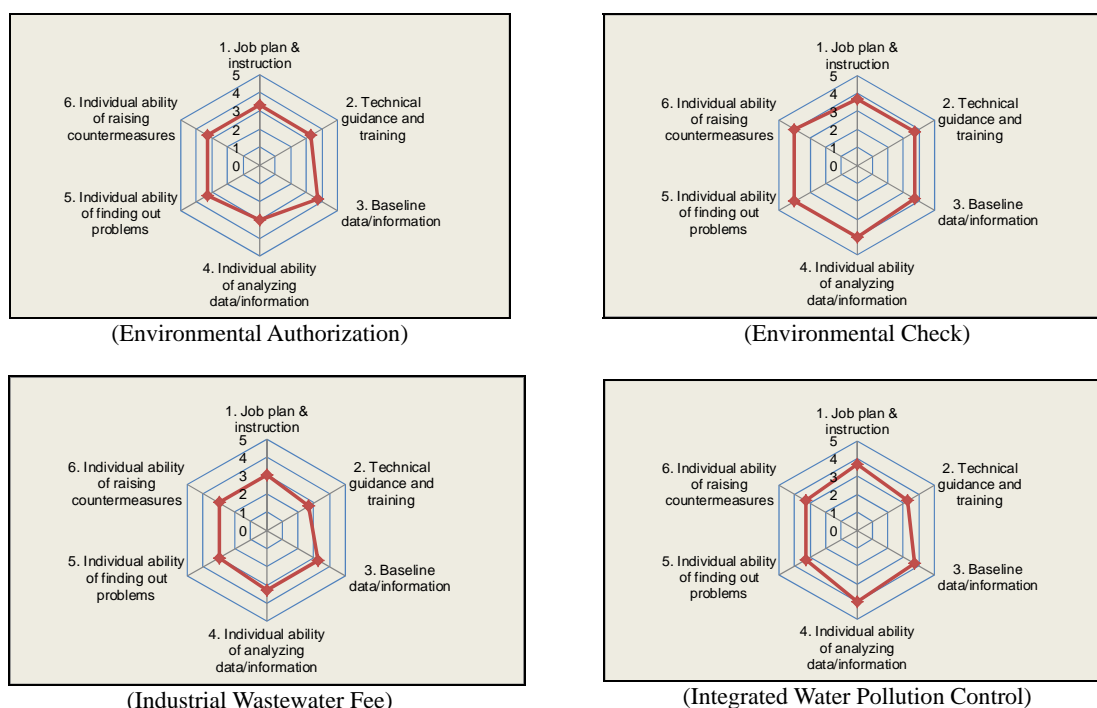
In this assessment, the capacities related to respective management tasks were evaluated based on the elements at individual and organizational levels, as follows:

- Organizational elements
 - Job plan and instruction;
 - Technical guidance and training; and
 - Baseline data/information.

- Individual elements
 - Individual ability of analyzing data/information;
 - Individual ability of finding out problems; and
 - Individual ability of raising countermeasures.

The assessment results of units concerned are shown in Figure 2.6-1 (1/2 and 2/2).

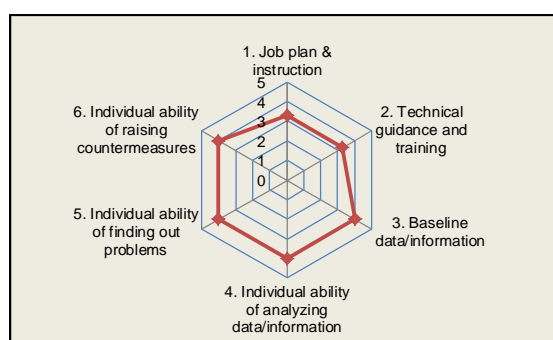
HNI EPA



Source: JET using data from the Vietnamese side

Figure 2.6-1 Capacity Assessment Result (1/2) (HNI EPA)

DWRM



Source: JET using data from the Vietnamese side

Figure 2.6-1 Capacity Assessment Result (2/2) (Wastewater Discharge License)

2.6.1.4 Capacity Development (CD) Plan

The final objective of the capacity development in Output 3 is the strengthening of DONRE's capacity of making effective water pollution control measures. This objective is to be achieved at the end of the Project, by way of the phased approach from Phase I to Phase IV along the timeline of Output 3, as shown in Figure 2.6-2.

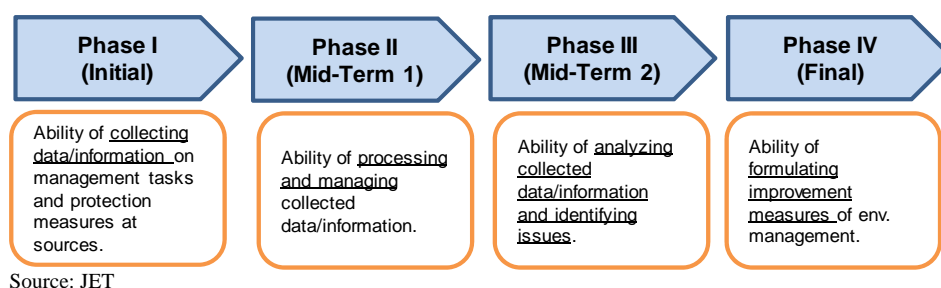


Figure 2.6-2 Approach of Capacity Development

The phased capacity development plan is developed to attain the final objective, as shown in Table 2.6-4.

Table 2.6-4 Capacity Development Plan for Output 3

Phases Items	Phase I (Initial)	Phase II (Mid-term 1)	Phase III (Mid-term 2)	Phase IV (Final)
CD Objectives	To enhance the ability of collecting data/information on environment management and environment protection measures at sources.	To enhance the ability of processing and managing collected environment management data/information.	To enhance the ability of analyzing collected data/information and identifying issues.	To enhance the ability of formulating improvement measures of environment management.
Work Contents	1) Discuss the work plan and set up the working group 2) Discuss the model area and target industries 3) Prepare the questionnaire for Hanoi City and collect data/information to answer it. 4) Prepare the pollution source table (PST) form and collect data/information available in Hanoi EPA to make PST 5) The 1 st site survey on the existing environment protection measures at site and management tasks (for about 30 industrial entities)	1) Process and manage collected data/information for Hanoi City 2) Formulate the PST for the model area 3) Process and manage data /information collected in the 1 st site survey	1) Identify issues in environment management in Hanoi City 2) Analyze the PST and discuss the improvement and mobilization of management tools 3) The 2 nd site survey for verifying improvement and mobilization of management tools (for about 10 industrial entities) 4) Estimate the effect of pollution load reduction by the improvement and mobilization of management tools	1) Formulate the improvement and mobilization of management tools 2) Draft the outline of water pollution control measures 3) Gain the approval of the draft outline from Hanoi DONRE 4) Evaluate the entities' performance with industrial wastewater management rating (IWMR).
Expected outputs	Discussion note on the results of processing and analyzing collected data, including issues to be solved	Survey result notes, including issues to be solved.	Discussion note on the effect caused by pollution load reduction in industrial entities.	Final report on the outline of effective water pollution control measures.
Facilitator	JET	JET	JET	JET
Target Group	Members of WG-3 and associated members	Members of WG-3 and associated members	Members of WG-3 and associated members	Members of WG-3 and associated members
CD activity	Joint working between VN-C/Ps and JET	Joint working between VN-C/Ps and JET	Joint working between VN-C/Ps and JET	Joint working between VN-C/Ps and JET
Period	Between April 2011 and August 2012	Between October 2011 and October 2012	Between April 2012 and November 2012	Between August 2012 and April 2013

Source: JET

2.6.1.5 Preparation of the Work Plans (WPs)

The WP of Output 3 is discussed in WG-3 and is enumerated below.

(1) Objectives and Definitions of Output 3

Terms and definitions to be used in Output 3 are discussed and confirmed as follows:

- What is the objective of Output 3? To strengthen DONRE's capacity of making effective water pollution control measures.
- What is the final product of Output 3? To develop the Outline of Improvement Plan for Water

- What is Water Pollution Control? Pollution Control in Hanoi City.
Administrative management activities undertaken by HNI DONRE to prevent water pollution by means of different environmental management systems.
- What is the Model Area? Administrative area subject to precise site survey to study the water pollution control measures in Hanoi City (Tu Liem District and Ha Dong District).

(2) Overall Activities for Output 3

The WP of Output 3 was formulated over the project period between April 2011 and March 2013, including a series of specific activities as tabulated in Table 2.6-5.

Table 2.6-5 Specific Activities for Output 3

Activities (Activity Number)	Work Contents	Period
1. Performance Assessment and Issues Identification in Hanoi City (3-1)	The effect of current water pollution control is assessed, by clarifying problems and constraints of environment protection measures at sources and management tasks by DONRE.	April 2011–June 2011
2. Confirming Project Province (3-2)	Subject province is defined.	June 2011
3. Specifying the Model Area and Industrial Groups (3-3)	The model area and target industrial groups are specified.	July–August 2011
4 to 7. Drafting Outline of Improvement Plan for Water Pollution Control (3-4)	The outline of water pollution control for the model area is drafted through the following series of activities.	September 2011–April 2013
4. Clarification of Situation in Industrial Wastewater Measures (3-4-1)	The existing situations related to water pollution control and industrial wastewater measures in the model area are surveyed and clarified, by way of: 1. Preparation of pollution source database (PSD) and pollution source table (PST) (3-4-1A) 2. Survey on industrial entities (first site survey, 3-4-1B) 3. Additional survey on industrial wastewater measures (additional site survey, 3-4-1C)	September 2011–October 2012
5. Identification of Issues to be Solved, including Assessment of Compliance and Pollution Loads (3-4-2)	Issues in water pollution control and industrial wastewater measures which should be solved are identified.	May 2012–October 2013
6. Examination and Drafting Improvement Plan (3-4-3)	The strengthening of water pollution control is examined by the following steps: 1. Discussion of strengthening of environment management tools (3-4-3A), including: a. Improvement of existing management tools, b. New introduction of management policy and tools to be proposed in Output 2, and c. Application of industrial wastewater compliance rating (IWCR). 2. Examination and verification of strengthened water pollution control (second site survey, 3-4-3B) 3. Estimation on the effect of pollution load reduction (3-4-3C) 4. Drafting the outline of effective water pollution control measures (3-4-3D) 5. Holding a sector seminar for industrial wastewater management (3-4-3E)	October 2012–April 2013

Source: JET

Among the activities of Output 3, WG-3 has carried out site surveys (thrice in total) in the model area to clarify the situations of industrial wastewater measures by entities.

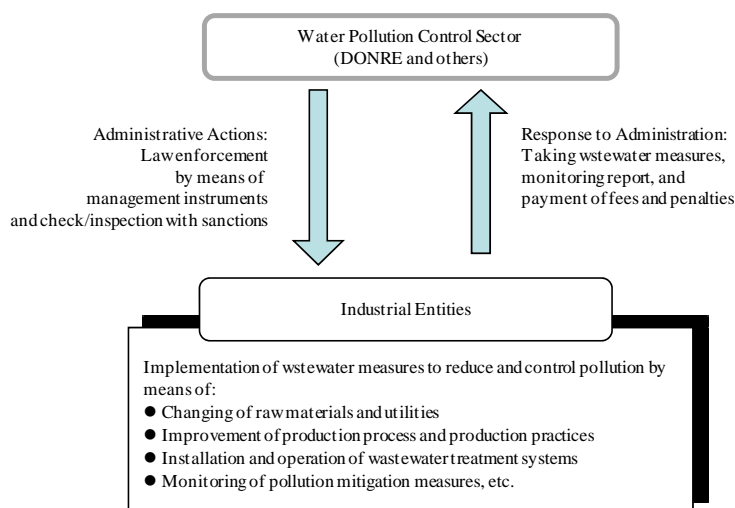
Through the collection of data in DONRE office and site surveys in the model area, a large amount of data/information was gathered. To process and store these data/information, WG-3 has introduced the pollution source database (PSD), pollution source table (PST), and pollution source map (PSM), as information tools. The development and actual application of these information tools were also performed in the activities of Output 3.

The WG-3 activities had been made as a joint work between the Vietnamese side and JET. JET has provided necessary support and advices to the Vietnamese side, depending on the needs. Discussion meetings with the attendance of WG-3 members and JET were held every three weeks, as opportunities for technology transfer.

As a result of the processing and analysis of these collected data and information, the status of water pollution control by DONRE in Hanoi City has been clarified, as follows:

(2) Organizational Structure and Management Resources of DONRE

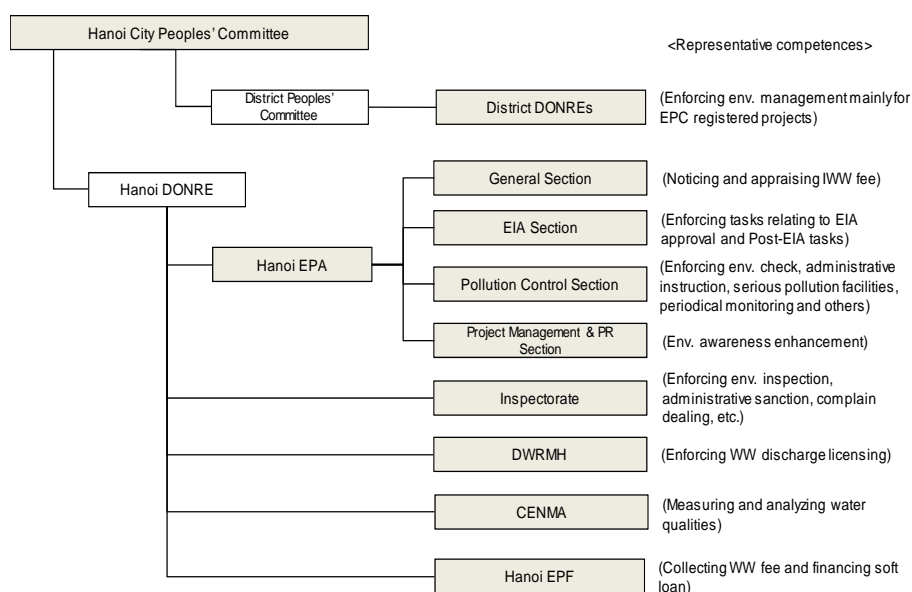
DONRE is given the mandate of enforcing water pollution control to achieve administrative objectives. Supervising of the status of the environment protection measures taken by pollution generators is also the responsibility of DONRE, as the state environment management agency. The objective of water pollution control by DONRE is to reduce and control pollution loads generated by industrial entities through promotion, regulation, and supervision of industrial entities. Such interactive relationship between state environment management agencies and industrial entities is presented in Figure 2.6-4.



Source: JET

Figure 2.6-4 Concept of Administrative Management of Water Pollution Control

Water pollution control in Hanoi City is enforced by different units under DONRE such as EPA, HNI Inspectorate, and DWRM. District DONREs are involved in water pollution control in a number of competencies. Representative tasks of units related to the water pollution control sector are shown in Figure 2.6-5.



Source: JET

Figure 2.6-5 Administrative Structure of Water Pollution Control in Hanoi City

The EPA, Inspectorate, DWRM, and CENMA are the units in charge of water pollution control, and the numbers of staff are 47, 24, 11, and 72, respectively, as of the end of 2011. District DONREs were formed to implement tasks of specialized environmental management agencies. It is common knowledge that district DONREs cannot function properly as assigned because of limited manpower and professional knowledge and skills.

Among the organizations, EPA is the lead player among local authorities delegated with variety of related competencies. Besides, the environmental police and management board of industrial park are involved in the local environment management with certain authorities.

All of the WG-3 members agreed that HNI DONRE seriously lacks all management resources. It is certain that human resources, budget, and equipment and materials are now insufficient, and the availability of these resources highly depends on the decision of PPC. However, the situation on information resources (especially pollution source information) is different from others. There is a certain possibility that DONRE can utilize information generated from daily tasks and activities, as useful resources for water pollution control, if secured information system will be structured and operated in a sustainable way.

(3) Applied Environmental Management Systems and Current Activities

The DONRE has the responsibility of supervising environment protection measures taken by business owners. Being in the frontline, administrative management is enforced against industrial wastewater by means of environment management systems. Meanwhile, MONRE formulates policies and regulatory mechanisms of management systems and gives guidance to DONRE to enforce them. In terms of water pollution control, major management systems being employed by DONRE for water pollution control, as per Table 2.6-7, aim to promote and encourage appropriate environment protection measures.

Table 2.6-7 Major Management Systems for Industrial Wastewater

Management System (Relevant System)	Main Grounding Regulations	Objectives and Functions
1. Environmental authorization and compliance, including the national effluent standard of industrial wastewater and self-monitoring of environmental protection measures.	Decree 80/2006/ND-CP	All pollution generators must be authorized through EIA or EPC (or EPP) under their environmental protection measures to comply with environmental protection requirements, including the provision of wastewater treatment meeting the effluent standards and self-monitoring.
2. Industrial wastewater fee (environment protection fee for wastewater)	Decree 67 /2003/ND-CP (Amended later on)	Wastewater fees are collected from all pollution generators of domestic wastewater or industrial wastewater, giving the economic incentive for reducing pollution load.
3. Wastewater discharge license	Decree 149/2004 /ND -CP Grounded on Law on Water Resources	Pollution generators discharging wastewater into water sources must obtain wastewater license.

Source: JET

The current situation of these environmental management activities is presented as follows:

- **Environmental Authorization and Compliance**

The management purpose of authorization and compliance (including EIA approval, self-monitoring, and so forth) is yet to be attained, as seen from many and repeated violations against environmental requirements. Functions of this management system are constrained by different reasons, like low environment awareness of entity operators, immature enforcement of administrative process, ineffective check and inspection by DONRE, and so forth.

- **Industrial Wastewater Fee**

The system of industrial wastewater fee is not functioning as expected and the amount of collected fee is very limited due to vulnerable implementation setup, lack of dissemination to entities, and so forth.

- Wastewater Discharge License

The purpose of wastewater discharge license based on the Law on Water Resources overlaps with the management system of environmental authorization and compliance, grounded on the amended LEP. For the moment, the system of wastewater discharge license is not active and only limited licenses to industrial entities have been issued.

- Definition of Minimum Scale for Management System

The provision of setting a minimum scale for regulation is not common in management systems (such as the application of national standards of discharged industrial wastewater quality, wastewater fee, etc.) in Vietnam. Therefore, DONRE presses for inefficient administrative works, and forces entities to enforce excessively massive works.

(4) Government Support Measures

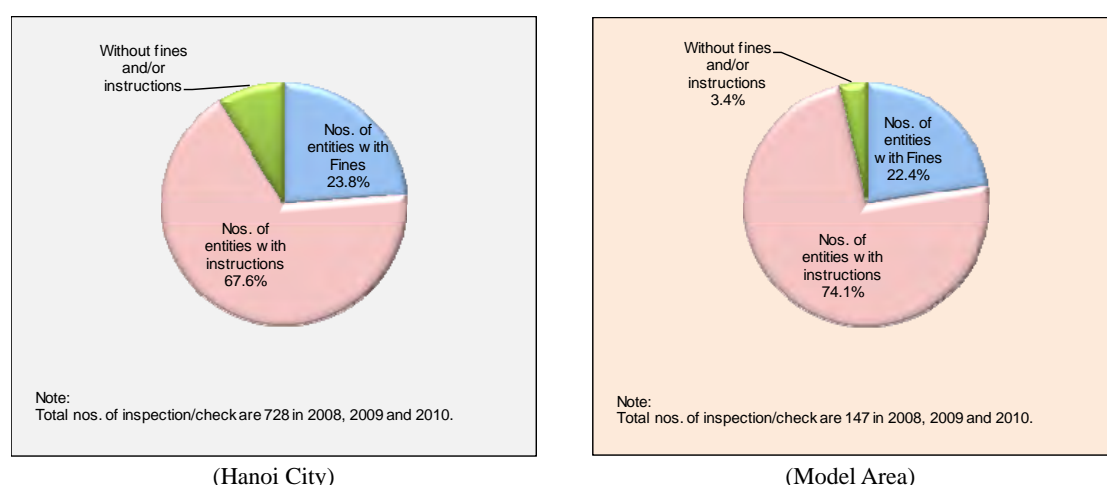
The amended LEP stipulates and guides to set up a number of support measures by the government and to promote industrial wastewater measures by entities. They include, for example, preferential loan, preferential land use, preferential tax, promotion of cleaner production technologies, promotion of environment-related service, and so forth. However, these support measures are generally not actively used.

As another line of government support measure for environmental protection, HNI PC has pushed forward the relocation and agglomeration of industries, and the environmental protection fund. Among other measures, it is important that the relocation of industrial clusters be pursued more, along with the installation of a centralized industrial wastewater treatment plant (IWTP). This support measure is useful in encouraging small-scale industries to take environment protection measures.

(5) Environmental Check and Inspection

Recently, HNI DONRE is carrying out many environmental check and inspection activities, as compared to other provinces. Over the recent three years (from 2008 to 2010), a total of 728 checks and inspections were conducted against entities discharging wastewater. Through these checks and inspections, DONRE has found many violations against environmental regulations and imposed administrative sanctions.

Even so, many industrial entities are repeating violations without rectifying their environmental protection measures, as shown in Figure 2.6-6. Although environmental check and inspection are important management activities to promote and supervise wastewater measures by entities, the effects are assessed to be very limited in deterring entities from repeating environmental violations.



Source: Survey Result by WG-3 in 2011

Figure 2.6-6 Status of Administrative Sanctions

It is analyzed that environmental check and inspection by DONRE have not exerted sufficient pressures on industrial entities due to the following reasons:

- Integrated information system of pollution sources is unavailable for common use.

Information pertaining to wastewater measures, which come from the approval of EIA and pre-operation certification, are not properly shared among units involved in the check and inspection. Similarly, records of results of different management tasks are not properly shared among concerned units. Concerning other management systems (such as industrial wastewater fee, wastewater discharge license, and so forth), mutual information sharing among concerned units is again very limited. This is the reason of the delay in establishing an integrated information system necessary for the implementation of check and inspection. Thus, checks and inspections are not prepared well beforehand, and tend to miss the underlying environmental infringements.

- Undeveloped ability and insight especially on environmental violations.

Most officers engaged in check and inspection lack specialized knowledge and experiences in wastewater measures. Thus, there are many cases that concerned officers do not have technical insights into the actual conditions of wastewater measures at the site, and overlook underlying environmental violations.

- Administrative sanctions are too light.

The Decree No. 117/2009/ND-CP stipulates sets of administrative sanctions against various violations. It is, however, assessed that the economic damages to violators are too insignificant to prevent these people from repeating the same violation. In many cases, paying fines is much more economical than actually taking the measures.

2.6.2.3 Activity 3-2: Select Target Province

Activity 3-2 took place in June 2011. In this activity, Hanoi City has been confirmed to be the subject provincial area of Output 3, as envisaged during the Project preparation stage. In the discussion, it was confirmed that the selection of Hanoi City is appropriate, taking into account the relatively advanced management enforcement as compared to other provinces. At the same time, the importance of sharing Output 3 results to other DONREs has been confirmed.

2.6.2.4 Activity 3-3: Specify Target Region and Industries for Application of the Effective Water Pollution Control Measures

(1) Overview

Activity 3-3 took place between April and August 2011. In the discussion of WG-3, the manufacturing industry was selected as the target industrial group because it is a major pollution source in Vietnam, and DONRE is predominantly competent to control environmental problems generated by the manufacturing industries. Also, Tu Liem District and Ha Dong District have been defined as the model area since they are representative areas which accommodate diverse manufacturing industries discharging large amount of pollution load into nearby watercourses like the Nhue River and Day River. The brief profile of the model area is presented as follows:

(2) Geographical Location

Tu Liem District and Ha Dong District, as shown in Figure 2.6-7, have been defined as the model area, as explained above.



Source: JET

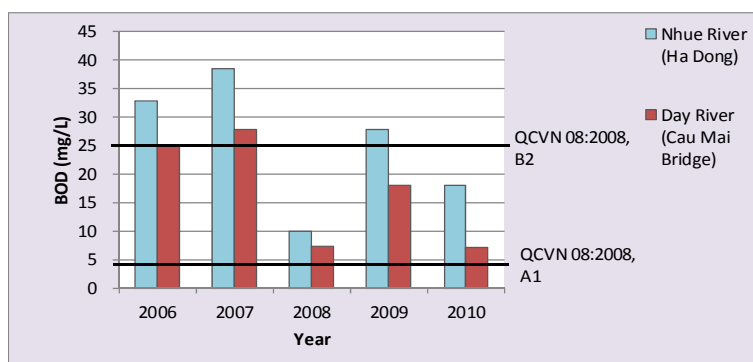
Figure 2.6-7 Location of Model Area

(3) Socioeconomic Condition

According to the statistical book, Hanoi City has produced an industrial GDP of some VND 118 billion, with 9% to 14% annual growth rate (constant price in 1994) in the past seven years,. It has around 6400 registered manufacturing enterprises with close to 255,000 workers. Industrial activities take place mainly in industrial zones and industrial clusters in/around the urban center. Besides, many craft villages (about 260 sites) are located in the city.

(4) Environmental Condition

The Nhue River and Day River flowing through the model area have been seriously polluted far beyond the national environment standards over the years, by inflowing pollution loads discharged from anthropogenic activities in the surrounding area. Monitoring data of BOD are shown in Figure 2.6-8.



Source: Hanoi PC, State of Environment Report in Hanoi City for the Period of 2006-2010

Figure 2.6-8 BOD Monitoring Data of Nhue River and Day River

(5) Discharged Pollution Load

Different pollution sources are responsible for water pollution in the model area. Major source is the domestic wastewater discharged from households, commercial, and institutional facilities without treatment, accounting for some 90% of the total BOD pollution load. It is reported that industrial wastewater accounts for about 7% to 11% of BOD load discharged in Tu Liem and Ha Dong districts, respectively.

2.6.2.5 Activity 3-4: Draft an Outline for Effective Water Pollution Control

(1) Activity 3-4-1: Industrial Wastewater Measures by Entities

1) Overview

Activity 3-4-1 took place between July 2011 and October 2012. This activity, which surveyed manufacturing industries located in the model area, has clarified the characteristics of manufacturing industries, actual status of industrial wastewater measures, status of environmental compliance, environmental awareness of entity operators, and so forth. The WG-3, with local experts, had carried out site surveys to collect data/ information through interviews and observations during the site visits to subject entities. The site surveys in the model area took place thrice, as follows:

- First site survey: for 30 entities, between August 2011 and November 2011,
- Additional site survey: for five entities, between February 2012 and March 2012, and
- Second site survey: for 60 entities, between June 2012 and October 2012.

The results of these site surveys have been compiled and prepared separately in the following field notes:

- Field note of first site survey in the model area,
- Field note of additional site survey in the model area, and
- Field note of the second site survey in the model area.

Photos 2.3.2-1 and 2.3.2-2 show the typical scenes of the site survey in the model area.



Photo 2.6.2-1 Interview with Entity Operators



Photo 2.6.2-2 Wastewater Treatment Plant in the Brewery

The survey results of Activity 3-4-1 were analyzed, after combining with the data and information obtained in Activity 3-1. Major findings observed are presented as follows:

2) Entities' Duty for Industrial Wastewater Control

Along the polluter-pay-principle (PPP), the amended LEP states a number of entities' duties to take necessary measures for industrial wastewater and sets specific provisions by promulgation of different regulations. Entities are regulated to fulfill a number of specific responsibilities to take pollution

protection measures under the amended LEP and its derivative regulations. Among others, the most important and representative obligations of pollution generators may be categorized, as follows:

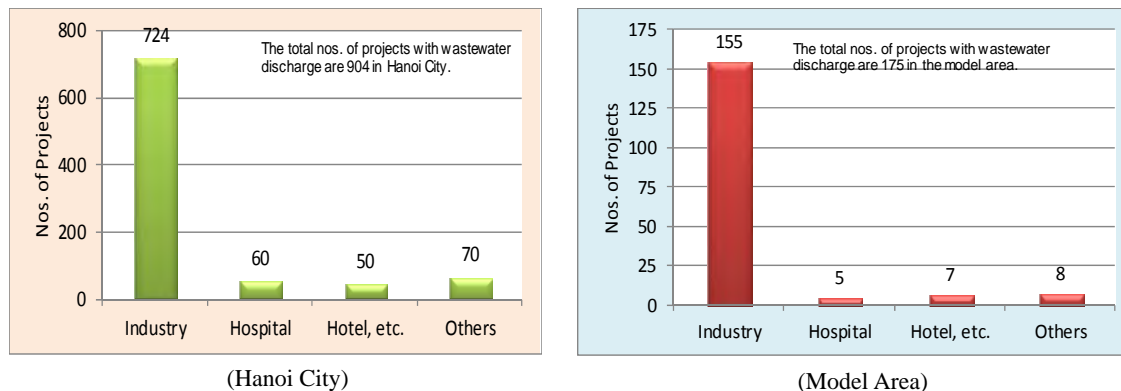
- Acquisition of environment authorization: Acquiring the authorization of the state management agency for an intended economic/development project through the approval of EIA (or EPP) or the registration of EPC,
- Reduction of generated pollution load: Improving production technologies so as to reduce pollution loads generated from production processes,
- Treatment of generated wastewater: Installing and operating an appropriate wastewater treatment system so as to meet the wastewater standards specified in QCVN,
- Self-monitoring: Periodic self-monitoring on the operation status of adopted environmental protection measure.
- Industrial wastewater fee: Paying the calculated fee for discharging wastewater, depending on discharged pollution loads.

In spite of the legal requirements, majority of industrial entities do not take appropriate measures to control industrial wastewater in general.

3) Characteristics of Pollution Sources

(a) Numbers of Manufacturing Industries

Figure 2.6-9 shows all kinds of entities as well as manufacturing industries. The total numbers of manufacturing entities discharging industrial wastewater which were surveyed by WG-3 are 724 and 155 in Hanoi City and the model area, respectively. In addition, some other small-scale industries registered with EPC exist. Besides this, craft villages in 260 and nine locations are operated in the city and the model area, respectively. Me Linh District accommodates the largest number of pollution source projects, and Tu Liem and Ha Dong districts are ranked second and third, respectively.

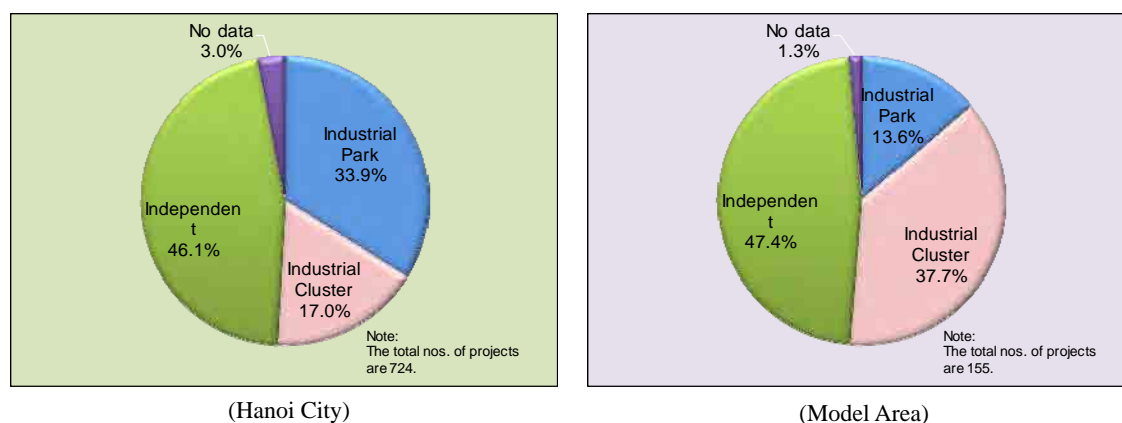


Source: Survey Result by WG-3 in 2011 and 2012

Figure 2.6-9 Numbers of Pollution Source Projects

(b) Industrial Locations

As for industrial locations, 51% of manufacturing industries are located in industrial parks or industrial clusters in the city and the model area. Remaining entities are located independently outside the industrial parks and clusters. This is shown in Figure 2.6-10.



Source: Survey Result by WG-3 in 2011 and 2012

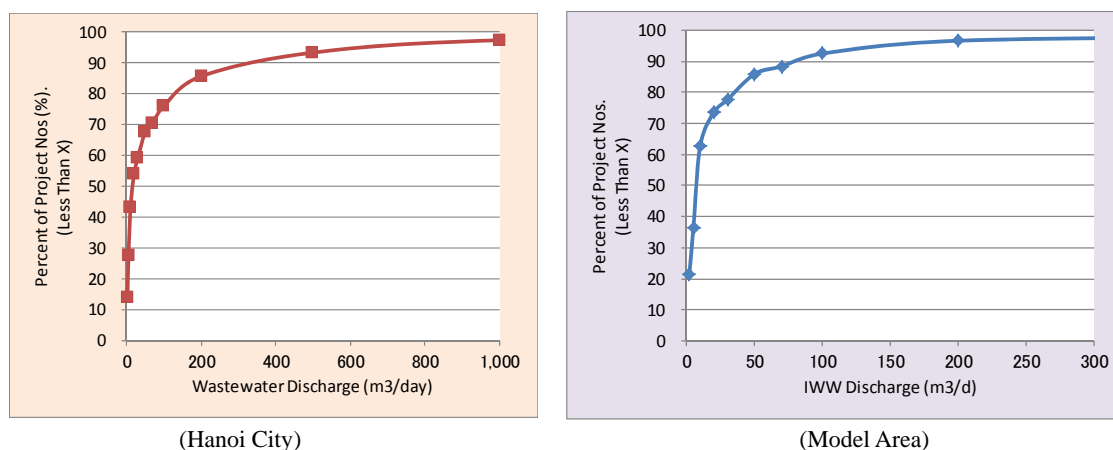
Figure 2.6-10 Number of Projects by Industrial Locations

(c) Industrial Categories

The majority of manufacturing enterprises located in the city and the model area belong to the light industry, like electrical and machinery parts, textile, food processing, and so forth. Heavy industries are not located in the city and the model area.

(d) Production Scale

Production scales of industries located in the city and the model area are relatively small. In terms of employee's numbers (employee/entity), averages are 270 in the city and 128 in the model area. In terms of discharged wastewater flow, averages are 154 m³/day in the city and 35 m³/day in the model area, as shown in Figure 2.6-11.



Source: Survey Result by WG-3 in 2011 and 2012

Figure 2.6-11 Scale of Projects in terms of Wastewater Discharge

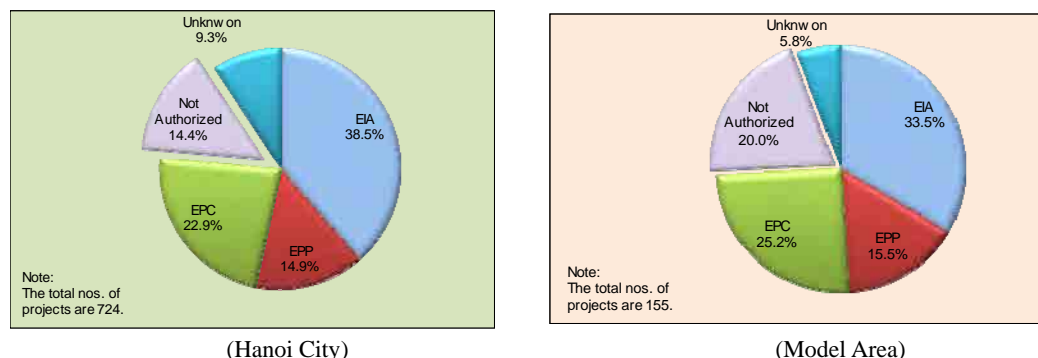
4) Actual Status of Measures to Control Industrial Wastewater

(a) Preamble

The current situation of industrial wastewater control undertaken by entities was clarified based on the analysis of site survey data, incorporating partly the assessment results of water pollution control (Activity 3-1).

(b) Environmental Authorization and Compliance

Figure 2.6-12 shows that there are some entities operating without any environmental authorization (EIA, EPP, EPC, etc.). Of all the entities discharging industrial wastewater, 14% and 20% of the entities do not have any type of authorization in the city and the model area, respectively. This is one of the basic issues to be solved in the environmental compliance in the city.

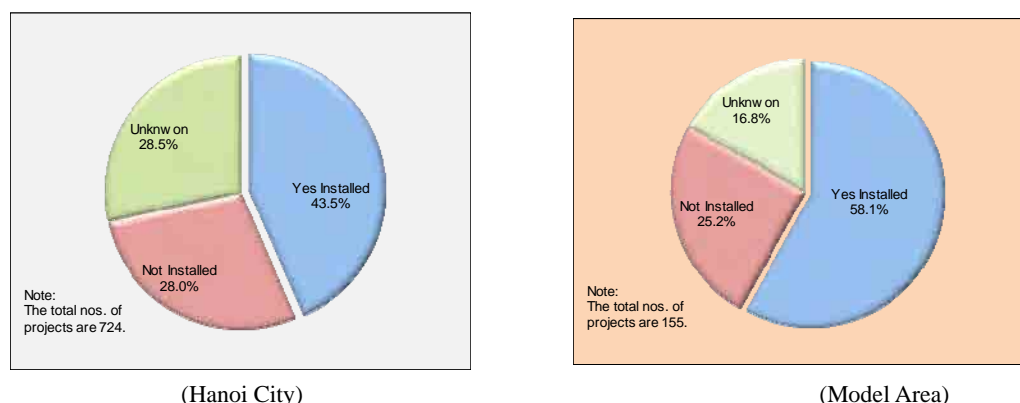


Source: Survey Result by WG-3 in 2011 and 2012.

Figure 2.6-12 Status of Environment Authorization (in terms of Numbers of Projects)

(c) Installation or Use of IWTP

Some 44% and 58% of entities in Hanoi City and in the model area, respectively, are operating with different types of IWTP. Meanwhile, some 28% and 25% of entities in the city and in the model area, respectively, are discharging wastewater without treatment, as shown in Figure 2.6-13. In terms of wastewater volume, 67% and 90% of discharged wastewater in the city and in the model area, respectively, are treated with different types of IWTP. It has been found that large-scale projects (in terms of wastewater flow rate) tend to be equipped with IWTP at a higher rate.



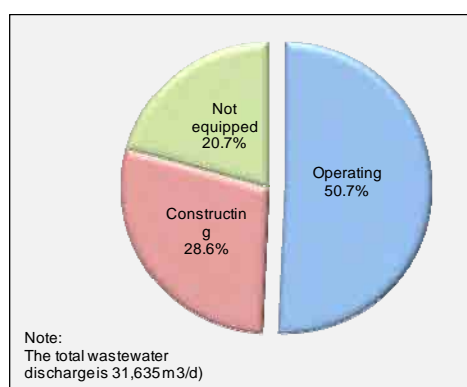
Source: Survey result by WG-3 in 2011 and 2012

Note: Projects connected to a central IWTP for industrial parks and clusters are counted as "Yes"

Figure 2.6-13 Installation Status of IWTP (in terms of Numbers of Projects)

(d) Installation of Centralized IWTP in Industrial Parks and Clusters

In terms of projects located in industrial parks and clusters, 51% of discharged wastewater volume is treated with central IWTPs in Hanoi City as per Figure 2.6-14. In addition, central IWTPs with a capacity of another 29% of discharged wastewater volume are currently under construction.



Source: Data in this table are sourced from the State of Environment Report in 2009 issued by MONRE

**Figure 2.6-14 Installation Status with Centralized IWTP in Hanoi City
(in terms of Wastewater Volume)**

(e) Water Quality of Discharged Effluent

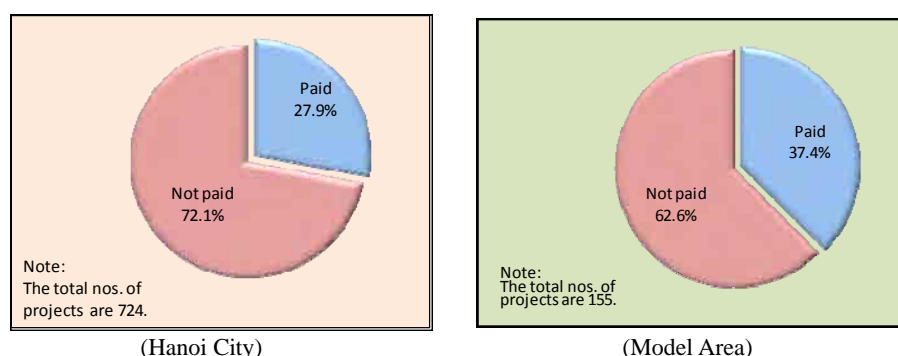
In terms of wastewater quality, 38% and 42% of entities are discharging wastewaters that meet the national effluent standards in Hanoi City and in the model area, respectively. In terms of wastewater volume, 64% and 63% of total wastewater are meeting the national standards in the city and in the model area, respectively.

(f) Self-monitoring

Of all the entities discharging industrial wastewater, 33% to 44% conduct self-monitoring appropriately, including periodic submission of monitoring reports, in the city and in the model area, respectively.

(g) Industrial Wastewater Fee

In terms of number of projects, some 72% and 60% do not pay industrial wastewater fee in Hanoi City and in the model area, respectively, as shown in Figure 2.6-15. In terms of discharged wastewater amount, some 70% and 59% do not pay industrial wastewater fee in the city and in the model area, respectively. As seen from this figure, it has been found that majority of entities do not pay wastewater fees. Especially, as high as 81% of entities located independently outside of the industrial areas do not pay wastewater fees.



Source: Survey result by WG-3 in 2011 and 2012

Note: 1) Not paid includes projects with no data in this graph.

2) Projects connected to a central IWTP for industrial parks and clusters are counted as paid.

Figure 2.6-15 Status of Payment of IWW Fee (in terms of Numbers of Project)

(h) Wastewater Discharge License

In terms of number of projects, some 77% and 66% do not take wastewater discharge license in Hanoi City and in the model area, respectively. Based on this, it has been found that majority of entities do

not have necessary discharge license in accordance with the Law on Water Resources in the meantime. Especially, as high as 81% of entities located independently do not have discharge license.

(2) Activity 3-4-2: Compliance Assessment and Issue Identifications

1) Overview

Activity 3-4-2 took place between May 2012 and October 2012. In Activity 3-4-2, WG-3 assessed the environmental compliance of industrial entities and discharged pollution loads, based on data collected in Activities 3-1 and 3-4-1. Based on these results, issues to be solved in water pollution control have been identified.

In order to check and assess the environmental compliance by entities, appropriate numerical indicators are necessary. To this end, Industrial Wastewater Compliance Rating (IWCR) has been introduced. In parallel, information tools for collected data were developed in this activity. These are pollution source database (PSD), pollution source table (PST) and pollution source map (PSM). By using these information tools, rating scores of IWCR, discharged pollution loads, and other aspects of water pollution were assessed. In this activity, WG-3 formulated the following manuals and software programs:

- User's Manual for Pollution Source Database (PSD)
- User's Manual for Pollution Source Map (PSM)
- Database Program of Hanoi Pollution Source Database (with Microsoft Access)

Specifically, the following activities have taken place in Activity 3-4-2:

- Development of information tools (PSD, PST, and PSM),
- Industrial wastewater compliance rating (IWCR),
- Analysis of noncompliance in industrial wastewater measures,
- Pollution load assessment, and
- Identification of issues in water pollution control.

2) Development of Information Tools

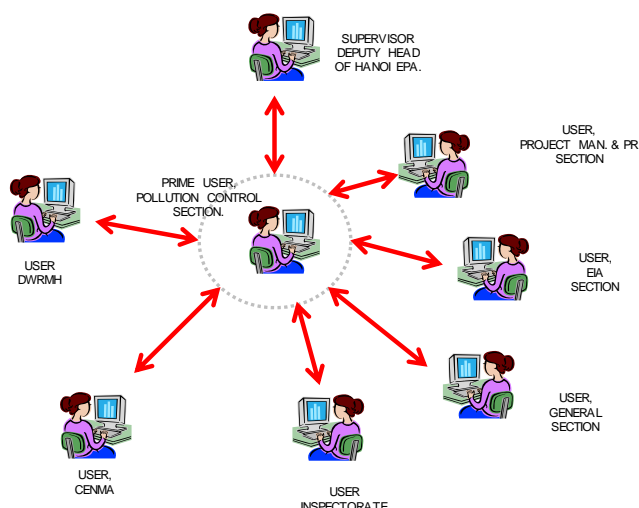
(a) General

Information tools for pollution sources have been developed and applied in this activity, therefore, collected data were stored and processed systematically. By using stored and organized data, WG-3 has assessed and examined water pollution control. The information tools comprised specifically the PSD, PST, and PSM.

(b) Pollution Source Database (PSD)

The PSD was developed in this Project, aiming to build an integrated information system on pollution sources. The PSD has been used for storing and processing collected data/ information through Output 3 activities (such as the performance assessment of water pollution control, first site survey, additional site survey and second site survey). As of October 2012, PSD has stored a total of 1161 pollution sources in Hanoi City.

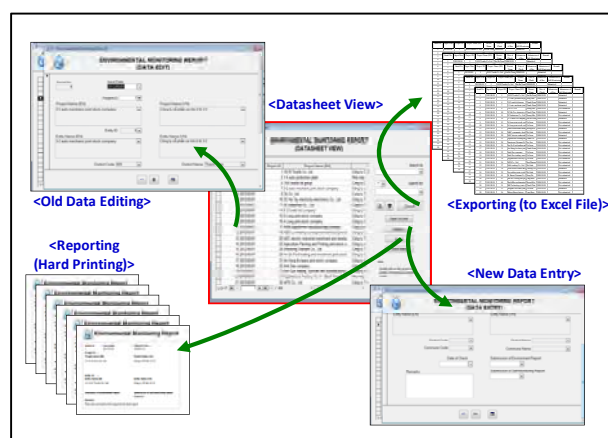
The PSD is a program which has been developed to store different data generated from water pollution control with the Windows OS platform and MS Access 2003 (or later versions) software. The PSD is based on a multi-users system, as shown in Figure 2.6-16., whereby all users of units concerned with water pollution control can access the database through the data synchronization function.



Source: JET

Figure 2.6-16 Concept of PSD Operation Task Force

The PSD has 22 data tables, such as project name, basic information, environmental authorization, environmental check and inspection, and industrial wastewater fee, which enables the entry of data generated from water pollution control, and the output of aggregating tables. All data records stored in PSD are assorted with the prime-key of pollution source projects. Main operations of respective tasks are data entry, data edit, data reporting, and data exporting, as shown in Figure 2.6-17. These operations are made through operation tabs in the display of the datasheet view.



Source: JET

Figure 2.6-17 Image of Main Functions of PSD

(c) Pollution Source Table (PST)

By aggregating collected data in PSD, tabulating basic information of pollution sources through PST and the status of environmental compliance and other data were formed, as shown in Table 2.6-8, for Hanoi City. Rating scores of IWCR were calculated by using several compliance items in the field of PST exported from PSD.

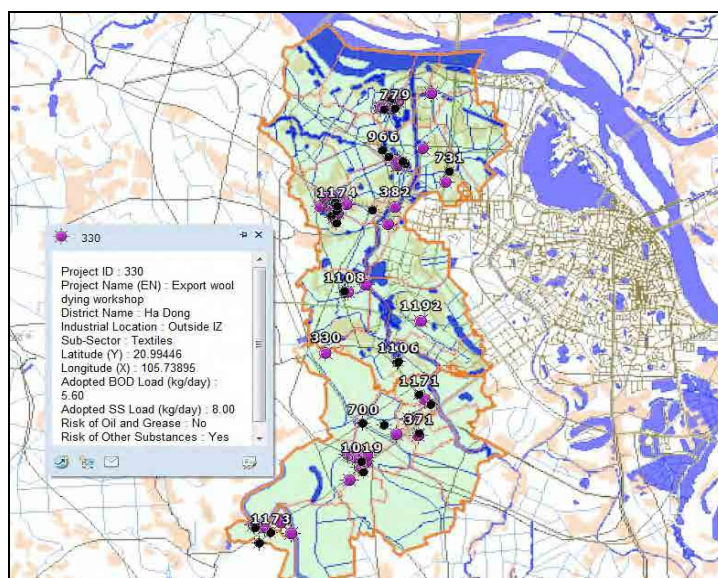
Table 2.6-8 Image of Pollution Source Table (PST)

Project ID	Site Survey (1-14/3)	District	Industrial Location	Sector	Product or Service	No. of Employees (person)	Authorized Date	Authorization Type	President of (Vietnam WWTP)	Submission of Self-Monitoring Report	Submission Agency (ad.)	Payment of WW Fee	Act WW License	Wastewater Flowrate (m3/d)
1		Ha Ba Trung	Outside IZ	Industry	Rubber & plastic products			EIA	No	Submitted	OK	Paid		600.0
2		Dong Anh	Outside IZ	Industry	Motor vehicles and parts			EIA	Yes	Submitted	OK			30.0
3		Thanh Xuan	Outside IZ	Industry	Textiles			EIA	Yes	Submitted	OK	Paid		
4		Thanh Xuan	Outside IZ	Industry	Wearing and garment			EIA	Yes	Submitted	OK		Taken	200.0
5		Dong Anh	Outside IZ	Industry	Electrical machinery & apparatus		2009/01/01	EPP						
6		Thanh Trn	Outside IZ										Taken	100.0
7		Thanh Xuan	Outside IZ	Industry	Motor vehicles and parts			EIA	No	Submitted	OK			
8		Hoang Mai	Inside Industrial Cluster	Industry	Machinery & equipment			Not authorized	No	Not submitted	No Good			5.3
9		Hoang Mai										Paid		
10		Thach That	Outside IZ	Industry	Electronic equipment	100	2007/02/13	EPC	No	Submitted	OK			12.0
11		Hoang Mai	Outside IZ	Industry	Electrical machinery & apparatus	50	2001/06/07	EPC	Yes	Not submitted	No Good			9.0
12		Cau Giay		Tourism	Hotel		2007/01/01	EIA						
14		Ha Ba Trung	Inside Industrial Cluster	Industry	Wearing and garment		1998/01/09	EIA	No	Submitted	OK			98.0
16	2	Tu Liem	Inside Industrial Cluster	Industry	Rubber & plastic products	6060	2007/5/17	EPC	Yes	Submitted	No Good	Not paid	Not taken	5.0
17		Hoang Mai	Outside IZ	Industry	Electronic equipment		2008/07/31	EIA	Yes	Submitted	OK			20.0
18		Me Linh	Outside IZ	Industry	Medical, precision & optical instrument	40		Not authorized		Not submitted	No Good			1.5
19		Dan Phuong		Health	Hospital		2009/01/01	EIA						
20	1	Tu Liem	Inside Industrial Cluster	Industry	Electronic equipment	40	2003/01/21	EIA	Yes	Submitted	OK	Not paid	Not taken	7.0
21		Thanh Trn		Health	Hospital		2008/01/01	EPP						
22		Thanh Trn	Inside Industrial Cluster	Industry	Paper & paper products	200	2005/07/12	EPC	No	Submitted	OK			
23		Soc Son		Wastes treatment	Waste disposal		2007/01/01	EIA						
24			Outside IZ	Industry	Fabricated metal products		2009/01/01	EPP						
25		Ba Dinh	Outside IZ	Industry	Non-Ferrous metal			Not authorized	No					
26		Cau Giay		Health	Hospital		2007/01/01	EIA						
28		Soc Son	Inside IZ	Industry	Food products & processing	220	2003/10/09	EPC	Yes	Not submitted	No Good			300.0
29		Tu Liem	Outside IZ	Industry	Motor vehicles and parts			Not authorized	No	Not submitted	No Good			8.0
30	2	Tu Liem	Outside IZ	Industry	Motor vehicles and parts	107		Not authorized	Yes	Not submitted	No Good	Not paid	Not taken	10.0
31		Thanh Xuan	Outside IZ	Industry	Motor vehicles and parts			Not authorized	No	Not submitted	No Good			4.0
32	1	Tu Liem	Outside IZ	Industry	Beer & beverage	50	2009/11/27	EPP	No	Not submitted	No Good	Paid	Not taken	20.0
33		Tu Liem	Inside IZ	Industry	Electrical machinery & apparatus	11	2007/12/28	EPC		Not submitted	No Good			
34		Tu Liem	Inside Industrial Cluster	Industry	Machinery & equipment	34	2007/01/01	EPC	No	Not submitted	No Good			
35		Hoan Kiem	Outside IZ	Industry	Chemicals and paints		2009/01/01	EPC						
36		Dan Phuong	Inside Industrial Cluster	Industry	Rubber & plastic products	70		Not authorized	No	Not submitted	No Good			1.0
37		Me Linh	Inside IZ	Industry	Machinery & equipment		2005/07/25	EPC	No	Not submitted	No Good			
38		Thuong Tin	Outside IZ	Industry	Beer & beverage	80	1997/05/20	EIA	Yes	Submitted	OK			480.0
39		Me Linh	Inside IZ	Industry	Rubber & plastic products		2004/09/06	EPC	No	Not submitted	No Good			
40		Long Bien	Outside IZ	Industry	Rubber & plastic products			EPP						
41		Dong Da	Outside IZ	Industry	Chemicals and paints	550	2007/04/27	EPC		Not submitted				30.0

Source: JET

(d) Pollution Source Map (PSM)

Furthermore, PSMs, which are geographical images of locations, and different characteristics of pollution sources were created, as shown in Figure 2.6-18, based on pollution load tables (PLTs) produced in PSD. This PSM can be used to examine the relationship between nearby watercourse and pollution sources as well as identify pollution sources' location.



Source: JET

Figure 2.6-18 Example of Pollution Source Map (PSM) in the Model Area

3) Industrial Wastewater Compliance Rating

(a) Criteria for Rating Score of IWCR

The environmental compliance level is defined as the achievement status of industrial wastewater measures which industrial entities attained by observing legal rules and regulations. In order to numerically present the compliance status, the IWCR has been developed by WG-3 and applied.

Rating scores of IWCR are calculated by rating the status of each item of water pollution control (namely, compliance levels for six items) with three degrees (1, 3, and 5), as per Table 2.6-9.

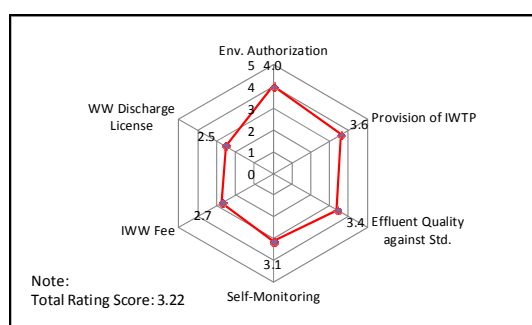
Table 2.6-9 Criteria of Industrial Wastewater Compliance Rating (IWCR)

Compliance Item \ Rating	"1"	"3"	"5"	Remark
1. Environmental Authorization	Not taking the approval	Taking the approval is "Not Clear".	Taking the approval	
2. Provision of IWTP	No provision	Yes and sufficient is "Not Clear".	Yes and sufficient	Give 5 for the use of centralized IWTP
3. Effluent water quality	Not meeting the standard	Meeting the standard is "Not Clear".	Meeting the standard	Give 5 for the use of centralized IWTP
4. Self-monitoring of protection measures	Not observed	Observed is "Not Clear".	Observed	
5. Industrial wastewater fee	Not paid	Paid is "Not Clear".	Paid	Give 5 for the use of centralized IWTP
6. Wastewater discharge license	Not taking	Taking is "Not Clear".	Taking	Give 5 for the use of centralized IWTP

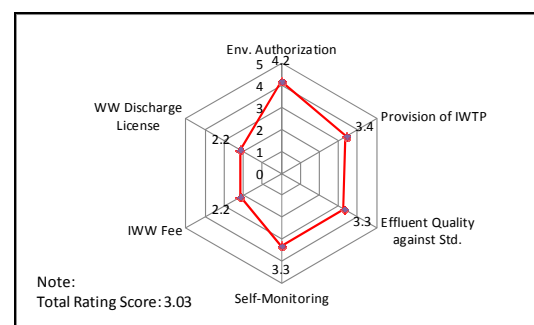
Source: JET

(b) Calculation Results of Rating Scores of IWCR

Numerical rating scores of IWCR are calculated by using PST. Calculated rating scores of IWCR, such as total score of entities, average score of some entity groups, individual score of respective compliance items, etc., may be used in several ways depending on the purpose. Average values of total rating scores for 103 and 52 entities located in Tu Liem District and Ha Dong District, respectively, are shown in Figure 2.6-19. From this result, it has been clarified that the compliance status on wastewater fee and wastewater discharge are very unsatisfactory in both entities.



(Tu Liem District)

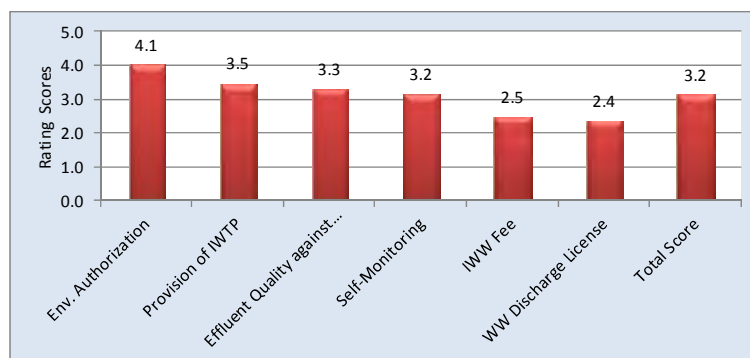


(Ha Dong District)

Source: JET

Figure 2.6-19 Results of IWCR for Tu Liem District and Ha Dong District

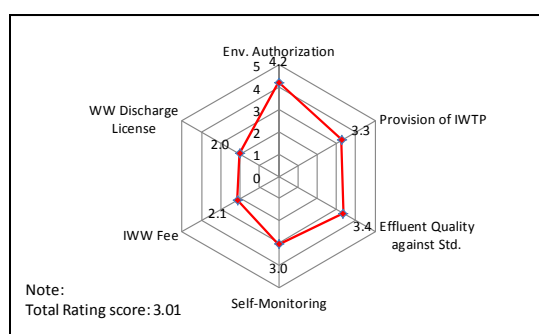
Figure 2.6-20 shows the result of average rating of six compliance items over 155 entities located in the model area, implying that the compliance levels are different depending on items, and distributed between scores of 2.4 and 4.1. Among the six compliance items, the rating score on the environmental authorization shows the highest (score of 4.1), which means that majority of the projects have obtained the necessary EIA approval and so forth. Meanwhile, the compliance for wastewater discharge license shows low score (score of 2.4) indicating that the discharge license system is yet to be enforced.



Source: JET

Figure 2.6-20 Results of IWCR on Average Rating by Compliance Items in Model Area

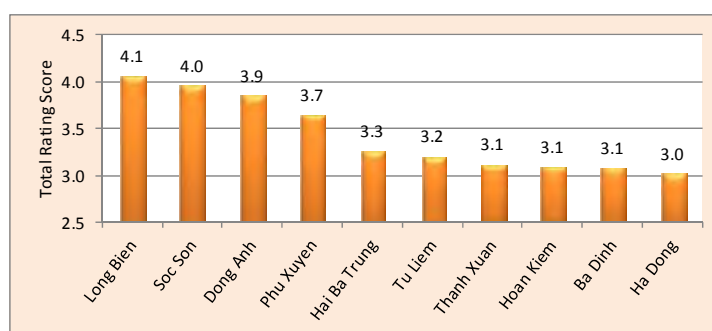
Average values of total rating scores for 724 entities located in Hanoi City are shown in Figure 2.6-21. From this result, it has been clarified that the compliance status on wastewater fee and wastewater discharge is very unsatisfactory.



Source: JET

Figure 2.6-21 Results of IWCR on Average Rating for Hanoi City

In Hanoi City, average total compliance scores of districts range from 2.2 to 4.1 and overall average score is calculated to be 3.01. As shown in Figure 2.6-22, districts of Long Bien, Soc Son, Dong Anh, etc. have high rating scores.



Source: JET

Figure 2.6-22 Ranking of High Compliance Rating Scores in Hanoi City

(c) Application of IWCR to Water Pollution Control

As mentioned above, the compliance statuses are widely different, depending on the entities. Such different statuses can be evaluated with numerical figures using IWCR. Therefore, DONRE may use the rating scores in different ways, because the rating scores of IWCR represent the status of industrial wastewater measures and the compliance levels of the entities. The following actual applications of IWCR are possible:

- Setting of Improvement Target

The scores calculated with IWCR represent the compliance status as numerical indicators. Thus, DONRE may use it to set the improvement target of industrial wastewater compliance in individual entities and/or grouped entities in industrial wastewater management.

- Selection of Subject Entities for Environmental Check and Inspection

Results of IWCR may be used to select entities with deficient compliance, in planning the environmental check and inspection. In this way, it is possible to implement environmental check and inspection effectively and efficiently by choosing and concentrating on focal entities with certain conditions.

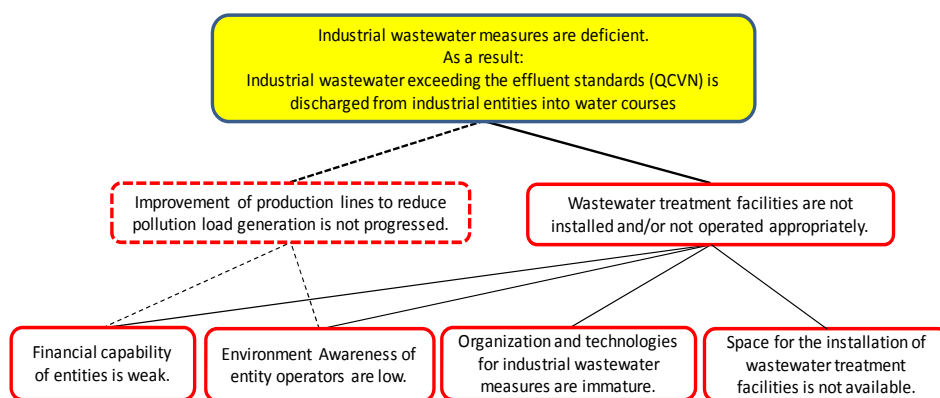
- Choosing the Best and Worst Complying Entities

In selecting excellent complying entities to be awarded and worst entities to be publicized, IWCR may be used as the initial step to nominate entities. In actual cases, final entities for awarding and publicizing will be selected based on the following different aspects, in addition to the results of IWCR.

- Degree of environmental impact/risk potentially caused by the wastewater of the entity,
- Degree of influence which an entity gave to wastewater measures and improvement of production lines of other industries (in case of best compliance),
- Degree of environmental damages actually caused by wastewater (in case of bad compliance),
- Actions to reduce pollution load in the production line (including the application of cleaner production technologies),
- Environmental consciousness and behavior for general environmental fields,
- Records of environmental violations and administrative instructions in the past, and
- Future prospects of wastewater measures subject to the assessment.

4) Analysis of Factors Related to Noncompliance of Industrial Wastewater Measures

Interview surveys to industrial operators together with site surveys took place in the model area. Based on the analysis of these interview results, major causes of environmental noncompliance were identified as low awareness and motivation of entity operators, lack of land spaces, and lack of finances, as shown in Figure 2.6-23. This implies that government support measures are necessary to overcome these causes, in parallel to the stringent administrative sanctions imposed by DONRE.



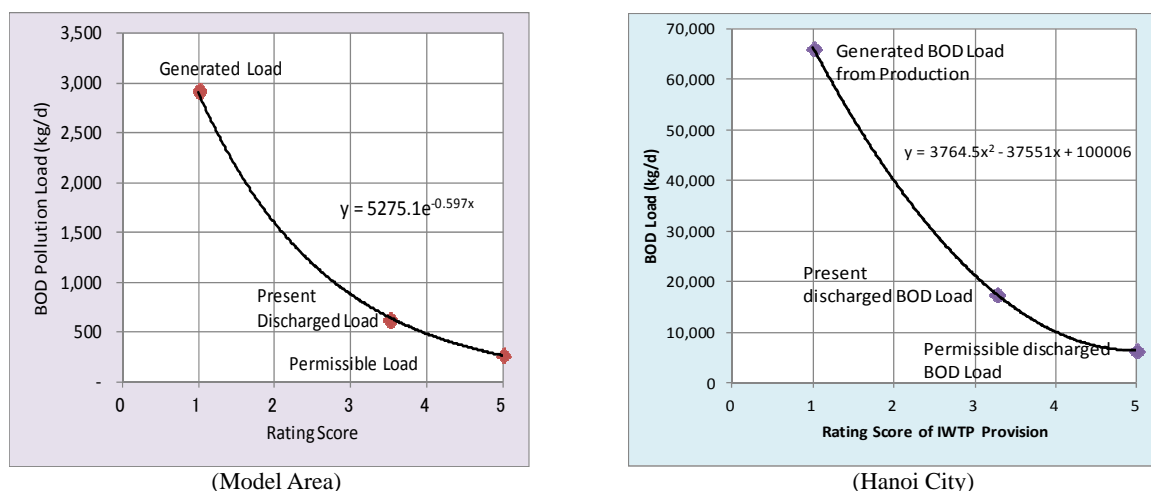
Source: JET

Figure 2.6-23 Problem Structure of Deficient Industrial Wastewater Measures in Entities

5) Pollution Load Assessment

The BOD pollution loads on pollution source projects belonging to manufacturing industry have been calculated, by using measurement results of BODs stored in PSD and estimated BODs based on related information in PSD. By using calculation results, provisional regression curves have been

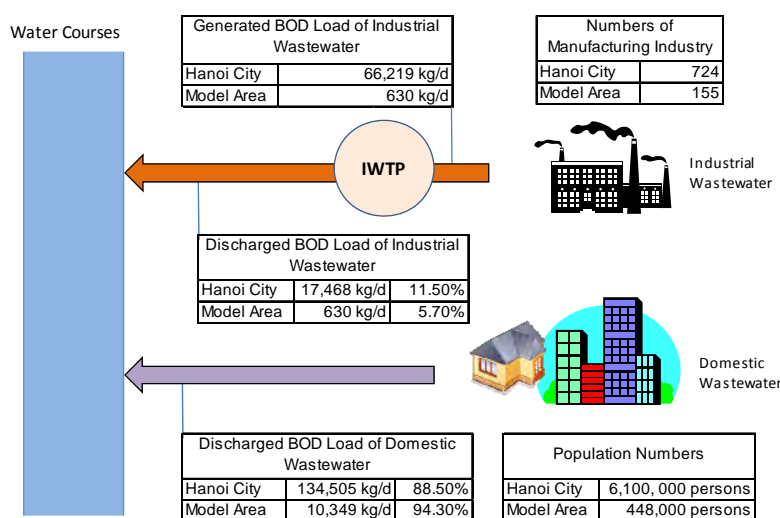
formed between the rating scores of ITWP provision and total BOD pollution loads in the model area and Hanoi, as shown in Figure 2.6-24. In these figures, present discharged loads correspond to discharged BOD loads with current IWTP provision and permissible loads correspond to discharged BOD loads in case all projects observe the national effluent standards.



Source: JET

Figure 2.6-24 Provisional Regression Curves of Rating Score vs BOD Load

Based on the BOD load calculation, it has been clarified that the share of industrial BOD pollution loads (total domestic and industrial wastewater loads) are only 5.7% and 11.5% in the model area and Hanoi City, respectively, as shown in Figure 2.6-25.



Source: JET

Note: The shares of discharged BOD loads mean the ratios of the total domestic and industrial wastewater loads.

Figure 2.6-25 Ratio of Industrial Discharged BOD Load

6) Identification of Issues in Water Pollution Control

(a) Identified Issues

Present environmental compliance by entities is very different, depending on the entities. This implies that DONRE's water pollution control and enforcement of industrial wastewater management based mainly on the amended LEP are still immature. Based on the different findings coming from this Project as described in the previous sections, a number of problems have been identified. The relationship between the cause and effect of these problems is analyzed in Figure 2.6-26.

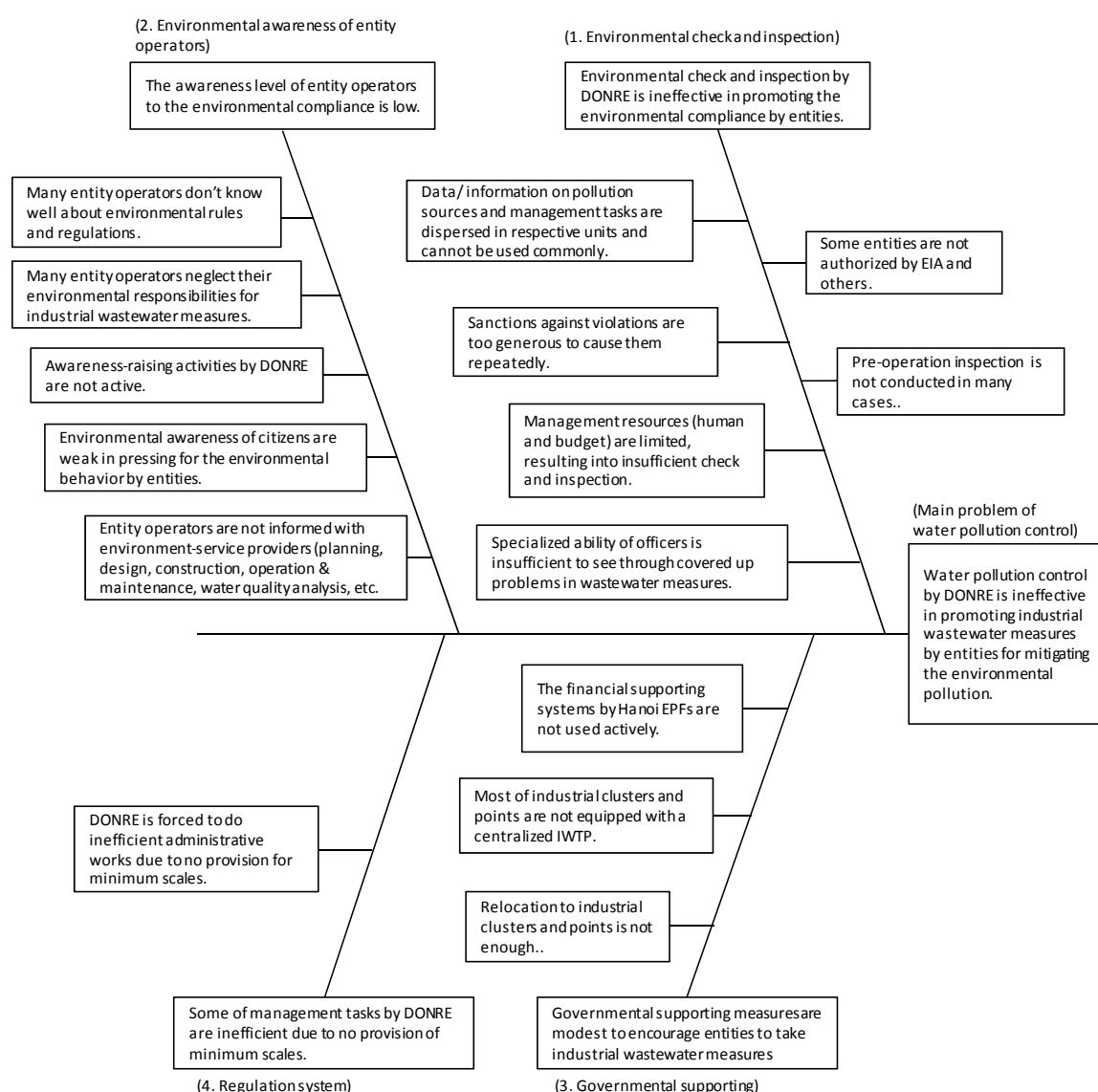
(b) Identification of Issues

Based on the problem analysis, the main problem in water pollution control by DONRE is stated as:

- Main Problem: Water pollution control by DONRE is ineffective in promoting industrial wastewater measures by entities for mitigating environmental pollution.

Overall, four key issues which generate the main problem have been identified as follows:

- Key issue 1: Environmental check and inspection by DONRE are ineffective in promoting the environmental compliance of entities.
- Key issue 2: The awareness level of entity operators toward environmental compliance is low.
- Key issue 3: Government support measures which encourage entities to take industrial wastewater measures are modest.
- Key issue 4: Management tasks of DONRE for water pollution control are inefficient due to non provision of minimum scales for the management.



Source: WG3

Figure 2.6-26 Problem Structure of Water Pollution Control

(3) Activity 3-4-3: Examination and Drafting of Improvement Plan

1) Overview

Activity 3-4-3 took place between August 2012 and March 2013. In this activity, WG-3 has examined and formulated the Outline of Improvement Plan for Water Pollution Control in Hanoi City, including proposed framework of improvement plan, provisional target, proposed actions, and conclusion. The Outline of Improvement Plan of Water Pollution Control in Hanoi City proposed by WG-3 consisted of the following contents:

- Chapter 1: General
- Chapter 2: Description of Study Area
- Chapter 3: Water Pollution Control by DONRE
- Chapter 4: Industrial Wastewater Measures by Entities
- Chapter 5: Assessment of Industrial Wastewater Compliance and Pollution Control and Compliance
- Chapter 6: Proposed Outline of Improvement Plan for Water Pollution Control
- Chapter 7: Conclusion and Recommendation

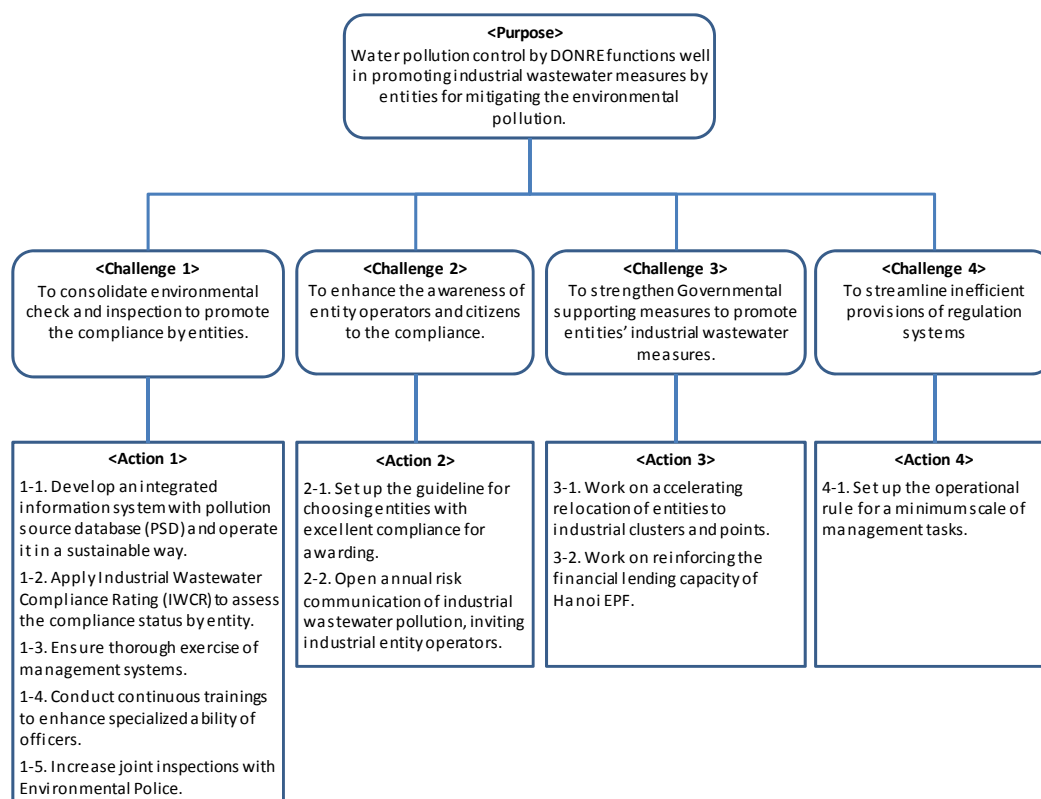
As the final activity of Output 3, WG-3 organized the sector seminar to share the outcomes of WG-3 activities with other provincial DONREs, concerned persons of industrial entities in the model area, and others.

2) Proposed Framework of Improvement Plan

The WG-3 examined how to improve the present water pollution control of DONRE by employing the methodology of objective analysis through “measures” and “end” relationship. As a result, the purpose of this improvement has been set up as follows: water pollution control by DONRE functions well in promoting industrial wastewater measures by entities for mitigating environmental pollution. Then, WG-3 identified four challenges to be tackled in attaining the improvement purpose, as follows:

- Challenge 1: To consolidate environmental check and inspection to promote compliance of entities.
- Challenge 2: To enhance the awareness of entity operators toward environmental compliance.
- Challenge 3: To strengthen government support measures by promoting industrial wastewater measures of entities.
- Challenge 4: To streamline the regulation systems of water pollution control.

Along the purpose and a series of challenges of the improvement, specific schemes of the Improvement Plan have been examined by means of the objective analysis. As a result, the framework of the Improvement Plan which comprised a series of actions has been formulated as shown in Figure 2.6-27.



Source: WG3

Figure 2.6-27 Proposed Framework of Improvement Plan of Water Pollution Control

3) Provisional Target

In general, the target to be set should be expressed with numerical figures, as much as possible, so that people concerned can easily realize their situations. Table 2.6-10 shows the provisional target of improvement plan for water pollution for the model area, as an example. This means that the improvement plan will be implemented, aiming to increase the current score of 2.4-4.1 to the short-term target of 4.0-4.5, apart from the long-term target of 5.0.

Table 2.6-10 Provisional Target for Improvement in the Model Area

Compliance Items	Current Compliance Rating Score	Target of Rating Score (as example)
Environmental Authorization	4.1	4.5
Provision of IWTP	3.5	4.5
Effluent Quality against Standard	3.4	4.5
Self-monitoring	3.2	4.5
IWW Fee	2.5	4.0
Wastewater Discharge License	2.4	4.0
Total Score	3.2	4.3

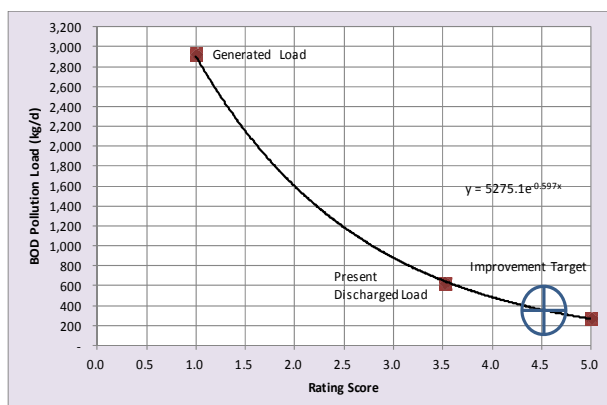
Source: JET

Table 2.6-11 indicates the BOD load reduction for the target score of waste water treatment plant (WWTP) provision. At present, the model area discharges the pollution load of 630 kg/d into the environment. Aiming to reduce the pollution load to 370 kg/d as the provisional target, the target of the rating score of 4.5 is set, by employing the regression curve of BOD pollution load in the model area as shown in Figure 2.6-28. In this manner, the rating scores of IWCR may be used as convenient numeric targets to estimate rough figures of discharged BOD load. It is recommended that specific improvement targets be raised and set by DONRE based on short- and long-term strategies.

Table 2.6-11 Target for Discharged BOD Load in the Model Area

Item	Current Discharged Load		Permissible Load		Target BOD Load	
	Rating Score	BOD Load (kg/d)	Rating Score	BOD Load (kg/d)	Rating Score	BOD Load (kg/d)
Rating score of WWTP provision	3.5	630	5.0	270	4.5	Around 370

Source: JET



Source: JET

Figure 2.6-28 Target BOD Load of Improvement Plan in the Model Area

4) Proposed Actions

The contents of the ten proposed actions under their corresponding challenges are set forth in Table 2.6-12.

Table 2.6-12 Profile of Proposed Actions

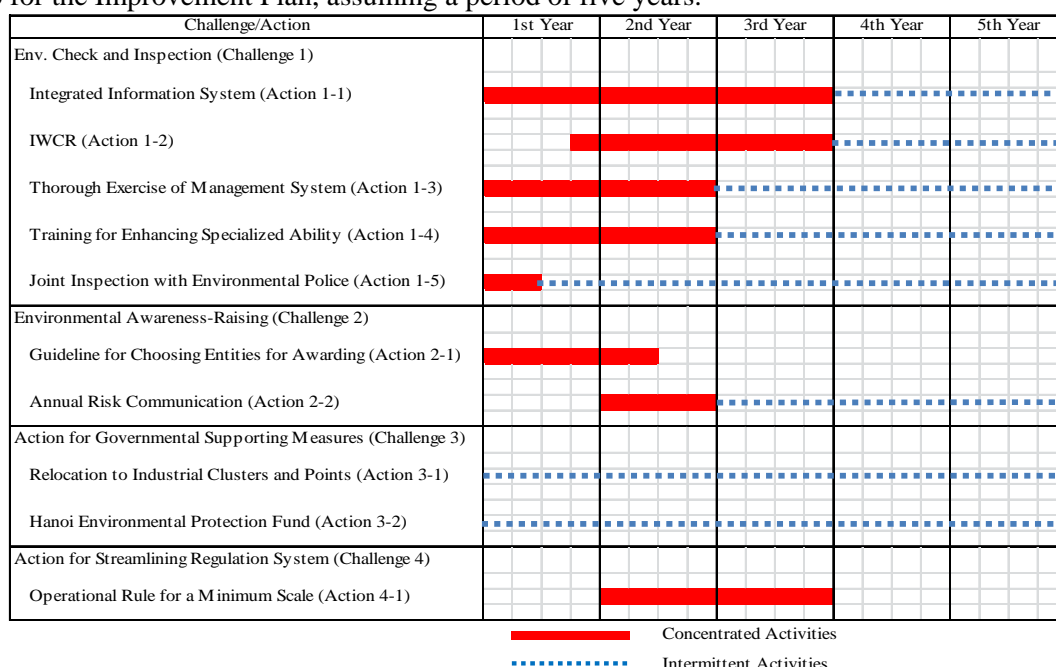
Challenge	Title of Action	Objective of Action	Component Activity
Challenge 1: Environmental Check and Inspection			
	Action 1-1: Integrated Information System	To develop an integrated information system with pollution source database (PSD) and operate it in a sustainable way.	1) Operate the PSD 2) Utilize outputs of the PSD for environmental check 3) Upgrade the PSD and inspection
	Action 1-2: Assessment of Environmental Compliance with IWCR	To annually assess the compliance status of entities, by applying the Industrial Wastewater Compliance Rating (IWCR)	1) Annually calculate the rating scores of the IWCR and analyze the compliance status 2) Use the rating score of the IWCR in regular management tasks
	Action 1-3: Thorough Exercise of Management System	To ensure a thorough exercise of management systems	1) Ensure the enforcement of check and inspection before operation, and collect and record data/information on actual wastewater measures. 2) Find out unauthorized entities
	Action 1-4: Training for Enhancing Specialized Ability	To conduct continuous trainings to enhance specialized ability of officers engaged in environmental check and inspection.	1) Continue to hold periodic technical trainings for environment-specialized abilities.
	Action 1-5: Joint Inspection with Environmental Police	To increase joint inspections with Environmental Police.	1) Conduct more joint inspection with Environmental Police
Challenge 2: Environmental Awareness Raising			
	Action 2-1: Publication of Compliance Situations on Industrial Wastewater	To publicize the compliance situation for industrial wastewater, after developing the guideline for choosing Best and Bad-Compliance Entity.	1) Prepare the guideline for choosing the best and bad-compliance entities 2) Periodically publicize the compliance situations of industrial wastewater
	Action 2-2: Annual Risk Communication of Industrial Wastewater Pollution	To open the annual risk communication of industrial wastewater pollution, inviting industrial entity operators and general citizens.	1) Choose the most excellent-compliance entities for awarding 2) Open the risk communication of industrial wastewater pollution (annual meeting), inviting entity operators in Hanoi City and citizens

Challenge	Title of Action	Objective of Action	Component Activity
Challenge 3: Government Support Measures			
	Action 3-1: Relocation to Industrial Clusters and Points	To work on accelerating relocation of entities to industrial clusters and points.	1) Work on relocations of entities discharging environmental pollution into industrial clusters and points provided with a centralized IWTP.
	Action 3-2: Hanoi Environmental Protection Fund	To work on reinforcing the financial lending capacity of Hanoi EPF.	1) Work on the use and the capital increase of Hanoi EPF.
Challenge 4: Streamlining Regulation System			
	Action 4-1: Operation Rule for a Minimum Scale of Management Task	To set up the operational rule for a minimum scale of management tasks.	1) Set up the operation rule for certain minimum discharge for industrial wastewater fee, effluent water quality standard, and wastewater discharge license.

Source: JET

5) Conclusions

- The proposed Outline of Improvement Plan for Water Pollution Control aims to achieve the purpose that water pollution control will function well in promoting industrial wastewater measures by entities for mitigating environmental pollution. As a result of the problem and objective analysis, four challenges to attain the improvement purpose have been identified. By achieving this improvement purpose, water pollution control will solve uneven management which has been brought about by ineffective enforcement at present.
- The final outcome of Output 3 is titled as the Outline of Water Pollution Control Measures. As defined in PDM, this means that a more detailed implementation plan will be necessary before implementing the improvement plan as suggested here. It has been confirmed that this detailed planning for implementation will be made by DONRE separately, following this Project.
- Considering the character of this Outline of Improvement Plan, it is recommended that the detailed implementation schedule for the Project should be discussed separately in DONRE, and examination of the detail contents should be carried out. Figure 2.6-29 shows the referential road map for the Improvement Plan, assuming a period of five years.



Source: WG-3.

Figure 2.6-29 Road Map of the Improvement Plan for Water Pollution Control in Hanoi City

- In the Output 3 activities, PSD has been developed and actually used to store and process collected data. In the Improvement Plan proposed by WG-3, the integrated information system is a key instrument to support water pollution control by DONRE. It is expected that the system and stored data of PSD used in this Project will be utilized for structuring the integrated information system. The PSD developed in this Project can be used for actual management activities for water pollution control and, in the future, it should be considered that PSD would be upgraded into a more convenient and more functional type.
- The WG-3 tried the use of IWCR to assess the status of wastewater measures taken by entities. The rating scores of IWCR, as numerical indicators which may be calculated from the PST data created from PSD, represent the compliance status of environmental authorization, IWTP provision, wastewater fee, and so forth. It is recommended that DONRE applies IWCR to assess compliance status of entities, to set up improvement targets, and to select excellent entities for awarding.
- The main objective of the Improvement Plan is to improve water pollution control in the field of industrial wastewater management. HNI DONRE has been enforcing water pollution control by employing different environmental management activities and systems. In this JICA Project, there are other capacity components, such as PSI (Output 2-3), inspection (Output 2-4), and environmental awareness (Output 4), which complement capacity development in Output 3. In the detailed implementation plan of this Improvement Plan, it is suggested that outcomes from these capacity developments be considered and utilized also.

6) Joint Sector Seminar

A sector seminar on industrial wastewater management took place on 12 March, 2013, as a joint activity with Output 4. This seminar aimed to share the outcomes of Output 3 with other provincial DONREs, representatives of entities located in the model area, and others. A total of 61 participants attended this seminar. This was joined by 26 participants from DONRE, three from MONRE and VEA, ten from industrial enterprises, one from VCCI, two from JETRO, 15 from JICA and JET and four from mass media. Specifically, items shared in the seminar are as follows:

- Output 3:

- Improvement Plan of Water Pollution Control Measures in Hanoi
- Evaluation and Challenges of Industrial Wastewater Management in Vietnam and Introduction of Japanese Experiences
- Integrated Information System and Industrial Wastewater Management Rating (IWMR)

- Output 4:

- Explanation and Dissemination of “Introductory Guidebook for Industrial Wastewater Management” developed by Output 4
- Discussion on Industrial Wastewater Management

2.6.3 Achievements

2.6.3.1 Achievements of Output 3

Output 3 has implemented various activities along PDM and PO, taking respective steps for capacity development. Almost all activities in the capacity development of Output 3 have been completed, as of the end of March 2013. Through series of activities and discussions, the draft of the Outline of Improvement Plan of Water Pollution Control in Hanoi City has been prepared. It is expected that WG-3 will submit this said outline to PPC through the Director of DONRE in the near future. Table 2.6-13 summarizes the PDM indicators and achievement status as of the end of March 2013.

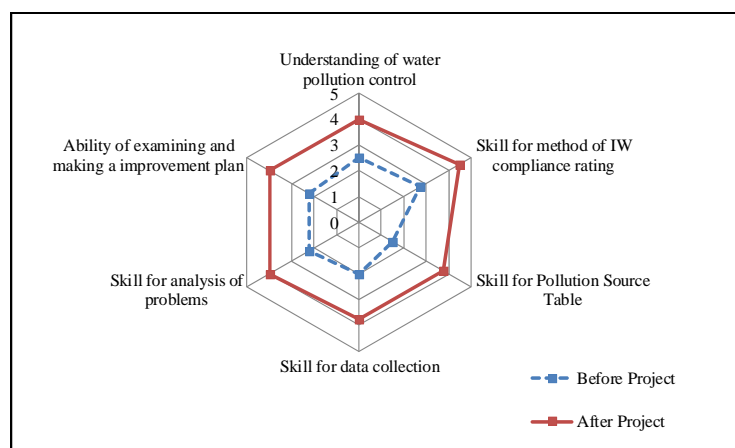
Table 2.6-13 Status of PDM Indicators at the end of the Project (WG-3: Measures)

Indicators	Status to be Achieved by each Organization	Status at the Beginning of the Project	Status at the End of the Project
3-1 A working group that work specifically on studying and making water pollution control measures are established and continues its activities, holding 10 times periodical meeting during the project period with more than 70% attendance rate.	Same as the indicator.	- The WG is yet to be organized.	- Since April 2011, discussion meetings have been held 17 times in total. Among them, 11 meetings had more than 70% attendance rate. - Through these discussion meetings, related technology transfer has been provided to the Vietnamese side.
3-2 Progress status of Output-3 is reported to the Director of DONRE every 6 months.	Same as the indicator.	- The activity of WG 3 is yet to be implemented.	- EPA has reported quarterly the progress status of Output-3 in its periodical working report.
3-3 The draft outline for effective water pollution control measure is submitted to PPC through Director of DONRE.	Same as the indicator.	- The Outline of Improvement Plan of Water Pollution Control is yet to be drafted. - Since data/information were limited, it was difficult to evaluate the status of industrial water measures implemented by industrial entities and the enforcement of water pollution control regulations by DONRE.	- The draft of the Outline of Improvement Plan of Water Pollution Control has been prepared in October 2013. - During the discussion meeting nos. 16 and 17, WG 3 members have examined and completed the draft of the outline of the improvement plan in March. - The draft outline is to be submitted to PPC from DONRE.

Source: JET

2.6.3.2 Capacity Assessment

Figure 2.6-30 shows the results of self-evaluation on the capacity development by using out-of-five ratings, comparing the ratings before and after the Project. The graph focuses on the items relating to capacity development elements.



Source: WG-3

Figure 2.6-30 Results of Self-Evaluation on Capacity Development

As a result of the series of activities, the capacity development of Output 3 has generated considerable effects on the whole, as indicated by the “Good (Level 4)” rating result in the self-evaluation of the Vietnamese counterparts. It is, however, envisaged that some capacity elements will not achieve the

“Very Good (Level 5)” rating. This is mainly because achieving such level of competency requires intensive and diverse daily experiences in developing and implementing improvement plans.

By employing the self-evaluation results of WG-3 members, JET has analyzed and examined the current status of the capacity development of Output 3 and a number of challenges to be tackled further, as shown in Table 2.6-14.

Table 2.6-14 Achievement Status and Further Challenges of Output 3

Indicators	Achievement Status	Further Challenges
Indicator 3-1: Working group	<ul style="list-style-type: none"> WG-3 has been organized by appropriate constituent members and has opened timely discussion meetings. 	<ul style="list-style-type: none"> Some of WG-3 members need to reconsider the use of opportunities for technology transfer.
Indicator 3-2: Basic assessment tools and reporting	<ul style="list-style-type: none"> WG-3 members have learned basic assessment tools like PSD, PST and PSM necessary for data/information management of water pollution control. As a result, they can now explain basic assessment tools, and can use them in a certain condition. The progress status of these activities has been informed to DONRE and PPC, periodically. 	<ul style="list-style-type: none"> The Vietnamese side needs to consolidate their skills more for actual application of PSD, PST and PSM, collaborating with other sections concerned in collecting and updating the contents.
Indicator 3-3: Improvement plan of water pollution control	<ul style="list-style-type: none"> WG-3 members have learned basic knowledge and skills in making the improvement plan for water pollution control, including collection, storing, management and analysis of data/information, examination and formulation of improvement plan. As a result, WG-3 members have acquired knowledge and skills in making improvement plan. It is evaluated that they can make improvement plan in certain condition. It is expected that they will be able to explain how to make improvement plan, and can examine and make an improvement plan in certain extent, till the end of the Project. During the Project, the final draft of the Outline of Improvement Plan has been prepared. 	<ul style="list-style-type: none"> The Vietnamese side needs to ensure their knowledge and skills in making improvement plan, through actual practices. The Vietnamese side needs to establish a collaboration regime among different sections of DONRE, ensuring collecting and managing data/information necessary for the examination of water pollution control.

Source: JET

2.6.3.3 Recommendations for Post Project Activities

Through a series of activities in Output 3, WG-3 has tackled capacity development with a plan on how to improve water pollution control. As a result, it is assessed that different abilities have been enhanced remarkably. Because the activities of Output 3 have been mainly performed by 3 to 5 officers of WG-3, coming from HNI EPA and other units, it is considered that the main issue in the future is how to disseminate the outcomes of this Project to the whole DONRE.

From such view, it is recommended that after this Project, DONRE takes the following actions to disseminate and realize the outcomes of Output 3:

- Following the Outline of Improvement Plan, DONRE should formulate a detailed implementation plan and ensure its implementation in order to verify the relevance of the proposed plan.
- DONRE should apply PSD to actual environmental management tasks, and update it as daily tasks, in order to construct a systematic information system and to improve environmental management through utilization.
- DONRE needs to set up appropriate opportunities for internal training to disseminate outcomes of Output 3 to other members of DONRE, especially members of EPA.

2.7 Output 4 (WG-4): Environmental Awareness

2.7.1 Introduction

2.7.1.1 PDM and PO

Based on the actual activities of WG-4, the PDM and PO were originally prepared at the beginning of the Project in June 2010 and were revised at the half of the Project period in June 2012. Table 2.7-1 shows the items related to environmental awareness (Output 4).

Table 2.7-1 PDM and PO Related to Environmental Awareness

Item	Contents
PDM	Output
Objectively Verifiable Indicators	<p>Target DONRE's capacity of promoting awareness of public and industrial sectors on water environment is strengthened.</p> <p>4-1 The results of the questionnaire survey to target groups such as industries, district/commune/ward officers, and social organizations, on environmental awareness show significant improvement, compared with the initial stage of the Project (consider the environmental awareness events as opportunities to conduct surveys);</p> <p>4-2 Tools (e.g., film for the public and introductory guidance for industries) to promote environmental awareness targeting public and industries are developed.</p> <p>4-3 Environmental awareness activities with target groups are conducted, making use of newly developed tools.</p> <p>4-4 The results of the capacity assessment targeting DONRE officers show improvement as compared with the initial stage of the Project.</p>
Means of Verification	<p>4-1 Questionnaire survey (report showing the results)</p> <p>4-2 Tools to promote environmental awareness</p> <p>4-3 Record of event implementation</p> <p>4-4 Results of capacity assessment</p>
Activities	<p>4-1 Review the current system and situation of environmental awareness activities at target provinces.</p> <p>4-2 Make awareness raising plans for water environment to be conducted by target DONREs.</p> <p>4-3 Conduct awareness raising activities in accordance with the plan set at 4-2.</p> <p>4-4 Review and improve awareness raising activities based on the result of 4-3.</p>
PO	4-1
	4-2
	4-3
	4-4

Source: JET

2.7.1.2 Review and Analysis of Implementing Organization and Past Activities of Environmental Awareness Activities in Target DONREs

The Law on Environmental Protection (LEP) (No.52/2005/QH11) stipulates the responsibilities of governments related to environmental awareness such as:

- Step-up propaganda, education, and mobilization in combination with application of administrative, economic, and other measures to build self-consciousness and discipline related to environmental protection activities (Article 5-2);
- Propaganda, education, and mobilization of all the people to participate in environmental protection is encouraged (Article 6.1);
- Good practice and performance on environmental protection shall be disseminated and rewarded (Article 106); and
- Environmental education and training for environmental protection are promoted (Article 107).

However, the implementation of environmental awareness activities in the target DONREs is still in its preparatory stage. As shown in Table 2.7-2, only HCMC DONRE set the specialized section in charge of environmental awareness, and not many activities are being implemented except for HPG and HCMC, due to the of lack of human and financial resources.

Table 2.7-2 Review of Results of Environmental Awareness Activities

Item	HNI	HPG	TT-HUE	HCMC	BRVT
1)Framework of environmental awareness	<p>a) Responsible section Project Management and Communication Division of EPA (Not specialized in environmental awareness)</p> <p>b) 7 staff</p> <p>c) 7 activities in 2010</p>	<p>a) Responsible section Administrative Division of EPA (Not specialized in environmental awareness)</p> <p>b) 8 staff</p> <p>c) 26 activities in 2010</p>	<p>a) Responsible section EIA Appraisal Division of EPA (Not specialized in environmental awareness)</p> <p>b) 4 staff</p> <p>c) 9 activities in 2010</p>	<p>a) Responsible section Environmental Information and Training Division of EPA</p> <p>b) 14 staff</p> <p>c) Activity 20 activities in 2010</p>	<p>a) Responsible section Pollution Control Division of EPA (Not specialized in environmental awareness)</p> <p>b) 8 staff</p> <p>c) 4 activities in 2010</p>

Item	HNI	HPG	TT-HUE	HCMC	BRVT
2) Summary of current awareness activity in 2010	a) Training course: Lectures on environmental legislation for district officers b) Event: Organize annual events to encourage environmental consciousness for public c) Mass media: Broadcasting environmental information by radio and TV program d) Pilot activity: Raising awareness of residents focusing on water environment in To Lich River	a) Training course: Lectures on environmental protection, legislations for district officers and enterprises b) Event: Same as HNI c) Workshop: Workshop on specific environmental topics for government officers	a) Training course: Lectures on environmental legislations and provincial environmental management for district officers, residents, enterprises. b) Event: Same as HNI c) Contest: Eco-quiz contest for officers and farmers d) Mass media: Same as HNI	a) Training course: Lectures and study tour on community based environmental management for officers, residents. b) Event: Same as HNI Some original events organized by HEPA c) Contest: Eco-quiz and various contest for women, workers, students, farmers, pupils d) Mass media: Same as HNI e) Pilot activity: Community-based environmental management program in 4 wards f) Workshop for district: Officers to discuss ideas to improve environmental awareness activity	a) Training course: Lectures on environmental legislations for enterprises and workers b) Event: Same as HNI
3) Constraints	-No section specialized in environmental awareness - Little experience on awareness activity targeted on industrial wastewater	-No section specialized in environmental awareness - Little experience on awareness activity targeted on industrial wastewater	-No section specialized in environmental awareness -Little experiences to implement awareness activity on water pollution issue	- Little experience on awareness activity targeted on industrial wastewater -Few activities utilizing information obtained by relevant sections of DONRE	-No section specialized in environmental awareness - Little experience to implement awareness activity
4) Training Needs	a) OJT on awareness activity focusing on industrial wastewater b) Enhancement of current environmental awareness activity by utilizing information obtained by relevant sections of DONRE	a) Lecture on planning and implementation of awareness activity b) OJT on awareness activity focused on water environmental pollution	a) Lecture on planning and implementation of awareness activity b) OJT on awareness activity focused on water environmental pollution	a) OJT on awareness activity focusing on industrial wastewater b) Enhancement of current environmental awareness activity by utilizing information obtained by relevant sections of DONRE.	a) Lecture on planning and implementation of awareness activity b) OJT on awareness activity focusing on water environmental pollution

Source: JET

2.7.1.3 Initial Capacity Assessment

In 2011, JET distributed CA survey questionnaire sheets to each DONRE by appointing WG-4 members from EPA as respondents, because EPA is mainly involved in environmental awareness activities. For Output 4, a total of 12 accomplished survey questionnaires were collected from all DONREs. In the questionnaire, the DONRE staff evaluated their capacities by themselves using five levels of evaluation method. The summary of the results are shown in Table 2.7-3. Based on the results, it was found out that the levels of the following capacities are considered to be relatively lower than other capacities, and to need be developed:

- Formulation of environmental awareness activity plan;
- Identification of stakeholders and target group for environmental awareness activity;
- Estimation and acquisition of budget for environmental awareness activity;
- Evaluation of environmental awareness activity by setting indicator and monitoring method;
- Report preparation of environmental awareness activity; and
- Improvement of environmental awareness activity based on the past activity.

Through OJT on environmental awareness activity conducted in the Project, the capacities mentioned above were the focus of the training activities.

Table 2.7-3 Summary of Initial CA for Output 4

Stage	Knowledge/Experience/Skill	Answer on Level of Capacity					
		5 (High -est)	4	3	2	1 (Low- est)	Average
Planning	Can you explain the procedures needed to prepare environmental awareness activity plan?	3	0	2	2	1	2.2
	Can you identify the relevant officials, departments/divisions within and outside DONRE related to environmental awareness activities?	2	2	3	1	0	2.4
	Can you identify social organizations/associations such as WU, YU and/or resource persons such as universities, donors who can be involved in environmental awareness activity?	3	2	4	1	0	3.1
	Can you explain how to identify the environmental awareness issues to be improved?	1	1	5	1	1	2.3
	Can you explain how to identify stakeholders and target group for environmental awareness activity?	2	1	3	1	1	2.2
	Can you identify the type of strategy/approach for environmental awareness activity such as direct approach or indirect approach?	2	1	3	3	0	2.4
	Are you involved in or consulted on preparing environmental awareness activity plan, which contains the objective, target, approach, activity, schedule, and budget?	2	2	3	0	2	2.4
Implementa- tion	Can you explain how to involve relevant officials within and outside the DONRE for implementing environmental awareness activity?	1	3	3	2	0	2.5
	Can you explain how to procure materials and/or organize workshops for implementing environmental awareness activity?	3	0	3	2	1	2.4
	Can you explain how to estimate and acquire the necessary budget for implementing environmental awareness activity?	3	0	1	3	2	2.2
Evaluatio- n	Can you explain the indicator and monitoring method for environmental awareness activity?	1	0	2	3	3	1.7
	Can you express your personal evaluation for environmental awareness activity and explain the reason for each evaluation?	1	2	4	0	3	2.3
Report writing	Are you involved in report preparation of environmental awareness activity?	2	1	2	2	2	2.2
	Can you make suggestion to improve similar environmental awareness activity in the future?	1	2	3	1	1	2.1

Note: 12 accomplished questionnaires were collected from all DONREs. However, some staff did not answer all questions, so total number of answers in each question is lower than 12.

The highlighted capacities mean that the level of capacities is relatively lower than other capacities.

Source: JET

2.7.1.4 Capacity Development (CD) Plan

By reviewing past environmental awareness activities, it was found out that the target DONREs do not have enough experience to conduct environmental awareness activity focused at specific geographical areas and pollution sources directly contributing to their water environmental management. Therefore, the capacity development on environmental awareness should focus more on planning and implementation of environmental awareness activities in critical areas and sources of pollution to improve or conserve water environment. In line with this, the collaboration and coordination with Output 2 (Monitoring, Inventory, and Inspection) and Output 3 (Water Pollution Control Measures) activities are indispensable in order to analyze the current condition, structure of problems, and countermeasures of pollution issues. Moreover, it is important to exchange experiences among DONREs, in order to continuously improve the effectiveness of environmental awareness activities. Therefore, the goals of CD for Output 4 are set as follows:

- To implement environmental awareness activities on specific water environmental problems;
- To conduct environmental awareness activities by using the results of Outputs 2 and 3;
- To improve planning, implementation, and monitoring and evaluation skills on environmental awareness activities; and
- To exchange and disseminate experiences and lessons learned among DONREs, in order to improve effectiveness and practicability of DONRE's pollution control measures.

The CD plan was designed considering the abovementioned goals as shown in Table 2.7-4. Actual activities for capacity development are conducted through the joint effort between members of WG-4 of the Vietnamese side and JET.

Table 2.7-4 Capacity Development Plan for Output 4

Phases Items	Phase I (Initial)	Phase II (Mid-Term 1)	Phase III (Mid-Term 2)	Phase IV (Final)
CD Objectives	- To enhance the ability of planning environmental awareness activity on water environmental management.	- To enhance the ability of implementing environmental awareness activity on water environmental management.	- To enhance the ability of planning and implementing environmental awareness activity by utilizing Outputs 2 and 3.	- To enhance the ability of disseminating lessons obtained from activity.
Work Contents	1) Review of current organizational system and past activities on environmental awareness; 2) Identification of target area for environmental awareness activity; 3) Formulation of Work Plan for the 1 st year;	4) Preparation for environmental awareness activity for 1 st year; 5) Implementation of environmental awareness activity for 1 st year; 6) Reviewing of activity and improvement for 2 nd year;	7) Formulation of environmental awareness activity plan for 2 nd year using Outputs 2 and 3; 8) Preparation for environmental awareness activity for 2 nd year; 9) Implementation of environmental awareness activity for 2 nd year;	10) Reviewing of activity and evaluation of achievement; 11) Sharing experiences among target DONREs; 12) Preparation of procedural manual for environmental awareness activity by lessons obtained from activities.
Expected Outputs	- Work Plan for Output 4 - Program for environmental awareness activity (1 st year)	- Material for environmental awareness activity (1 st year) - Environmental awareness activity report (1 st year)	- Program for environmental awareness activity (2 nd year) - Material for environmental awareness activity (2 nd year)	- Preparation of environmental awareness activity report (2 nd year) - Procedural manual for environmental awareness activity
Facilitator	JET	JET	JET	JET
Target Group	Members of WG-4 and associated members	Members of WG-4 and associated members	Members of WG-4 and associated members	Members of WG-4 and associated members
CD activity	Joint working between C/Ps and JET	Joint working between C/Ps and JET	Joint working between C/Ps and JET	Joint working between C/Ps and JET
Period	Between April 2011 and September 2011	Between October 2011 and March 2012	Between April 2012 and September 2012	Between October 2012 and February 2013

Source: JET

2.7.1.5 Preparation of Work Plans (WPs)

To attain the CD objectives and expected outputs set forth in the CD plan, the Work Plan (WP) for Output 4 was developed as shown in Table 2.7-5. The WP was revised and updated as necessary in the course of the Project based on the discussions between C/P and JET. In the WP, the environmental awareness activities that focused on the target areas were planned in the first year of the Project paving the ways to implement the improved and enhanced activities by utilizing the outcomes obtained in Outputs 2 and 3 in the second year of the Project.

Table 2.7-5 Summary of Work Plan for Output 4

DONRE	Item		Description
HNI	Target area		Tu Liem and Ha Dong District
	Goal		Capacity of DONRE promoting awareness of enterprises on industrial water environment is strengthened.
	1 st year	Activity	Workshops for enterprises
		Purpose	The enterprises in Tu Liem and Ha Dong District recognize the relevant water environmental legislations, access method to support and incentive for environmental investment, and discussions on the applicable measures for industrial wastewater management.
		Target	Enterprises
		Timing	December 2011
		Program	- Presentation on industrial wastewater management in Hanoi City - Discussion on applicable measures on industrial wastewater management
	2 nd year	Activity	-Development of introductory guidebook on industrial wastewater management -Holding sector seminar in collaboration with Output 3 and disseminate introductory guidebook for enterprises.
		Purpose	-The enterprises in Tu Liem and Ha Dong districts are aware of the relevant water environmental legislations, financial assistant system, and industrial wastewater management measures. -The outcomes obtained in Output 3 activities are shared among the relevant government organizations and enterprises.
		Target	Enterprises and related government officers
		Timing	June 2012 – March 2013
		Program	Development of Introductory Handbook on Industrial Wastewater Management A handbook will be developed to be used by the enterprises to guide them in understanding the relevant water environmental legislations, financial assistant system, and industrial wastewater management measures.

DONRE	Item		Description
			Holding Sector Seminar Holding sector seminar aiming at disseminating developed handbook and outcome obtained from Output 3 activities among relevant government organizations and enterprises.
HPG	Target area		Re River basin
	Goal		The capacity of DONRE promoting awareness of public and enterprises on source water protection is strengthened.
	1 st year	Activity	Workshop and study tour
		Purpose	Relevant district officers and leaders of social organizations recognize the current water environmental condition in Re River and examine environmental awareness activity to be implemented in the second year of the Project.
		Target	Leaders of social organizations as well as district DONRE officers
		Timing	December 2011
		Program	- Presentation on awareness raising for water environmental management in Re River - Study tour in Re River - Discussion on environmental awareness activity in Re River
	2 nd year	Activity	- Workshop for enterprises - Publicity to residents
		Purpose	- The enterprises in Re River basin studied by Output 2-2 (Inventory) recognize the measures on industrial wastewater management. - The residents and social unions recognize the measures on water environmental management in Re River.
		Target	Enterprises, residents, and social organizations in Re River basin
		Timing	November 2012 – January 2013
		Program	Workshop for enterprises - Presentation on current water environmental condition in Re River - Presentation on industrial wastewater management - Discussion on industrial wastewater management in Re River Publicity to residents and enterprises by TV reports and signboards For the purpose to publicize the environmental situation of Re River, publicity to residents and enterprises will be conducted by producing TV reports and signboards.
TT-HUE	Target area		Tam Giang – Cau Hai Lagoon and Huong Rivers
	Goal		The capacity of DONRE promoting awareness of public and enterprises on water environment is strengthened.
	1 st year	Activity	Workshop and study tour
		Purpose	District officers and leaders of social organizations understand the current water environmental condition in TGCH lagoon and necessary countermeasures on shrimp farming.
		Target	District officers and leaders of social organizations
		Timing	December 2011
		Program	- Presentation on awareness raising for water environmental management in Tam Giang – Cau Hai Lagoon - Study tour to Tam Giang – Cau Hai Lagoon - Group discussions on environmental management in Tam Giang – Cau Hai Lagoon
	2 nd year	Activity	- Workshop for enterprises - Simple water quality survey and garbage cleaning up event
		Purpose	- The enterprises studied by Output 2-2 (Inventory) understand the measures on industrial wastewater management - DONRE will improve the cooperation on environmental awareness activity with district officers and social organizations by organizing events on water environmental protection.
		Target	- Enterprises in TGCH Lagoon and Huong River area - Residents, students, and social organizations
		Timing	September – November 2012
		Program	Workshop for enterprises - Presentation on current water environmental condition - Presentation on industrial wastewater management - Discussion on industrial wastewater management Simple water quality survey and garbage cleaning up event with residents and social organizations Organizing simple water quality survey garbage clean up events with districts, social organizations, residents, and students.
HCMC	Target area		Tan Quy Industrial Cluster
	Goal		Capacity of DONRE promoting awareness of enterprises in Tan Quy Industrial Cluster on industrial water environment is strengthened.
	1 st year	Activity	Workshop for enterprises in Tan Quy Industrial Cluster
		Purpose	Target enterprises understand current water environmental management in Tan Quy Industrial Cluster
		Target	Enterprises in Tan Quy Industrial Cluster
		Timing	February 2012
	2 nd year	Program	- Presentation on water environmental management in Tan Quy Industrial Cluster - Discussion on applicable measures on industrial wastewater management
		Activity	- Development of handbook on industrial wastewater management and its distribution - Organize garbage cleaning up event
		Purpose	- Enterprises in Tan Quy Industrial Cluster understand relevant water environmental legislations, financial assistance and industrial wastewater management measures - DONRE will improve cooperation on environmental awareness activity with social organizations and residents by organize events on water environmental protection
		Target	- Enterprises in Tan Quy Industrial Cluster - Residents, students and social organizations

Source: JET

2.7.2.1 Activities Compared with PO

[illegible]

Figure 2.7-1 Progress of Project Activities Against the Plan of Operations (PO)

At the beginning of the Project, WG-4 reviewed the framework and the past activities of environmental awareness in each DONRE, and discussed the constraints and training needs for environmental awareness. The results of review were summarized in Table 2.7-5 and were used for developing CD plan and WP.

2.7.2.3 Activity 4-2: Make Awareness of Raising Plans for Water Environment to be Conducted by Target DONREs

Based on the review results of current situation of environmental awareness activities of target DONREs and CD plan, the WP was firstly developed from July to September 2011 in each DONRE and it was periodically revised and updated as may be necessary in the course of the Project as summarized in Table 2.7-5

2.7.2.4 Activity 4-3: Conduct of Awareness Raising Activities in Accordance with the Plans

(1) Workshops in the First Year

1) Objectives

As planned in WP, the environmental awareness workshop was held in each DONRE in the first year with the objectives listed below:

- i) To raise environmental awareness of enterprises, related government organizations, and residential groups in the target area;
- ii) To strengthen the capacity of DONRE counterparts on environmental awareness activities; and
- iii) To examine and formulate environmental awareness activity plan for the second year of the Project.

2) Participants

The participants of workshops varied in each DONRE depending on their target area. As HNI and HCMC DONREs focused on industrial wastewater, the invitees were mainly enterprises. HPG, TT-HUE, and BRVT DONREs focused on specific areas where water pollution is a concern, and the invitees consisted of district officers and social organizations so as to build-up partnership in environmental awareness activities.

3) Program

The workshop consisted of a lecture session and a group discussion session. In the lecture session, DONRE, JET, and other resource persons conducted presentations on how to enhance the participants' understanding on target area. In addition, a field trip was held in HPG, TT-HUE, and BRVT for better understanding of the target areas. Group discussions were held to identify and analyze the problems, attempt to seek the countermeasures against water pollution, and finally to clarify the actions to be taken in the next year. The summary of the workshops held in each DONRE is shown in Table 2.7-6, and photographs taken during each workshop are shown in Figure 2.7-2.

Table 2.7-6 Summary of Environmental Awareness Workshops in the First Year

DONRE	Item	Description
HNI	Date/Venue	8 December 2011, 14:00~17:00, Bao Son Hotel
	Participants	Enterprises (mainly from Tu Liem and Ha Dong districts), DONRE, DOIT, DOST, DARD of Hanoi City, DONRE of Tu Liem and Ha Dong districts, Vietnam Chamber of Commerce and Industry (VCCI), Hanoi Environmental Protection Fund (HEPF), Hanoi TV, JET (52 persons in total)
	Purpose	-The enterprises will raise awareness on obligations, financial support, applicable technology on industrial wastewater management; -DONRE will get feedback on the necessary measures to improve industrial wastewater management from enterprises and relevant organization.
	Contents (Tool/Material)	-Presentation on industrial pollution control activities in Hanoi City (HNI EPA) -Presentation on legislations regarding industrial wastewater management (HNI EPA) -Presentation on access method to support for environmental investment by enterprises (HEPF) -Presentation on Japan's experience in industrial wastewater management (JET) -Group discussion on applicable measures on industrial wastewater management (HNI EPA)
	Major discussion results	-Enterprises expressed that they need three kinds of information, which are laws and regulations on wastewater management, wastewater treatment technology, and financial support scheme. -A participant from an enterprise commented that they already invested in a wastewater treatment facility by borrowing from a city bank. He did not know a preferential loan from EPF before. -Some participants in-charge of environmental management in their enterprises are busy and have not only environmental management task but also many other tasks. Therefore it is difficult for them to understand all laws and regulations.

DONRE	Item	Description
	Lessons/ Feedbacks	-The result of questionnaire survey shows that the contents/messages of the workshop were well delivered to its participants. -It is preferable to develop a handbook to facilitate information dissemination to more enterprises and for longer period of time.
HPG	Date/Venue	20 December 2011, 07:30~16:00, Song Gia Resort
	Participants	DONRE, DOST, DARD of Hai Phong City, Hai Phong Water Supply Co., Ltd., An Hai Irrigation Company, HEZA, Environmental Protection Association, WU (Woman's' Union), FA (Farmer's Union), LU (Labor's Union), YU (Youth Union), related district DONREs and PCs, Hai Phong TV, JET (55 persons in total)
	Purposes	-Related government and social organizations will understand the current situation of water environment in Re River and function of An Duong Water Purification Plant; -DONRE will acquire feedbacks on the necessary measures to improve water environmental management in Re River from relevant organizations.
	Contents (Tool/Material)	-Field visit to Re River -Presentation on An Duong Water Purification Plant (HPG Water Supply Co., Ltd) -Presentation on water source management activities in Re River (Irrigation An Hai Co., Ltd) -Presentation on status of water quality in Re River and main sources causing (HACEM) -Presentation on Japan's experience in industrial pollution control, and environmental awareness activity (JET) -Group discussion to enhance the capacity of environmental management in Re River
	Major discussion results	-It was confirmed that there are a variety of stakeholders that will utilize Re River water; and there were many ideas/proposals for the conservation of water resources of Re River, such as information exchange among agencies/organizations concerned, awareness raising for enterprises on laws and regulations, and awareness raising for the public through mass media. -A participant suggested to set-up a network, so that all stakeholders can exchange information and discuss countermeasures to be taken.
	Lesson/ Feedback	-Result of questionnaire survey shows that the contents/messages of the workshop were well delivered to participants. -It is preferable to plan environmental awareness activity focusing on enterprises as well as public relation activity by means of mass media.
HUE	Date/Venue	13 December 2011, 08:30~17:00, Tam Giang Resort and Spa
	Participants	DONRE, DARD of TT-HUE Province, related District DONREs and DARDs, FA, WU, YU, VA, Hue University, Hue TV, Hue Magazine, JET (54 persons in total)
	Purposes	-Related government and social organizations will understand the current situation and pollution sources in TGCH Lagoon; -DONRE will acquire feedbacks on necessary measures to improve water environmental management in TGCH Lagoon from relevant organizations.
	Contents (Tool/Material)	-Field visit to TGCH Lagoon -Presentation on current water environment in TGCH Lagoon (Hue University) -Presentation on aquaculture in TGCH Lagoon (TT-HUE DARD) -Presentation on water environmental management (TT-HUE DONRE) -Group discussions on environmental awareness activity in TGCH Lagoon
	Major discussion results	-It is necessary for the stakeholders of TGCH Lagoon to take countermeasures against aquaculture, pollution load from enterprises, domestic wastewater discharge, and solid waste. -It is important to promote awareness activity for enterprises and public in collaboration with stakeholders.
	Lesson/ Feedback	-Result of questionnaire survey shows that the contents/messages of the workshop were well delivered to participants. -It is necessary to plan awareness raising workshop focusing on enterprises, and at the same time, environmental awareness activities for residents and students in collaboration with social organizations.
HCMC	Date/Venue	7 February 2012, 08:00~11:30, Norfolk Hotel
	Participants	Enterprises in Tan Quy Industrial Cluster, VEA, DONRE and DOIT of HCMC, Cu Chi, District 12 and Thu Duc districts DONRE, Saigon newspaper company, JET (66 persons in total)
	Purposes	-Enterprises will raise awareness on obligations, financial support, applicable technology on industrial wastewater management; -DONRE will get feedback on the necessary measures to improve industrial wastewater management from enterprises and relevant organization.
	Contents (Tool/Material)	-Presentation on water quality condition in Ba Bep Canal and Saigon River (DONRE) -Presentation on wastewater quality and environmental management in TQIC (DONRE) -Presentation on laws and regulations on industrial wastewater management (DONRE) -Presentation on cleaner production technology (VNCPC) -Presentation on Japan's experience in industrial pollution control (JET) -Discussions on applicable measures on industrial wastewater management
	Major discussion Results	-The enterprises expressed their willingness to follow the regulations and requested DONRE to provide information or training on wastewater treatment technology and detailed information on cleaner production.
	Lesson/ Feedback	-Result of questionnaire survey shows that the contents/messages of the workshop were well delivered to participants. -It is preferable to develop handbook to disseminate the information to more enterprises and for longer period.
BRVT	Date/Venue	16 December 2011, 07:30~16:00, Long Hai Resort
	Participants	BRVT DONRE, DONRE in Vung Tau City and Long Dien District, related commune PC, Environmental Police, WU, YU, FA, JET (38 persons in total)
	Purpose	-Related government and social organizations will understand the current situation of water environment in Cua Lap River and pollution sources in Vung Tau City and Long Dien District; -DONRE will get feedback on necessary measures to improve water environmental management in Re River from

DONRE	Item	Description
		relevant organizations.
	Contents (Tool/Material)	<ul style="list-style-type: none"> -Field visit to Cua Lap River -Presentation on current situation in Cua Lap area by BRVT DONRE -Presentation on pollution treatment situations in Vung Tau City by Vung Tau City DONRE -Presentation on pollution treatment situations in Long Dien District by Long Dien District DONRE -Presentation on Japan's experience in industrial pollution control, and environmental awareness activity by JET -Group discussions to enhance the capacity of environmental management in Re River
	Major discussion result	<ul style="list-style-type: none"> -It was confirmed that the awareness raising for enterprises on compliance with environmental laws is important; -Social organizations and communities leaders expressed their willingness to implement the awareness raising activities in cooperation with DONRE; -Ideas of awareness raising activities such as environmental patrol by social unions/communities by checking water quality and making pollution map, and producing an environmental film, were proposed.
	Lesson/Feedback	<ul style="list-style-type: none"> -Result of questionnaire survey shows that the contents/messages of the workshop were well delivered to participants. -It is preferable to plan environmental awareness activity so that enterprises and residents will understand importance of water environmental protection in Cua Lap River.

Source: JET

	
Presentation conducted by Hanoi Environmental Protection Fund in HNI W/S	Group Discussion with Enterprises in HNI W/S
	
Study Tour to An Duong Water Purification Plant in HPG W/S	Group Discussion with Social Organizations in HPG W/S
	
Explanation conducted by Fishers Association in the Study Tour in TT-HUE W/S	Presentation of Result of Group Discussion in TT-HUE W/S

	
Presentation conducted by HCMC DONRE in HCMC W/S	Discussion with Enterprises in HCMC W/S
	
Study Tour to Seafood Processing Factory in BRVT W/S	Group Discussion with Social Organizations in BRVT W/S

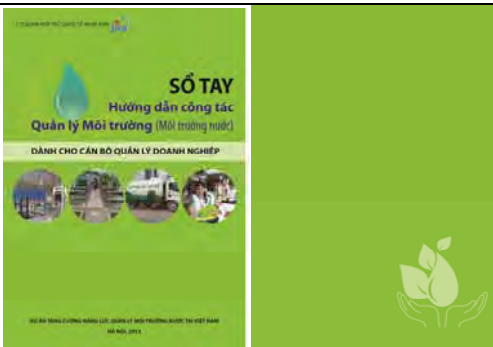
Source: JET

Figure 2.7-2 Photographs taken during the Workshops in each DONRE

(2) HNI DONRE

1) Handbook on Guiding Environmental Management Work (Water Environment) for Enterprises Managers

In order to raise the awareness and understanding of enterprises on obligations, financial supports, and technologies related to industrial wastewater management, the Handbook on Guiding Environmental Management Work (Water Environment) for Enterprises Managers, which summarizes the essential information for industrial wastewater management, was developed. The table of contents of the guidebook and the cover image of developed handbook are shown in Figure 2.7-3.

<p>I. Regulations related to industrial wastewater</p> <p>II. What do enterprises need to do in investment preparation stage?</p> <p>III. Responsibilities of enterprises before official project operation</p> <p>IV. Responsibilities of enterprises in project operation stage</p> <p>V. Some necessary issues should be considered</p> <p>APPENDIX</p>	
Table of Contents	Cover Image

Source: JET

Figure 2.7-3 Table of Contents and Cover Image of the Developed Handbook in HNI

2) Sector Seminar

To share the outcomes of activities under WG-3 and to disseminate the handbook prepared by WG-4 to the enterprise managers, a sector seminar on industrial wastewater management was held in March 2013. The summary of sector seminar and some photographs taken during the said event are presented in Figure 2.7-7 and Figure 2.7-4.

Table 2.7-7 Summary of Sector Seminar in HNI

Date/Venue	12 March 2013, 08:00~12:00, Bao Son Hotel
Participants	DONRE of Hanoi City, related District DONREs, VEA, other target DONREs, enterprises, VCCI, Hanoi DOIT, HEPZA, JICA, JETRO, JET, etc (80 persons in total)
Purposes	-DONRE will disseminate the introductory guidebook on industrial wastewater management. -Enterprises will raise the awareness on water pollution control measures as well as obligations, financial support, and applicable technology on industrial wastewater management.
Contents (Tool/Material)	-Presentation on the improvement plan of water pollution control measures in Hanoi (by WG-3) -Presentation on the evaluation and challenges of industrial wastewater management in Vietnam and introduction of Japanese experiences (by WG-3) -Presentation on the integrated information system and industrial wastewater management rating (IWMR) (by WG-3) -Introduction of handbook on guiding environmental management work (water environment) for enterprise managers -Discussion on industrial wastewater management
Major Discussion Results	- To improve the compliance of enterprises is very important. HNI DONRE strongly implements checking and inspection of at least 500 enterprises/year. The current regulations in HNI became stricter than before. - Water management should be consistent with the land use regulations. The enterprises among the residential areas should not cause water pollution. - The enterprises making great efforts to improve the water quality of their industrial wastewater should be rewarded and awarded.
Lesson/Feedback	-The result of questionnaire survey shows that the contents/messages of the seminar were well delivered to its participants. Especially, the contents of the guidebook on industrial wastewater management were highly evaluated. -It is preferable to hold this kind of seminars for enterprises more frequently to further communicate between DONRE and enterprises.

Source: JET



Source: JET

Figure 2.7-4 Images taken during the Sector Seminar in HNI

(3) HPG DONRE

1) Workshops for Enterprises

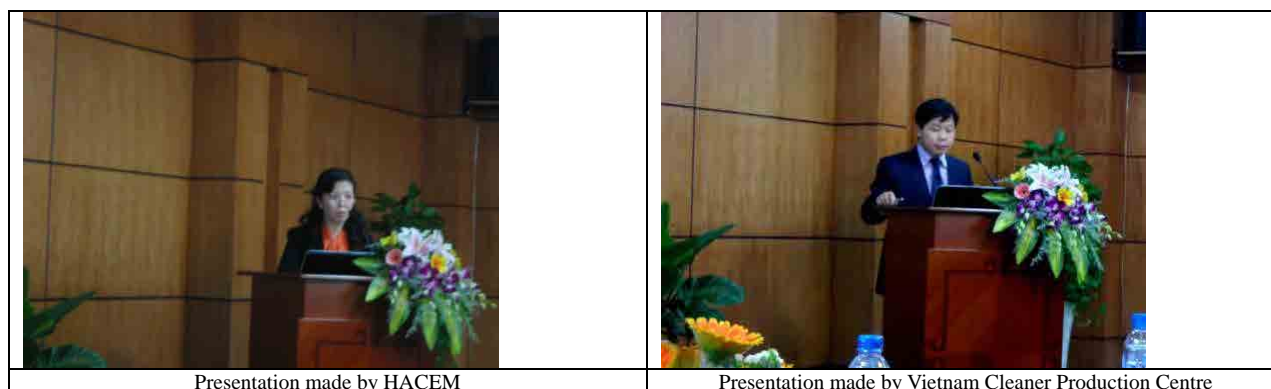
An awareness raising workshop on industrial wastewater management was held in November for enterprises in Re River basin, which were identified and studied by Output 2-2 (Inventory) in the first year. The summary and selected images taken during the workshop are presented in Table 2.7-8 and Figure 2.7-5.

Table 2.7-8 Summary of Workshop for Enterprises in HPG

Date/Venue	28 November 2012, 08:00~12:00, Hai Phong City Conference Centre
Participants	HPG DONRE, Environmental Police Department, Department of Healthcare, DOIT, DARD of HPG City, District DONREs, enterprises in Re River basin, VEPF, VNCPC, YU, LU, WU, VU, environmental protection association, HPG TV, newspaper, Hai Phong water supply one-member Ltd. Co., An Hai irrigation works exploitation one-member Ltd. Co., JET (65 persons in total)
Purposes	-Enterprises will raise the awareness on obligations, financial support, applicable technology on industrial wastewater management; -DONRE will get feedback on necessary measures to improve industrial wastewater management from enterprises and relevant organizations.
Contents (Tools/Materials)	-Water quality condition and inventory of pollution sources in Re River (HACEM) -Presentation on An Duong Water Purification Plant (HPG Water Supply Co., Ltd.) -Financial Support and Incentive for environmental protection investment (VEPF) -Applicable technology for industrial wastewater management (VNCPC) -Presentation on Japan's experience in industrial wastewater management (JET)
Major Discussion Results	-Enterprises need to know the detailed and compiled information on their responsibilities on industrial wastewater management, wastewater treatment technology with low cost and easy to apply, procedures to access for financial support. -Therefore the enterprises are allowing DONRE to provide consulting on related regulations and access to financial support, and technology transfer.
Lessons/Feedbacks	-The results of questionnaire survey show that the contents/messages of the workshop were appropriate and matching with the enterprises' needs.

Date/Venue	28 November 2012, 08:00~12:00, Hai Phong City Conference Centre
	-DONRE should coordinate to share information on pollution source inventory, monitoring results and so on among related organizations and enterprises.

Source: JET



Presentation made by HACEM

Presentation made by Vietnam Cleaner Production Centre

Source: JET

Figure 2.7-5 Images taken during the Workshop for Enterprises in HPG

2) TV Reports and Signboard

To raise the public awareness on water environmental protection in Re River, TV reports and a signboard were produced. WG-4 examined the topics and contents of TV reports, and designed and constructed a signboard in collaborating with An Duong District, Hai Phong Water Supply One-member Ltd. Co. and An Hai Water Irrigation Works Exploitation One-member Ltd. Co. Figure 2.7-6 shows the developed TV reports and signboard.



Sample Content and DVD of TV Report

Screen Capture of Produced TV Reports

Installed Signboard nearby Re Bridge

Design of Signboard

Source: JET

Figure 2.7-6 Produced TV Reports and Signboard in HPG

(4) TT-HUE DONRE

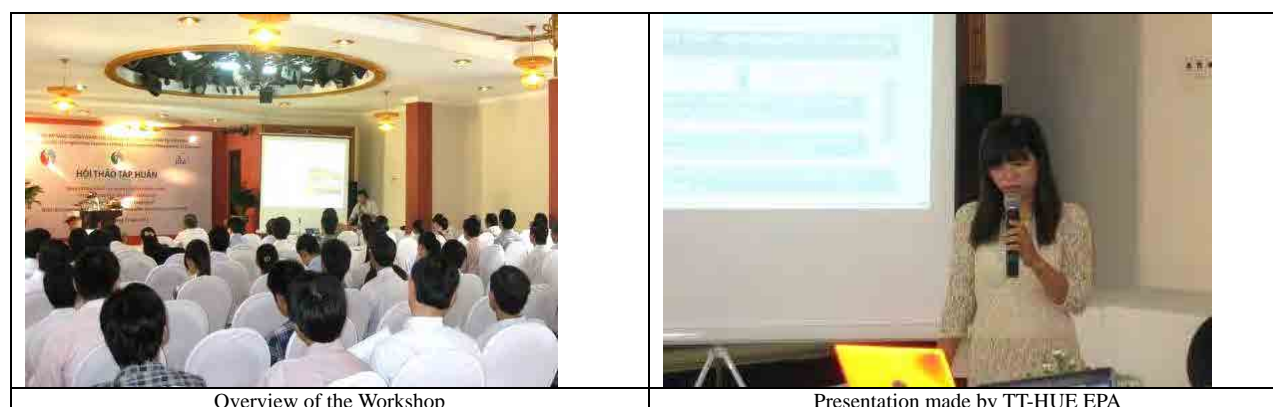
1) Workshop for Enterprises

An awareness raising workshop on industrial wastewater management was held in November for enterprises in TT-HUE Province, which was identified and studied in Output 2-2 (Inventory). The summary and the images taken during the workshop are presented in Table 2.7-9 and Figure 2.7-7.

Table 2.7-9 Summary of Workshop for Enterprises in TT-HUE

Date/Venue	23 November 2012, 08:00~12:00, Festival Hotel
Participants	TT-HUE DONRE, District and Commune DONREs, Enterprises studied by Inventory Output, Management Boards of Economic Areas and Industrial Zones, TT-HUE EPF, VEPF, VNCPC, TT-HUE TV, Newspaper, JET (72 persons)
Purposes	-Enterprises will raise awareness on obligations, financial support, applicable technology on industrial wastewater management; -DONRE will get feedback on necessary measures to improve industrial wastewater management from enterprises and relevant organizations.
Contents (Tool/Material)	-Presentation on Water environmental management by TT-HUE DONRE (TT-HUE EPA) -Presentation on Inventory of pollution sources in TT-HUE and wastewater management in enterprises (TT-HUE EPA) -Presentation on Financial support and incentive for environmental protection investment (VEPF) -Presentation on Applicable technology for industrial wastewater management (VNCPC) -Presentation on Japan's experience in industrial wastewater management (JET)
Major Discussion Results	-Enterprises are willing DONRE to hold regular training course lecture on environmental regulations. -Enterprises are willing DONRE to provide technical and financial support on industrial wastewater treatment.
Lessons/Feedbacks	-The result of questionnaire survey shows that the contents/messages of the workshop were appropriate and matching with the enterprises' needs. -Most enterprises are willing to have more frequent W/S, lecture and training course on industrial wastewater management. DONRE should continue to hold those awareness raising activities by utilizing the materials developed under the Project.

Source: JET



Source: JET

Figure 2.7-7 Photographs taken during the Workshop for Enterprises in TT-HUE

2) Simple Water Quality Test and Clean-up Event

To raise public awareness on water environmental protection in Huong River and Tam Giang - Cau Hai Lagoon, activities such as simple water quality test and environmental clean-up were planned and held three times in September as shown in Table 2.7-10. WG-4 members examined the program for each event, prepared a manual, instruction paper and record sheets for water quality testing, and developed banners and t-shirts with message and graphic design. The photographs and the materials prepared for the events are shown in Figure 2.7-8.

Table 2.7-10 Summary of Simple Water Quality Test and Clean-up Event in TT-HUE

No.	Date	Time	Location	Participants
1st	1 September 2012	07:00~11:30	Nguyen Dinh Chieu Street	Social work team, Youth union under Hue University, EPA (63 person in total)
2nd	8 September 2012	07:00~11:00	Nguyen Van Troi School	Social work team, secondary school students, EPA (92 person in total)
3rd	22 September 2012	07:00~11:00	Huong Chu Market	Youth union under Hue University, local residents, EPA (103 person in total)

Source: JET




Source: JET

Figure 2.7-8 Photographs and Materials for the Events in TT-HUE

(5) HCMC DONRE

1) Introductory Guidebook for Enterprises

In order to raise awareness and understanding of enterprises on obligations, financial supports, and technologies related to industrial wastewater management, the introductory guidebook for enterprises which summarizes the essential information for industrial wastewater management was developed. The contents of the guidebook are similar with the one in HNI, but HCMC prepared it based on the current practice and future directions of industrial wastewater management in HCMC.

<p>Preface Part 1 Regulations Related to Wastewater 1. Regulations Related to Wastewater 2. Responsibilities of Organizations, Individuals on Environmental Protection 3. Sanction Regulations Related to Wastewater Part 2 Financial Support For Enterprises 1. Vietnam Environmental Protection Fund (VEPF) 2. Revolving Fund 3. Fund for Industrial and Small Scale Industry Pollution Minimization of Ho Chi Minh City (ISIPM FUND) 4. Recycling Fund Part 3 Cleaner Production Application 1. Cleaner Production Application References</p>	
Table of Contents	Cover Image of Developed Guidebook

Source: JET

Figure 2.7-9 Developed Introductory Guidebook in HCMC

2) PR Tool Production for Clean-up Event

To raise public awareness on water environmental protection in HCMC, hand fan with message and graphic design was developed by WG-4 and distributed in the clean-up event held on 16 September 2012. The photographs of the event and material prepared are shown in Figure 2.7-10. About 1000 participants gathered for the clean-up event.

	
Participants of the Clean-up Event	Cleaning a Yard of a Housing-Complex
	
Filling out Feedback Sheet for the Hand Fan	Produced Hand Fan

Source: JET

Figure 2.7-10 Photographs and Materials for Clean-up Event in HCMC

(6) BRVT DONRE

1) Environmental Film

In order to raise awareness of enterprises and public on water environmental management in Cua Lap River, an environmental film was developed. WG-4 examined the scenario of the film, locations of shooting and interviewees, and the produced film was broadcasted in local TV in BRVT. Figure 2.7-11 shows the photograph and material for developed environmental film.



Source: JET

Figure 2.7-11 Produced Environmental Film in BRVT

2.7.2.5 Activity 4-4: Review and Improve Awareness Raising Activities

(1) Examination and Reflection of Implemented Activities

The awareness raising activities were reviewed from January 2012 to March 2012 after Project Activity 4-3 of the first year was completed. HCMC DONRE started the review in February 2012. From May 2012 to June 2012, each DONRE and JET elaborated the awareness raising plan for the second year based on the results of the review in March 2012. This elaboration process is the improvement in Project Activity 4-4. In March 2013, each DONRE and JET reviewed the environmental awareness activities and found guidelines for future activities. Table 2.7-11 shows the summary of wrapped-up discussions.

Table 2.7-11 Summary of Wrapped-up Discussions

DONRE	Item	Description
HNI	Date	6 March 2013
	Name of Counterpart	Ms. Le Thanh Thuy, Head of Project Management and Communication Division, EPA Mr. Ta Ngoc Son, Vice Head of Project Management and Communication Division, EPA
	Contents	1. Review of Activities by all target DONREs 2. Capacity Development during the Project 3. Future Direction
	Review of Activities	- Any new activities cannot be seen in other DONRE activities. - Due to budget limitation, continuous awareness activities could not be implemented.
	Capacity Development	- HNI DONRE learned planning skills and careful preparation for events during the Project - HNI DONRE also learned the importance of obtaining feedbacks from others through Johari Windows concept.
	Future Direction	- HNI DONRE would like to conduct a variety of activities and ensure continuous environment awareness by applying "Plan-Do-See" process.
HPG	Date	26 February 26 2013
	Name of Counterpart	Ms. Nguyen Thi Tuyet Lan, Director of HACEM
	Contents	1. Review of Activities by all target DONREs 2. Capacity Development during the Project 3. Future Direction
	Review of Activities	- As a result of sharing of activities by other DONREs, HPG DONRE showed the interest in the handbook prepared by HNI and HCMC DONREs. - HPG DONRE could experience a variety of activities including a training, which injects new ideas of the activities.
	Capacity Development	- New skills and ideas could be acquired through the training for environmental awareness activities. Study tours for kids by the City of Yokohama inspired the officers of HPG DONRE. - HPG DONRE also views that the concept of Plan-Do-See was also important for conducting environmental awareness activity.

DONRE	Item	Description
	Future Direction	- Training of trainers will be conducted based on the contents of the training for environmental awareness activities by JET. - Events such as women's day event, tourism year event, will be conducted through Plan-Do-See process.
TT-HUE	Date	27 February 2013
	Name of Counterpart	Ms. Le Thi Hanh, Vice head of General Division, EPA
	Contents	1. Review of Activities by all target DONREs 2. Capacity Development during the Project 3. Future Direction
	Review of Activities	- As a result of sharing of activities by other DONREs, TT-HUE DONRE showed the interest in the handbook prepared by HNI and HCMC DONREs. - Some social organizations and districts are requesting TT-HUE DONRE to advise how to raise environmental awareness since the clean-up events and workshops for enterprises.
	Capacity Development	- Skills to make detailed plan for each activity could be enhanced. - The number of DONRE officers who get involved in organizing environmental awareness activities increased.
	Future Direction	- TT-HUE DONRE will continue holding a workshop for enterprises after this, but the topic will cover not only water environment but broader environment including solid waste management. - Events such as clean-up campaign, environmental day are also to be continued by taking Plan-Do-See process.
HCMC	Date	4 March 2013
	Name of Counterpart	Ms. Tran Thi Lien, Vice Head of Environmental Communication and Information Division, EPA Ms. Le Thi Thanh Dung, Vice Head of EIA Division, EPA
	Contents	1. Review of Activities by all target DONREs 2. Capacity Development during the Project 3. Future Direction
	Review of Activities	- As a result of sharing the activities by other DONREs, HCMC DONRE showed the interest in the signboard by HPG DONRE, because signboard installation has not been conducted yet in HCMC.
	Capacity Development	- Knowledge of awareness activities could be enhanced. They could learn the layers from attention to behavior. - Skills to evaluate the activities could be also developed.
	Future Direction	- HCMC DONRE will make an effort to further obtain evaluation skills to improve the activities by sending some officers to a training course. - In addition to the activities, trainings of trainers will be conducted for social organizations and districts.
BRVT	Date	5 March 2013
	Name of Counterpart	Mr. Luong Hung Phi, Expert of Pollution Control Division, EPA
	Contents	1. Review of Activities by all target DONREs 2. Capacity Development during the Project 3. Future Direction
	Review of Activities	- As a result of sharing the activities by other DONREs, HCMC DONRE showed the interest in the workshops for enterprises of HPG and TT-HUE. - It was difficult to coordinate with subcontractors, TV companies, etc. for the video production, because it is the first time for BRVT DONRE to prepare the environmental film.
	Capacity Development	- Knowledge of awareness raising could be enhanced. - The overall skills for film production including arrangement, scenario making, etc. could be also enhanced, because it was the first time for BRVT-DONRE to produce a video film.
	Future Direction	- BRVT DONRE would like to ensure identification of the target group for efficient and effective awareness raising. - BRVT DONRE would like to conduct events, workshops, competition, etc. by taking Plan-Do-See process. - BRVT DONRE will conduct environmental awareness by utilizing CD-ROMs of environmental film produced during the Project.

Source: JET

(2) Training for DONRE Officers

JET provided trainings for environmental awareness activities for C/Ps putting emphasis on "Plan-Do-See" process. The importance of identifying the target group of the activities was also addressed in the training. Table 2.7-12 summarizes the training for environmental awareness activities and Figure 2.7-12 shows the photographs and material of the training.

Table 2.7-12 Summary of Training for Environmental Awareness Activities

DONRE	Item	Description
HNI	Date	31 October 2012
	Participants	4 officers of HNI DONRE
	Purposes	1. To be able to set target and message to be delivered 2. To be able to identify optimal means to deliver message 3. To be able to review the activities and reflect lessons learnt to the following activities
	Contents	<u>1. Lecture</u> 1. Introduction : (1.1 Purpose of Training, 1.2 What is Environmental Awareness?, 1.3 Stage of Activities (Plan-Do-See)) 2. Planning: (2.1 Understanding of Ideal, Problems, and Reality, 2.2 Goal Setting, 2.3 Target Group, 2.4 Message, 2.5 Media, 2.6 Plan of Operation, 2.7 Summary of Planning)

DONRE	Item	Description
		<p>3. Implementation: (3.1 Considerations in Implementation, 3.2 Awareness Raising Activities in Japan)</p> <p>4. Evaluation and Reflection: (4.1 Importance of Evaluation and Reflection, 4.2 Johari Window, 4.3 Evaluation Method, 4.4 Evaluation Criteria, 4.5 Reflection to upcoming activities)</p> <p>II Exercise</p> <p>No.2 Johari Window (Importance of Receiving Feedback)</p> <p>(Exercise of No.1 and No.3 were omitted due to lack of time and small number of participants)</p>
	Lessons/ Feedbacks	<p>- The venue was in an office room and was not suitable for the training. To avoid this, the trainer and the assistant should have carefully checked the arrangement for the venue.</p> <p>- The number of participants was small due to lack of prior notice. The trainer should have explained the importance of the training.</p> <p>- Result of questionnaire survey shows that the contents of the training were well delivered to participants.</p>
HPG	Date	2 November 2012
	Participants	10 officers of HPG DONRE
	Purposes	<p>1. To be able to set target and message to be delivered</p> <p>2. To be able to identify optimal means to deliver message</p> <p>3. To be able to review the activities and reflect lessons learnt to the following activities</p>
	Contents	<p>I. Lecture</p> <p>1. Introduction : (1.1 Purpose of Training, 1.2 What is Environmental Awareness?, 1.3 Stage of Activities (Plan-Do-See))</p> <p>2. Planning: (2.1 Understanding of Ideal, Problems, and Reality, 2.2 Goal Setting, 2.3 Target Group, 2.4 Message, 2.5 Media, 2.6 Plan of Operation, 2.7 Summary of Planning)</p> <p>3. Implementation: (3.1 Considerations in Implementation, 3.2 Awareness Raising Activities in Japan)</p> <p>4. Evaluation and Reflection: (4.1 Importance of Evaluation and Reflection, 4.2 Johari Window, 4.3 Evaluation Method, 4.4 Evaluation Criteria, 4.5 Reflection to upcoming activities)</p> <p>II Exercise</p> <p>No.1 Planning, No.2 Johari Window (Importance of Receiving Feedback), No.3 Evaluation</p>
	Lessons/ Feedbacks	<p>-The result of questionnaire survey shows that the contents of the training were well delivered to its participants.</p> <p>- Some participants thought the time of the training was short.</p> <p>- Most of the participants seem to be interested in Planning, though they understand the whole process of "Plan-Do-See" process.</p>
HUE	Date	26 October 2012
	Participants	10 officers of TT-HUE DONRE
	Purposes	<p>1. To be able to set target and message to be delivered</p> <p>2. To be able to identify optimal means to deliver message</p> <p>3. To be able to review the activities and reflect lessons learnt to the following activities</p>
	Contents	<p>I. Lecture</p> <p>1. Introduction : (1.1 Purpose of Training, 1.2 What is Environmental Awareness?, 1.3 Stage of Activities (Plan-Do-See))</p> <p>2. Planning: (2.1 Understanding of Ideal, Problems, and Reality, 2.2 Goal Setting, 2.3 Target Group, 2.4 Message, 2.5 Media, 2.6 Plan of Operation, 2.7 Summary of Planning)</p> <p>3. Implementation: (3.1 Considerations in Implementation, 3.2 Awareness Raising Activities in Japan)</p> <p>4. Evaluation and Reflection: (4.1 Importance of Evaluation and Reflection, 4.2 Johari Window, 4.3 Evaluation Method, 4.4 Evaluation Criteria, 4.5 Reflection to upcoming activities)</p> <p>II Exercise</p> <p>No.1 Planning, No.2 Johari Window (Importance of Receiving Feedback), No.3 Evaluation</p>
	Lessons/ Feedbacks	<p>- The result of questionnaire survey shows that the contents of the training were well delivered to the trainees.</p> <p>- Some trainees commented that the evaluation and reflection is the part that had not been focused before, however, this would be the important item to carry out followed activities better.</p> <p>- Most of the participants seem to be interested in Planning, though they understand the whole process of "Plan-Do-See" process.</p> <p>- The venue for the training was fairly large for the number of the trainees.</p>
HCMC	Date	23 October 2012
	Participants	25 officers of HCMC DONRE
	Purposes	<p>1. To be able to set target and message to be delivered</p> <p>2. To be able to identify optimal means to deliver message</p> <p>3. To be able to review the activities and reflect lessons learnt to the following activities</p>
	Contents	<p>I. Lecture</p> <p>1. Introduction : (1.1 Purpose of Training, 1.2 What is Environmental Awareness?, 1.3 Stage of Activities (Plan-Do-See))</p> <p>2. Planning: (2.1 Understanding of Ideal, Problems, and Reality, 2.2 Goal Setting, 2.3 Target Group, 2.4 Message, 2.5 Media, 2.6 Plan of Operation, 2.7 Summary of Planning)</p> <p>3. Implementation: (3.1 Considerations in Implementation, 3.2 Awareness Raising Activities in Japan)</p> <p>4. Evaluation and Reflection: (4.1 Importance of Evaluation and Reflection, 4.2 Johari Window, 4.3 Evaluation Method, 4.4 Evaluation Criteria, 4.5 Reflection to upcoming activities)</p> <p>II Exercise</p> <p>No.1 Planning, No.2 Johari Window (Importance of Receiving Feedback), No.3 Evaluation</p>
	Lessons/ Feedbacks	<p>-The result of questionnaire survey shows that the contents of the training were well delivered to participants.</p> <p>- Some participants thought the time of the training was short.</p> <p>- Most of the participants seem to be interested in Planning, though they understand the whole process of "Plan-Do-See" process.</p>

DONRE	Item	Description
BRVT	Date	24 October 2012
	Participants	6 officers of BRVT DONRE
	Purposes	1. To be able to set target and message to be delivered 2. To be able to identify optimal means to deliver message 3. To be able to review the activities and reflect lessons learnt to the following activities
	Contents (Tool/Material)	<p>I. Lecture</p> <p>1. Introduction : (1.1 Purpose of Training, 1.2 What is Environmental Awareness?, 1.3 Stage of Activities (Plan-Do-See))</p> <p>2. Planning: (2.1 Understanding of Ideal, Problems, and Reality, 2.2 Goal Setting, 2.3 Target Group, 2.4 Message, 2.5 Media, 2.6 Plan of Operation, 2.7 Summary of Planning)</p> <p>3. Implementation: (3.1 Considerations in Implementation, 3.2 Awareness Raising Activities in Japan)</p> <p>4. Evaluation and Reflection: (4.1 Importance of Evaluation and Reflection, 4.2 Johari Window, 4.3 Evaluation Method, 4.4 Evaluation Criteria, 4.5 Reflection to upcoming activities)</p> <p>II Exercise</p> <p>No.1 Planning, No.2 Johari Window (Importance of Receiving Feedback), No.3 Evaluation</p>
	Lessons/ Feedbacks	<ul style="list-style-type: none"> - Result of questionnaire survey shows that the contents of the training were well delivered to trainees. - Some trainees commented that evaluation and reflection were difficult to understand. This part should have been more elaborated. - Most of the participants seem to be interested in Planning, though they understand the whole process of "Plan-Do-See" process.

Source: JET



Source: JET

Figure 2.7-12 Photographs and Material of Training for Environmental Awareness Activities

2.7.3 Achievements

2.7.3.1 Overall Achievements

Table 2.7-13 summarizes the PDM indicators related to Output 4, status to be achieved by each organization, status as of March 2013, and related issues and actions to be taken. All DONREs have implemented a series of activities through conducting workshops and developed handout, to achieve the four indicators as shown in Table 2.7-13 from May 2011 to March 2012. The Project started off rather slowly in 2011 with limited number of activities, because DONREs took more time to identify key stakeholders of environmental awareness activities and to pursue meeting with the stakeholders than to implement activities without considering how to raise awareness of stakeholders effectively. This process was strategic and critical to strengthen the capacity of all target DONREs on environment awareness in the Project. By May 2012 DONREs could elaborate a new plan for activities, by taking the process. Based on the elaborated plan, the activities have been conducted from June 2012 to March 2013. By conducting activities such as trainings and meeting discussions, the target DONREs had meetings on how to further develop the capacity while conducting the activities.

Table 2.7-13 Statuses of PDM Indicators at the End of the Project

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
4-1 The results of the questionnaire survey answered by the target groups, such as industries, district/commune/ward officers and social organizations, on environmental awareness would show improvement, as compared with during the initial stage of the Project (consider environmental awareness events as opportunities to conduct surveys).	<ul style="list-style-type: none"> The target groups (industries, district/commune/ward officers and social organizations) show improvement in environmental awareness through the results of the questionnaire surveys answered after the events. 	<ul style="list-style-type: none"> DONREs have been conducting many awareness raising events, but they do not target specific areas and/or pollution sources, and do not directly contribute to the improvement of the water environment. 	<ul style="list-style-type: none"> The status of achievement was evaluated as completely achieved at the end of March 2013. In the first year, 98% of the target groups showed improvement in environmental awareness though the workshops conducted in the target provinces, according to the results of the questionnaire survey. In the second year, the workshops for enterprises in HPG and TT-HUE, the events for residents in TT-HUE and HCMC, and production of signboards and TV reportage in HPG have been conducted so far.
4-2 Tools (e.g., film showing to the public and introductory guidance for industries) to promote environmental awareness targeting public and industries are developed.	<ul style="list-style-type: none"> Tools would be developed at each DONRE as follows: <ul style="list-style-type: none"> HNI: Workshop materials, guidebook on environmental laws and regulations for enterprises. HPG: Workshop materials, signboards, TV reportages. TT HUE: Workshop materials, materials and goods for simple water quality test and clean-up events (manual, T-shirts, and banners). HCMC: WS materials on introductory guidebook on environmental laws and regulations for enterprises, goods for clean-up events (hand fans). BRVT: Workshop materials, and environmental film. 	<ul style="list-style-type: none"> DONREs already have various tools developed through its activities, but they have not necessarily been developed considering specific targets or objectives in mind. 	<ul style="list-style-type: none"> The status of achievement is evaluated as completely achieved at the end of Mar. 2013. Workshop materials for enterprises, government officers and/or residents were developed in each DONRE in the first year. The following tools were developed in the second year: <ul style="list-style-type: none"> HNI: An introductory guidebook on environmental laws and regulations for enterprises and materials for sector seminar is being developed. HPG: Signboards and TV reportages for the public and enterprises were developed. Materials for workshop on raising the awareness of enterprises were prepared. TT-HUE: Materials and goods for simple water quality test and clean-up events and for workshops on raising the awareness of enterprises were prepared HCMC: Goods for a clean-up event was developed. An introductory guidebook on environmental laws and regulations for enterprises is being developed. BRVT: An environmental film for the public and enterprises is being developed.

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
4-3 Environmental awareness events for target groups are conducted by utilizing newly developed tools.	<ul style="list-style-type: none"> Each DONRE would conduct the following events by utilizing the tools developed in 4-2 above: <ul style="list-style-type: none"> HNI: Workshop and seminar on guidance on environmental laws and regulations HPG: Workshop, and broadcasting TV reportages TT HUE: Workshop, and simple water quality test, and clean-up events HCMC: Workshop, clean-up events, and distribution of an introductory guidebook on environmental laws and regulations for enterprises BRVT: Workshop, and broadcasting of TV films 	<ul style="list-style-type: none"> DONREs have been conducting awareness events, but most of them are targeting social organizations. 	<ul style="list-style-type: none"> The status of achievement has been evaluated as mostly achieved at the end of March 2013. In the first year, environmental workshops for enterprises were organized in HNI and HCMC. Environmental workshops for the public and stakeholders were organized in HPG, TT-HUE and BRVT. In the second year, the following activities were carried out utilizing the tools developed: awareness workshops for enterprises in HPG and TT-HUE, clean-up events for residents in TT-HUE and HCMC, and production of signboard and TV reportage in HPG.
4-4 The results of the CA targeting DONRE officers show improvement, as compared with during the initial stage of the Project.	<ul style="list-style-type: none"> Needs for capacity development are assessed at the initial stage of the Project. Based on the assessment, capacity development plans are developed and environmental awareness activities are conducted. Target DONRE officers are expected to implement a series of activities and show improvement in their capacity at the end of the Project. 	<p>The levels of the following capacities that were considered to be relatively lower than other capacities, and needed to be developed:</p> <ul style="list-style-type: none"> Formulation of environmental awareness activity plan; Identification of stakeholders and target group for environmental awareness activity; Estimation and acquisition of budget for environmental awareness activity; Evaluation of environmental awareness activity by setting indicator and monitoring method; Report preparation of environmental awareness activity; and Improvement of environmental awareness activity based on past activities. 	<ul style="list-style-type: none"> The status of achievement was evaluated as completely achieved at the end of March 2013. Needs assessment was conducted and the capacity development plans were developed in the first year. Environmental awareness activities, such as on-the-job training, were implemented in the first year. Environmental awareness activities, such as on-the-job training, were implemented continuously in the second year. Besides, training on environmental awareness, such as off-the-job training, was conducted at each DONRE. The DONRE officers which attended the training improved basic knowledge and acquired skills on environmental awareness.

Source: JET

2.7.3.2 Achievements by Each Organization

Table 2.7-14 summarizes the statuses of achievement of indicators by each organization related to activities of WG-4 (environmental awareness) at the end of the Project.

Table 2.7-14 Statuses to Archive Indicators by Each Organization at the End of the Project

DONRE	Indicators	Timing of Completion	Status at the End of the Project
HNI	Indicator 4-1	March 2013	HNI DONRE conducted questionnaire surveys for joint seminar of industrial wastewater management and introductory guidebook for industrial wastewater management. The results showed the awareness of the target groups has been improved.
	Indicator 4-2	March 2013	HNI DONRE prepared the introductory guidebook for industrial wastewater management as a tool of environmental awareness.
	Indicator 4-3	March 2013	HNI DONRE conducted joint seminar of industrial wastewater management and introduced the introductory guidebook as mentioned in Indicator 4-2.
	Indicator 4-4	March 2013	Capacity on environmental awareness of the target officers has been developed through implementation of the activities as well as taking the training for environmental awareness activity by JET.
HPG	Indicator 4-1	January 2013	HPG DONRE conducted questionnaire surveys for the workshop for enterprises, TV report, and signboard. The results of each survey showed that the awareness of the target groups has been improved.
	Indicator 4-2	January 2012	HPG DONRE produced TV reportage. The DONRE also designed and installed the signboard with the collaborative effort of HPG Water Supply Company.
	Indicator 4-3	December 2012	HPG DONRE held the workshop for enterprises. The video of TV report and handout of the workshop were shared with the participants of the workshop.
	Indicator 4-4	March 2013	Capacity on environmental awareness of the target officers has been developed through implementation of the activities as well as taking the training for environmental awareness activity by JET.

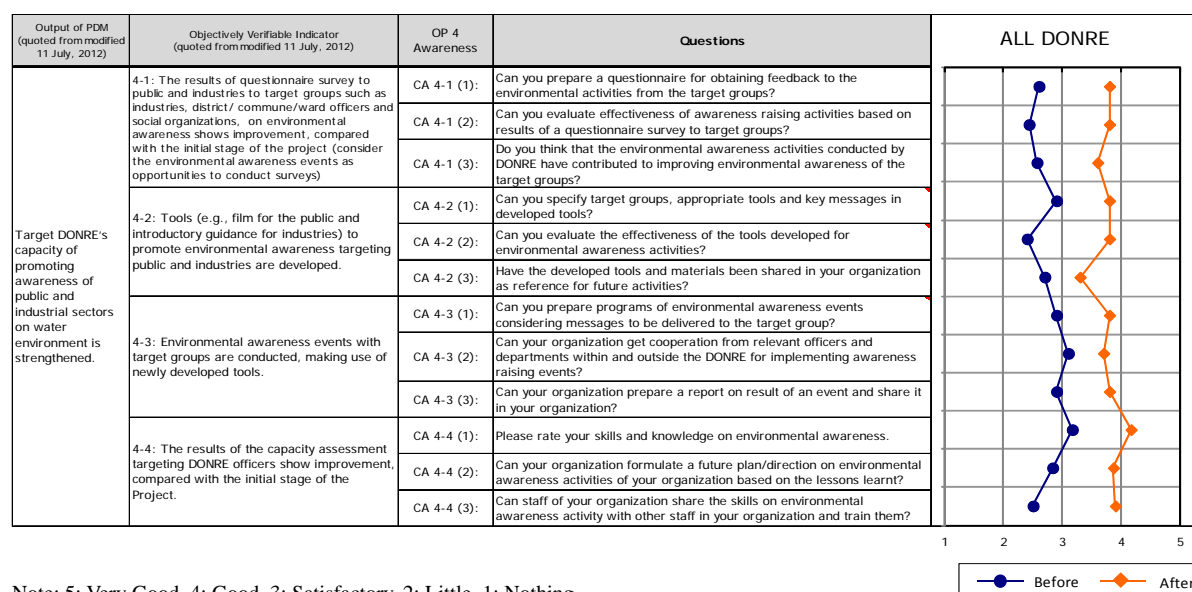
DONRE	Indicators	Timing of Completion	Status at the End of the Project
TT-HUE	Indicator 4-1	November 2013	TT-HUE DONRE conducted questionnaire surveys for clean-up events, workshop for enterprises. The results of each survey showed that the awareness of the target groups has been improved.
	Indicator 4-2	November 2012	HPG DONRE produced awareness tools such as banners, t-shirts, for the clean-up events. The DONRE also produced the handouts shared in the workshop for enterprises.
	Indicator 4-3	November 2013	HPG DONRE conducted the clean-up events and the workshop. The tools as mentioned in Indicator 4-2 were utilized in the events.
	Indicator 4-4	March 2013	Capacity on environmental awareness of the target officers has been developed through implementation of the activities as well as taking the training for environmental awareness activity by JET.
HCMC	Indicator 4-1	March 2013	HCMC DONRE conducted questionnaire survey for hand fans prepared for the clean-up event. The results of the survey showed that the awareness of the target groups has been improved.
	Indicator 4-2	March 2013	HCMC DONRE produced awareness tools such as hand fans for the clean-up event and introductory guidebook for industrial wastewater management.
	Indicator 4-3	March 2013	HCMC DONRE had the clean-up event. The hand fans were distributed to the target groups in the event.
	Indicator 4-4	March 2013	Capacity on environmental awareness of the target officers has been developed through implementation of the activities as well as taking the training for environmental awareness activity by JET.
BRVT	Indicator 4-1	March 2013	BRVT DONRE conducted questionnaire survey for obtaining feedback on environmental film. The results of the survey showed that the awareness of the target groups has been improved.
	Indicator 4-2	February 2013	BRVT DONRE produced environmental film as a tool of environmental awareness and broadcasted on local TV channel.
	Indicator 4-3	March 2013	BRVT DONRE held a meeting for viewing environmental film after the film was compiled and contained into CD-ROMs.
	Indicator 4-4	March 2013	Capacity on environmental awareness of the target officers has been developed through implementation of the activities as well as taking the training for environmental awareness activity by JET.

Source: JET

2.7.3.3 Capacity Assessment

(1) Results of Internal Evaluation

The results of internal evaluation was conducted in January 2013. Figure 2.7-13 shows the questions related to each objectively verifiable indicator of the PDM and the average scores of the five-level, semi-quantitative self-evaluation for environmental awareness component (Output 4) marked by all DONREs. Before starting the Project, most capacities were evaluated as between “little” and “satisfactory”. As of January 2013, they were evaluated as between “satisfactory” and “good”, indicating the general improvement of DONREs’ capacities for awareness building through the Project. A special question on skills and knowledge in CA 4-4 (1) regarding indicator 4-4 was highly evaluated as above “good”.



Note: 5: Very Good, 4: Good, 3: Satisfactory, 2: Little, 1: Nothing

Source: Target DONREs compiled by JET

Figure 2.7-13 Overall Results of Questionnaire for Output 4 (Average of all DONREs)

(2) Capacity Development through the Project

1) Indicator 4-1: Improvement of Environmental Awareness

Before the Project, most target DONREs had not been conducting, with their own initiatives, questionnaire surveys to check the effectiveness of their activities. JET introduced the concept of “Plan-Do-See” process for environmental awareness activities through discussions and trainings during the Project. A questionnaire survey is one of the effective tools to monitor the activities in the “See” stage of the “Plan-Do-See” process. JET stressed the importance of getting feedback from the target group in order to enhance environmental awareness by improving the activities. Through on-the-job training (OJT), the target DONREs gained experience in designing a questionnaire survey sheet, to analyze as well as to evaluate the results.

CA 4-1 (1) and CA 4-1 (2) are related to the capacities in conducting a questionnaire survey and analysis of results. CA 4-1 (3) is more related with whether the results of the questionnaire survey shows improvement of environmental awareness of the target groups. Since the environmental awareness activities requires long-term and continuous efforts to change the performance of target groups, the degree of improvement for CA 4-1 (3) during the Project was smaller than CA 4-1 (1) and CA 4-1 (2).

For the key points of improvement, the target DONREs, reflecting what they have learned, mentioned that the quality of their activities should be improved through getting feedbacks and observing awareness and performance by conducting a questionnaire survey. It is expected that the target DONREs continue to improve the quality of activities by getting feedbacks in their environmental awareness activities as well as acquiring analysis of related skills.

2) Indicator 4-2: Development of Tools

The target DONREs had been developing promotion tools without any basic concept for their activities. The target DONREs introduced a basic concept in which issues, target group of the activities, effective tools, and message to be delivered are addressed. In the first year, the target DONREs clarified the target groups and effective tools, which were connected to the issues such as improvement of wastewater quality from industrial sectors and the general public.

Most of the target DONREs seemed to have capacity related to CA 4-2 (1) on specifying target groups, appropriate tools and key messages in developing awareness raising tools. The capacity related to CA 4-2 (2) on evaluating the effectiveness of awareness raising is similar with CA 4-1 (1) and CA 4-1 (2), so the DONREs were requested to conduct a questionnaire survey regarding the design and impact of the message of developed tools. The level of the capacity related to CA 4-2 (2) tends to be lower than that of CA 4-2 (1).

To measure the capacity development at organizational level, the capacity on sharing the developed tools and materials for future activities, related to CA 4-2 (3), was tested. Since the Project period of two years is short to allow them to reuse the developed tools, the degree of improvement in CA 4-2 (3) was smaller than CA 4-2 (1) and CA 4-2 (2). The target DONREs are expected to accumulate the experiences to share developed tools within and outside the organization.

3) Indicator 4-3: Environmental Awareness Activities

The target DONREs already had enough experiences to conduct environmental awareness events prior to the Project, but the objectives of these events were not clear. During the Project, the DONREs were advised to clarify the objectives and prepare the program considering the message to be imparted to the target groups aiming raising their environmental awareness. This capacity is related to CA 4-3 (1) and is mainly at the individual level. Other two capacities are at the organization level, such as getting cooperation from other resources as shown in CA 4-3 (2) and preparing a report to share the experiences as shown CA 4-3 (3). Since the target DONREs are good at organizing events from the beginning, the degree of the improvement for CA 4-3 was small, but the level of the capacity has remained fairly high since the start of the Project.

4) Indicator 4-4: Capacity Development

Indicator 4-4 recognizes the capacity development for the target DONRE officers. CA 4-4 (1) is connected with the capacity development at individual level. CA 4-4 (2) tests the capacity to reflect the lessons learnt to the upcoming activities and plans, and to set the future direction. CA 4-4 (3) is the capacity development of organizational level by sharing the skills acquired and train other members of the organization. Since most of the officers were interested in individual capacity development rather than organizational capacity development, the level of CA 4-4 (1) is higher than other two capacities. CA 4-4 (2) is related with “See” of the “Plan-Do-See” process, which most of the target officers had been good at from the beginning. The level of capacity related to CA 4-4 (3) was low at first, but the degree of improvement during the Project was fairly high. It may be because most of the DONREs have made an effort to raise their awareness in sharing the skills in the organization by following JET’s advice during the Project.

2.7.3.4 Recommendations for Post Project Activities

(1) Setting Clear Purpose, Target Group, Message, and Goal

In the beginning of the Project, most DONREs were concerned with the effectiveness of their environmental awareness activities and they thought it was difficult to raise the awareness of the public in a sustainable way. In this Project, WG-4 introduced the Plan-Do-See process for environmental awareness activities and they tried to set the purpose, the target group, and the message to be delivered to the target groups clearly. The DONREs should clarify those items in the planning stage of the environmental awareness activities so as to review and evaluate the achievements of the activity.

(2) Selecting Tools considering their Characteristics

In the course of the Project, DONREs learned the characteristic of various environmental awareness tools/means and how to select them appropriately in accordance with the purposes and goals of the activities. For example, workshop is an appropriate tool in delivering detailed information to a limited number of people and get feedback from them, while mass media is an appropriate tool in delivering simple message to a greater number of people. The DONREs should utilize a variety of environmental awareness tools developed under the Project and devise suitable tools for future activities by referring to the developed tools.

(3) Improving the Activities through Feedbacks

In the beginning of the Project, DONREs had hardly conducted feedback surveys after their environmental awareness activities. In this Project, WG-4 prepared and conducted a questionnaire survey for every activity, and discussed the effectiveness of each activity based on the obtained feedbacks from the target groups such as enterprises, social organizations, etc. DONREs should put more emphasis on this evaluation process to learn lessons from the conducted activities so as to improve them in future activities. Also, it is important to prepare activity sheets for each activity so that DONREs can share the results of an activity and refer to them when planning for future activities.

(4) Utilization of Data and Information on Monitoring, Inventory, Inspection, Water Pollution Control

Currently, the environmental awareness activity in DONREs is mostly focused on the general public. In this Project, all DONREs have tried to conduct environmental awareness activities focused on enterprises. In order to conduct environmental awareness activities for enterprises, DONREs noticed the necessity to utilize data and information on monitoring, inventory, inspection, and water pollution control measures. Therefore, DONREs should strengthen the communication and cooperation with other relevant sections of DONRE as well as other related organizations to convey messages on awareness raising for enterprises.

2.8 Output 5 (WG 5): Environmental Information Management and Utilization

2.8.1 Introduction

2.8.1.1 Objective and Procedure of Activities

According to PDM, the outputs of Output 5 is "Capacity of MONRE and DONREs on information management and utilization is strengthened". There are 6 items are shown as activities to achieve this output:

- 1) Grasping the status and problems of collection, management and utilization of the current water environmental information (at MONRE) (item 1)
- 2) Based on 1), selecting the priorities information, which MONRE, DONREs manage and enforce, and develop the more effective methods (formats, reporting methods and frequency) by gathering the opinions from the people involved through workshops as well as a trial. Then propose the specific methods for the collection, management and utilization of water environmental information (item 2 - item 7)

Two following items have been identified as targets to ensure for achieving.

Narrative Summary	Objectively Verifiable Indicators
Outputs Capacity of MONRE and DONREs on information management and utilization is strengthened.	5-1 MONRE and the target DONREs realize more smooth communication between the both than before in terms of frequency and contents. 5-2 The draft of "water environmental information procedure in terms of collection, management and utilization (including dissemination)" is prepared.

Thus, to summarize the activities of Output 5, "MONRE receiving water environment information provided by DONREs, and both MONRE and DONREs share the same awareness of the utilization of the improvement for policies. Also MONRE and DONREs make a better way of water environmental information collection, management and utilization though the better communication.

2.8.2 Contents of Activities

2.8.2.1 Overall Activities for Output 5

(1) Basic Stance of the Activities

Objective of Output 5 is to strengthen the capacity of management and utilization of water environmental information. Water environmental information such as monitoring data of river water or wastewater from factories is essential for the creation or enforcement of water environmental policy. In general, water environmental information is divided into two categories from the aspect of its utilization. It is, first of all, that utilized inside governmental sectors and the second one is that utilized outside of governmental sectors such as public awareness.

In Vietnam, it is quite often the case that the provider of information is DONRE and user of information is MONRE. In such a case, when provider of information and user of information are different, it is necessary to coordinate between provider's capacity and user's requests in necessary information. Then based on this coordination, it should be decided how to collect, how to process and how to utilize all the necessary water environmental information.

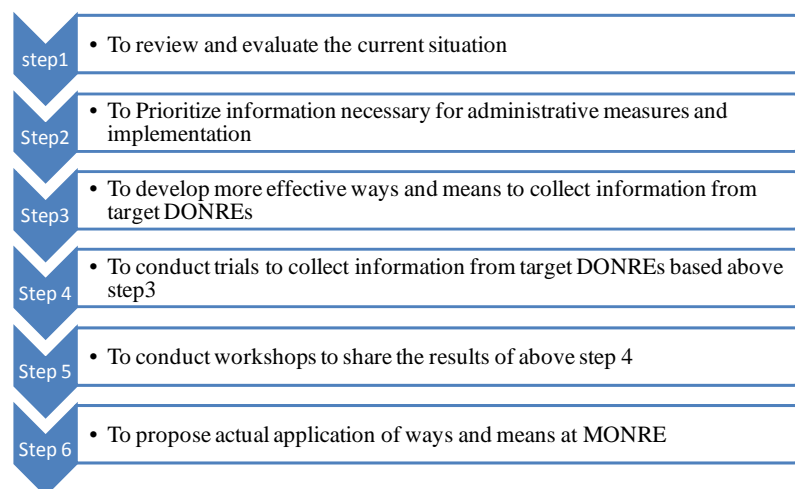
(2) Operation Flow of Output 5

Operation flow is as shown below in Figure 2.8-1. First of all, the current situation of the management and utilization of environmental information is reviewed (Step 1). This review was conducted with the following methods. Namely, the 1st method was to give questionnaire/interview to the relevant departments in MONRE in order to grasp the current situation of information flow from DONREs to MONRE and its utilization. In conducting the 1st method, it was tried to make clear the issues to be improved concerning information management and utilization. The 2nd method was to give questionnaire/interview to 5 DONREs based on the questionnaire/interview results from the relevant departments in MONRE.

Secondly the necessary information for administrative measures was prioritized. (Step 2) This operation was conducted by cooperation with relevant departments of MONRE and JICA. In addition, a working group was established by Center for Environmental Information and Data (CEID), ISD and JICA for the smooth implementation of the plan.

Thirdly the prioritized information was selected based on the survey and more effective ways to collect, manage and utilize the information was developed as “the Suggestion for the Water Environmental Information Management in Vietnam”. In this suggestion, the regular reporting formats from DONRE to MONRE were introduced and the expert meeting was held to obtain more opinions about the reporting formats. Subsequently the actual trial for the developed formats was brought into practice in Hai Phong DONRE (Step 3 & 4)

Fourthly the results of the trial were shared through workshop and finally “the Suggestion for the Water Environmental Information Management in Vietnam” was finalized and proposed to MONRE (Step 5 & 6).

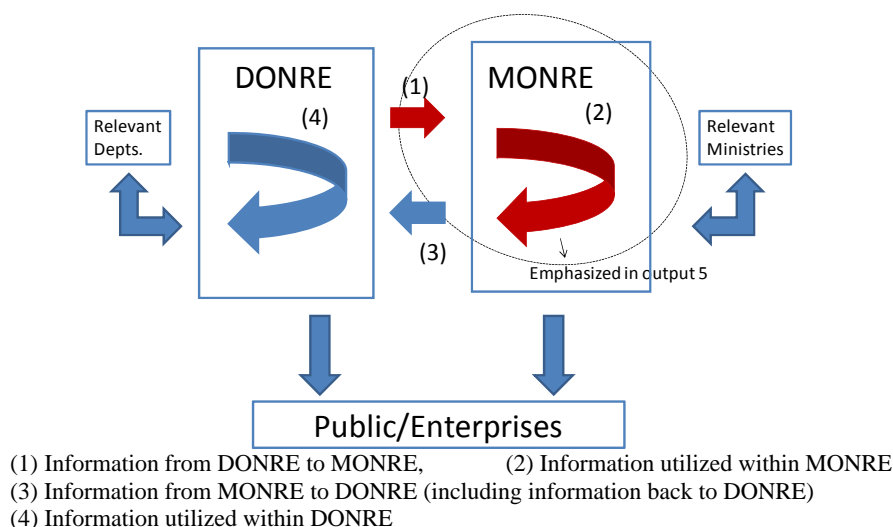


Source: JET

Figure 2.8-1 Flow of the Operation of Output 5

(3) Focus Point of Output 5

In considering the information flow between DONRE and MONRE, there are 4 ways as shown in Figure 2.8-2. Due to the limited time, in this project, the shaded circle will mainly be focused, namely, the information from DONRE to MONRE as well as Information utilizing with in MONRE.



Source: JET

Figure 2.8-2 Flow of the Information

2.8.3 "The Scope of the Information" and "the Selection of the Information"

2.8.3.1 The Scope of the Information

MONRE play a role not only as a body of policy making, but also as a body of policy enforcement in some policy. So, the information which should be sent to MONRE from DONREs can be divided into the two kinds of information below 1) and 2), but considering the purpose of Output 5, we take up only 1) as a target information of Output

- 1). Information which is necessary for MONRE to evaluate and improve the current policies.
- 2). Information which is necessary for MONRE to enforce the current policies effectively
<e.g.> Enforcement of EIA

2.8.3.2 The Selection of the Information

To assess and improve the current policy, based on the Japanese experiences, we believed that it is reasonable to split into two stages below to implement, and it was decided to select the target information of Output 5 based on the purpose of Phase1.

(Phase 1)

In order that MONRE grasp the current policy issues roughly, DONREs have to send the necessary information to MONRE periodically once a year after processing the data collected through the daily activity.

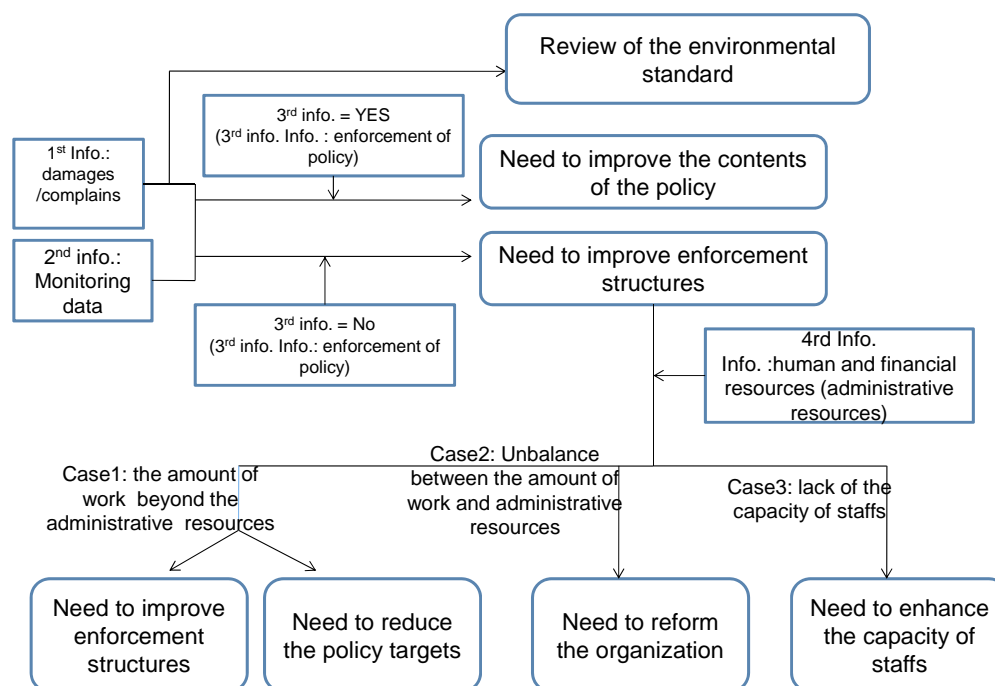
(Phase 2)

If MONRE needed more detailed information in order to evaluate or improve specific current policies, MONRE have to collect further information by asking DONRE or to conduct additional investigation. We have selected the four types of the following information as Phase 1 information.

As four type of this information is daily collected information by DONREs throughout the management, and it helps to grasp the issues of current policies by mutually collating the gathered information (refer to below Figure 2.8-3. For more information, refer to the "Suggestions for the environmental information management in Vietnam": the final report of Output 5)

(Target 4 type information)

- 1st "Complaints from citizens originated in pollution" or "accidents/damages caused by pollution"
- 2nd Monitoring data of public water bodies
- 3rd The actual status on the enforcement of policy
- 4th The human and financial resources allocated for water environmental management in the local governments (administrative resources)



Source: JET

Figure 2.8-3 Utilization of the Information for Grasping Policies Issues (image)

2.8.3.3 Proposed Format in Each Target Information

The proposed format in each target information is shown in Table 2.8-1.

Table 2.8-1 Proposed Format in Each Target Information

Target Information	Contents
Complaints from citizens or accidents/damages	The important information for the central government (including pollution sources and polluting substances) among complains came to the local governments
Monitoring data	- Numbers of monitoring points and samples - The most common parameters of organic pollution (such as DO/BOD/COD) - Toxic substance items (such as As, Cd, Pb, Hg and agricultural chemicals (depending on the purpose of use))
The status of enforcement of policy	-The number of applying permissions (EIA, EPC, EPP and discharging permission) -The number of approval -The number of inspection activities -The contents of penalty (fine, order...etc) -The percentage of discharging fee and the amount of collected fee
Human and financial resources allocated for water environmental management in the local governments (administrative resources)	-The number of departments/agencies relevant to water environment -The number of human resources and budgets by a department/agency

Source: JET

2.8.4 Achievement and Recommendation about Output 5

2.8.4.1 Achievement based on the Indicator of PDM

Indicator 5-1 in PDM ("MONRE and the target DONREs realize more smooth communication between the both than before in terms of frequency and contents") has been achieved through the sharing of the results of the survey..

Indicator 5-2 in PDM ("The draft of "water environmental information procedure in terms of collection, management and utilization (including dissemination)" is prepared") was also achieved as the document entitled "the Suggestion for the Water Environmental Information Management in Vietnam", which include the regular reporting formats from DONREs to MONRE.

The table below shows a comparison of the achievements and indicators set in the PDM.

Table 2.8-2 Achievements of Output 5 (WG 5): Environmental Information Management and Utilization

Indicators	Status to be Achieved by Each Organization	Status at the Beginning of the Project	Status at the End of the Project
Output 5: Environmental Information Management and Utilization			
5-1 MONRE and the target DONREs realize more smooth communication between the both than before in terms of frequency and contents	For making the relevant people understood more, based on the project results, it is expected to disseminate the better way of collecting, managing and utilizing the water environmental information and bring it into practice.	(1) MONRE was collecting the necessary information by issuing the official written letter to DONRE. (2) There was no regular information collection system between MONRE and DONRE except CEM and ID. (3) Both MONRE and DONRE seemed not fully aware the necessity of the information collection, management and utilization for their duties.	(1) The survey to understand the current status of water environmental information collection, management and utilization has been done by the end of 2012. (2) Throughout the surveys, the expert meeting and the workshop with MONRE and DONRE, it became clear for the relevant departments in MONRE and DONRE that current communication is neither sufficient nor smooth and need to be improved.
5-2 The draft of "water environmental information procedure in terms of collection, management and utilization (including dissemination)" is prepared	(1) Based on the Project results, the legal procedure to send the information from DONRE to MONRE on regular basis should be re-arranged. (2) In order to mobilize the draft procedure, it would be needed to issue a circular and disseminate it.	(1) There was no guideline regarding water environmental information collection, management and utilization (2) There were no existing nationwide uniformed formats (except CEM and ID) to collect information. (3) There was no regular information collection mechanism (except CEM and ID)	(1) Based on the survey results, the draft procedure in terms of collection, management and utilization was made (2) By referring to Japanese experiences, 10 formats for regular reporting from DONRE to MONRE were developed. (3) The 10 reporting formats were examined and revised through the trial in Hai Phong DONRE (4) Based on the trial, the workshop was conducted and the draft of "water environmental information procedure in terms of collection management and utilization" including the 10 regular reporting formats was prepared.

Source: JET

2.8.4.2 Achievement

The achievements of Output 5 are summarized as follows:

- 1) MONRE and DONREs became aware of the importance of using information to evaluate the existing policies (particularly by organizing the targeted information into uniformed formats, it became possible to grasp policy issues).
- 2) MONRE and DONREs understood their roles to utilize the information for the policy evaluations.
- 3) MONRE and DONRE have learnt each type of information/data processing methods by which current policy can be evaluated roughly from the aspect of effectiveness and enforceability (especially through the trial activities from the HPG DONRE)
- 4) MONRE and DONRE could understand the importance of disclosing the information to the public which was gathered and organized in order to promote public awareness and public participation.

2.8.4.3 Recommendation

In the post-project, following items are recommended in order to put into practice the outcome of Output 5 effectively.

- (1) To improve procedures when MONRE collects information from DONREs.
 - 1) In taking consideration of the results of output 5, it is expected to clarify how MONRE will arrange the information gathered from DONREs and what purpose MONRE will use them for.

- 2) In taking consideration of the results of output 5, it is expected for MONRE to clarify the mechanisms of gathering the information, by the discussion among relevant departments. Namely, to determine whether (1) should the information be collected by each department, which mainly uses the information? or (2) should MONRE assign a specified Department as a focal point to collect all the types of information?
 - 3) The procedures should be simplified when MONRE collects information from DONREs in order that information can be sent more easily. (Currently when MONRE requires some information, the written request must be sent to DONRE in each time. This system should be simplified).
- (2) After MONRE organize the information which was collected nationwide from DONREs, MONRE is expected to feedback this information to DONREs. By doing this feedback, each DONRE can enforce the policy more smoothly, because each DONRE often need the information outside of its jurisdiction area.
- (3) In order to utilize "environmental monitoring data of public water" which is collected from DONREs, MONRE has to clarify following items.
- 1) The meaning of the value of WQES (refer to Section 2.8.4-2.8.4.2-1))
 - 2) How to designate the type of WQES in each public water body(refer to Section 2.8.4-2.8.4.2-2))
 - 3) How to evaluate environmental monitoring data of public water, especially how to compare monitoring data with WQES (refer to Section 2.8.4-2.8.4.2-3))
- (4) When MONRE disclose to the public on the information gathered from DONREs for the purposes of promoting public-education or public-participation, it is expected for MONRE/DONRE to explain briefly so that public can understand the meaning of the disclosed information.
- (5) When DONREs provide necessary information to MONRE, DONREs have to process all the information into the fixed format. Therefore, it is expected for MONRE to give DONREs the technical guidance and financial supports so that DONREs can process information properly.

CHAPTER 3 INPUTS TO THE PROJECT

3.1 Inputs of the Vietnamese Side

3.1.1 Counterpart Personnel

In order to ensure the proper management of the Project, the Joint Coordinating Committee (JCC), Project Management Board (PMB), and working groups (WGs) were established at the beginning of the Project based on the official decisions of the Vietnamese side.

(1) Joint Coordinating Committee (JCC)

The JCC was established based on R/D signed between MONRE and JICA on 8 January 2010. Following the composition of JCC determined in R/D, the actual committee members assigned come from various relevant organizations and agencies are shown in Table 3.1-1.

Table 3.1-1 List of JCC Members

Name	Position in JCC	Position and Organization
Vietnamese Side		
(1) Assoc. Prof. Dr. Bui Cach Tuyen	Chairperson	Deputy Minister of MONRE, Director General of VEA
(2) Dr Nguyen The Dong	Project Director	Deputy General Director of VEA
(3) Dr Hoan Danh Son (- August 2012)	Project Manager	Director of ISD, VEA
(3) Mr. Nguyễn Minh Cường (August 2012 -)		Vice Director of ISD, VEA
(4) Mr. Nguyen Viet Thang	Member	Officer of ISD, VEA
(5) Mr. Pham Van Khanh	Member	Deputy Director, HNI DONRE
(6) Mr. Phung Van Thanh (- April 2012)	Member	Deputy Director, HPG DONRE
(6) Mr. Pham Quoc Ka (May 2012 -)		
(7) Mr. Nguyen Huu Quyet	Member	Deputy Director, TT-HUE DONRE
(8) Mr. Le Van Sam	Member	Director, BRVT DONRE
(9) Mr. Nguyen Van Phuoc	Member	Deputy Director of HCMC DONRE
Japanese Side		
(10) Mr. Shigenobu Obayashi	Member	JICA Expert Team (Long-term Expert: LET)
(11) Ms Saori Ushimi	Member	ditto
(12) Mr. Yoichi Iwai	Member	JICA Expert Team (Short-term Expert: SET)
(13) Mr. Itaru Okuda	Member	ditto
(14) Mr. Akira Shimizu (- May 2012)	Member	Senior Representative, JICA VN Office
(14) Mr. Fumihiko Okiura (June 2012 -)	Member	ditto
(15) Mr. Shigeru Kishida	Member	Official of the Embassy of Japan in Vietnam
Total: 16 persons		

Note: Other official(s) appointed by the project director and leader attended the Joint Coordination Committee (JCC) meeting as observer(s). At the second JCC meeting on 10 June 2011, representatives of MPI and ICD/MONRE have been relieved of the duties of the JCC member. Itaru Okuda was newly added to JCC.

Source: JET

(2) Project Management Board (PMB)

Under JCC, the Project Management Board (PMB) was established to manage project activities, and to report progresses to JCC. The members of PMB are shown in Table 3.1-2.

Table 3.1-2 List of PMB Members

Name	Position in PMB	Position and Organization
Vietnamese Side		
(1) Dr Nguyen The Dong	Project Director	Deputy General Director of VEA
(2) Dr Hoan Danh Son (- August 2012)	Project Manager	Director of ISD, VEA
(2) Mr. Nguyễn Minh Cường (August 2012 -)		Vice Director of ISD, VEA
(3) Mr. Nguyen Viet Thang	Member	Representative of ISD
(4) Mr. Pham Van Khanh	Member	Deputy Director of HNI DONRE
(5) Mr. Phung Van Thanh (- April 2012)	Member	Deputy Director, HPG DONRE
(5) Mr. Pham Quoc Ka (May 2012 -)		
(6) Mr. Nguyen Huu Quyet	Member	Deputy Director, TT-HUE DONRE
(7) Mr. Le Van Sam	Member	Director of BRVT DONRE
(8) Mr. Nguyen Van Phuoc	Member	Deputy Director of HCMC DONRE
*Other official(s) invited by the project director may attend the JCC as member(s)		

Name	Position in PMB	Position and Organization
Japanese Side		
(9) Mr. Shigenobu Obayashi	Member	JICA Expert Team
(10) Ms Saori Ushimi	Member	JICA Expert Team
(11) Mr. Yoichi Iwai	Member	JICA Expert Team
(12) Mr. Itaru Okuda	Member	JICA Expert Team
*Other personnel concerned to be decided and/or dispatched by JICA, if necessary		
Total: 12 persons		

Source: JET

(3) Working Group (WG)

The Project activities were carried out by the working groups (WGs) for each output of the Project. The members of WGs are shown in Table 3.1-3.

Table 3.1-3 List of WG Members

Name	Position in WG	Position and Organization
1. Environmental Policy (Working Group 1: WG-1)		
1) Ms Nguyễn Hoàng Ánh	Member	Head of Division, Pollution Control Department
2) Mr. Nguyễn Trung Thuận	Member	Officer, ditto
3) Mr. Lương Duy Hạnh	Member	Chief Inspector, Inspection Department
4) Ms Trần thị thu Hường	Member	Officer, ditto
5) Mr. Mai Thế Toàn	Member	Deputy Director, Department of Appraisal and Environmental Impact Assessment
6) Ms Trần Thị Lệ Anh	Member	Deputy Head of Division, Department of Waste Management and Environmental Promotion
7) Ms Nguyễn Thị Nguyệt Ánh	Member	Head of Division, Center for Environmental Monitoring
8) Mr. Nguyễn Hữu Thắng	Member	Deputy Head of Division, ditto
9) Mr. Đỗ Nam Thắng	Member	Deputy Director, Institute of Environmental Management Science
10) Ms Nguyễn Phạm Hà	Member	Officer, Department of International Cooperation and Science Technology
11) Ms Nguyễn Thanh Thảo	Member	Officer, Department of Water Resource Management
2. Monitoring (Working Group 2-1: WG 2-1)		
HNI DONRE		
1) Ms. Nguyen Phuong Lien	Head of WG 2-1	Officer of Information and International Relation department, CENMA
2) Ms. Le Thi Nhi	Member	ditto
3) Ms. Nguyen Thi Nghia	Member	ditto
4) Ms. Nguyen Thi Thu Hien	Member	ditto
HPG DONRE		
1) Ms. Nguyen Thi Tuyet Lan	Head of WG 2-1	Director of HACEM
2) Mr. Khong Minh Tien	Member	Head of Analysis and monitoring division of HACEM
3) Mr. Le Tien Thanh	Member	Officer of Analysis and monitoring division of HACEM
4) Mr. Nguyen Duy Toan	Member	ditto
TT-HUE DONRE		
1) Mr. Nguyen Hoang Phuoc	Head of WG 2-1	Director of Station of Environmental Monitoring & Analysis, Vice Head of EPA
2) Mr. Nguyen Dinh Phuoc	Member	Staff of Station of Environmental Monitoring & Analysis, EPA
3) Mr. Tran Canh Hung	Member	ditto
4) Mr. Nguyen Van Chung	Member	ditto
5) Ms. Le Thi Thuy Tien	Member	ditto
6) Ms. Nguyen Thi Thuy Linh	Member	ditto
HCMC DONRE		
1) Mr. Huynh Thanh Nha	Head of WG 2-1 (- Mar 2012)	Former Vice Director , HEPA
2) Mr. Ngo Thanh Duc	Head of WG 2-1 (Apr 2012-)	Director of Center of Environmental Monitoring & Analysis (CEMA), HEPA
3) Mr. Nguyen Thanh Huy	Member	Head of Division of Environmental Monitoring, CEMA, HEPA
4) Ms. Dang Thi Tuyet Loan	Member	Vice Head of Division of Environmental Monitoring, CEMA, HEPA
5) Ms. Tran Minh Ngọc	Member	Vice Head of Division of Environmental Monitoring, CEMA, HEPA
6) Mr. Nguyen Vo Qui Chau	Member	Staff of Division of Environmental Monitoring, CEMA, HEPA
7) Ms. Truong Hong Ha	Member	ditto
BRVT DONRE		
1) Mr. Le Tuan Kiet	Head of WG 2-1	Vice Director , CEMAB
2) Ms. Nguyen Thi Hang	Member	Head of Environmental Monitoring Division, CEMAB
3) Mr. Nguyen Xuan Son	Member	Vice Head of Environmental Monitoring Division, CEMAB
4) Mr. Trinh Dinh Loi	Member	Staff of Environmental Monitoring Division, CEMAB
5) Ms. Truong Thi Le Phuong	Member	ditto
6) Nguyen Vy Quang	Member	Staff of Loc An Monitoring Station, CEMAB
7) Mr. Bui Van Thanh	Member	Staff , Environmental Monitoring Division of CEMA, in charge of Con Dao island monitoring station
3. Water Quality Analysis (Working Group 2-2: WG 2-2)		
HNI DONRE		

Name	Position in WG	Position and Organization
1) Mr. Hoang Duy Huan	Head of WG 2-2	Head of Analysis division, CENMA
2) Mr. Le Van Duc	Member	Vice Head of Analysis division, CENMA
3) Ms. Dang Thi Lien	Member	Staff of Analysis division, CENMA
HPG DONRE		
1) Ms. Nguyen Thi Tuyet Lan	Head of WG 2-2	Director of HACEM
2) Mr. Khong Minh Tien	Member	Head of Analysis and monitoring division, HACEM
3) Mr. Nguyen Tien Tung	Member	Vice Head of Analysis and monitoring division, HACEM
4) Ms. Vu Tu Linh	Member	Staff of Analysis and monitoring division, HACEM
5) Ms. Nguyen Thi Nhu Quynh	Member	ditto
6) Ms. Nguyen Thi Hai Au	Member	ditto
7) Ms. Ha Thi Hang	Member	ditto
8) Mr. Nguyen Van Tiep	Member	ditto
9) Ms. Tran Thi Minh Huyen	Member	ditto
10) Mr. Tran Ngoc Long	Member	ditto
TT-HUE DONRE		
1) Mr. Nguyen Hoang Phuoc	Head of WG 2-2	Director of Station of Environmental Monitoring & Analysis, Deputy Director of EPA
2) Mr. Nguyen Dinh Phuoc	Member	Staff of Station of Environmental Monitoring & Analysis, EPA
3) Mr. Tran Canh Hung	Member	ditto
4) Mr. Nguyen Van Chung	Member	ditto
5) Ms. Le Thi Thuy Tien	Member	ditto
6) Ms. Nguyen Thi Thuy Linh	Member	ditto
HCMC DONRE		
1) Mr. Huynh Thanh Nha	Head of WG 2-2 (- Mar 2012)	Former Vice Director , HEPA
2) Mr. Ngo Thanh Duc	Head of WG 2-2 (Apr 2012-)	Director of Center of Environmental Monitoring & Analysis (CEMA), HEPA
3) Mr. Nguyen Thanh Huy	Member	Vice Head of Monitoring Env. Quality Assessment Division, HEPA
4) Ms. Dang Thi Tuyet Loan	Member	Officer of Monitoring Env. Quality Assessment Division, HEPA
5) Ms. Tran Minh Ngoc	Member	ditto
6) Ms. Nguyen Vo Qui Chau	Member	ditto
7) Mr. Nguyen Ngoc Hoang Trung	Member	ditto
8) Ms. Truong Hong Ha	Member	Officer of Monitoring Env. Quality Assessment Division, HEPA
9) Ms. Do Thi Thu Hang	Member	ditto
BRVT DONRE		
1) Mr. Le Tuan Kiet	Head of WG 2-2	Deputy Director of CEMAB
2) Ms. Le Thi Thanh Lieu	Member	Deputy Chief of Division of Environmental Monitoring, CEMAB
3) Mr. Pham Ba Thien	Member	Officer of Division of Environmental Monitoring, CEMAB
4) Mr. Doan Thanh Hai	Member	ditto
4. Inventory (Working Group 2-3: WG 2-3)		
HANOI DONRE		
1) Ms. Dao Thi Anh Diep	Head of WG 2-3	Deputy Director of EPA
2) Mr. Ngo Thai Nam	Member	Deputy Director of EPA,
3) Mr. Nguyen Trong Truong	Member	Officer of Pollution control division, EPA,
4) Mr. Ta Ngoc Son	Member	Vice Head of Project management and communication division, EPA
HPG DONRE		
1) Ms. Nguyen Thi Tuyet Lan	Head of WG 2-3	Director of HACEM
2) Mr. Le Son	Member	Deputy Director of EPA
3) Mr. Mai Duc Long	Member	Inspector of Inspection Division
TT-HUE DONRE		
1) Mr. Nguyen Viet Hung	Head of WG 2-3	Director of EPA
2) Ms. Nguyen Tran The Anh	Member	Inspector of DONRE Inspectorate,
3) Ms. Tran Thi Ngoc Diep	Member	ditto
4) Mr. Nguyen Manh Dai Lan	Member	Officer of Water Resources division
5) Ms. Le Thi Hanh	Member	Vice Head of Environmental, General Administrative Division, EPA
6) Mr. Chau Manh Quynh	Member	Staff of EIA appraisal division
HCMC DONRE		
1) Mr. Cao Tung Son	Head of WG 2-3	Deputy Director of HEPA
2) Ms. Le Thi Thanh Dung	Member	Vice Head of EIA Appraisal Division, HEPA
3) Ms. Nguyen Thi Tam Phuong	Member	Vice Head of Pollution Control Division, HEPA
4) Mr. Dang Le Hien	Member	Inspector of DONRE Inspectorate
BRVT DONRE		
1) Mr. Le Tan Cuong	Head of WG 2-3	Director of EPA
2) Ms. Tang Thi Diem My	Member	Officer of DONRE Inspectorate
3) Mr. Le Thanh Tam	Member	Officer of Water Resources Management
4) Mr. Luong Hung Phi	Member	Officer of Pollution Control Division, EPA
5. Inspection (Working Group 2-4: WG 2-4)		
HNI DONRE		
1) Ms. Dao Thi Anh Diep	Head of WG 2-4	Deputy director of EPA
2) Mr. Nguyen Tien Hung	Member	Deputy Chief Inspector of DONRE Inspectorate

Name	Position in WG	Position and Organization
3) Mr. Nguyen Trong Truong	Member	Officer of Pollution Control Division, EPA
4) Mr. Ta Ngoc Son	Member	Vice Head of Project management and communication division, EPA
HPG DONRE		
1) Ms. Nguyen Thi Vinh	Head of WG 2-4	Chief Inspector, DONRE Inspectorate
2) Ms. Nguyen Thi Tuyet Lan	Member	Director of HACEM
3) Mr. Le Son	Member	Deputy Director of EPA
4) Mr. Mai Duc Long	Member	Inspector of DONRE Inspectorate
TT-HUE DONRE		
1) Mr. Duong Van Thanh	Head of WG 2-4	Vice-chief inspector of DONRE Inspectorate
2) Ms. Nguyen Tran The Anh	Member	Inspector of DONRE Inspectorate
3) Ms. Tran Thi Ngoc Diep	Member	Ditto
4) Mr. Ly Thanh Trung	Member	Officer of Pollution Control Division, EPA
HCMC DONRE		
1) Ms. Le Thi Kim Oanh	Head of WG 2-4	Deputy Chief Inspector of DONRE Inspectorate
2) Ms. Le Thi Thanh Dung	Member	Vice Head of EIA Appraisal Division, HEPA
3) Ms. Nguyen Thi Tuyet Hoa	Member	ditto
3) Mr. Dang Le Hien	Member	Inspector of DONRE Inspectorate
BRVT DONRE		
1) Mr. Nguyen Thai Sinh	Head of WG 2-4	Chief Inspector of DONRE Inspectorate
2) Ms. Tang Thi Diem My	Member	Officer of DONRE Inspectorate
3) Mr. Nguyen Thanh Tam	Member	Officer of Water Resource Management Department
4) Mr. Luong Hung Phi	Member	Officer of Pollution Control Division, EPA
6. Water Pollution Control Measures (Working Group 3: WG 3)		
HNI DONRE		
1) Ms. Dao Thi Anh Diep	WG-3 Leader	Deputy Director of EPA
2) Mr. Nguyen Trong Truong	Member	Officer of Pollution Control Division, EPA
3) Mr. Ta Ngoc Son	Member	Vice Head of Project management and communication division, EPA
4) Mr. Pham Hung Cuong	Member	Head of DWRM
5) Mr. Nguyen Trong Dung	Member (- Apr. 2012)	Officer of DWRM
5) Ms. Nguyen Phuong Dung	Member (Apr. 2012 -)	Officer of DWRM
6) Mr. Nguyen Tien Hung	Member	Deputy Chief Inspector of DONRE Inspectorate
7) Mr. The Anh	Member	Head of Ha Dong District DONRE
8) Ms. Quan Thi Nam	Member	Officer of Ha Dong District DONRE
9) Ms. Dao Thi Hong Le	Member	Officer of Tu Liem District DONRE
7. Environmental Awareness (Working Group 4: WG 4)		
HNI DONRE		
1) Mr. Vu Duc A	Head of WG4 (- Sep 2011)	Former Vice Head, Project Management and Communication Division, EPA
2) Ms. Le Thanh Thuy	Head of WG 4 (Sep 2011 -)	Vice Head of Project management and communication division, EPA
3) Mr. Ta Ngoc Son	Member	Vice Head of Project management and communication division, EPA
4) Ms. Hoang Dieu Anh	Member	Officer, Project Management and Communication Division, EPA
5) Ms. Pham Mai Phong	Member	Officer, Project Management and Communication Division, EPA
6) Mr. Bui Van Linh	Member	Officer, Project Management and Communication Division, EPA
HPG DONRE		
1) Ms. Nguyen Thi Tuyet Lan	Head of WG 4	Director of HACEM
2) Mr. Le Son	Member	Deputy Director of EPA
3) Ms. Nguyen Thi Hong Phuong	Member	Officer of EPA
4) Mr. Pham Khac Thanh	Member	Vice Head of Center for Information of Resources & Environment, EPA
TT-HUE DONRE		
1) Mr. Nguyen Viet Hung	Head of WG 4	Director of EPA
2) Mr. Nguyen Xuan Khuong	Member	Head of EIA Appraisal Division, EPA
3) Ms. Le Thi Hanh	Member	Vice Head of General Division, EPA
4) Ms. Pham Thi Nguyet	Member	Officer of EIA Division, EPA
HCMC DONRE		
1) Mr. Huynh Thanh Nha	Head of WG4 (- Nov 2011)	Former Vice Director of EPA
2) Mr. Ha Van Dung	Head of WG 4 (Nov 2011 -)	Deputy Director of EPA
3) Ms. Tran Thi Lien	Member	Vice Head of Environmental Communication and Information Division, EPA
4) Ms. Le Thanh Dung	Member	Vice Head of EIA Division, EPA
5) Ms. Huynh Thu Van	Member	Head of Environmental Information and Training Division, EPA
6) Ms. Nguyen Thi Tu Uyen	Member	Vice Head of Environmental Information and Training Division, EPA
7) Ms. Nguyen Thi Tuyet Hoa	Member (- Jul 2012)	Officer of EMD (former EMD)
BRVT DONRE		
1) Mr. Le Tan Cuong	Head of WG 4	Director of EPA
2) Mr. Tran Anh Duc	Member	Vice Head of Pollution Control Division, EPA
3) Mr. Luong Hung Phi	Member	Officer of Pollution Control Division, EPA
8. Environmental Information Management and Utilization (Working Group 5: WG-5)		
1) Mr. Nguyễn Quốc Khánh	Head	Acting Director, Center for Environmental Information and Data
2) Ms. Vũ Thị Thu Thủy	Member	Officer, ditto

Source: JET

3.1.2 Operational Expenses Borne by the Vietnamese Side

The following counterpart budget for the Project has been provided by MONRE. As for DONRE, TT-HUE DONRE has received VND 887 million from PPC for the conduct of monitoring activity from 2011-2012. PPCs of the other four provinces did not allocate project budget.

Table 3.1-4 Operational Expenses Borne by the Vietnamese Side

Item	Year (VND million)					Major Expense Item
	2010	2011	2012	2013	Total	
	Actual	Actual	Actual	Budget	Budget	
MONRE	In-kind	In-kind	150 (cash) + In kind	370 (cash) (not yet allocated) + In kind	520 In-kind	- Office rent for the Long-term Expert Team - Expenses for official trips to DONREs - Administrative expenses (including office equipment) - Allowance for the PMB member from MONRE

Note: The counterpart fund includes expenses that are supported by the Vietnamese side for the implementation of the Project activities, honorarium/allowance for personnel involved, and for office space, as well as required facilities.

Source: JET

3.1.3 Office Space

According to R/D on the Project signed in January 2010, it is stipulated that the Vietnamese side would provide the office space and facilities.

- 1) The office and meeting space for the performance of duties of the experts in VEA and in each DONRE.
- 2) Office facilities such as desks, chairs, book shelves, internet access, telephones, etc., necessary for the Project activities.
- 3) Other facilities which are mutually agreed upon as necessary.

The office space with appropriate facilities for the Long-term Expert Team (LET) assisting Outputs 1 and 5 was provided by the Vietnamese side in October 2010. On the other hand, JICA provided an office space for the Short-term Expert Team (SET) in Hanoi, as office spaces offered by the Vietnamese side in Hanoi were too small for SET to implement the necessary activities not only for HNI DONRE, but also for the other DONRE and MONRE in Hanoi as the capital city of Vietnam. The office spaces with facilities provided for the four DONREs (HPG, TT-HUE, HCMC, and BRVT) were all appropriate.

3.2 Inputs of the Japanese Side

3.2.1 Dispatch of Experts

Table 3.2-1 shows the name of the experts, their expertise, and the duration of their assignment from Project commencement until now.

Table 3.2-1 Inputs of the JICA Expert Team

Name (Field in charge)		M/M (JFY)			
		2010.6-2011.2	2011.3-2012.3	2012.4-2013.6	Total
Long-term Expert Team					
1) Shigenobu Obayashi (Leader/Water Environmental Policy)	Before change contract After change contract	9	13	15	37
2) Saori Ushimi (Coordinator/Water Environment Management)	Before change contract After change contract	7	13	15	35
Sub-total (Long-term Expert Team)	Before change contract After change contract	16	26	30	72
Short-term Expert Team					
3) Yoichi Iwai (Chief Advisor)	Before change contract After change contract	-	4.20	4.40	8.60
4) Itaru Okuda (Deputy CA/Water Environmental Management)	Before change contract After change contract	-	8.50	8.60	17.10
5) Derek Johnson (Water Environmental Monitoring (1))	Before change contract After change contract	-	4.50	4.50	9.00
6) Yoshiharu Shirane (Water Quality Analysis/QAQC (1))	Before change contract After change contract	-	3.50	4.00	7.50

Name (Field in charge)		M/M (JFY)			
		2010.6-2011.2	2011.3-2012.3	2012.4-2013.6	Total
7) Shinsuke Sato (Pollution Source Inventory (1))	Before change contract	-	5.00	3.50	8.50
	After change contract			5.00	10.00
8) Hiroyuki Oi (Pollution Source Inspection (1))	Before change contract	-	4.00	4.00	8.00
	After change contract				
9) Tomoyuki Hosono (Environmental Awareness (1))	Before change contract	-	4.23	3.50	7.73
	After change contract				
10) Tadashi Shoji (Water Pollution Measure (1))	Before change contract	-	4.20	5.00	9.20
	After change contract				
11) Shunsuke Hieda (Water Environmental Monitoring (2))	Before change contract	-	7.00	6.00	13.00
	After change contract				
12) Yoshiki Yamamoto (Water Quality Analysis/QAQC (2))	Before change contract	-	4.03	4.00	8.03
	After change contract				
13) Naoki Hosotani (Pollution Source Inventory (2))	Before change contract	-	5.33	3.50	8.83
	After change contract			4.50	9.83
14) Kengo Naganuma (Pollution Source Inspection (2))	Before change contract	-	3.17	3.50	6.67
	After change contract				
15) Shinichi Fukasawa /Masahiro Ibayashi (Environmental Awareness (2))	Before change contract	-	4.00	3.00	7.00
	After change contract			4.00	8.00
16) Yasuharu Matayoshi (Water Pollution Measure (2))	Before change contract	-	2.77	3.50	6.27
	After change contract				
17) Tomoe Takeda (Coordinator (1)/Water Quality Analysis/QAQC Assistant)	Before change contract	-	1.30	0.00	1.30
	After change contract			1.50	2.80
	Non-contractual assignment in Vietnam		4.43	2.83	7.26
18) Hiroshi Nakano (Pollution Source Inventory (3))	Before change contract	-	0.00	0.00	0.00
	After change contract			2.70	2.70
19) Hiroshi Nakano (Coordinator (2)/Workshop Assistance)	Before change contract	-	0.30	0.00	0.30
	After change contract			0.30	0.60
	Non-contractual assignment in Vietnam		6.47	4.23	10.70
Support for JICA Training in Japan	Before change contract	-	-	0.87	0.87
	After change contract				
Sub-total (Short-term Expert)	Before change contract	-	66.03	61.87	127.90
	After change contract			69.87	135.90
	Non-contractual assignment in Vietnam		10.90	7.06	17.96

Source: JET

3.2.2 Training Programs in Japan

Three training courses in Japan were tailored and two of them have been conducted for the counterpart personnel of the Project. Their names, course titles, and the programs are listed from Table 3.2-3 to Table 3.2-11. By the end of the Project, it is expected that a total of 38 personnel have participated in the training courses (369 man/days in total).

Table 3.2-2 Training Programs in Japan

Course Name	Period	Participants
Administrative Capacity Enhancement for Water Pollution Control	19 February to 3 March 2012	13 trainees (3 trainees from MONRE and 10 trainees from target DONRE)
Enforcement of Administrative Measure for Water Environmental Management	21 to 28 August 2012	10 trainees (2 trainees from MONRE and 2 trainees from target DONRE except for HCMC *)
Water Environmental Management for Sustainable Development (tentative)	18 to 25 April 2013	14 trainees

*: The second training course is also targeted to counterpart the personnel in MONRE and five in DONRE. JICA sent an invitation requesting the Vietnamese side to submit their application three months before the training. However, HCMC DONRE missed the deadline for submitting the application caused by the delay of selecting participants.

Source: JET

**Table 3.2-3 Outline of the First Training in Japan
(Administrative Capacity Enhancement for Water Pollution Control Course)**

Course Name	Administrative Capacity Enhancement for Water Pollution Control
Period	19 February (Sunday)– March (Saturday) 2012 (14 days in total)
Participants	13 trainees (3 trainees from MONRE and 10 trainees from target DONREs)
Main Places for Training	Tokyo, Yokohama, Osaka, Kitakyushu
Summary	The training aims to introduce the water environmental policies in Japan including the Water Pollution Control Act, and to learn ways on how to enforce the Water Pollution Control Act by the local government, environmental regulations of local governments, and water pollution control by industries. After learning the national-level policies and regulations for pollution control in Japan, the trainees visited a number of local governments and other organizations in Japan to learn how such policies and regulations are enforced. There were opportunities for field visits, too. Knowledge and experiences obtained through this training were utilized in all activities of the Project.

Source: JET

**Table 3.2-4 List of Participants for the First Training in Japan
(Administrative Capacity Enhancement for Water Pollution Control Course)**

No.	Organization	Name	Organization	Position
1	VEA	Dr Hoang Danh Son	Department of International Cooperation and Science, Technology, VEA	Director (Project Manager)
2	VEA	Dr Chu Ngoc Kien	Department of International Cooperation and Science, Technology, VEA	Official (Project Coordinator)
3	MONRE	Ms Nguyen Thanh Thao	Department of Water Resources Management, International Relation Division	Official
4	HNI DONRE	Ms Dao Thi Anh Diep	HNI Environmental Protection Agency	Vice Head
5	HNI DONRE	Mr Ta Ngoc Son	HNI Environmental Protection Agency	Officer
6	HPG DONRE	Mr Phung Van Thanh	Haiphong Department of Natural Resources and Environment	Deputy Director
7	HPG DONRE	Ms Nguyen Thi Vinh	Inspection Department, HPG DONRE	Chief Inspector
8	TT-HUE DONRE	Mr Nguyen Huu Quyet	Thua Thien-Hue Department of Natural Resources and Environment (TT-HUE DONRE)	Deputy Director
9	TT-HUE DONRE	Mr Nguyen Viet Hung	TT-HUE Environmental Protection Agency), TT-HUE DONRE	Head of EPA
10	HCMC DONRE	Mr Nguyen Hoai Nam	HCM Department of Natural Resources and Environment (HCMC DONRE)	Deputy Director
11	HCMC DONRE	Ms Le Thi Thanh Dung	Division of Environmental Management, HCMC DONRE	Officer
12	BRVT DONRE	Mr Le Van Sam	Ba Ria-Vung Tau Department of Natural Resources and Environment	Director
13	BRVT DONRE	Mr Le Tan Cuong	BRVT Environmental Protection Agency (EPA)	Head of EPA

Source: JET

**Table 3.2-5 Training Program for the First Training in Japan
(Administrative Capacity Enhancement for Water Pollution Control Course)**

Day		Time	Activities	Lecturers	Relevant Outputs	Stay
1	19 February (Sunday)	-	- Leave from Hanoi (VN954 AM0:05 - AM7:05)	-	-	TIC
2	20 February (Monday)	9:30–12:00	- Briefing of training in Japan	-	-	
		13:30–15:00	- Orientation of training course	TIC, JET		
		16:00–17:00	- Courtesy call to JICA	JICA Tokyo Head Office		
3	21 February (Tuesday)	9:00–12:00	- Lecture: History of administrative measures for overcoming water pollution problems, current condition and tasks in Japan	Overseas Environmental Cooperation Center	Output 1	
		14:00–16:30	- Lecture: Japanese administrative system for water environment management	Ministry of Environment		
4	22 February (Wednesday)	10:00–10:15	- Lecture: Outline of Japanese local legislative system	Yokohama City	Outputs 2, 4	
		10:15–10:45	- Lecture: Outline and history of pollution prevention agreement			
		11:00–11:50	- Lecture: Administrative guidance for water environment management			
		13:30–14:30	- Lecture: Introduction of inspection activity on enterprises			
		14:50–16:20	- Site visiting: Environmental monitoring center			

Day		Time	Activities	Lecturers	Relevant Outputs	Stay
5	23 February (Thursday)	9:00–12:00	- Lecture: Technical guideline and operation and maintenance measure on continuous environmental monitoring	Japan Environmental Technology Association	Output 2	JICA Osaka International Center
		PM	- Move from Yokohama to Kobe	-	-	
6	24 February (Friday)	9:00–12:00	- Lecture and site visiting: Introduction to sewerage system and its management for treating industrial wastewater	Kobe City	Output 2	
		13:30–17:00	- Site visiting: Example of industrial wastewater monitoring and management system by private enterprise	KOBELCO		
7	25 February (Saturday)	-	- Holiday	-	-	
8	26 February (Sunday)	PM	- Move from Osaka to Kitakyushu	-	-	
9	27 February (Monday)	9:00–12:00	- Lecture: General matters on wastewater treatment and cleaner production technique	Lecturer selected by Kitakyushu International Techno-Cooperative Association	Output 2	JICA Kyusyu International Center
		14:00–16:00	- Site visiting: Water quality analytical laboratory and its quality control system	Kitakyushu Environment and Science Institute		
10	28 February (Tuesday)	9:00–12:00	- Lecture: Wastewater treatment and cleaner production technique on seafood processing, beverage, and dyeing industry	Lecturer selected by Kitakyushu International Techno-Cooperative Association		
		14:00–17:00	- Site visiting: Industrial wastewater control and monitoring by private enterprise in metal processing industry	Ishikawa Metal Processing Industry		
11	29 February (Wednesday)	-	- Move from Kitakyusyu to Tokyo	-	-	
12	1 March (Thursday)	9:00–11:00	- Discussion: Administrative system for water environment management from the experience of this training program.	JET	Outputs 1,2,4	TIC
		14:00–14:30	- Discussion: Introduction of technical cooperation for water environment management field			
		15:30–17:00	- Self-study: Preparation of presentation for proposed administrative system for water environment management from the experience of this training program			
13	2 March (Friday)	9:30–11:30	- Presentation and discussion: Proposed administrative system for water environment management from the experience of this training program	JET	Outputs 1,2,4	
		13:30–14:30	- Evaluation of training course and conferment of certifications of completion of training course	TIC		
14	3 March (Saturday)	-	- Leave from Tokyo (VN955 AM10:25 - PM1:50)	-	-	-

Source: JET

**Table 3.2-6 Outline of the Second Training in Japan
(Enforcement of Administrative Measure for Water Environmental Management Course)**

Course Name	Enforcement of Administrative Measure for Water Environmental Management
Period	21 August (Tuesday)–28 August (Tuesday) 2012 (8 days in total)
Participants	10 trainees (2 trainees from MONRE and 8 trainees from target DONREs except for HCMC)
Main Places for Training	Tokyo
Summary	The training aims to introduce the water environmental policies in Japan including the Water Pollution Control Act, and to learn monitoring, inspection, and other means to enforce water environmental laws and regulations by the local governments in Japan, environmental initiatives by local governments to supplement national-level laws and regulations, water pollution control by industries in Japan, and environmental awareness activity with the cooperation of the local government, local communities, and industries. After learning national-level policies and regulations for pollution control in Japan, the trainees visited a local government and other organizations in Japan to learn how such policies and regulations are enforced. There were opportunities for field visits, too. Knowledge and experiences obtained through this training were utilized in all activities of the Project.

Source: JET

**Table 3.2-7 List of Participants for the Second Training in Japan
(Enforcement of Administrative Measure for Water Environmental Management Course)**

No.	Name	Position	Agencies
1.	Mr Chu Van Thao	Deputy Head of General Inspection, Environment Inspectorate	VEA
2	Ms Tran Thi Viet Dung	Officer, Department of Organization and Personnel	VEA
3	Mr Nguyen Hoang Phuoc	Deputy Head of EPA	TTHue DONRE
4	Mr Duong Van Thanh	Deputy Chief Inspector	TTHue DONRE
5	Mr Pham Quoc Ka	Deputy Director	Hai Phong DONRE
6	Ms Nguyen Thi Tuyet Lan	Director, HACEM	Hai Phong DONRE
7	Mr Nguyen Thai Sinh	Chief Inspector	Ba Ria Vung Tau DONRE
8	Mr Tran Anh Duc	Head of Pollution Control Division, BR-VT EPA	Ba Ria Vung Tau DONRE
9	Mr Nguyen Trong Truong	Officer, Ha Noi EPA	Ha Noi DONRE
10	Ms Nguyen Dung Phuong	Officer, Water Resources Division	Ha Noi DONRE

Source: JET

**Table 3.2-8 Training Program for the Second Training in Japan
(Administrative Capacity Enhancement for Water Pollution Control Course)**

Day		Time	Activities	Lecturers	Relevant Outputs	Stay
1	21 August (Tuesday)	-	- Leave Hanoi for Narita	-	-	TIC
2	22 August (Wednesday)	9:30–12:00	- Briefing of training in Japan	TIC	-	
		13:30–14:00	- Orientation of training course	JET	-	
		14:00–16:00	- Lecture on history of administrative measures for overcoming water pollution problems, current condition, and tasks in Japan	Overseas Environmental Cooperation Center, as a candidate	Outputs 1,2	
3	23 August (Thursday)	10:00–12:00 13:30–17:00	- Lecture on current administrative measures of local government for water environment management - Visiting on the monitoring center	Local government	Outputs 1,2,4	
4	24 August (Friday)	9:00–11:00	- Lecture on the approach to enhancement of environment management of the discharged water in the factory	Environmental Management Association For Industry, as a candidate	Output 2	
		14:30–16:30	- Visiting on wastewater treatment facilities in the factory	Private company	Output 2	
5	25 August (Saturday)	9:30–11:30	- Site visiting for the case study on the cooperation among the local public, local government, and private company for water environmental preservation and their activities on environmental awareness	NPO(Nonprofit Organization) etc	Output 4	
6	26 August (Sunday)	-	- Self-study	-	-	
7	27 August (Monday)	9:00–12:00	- Preparation of presentation	JET	Outputs 2,4	
		13:00–15:00	- Presentation of administrative system for water environmental management from the experience of this training program	JET		
		15:00–16:00	- Evaluation of training course, Certificate Ceremony	TIC		
8	28 August (Tuesday)	-	- Leave Narita for Hanoi	-	-	

Source: JET

**Table 3.2-9 Outline of the Third Training in Japan
(Making and Enhancement of Policy/Measures for Water Environmental Management Course)**

Course Name	Making and Enhancement of Policy/Measures for Water Environmental Management
Period	18 April (Thu)– 25 April (Thu) 2013 (8 days in total)
Participants	14 trainees (5 trainees from MONRE, 5 trainees from target DONREs and 4 trainees from target city/province people's committee except HCMC people's committee)
Main Places for Training	Tokyo
Summary	The training aims to learn the Japanese administrative process of policymaking on water environment management, the measures for local government to reflect the policy for their practical activities and the environmental data management, which lead to enhance their knowledge. After learning national-level policies and regulations for pollution control in Japan, the trainees visited a local government and other organizations in Japan to learn how such policies and regulations are enforced. There were opportunities for field visits, too. Knowledge and experiences obtained through this training were utilized for all activities of the Project.

Source: JET

**Table 3.2-10 List of Participants for the Third Training in Japan
(Making and Enhancement of Policy/Measures for Water Environmental Management Course)**

No.	Name	Position	Organization
1.	Mr Nguyen Minh Cuong	Deputy Director	Department of International cooperation and Science Technology - VEA
2	Ms. Nguyen Hoang Anh	Head of the Division	Water and Soil Pollution Control Division/Pollution Control Department - VEA
3	Ms. Tran Thi Le Anh	Head of the Division	Environment Protection for River Basin and Coastal Zone/Waste Management and Environment Improvement Department (WENID)
4	Ms. Nguyen Thanh Thao	Officer	Department of International cooperation and Science Technology /Department of Water Resources Management
5	Mr Le Hong Duong	Director	Southern Branch - VEA
6	Mr. Do Trung Thoai	Vice Chairman	Haiphong People's Committee
7	Mr. Nguyen Huu Loi	Vice Director	BaRia-Vung Tau DONRE
8	Mr. Nguyen Dinh Dau	Director	TT-HUE DONRE
9	Mr. Tran Nguyen Hien	Head	Hochiminh EPA/HCMC DONRE
10	Mr. Bui Quang San	Director	HPG DONRE
11	Mr. Nguyen Duy Thach	Vice Chief	Division Department of Natural Resources and Environment/Hanoi People's Committee
12	Mr. Pham Hung Cuong	Head	Water Resources Management/HNI DONRE
13	Ms. Tran Thi Hoan	Manager	State Administration Environment/Provincial People's Committee of Ba Ria - Vung Tau
14	Mr. Dang Ngoc Tran	Deputy Manager	Office of TT- HUE Provincial People's Committee
15	Mr. Luong Duy Hanh	Chief Inspector	Inspection of Administration - VEA

Source: JET

**Table 3.2-11 Training Program for the Third Training in Japan (Tentative schedule)
(Administrative Capacity Enhancement for Water Pollution Control Course)**

Day	Time	Activities	Lecturer etc	Stay
1 Apr 18 (Thursday)	-	Leave Hanoi/ HCMC for Narita	-	TIC
2 Apr 19 (Friday)	09:30 - 12:00	Briefing of training	TIC	
	13:30 - 14:00	Orientation of training course	JET	
	14:00 - 16:00	Lecture on the national administrative policy making process and effective usage of environmental information in Japan	M. of Environment, Japan	
	18:30 - 20:30	Welcome party	-	
3 Apr 20 (Saturday)	09:00 - 12:00	1)Lecture on historical review of administrative measures for overcoming water pollution problems 2)Discussion on necessary administrative policy and effective enforcement	Tokyo Metropolitan Research Institute	JICA Yokohama
	14:20 - 15:00	Site visit to the Sumida river	JET	
4 Apr 21 (Sunday)	AM-PM	day-off	-	
5 Apr 22 (Monday)	09:00 - 16:00	1)Lecture on implementation process of local government related to policy and ordinance preparation, planning, institutional set-up, budget preparation, enforcement, information disclosure 2)Lecture on the Future Environment City Concept focusing on Green Growth and Green Economy 3)Seeing land use and cityscape, and visiting the monitoring center	Yokohama city	

Day	Time	Activities	Lecturer etc	Stay
6	Apr 23 (Tuesday)	10:00 – 12:00	Site visit of industrial wastewater treatment facility	Private Company (SAN-EI REGULATOR CO.,LTD.)
		14:00 – 16:00	Visiting NPO related to partnership among local citizens, local government, and enterprises, and public awareness	NPO (Tsurumi. River Basin Networking)
7	Apr 24 (Wednesday)	9:00 – 11:30	Preparation of presentation	JET
		12:00 – 13:20	Lunch meeting with JICA HQ	-
		14:00 – 16:00	1)Presentation by trainees 2)Evaluation and certificate ceremony 3) Courtesy call to JICA HQ	JICA HQ
		19:00	Leave Narita for HCMC (for Mr.Luong Duy Hanh)	-
8	Apr 25 (Thursday)	-	Leave Narita for Hanoi/ HCMC	-

Source: JET

3.2.3 Equipment Procured

The total amount of USD 340,200 is allocated for the needed equipment for the Project.

Table 3.2-12 List of Procured Equipment Brought by the Short-term Experts (SET)

Japanese Fiscal Year (JFY)	Item	Qty.	Cost (USD)
2011	(1) Desk top computer	1	1,640
	(2) Desk top computer	6	11,700
	(3) Lap top computer	1	1,585
	(4) Lap top computer	3	7,110
	(5) Phone /Fax	1	355
	(6) Phone /Fax	1	217
	(7) Photo copier	1	3,750
	(8) Photo copier	1	3,226
	(9) Laser printer	1	1,250
	(10) Laser printer	1	929
	(11) Portable scanner	1	295
	(12) Portable scanner	1	485
	(13) UPS	1	45
	(14) UPS	5	660
	(15) GIS software	7	14,504
	(16) Simplified GPS	5	2,230
		Total	USD 49,981

Source: JET

Table 3.2-13 List of Equipment Procured by SET

Japanese Fiscal Year (JFY)	Item	Qty.	Cost (USD)
2011	(1) Water purifier	1	8300
	(2) COD digester	1	2100
	(3) pH meter	1	1700
	(4) EC meter	1	1400
	(5) Portable multi-analyzer	1	6700
	(6) UV-VIS	1	12,300
	(7) Analytical balance	1	5000
	(8) Balance	1	500
	(9) Magnetic stirrer	1	800
	(10) Vacuum pump	1	700
	(11) Incubator	1	3000
	(12) BOD (DO) meter	1	1400
	(13) Dry oven	1	2000
	(14) Fume hood	1	38,000
	(15) Glassware	1	26,400
	(16) Reagents	1	8500
		Total	USD 119,100

Source: JET

Table 3.2-14 List of Equipment Procured by the JICA Vietnam Office

Year (JFY)	Lot	No.	Name of Equipment	Qty	Unit	Unit Cost (USD)	Amount (USD)	Unit Cost (VND)	Amount (VND)	Site Installed (DONRE)
2012	Lot 1	1	Extraction apparatus	1	Set	7201.40	7201.40	-	-	HNI
		2	Cartridge for solid-phase extraction	10	Boxes	102.30	1023.00	-	-	HNI
		3	Micro syringe	1	Set	236.60	236.60	-	-	HNI
		4	GC columns DB-5 ms	1	Set	1088.50	1088.50	-	-	HNI
		5	Mixing machine	1	Set	300.00	300.00	-	-	HNI
		6	Draft chamber	1	Set	6500.00	6500.00	-	-	HPG
		7	COD digester	1	Set	1560.00	1560.00	-	-	HPG
		8	Decomposition analysis kit for Kjeldahl nitrogen	1	Set	22,670.00	22,670.00	-	-	HPG
		9	Water distilling machine	1	Set	3625.00	3625.00	-	-	HPG
		10	Refrigerator with freezer	3	Pieces	756.00	2268.00	-	-	HPG (1) and TT-HUE (2)
		11	Hot plate with stirrer	1	Piece	776.00	776.00	-	-	TT-HUE
		12	Dehumidifier	2	Pieces	244.00	488.00	-	-	TT-HUE
		13	Water bath	1	Piece	946.00	946.00	-	-	TT-HUE
		14	Flow meter	4	Sets	1548.00	6192.00	-	-	Each (1) for HPG, TT-HUE, HCMC, and BRVT
		15	Van dorn sampler	2	Sets	1050.00	2100.00	-	-	HCMC
		16	Multi-parameter water quality analyzer	5	Sets	5000.00	25,000.00	-	-	HPG (2), HCMC (2) and BRVT (1)
		17	Micro-pipet for 1000 µL	1	Set	196.50	196.50	-	-	TT-HUE
		18	Micro-pipet for 5000 µL	1	Set	210.30	210.30	-	-	TT-HUE
		19	Micro-pipet for 10 mL	1	Set	196.70	196.70	-	-	TT-HUE
		20	Micro-pipet for 50 µL	1	Set	196.50	196.50	-	-	BRVT
		21	Micro-pipet for 1000 µL	1	Set	196.50	196.50	-	-	BRVT
		22	Micro-pipet for 5000 µL	1	Set	210.30	210.30	-	-	BRVT
		23	Pipet holder	2	Pieces	65.40	130.80	-	-	TT-HUE (1) and BRVT (1)
		24	POPs standard solution	3	Pieces	1720.00	5160.00	-	-	HNI
		25	Reagents for analysis	1	Set	2028.80	2028.80	-	-	HPG
		26	Reagents and glassware for analysis	1	Set	17,743.10	17,743.10	-	-	BRVT
		Sub Total				-	108,244.00	-	-	
	Lot 2*3	1.AAS* ¹ instrument and parts of AAS								BRVT
		1-1	HGA-850, AS-800 with cooling system	1	Piece	(36,127)	(36,127)	753,239,300	753,239,300	
		1-2	Grooved Pyrocoated Tubes BX/20	1	20/box	(1321)	(1321)	27,537,555	27,537,555	
		1-3	Graphite Contacte F.HGI Long/S	1	Box	(159)	(159)	3,318,790	3,318,790	
		1-4	Acetylene Filter Assy	1	Piece	(479)	(479)	9,977,375	9,977,375	
		1-5	Impact Bead	1	Piece	(101)	(101)	2,100,500	2,100,500	
		1-6	Modifier 1% Magnes. Complete	1	Bottle	(153)	(153)	3,192,760	3,192,760	
		1-7	Modifier 1% Pallad. Complete	1	Bottle	(356)	(356)	7,414,765	7,414,765	
		1-8	Modifier - NH4H2PO4 Matrix	1	Bottle	(100)	(100)	2,079,495	2,079,495	
		1-9	Fias System Board	1	Piece	(4918)	(4918)	102,546,410	102,546,410	
		1-10	PTFE Membrane PK/50	1	50/pk	(455)	(455)	9,494,260	9,494,260	
		1-11	Red/Red Pump Tubing PK/12	1	12/pk	(95)	(95)	1,974,470	1,974,470	
		1-12	Yellow/Blue Pump Tubing PK/12^^	1	12/pk	(95)	(95)	1,974,470	1,974,470	
		1-13	Tubing per Pump 3.18 MM BL/WH 40 cm PK/12	1	12/pk	(102)	(102)	2,121,505	2,121,505	
		1-14	CU LUMINA HCL^	1	Piece	(599)	(599)	12,497,975	12,497,975	

Year (JFY)	Lot	No.	Name of Equipment	Qty	Unit	Unit Cost (USD)	Amount (USD)	Unit Cost (VND)	Amount (VND)	Site Installed (DONRE)	
		1-15	ZN LUMINA HCL^	1	Piece	(811)	(811)	16,909,025	16,909,025		
		1-16	CD LUMINA HCL^	1	Piece	(776)	(776)	16,173,850	16,173,850		
		1-17	PB LUMINA HCL^	1	Piece	(911)	(911)	18,988,520	18,988,520		
		1-18	CR LUMINA HCL^	1	Piece	(686)	(686)	14,304,405	14,304,405		
		1-19	NI LUMINA HCL^	1	Piece	(599)	(599)	12,497,975	12,497,975		
		1-20	MN LUMINA HCL^	1	Piece	(722)	(722)	15,060,585	15,060,585		
		2. Parts of GC-ECD ^{*2}									BRVT
		2-1	Detector-GC9000 ECD 230 V	1	Piece	(6294)	(6294)	131,239,240	131,239,240		
		2-2	ECD Amplifier Add-On Kit For ECD	1	Piece	(1546)	(1546)	32,242,675	32,242,675		
		2-3	Oxygen/Moisture/Hydroc arbon Trap Clickton	1	Piece	(229)	(229)	4,768,135	4,768,135		
		2-4	11 mm Crimp Top Vial, 2 ml PK/100	5	100/Pk	(26)	(131)	546,130	2,730,650		
		2-5	Graphite Ferrule 1/16 x 0.5 mm PK/10	5	10/pk	(70)	(348)	1,449,345	7,246,725		
		2-6	Graphite Ferrule 1/8 x 0.5 mm PK/10	5	10/pk	(70)	(348)	1,449,345	7,246,725		
		2-7	SEPTA-11 mm Mold GRN INJ Port (50PK)	1	50/pk	(126)	(126)	2,625,625	2,625,625		
		2-8	COL-ELITE CLP 30M 0.32 mm 0.50UM	1	Piece	(1067)	(1067)	22,244,295	22,244,295		
		2-9	COL-ELITE-608-30M-.5 0UM-.32MM	2	Pieces	(858)	(1717)	17,896,260	35,792,520		
		2-10	Syringe-10UL 701SRN Point ST-2	2	Pieces	(100)	(199)	2,079,495	4,158,990		
		2-11	CAP-11MM Crimp Red Rubber/PTFE PK/100	5	100/pk	(16)	(81)	336,080	1,680,400		
		2-12	2MM Quartz PSS Liner	2	Pieces	(29)	(58)	609,145	1,218,290		
		2-13	2MM Quartz SP/SPL Liner	2	Pieces	(34)	(69)	714,170	1,428,340		
		2-14	Dell PC with LCD 17 inch, Windows license	1	Piece	(1099)	(1099)	22,916,455	22,916,455		
		Subtotal						-	(62,875.00)	-	
Total(Lot 1 + Lot 2)						-	171,119.00	-	-		

*1: Atomic Absorption Spectrophotometer

*2: Gas Chromatography - Electron Capture Detector

*3: Exchange Rate (as of 28 February 2013) State Bank of Vietnam USD 1.00 = VND 20,850

Source: JET

3.2.4 Operational Expenses Borne by the Japanese Side

The operational expenses borne by the Japanese side is shown in Table 3.2-15 below. The total amount of USD 1,172,510 was allocated for operational expenses for the Project by JICA.

Table 3.2-15 Operational Expenses Borne by the Japanese Side

Output	Subjects	JFY 2011 Actual ^{*1}		JFY 2012 Budget ^{*2}	
		Expense (million VND)	(Expense) (USD)	Expense (million VND)	(Expense) (USD)
Output 1	Hiring local experts	2257	110,452	1780	85,494
Output 2-1 (WG 2-1)	Hiring local experts	410	20,060	713	34,054
	Subcontract	0	0	0	0
Output 2-1 (WG 2-2)	Hiring local experts	173	8454	410	19,574
	Subcontract	0	0	0	0
Output 2-2 (WG 2-3)	Hiring local experts	561	27,462	426	20,358
	Subcontract	1472	72,054	2126	101,600
Output 2-3 (WG 2-4)	Hiring local experts	84	4110	356	16,998
	Subcontract	0	0	0	0
Output 3 (WG 3)	Hiring local experts	317	15,497	356	16,998
	Subcontract	0	0	0	0
Output 4 (WG 4)	Hiring local experts	245	12,011	388	18,534
	Subcontract	668	32,705	1358	64,862
Output 5	Hiring local experts	379	18,200	249	11,945
Other Expenses for SET (Cost for Project Operation)		4219	206,461	5076	254,627
Total		10785	527,466	13238	645,044
Grand Total				24,023	1,172,510

*1 This item is calculated by JICA's exchange rate of March 2012

*2 This item is calculated by JICA's exchange rate of January 2013

Source: JET

CHAPTER 4 PROJECT MANAGEMENT ACTIVITIES

4.1 Joint Coordinating Committee Meeting

In order to ensure smooth implementation of the Project activities, a Joint Coordinating Committee (JCC) was established in accordance with the R/D signed on 8 January 2010. The functions of the JCC are as follows:

- a) To formulate an annual operation work plan for the Project based on the tentative implementation schedule in the framework of the R/D,
- b) To review the overall progress and achievements of the Project,
- c) To examine major issues arising from or in connection with the Project,
- d) To work out modification of activities depending on the necessity, and
- e) To ensure smooth implementation of the Project and to secure coordination with ministries and provinces concerned.

The major discussion results of the JCC meeting are summarized in Table 4.1-1.

Table 4.1-1 JCC Meetings

No./Date	Theme	Major Comments and Requests by JCC	Actions of C/P and JET
First JCC Meeting (1 November 2010: HNI)	-Discussion on the results of the JICA monitoring mission -Discussion on the progress of the Project	1) The Vietnamese side and JICA agreed on the contents of the five outputs of the Project. 2) The JICA monitoring mission appraised that HUE DONRE does not have basic equipment to conduct monitoring and inspection. Thus, the mission suggested that selected basic equipment would be provided in the Project for Hue DONRE. 3) MONRE/DONREs emphasized the need of technical equipment and knowledge for monitoring, analysis, and pollution forecast on chemicals such as POPs, pesticides, herbicides, carcinogens, endocrine disrupting chemicals (EDCs), etc., and the need of automatic, continuous monitoring stations at sensitive hotspots as well as the importance of equipment provision for project management such as vehicles, office equipment, etc.	1) Activities at all outputs will be implemented under guidance of VEA/MONRE. 2) MONRE and DONRE shall smoothly implement the procedures of the Project approval, and secure office space and facilities including internet connection for JET. 3) In response to this request, JICA responded that they would consider, in consultation with MONRE and DONREs, the necessity of equipment, with careful examination in the course of the Project if equipment is inevitable for the purpose of the Project and within the limit of its budget.
Pre JCC Meeting (7 April 2011: HNI)	-Discussion on the draft Ic/R	1) The Ic/R needs to cover the components of both central and local governments related to the five outputs of the Project. 2) The role of VEA, DONREs, and relevant organizations under VEA should be clarified in detail in the final Ic/R. 3) VEA is the organization which coordinates the implementation of the Project from the Vietnamese side. 4) The total budget for the Project, the budget for each province, the budget for organizations under VEA and involved organizations under VEA, the budget for hiring Japanese experts and local experts, and the budget for equipment need to be clarified before developing the actual plan for each province and the Project in general. 5) JET should work in each province to evaluate the requirements for CD with respect to both technical capacity and equipment, in order to effectively implement the Project, following the idea described in the M/M of the first JCC on 1 November 2010. 6) For activities at the level of the central government, relevant organizations need to concentrate on the main target of the Project, namely CD for water environmental management, and support the effort to review policies and institutional aspects of environmental management toward the anticipated revision of the Environmental Protection Law.	1) JET agreed to this request and would include the five outputs in the final Ic/R. 2) C/P and JET will confirm the relevant organizations through discussion and reflect such in the final Ic/R. 3) JET agreed to conduct the Project in coordination with VEA. 4) JICA and JET will inform a figure of budget of the Project for confirming the C/P budget of the Vietnamese side. 5) JET will further discuss technical capacity and equipment with each DONRE based on the action plan prepared by each DONRE, and reflect it on the final Ic/R as much as possible. 6) JET agreed to this request and will conduct actual activities mostly in Output 1.
Second JCC Meeting (10 June 2011: HNI)	-Discussion and approval of the final Ic/R	1) JCC agreed with the general contents of the Ic/R. JCC entrusted VEA and JET with the task of finalizing the Ic/R by the end of July 2011 considering the comments raised at the JCC meeting as well as other requirements of both the Vietnamese and Japanese sides. 2) JCC assigned VEA to cooperate with the Japanese side in finalizing the roles, functions, operating mechanism and components of JCC and PMU before the end of July 2011. 3) VEA, JET and DONREs are responsible for developing	1) JET finalized the Ic/R in August 2011 mainly due to mutual agreement on PMB. 2) JET, in cooperation with VEA, finalized the Ic/R reflecting all comments. 3) Through further discussion with each DONRE,

No./Date	Theme	Major Comments and Requests by JCC	Actions of C/P and JET
		<p>detailed CD plans in each province considering the CD need of each DONRE, availability of detailed information to design activities, assignment schedule of JET members, and the aspects. These plans should be developed in steps: first set of plans by the middle of September 2011 to cover activities to be carried out in 2011, and the second set of plans by the middle of October 2011 for the activities in 2012.</p> <p>4) Local experts and subcontractors will be decided by VEA, DONREs and JET by following the regulations of JICA.</p> <p>5) Procurement of equipment for TT-HUE DONRE should be started based on the list of equipment approved at the first JCC meeting on 1 November 2010. JCC assigned VEA and JET to investigate the needs for additional procurement of equipment for the Project activities, and develop and submit lists of necessary equipment to JCC and JICA for consideration by early September 2011. Procurement is considered only if the equipment is critical to the purpose of the Project and if it is within the limits of JICA's budget.</p> <p>6) The revision of the PDM would be discussed in the subsequent JCC meetings.</p> <p>7) JCC officially agreed with the revision of the Plan of Operation (PO).</p> <p>8) The Japanese side and the Vietnamese side should discuss further about the JET office.</p>	<p>JET and C/Ps prepared the WP covering the entire Project period. C/Ps of each DONRE and JET will continue to revise the activities to be implemented in the Project.</p> <p>4) JET agreed to this request.</p> <p>5) JET started the procurement procedure to TT-HUE DONRE. JET and VEA prepared a short list of equipment through discussion with DONREs. This short list was submitted to JICA HQ for decision making.</p> <p>6) JET agreed with this matter.</p> <p>7) The C/P members and JET will implement the project activities in accordance with the revised PO.</p> <p>8) JET agreed.</p>
Third JCC Meeting (22 December 2011: HNI)	<p>-Reporting of the results of the First PMB Meeting</p> <p>-Discussion on the Project activities and approval of the Progress Report (1)</p> <p>-Discussion of the results of the mid-term review</p> <p>-Discussion and approval of the planned activities in 2012</p>	<p>1) JCC agreed with the contents of Pr/R (1) and requested JET to submit it officially.</p> <p>2) The mid-term review team reported their findings and presented suggestions for the Project works forward. JCC confirmed the suggestions of the mid-term review team.</p> <p>3) JCC generally agreed on the planned activities in 2012 and requested WGs and JET to reflect them in the WP.</p> <p>4) Since the Project was approved by the government officially, JCC requested to DONRE and JET to prepare a budget plan in 2012 in order to obtain the counterpart budget for the Project.</p> <p>5) Revision of the Law on Environment Protection is a crucial matter for the Vietnamese side. Thus, JCC requested for more support from the Japanese side. JICA would continue to support the Vietnamese side in line with the current Project components as much as possible. Additional assistance should be discussed further between the Vietnamese side and the Japanese side in another opportunity.</p> <p>6) Revision of the current PDM would be discussed in subsequent activities of the Project.</p>	<p>1) JET will print and submit Pr/R (1) to VEA/DONRE and JICA.</p> <p>2) The Vietnamese side and JET will continue the Project activities according to the suggestions.</p> <p>3) C/Ps and JET will revise the current WP reflecting the proposed activities and comments from JCC.</p> <p>4) C/Ps and JET will prepare a budget plan in 2012 as soon as possible.</p> <p>5) C/Ps and JET will carry out the Project activities for contribution of the LEP revision through strengthening the capacity of the organizations concerned.</p> <p>6) C/Ps and JET will continue discussions on revision of PDM.</p>
Fourth JCC Meeting (29 June 2012: BRVT)	<p>- Evaluation of the achievements of activities</p> <p>- Approval of the activities in the next term (May 2012 to May 2013)</p> <p>- Approval of the revised PDM</p> <p>- Approval of Progress Report No. 2</p>	<p>1) JCC agreed with the activity plans until the end of the Project.</p> <p>2) JCC agreed with the proposed revision of the PDM and the PO in principle. JCC requested VEA and JET to finalize the PDM and PO. The finalized version will be reported to MONRE.</p> <p>3) For Output 2, the indicators of PSM should be clarified. Techniques on monitoring, sampling and chemical analysis should be documented as a set of guidelines so that the staff can check or refer to them after the Project.</p> <p>4) Intensive training of DONRE staff is very necessary.</p> <p>5) Output 3 shall be pushed further so that its results can be shared and learned by other DONREs.</p> <p>6) Output 4 is clear enough and shall be continued actively.</p> <p>7) Output 5 is behind schedule and shall be facilitated further to achieve concrete results.</p> <p>8) JCC agreed with JET's responses to comments on Progress Report No. 2.</p> <p>9) Regarding the comments and difficulties raised by DONREs, JCC will discuss with JICA to work out solutions, which should be in line with the Record of Discussions signed by both sides on 8 January 2010.</p> <p>10) The A4 form shall be obtained before 10 July 2012.</p> <p>11) The offices for JET shall be discussed and be decided with DONREs before 10 July 2012.</p>	<p>1) C/Ps and JET should revise the activity plans as necessary.</p> <p>2) VEA and JET should finalize the PDM and PO reflecting the comments of relevant organizations.</p> <p>3) VEA and JET should finalize the indicators in the PDM. C/Ps and JET should develop technical guidelines.</p> <p>4) More training will be provided.</p> <p>5) C/Ps and JET should organize a WS to disseminate the results to other DONREs.</p> <p>6) Activities of Output 4 will be continued.</p> <p>7) Activities of Output 5 should be pursued actively.</p> <p>8) No need to reprint the report. The Project should focus on producing a good Progress Report No. 3 considering the comments on Progress Report No. 2.</p> <p>9) C/P and JET should regularly organize PDM and discuss important issues.</p> <p>10) VEA should obtain the A4 form.</p> <p>11) JICA and VEA should discuss and resolve the office issue.</p>

No./Date	Theme	Major Comments and Requests by JCC	Actions of C/P and JET
Fifth JCC Meeting (20 March 2013: HNI)	- Discussion on the terminal evaluation results - Approval of current activities and achievement - Discussion on remaining activities	<ol style="list-style-type: none"> 1) The joint terminal evaluation mission explained that the team found the prospects for achieving the purpose of the Project is high, and would like to confirm the remaining activities through this JCC. 2) The evaluation results were presented concluding that almost all activities have been conducted at the time of evaluation, and that the purpose of the Project and the five outputs are likely to be achieved by the end of the Project. The evaluation results according to the five evaluation criteria were presented, and the recommendations and lessons learnt were given to encourage Project members toward sustainability and further expansion of the Project outcome. JCC members approved the results of the evaluation. 3) VEA presented the progress and achievements, explaining the five outputs made by the Project activities in MONRE and DONREs. Recommendations were also made for each output. 4) JCC confirmed that the activities remaining until the end of the Project are to: <ul style="list-style-type: none"> - discuss the way to implement "actions" and the "way forward" as presented in the WS in Hue on 14 March 2013, - review the Project activities, conduct follow-up activities if needed, and draw lessons learnt for future activities, - finalize the Project Completion Report, - conduct training in Japan in April 2013, - finalize other deliverables (handbooks, guidelines, and outlines) and make them available through VEA, if appropriate, and - prepare for the final seminar which will take place in mid-May 2013 5) JCC agreed with the activity plans until the end of the Project. 	<ol style="list-style-type: none"> 1) C/Ps and JET would continue the remaining works and activities to fully achieve the targets in the PDM considering sustainability. 2) VEA/MONRE and DONREs will support the activities of C/Ps to obtain more effective outputs from the Project. 3) C/Ps and JET confirmed the remaining activities which the joint terminal evaluation team listed, and would conduct them smoothly during the remaining period of the Project.
Sixth JCC Meeting (21 May 2013: HNI)	-To discuss: a) Achievements of the Project b) Approval of Project Completion Report c) Distribution of project outputs d) Handover of equipment, and e) Utilization of outputs of the Project for improvement of water environmental management	<ol style="list-style-type: none"> 1) Overall the Project has made significant contributions to water environmental management in Vietnam, and is considered a success. The JCC highly appreciated the efforts made by both the Vietnamese side and the Japanese side. 2) The JCC agreed with the contents of the PC/R. 3) The JCC agreed with the contents of other technical outputs of the Project. SET has already distributed all of its technical outputs in electronic format at the Final Seminars in HCMC and Hanoi. 4) The JCC requested LET to complete the 4th training on "policy making and tools" scheduled in June 2013, which is the only main activity of the Project remaining. 5) Relevant organizations shall review both tangible and intangible outputs of the Project, and incorporate them into their activities for water environmental management. Also, relevant organizations shall assume the leading roles in extending positive effects of the Project to other organizations. 6) Even though the Project has achieved significant successes, there were various difficulties in implementing this Project. 7) Official handover of all equipment and assets has been completed by signing of the minutes of receipt of equipment/assets by Mr. Fumihiko Okiura, Senior Representative of JICA Vietnam and Dr. Nguyen The 	<ol style="list-style-type: none"> 2) The Japanese side should print the report in Japan and deliver them to VEA. It is the responsibility of VEA to distribute them to all relevant sections and departments of MONRE and DONREs, and to ensure that the outputs of the Project are used in most efficient way possible. 3) SET shall send the printed copies of technical materials (six volumes) to VEA, and VEA shall distribute them to all relevant sections and departments of participating organizations. LET shall prepare electronic copies of outputs for the activity output1 and output5. VEA is again responsible for distributing these materials to all relevant sections and departments. 4) LET should complete the 4th training on "policy making and tools" scheduled in June 2013. 5) Relevant organizations of MONRE and DONREs should review both tangible (e.g., reports, handbooks, documents) and intangible (e.g., capacities of officers developed, suggestions to improve institutional and organizational issues) outputs of the Project, and incorporate them into their activities. Also, they should assume the leading roles in extending positive effects of the Project to other organizations, such as other provincial DONREs, district DONREs and MONRE units involved in other aspects of environmental management. 6) The counterparts should review the difficulties in implementing this Project and consider to avoid them in future cooperation projects.

No./Date	Theme	Major Comments and Requests by JCC	Actions of C/P and JET
		<p>Dong, Deputy Director General of VEA.</p> <p>8) This Project shall officially end upon the completion of the 4th training on policy making and tools and distribution of the PC/R and other outputs of the Project to relevant organizations.</p> <p>9) This is the last JCC meeting of the Project unless required by the situation.</p> <p>10) Various organization participated in the Project expressed their desires for further supports by JICA to improve environmental management at the local and the national levels.</p>	<p>9) In such case, both the Japanese side and the Vietnamese side shall discuss and organize the JCC.</p> <p>10) JICA replied JICA is willing to extend further support to the Vietnamese side as long as relevant organizations continue their efforts to improve their environmental management with their own initiatives and ownership.</p>

Source: JET

4.2 Project Management Board Meeting

In order to facilitate active and regular coordination among MONRE and the five DONREs, a Project Management Board (PMB) was organized under JCC. The functions of PMB are as follows:

- To support smooth implementation of the Project,
- To formulate the draft annual operations work plan of the Project based on PDM and PO,
- To discuss TOR of subcontract works,
- To share the progress of the Project activities,
- To discuss issues that would arise during the course of the Project activities,
- To prepare the subjects to be reported to JCC, and
- To disseminate the outcome of the Project.

The major discussion results of the PMB meeting are summarized in Table 4.2-1.

Table 4.2-1 Project Management Board (PMB) Meeting

No./Date	Theme	Major Comments and Requests by JCC	Actions of C/P and JET
First PMB Meeting (25 November 2011: HNI)	-Discussion on Progress Report No. 1 (PrR-1)	<p>1) Basically, PMB agrees with the contents of Progress Report No. 1 and the next year's plan of the Project with some comments.</p> <p>2) Plan in the next year: Policy review shall be continued, more specific reviews are needed. Evaluation criteria shall be set out.</p> <p>3) The revision of Circular No. 07/2007/TT-BTNMT needs to be discussed further.</p> <p>4) The Project activities during the period between 15 December 2011 and 25 January 2012 should be organized considering the end of fiscal year and lunar new year holidays in Vietnam.</p> <p>5) Training courses in Vietnam and in Japan shall be announced and planned. If possible, training courses in Vietnam shall be organized in the five DONREs alternatively so that DONRE staff can exchange experiences and current practice.</p> <p>6) VEA has assigned the Centre for Environmental Information and Data as the responsible agency for developing the information system. LET should contact this center for implementing the Output 5 activities through ISD in VEA.</p> <p>7) For activities in the post project phase, a survey on the status of environmental management in other provinces (not including the five provinces in the Project area) shall be implemented.</p>	<p>1) VEA and JET are to finalize Progress Report No. 1 considering the comments from JICA, DONREs, and MONRE organizations.</p> <p>2) VEA should ensure that the Project is officially approved and the counterpart funds be allocated. Therefore, VEA will try its best to get the approving documents in the next week and inform DONREs officially about the Project and its counterpart fund.</p> <p>3) DONREs should arrange working spaces for JET members.</p> <p>4) Upon approval of the Project, VEA, DONREs and JET should improve project management.</p> <p>5) The Vietnamese side promised to the Japanese side to provide a work office for JET. Therefore, despite of space difficulties, each DONRE should arrange at least two working desks for JET. VEA will send official notice to DONREs about this.</p> <p>6) Project coordination aims to ensure smooth and efficient implementation of the Project. If necessary, such coordination would be discussed and simplified.</p>
Second PMB Meeting (29 June 2012: HNI)	- To discuss project coordination - To share experiences and	<p>1) The Project is a JICA technical assistance project, and according to JICA mechanism, the Vietnamese side is expected to contribute human resources, time as well as counterpart fund to the Project. In order to ensure smooth implementation of the Project, JET should discuss closely and clearly with DONREs, and clarify the demarcation of</p>	<p>1) Based on the R/D and other relevant documents, C/Ps and JET should clarify how to share responsibilities.</p>

No./Date	Theme	Major Comments and Requests by JCC	Actions of C/P and JET
BRVT)	knowledge with other DONREs	responsibilities among JET and the DONREs so that DONRE can disburse their counterpart funds. 2) Outputs of the Project shall be measurable by indicators. 3) The Project is expected to provide training courses to four or five staff of EPA for mastering the PSI (understand, update, and use) and grant them with training certificates. 4) At the end of the Project, the list of training courses, list of staff attending the training courses, and training materials must be documented. 5) The Project cannot solve all environmental issues in Vietnam. Regarding DONRE's comments, PMB will record and discuss such with JICA.	2) C/Ps and JET should finalize the indicators in PDM. 3) A WS will be organized in July 2012, and more training will be provided. Details are to be discussed. 4) Because some of the activities are not well-structured, C/Ps and JET should discuss how to develop a list of training courses. 5) C/Ps and JET should discuss and prioritize activities considering sustainability of efforts.

Source: JET

4.3 Regular Meeting

In addition to the JCC and PMB meetings, VEA, JICA and JET met a total of 46 times during the course of the Project implementation in order to discuss the details of the Project activities, coordination among participating organizations, various official procedures, JICA training in Japan, procurement of equipment, and other issues. The discussion items of each meeting are described in Table 4.3-1.

Table 4.3-1 Regular Meeting

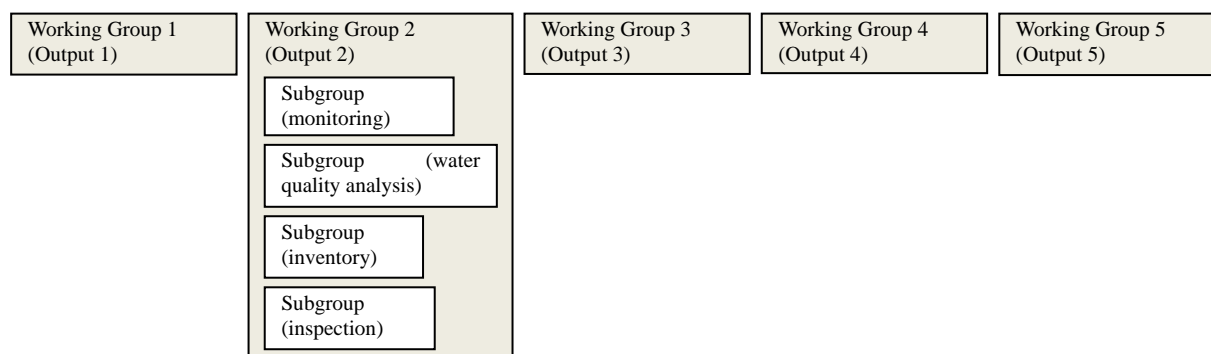
No.	Date	Discussion Items
1	30 March 2011	-Submission of first draft of Ic/R; -preparation of pre-JCC meeting on 7 April (agenda/ list of attendants)
2	31 March 2011	-Planning of first DONRE visit (lab check included)
3	6 April 2011	-Final preparation for pre-JCC meeting on 7 April
4	12 April 2011	-Discussion on M/M of pre-JCC meeting
5	25 April 2011	-Schedule of second DONRE visit; -first meeting of Output 3; - general schedule in May
6	10 May 2011	-Finalization of Ic/R; -preparation for second JCC; -comments on Ic/R; -project approval; -office for JET
7	19 May 2011	-Finalization of Ic/R; -preparation for second JCC; -comments on Ic/R
8	30 May 2011	-Preparation for second JCC; -invitation letters; -logistics arrangement for participants; -anticipated agenda; -letter from HUE DONRE
9	2 June 2011	-Preparation for second JCC; -presentations by VEA and JET; -logistics arrangement for participants; -anticipated agenda
10	16 June 2011	-Draft MM of second JCC; -hiring of local experts; -WS on environmental data management
11	20 June 2011	-Revision MM of second JCC; -development of detailed WPs; -demarcation of expenses; -members of C/Ps; -training in Japan
12	1 July 2011	-WS on environmental data management
13	4 July 2011	-Revision of MM of second JCC; - finalization of Ic/R; -additional procurement of equipment
14	19 July 2011	-Finalization of MM of second JCC; -finalization of Ic/R; -hiring of local experts and interpreters; -WS on environmental data management; -project approval
15	25 July 2011	-Roles and functions of PMU
16	5 August 2011	-Discussion on PMB; -sending CA sheet to DONREs by VEA; -DQO training of WG 2-1 (Monitoring) in each DONRE; -discussion meeting by WGs in each DONRE; -and basic training of WG 2-2 (Water Quality Analysis) in each DONRE; -planned activities of each WG
17	12 August 2011	-Final confirmation of Ic/R including PMB matter; -DQO training of WG 2-1 (Monitoring) in each DONRE; -discussion for preparing a short list of equipment; -basic training of WG 2-2 (Water Quality Analysis); -planned activities of each WG
18	19 August 2010	-Visit DONRE for preparing a short list of equipment; -cross training WS of WG 2-4 (Inspection) in HCMC DONRE, -TOR for the first site survey of WG-3 in HNI DONRE; -planned activities of each WG
19	26 August 2011	-Draft short list of equipment; -Table of contents for Pr/R(1); -discussion on draft WP; -agenda of discussion meeting and local experts of WG-3; -planned activities of each WG
20	5 September 2011	-Comments on draft WP; -dealing with the complaints from HPG DONRE; -comments on the short list of equipment; -TOR for subcontract work of WG 2-3 (Inventory); -planned activities of each WG
21	9 September 2011	-Method for distribution of Ic/R to DONRE; -draft agenda of the third JCC meeting; -next training program of WG 2-1 (Monitoring); -checking UV-Vis in HPG DONRE; -planned activities of each WG
22	16 September 2011	-Preparation of Pr/R1; -agenda of third JCC meeting; -mid-term review in December; - procurement of equipment; -status and planned activities of each WG
23	23 September 2011	-Preparation of Pr/R1; -collection of CA sheets; -status and planned activities of WG 2-4; -specifications of equipment for TT-HUE DONRE; -subcontract work for awareness raising WSs; -next RM to be held on 30 September
24	30 September 2011	-Preparation of Pr/R1, anticipated schedules for 1st PMB/Mid-term Review/3rd JCC, -specifications of TT-Hue equipment and additional equipment, -status and planned activities of WG 2-4, -POPs analysis in HNI, -preliminary result of the first site survey of WG-3, -awareness raising workshops, -next RM to be held on 7 October.
25	7 October 2011	-Comments on Pr/R1; -anticipated schedules and agenda of first PMB/mid-term review/third JCC; -specifications of TT-HUE equipment and additional equipment; -status and planned activities of WG-2; -subcontract work for inventory development in BRVT; -next RM to be held on 14 October

No.	Date	Discussion Items
26	14 October 2011	-Revision of Pr/R1; -anticipated schedules and agenda of first PMB/mid-term review/third JCC; -schedule for procurement of TT-HUE equipment and additional equipment; -status and planned activities of WG-2; -next RM to be held on 21 October
27	24 October 2011	-Revision of Pr/R1; -anticipated schedules and agenda of first PMB/mid-term review/third JCC; -result of bidding for TT-HUE equipment; -status and planned activities of WGs 2 and 4; -subcontract work for inventory development in BRVT; -programs for awareness raising WSS; -next RM to be held on 28 October
28	28 October 2011	-Revision of Pr/R1; -schedule and agenda of first PMB; -Mid-term review to be held in December; -agenda of third JCC; -progress of procurement; -status and planned activities of WGs 2 and 4; -subcontract work for awareness raising WSS; -next RM to be held on 4 November
29	4 November 2011	-Revision of Pr/R1; -schedule and agenda of first PMB; -anticipated program of mid-term review; -agenda of third JCC; -progress of procurement; -proposed program of training in Japan; -status and planned activities of WGs 2 and 4; -next RM to be held on 11 November
30	11 November 2011	-Revision of Pr/R1; -schedule and agenda of first PMB; -anticipated program of mid-term review; -schedule and agenda of third JCC; -progress of procurement; -training in Japan; -status and planned activities of WGs 2 and 4; -internal WSS of WG 2-4; -schedule for awareness raising WSS; -next RM to be held on 18 November
31	18 November 2011	-Finalization of Pr/R1; -preparation for first PMB meeting on 25 November; -preparation for mid-term review in December; -agenda of third JCC meeting; -progress of procurement; -training in Japan; -status and planned activities of WGs 2 and 4; -subcontract work for inventory development in HPG; -next RM to be held on 2 December
32	2 December 2011	-Finalization of Pr/R1; -M/M of first PMB meeting; -preparation for mid-term review; -preparation for third JCC meeting; -preparation for training in Japan; -status and planned activities of WGs 2 and 4; -arrangement for awareness raising WSS; -next RM to be scheduled as needed
33	6 January 2012	-Submission of Pr/R1; -list of trainees and A2, A3 form for training in Japan in February; -A4 form for equipment procurement; -status and planned activities of WGs 2-4 and 3; -request for reporting and sharing the results of WSS conducted by C/Ps and JET; -the next RM to be held on 13 January
34	13 January 2012	-Collaboration with Outputs 1 and 5; -draft table of contents for Pr/R2; -A4 form preparation by VEA for procurement of equipment; -status and planned activities of WG 2-4 and 3; -current discussion on verifiable indicators for modification of PDM; -results of WS on Outputs 2-4 and 4 should be reported to VEA in February; -LET plans to hold a meeting with DWRM on 16 January and VEA invites SET to attend the meeting; -the next RM to be held on 3 February
35	12 February 2012	-Pr/R2 preparation schedule; -timing and agenda of second PMB meeting; -timing of fourth JCC meeting; -procurement (A4 form) ; -preparation for training in Japan; -activities in 2012 (Outputs 1 and 5); -status and planned activities of WGs 2, 3, and 4; -next RM to be held on 17 February
36	7 March 2012	-Pr/R2 destitution schedule, Products of Technical Cooperation Materials; -timing and agenda of second PMB meeting; -timing of fourth JCC meeting; -procurement (A4 form) ; -Revision of PDM, Project website, return of SET members; -activities in 2012 (Outputs 1 and 5) ; -status and planned activities of WGs 2, 3, and 4
37	15 May 2012	-Overall schedule for May-June 2012, second PMB and fourth JCC; -revision of PDM and PO; -finalization of Pr/R2; -procurement; -communication with DONREs; -counterpart budgets
38	1 June 2012	-Fourth JCC meeting and second PMB; -revision of PDM and PO; -finalization of Pr/R2; -training in Japan; -terminal evaluation in January 2013; -procurement; -counterpart budget; -master plan diagram/table
39	21 June 2012	-Second PMB and fourth JCC meeting; -revision of PDM and PO, finalization of Pr/R2; -training in Japan; -terminal evaluation in January 2013; -procurement; -counterpart budget, -master plan diagram/table
40	11 July 2012	-Second PMB and fourth JCC meeting; -revision of PDM and PO; -finalization of Pr/R2; -terminal evaluation in January 2013; -training in Japan; -procurement; -regulation on organization and operations of PMB
41	31 July 2012	-Internal evaluation for terminal evaluation; -procurement; -revision of PDM and PO; -training in Japan
42	27 August 2012	-Terminal evaluation in January 2013; -training in Japan; -procurement; -office; -Progress Report No. 3
43	3 October 2012	-Terminal evaluation in February 2013; -Progress Report No. 3; -PMB and JCC in October; -procurement; -regulation on organization and operations of PMB; -office; -training in Japan
44	23 November 2012	-Internal evaluation; -Comments on Progress Report No. 3; -procurement; -training in Japan
45	23 January 2013	-Terminal evaluation in March 2013; -WS in TT-HUE and the fifth JCC meeting; -procurement; -training in Japan
46	2 April 2013	-Final seminar; -draft Project Completion Report; -Outputs of the Project; -Training in Japan

Source: JET

4.4 Working Group and Discussion Meeting

Technical discussions and activities were implemented by the WGs organized for each output of the Project as shown in Figure 4.4-1 below. For Output 2, four subgroups were respectively organized on monitoring (WG 2-1), water quality analysis (WG 2-2), inventory (WG 2-3), and inspection (WG 2-4).



Source: JET

Figure 4.4-1 WGs

Each WG conducted actual activities based on the WP, and discussed the contents and issues raised in the course of the Project activities through a series of discussion meetings (DMs). The discussion items in each DM, namely, WG 2-1, WG 2-2, WG 2-3, WG 2-4, WG-3, and WG-4, have been described in Table 4.4-1 to Table 4.4-6.

Table 4.4-1 Results of DMs for WG 2-1

DONRE	DM	Theme	Major Comments and Proposal by WG 2-1	Actions of C/P and JET
HNI	1st DM (20/5/2011, CENMA)	1. Objective and approach for OP 2-1 and contents of draft WP	1) CENMA agreed activities based on draft WP. 2) JET requested CENMA to nominate WG members. 3) CENMA agreed that the first training for reviewing the monitoring plan will be held in August 2011.	1) CENMA will nominate WG members and staff for training. 2) JET will send agenda of the first training.
	2nd DM (23/8/2011, CENMA)	1. Feedback on the first training on reviewing the monitoring plan 2. WP discussion	1) CENMA commented that the first training was useful for the staff, especially the training on the interaction between contaminants and the aquatic environment. 2) CENMA agreed that the second training on development of monitoring plan will be held in December 2011. 3) CENMA agreed with WP.	1) CENMA will nominate WG members and prepare information for the second training. 2) JET will send agenda of the 2nd training.
	3rd DM (9/12/2011, CENMA)	1. Feedback on the first WS 2. WP for 2012 3. Revision of objective variable indicators in the original PDM	1) CENMA understood the relationship between pollutants and the environment through a WS, and they commented that if the first WS had been organized in November 2011, many key persons could have participated in in-depth discussions. 2) CENMA agreed on the activities in 2012, and selected the Red River as the target river. 3) CENMA agreed on the revised objective variable indicators in the original PDM, and that the second training will be held in February 2012.	1) JET will update WP for 2012. 2) JET will send the agenda of the second training including training on revision of the monitoring plan. 3) CENMA will nominate WG members.
	4th DM (2/3/2012, CENMA)	1. Feedback on the second training 2. Updated WP	1) CENMA identified the target area to review monitoring plan in the Red River, and they collected data to revise the monitoring plan in 2013. 2) CENMA updated WG members for OP 2-1 activities in 2012 and agreed with its WP in 2012.	1) CENMA will collect data for the revised monitoring plan. 2) CENMA will nominate C/Ps in charge.
	5th DM (8/6/2012, CENMA)	1. Checking activities in 2012 2. Sharing revised monitoring plan of the Red River	1) CENMA confirmed activities and schedules of WG in 2012. 2) CENMA explained the outline of the monitoring plan of the Red River in 2012, and JET explained the structure of the DQO based monitoring plan. 3) CENMA and JET discussed the points for modification/revision in the monitoring plan including confirmation of monitoring objectives.	CENMA will collect data and information for preparation of the monitoring plan of the Red River.
	6th DM (20/6/2012, CENMA)	Discussion on revised monitoring plan of the Red River	1) CENMA and JET discussed points for modification/revision in the monitoring plan of the Red River. 2) CENMA will prepare draft the monitoring plan of the Red River in 2013 in order to be able to receive the budget by August 2012.	CENMA will prepare the monitoring plan of the Red River basin.
	7th DM (25/9/2012, CENMA)	1. Feedback on the training 2. Revised monitoring plan of the Red River	1) CENMA learned how to perform statistical tests and interpret monitoring data statistically through lecture and practice. 2) OJT will be organized in November 2012. 3) Joint seminar for water quality monitoring and analysis will be organized in November 2012.	1) JET will send the agenda of OJT and invitation letter on the joint seminar. 2) CENMA will prepare presentation for the joint seminar.
	8th DM (13/12/2012, CENMA)	1. Feedback of OJT on report preparation 2. Revised monitoring plan of the Red River	1) CENMA learned how to prepare effective monitoring reports and how to interpret monitor data and reflect them on the report. 2) CENMA reported the progress of approval of the monitoring plan of the Red River by DONRE. 3) CENMA requested JET to support the development of the monitoring plan of the To Lich River.	1) JET will provide necessary support for the preparation of the monitoring report to CENMA through e-mail. 2) CENMA will report the progress of approval of the monitoring plan of the Red River.

DONRE	DM	Theme	Major Comments and Proposal by WG 2-1	Actions of C/P and JET
				3) CENMA will send to JET the necessary data and information related to the development of the To Lich River monitoring plan.
	9th DM (24/1/2013, CENMA)	1. Wrap-up of the Project activities before terminal evaluation 2. Review the monitoring plan of the To Lich River	1) CENMA reported to JET in order to get official approval of the monitoring plan of the Red River. 2) CENMA and JET confirmed the current achievement of indicators of the monitoring component. 3) CENMA and JET agreed with the results of the internal evaluation of the monitoring component by DONRE. 4) JET provided examples on the optimization of monitoring parameters for the development of the monitoring plan of the To Lich River.	1) JET will finalize the internal evaluation report based on the current achievement and results of the internal evaluation by DONRE.
	10th DM (11/3/2013, CENMA)	1. Feedback on the training for understanding chemical behavior 2. Wrap-up of the Project activities 3. Review the monitoring plan of the To Lich River	1) CENMA learned about water pollution mechanisms through lectures on chemical behavior. 2) JET conducted special lecture training on drinking water incident and response by monitoring section in the Tone River basin in Japan in order to understand the roles and importance of monitoring activities. 3) CENMA and JET discussed the APs for monitoring after the Project. 4) CENMA and JET discussed the direction of revising the monitoring plan of the To Lich River.	1) JET will provide necessary support, via e-mail, for the revision of the monitoring plan of the To Lich River.
HPG	1st DM (11-12/5/2011, HACEM)	Objective and approach of the draft WP	1) HACEM agreed with the contents of the Output 2-1 activities, and nominated WG members for the Output 2-1 activities. 2) HACEM agreed that the first training on reviewing of monitoring plan will be held in August 2011.	1) JET will send the agenda of the first training to HACEM. 2) HACEM will nominate staff for the training.
	2nd DM (12/8/2011, HACEM)	1. Feedback on the first training on reviewing the monitoring plan 2. WP discussion	1) HACEM commented that the first training was useful especially the timing of sampling in accordance with variation of water quality in a day. 2) HACEM agreed that the second training on the development of the monitoring plan will be held in November 2011. 3) HACEM agreed on the WP.	1) JET will send the agenda of the second training with request of its preparation. 2) HACEM will prepare information for the second training.
	3rd DM (18/11/2011, HACEM)	1. Feedback on the first WS 2. WP for 2012 3. Revision of indicators of PDM	1) HACEM was certain about developing a monitoring plan for small rivers, and requested one day training covering the chemical and biological processes in rivers. 2) HACEM agreed on the activities in 2012 and selected the Re River, and also agreed on the revised indicators in PDM. 3) The second training will be organized in February 2012.	JET will update the WP for 2012.
	4th DM (21/2/2012, HACEM)	1. Feedback on the second training 2. Discussion of WP for 2012	1) HACEM identified the target area to review the monitoring plan of the Re River, and they collected data to revise the monitoring plan for 2013. 2) HACEM nominated C/Ps in charge, confirmed activities in 2012, and agreed on its WP in 2012.	1) HACEM will collect data to develop the revised monitoring plan by May 2012.
	5th DM (7/6/2012, HACEM)	1. Checking activities in 2012 2. Sharing revised monitoring plan of the Re River	1) HACEM confirmed activities and schedules of WG 2-1 in 2012. 2) HACEM explained the outline of the monitoring plan of the Re River in 2012, and JET explained the structure of the DQO based monitoring plan. 3) HACEM and JET discussed modification points of the current plan including monitoring objectives.	1) HACEM will collect data and information for preparation of the monitoring plan of the Re River.
	6th DM (2/7/2012, HACEM)	Discussion on revised monitoring plan of the Re River	1) JET conducted special lecture training on drinking water incident and response by the monitoring section in the Tone River basin in Japan in order to understand roles and importance of monitoring activities. 2) HACEM and JET discussed the points for modification/revision in the monitoring plan of the Re River.	1) HACEM will prepare the draft monitoring plan of the Re River for 2013 based on collected data and information.
	7th DM (14/9/2012, HACEM)	1. Feedback on the training on statistics 2. Revised plan of the Re River	1) HACEM learned how to perform statistical tests and interpret monitoring data statistically through lecture and practice. 2) OJT will be organized in December 2012 for preparation of the report. 3) Joint seminar on water quality monitoring and analysis will be organized on 27 November.	1) JET will send the agenda of OJT and invitation letter on the joint seminar. 2) HACEM will prepare the presentation for the joint seminar.
	8th DM (7/12/2012, HACEM)	1. Feedback on OJT on report preparation 2. Revised monitoring plan of the Re River	1) HACEM learned how to prepare effective monitoring reports and how to interpret monitoring data and reflect them on the report. 2) HACEM and JET basically agreed with contents of monitoring plan of Re River.	1) JET will provide necessary support for the preparation of the monitoring report to HACEM through e-mail.
	9th DM (25/1/2013, HACEM)	Wrap-up of the Project activities before terminal evaluation	1) HACEM and JET confirmed the current achievement of indicators for the monitoring component. 2) HACEM and JET agreed with the results of internal evaluation for the monitoring component by DONRE. 3) HACEM requested JET to support the preparation of the five	1) JET will finalize the internal evaluation report based on the current achievement and results of internal evaluation by DONRE.

DONRE	DM	Theme	Major Comments and Proposal by WG 2-1	Actions of C/P and JET
			year monitoring report in HPG for the public.	2) JET will provide the necessary support for the preparation of the five year monitoring report to HACEM by e-mail.
	10th DM (28/2/2013, HACEM)	1. Feedback on the training on understanding chemical behavior 2. Wrap-up of the Project activities 3. Five-year monitoring report in HPG	1) HACEM learned about water pollution mechanisms through lectures on chemical behavior. 2) HACEM and JET discussed the APs for monitoring after the Project. 3) HACEM and JET discussed the draft five year monitoring report in HPG.	1) JET will provide necessary support, via e-mail, for the preparation of the monitoring report in HPG
TT-HUE	1st DM (4-5/5/2011, EPA)	Introduction to objective and approaches for OP 2-1 and discussion of contents	1) The monitoring section of EPA agreed to the draft contents of the OP 2-1 activities based on the draft WP, and suggested that data management system was added to the contents of activities. 2) EPA nominated WG members and agreed that the first training for reviewing the monitoring plan will be held in August 2011.	1) JET will send the agenda of the first training to EPA. 2) The monitoring section of EPA will nominate staff for the training.
	2nd DM (9/8/2011, EPA)	Feedback on the first training on reviewing the monitoring plan	1) EPA commented that the first training was effective especially on the trainees' way of thinking of developing the monitoring plan, although it would be helpful to have group work to discuss the current status of monitoring. The next training will be conducted by group work on developing the monitoring plans. 2) EPA agreed that the second training on the development of the monitoring plan will be held in November 2011.	1) JET will send the agenda of the second training with request of its preparation to EPA. 2) EPA will prepare information for the second training.
	3rd DM (12/09/2011, EPA)	1. Feedback on the first training 2. WP discussion	1) EPA commented that the first training was useful for the section especially setting the rule of data inputting, checking, and making a backup. 2) EPA agreed on the WP.	1) EPA will operate provisional data management system and review in December 2011.
	4th DM (10/11/2011, EPA)	1. WP for 2012 2. Revision of indicators in PDM	1) EPA will revise the monitoring plan of the Houng River. 2) EPA agreed on the contents and schedule of activities in 2012. 3) EPA selected the Houng River as the target river for revision of the monitoring plan, data analysis, and report preparation. 4) EPA agreed that the revised objective variable indicators for OP 2-1 in the original PDM, and that the second training on data analysis and report preparation will be organized in February 2012.	1) JET will update the WP for 2012. 2) JET will send the agenda of the second training including training on revision of the monitoring plan to EPA.
	5th DM (23/2/2012, EPA)	1. Feedback on the second training 2. Discussion of WP for 2012	1) EPA set the locations of monitoring stations in the Houng River based on the changed monitoring plan in 2012. 2) EPA collected data to revise the monitoring plan of the Houng River for 2013, and nominated C/Ps in charge. 4) EPA will operate provisional data management system for monitoring based on its draft manual. 5) EPA updated the WG members and agreed with its WP in 2012.	1) EPA will revise the plan by May 2012. 2) EPA will operate provisional data management system for monitoring by May 2012.
	6th DM (11/6/2012, EPA)	1. Checking activities in 2012 2. Sharing the revised monitoring plan of the Huong River	1) EPA confirmed the activities and schedules in 2012, and explained the outline of the monitoring plan of the Huong River in 2012. 2) JET explained the structure of the DQO based monitoring plan. 3) EPA and JET discussed points for modification/revision in the monitoring plan including confirmation of monitoring objectives.	EPA will collect data for the preparation of the monitoring plan of the Huong River.
	7th DM (5/7/2012, EPA)	Discussion on the revised plan of the Huong River	1) JET conducted special lecture training on drinking water incident and response for the monitoring section in the Tone River basin in Japan in May 2012. 2) EPA and JET discussed the modification of the plan of the Huong River. 3) EPA agreed to prepare the draft monitoring plan of the Huong River for 2013 by the end of 2012. 4) JET asked DARD to introduce hydrological structures and water usage in the Huong River basin.	JET will summarize the results of the interview to DARD and share them with EPA.
	8th DM (7/9/2012, EPA)	1. Establishment of data management system 2. Revised plan of the Huong River	1) EPA confirmed that EPA start to input monitoring data into database in accordance with data management system. 2) EPA and JET discussed modification points for revision of monitoring plan based on location of existing monitoring stations, water intake point, hydrological structure, and pollution sources in the Huong River.	1) EPA continues to prepare the monitoring plan of the Huong River. 2) EPA will develop monitoring plan of the Huong River.
	9th DM (28/9/2012, EPA)	Feedback on training on statistical data analysis	1) EPA learned how to perform statistical tests and interpret monitoring data statistically through lectures and practice. 2) OJT will be held in December 2012 on preparation of the monitoring report. 3) Joint seminar for water quality monitoring and analysis will be organized on 27 November.	1) JET will send the agenda of OJT and invitation letter on the joint seminar. 2) EPA will prepare the presentation for the joint seminar.
	10th DM	1. Feedback of	1) EPA learned how to prepare effective monitoring reports and	1) JET will provide necessary

DONRE	DM	Theme	Major Comments and Proposal by WG 2-1	Actions of C/P and JET
	(6/12/2012, EPA)	OJT on report preparation 2. Revised monitoring plan of the Huong River	how to interpret monitoring data and reflect them on the report. 2) EPA and JET reconstructed the contents of the monitoring report.	support for preparation of monitoring report to EPA by e-mail.
	11th DM (30/1/2013, EPA)	Wrap-up of the Project activities before terminal evaluation	1) EPA and JET confirmed the current achievement of indicators for the monitoring component. 2) EPA and JET decided to develop the technical report for the monitoring of the Huong River in order to acquire skills and know-how on the preparation of the monitoring report. 3) EPA and JET agreed with the results of the internal evaluation for the monitoring component by DONRE.	1) JET will finalize the internal evaluation report based on the current achievement and results of internal evaluation by DONRE. 2) JET will provide necessary support for preparation of monitoring report to EPA by e-mail.
	12th DM (26/2/2013, EPA)	1. Feedback on the training on understanding chemical behavior 2. Wrap-up of the Project activities 3. Technical report on the monitoring of the Huong River	1) EPA learned about water pollution mechanisms through lectures on chemical behavior. 2) EPA and JET discussed APs on monitoring after the Project. 3) EPA and JET discussed technical report for the monitoring of the Huong River.	1) JET continues to provide necessary support for the preparation of the monitoring report to EPA by e-mail.
HCMC	1st DM (11-12/5/2011, HEPA)	Introduction to objective and approaches and discussion of contents	1) The monitoring section of HEPA agreed with the contents of the OP 2-1 activities based on the draft WP. 2) HEPA nominated WG members for the Output 2-1 activities. 3) HEPA agreed that the first training on reviewing the monitoring plan will be held in August 2011.	1) JET will send the agenda of the first training to HEPA. 2) HEPA will nominate staff for the training.
	2nd DM (12/8/2011, HEPA)	1. Feedback on the first training on reviewing the monitoring plan 2. WP discussion	1) HEPA commented that the first training was effective especially on defining the sampling locations after confluence of the mainstream and tributaries. 2) HEPA agreed that the second training for development of the monitoring plan will be held from November to December 2011. 3) HEPA agreed on the WP.	1) JET will send the agenda of the second training. 2) HEPA will prepare necessary information for the second training.
	3rd DM (2/12/2011, HEPA)	1. Feedback on the first WS 2. WP for 2012 3. Revision of indicators in the original PDM	1) HEPA have ideas about future training, water quality database, methods for analyzing the water quality data, behavior of pollutants and relationship between concentrations and river flow, use of mathematical models, and preparation of more effective water quality reports. 2) HEPA agreed on the contents and schedule of activities in 2012, and selected the Saigon River as the target river. 3) HEPA agreed on the revised indicators in the original PDM. 4) The second training will be organized in February 2012.	1) JET will update the WP for 2012. 2) JET will send the agenda of the second training on data analysis and report preparation including training on revision of the monitoring plan to HEPA.
	4th DM (17/2/2012, HEPA)	1. Feedback on the second training 2. WP for 2012	1) HEPA identified the target area to review the monitoring plan of the Saigon River, and they collected data on revising the monitoring plan in 2013. 2) HEPA updated WG members for the OP2-1 activities in 2012 and agreed with its WP in 2012.	1) HEPA will collect data for developing the revised monitoring plan. 2) HEPA will nominate C/Ps in charge.
	5th DM (13/6/2012, HEPA)	1. Checking activities in 2012 2. Sharing the revised monitoring plan of the Saigon River	1) HEPA newly established CEMA in March 2012 to strengthen the function of environmental monitoring and analysis. 2) HEPA explained the outline of the monitoring plan of the Saigon River in 2012, and JET explained the structure of the DQO based monitoring plan. 3) HEPA discussed the points for modification/revision in the monitoring plan including confirmation of monitoring objectives.	1) HEPA will collect data and information for preparation of the monitoring plan of the Saigon River.
	6th DM (26/6/2012, HEPA)	Revised monitoring plan of the Saigon River	1) JET conducted special lecture training on drinking water incident and response for the monitoring section in the Tone River basin in Japan in May 2012. 2) HEPA discussed the points for modification in the monitoring plan of the Saigon River, and they prepared the draft plan for 2013.	HEPA continues to the prepare monitoring plan of the Saigon River based on collected data and information.
	7th DM (24/8/2012, HEPA)	Revised monitoring plan of the Saigon River	HEPA discussed modifications for revision of the plan based on the location of existing monitoring points, water intake point, hydrological structure, and pollution sources along the Saigon River.	1) HEPA continues to prepare the monitoring plan of the Saigon River.
	8th DM (26/9/2012, HEPA)	1. Feedback on the training on statistics 2. Revised monitoring plan of the Saigon River	1) HEPA learned how to perform statistical tests and interpret monitoring data statistically. 2) OJT on data analysis and report preparation will be organized in November 2012 for the preparation of the monitoring report of 2012. 3) Joint seminar for water quality monitoring and analysis will be organized in November 2012.	1) JET will send the agenda of OJT, and invitation letter on the joint seminar. 2) HEPA will prepare the presentation for the joint seminar.
	9th DM	1. Feedback of	1) HEPA learned how to prepare effective monitoring reports, and	1) JET will provide necessary

DONRE	DM	Theme	Major Comments and Proposal by WG 2-1	Actions of C/P and JET
	(22/11/2012, HEPA)	OJT on report preparation 2. Revised monitoring plan of the Saigon River	how to interpret monitoring data and reflect them on the report. 2) HEPA and JET reconstructed the contents of the monitoring report. 3) HEPA and JET basically agreed on the contents of the monitoring plan of the Saigon River.	support for the preparation of the monitoring report to HEPA by e-mail.
	10th DM (29/01/2013, HEPA)	Wrap-up of the Project activities before terminal evaluation	1) HEPA and JET confirmed the current achievement of indicators for the monitoring component. 2) HEPA and JET agreed with the results of the internal evaluation for the monitoring component by DONRE. 3) HEPA requested JET to support the development of a real-time monitoring plan of the Saigon River.	1) JET will finalize the internal evaluation report based on the current achievement and results of the internal evaluation by DONRE. 2) JET will provide necessary support for the development of a real-time monitoring plan to HEPA by e-mail.
	11th DM (07/3/2013, HEPA)	1. Feedback on the training for understanding chemical behavior 2. Wrap-up of the Project activities	1) HEPA learned about water pollution mechanisms through lectures on chemical behavior. 2) HEPA and JET discussed the APs for monitoring after the Project.	1) JET continues to provide necessary support for development of a real-time monitoring plan to HEPA by e-mail.
BRVT	1st DM (28-29/4/2011, CEMAB)	Objective and approaches for OP 2-1 and contents	1) CEMAB agreed on the contents of the OP 2-1 activities based on the draft WP and nominated WG members. 2) CEMAB agreed that the first training on reviewing the monitoring plan will be held in August 2011.	1) JET will send the agenda of the first training to CEMAB. 2) CEMAB will nominate staff for the training.
	2nd DM (18/8/2011, CEMAB)	1. Feedback on the first training on reviewing the monitoring plan 2. WP discussion	1) CEMA commented that the first training was effective for the staff especially the training on the accuracy of monitoring results depending on the number of sampling. 2) CEMAB agreed on the WP, and the second training for the development of the monitoring plan will be held in November 2011.	1) JET will send the agenda of the second training. 2) CEMAB will prepare the necessary information for the second training.
	3rd DM (24-25/11/2011, CEMAB)	1. Feedback on the first WS 2. WP for 2012 3. Revision of indicators in PDM	1) CEMAB requested more support when detailed planning is carried out. CEMAB agreed on contents of the activities in 2012 selecting the Dinh River as the target river. 2) CEMAB agreed on the revised objective variable indicators in PDM. 3) The second training will be organized in February 2012.	1) JET will update the WP for 2012. 2) JET will send the agenda of the second training.
	4th DM (15/2/2012, CEMAB)	1. Feedback on the second training 2. Discussion of WP for 2012	1) CEMAB identified the target areas and key parameters for the revised monitoring plan of the Dinh River for 2013. 2) CEMAB collected data to revise the plan of the Dinh River. 3) CEMAB nominated C/Ps in charge, confirmed activities in 2012, and agreed on its WP for 2012.	CEMAB will collect available data from DONRE to revise the plan by May 2012.
	5th DM (12/6/2012, CEMAB)	1. Checking activities in 2012 2. Sharing the revised monitoring plan of the Dinh River	1) CEMAB confirmed the activities and schedules for 2012. 2) CEMAB explained outline of monitoring plan of the Dinh River in 2012, and JET explained the structure of the DQO based monitoring plan. 3) CEMAB and JET discussed the points for modification/revision. 4) CEMAB agreed to conduct field survey to check the pollution sources, hydrological structures, and water use in the Dinh River basin.	CEMAB will collect data and information for preparation of monitoring plan of the Dinh River.
	6th DM (28/6/2012, CEMAB)	1. Revised monitoring plan of the Dinh River 2. Field survey in the Dinh River	1) JET conducted special lecture training on drinking water incident and response for the monitoring section in the Tone River basin in Japan in May 2012 as a case study. 2) CEMAB discussed the modifications of the plan of the Dinh River. 3) CEMAB agreed to prepare the draft monitoring plan of the Dinh River for 2013, and they confirmed the survey contents.	1) CEMAB will continue to prepare the monitoring plan of the Dinh River. 2) CEMAB will prepare the field survey.
	7th DM (30/8/2012, CEMAB)	Revised monitoring plan of the Dinh River and field survey	1) CEMAB and JET summarized the field survey and discussed on how to prepare field notes. 2) CEMAB and JET discussed the points for modification/revision of the monitoring plan based on the field survey.	1) CEMAB will prepare the field notes. 2) CEMAB will continue to prepare the monitoring plan in the Dinh River.
	8th DM (21/9/2012, CEMAB)	Feedback on the training on statistical data analysis	1) CEMAB learned how to perform statistical tests and interpret the monitoring data statistically. 2) OJT will be organized in November 2012 for the preparation of the report in 2012. 3) Joint seminar on water quality monitoring and analysis (OP 2-1 and OP 2-2) will be organized on 27 November.	1) JET will send the agenda of OJT and invitation letter on the joint seminar. 2) CEAMB will prepare presentation for the joint seminar.
	9th DM (22/11/2012, CEMAB)	1. Feedback of OJT on report preparation 2. Revised monitoring plan of the Dinh River	1) CEMAB learned how to prepare effective monitoring reports, and how to interpret monitoring data and reflect them on the report. 2) CEMAB and JET reconstructed the contents of the monitoring report. 3) CEMAB requested JET to improve plan for QC sample in the	1) JET will introduce example of plan for QC sample to CEMAB by e-mail. 2) JET will provide necessary support for preparation of the monitoring report to CEMAB by

DONRE	DM	Theme	Major Comments and Proposal by WG 2-1	Actions of C/P and JET
			draft revised monitoring plan.	e-mail.
	10th DM (28/1/2013, CEMAB)	Wrap-up of the Project activities before terminal evaluation	1) CEMAB and JET confirmed the current achievement of indicators for the monitoring component. 2) CEMAB and JET agreed with results of the internal evaluation for the monitoring component by DONRE. 3) CEMAB and JET basically agreed on the contents of the monitoring plan of the Dinh River	1) JET will finalize the internal evaluation report based on the current achievement and results of the internal evaluation by DONRE.
	11th DM (7/3/2013, CEMAB)	1. Feedback on the training on understanding chemical behavior 2. Wrap-up of the Project activities	1) CEMAB learned about water pollution mechanisms through lectures on chemical behavior. 2) CEMAB and JET discussed the APs for monitoring after the Project. 3) CEMAB requested JET to prepare proposal for the monitoring of the Dinh River by PPC.	1) JET continues to provide necessary support for preparation of proposal for monitoring plan in Dinh River to PPC by e-mail.

Source: JET

Table 4.4-2 Results of DMs for WG 2-2

DONRE	DM	Theme	Major Comments and Proposal by WG 2-2	Actions of C/P and JET
HNI	1st DM (20/5/2011, CENMA)	Discussion on draft training plan (draft WP)	1) JET checked the current conditions on analysis and lab management. 2) CENMA checked draft WP and set training for POPs analysis to be first priority, and training for identifying materials in factory wastewater to be second priority.	1) JET will prepare detailed WP based on the discussion. 2) JET will conduct a short POPs training on 5/30-6/1 in 2011.
	2nd DM (18/8/2011, CENMA)	Discussion on additional equipment to be procured	1) CENMA agreed to prepare a long list by themselves and send it to JET before 25 August. 2) Discuss the short list with CENMA on August 25	CENMA will prepare a long list of equipment.
	3rd DM (26/8/2011, CENMA)	1. Additional equipment 2. Discussing WP	1) The long list of equipment was discussed based on actual needs and the purpose of the Project. CENMA agreed on its priority. 2) CENMA basically confirmed the WP.	1) JET and VEA will prepare a short list of equipment based on the discussion.
	4th DM (7/9/2011, CENMA)	Revision of WP	1) CENMA agreed on the revised WP. 2) Goal was confirmed, referential analytical methods and the target nine compounds of POPs using GC-ECD.	1) JET and C/Ps will start OJT from 8 September 2011.
	5th DM (28/11/2011, CENMA)	Discussion on revised WP	1) Training for pesticide analysis using GC-ECD will be held in December. 2) CENMA agreed to use GC/MS for PBDEs analysis training planned to be held in 2012. For the training, CENMA should keep operating MS for several weeks. 3) C/Ps in charge of the training are reassigned.	CENMA restarts OJT from 12/12 in 2011.
	6th DM (7/6/2012, CENMA)	Discussion on WP in 2012	1) CENMA reviewed training activities in 2011 and discussed the next training plans. 2) Main C/P is changed but a quite beginner of GC analysis. Training for pesticide analysis will be held in June.	Training for pesticide analysis using GC-ECD will use a new standard mixture.
	7th DM (6/8/2012, CENMA)	Discussion on WP and improvement of method	1) Discussion on the direction of improvement of pesticide analysis. 2) C/Ps will modify their own method into a better one, and submit a draft document of established methods.	CENMA starts OJT from 07/08/2012.
	8th DM (27/11/2012, CENMA)	1. Feedback on the training 2. Discussion of WP for 2013	JET and C/P agreed that the hands-on training on chlorinated pesticides using GC-ECD achieved the goal level based on a duplicate test and necessary sensitivities. Hands-on training for PBDEs analysis using GC/MS will continue in 2013.	1) C/P will continue experiments to improve recovery rates of pesticide analysis. 2) JET required C/P to make sure of consecutive operation of GC/MS for PBDE analysis in March 2013.
	9th DM (28/3/2012, CENMA)	Review the series of trainings in the Project	1) JET reviewed OJT on chlorinated pesticides and PBDEs. 2) C/P made questions on the difference of results followed by authorized analytical procedures. JET answered the questions.	C/P will complete analytical SOP for chlorinated pesticides by the end of April.
HPG	1st DM (11/5/2011, HACEM)	Discussion on draft training plan (draft WP)	1) JET checked the current conditions of analysis and lab management. 2) JET confirmed no training needs for AAS. Instead, C/Ps requested a practical training for water sampling and on-site measurement, QA/QC in analysis, training for basic analysis according to TCVN targeting parameters of COD, BOD, T-P, T-N, NH ₃ , phenol, NO ₃ , and NO ₂ .	JET will prepare WP based on the discussion.
	2nd DM (19/8/2011, HACEM)	Additional equipment	1) The long list of equipment was discussed based on actual needs and the purpose of the Project. CENMA and JET agreed on its priority.	JET and VEA will prepare a short list of equipment.
	3rd DM (4/10/2011, HACEM)	Confirming capacity of the lab	1) HACEM has VILAS certification for the parameters of BOD, COD, TSS, T-P, NH ₃ , Cl, TSP (Total Solid Particle) in air, SO ₂ in air, NO ₂ in air, hardness, TDS, T-N(=kjeldahl nitrogen), phenol, NO ₃ -N, PO ₄ -P, and S ₂ -, 16parameters in total. 2) HACEM requests training on quantification analytical limit. 3) JET found good precision on titration analysis of NH ₄ ⁺ and	JET will train the calculation procedure of MDL.

DONRE	DM	Theme	Major Comments and Proposal by WG 2-2	Actions of C/P and JET
			T-N, but that of UV/VIS analysis was bad.	
	4th DM (8/6/2012, HACEM)	1. Checking equipment procured by JICA 2. Discussion on schedule of analysis training	1) All equipment and chemicals delivered to HACEM in April 2012 were installed and ready to use for analysis training. 2) The inspection division in DONRE should keep a flow meter and multi-water quality analyzer procured by JICA, though these are currently kept by HACEM lab. 3) Storage place of these two equipment should be agreed between HACEM and DONRE's inspection division.	The analysis training will be held 6/12-15 for five parameters (NO ₃ -N, NH ₄ -N, Kjeldahl-N, phenol, and COD).
	5th DM (8/11/2012, HACEM)	Review the series of trainings in the Project	1) JET reviewed the series of hand-on trainings on basic water quality analysis. 2) JET and C/Ps agreed that C/Ps have achieved the expected goal of the Project.	C/P will apply the QC method in their daily work.
TT-HUE	1st DM (6/5/2011, EPA)	Discussion on WP and equipment list	1) The lab is under construction. It will be established in July 2011. JET suggested additional water taps. 2) EPA agreed on the equipment list in M/M of the first JCC meeting. 2) EPA requested OJT on sampling and on-site measurement, basic water quality analysis based on TCVN (pH, EC, salinity, DO, COD, BOD, TSS, TDS, NO ₃ , NO ₂ , NH ₄ , SO ₄ , and PO ₄), and lab management.	JET will prepare the WP based on the discussion.
	2nd DM (17/8/2011, EPA)	Additional equipment	1) EPA basically agreed with the priority in the long list. 2) Water lines of lab are improved.	JET and VEA will prepare a short list of equipment.
	3rd DM (13/2/2012, EPA)	1. Revised WP 2. Training schedule 3. Installation procedure of equipment	1) The revised WP was confirmed. 2) The next training schedule in DANETC was discussed. 3) The procedure on installation and handover of equipment procured by the Project was confirmed. 4) EPA and JET discussed on arrangement of installed equipment.	1) JET proceeds to install the equipment. 2) EPA and JET continue the training in DANETC.
	4th DM (27/2/2012, EPA)	Equipment installed with handover certificate	1) EPA confirmed the installed equipment. 2) JET handed over all equipment procured in the Project to DONRE.	C/P will start analysis using the procured equipment.
	5th DM (7/6/2012, EPA)	1. Checking equipment procured by JICA 2. Contents and location of training	1) All equipment and chemicals procured in February 2012 have been installed. 2) The EPA lab has not been operational due to unavailable water supply and discharge for lab, and lack of sink for washing glassware. 3) From last year, JET pointed that the current transformer does not have enough capacity to supply electricity to lab. 4) EPA explained that it is due to the slow construction progress by the contractor. EPA urged to complete within July. Also EPA plans to fix the transformer as soon as possible. 5) JET suggests EPA that VEA can send a letter to TT-HUE PPC to hasten the construction work.	1) EPA and JET continue the training in DANETC. 2) EPA will install water lines and increase electricity in the lab.
	6th DM (09/8/2012, EPA)	Discussing the schedule of training	1) EPA and JET reviewed the training activities done in 2011. 2) OJT on the monitoring activities will be held in 8/13-24. OJT would include sampling, on-site measurement, basic water quality analysis, and lab management training.	JET will hold analysis training in August 2012.
	7th DM (18/10/2012, TT-HUE/ EPA)	Confirming the status of hand-on training of basic water quality analysis (oil, salinity, etc.)	1) TT-HUE EPA confirmed the progress of the hands-on training on salinity analysis and oil and grease analysis. 2) JET requested TT-HUE EPA to prepare the budget and human resources etc. to maintain the laboratory and get the VILAS in the near future. TT-HUE EPA said they will continue to make efforts to improve the laboratory's capacity by attending the other analysis training etc. after the project period.	1) JET will continue the OJT to follow up in November and later.
	8th DM (30/01/2013 TT-HUE/ EPA)	Confirming the status of hands-on training on basic water quality analysis (NH ₄ , BOD, COD, and TDS)	1) JET and C/Ps reviewed the series of hand-on trainings for basic water quality analysis. 2) JET asked the C/Ps in EPA to review and practice the analysis by themselves until the next OJT. 3) JET asked the C/Ps of EPA to prepare SOP of COD and BOD by the next OJT.	1) JET will check the results of their own work in the next OJT.
	9th DM (23/04/2013, TT-HUE/ EPA)	Review the series of trainings in the Project	1) JET reviewed the series of hand-on trainings on basic water quality analysis. 2) JET and C/P agreed that C/P have achieved the expected goal of the Project.	C/P will apply the analysis method with QC in their daily work.
HCMC	1st DM (18/5/2011, HEPA)	Monitoring activity and WP with lab staff	1) JET confirmed the current data management system. 2) HEPA requested a lecture on QC of external laboratory results.	JET will prepare WP based on the discussion.
	2nd DM (25/8/2011, HEPA)	1. Additional equipment to be procured	1) HEPA basically agreed on the priority in the long list. 2) WP was confirmed with C/Ps in HEPA.	JET and VEA will prepare a short list of equipment.

DONRE	DM	Theme	Major Comments and Proposal by WG 2-2	Actions of C/P and JET
		2. Confirming WP		
	3rd DM (02/11/2012, HEPA)	Review the series of trainings	1) JET and HEPA reviewed the contents of trainings in the Project. 2) HEPA basically agreed on the methodology to control external laboratory.	HEPA will try to apply the method to control external laboratory.
BRVT	1st DM (16-17/5/ 2011, CEMAB)	1. Condition of analysis and lab management 2. Discussing draft WP	1) GC is not operational because there is no staff in charge. Furnace for heavy metals is not attached in AAS. There is no distillation unit for fluoride or phenol analysis. 2) CEMAB requested OJT on GC and fluoride and phenol analysis, and training on sampling.	1) JET will prepare WP based on the discussion. 2) After CEMAB procures a furnace, JET will provide AAS training.
	2nd DM (24/8/2011, CEMAB)	1. Additional equipment 2. Confirming WP	1) CEMAB agreed with the priority in the long list. 2) WP was confirmed with C/Ps in HEPA.	JET and VEA will prepare a short list of equipment.
	3rd DM (12-13/9/2011 , CEMAB)	1. Current conditions of GC and AAS 2. Discussion of WP	1) JET checked what kinds of maintenance and repair were needed on GC and AAS in order to carry out the planned training. C/P showed their own data of low sensitivity of AAS. 2) CEMAB requests training focusing on GS and AAS.	1) C/P will arrange the date of equipment inspection. 2) C/P will collect information on specifications of equipment.
	4th DM (22/9/2011, CEMAB)	Inspection for the estimates of overhaul	1) Supplier checked the current status. 2) Discussion on the estimates for overhaul and new procurement of accessories of AAS.	Supplier will submit estimates within ten days.
	5th DM (21/10/2011, CEMAB)	1. Details of equipment 2. Training parameters and schedule	1) Supplier of GC and AAS (Saigon Instrumentation) checked the conditions of GC and AAS on 23 September. The report was handed to DONRE. 2) The specifications of the equipment to be procured were discussed.	JET proceeds to carry out additional procurement activities.
	6th DM (31/7/2012, CEMAB)	Training plan of GC-ECD and AAS	JET explained the current situation of the A4 form and training plan before and after installing the equipment. CEMAB agreed on the WP.	C/Ps will have a short training course on flame AAS from 15-17 August 2012.
	7th DM (4/10/2012, BRVT CEMAB)	1. Status of additional procurement 2. Confirming the status of hands-on training	1) JET explained the status of procurement of GC and AAS parts. 2) JET reported that the hands-on training on fluoride analysis using electrochemical probe method achieved good results. 3) JET reviewed the SOP on phenols analysis prepared by CEMAB and told it was well-made.	1) JET will continue to push the approval of the A4 form from the Vietnamese side. 2) CEMAB will prepare the SOP on fluoride analysis.
	8th DM (30/1/2013, CEMAB)	Installation of AAS and GC parts	1) CEMAB, Mr. Tiep of JICA Vietnam office, the supplier (SISC) and JET checked the delivery of parts of AAS and GC. 2) JET reported the progress of the inspection of equipment after some days work of SISC. CEMAB and JET confirmed that the equipment was just installed and needs more time to finish the initial training and adjusting the working conditions. 3) Contents of training in 2013 were discussed.	1) The supplier will continue the tuning of equipment and initial training. 2) JET will follow the checking of status and report the results of inspection to the JICA Vietnam office after the supplier finishes their work. 3) JET will continue additional training for CEMAB.
	9th DM (26/3/2013, CEMAB)	Review the series of trainings in the Project	1) Each C/P made presentation on the results of trainings. 2) Local experts made comments to OJT and gave suggestions on QA/QC activities in the laboratory. 3) JET made an overall comment to C/P that now they know how to revise analytical SOP including QA/QC items. 2) JET and C/P agreed that C/P have achieved the expected goal of the Project.	C/P will apply the analysis method with QC in their daily work.

Source: JET

Table 4.4-3 Results of DMs for WG 2-3

DONRE	DM	Theme	Major Comments and Proposal by WG 2-3	Actions of C/P and JET
HNI	1st DM (08/6/2011)	Concept of PSI	DONRE develops the PSI, though some data have been already digitized and managed in Excel format.	JET will investigate current condition of PSI in DONRE.
	2nd DM (09/8/2011)	Current conditions of PSI DB	PPC approved the budget to develop a new environmental DB in DONRE, but the actual plan was not prepared.	DONRE is requested to clarify the PSI DB development plan.
	3rd DM (26-30/8/2011)	Discussion of the draft WP	JET explained the draft WP and requested for participation of EPA, Inspection, and WRMD. DONRE is requested to give development concept PSI and DB use.	JET will prepare revised WP and propose PSI use.
	4th DM (22/9/2011)	1. Introduction of PSI usage 2. Linkage of DB system	1) DONRE commented that the environmental DB in DONRE is planned to be developed in a similar manner, and requested JET mostly for technical support to develop DB. 2) DONRE will organize a taskforce to develop DB early 2012.	JET discusses among the team how to assist DONRE on PSI development.
	5th DM (17/11/2011)	Method of support to DB development	1) DONRE promised to send a document describing the DB development plan. 2) DONRE decided not to request JET to support data collection.	DONRE will provide final F/S and information to JET.

DONRE	DM	Theme	Major Comments and Proposal by WG 2-3	Actions of C/P and JET
	6th DM (14/2/2012)	1. DB development 2. PDM revision	1) DONRE has not provided information on DB development. 2) DONRE proposed the meeting with JET to discuss modification of PDM.	C/P discusses and makes an agreement with DONRE.
	7th DM (7/3/2012)	1. Revision of PDM. 2. Second year activities	1) DONRE explained revision of PDM to other departments of DONRE. 2) DONRE provided some documents on DB to JET.	1) JET reviews the documents provided by HNI DONRE. 2) JET follows the progress activities from HNI DONRE.
	8th DM (29/5/2012)	1. WS on PSI use 2. Second year activities	1) DONRE will prepare presentation materials for the WS. 2) DONRE proposed developing PSI in the Cau Bay River basin located in Long Bien District for the second year activities.	DONRE will prepare a plan for the second year activities.
	9th DM (25/9/2012)	1. Preparation of reports 2. Sustainability of PSI activity	1) DONRE agreed on the proposal for report preparation. 2) DONRE understood that the objective, target, and updating are the key factors for sustainability of PSI.	1) JET will prepare revised TOC. 2) DONRE and JET will continue to discuss sustainability of PSI activities.
	10 th DM (25/10/2012)	1. Inspection activities 2. Report on PSI development	1) JET requested HNI EPA to think and share their opinions about how PSI is used in DONRE. 2) DONRE agreed to prepare Chapters 3 and 4 (Usage and Sustainability).	1) JET prepares the ideas of objectives of using PSI. 2) DONRE modifies PSI format (if necessary).
	11th DM (5/11/2012)	1. Development of PSI 2. Development of PSM	1) DONRE checked modified PSI format. 2) JET installed ArcGIS 10.0 in their desktop computers, and explained the development of PSM.	DONRE provides monitoring reports for local experts/JET.
	12th DM (7/12/2012)	1. Reports on second year activities 2. Development of PSM	1) DONRE requested to dispatch local experts for PSM. 2) DONRE commented that they want to apply PSI in their next year activities so that HNI DONRE can confirm the real situation.	1) DONRE prepares PSM. 2) DONRE supplements ideas on Chapter 4.
	13th DM (5/3/2013)	1. PSI manual 2. Presentation of terminal evaluation WS	1) JET instructed in PSI manual. 2) Presentation for terminal evaluation was informed by JET. The format for the presentation was introduced by JET.	DONRE prepares the presentation for terminal evaluation.
	14th DM (22/3/2013)	Summary of activities	1) JET presented a brief summary of PSI activities in HNI DONRE. 2) DONRE shared the report among relevant departments and divisions. 3) DONRE considers combining PSI activities with other activities of DONRE after completion of the Project.	-
HPG	1st DM (20/5/2011)	Current conditions of PSI	1) DONRE has input some data in Excel sheet, but most are stored in hard copies with no systematic manner. 2) DONRE is trying to work out the procedure of Circular No. 07/2007/TT-BTNMT. 3) JET proposed a WS inviting five DONREs. The DONREs agreed to JET's proposal.	JET will prepare a WS on data management in June or July 2011.
	2nd DM (17/6/2011)	Concept of PSI	1) JET introduced the procedure on PSI development. 2) DONRE is requested to provide self-monitoring reports conducted by enterprises.	JET will confirm with VEA the guidelines for preparing the self-monitoring report.
	3rd DM (19/7/2011)	Holding WS and target area of PSI	1) DONRE is preparing presentation materials for the WS. 2) DONRE agreed on the WP and selected the Re River as the target area. 3) DONRE is requested for data collection such as EIA, EPC, EPP, and environmental protection fee.	1) JET will prepare the WS in July. 2) HPG DONRE will start to collect data in the Re River for the PSI.
	4th DM (28/7/2011)	Draft TOR for data collection	1) DONRE agreed draft TOR with several comments for clarification.	JET will prepare a subcontract work.
	5th DM (4/8/2011)	Current conditions of PSI in the Re River	DONRE suggested that the following parameters should be added: COD, Pb, Hg, As, Cd, TSS (these parameters are stated in Decree No. 67 on calculation of wastewater discharge fee).	JET will propose PSI usage.
	6th DM (31/8/2011)	Revised draft WP	DONRE basically agrees the draft WP and shares within DONRE.	DONRE will continue to collect data in the Re River for the PSI.
	7th DM (25/10/2011)	Draft TOR for subcontract work	DONRE answered to the questionnaire survey sheet.	JET finalizes TOR.
	8th DM (10/11/2011)	Draft TOR for subcontract work	DONRE provided a list of enterprises in the Re River basin based on a preliminary site survey, and also provided the documents of nominated enterprises for subcontract work.	1) JET reviews the list. 2) JET starts to explain draft TOR to nominated companies.
	9th DM (5/12/2011)	PSI survey, and method of sampling analysis	DONRE issues official introductory letters to facilitate the subcontract survey, and confirmed schedule and procedure of the subcontract work.	JET reviews a list of entities for wastewater sampling.
	10th DM (15/2/2012)	1. Results of subcontract work 2. PDM revision	1) DONRE requested to draft WP that describes enterprises, environmental issues, and target areas in 2012.	JET prepares the revised WP that describes proposed activities in the second year.
	11th DM	1. Modification of	1) DONRE agreed with the proposal on modification of PDM.	JET finalizes WP after receiving

DONRE	DM	Theme	Major Comments and Proposal by WG 2-3	Actions of C/P and JET
	(29/2/2012)	PDM 2. Details of activities in the second year.	2) DONRE will present the progress of first year, as well as applying PSI in daily work and improved usage.	comments from DONRE.
	12th DM (31/5/2012)	1. Holding of WS 2. TOR for subcontract work	1) DONRE agreed on the WS program for sharing information and experience, and preparation of WS presentation. 2) DONRE discussed basic information related to the Da Do River, which was selected as a target area in 2012, and agreed to implement PSI survey by subcontract work.	1) JET prepares materials for sharing information training in June. 2) DONRE fulfills background information in TOR.
	13th DM (26/6/2012)	1. TOR for subcontract work 2. WS in July	DONRE agreed finalized TOR and explained the current progress of presentation materials.	JET starts bidding subcontract work
	13th DM (9/7/2012)	Draft contract and WP	DONRE agreed on the WP on subcontract work and also the preparation of annual environmental reports.	DONRE and JET start to manage subcontract work.
	14th DM (14/8/2012)	1. Modified contract 2. GIS training	DONRE requested that JET should organize two kinds of training courses: one is a basic training course for beginner participants, and the other is an intensive training course for advanced participants.	JET will consider training program based on the requests of DONRE.
	15th DM (24/9/2012)	1. Preparation of reports 2. Sustainability of PSI activity	1) DONRE agreed on the proposal for report preparation targeting the Re River basin. 2) Regarding sustainability of PSI, DONRE will report to PPC to obtain solutions on this issue.	1) DONRE continues to manage subcontract work. 2) JET prepares the revised contents for report preparation.
	16th DM (13/11/2012)	1. Pollution source survey 2. Preparation of reports on using PSI	1) DONRE gave comments about the subcontractor's report. 2) DONRE received the report.	DONRE sends the draft report by 30 November.
	17th DM (30/11/2012)	1. Preparation of reports on using PSI 2. Sustainability of inventory activity	1) DONRE prepared the draft report along the Re River. 2) JET recommended that Chapter 4 should not only explain the short-term plan but also discuss the future vision of PSI development from the point of view of DONRE.	DONRE has comments on Chapters 1-3 and supplement ideas on Chapter 4 of the report.
	18th DM (5/3/2013)	1. PSI manual 2. Presentation of terminal evaluation WS	1) JET instructed PSI manual. 2) Presentation for terminal evaluation were informed by JET.	DONRE prepares the presentation for terminal evaluation.
	19th DM (28/3/2013)	Summary of activities	1) JET presented briefly summary for the PSI activities in DONRE 2) DONRE explained the current activities and submitted the report to PPC in order to sustain development of PSI. 3) DONRE invited JET to support the explanation of PSI to other DONREs.	-
TT-HUE	1st DM (5/5/2011)	Fact finding	JET requested to provide basic data for PSI preparation such as organization, pollution issue, and pollution source.	JET will investigate the current conditions.
	2nd DM (27/6/2011)	Concept of PSI	JET introduced the procedure for PSI development.	JET will collect data and information.
	3rd DM (18/7/2011)	Explanation of WS and target area of PSI	1) JET explained a sample list of enterprises for PSI and the draft program of WS. 2) DONRE agreed on a list of PSI and drafted the WS program.	JET will prepare the WS in July.
	4th DM (12/8/2011)	Draft WP	DONRE basically agrees the draft WP and considers additional C/Ps for PSI preparation.	DONRE continues to collect the current data for PSI.
	5th DM (24/10/2011)	Procedure of data input for PSI development	1) Opinion exchanged regarding the current data condition. 2) C/P agreed with the additional survey. 3) DONRE collects the current data and information.	JET updates the procedure for development of PSI.
	6th DM (16/2/2012)	1. Document management 2. PDM revision	1) DONRE and JET confirmed the situation of the information and data available in EPA. 2) DONRE agreed to discuss details of PDM and the second year activities in the next meeting.	1) C/P continues collection and digitization of available data. 2) JET prepares the revised WP.
	7th DM (23/2/2012)	Proposed list of priority data and information	1) A list of priority data and information was proposed to DONRE based on revised objectives of developing PSI. 2) DONRE and JET discussed how to modify the collection format based on usage of PSI.	JET revises collection format and send back to EPA, and the Inspection Department.
	8th DM (8/3/2012)	Inputting data into PSI format	DONRE requested JET and local staff to finish the data inputting by 23 March.	DONRE supervises and supports the work of temporary local staff to finish.
	9th DM (24/5/2012)	1. Data input to PSI format 2. Discussion on subcontract work	1) DONRE confronted difficulties and constrains for fulfillment of PSI format. 2) Subcontract work is necessary to implement PSI survey due to a lot of missing data.	DONRE and JET prepares TOR for subcontract work.
	10th DM	1. WS in July	1) DONRE agreed preparation of WS presentation and plan to	1) JET prepares materials for

DONRE	DM	Theme	Major Comments and Proposal by WG 2-3	Actions of C/P and JET
	(7/6/2012)	2. Draft TOR for subcontract work	organize sharing information training in June. 2) DONRE agreed on the draft TOR.	sharing information training. 2) DONRE fulfills background information in TOR.
	11th DM (14/6/2012)	Modified TOR for subcontract	DONRE selected 100 target enterprises and 40 entities for sampling.	1) DONRE prepares presentation documents. 2) JET finalizes TOR.
	12th DM (11/7/2012)	1. WP of subcontract work 2. Activity in July	1) DONRE requested subcontractor to submit modified WP, and also to report the draft to DONRE in advance. 2) DONRE provides necessary documents for next activity to JET.	DONRE starts to manage subcontract work.
	13th DM (10/8/2012)	1. Modified WP 2. GIS training 3. Site Survey	1) DONRE agreed on the modified WP and GIS training agenda. 2) First site survey was implemented with supervision by DONRE and JET.	DONRE and JET continues to manage subcontract work based on finalized contract.
	14th DM (13/9/2012)	1. Preparation of reports 2. Sustainability of PSI activity	1) JET proposed TOC of PSI report, but DONRE recommended preparing the summary report of PSI for leaders of PPC. 2) Regarding sustainability of PSI, DONRE continues to discuss this issue with JET.	1) DONRE manages subcontract work. 2) JET sends updated TOC to DONRE.
	15th DM (14/11/2012)	1. Pollution source survey of target enterprises 2. Preparation of reports on using PSI	1) JET requested the subcontractor to explain progress of making report. 2) EPA did not have any objections with the report.	EPA will send the draft report prepared by DONRE.
	16th DM (28/11/2012)	1. Pollution source survey 2. Report on using PSI 3. Sustainability of inventory activity	1) JET explained detail progress of making report to use PSI, and asked TT-HUE DONRE to study the documents. 2) EPA intends to report and get the ideas from relevant departments and then sends the feedback to JET.	DONRE has comments on the Chapters 1-3, and supplemented ideas on Chapter 4 of the report.
	17th DM (6/3/2013)	1. PSI manual 2. Presentation of terminal evaluation WS	1) JET gave instructions on PSI manual. 2) Presentation for terminal evaluation was informed by JET.	1) JET introduces necessary things to maintain and use PSI sustainably. 2) DONRE prepares the presentation for terminal evaluation.
	18th DM (29/3/2013)	Summary of activities	1) JET presented briefly summary for the PSI activities. 2) DONRE and JET discussed about the activities after completion of the Project. DONRE commented that the legal basis of PSI development is most important.	-
HCMC	1st DM (27/4/2011)	Current PSI conditions	1) JET proposed training plan for estimating pollution load and analyzing impacts using PSI based on AP of DONRE. 2) DONRE selected Tan Quy Industrial Cluster as a target. DONRE had developed PSI, but they did not evaluate the impacts.	DONRE will provide the data of current conditions in the Tan Quy Industrial Cluster.
	2nd DM (16/5/2011)	Current conditions of target site	DONRE and JET conducted the site survey.	JET will prepare the draft WP.
	3rd DM (20/5/2011)	Draft WP	DONRE agreed on the draft WP, and requested JET to revise several parts.	JET will prepare subcontract work
	4th DM (22/6/2011)	Concept of PSI	JET introduced the procedure for PSI development.	JET will examine current conditions.
	5th DM (15/7/2011)	1. WS program 2. Tan Quy Industrial Cluster	1) JET proposed WS program and asked DONRE to prepare a presentation 2) DONRE and JET confirmed the target industrial conditions.	JET will prepare questionnaires and subcontract work.
	6th DM (16/8/2011)	Explanation of draft WP and draft subcontract work	1) DONRE agreed with the draft WP. 2) DONRE commented on nominated entities, and agreed to carry out a site survey to fix the sampling points.	DONRE will conducts a site survey with JET
	7th DM (19/8/2011)	Questionnaire survey sheet	DONRE commented on the questionnaire survey sheet, and followed the ones prepared by EPA.	JET will finalize the subcontract work and questionnaires.
	8th DM (13/9/2011)	Updated questionnaire survey sheet	DONRE agreed with TOR of the subcontract work.	1) JET starts the tender. 2) C/P prepares the necessary permits.
	9th DM (6/10/2011)	Subcontract work	DONRE confirmed the schedule and procedure of the subcontract work.	JET prepares PSI format.
	10th DM (18/10/2011)	1. TOR of the survey 2. Target factory list and sampling	1) DONRE and JET supervise the questionnaire survey and regional surface water sampling in the Tan Quy Industrial Cluster. 2) DONRE and JET confirmed the sampling points prior to the implementation of sampling.	DONRE issued an entry permit letter to the target factories.
	11th DM (17/2/2012)	1. Final report of subcontract work. 2. PDM revision	1) DONRE agreed on the results of pollution load calculations, and requested JET to estimate the maximum and minimum impact cases.	1) JET calculates the max and min impact cases of pollution loads. 2) C/P selects the target area for

DONRE	DM	Theme	Major Comments and Proposal by WG 2-3	Actions of C/P and JET
			2) DONRE requested training on estimating pollution loads. 3) The target area and industries for the second year are to be determined by the director of DONRE.	the second year activities.
	12th DM (22/5/2012)	Draft TOR for subcontract work	1) DONRE agreed on the subcontract survey including its TOR and preparation of WS presentation.	DONRE fills in the background information in TOR.
	13th DM (14/6/2012)	TOR for subcontract work	DONRE approved the finalized TOR.	JET starts bidding work based on the finalized TOR
	14th DM (9/7/2012)	Draft contract and WP	1) DONRE agreed on the WP and decided the first sampling schedule. 2) DONRE requested statistical data to estimate wastewater amount.	DONRE and JET managed the subcontract work.
	15th DM (23/8/2012)	Progress report of subcontract work	1) DONRE confirmed subcontract survey progress. 2) DONRE wants to use MIKE 11 to simulate pollution load. 3) DONRE provides base map of the target area.	1) JET discusses additional survey for MIKE 11.
	16th DM (18/9/2012)	1. PSI report and the second year activity 2. Sustainability of PSI activity	1) DONRE will prepare a report and submit to PPC. 2) DONRE added issues of data sharing to the report contents proposed by JET. 3) Data collection from monitoring, inspection activities are continued by DONRE.	JET prepares the revised report contents.
	17th DM (31/10/2012)	Sub-contract work progress	DONRE had some comments on the results of subcontract work.	JET prepares the methods of pollution load estimates.
	18th DM (23/11/2012)	1. Subcontract work 2. Report on using PSI 3. Sustainability of inventory activity	1) JET analyzed the pollution load in the target area, and distributed handouts to DONRE. 2) DONRE shall prepare the preliminary countermeasures for sustainable usage of PSI.	DONRE shall prepare the preliminary countermeasures of PSI sustainability after completion of the Project.
	19th DM (26/2/2013)	1. PSI manual 2. Presentation for the terminal evaluation WS	1) JET gave instructions on the PSI manual. 2) Presentation for terminal evaluation was informed by JET.	1) JET introduces necessary things to maintain and use PSI sustainably. 2) DONRE prepares the presentation for terminal evaluation.
	20th DM (2/4/2013)	Summary of activities	1) JET presented a brief summary on the PSI activities. 2) DONRE and JET discussed on the activities after completion of the Project.	-
BRVT	1st DM (28/4/2011)	Current PSI conditions	DONRE confirmed to conduct a questionnaires survey for approximate 100 entities following the tentative AP.	DONRE will provide a list of 100 entities.
	2nd DM (17/5/2011)	Site survey	JET conducted the site survey and confirmed the current condition.	JET will prepare the draft WP.
	3rd DM (24/5/2011)	Draft WP	DONRE agreed on the draft WP and requested JET to arrange the subcontract work.	DONRE will collect the current data for PSI.
	4th DM (22/6/2011)	Concept of PSI	DONRE agreed on the proposed procedure for PSI development.	JET will examine the current conditions in BRVT DONRE.
	5th DM (15/7/2011)	WS program and PSI conditions	DONRE agreed on the WS program, prepared the presentation, and confirmed the conditions of the target industries.	DONRE will collect data for PSI.
	6th DM (15/8/2011)	Draft WP	DONRE agreed on the draft WP and requested the current data management survey by local experts.	JET will prepare TOR for local experts.
	7th DM (18/8/2011)	TOR for data collection	BRVT DONRE agreed TOR proposed.	JET will finalize TOR.
	8th DM (14/9/2011)	WP for PSI development	DONRE agreed on the criteria for the wastewater sampling within the scope of PSI development.	JET prepares draft TOR for subcontract work
	9th DM (4/10/2011)	Draft TOR for subcontract work	DONRE agreed on the draft TOR for the subcontract work (questionnaire survey of 100, and effluent sampling at 40 entities).	DONRE prepares the necessary documents for subcontract work.
	10th DM (19/10/2011)	TOR and subcontract work	DONRE was briefed about the schedule of subcontract work.	JET starts the tender for subcontract work.
	11th DM (4/11/2011)	WP for subcontract work	DONRE confirmed schedule and procedure for subcontract work.	JET reviews the list of entities for wastewater sampling.
	12th DM (8/11/2011)	WP for subcontract work	1) DONRE finalized 44 entities for sampling and data collection. 2) DONRE classified 100 target entities based on the code of "Vietnam Standard Industrial Classification 2007" (Decision No. 10/2007/QĐ-TTg), and confirmed the detailed addresses.	DONRE confirms procedures of the subcontract work, and supervises it.
	13th DM (8/2/2012)	Progress of subcontract work	1) DONRE considers that the industries located in industrial zones would be the focus of the survey in the second year. 2) DONRE and JET should be reported the progress by the subcontractor.	DONRE continues discussion with JET and determines the target enterprises for the survey in the second year.
	14th DM (15/2/2012)	1. Results of subcontract work 2. PDM revision	1) Due to the limited contract period, DONRE could not work extensively with subcontractor in developing PSI.	1) C/P will decide the target enterprises for the second year. 2) Subcontractor submits the final

DONRE	DM	Theme	Major Comments and Proposal by WG 2-3	Actions of C/P and JET
		3. Second year activities	2) In the second year, DONRE should have more opportunities to work with subcontractor. 3) Site surveys for 100 enterprises have been conducted. DONRE is hoping to implement a survey of 200 enterprises.	report in February 2012.
	15th DM (8/3/2012)	Progress of subcontract work	1) DONRE will have two weeks for trial operation before transferring the software. 2) DONRE requested selected subcontractor in the second year activities to promise detailed obligations and tasks before tendering.	DONRE and JET continue to discuss to decide the target enterprises for the second year activity.
	16th DM (23/5/2012)	1. Draft TOR for subcontract work 2. WS in July	1) DONRE agreed PSI survey by subcontract work and draft TOR. 2) DONRE agreed with preparation of WS presentation.	DONRE prepares presentation materials.
	17th DM (8/6/2012)	Modified TOR for subcontract work	DONRE prepared a list of target enterprises and requested JET to supplement it to modified TOR.	DONRE fulfills background information in TOR.
	18th DM (13/7/2012)	1. Draft contract and WP of subcontract work 2. Next activity after WS in July	1) DONRE proposed to implement preliminary survey next week. 2) The final report of former subcontract work was handed over to DONRE. DONRE disseminates this report internally. 3) DONRE implements remaining 100 enterprises survey same as 1st and second year.	1) DONRE provides necessary documents for the next activities. 2) DONRE and JET starts to manage subcontract work.
	19th DM (22/8/2012)	1. Activities in 2012 2. Progress of subcontract work	1) DONRE reflects PSI results to inspection plan in 2013. 2) DONRE tries to share the result within DONRE. 3) Before completion of subcontract work, JET organizes training of pollution source map.	DONRE sends detailed contents of PSM training.
	20th DM (14/9/2012)	Sharing information of first year activities	1) Progress of the first year activities, procedure manual for PSI development, and direction of activities in 2012 are shared. 2) DONRE recommended the update PSI to be used for gripping historical trend.	DONRE and JET continue to manage subcontract work.
	1st TG (2/11/2012)	1. GIS training 2. Draft final report of subcontract work	1) DONRE studied the basic policy, methods of Arc GIS. 2) DONRE and JET discussed with the subcontractor about PSI, and modified the format as appropriate.	JET instructs subcontractor to finalize their work.
	21th DM (29/11/2012)	1. Progress of subcontract work 2. Report preparation 3. Sustainability of inventory activity	1) DONRE separated PSI into different sheets with specific information for easier and smoother management. 2) DONRE prepared the issue and countermeasures of PSI development in the report. 3) JET instructed sustainability of PSI development.	DONRE comments on the report.
	22th DM (27/2/2013)	1. Explanation on PSI manual 2. Presentation for terminal evaluation WS	1) JET gave instructions on the PSI manual. 2) Presentation for terminal evaluation was informed by JET.	1) JET introduces necessary things to maintain and use PSI sustainably. 2) DONRE prepares the presentation for terminal evaluation.
	23th DM (3/4/2013)	Summary of activities	1) JET presented briefly the summary for the PSI activities. 2) DONRE and JET discussed about activities after completion of the Project.	-

Source: JET

Table 4.4-4 Results of DMs for WG 2-4

DONRE	DM	Theme	Major Comments and Proposal by WG 2-4	Actions of C/P and JET
HNI	1st DM (8/6/2011, Inspection Department and EPA)	Status of inspection and environment check (EC), and needs of CD	1) DONRE pointed out difficulties to retrieve information of entities to be inspected and checked due to insufficient data and information management. 2) ID and EPA implement inspection and EC for 250 entities per year. However, information on those entities were not stored systematically, thus a DB of entities is required.	JET will prepare a draft WP based on the discussion and AP prepared by DONRE.
	2nd DM (9/8/2011, EPA)	1. Discussion on WP for Output 2-4 2. Organizing of WG	1) JET proposed the following activities: i) Improving planning process of inspection, ii) Upgrading annual summary inspection and EC report, and iii) Assisting for developing regulations to address water environment incidents. EPA agreed on the framework. 2) JET recommended separating WG for each output. 3) DONRE is preparing regulation to address water environment incidents, and requested to support finalizing the regulation.	1) JET will revise the draft WP. 2) DONRE will hand the draft regulations on prevention and control of environmental incidents to JET. 3) DONRE will separate WG for each output.
	3rd DM (26/8/2011, ID)	1. Draft WP 2. Request on joining inspection	1) The Inspection Department agreed on the proposed WP. The Inspection Department requested to add lectures on ways of checking wastewater treatment for priority sectors. 2) JET requested to join inspection activity. The Inspection	JET finalized WP.

DONRE	DM	Theme	Major Comments and Proposal by WG 2-4	Actions of C/P and JET
		and EC	Department will consult with a top of DONRE.	
	4th DM (2/11/2011, WG)	1. Review of planning process of inspection plan 2. Criteria to select crucial pollution sources	1) Target facilities of inspection are selected based on the lists collected from other sections of DONRE and district DONREs. The Inspection Department should submit the final list to DONRE in November. 2) The Inspection Department does not have clear criteria to select primary and crucial pollution sources. 3) The Inspection Department agreed suggestions of focusing on pollution sources which violate laws frequently and do not follow administrative guidance.	1) The Inspection Department will select primary and crucial pollution sources. 2) JET will prepare a program of the first internal WS.
	5th DM (15/11/2011, WG)	Preparation of the first internal WS	1) For selecting primary and crucial pollution sources, DONRE will focus on industrial sectors and the Nue-Dye River basin 2) Internal WS will be held as proposed agenda. 3) WG agreed to propose modification of PDM indicators.	1) ID will select primary/crucial pollution sources. 2) JET will prepare the first internal WS.
	6th DM (16/1/2012, WG)	1. Follow-up of the first internal WS 2. Inspection plan in 2012	1) DONRE is preparing an inspection list of entities in 2012, but it is still waiting approval from the leader of PPC. 2) There are 700 entities to be checked in total for all sectors of land use, mineral resources, and environmental compliance. Among them, around 250 entities will be checked in the field of environmental compliance. 3) WG requested to organize training in Japan for inspectors.	WG will select pollution sources for OJT.
	7th DM (15/1/2012, WG)	1. OJT plan for inspection in 2012 2. Water environmental incidents	1) WG will select ten enterprises for OJT. 2) WG wants to know the experiences of incidents adopting countermeasures and their effectiveness in Japan and other developed countries. 3) WG suggested that practical technical manual should be prepared for inspection. JET proposed to share the Handy Reference Cards which is being prepared by WG of HPG DONRE, and existing guidelines prepared by IET/VAST under a JICA technical cooperation project.	1) WG will select primary/crucial pollution sources to be reviewed by the Project. 2) JET will collect information on Japan's and other developed countries' experiences of adopting countermeasures and their effectiveness.
	8th DM (24/5/2012, WG)	1. Planning OJT 2. Water environmental incidents	1) WG agreed on the handbook, though there could be some comments. 2) The Inspection Department listed 14 entities for OJT using selection criteria of: i) Target sector designated by PPC, ii) Wastewater volume, and iii) Relocation required. 3) WG agreed OJT around seven days from August to September. 4) JET introduced overview of situation on water environmental incidents in Japan.	1) WG will confirm the official procedure required for OJT. 2) Activity required for water environmental incidents shall be confirmed by WG.
	9th DM (7/8/2012, WG)	1. Discussion on OJT 2. Training on wastewater treatment techniques	1) WG agreed OJT in September. 2) WG requested the training on WWT and CP technique on paper/paper mill, textile and dyeing, food, and beverage industries. 3) WG agreed to use the additional form for information collection at site proposed by JET provisionally.	1) WG and JET will prepare OJT. 2) JET will contact HNI University of Technology.
	10th DM (18/9/2012, WG)	1. Review of inspection results 2. Training program on WWT and CP techniques	1) WG agreed to combine their preparatory information collecting form with supplemental form regarding wastewater treatment system prepared by JET. 2) WG commented that the information collected by inspection should be used for other objectives such as raising awareness. 3) WG commented that it is difficult to find good performance enterprises for the site training in Hanoi City. WG and JET will continue to find proper enterprises.	1) WG will revise the preparatory information collecting form, and use inspection in October. 2) JET will continue preparation work of the training.
	11th DM (20/11/2012, WG)	1. Criteria for selecting primary/crucial pollution sources 2. Preparation of training on wastewater treatment technique	1) WG agreed with the draft criteria for selecting primary crucial pollution sources. 2) HNI DONRE agreed to select paper industry for the training on wastewater treatment technique. The training will be held in December 2012 or January 2013. The enterprise visited in the training will be selected by HNI DONRE.	HNI DONRE and JET will work for preparation of the training on wastewater treatment.
	12th DM (12/12/2012, WG)	1. Preparation of training on WWT and CP technique	1) HNI DONRE and JET decided to hold the training on wastewater treatment technique in paper industry in January 2013. 2) HNI DONRE has selected the enterprise visited in the training.	HNI DONRE and JET will work for preparation of the training on wastewater treatment.
	13th DM (29/1/2013, WG)	1. Criteria for selecting primary/crucial pollution sources 2. Finalizing the handbook for inspection	1) HNI DONRE submitted the comments to the draft Handbook for Improving Inspection and Environmental Check. 2) JET and HNI DONRE reviewed the outcomes from the training on wastewater treatment techniques in the paper industry. The reviewed results will be reflected on the handbook.	JET will revise the Handbook for Improving Inspection and Environmental Check Performance based on the discussion.

DONRE	DM	Theme	Major Comments and Proposal by WG 2-4	Actions of C/P and JET
HPG	1st DM (12/5/2011, ID and EPA)	1. Current status of inspection and EC, and needs of CD 2. Organizing WG	1) Lack of unified format on self-monitoring reports makes review work difficult. Instruction documents should be developed. 2) Officers in charge of inspection and EC should improve their capacities to find environmental management issues on priority industries, such as the beverage, food processing, paper mill, textile and dyeing, and leather industries.	JET will prepare the initial framework of activities based on AP prepared by DONRE.
	2nd DM (20/5/2011, ID and EPA)	1. Discussion on the initial framework of activities 2. Organizing WG	1) JET proposed a framework of activities: i) Enhancing inspection capacity for priority sectors by preparing the Handy Reference Cards, and ii) Improving review system of self-monitoring report with preparing unified format and instruction documents. DONRE agreed on the framework. 2) DONRE put higher priority on improving review system of self-monitoring report, especially unified format. DONRE recommended to refer the format prepared by MONRE. 3) DONRE agreed to organize WG.	1) JET will revise the initial frameworks of the activities based on the discussion. 2) DONRE will prepare the documents and reports requested by JET. 3) DONRE will organize WG.
	3rd DM (17/6/2011, ID and EPA)	Discussion on initial WP of activities	1) DONRE requested to focus on the Re River basin where intake of water supply system is exist for implementing activities same as Output 2-3. 2) JET requested to prepare a list of target enterprises in the Re River.	1) JET will revise initial WP. 2) DONRE will prepare a list of target enterprises.
	4th DM (4/8/2011, EPA and HACEM)	1. Initial WP and organizing WG 2. Discussion on the Handy Reference Cards 3. Joining inspection and EC	1) DONRE reexamined target industrial sectors in the Re River basin. 2) WG will be organized by mid-August. 3) DONRE commented to the proposed the Handy Reference Cards that they already had similar format and requested regional specific one to for DONRE. 4) DONRE replied that JET can join inspection and EC in November-December 2011.	1) JET will finalize WP. 2) DONRE will prepare a list of target enterprises in the Re River basin. 3) DONRE will prepare the documents requested by JET.
	5th DM (19/8/2011, WG)	1. Discussion on WP and organizing WG 2. Handy Reference Cards and unified format of self-monitoring reports	1) DONRE requested to improve the format prepared by HACEM, and to focus on the food/beverage (especially seafood), shoes (leather), shipyard, plastic, steel, and cement industries. 2) WG members are proposed by DONRE. 3) DONRE requested to prepare official letter for joining inspection and EC. 4) WG agreed on the proposal to assist preparation of annual inspection plan in 2012, and inquired on measures of CA.	1) JET will modify WP. 2) DONRE is preparing a list of target enterprises.
	6th DM (31/8/2011, WG)	1. Revised WP 2. Draft Handy Reference Cards 3. Initial review results of the format of self-monitoring report	1) WG pointed out that the format had been prepared in 2004, and should be revised considering regulations enforced, such as Circular No. 07/2007/TT-BTNMT. 2) WG agreed on the comments on the report prepared by HACEM that it is required information to review status of pollution control measures by enterprises, and add sections for reviewing work, such as conclusion of self-monitoring activities. 3) WG recommended holding an internal WS on the Handy Reference Cards in November.	1) JET continues to prepare the draft Handy Reference Cards. 2) JET will prepare proposals on unified format of self-monitoring report. 3) WG is preparing a list of target enterprises in the Re River basin.
	7th DM (25/10/2011, WG)	Review of planning process of annual inspection plan in 2012	1) The Inspection Department and EPA have regular meeting to exchange information on pollution sources. 2) DONRE does not have clear criteria to select crucial pollution sources. 3) The Inspection Department should submit a target list on inspection to DONRE in November.	JET will prepare recommendation on planning of annual inspection plan in 2012.
	8th DM (3/11/2011, WG)	Discussion on planning process of annual inspection plan in 2012	1) WG should check: i) Instruction from PPC, ii) Pollution source lists submitted by other sections of DONRE and district DONREs, iii) Comments from district PCs related to complaints on enterprises, and iv) Records of violation. 2) JET recommended a process of finding primary/crucial pollution sources in the Re River area. WG deals with this matter.	WG will prepare the first internal WS.
	9th DM (10/11/2011, WG)	Preparation of the first internal WS	1) Internal WS will be held as proposed agenda. 2) WG will invite the Environmental Police Department to the WS.	WG will prepare the first internal WS.
	10th DM (30/11/2011, WG)	1. Follow-up of the first internal WS 2. Inspection plan in 2012	1) Based on the questionnaire results, DONRE should consider: i) Instructions from the central and provincial government on drafting inspection plan, and ii) Pollution sources to be listed by type of industrial sector and wastewater volume. 2) WG commented to add a wastewater treatment flow chart of dyeing industry in the Handy Reference Cards. 3) WG agrees to propose modification of PDM indicators.	WG will select primary/crucial pollution sources in the Re River basin.
	11th DM (6/1/2012,	Planning of OJT for inspection in 2012	1) WG prepared a draft inspection plan in 2012, and officially included in the target enterprises.	WG and JET will discuss the plan of OJT in 2012.

DONRE	DM	Theme	Major Comments and Proposal by WG 2-4	Actions of C/P and JET
	WG)		2) The plan will be approved before Tet.	
	12th DM (8/2/2012, WG)	1. OJT plan in 2012 2. Planning the second WS 3. Updating the Handy Reference Cards	1) WG selected 11 enterprises in the Re River area as primary/crucial pollution source and targets for OJT. 2) The second WS is to be held on 17 February. JET proposed to invite HNI and TT-HUE DONREs. 3) WG commented that wastewater treatment flow chart on pig breeding farm should be added, and will focus on pig breeding farm, and wastewater treatment system of paper industry should be checked by difference of raw materials such as wood and bamboo.	1) WG will prepare presentation in WS. 2) WG and JET will revise the Handy Reference Cards.
	13th DM (24/2/2012, WG)	1. OJT in 2012 2. Follow-up the second WS 3. Handy Reference Cards 4. Self-monitoring report	1) WG agreed with the proposals on the Handy Reference Cards to revise it in March and April. 2) WG requested to start OJT from June, and a letter from VEA for join field inspection with JET. 3) WG recommended to cooperate with Output 2-3 to identify information, and to submit finalized unified TOC to MONRE under Output 1.	1) JET will prepare OJT schedule. 2) JET will cooperate with Output 2-3 for preparation of unified TOC of self-monitoring report.
	14th DM (25/5/2012, WG)	1. Planning OJT 2. Use of the Handy Reference Cards	1) WG agreed on the handbook which summarized the activities of the Project, though there could be some comments. 2) The Inspection Department listed ten entities for OJT. The equipment procured by JICA (flow meter and water quality checker) will be used OJT. 3) WG agreed on OJT around ten days in August to September. 4) WG conducted a trial uses of the Handy Reference Cards and made it more practical.	ID will confirm the official procedure required for OJT.
	15th DM (8/8/2012, WG)	1. Discussion on OJT 2. Training on wastewater treatment	1) DONRE agreed on OJT in August. 2) WG requested the training on WWT and CP to paper/paper mill, textile and dyeing, and machinery industries. 3) WG agreed to use additional form for collecting information on wastewater treatment system proposed by JET.	1) WG and JET will prepare OJT. 2) JET will contact lecturers recommended by DONRE
	16th DM (27/11/2012, WG)	1. Criteria to select primary/crucial pollution sources 2. Conclusion of findings by OJT	1) WG agreed with the draft criteria for selecting primary crucial pollution sources. 2) JET presented the key points to be discussed for improvement of inspection and environment check based on the findings in OJT. The discussed matters will be reflected on the Handbook for Improvement of Inspection and Environmental Check Performance.	JET will revise the Handbook for Improving Inspection and Environmental Check Performance based on the discussion.
	17th DM (24/1/2012, WG)	1. Criteria for selecting primary/crucial pollution sources 2. Finalizing the handbook for inspection	1) HPG DONRE submitted the comments to the draft Handbook for Improving Inspection and Environmental Check. 2) JET and HPG DONRE reviewed the outcomes by the Project. The reviewed results will be reflected on the handbook.	JET will revise the Handbook for Improving Inspection and Environmental Check Performance based on the discussion.
	18th DM (8/3/2012, WG)	Discussion on required activities in the post-project phase.	1) As one of important activities in the post-project phase, JET suggested HPG DONRE to plan and conduct similar trainings with ones held in the Project. HPG DONRE and JET discussed the example of training programs and required actions for planning and holding the training.	JET will revise the Handbook for Improving Inspection and Environmental Check Performance based on the discussion.
TT-HUE	1st DM (5-6/5/2011, ID, EPA, WRMD)	1. Current status on inspection and EC	1) DONRE commented that seafood, aquaculture, hospital, and solid waste dumping site are the main targets. 2) Currently, only a few inspections were carried out due to lack of human resources. 3) DONRE mentioned that an information system should be developed to store information of inspected enterprises.. 4) DONRE requested field measurement apparatus and flow meter for inspection and EC.	JET will prepare an initial WP based on the AP prepared by DONRE
	2nd DM (27/6/2011, ID, EPA, WRMD)	1. Discussion on initial WP 2. Organizing WG 3. Request on joining inspection and EC	1) DONRE requested to cover both inspection and EC. 2) In 2011, main targets are seafood processing and solid waste dumping sites nominated by Decision No. 64/2003/QĐ-TTg. 3) Currently, DONRE concerns about water pollution by shrimp farms which most ones do not have wastewater treatment facilities. 4) DONRE agreed to organize WG and to accompany JET their inspection and EC.	1) JET will prepare a draft WP. 2) DONRE will organize WG and arranged EC on shrimp farm with JET in September 2011.
	3rd DM (12/8/2011, ID and EPA)	Discussion on draft WP	1) DONRE agreed on the proposed WP, especially on assistances on planning and data analysis on inspection and EC. 2) DONRE requested to introduce Japanese inspection and water pollution control system. 3) JET requested to provide records of environmental complaints to assist planning of inspection and EC. DONRE asked JET to prepare an official letter. 4) DONRE arranged EC on shrimp farm for JET to join.	JET will send documents of Japanese inspection and water pollution control system.

DONRE	DM	Theme	Major Comments and Proposal by WG 2-4	Actions of C/P and JET
	4th DM (28/10/2011, WG)	Review of planning process of annual inspection plan in 2012	1) WG should refer to: i) Complaints from local residents, ii) Information from mass media, and iii) Information from the Environmental Police Department in preparing an inspection plan. 2) WG requested JET to hold WS to learn Japanese inspection system.	JET and WG will plan to hold the first internal WS.
	5th DM (16/11/2011, WG)	Preparation of the first internal WS	1) Internal WS will be held as proposed agenda. 2) WG will invite district DONRE officers and the Environmental Police Department to WS.	WG will prepare the first internal WS.
	6th DM (11/1/2012, WG)	Planning of OJT for inspection in 2012	1) DONRE prepared the inspection plan in 2012, and its specific target name will be fixed after Tet. 2) WG and JET discussed modification of PDM indicators.	WG and JET will continue to discuss plan of OJT in 2012.
	7th DM (10/2/2012, WG)	1. OJT plan in 2012 2. Planning the second WS in HPG 3. Introduction of the Handy Reference Cards	1) DONRE prepared inspection plan for 2012. The criteria to select primary and crucial pollution sources are: i) Complaints from local residents, ii) Illegal wastewater discharge confirmed by wastewater quality monitoring, and iii) Instruction from PPC. 2) WG agreed on OJT, but a letter from VEA will be necessary for JET to accompany DONRE in inspection. 3) WG agreed with the Handy Reference Cards, and to join the WS in HPG.	1) JET will carry out necessary actions to join WS in HPG. 2) WG will send comments on the Handy Reference Cards.
	8th DM (21/2/2012, WG)	1. OJT plan in 2012 2. Follow-up the second WS	1) WG proposed on the Handy Reference Cards to add information on hospital, alcohol industry, and centralized system in industrial zones, and instruction on parameters to be monitored in each industry. 2) WG requested to provide training on i) wastewater treatment system, ii) parameters to be monitored in each industrial sector, and iii) calculation of wastewater discharged standard values. 3) WG agreed OJT on preparation of summary report in March to April.	1) JET will prepare OJT program 2) JET will send WG proposal on the Handy Reference Cards to HPG DONRE. 3) WG will start to prepare a summary report of inspection in 2011.
	9th DM (18/6/2012, WG)	Planning OJT and other activities	1) WG agreed on the handbook with summary of activities, though there could be some comments. 2) Target entities for OJT will be those in industrial zones and other independent plants. OJT plan is under discussion in PPC. 3) Summary report on half-year inspection shall be edited by WG.	DONRE shall forward a request letter to VEA for OJT.
	10th DM (13/8/2012, WG)	Planning OJT and water environmental incidents	1) DONRE commented difficulty to join on-site work. WG decided that on-site work training will be provided separately from inspection activity. 2) On-site training will be implemented in September. 3) WG requested training on WWT and CP on the beverage, textile and dyeing, and chemical industries.	WG and JET will prepare OJT and training on WWT and CP technique.
	11th DM (22/11/2012, WG)	1. Criteria for selecting primary/crucial pollution sources 2. Follow-up of OJT	1) WG agreed with the draft criteria for selecting primary crucial pollution sources. 2) TT-HUE DONRE and JET reviewed the outcome of OJT, and discussed on the key points to be checked at the site. The discussion results will be reflected on the Handbook for Improving Inspection and Environmental Check Performance.	JET will revise the Handbook for Improving Inspection and Environmental Check Performance based on the discussion.
	12th DM (29/1/2012, WG)	1. Criteria for selecting primary/crucial pollution sources 2. Finalizing the handbook for inspection	1) TT-HUE DONRE submitted the comments to the draft Handbook for Improving Inspection and Environmental Check. 2) JET and TT-HUE DONRE reviewed the outcomes of the Project. The reviewed results will be reflected on the handbook.	JET will revise the Handbook for Improving Inspection and Environmental Check Performance based on the discussion.
	13th DM (8/3/2012, WG)	Discussion on required activities in post-project phase	1) As one of important activities in the post-project phase, JET suggested TT-HUE DONRE to plan and conduct similar trainings with ones held in the Project. TT-HUE DONRE and JET discussed the example of training programs and required actions for planning and holding the training.	JET will revise the Handbook for Improving Inspection and Environmental Check Performance based on the discussion.
	14th DM (21/3/2012, ID, EPA, WRMD)	Presentation on the Handbook for Improving Inspection and Environmental Check Performance	JET provided a presentation to explain the contents of the Handbook for Improving Inspection and Environmental Check Performance.	TT-HUE DONRE will send comments on the handbook, if any.
HCMC	1st DM (16/5/2011, ID, EMD, HEPA, WRMD)	Current status of inspection and EC, and needs of CD	1) DONRE confirmed app 500 of EIA and 3,000 of EPC registrations, and has checked status of environmental protection fee collection on 400 to 500 enterprises in every year. 2) DONRE requested to focus on the Tan Quy Industrial Cluster for the activities. 3) DONRE plans to integrate EMD and HEPA, and to enhance cooperative activities for water pollution control. Therefore, DONRE requested to hold cross-training activities that all	JET will prepare an initial WP based on the discussion and AP prepared by DONRE.

DONRE	DM	Theme	Major Comments and Proposal by WG 2-4	Actions of C/P and JET
			relevant sections can join for better water pollution source control.	
	2nd DM (16/5/2011, WG)	1. Discussion on the initial WP 2. Organizing WG	1) DONRE agreed WP that planned to hold internal cross-training WS introducing Japanese cases, to share information with different sections, to discuss on required technical knowledge and skill. 2) DONRE organized WG consisting of ID, EMD, HEPA, and WRMD.	JET will prepare revised WP.
	3rd DM (23/6/2011, WG)	Questionnaire on training needs for cross-training WS	WG agreed to distribute the questionnaire on training needs for cross-training WS.	WG will distribute and collect the questionnaire.
	4th DM (14/7/2011, WG)	Collecting questionnaire on training needs for cross-training WS	1) WG collected the questionnaire. 2) WG requested to include i) classification of pollution sources, ii) measures on evaluating impacts of water pollution sources at sites, and Japanese legal tools and policies for inspection and EC, in the training	JET will modify WP and prepare a draft program of 1st cross-training WS.
	5 th DM (16/8/ 2011, WG)	Discussion on draft WP and program of the first cross-training WS	1) WG basically agreed with the draft WP and the program of the first WS including: i) recent outcomes of inspection and EC, and ii) lecture on the Japanese legislative system. 2) WG requested a lecture on knowledge and skill how to assess environment protection measures at site on paper and textile industries. Date of the first cross-training WS is set on 30 August 2011.	1) WG will organize the first WS. 2) JET finalizes WP and WS program.
	6th DM (9/11/2011, WG)	1. Review of planning in 2012 2. Select primary pollution sources	WG agreed on the tasks to select primary and crucial pollution sources in the Tan Quy Industrial Center considering cases of penalties and administrative sanctions, countermeasures applied, and record of complaints to pollution sources.	WG will check information on pollution sources for selection.
	7th DM (23/11/2011, WG)	1. Selecting primary/crucial pollution sources 2. Second WS	1) WG agrees procedure for selecting primary/crucial pollution sources. 2) WG agreed draft agenda of the 2nd internal WS. 3) WG and JET discussed modification of PDM indicators.	1) WG will select primary and crucial pollution sources in the Tan Quy Industrial Center. 2) JET will prepare the second WS.
	8th DM (2/12/2011, WG)	1. Selecting primary/crucial pollution sources 2. Preparation of the second internal WS	1) It is agreed that the following entities to be the targets: -Go Sao Co., Ltd -Tat Thang Co., Ltd -Thua Huan Co., Ltd -Lai Phu Co., Ltd -Worth Wooden Co., Ltd -Tan Viet Xuan Company. -SamCo Automobile Company -Hoang Dung Co., Ltd 2) Information collected by subcontractor will be checked by WG. 3) WG agreed to visit enterprise with good practice in the second WS.	1) JET will prepare the second WS. 2) WG will select enterprise to be visited in the second WS.
	9th DM (6/1/2012, WG)	Preparation of the second WS	1) WG agreed OJT from May 2012 including follow-up inspection. 2) WG requested to obtain an official letter from VEA for joint inspection. 3) In second WS, WG recommended visiting a textile industry.	JET will prepare the second WS.
	10th DM (14/2/2012, WG)	OJT plan in 2012	1) Criteria to select primary/crucial pollution sources are i) wastewater volume, ii) illegal wastewater discharge, and iii) conceivable questions concerned. 2) WG will carry out OJT in EC from May 2012. Follow-up environmental check will be carried out in September 2012. 3) WG requested to provide training on i) Pollution load calculation, ii) Storage of information collected, and iii) Parameters to be monitored in each sector. 4) WG did not to apply CP activities in the Tan Quy Industrial Center.	JET will prepare OJT plan.
	11th DM (11/6/2012, WG)	1. Planning for OJT and other activities 2. Preparatory meeting for OJT	1) WG agreed with the handbook with summary of activities of the Project. 2) OJT is held on four entities in the Tan Quy Industrial Center. 3) Flow meter and water quality checker are used on OJT. 4) Required information for EC has asked to entities by questionnaires in advance	Wrap-up meeting will be held after OJT to discuss on the achievement and issues found.
	12th DM (10/8/2012, WG)	Discussion on OJT and Training on wastewater treatment	1) OJT on follow-up EC will be conducted in August. 2) WG requested training on WWT and CP technique on the textile and dyeing industry.	1) WG and JET will prepare OJT on EC. 2) JET will contact VNCPC for lecturer introduced.

DONRE	DM	Theme	Major Comments and Proposal by WG 2-4	Actions of C/P and JET
	13th DM (2/11/2012, ID, EPA, WRMD)	1. Discussion on handbook for inspection 2. Subcontract work for wastewater sampling and analysis	1) JET provided the presentation on the key points to be checked for QC of subcontract work for wastewater sampling and analysis 2) Including the above topic, JET discussed with HCMC DONRE on the key points to be examined for improving inspection and environment check performance. The discussed results will be reflected on the handbook,	JET will revise the Handbook for Improving Inspection and Environmental Check Performance based on the discussion.
	14th DM (21/1/2012, WG)	1. Criteria for selecting primary/crucial pollution sources 2. Finalizing the handbook for inspection	1) HCMC DONRE submitted the comments to the draft Handbook for Improving Inspection and Environmental Check. 2) JET and HCMC DONRE reviewed the outcomes from the Project. The reviewed results will be reflected on the handbook.	JET will revise the Handbook for Improving Inspection and Environmental Check Performance based on the discussion.
	15th DM (1/3/2012, WG)	Discussion on required activities in post-project phase.	1) As one of important activities in the post-project phase, JET suggested HCMC DONRE to plan and conduct similar trainings with ones held in the Project. HCMC DONRE and JET discussed the example of training programs and required actions for planning and holding the training.	JET will revise the Handbook for Improving Inspection and Environmental Check Performance based on the discussion.
	16th DM (22/3/2012, ID, EPA, WRMD)	Presentation on the Handbook for Improving Inspection and Environmental Check Performance	JET provided a presentation to explain the contents of the Handbook for Improving Inspection and Environmental Check Performance.	HCMC DONRE will send comments on the handbook, if any.
BRVT	1st DM (29/4/2011, ID, EPA, WRMD)	Current status of inspection and EC	1) DONRE was concerned on: i) seafood processing, ii) livestock, iii) tourism sector, and iv) port development. 2) DONRE focused on middle and small scale industries such as seafood and other pollution sources located outside industrial zones.	DONRE will prepare documents requested by JET.
	2nd DM (17/5/2011, ID, EPA, WRMD)	Confirming needs of CD	1) DONRE replied two areas as hot spots: i) Lac Ba Channel area, and ii) Cua Lap River area. 2) Countermeasures on water pollution sources in Lac Ba channel area have been proposed to PPC. 3) DONRE requested wastewater flow measurement at sites and its implementing capacity.	1) JET prepared an initial WP based on the discussion and AP prepared by DONRE.
	3rd DM (24/5/2011, ID, EPA, WRMD)	Discussion on initial WP and organizing WG	1) DONRE agreed WP that planned to confirm impacts of seafood processing industries in the Cua Lap River and to examine countermeasures. 2) JET requested to organize WG and to collect data on water pollution sources in the Cua Lap area. 3) DONRE pointed out to cooperate with district DONREs.	1) JET will prepare a draft WP. 2) DONRE will collect information on water pollution sources in the Cua Lap area.
	4th DM (15/8/2011, WG)	Discussion on the draft WP	1) DONRE agreed with the draft WP for enhancing capacities to propose countermeasures on water pollution sources located in the Cua Lap River area. 2) WG provided a list of seafood enterprises in the Cua Lap area. 3) WG agreed a joint inspection and EC, and will arrange an inspection on livestock facility on 18 August 2011.	1) JET finalized WP. 2) WG will arrange joint inspection.
	5th DM (15/9/2011, WG)	Request to collect data and its questionnaire	1) WG agreed to collect data obtained by inspection and EC on the listed seafood processing enterprises in the Cua Lap River area. 2) WG agreed to collect the requested information.	WG is collecting data as JET requested.
	6th DM (9/11/2011, WG)	1. Review of planning in 2012 2. How to select primary and crucial pollution sources	1) WG handed information on seafood processing industries in the Cua Lap area, and suggested to collect further information from the Environmental Police Department. 2) WG agreed to select primary/crucial pollution sources based on the discussed viewpoints with JET. 3) WG suggested to have the WS after 2012.	WG will contact the Environmental Police Department to collect further information on seafood processing industries in the Cua Lap area.
	7th DM (2/12/2011, WG)	Discussion on how to select primary and crucial pollution sources	1) The Environmental Police Department participated in the meeting, and provided the results that they found illegal discharge from seafood processing industries in the Cua Lap area in July 2011, and some of them do not operate wastewater treatment plant. 2) DONRE will organize a training WS in February 2012. 3) WG agreed on the proposed viewpoints for selecting primary/crucial pollution sources. 4) WG and JET discussed modification of PDM indicators.	WG will select primary/crucial pollution sources based on the discussion.
	8th DM (7/2/2012, WG)	1. OJT plan in 2012 2. Planning of the first internal WS	1) WG selected 14 primary and crucial pollution sources among seafood enterprises in Cau Lap area applying criteria of i) Lack of wastewater treatment plant and ii) insufficient operation of wastewater treatment plant. 2) WG requested training on wastewater treatment system. 3) The first internal WS is to be held on 23 February. WG will	1) JET will prepare OJT plan and the first internal WS. 2) WG will prepare presentation material of the WS, and select an enterprise for on-site training.

DONRE	DM	Theme	Major Comments and Proposal by WG 2-4	Actions of C/P and JET
			select an enterprise for on-site training in WS.	
	9th DM (19/6/2012, WG)	1. Planning OJT and other activities 2. Preparatory meeting for OJT	1) WG agreed on the plan and contents of the handbook with the summary of all activities, though there could be some comments. 2) OJT is held on four seafood processing plant in Long Dien District. 3) Flow meter and water quality checker provided are under CEMAB. Official letter is required to transfer them to ID.	Wrap-up meeting will be held after OJT to discuss on the achievement and issues found.
	10th DM (10/8/2012, WG)	1. Discussion on OJT 2. Training on wastewater treatment technique	1) WG commented that seafood industry should be more focused because of serious pollution in province, and DONRE should check/insect medium and small scale enterprise, of which discharge volume 20-50 m ³ /day due to change of regulation. 2) Training on WWT and CP technique should be included in discussion session and on-site training.	JET will prepare the training on WWT and cleaner production (CP) technique.
	11th DM (25/10/2012, WG)	1. Review of training on wastewater treatment technique	1) By reviewing of questionnaire to the attendants of the training, it was confirmed that all attendants' relevant capacities were improved by the training. 2) BRVT DONRE requested to additionally provide the following information: (a) information on cost of construction of wastewater treatment facility, and (b) criteria for setting the weir for wastewater flow measurement.	JET will prepare documents related to the information requested by BRVT DONRE.
	12th DM (13/11/2012, WG)	1. Criteria to select primary/crucial pollution sources 2. Feedback of the meeting on 25 October 2012	1) BRVT DONRE set criteria to select primary/crucial pollution sources were agreed with BRVT DONRE. 2) JET provided the information requested by BRVT DONRE.	BRVT DONRE will examine required actions for utilizing the prepared criteria to select primary/crucial pollution sources.
	13th DM (21/1/2012, WG)	1. Criteria for selecting primary/crucial pollution sources 2. Finalizing the handbook for inspection	1) BRVT DONRE submitted the comments to the draft Handbook for Improving Inspection and Environmental Check. 2) JET and BRVT DONRE reviewed the outcomes from the Project. The reviewed results will be reflected on the handbook.	JET will revise the Handbook for Improving Inspection and Environmental Check Performance based on the discussion.

Source: JET

Table 4.4-5 Results of DMs for WG 3

DONRE	DM	Theme	Major Comments and Proposal by WG 3	Actions of C/P and JET
HNI	Overall Meeting (14/4/2011)	WP of Output 3	1) DONRE agrees with the proposed WP. 2) The upstream of the Nhue River should be included in the model area. 3) The WG 3 leader will be selected from EPA.	Next meeting to be held on 26 April.
	1st DM (26/4/2011)	Organizing WG	1) DONRE presented tentative WG organization lead by Deputy Head of DWRM. 2) DONRE selected model area in Tu Liem and Ha Dong districts. 3) JET proposed the joint work task matrix and asked DONRE to provide data in response to the questionnaire.	1) JET agreed with the model area proposed by DONRE. 2) DONRE agreed to start data collection.
	2nd DM (13/5/2011)	Data collection and PST	JET explained how to develop PST presenting instruction of the pollution source table (PST) development.	It was confirmed that DONRE will continue data collection
	3rd DM (26/5/2011)	Organizing WG and PST development	1) DONRE explained that the WG leader was changed to the Deputy Head of EPA. 2) DONRE requested JET to hire local experts to take care of PST development.	Confirmation on the hiring of local experts is pending.
	4th DM (16/6/2011)	WG and PST development	DONRE explained that WG was organized not only for Output 3 but also for Outputs 2 and 4.	Noted by JET
	5th DM (21/7/2011)	Data collection and PST	JET explained progress status of PST development by using collected data.	JET continues to develop the PST hiring local experts.
	6th DM (11/8/2011)	PST and CA	1) JET explained progress status of PST development. 2) Schedule for CA and individual unit interview are discussed and arranged.	JET distributes the questionnaires on CA.
	7th DM (30/8/2011)	1. Discussion note including PST 2. Plan of first site survey	1) Discussion was held regarding contents of the discussion note. 2) Plan and TOR of first site survey were discussed. 3) Discussion note should be upgraded when effective data come to be available more.	JET will select local experts for first site survey.
	8th DM (9/9/2011)	Preparation of first site survey of pollution source projects	1) Subject entities were discussed and selected. 2) Schedule of site visit was discussed. 3) DONRE develops the actual visit schedule selecting additional entities.	Local experts follow up and fix the visit schedule and carry out the site visit.
	9th DM (27/9/2011)	Initial check for first site survey	Reviewing and checking survey results of the first three entities.	Continuing site survey along the scheduled timeline.
	10th DM (27/12/2011)	Sharing results of the first site survey in the model area	1) JET explained and shared the survey result of the first site survey, by using "Field Note of First Site Survey". 2) JET also explained and shared additional result of data collection, by	WG 3 members were informed with current situations on water pollution control.

DONRE	DM	Theme	Major Comments and Proposal by WG 3	Actions of C/P and JET
			using "Discussion Note on Current Status of Water Pollution Control in Hanoi City".	
	11th DM (12/1/2012)	Sharing the preliminary results of problem analysis on water pollution control	1) JET made preliminary problem analysis of present water pollution control and shared its results to WG members. 2) Additional site survey in the model area was proposed to examine the situation of wastewater treatment, more precisely. 3) WG members were informed with results of problem analysis.	JET made the preparation of additional site survey.
	12th DM (22/5/2012)	Results of site survey and problem analysis	1) Sharing results of additional survey in the model area. 2) Reexamining preliminary problem results. 3) Discussing the activity plan for the 2012.	-
	13th DM (11/6/2012)	Technical training of PS database	Confirming the data entry of collected data/ information in the first site survey.	-
	14th DM (12/9/2012)	Activities and the plan of operation	Confirming the plan of operation in the final period.	JET will prepare a draft plan of water pollution control measures.
	15th DM (16/10/2012)	Draft outline of improvement plan	1) Discussing and confirming the main points of the outline of improvement plan. 2) WG will submit comments on the outline of improvement plan.	JET will prepare the second draft of the outline reflecting discussion results.
	16th DM (05/11/2012)	Draft outline of improvement plan	Examination and confirmation of opinions and comments from WG.	To review and elaborate the draft outline of improvement plan
	17th DM (1/3/2013)	Discussing the draft outline of improvement plan	1) WG agreed with the contents of the draft outline and set the proposals included in it. 2) WG will report the outline of improvement plan to the director of DONRE and submit it to PPC.	JET will follow the activity of WG.

Source: JET

Table 4.4-6 Results of DMs for WG 4

DONRE	DM	Theme	Major Comments and Proposal by WG 4	Actions of C/P and JET
HNI	1st DM (27/5/2011, EPA)	1. Current status of environmental awareness (EA) 2. Discussion on target area	1) The Project Management and Communication Section under EPA is in charge of EA. 2) DONRE agreed to provide report on EA to JET and to assign WG 4 members. 3) DONRE will decide the target area for EA activity.	JET will review past EA activity and consider CD approach.
	2nd DM (05/9/2011, EPA)	Draft WP and target area	DONRE decided that Tu Liem and Ha Dong Districts be the target areas and agreed to hold WS in these districts.	JET will propose the program of the WS.
	3rd DM (16/9/2011, EPA)	Discussion on WS	1) DONRE agreed a program of WS, but enterprises invited must be discussed further. 2) Date, venue, and detailed logistic arrangement of WS will be discussed with subcontractor.	JET will propose the candidate enterprises to be invited based on PST.
	4th DM (3/10/2011, EPA)	Enterprises to be invited to WS	1) DONRE requested to invite the same enterprises of the target of the survey of Output 3. 2) DONRE and JET nominated 20 and 30 enterprises, respectively.	DONRE and JET will select the enterprises to be invited.
	5th DM (17/11/2011, EPA)	1. List of 20 enterprises invited 2. WS program and preparation	1) DONRE intends to invite more 20 enterprises participating in other projects of HNI, and will send the list to JET. 2) It was confirmed how to prepare the invitation letter and how to divide the tasks to JET, HNI DONRE and the subcontractor.	1) DONRE will sign and send invitation letter for the enterprises invited.
	6th DM (23/11/2011, EPA)	WS program and preparation	1) WS will be held in December. The list of 20 enterprises will be combined together with current list of 30 ones used for Output 3. 2) DONRE will invite an environmental magazine and finalize their presentations.	DONRE and JET will prepare the WS.
	7th DM (28/11/2011, WG)	WS preparation	1) EPA will conduct facilitators for group discussion. 2) JET will prepare the draft questionnaire and send to DONRE.	-
	8th DM (5-7/12/2011, WG)	WS preparation	WG finalize the presentation and preparatory works of WS.	-
	9th DM (10/2/2012, WG)	PDM indicators and second year activities	WG agreed on modification of indicators and examined the second year activities based on WP and annual plan.	-
	10th DM (7/6/2012, WG)	WP for the second year	1) WG agreed with the activities on: i) Introductory guidelines on industrial wastewater management, and ii) awarding ceremony in collaboration with Output 3, and iii) training of DONRE officers. 2) WG proposed the Green gym machine to be constructed in the parks of Hanoi. JET will support to clarify this activity further. 3) WG agreed subcontract work to coordinate the second year work.	WG will propose detailed plan for the Green gym machine activity to JET.
	11th DM (10/7/2012, EPA)	Discussion on awarding ceremony activity	DONRE requested to cancel the awarding part in the seminar and the idea of the Green-gym-machine due to difficulties to get approval of leaders in DONRE and PPC. JET agreed.	DONRE will inform the final decision of the proposed awarding.
	12th DM (4/9/2012, WG)	1) Discussion on seminar program 2) Introductory	1) WG agreed to include introductory guidance, training of DONRE officers, and seminar on Outputs 3 and 4. 2) WG confirmed canceling awarding part of the sector seminar.	JET will revise WP and the seminar.

DONRE	DM	Theme	Major Comments and Proposal by WG 4	Actions of C/P and JET
		guideline on industrial wastewater management.	3) WG highly agreed on the main structure of the introductory guideline manuscript and its draft contents. 4) WG agreed with the contents of training and will provide information on the Hanoi Environmental Protection Fund (EPF).	
	13th DM (5/12/2012, WG)	1. Sector seminar of Outputs 3 and 4 2. Introductory guidance	1) Sector seminar will be held on 12 March 2013. WG will prepare a list of invitees. 2) WG agreed processing steps of preparing guidebook, and they will propose a peer review of the guidebook.	WG will decide who will make the opening speech.
	14th DM (1/3/2013, WG)	Preparation of the sector seminar	1) WG confirmed the invitees and demarcation for the seminar. 2) Around 13 members from DONRE will join the seminar.	-
	15th DM (6/3/2013, WG)	1. Sector seminar 2. Guidebook 3. Review activities	1) WG confirmed all matters of the seminar. 2) Guidebook on Industrial Wastewater Management was agreed to add more photos. JET will support the addition of more photos. 3) Summary ideas and future activity directions were discussed by WG. JET will send review and questionnaire results to WG.	1) DONRE will send presentations to JET. 2) JET will send the results of the questionnaire review.
HPG	1st DM (11/5/2011, DONRE)	1. Current status of EA 2. Discussion on target area	1) Administrative Division of EPA is in charge of EA. 2) DONRE agreed to assign WG members and to provide report on past EA activity to JET. 3) Site visit to candidate target areas including the Re River basin was conducted. DONRE will decide target area in the next meeting.	JET will consider CD approach based on past EA activity.
	2nd DM (17/6/2011, WG)	Procedure of EP plan and target area	1) WG understood the planning procedures and agreed to apply it in the Project. 2) EA activity should be implemented in the Re River.	JET will propose the WP.
	3rd DM (15/9/2011: WG)	Discussion on draft WP and target area	1) EA activity should be implemented in the Re River basin. 2) WG agreed to hold WS and study tour in the Re River and to discuss activity to be implemented. 3) Site visit to the Re River pumping station, the An Duong Water Purification Plant, and water pollution source was conducted.	1) WG will provide more information on EA activity. 2) JET will propose a WS program.
	4th DM (20/9/2011, WG)	Discussion on invitee and program of WS	1) WG agreed WS program, invitees, and study tour. 2) Date, venue, and detailed logistic arrangement of WS will be discussed with the subcontractor.	WG and JET will proceed with preparation of WS.
	5th DM (29/11/2011, WG)	WS program and study tour	1) WS will be held 20 December 2011 and WG finalize presentations. 2) WG discussed the study tour program.	WG and JET will prepare the WS.
	6th DM (19/12/2011, WG)	WS preparation	WG confirmed all preparatory works of WS.	-
	7th DM (13/2/2012, WG)	Modification of indicators and the second year activities	1) WG agreed on modification of indicators, and activities of the second year. 2) WG will discuss WP with relevant organizations in the Re River.	WG will coordinate discussions with relevant organizations.
	8th DM (08/6/2012, WG)	The second year WP	1) WG agreed to implement WP and WS for enterprises. WG and JET will prepare presentation list of WS, key contents for reports, and training contents. 2) WG agreed on the subcontract works.	WG and JET will develop concrete activities.
	9th DM (17/8/2012, WG)	Implementation of WP	1) WG basically agreed WS program to be held in November and the topics of TV reportages. 2) WG requested to replace banners with signboards.	JET will consider the signboard issue.
	10th DM (06/9/2012, WG)	Implementation of WP	1) WG will decide all matters related to the signboards and training program. WG and JET will discuss scenario of TV reportages. 2) DONRE informed HPG EPF was officially established and present short introduction in WS. 3) CA sheet was sent to WG via VEA for the terminal evaluation.	JET will send pre-training survey to WG.
	11th DM (27/9/2012, WG)	Implementation of WP	1) WG informed that official letter for the signboard, date of WS, and the outline scenario of reportages were decided. 2) Training will be held in November, and WG sent the pre-training survey sheet to JET.	WG will send the outline of scenario for reportages to JET.
	12th DM (8/11/2012, WG)	1) Signboards and TV reportages 2) WS for enterprises	1) Design and approval of signboards, progress of TV reportage, and the program of the WS were confirmed. 2) WG will send the presentations, venue, industrial sector main list, DVD of reportages, and invitation letters to JET.	JET will support on collecting presentations and translating.
	13th DM (26/2/2013, WG)	Review of EA activities and discussion on future direction	1) The completed EA activities were reviewed, and future direction discussed among WG and JET. WG will propose demarcation and contribution of related parties. 2) Site survey for checking environmental protection signboard to be installed.	JET will send the results of the questionnaire review.
TT-HUE	1st DM (24/5/2011, EPA)	1. Current status of EA 2. Discussion on target area	1) The EIA Appraisal Division of EPA is in charge for EA activity. 2) EPA agreed to provide report on EA activity to JET. 3) Site visit to the Tam Giang-Cau Hai Lagoon was conducted. 4) DONRE will assign WG members and decide target area.	JET will consider CD approach.
	2nd DM	1. Planning	1) WG understood the planning procedures and agreed to apply it	JET will propose the WP.

DONRE	DM	Theme	Major Comments and Proposal by WG 4	Actions of C/P and JET
	(15/6/2011, WG)	procedures for EA 2. Identification of target area	in the Project. 2) EA activities should be implemented in the Tam Giang-Cau Hai Lagoon.	
	3rd DM (15/8/2011, WG)	Discussion on draft WP	1) EA activity should be focused on water pollution by shrimp farming in the Tam Giang-Cau Hai Lagoon. 2) WG will have meeting with IMOLA project to discuss effective EA approach.	-
	4th DM (17/8/2011, WG)	1. WP for first year 2. WS program and field reconnaissance	1) WG agreed to hold WS and field reconnaissance, so as to understand current conditions in Tam Giang-Cau Ha Lagoon and countermeasures against pollution caused by shrimp farming. 2) WG will examine attendants, contents of presentation, and field reconnaissance sites. 3) WG will invite provincial DARD to make presentation on environmental friendly shrimp farming.	JET will propose the WS program.
	5th DM (12/9/2011, WG)	Discussion on WS program	1) WG agreed WS program, number of invitee, and study tour. 2) Date, venue, and detailed logistic arrangement of WS will be discussed with subcontractor.	WG and JET will proceed with WS preparation.
	6th DM (22/11/2011, WG)	WS program and study tour	1) WS will be held on 13 December 2011. WG confirmed the study tour program to visit Tam Giang-Cau Hai Lagoon. 2) WG prepared their presentation materials.	WG and JET will prepare the WS.
	7th DM (12/12/2011, WG)	WS preparation	WG confirmed all preparatory works of WS.	-
	8th DM (9/2/2012, WG)	Modification of PDM indicators and the second year activities	1) WG agreed modification of indicators and WP of the second year starting from May 2012. 2) WG will communicate with relevant organizations related to WP in the second year.	-
	9th DM (12/6/2012, WG)	WP for the second year	1) WG agreed WP, WS for enterprises, cleanup and water quality tests event, training of DONRE officers, and subcontract work. 2) JET will send the draft presentation list for WS.	WG and JET will prepare the WS.
	10th DM (9/7/2012, WG)	Site survey of the event places	1) WG nominated five candidate locations for the event. 2) WG will send proposed programs for three events, and preparation of t-shirts and banners.	-
	11th DM (20/8/2012, WG)	Preparation of WS for enterprises	1) WG agreed with the contents and date of the WS. 2) Final check of the site for event was conducted.	WG will continuously communicate with concerned organizations.
	12th DM (25/02/2012, WG)	WS, cleanup events, and training of DONRE officers	1) WG agreed all matters related to WS, clean up events, and training of DONRE officers including date, invitees, program, and demarcation.	-
	13th DM (9/11/2012, WG)	Preparation of WS for enterprises	1) WG confirmed the final program, venue, industrial main sectors. 2) WG will send invitee list to JET and send invitation letters.	WG and JET will prepare the WS.
	14th DM (27/2/2013, WG)	Review EA activities and future direction	1) WG discussed EA activities and future direction based on the results obtained.	JET will send the results of the questionnaire review.
HCMC	1st DM (16-18/5/2011, EPA)	1. Current status of EA 2. Discussion on target area	1) Environmental Information and Training Division of EPA is in charge for EA activity of the Project. 2) DONRE agreed to assign WG members and to provide the report on EA activity to JET. 3) It was agreed that environmental awareness activities will be implemented by collaborating with Output 2. 4) DONRE will decide the target area for EA activity.	JET will consider CD approach.
	2nd DM (7/7/2011, WG)	1. Planning procedures for EA 2. Identification of target area	1) WG understood the planning procedures and agreed to apply it in the Project. 2) EA activity should be implemented in the Tan Quy Industrial Center.	JET will propose the WP.
	3rd DM (24/8/2011, WG)	Discussion on the draft WP	1) WG agreed to hold WS for enterprises in the Tan Quy Industrial Center, so as to understand current condition of water environment in Ba Bep Channel, environmental management by enterprises, and applicable countermeasures. 2) WG examines attendants and contents of presentation.	JET will propose WS program.
	4th DM (13/9/2011, WG)	Participants for W/S	1) WG will list up enterprises in the Tan Quy Industrial Center to be invited to WS. 2) WG agreed WS program and will propose available date of WS.	-
	5th DM (14/12/2011, WG)	WS program and preparation	1) WS will be held in February 2012, and WG agreed with the WS program and list of invitees. 2) WG conducts preparatory works of WS and prepares WS presentation materials.	WG and JET will conduct preparatory works.
	6th DM (6/2/2012, WG)	Confirmation of WS preparation	WG confirmed all preparatory works of WS.	-
	7th DM	WP for the second	1) WG agreed to carry out introductory guideline on industrial	WG and JET will conduct

DONRE	DM	Theme	Major Comments and Proposal by WG 4	Actions of C/P and JET
	(15/6/2012, WG)	year	wastewater management and training of DONRE officers. 2) WG proposed producing hand-fan to distribute to residents for publicity.	activities.
	8th DM (29/8/2012, WG)	Implementation of WP	1) WG confirmed the detailed content for introductory guideline and the final work on distributing hand-fans. JET will join cleanup campaign in September 2012 with the distribution of hand-fans. 2) WG comments on documents and list of participants of training. 3) CA sheet was sent WG via VEA for the terminal evaluation.	WG and JET will continue activities.
	9th DM (4/12/2012, WG)	Introductory guidance	1) Detailed contents and schedule of making guidebook were agreed by WG. 2) Through a peer review, WG will revise the draft guidebook.	JET will answer about peer review for Guidebook.
	10th DM (4/3/2013, WG)	Review EA activities and future direction	1) WG discussed EA activities and future direction based on the results obtained.	JET will send the results of the questionnaire review.
BRVT	1st DM (17/5/2011, EPA)	1. Current status of EA 2. Discussion on target area	1) The Pollution Control Division of EPA is in charge of EA activities in the Project. 2) DONRE agreed to assign WG members and to provide report on EA activity to JET. 3) Site visit to target areas including the Cua Lap River was conducted. DONRE will decide target area.	JET will consider CD approach.
	2nd DM (8/6/2011, WG)	1. Planning procedures for EA activity 2. Identification of target area	1) WG understood the planning procedures and agreed to apply it in the Project. 2) EA activity should be implemented in the Cua Lap River. 3) Site visit to seafood processing factories with wastewater treatment plant was conducted. 4) WG will invite district DONREs and social organizations to discuss EA activity plan in the Cua Lap River.	JET will propose the WP.
	3rd DM (30/8/2011, WG)	Discussion on the draft WP	1) WG agreed to hold WS and field reconnaissance, so as to understand current water environmental condition in the Cua Lap River, and to discuss activity to be implemented in the next year.	WG will have meeting with district DONREs and social organizations.
	4th DM (14/9/2011, WG)	Confirmation of participants and WS program	1) DONRE agreed on the WS program and will list up the name of participants of WS. 2) DONRE will propose available date for WS.	-
	5th DM (02/12/2011, WG)	Preparation for the WS and study tour	1) WS will be held 16 December 2011. WG revises WS program and invitee list based on the draft proposed by JET. 2) WG will prepare presentation materials and study tour program visiting a shrimp breeding farm and fish processing factory.	WG and JET will continue preparatory works.
	6th DM (15/12/2011, WG)	Confirmation of WS preparation	WG confirmed all preparatory works of WS.	-
	7th DM (8/2/2012, WG)	Modification of PDM indicators and WP for the second year activity	1) WG agreed modification of PDM indicators and WP of the second year proposed by JET. 2) The second year activities will be started from May 2012. WG will continuously communicate with relevant organizations.	-
	8th DM (14/6/2012, WG)	WP of the second year and its implementation	1) WG agreed on the WP and the contents of the environmental film about the cleanup activity in the Cua Lap River. 2) A small meeting to disseminate and evaluate the film to and by commune leaders was confirmed to be held after production. 3) WG agreed subcontract work for film production.	JET will send a detailed table of contents for the film.
	9th DM (30/8/2012, WG)	1. Scenario of environmental film 2. Training of DONRE officers	1) WG agreed to modify the first scenario of environmental film in the Cua Lap area and to have training of DONRE officers. 2) WG will answer the way of broadcasting and the list of participants for training. 3) CA sheet was sent WG by VEA for the terminal evaluation.	JET will send pre-training survey sheet.
	10th DM (25/9/2012, WG)	1. Scenario of environmental film 2. Preparatory work of training	1) WG basically agreed on comments for modification of the detailed scenario, way of broadcasting, and schedule of film shooting activities. 2) WG confirmed all preparatory works of training of DONRE officers to be held date in October.	WG and JET will continue activity.
	11th DM (24/10/2012, WG)	Scenario of environmental film	1) WG confirmed on the progress of making an environmental film on water environmental management in the Cua Lap River area. Time schedule was agreed by WG.	WG will send the comments on the scenario to JET.
	12th DM (20/11/2012, WG)	Film shooting activities	1) WG agreed on environmental film shooting activity preparation. The process of preparing the film after shooting was confirmed. 2) WG will send the updated scenario and DVD to JET.	-
	13th DM (5/3/2013, WG)	Review EA activities and future direction	1) WG discussed the EA activities and future direction based on the results obtained. 2) Evaluation of environmental film via questionnaire survey was conducted.	JET will send the results of the questionnaire review.

Source: JET

CHAPTER 5 LESSONS LEARNED AND RECOMMENDATIONS

5.1 Lessons Learned

(1) Action Plans Prepared by DONREs

The preparation of the draft AP for Output 2 by each target DONRE during the project design stage was one of significant inputs to the actual implementation of the Project. This AP urged participation of the frontline staff of DONREs to the Project, guided the preparation of the WP with C/Ps, and contributed to establishing the actual and concrete targets of the Project. It should be noted that the same effects could have been expected for Outputs 3 and 4 if the APs for such had been considered in addition to Outputs 3 and 4 by C/Ps in advance. Therefore, this successful approach should be repeated in similar technical assistance projects in the future.

(2) Capability of VEA/MONRE to Coordinate with DONREs

The Project consisted of five components ranging from policy matters in the departments of VEA/MONRE to daily routine works in DONREs. Moreover, the Project targeted five DONREs which had different capacity levels and capacity development directions. This situation brought about fairly difficult and complicated coordination works to ISD/VEA. The effort of ISD/VEA has been highly appreciated. If ISD/VEA had been vested with more powers and resources to solve issues such as the project approval, preparation of C/P fund, provision of office space for SET, and approval of the A4 form for equipment procurement, then project implementation should have been even smoother.

(3) Planning Stage of the Project

The SET was assigned to the Project around half a year after the arrival of LET. This made it difficult for LET and units under MONRE to have detailed discussions with participating DONREs in the early phase of the Project on how to implement the Project together, and how to integrate the five components of the Project, especially Outputs 1 and 3. As a matter of fact, it was after the arrival of SET and commencement of the DONRE-led components (Outputs 2, 3, and 4) in April 2011 that the Ic/R was finally agreed at the second JCC and all the project activities started to move smoothly. The MONRE-led components of the Project and the DONRE-led components could have been started at the same time from the initial planning stage of the Project.

(4) Project Period for Achievement

In general, the achievement level of a technical assistant project accelerates rapidly from the third year of the project period. However, the actual period of the project implementation given to the DONRE-led components was less than 2.5 years. It means that many activities had to be stopped before entering the period of accelerated achievement, leaving important activities of further capacity development based on experiences gained, integrating the outcomes of the five project components, and disseminating important outcomes to other DONREs in Vietnam, largely to the hands of the Vietnamese side without support by JET. This is another reason why the MONRE-led and DONRE-lead components should have been started at the same time, maximizing the three-year project period.

(5) Target Stakeholders of Output 4

The component of Output 4 on capacity development to enhance environmental awareness mainly targeted C/Ps belonging to each DONRE. Considering that more stakeholders are involved in water environmental management, however, the target stakeholders should not have been limited only to DONRE staff, but have been extended to other organizations such as the Youth Union, the Women's Union, and the Farmers Union. Capacity development of these stakeholder groups could have

achieved more effective and efficient outcomes, and generated more powerful impacts to pollution sources.

5.2 Recommendations

(1) Institutionalizing and Extending the Outcomes of the Project

The Project produced many useful outcomes, such as knowledge on basic framework for policy development, systematic monitoring plans that became models for other monitoring plans, practical approaches to improve quality control in the laboratory, PSIs for water pollution management, inspectors' knowledge on wastewater management, an outline of strategies to improve water pollution control, various tools for awareness building, and a template to collect information from DONREs to MONRE for policy improvement. All organizations are strongly encouraged to take further steps to make such outcomes part of their own capacities, and extend them to those individuals and organizations that were not able to participate in the Project. These include junior or new members of organizations, district and commune-level officers, and DONREs in other provinces.

(2) Strong Commitment and Leadership of PPCs

As the Project started to produce various achievements, it became clearer that strong commitment and leadership of PPCs of the target provinces are crucial to improve the enforcement of environmental regulations by DONREs because their commitment and leadership drove the C/Ps to acquire more knowledge and skills through the project activities, and ensured actual and sustainable implementation of the measures obtained through the Project. Similarly the directions and guidance of PPCs are important to other provincial departments, Industrial Zone Management Board (IZMB), district and commune level governments, industries, and the general public. They are important stakeholders involved in water environmental management. This is why the PDM of the Project explicitly stated that PPCs of target provinces should make commitments to cooperate with the Project, as an important assumption. PPCs are encouraged to give further support to DONREs as well as other stakeholders to improve water environmental management in each province.

(3) Training in Japan

In the Project, JICA provided three training courses in Japan in February-March 2012, August 2012 and April 2013. These training courses became valuable opportunities for the Vietnamese C/Ps not only to learn how water environmental management has evolved in Japan, but also to exchange experiences and opinions among the participants from various units under MONRE, five DONREs and PPCs. It is recommended that similar training programs in Japan be provided widely to C/P organizations as an integral part of similar technical assistance projects in the future.

(4) Involvement of Directors

In Output 1, the most of directors from each relevant department were not directly involved as main focal points in the activities.

However, considering the fact that those directors are the decision makers, it is necessary to arrange well the working structures that all the outputs would surely be conveyed to the directors.

(5) Tasks of ISD

The working tasks of ISD (the main counterpart) were overloaded. As a result, the logistic arrangements seemed quite ineffective and time consuming.

The better way to manage projects should be considered.

(6) Physical Distance of Working Places

The working places between the experts and counterparts (mainly each relevant department in MONRE for Output 1) were physically distant. Therefore it caused lack of intensive cooperation, while, at the same time, the Japanese experts for Output 1 and 5 were only two people. The implementing structure for each output should be well considered before a project starts.