Ministry of Public Works and Transport
Lao People's Democratic Republic

THE PROJECT
ON
RIVERBANK PROTECTION WORKS
PHASE II

PROJECT WORK COMPLETION REPORT

August 2014

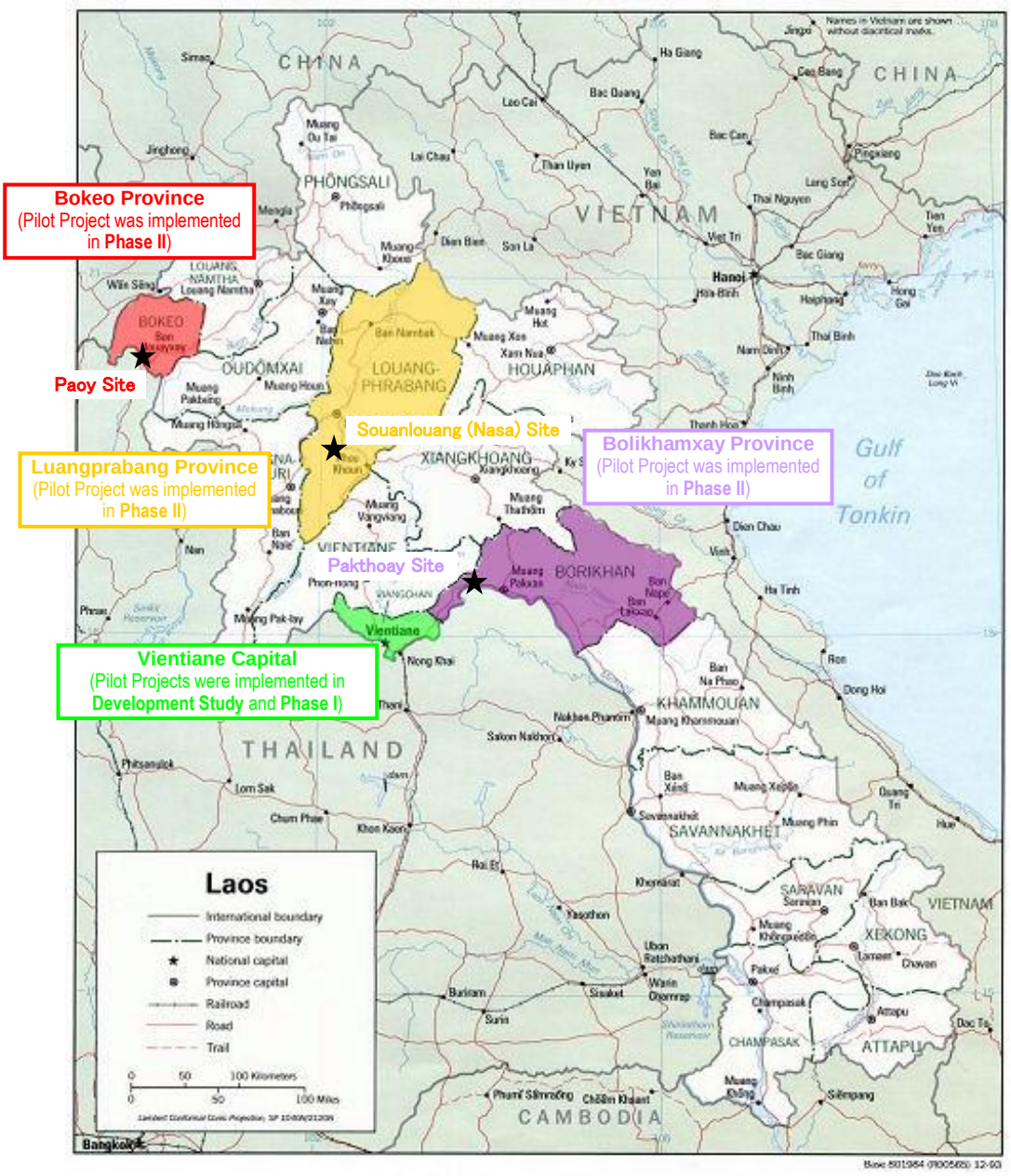
Japan International Cooperation Agency

NEWJEC

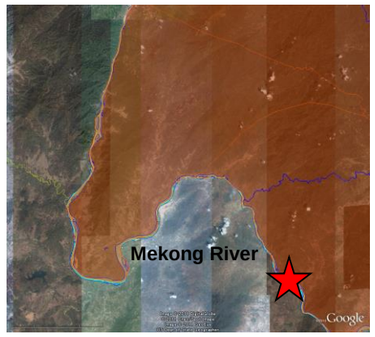
Yachiyo Engineering Co., Ltd.

GE
JR
14-162

LOCATION MAP OF PILOT PROJECT SITES



1ST PILOT PROJECT (RIVERBANK PROTECTION WORKS IN BOKEO PROVINCE)



(c)Google

Paoy Site in Bokeo Province

Before Construction (December 2010)

How to Make a Soda Mattress

During Construction (From January 2012 to May 2012)

Signboard for Public Relations (August 2014)

Just Completed (May 2012)

Monitoring & Maintenance (May 2014)

2ND PILOT PROJECT (RIVERBANK PROTECTION WORKS IN BOLIKHAMXAY PROVINCE)

(c)Google

Pakthoay Site in Bolikhamxay Province

Before Construction (May 2012)

Demonstration of Slope Protection Works (Cobble Stone with Soda Works)

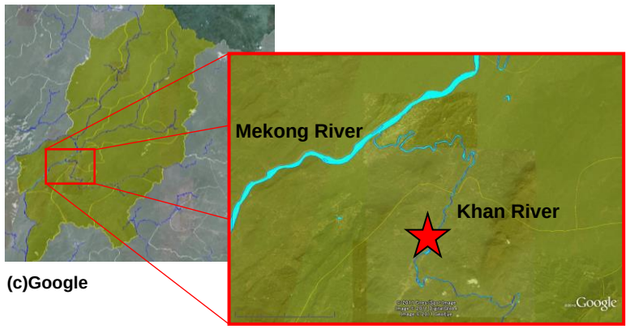
During Construction (From February 2013 to May 2013)

Signboard for Public Relations (June 2013)

Just Completed (June 2013)

Monitoring & Maintenance (May 2014)

3RD PILOT PROJECT (RIVERBANK PROTECTION WORKS IN LUANGPRABANG PROVINCE)



Souanlouang (Nasa) Site in Luangprabang Province

Before Construction (December 2010)

Signboard for Public Relations (August 2014)

During Construction (February 2014)

During Construction (From March 2014 to May 2014)

Just Completed (June 2014)

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Appendices

Annex: Technical Cooperation Output

Exchange Rate in this Report (as of August 2014)
1 US$ = 102.39 Japanese Yen
1 kip = 0.012 Japanese Yen

Abbreviation List

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
BPFCD	Bank Protection and Flood Control Division
C/P	Counterpart
CAD	Computer Aided Design
CV	Curriculum Vitae
DAC	Development Assistance Committee
DCTPC	Department of Communication, Transport, Post and Construction
DMH	Department of Meteorology and Hydrology
DoW	Department of Waterways
DoWR	Department of Water Resources
DPWT	Department of Public Works and Transport
EIA	Environmental Impact Assessment
GOJ	Government of Japan
GOL	Government of Lao P.D.R.
GPS	Global Positioning System
IC/R	Inception Report
IDI	Infrastructure Development Institute - Japan
J-SEAM	Japan-Southeast Asian Meeting for South-South Cooperation
JARCOM	JICA-ASEAN Regional Cooperation Meeting
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
M/M	Minutes of Meeting
M/P	Master Plan
MCTPC	Ministry of Communication, Transport, Post and Construction
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MONRE	Ministry of Natural Resources and Environment
MPWT	Ministry of Public Works and Transport
NUOL	National University of Laos
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OJT	On-the-Job Training
PCM	Project Cycle Management
PD	Project Director
PDCA	Plan → Do → Check → Action
PDM	Project Design Matrix
PM	Project Manager
PMO	1) Prime Minister's Office 2) Project Management Office
PO	Plan of Operation
R/D	Record of Discussion
UDAA	Urban Development Administration Authority
UPS	Uninterruptible Power Supply
WB	World Bank
WREA	Water Resources and Environment Administration

1. INTRODUCTION

1.1 Background of the Project

Lao People's Democratic Republic (hereinafter referred to as "Lao P.D.R.") faces on the Mekong River Basin which belongs to the Circum-Himalayan River Systems, and has been flourished on inland water transport with neighboring countries such as China and Thailand. On the other hand, collapse and washout of the riverine land caused by riverbank erosion has occurred along the Mekong River, about twenty meters per year of setback of riverbank at the most serious section of riverbank erosion. For its countermeasures, riverbank protection by Gabion Work has been mainly adopted in Lao P.D.R., however, it has not been satisfactorily developed due to high cost of gabion container and difficulty in procurement of materials (thick steel wire) and equipments in domestic market.

Under this situation, the first JICA expert dispatched to the Ministry of Public Works and Transport (ex-Ministry of Communications, Transport, Post and Construction) in 1990s proposed technology transfer of Japanese traditional river works which was of low cost and easy to maintain, and conducted the pilot construction of Riprap Groyne Work in Tonpheung Village, Bokeo Province.
Thereafter the Infrastructure Development Institute - Japan (hereinafter referred to as "IDI") had also studied local applicability of Japanese traditional river works such as Soda Mattress Work and others, and conducted these works on a pilot basis at Wat Sibounheuang in Vientiane Capital. As the result of these pilot implementations, the Government of Lao P.D.R. (hereinafter referred to as "GOL") requested the Government of Japan (hereinafter referred to as "GOJ") to establish a Master Plan (M/P) of riverbank erosion protection using Japanese traditional river works which can be conducted using Lao P.D.R.'s domestic resources available at low cost in Lao P.D.R. In response to the request, JICA had conducted "The Study on Mekong Riverbank Protection around Vientiane Municipality" (hereinafter referred to as "Development Study") for approximately three (3) years from November 2001.

In Development Study, low cost work methods were studied through pilot constructions at three (3) sites using Japanese traditional river works, and M/P of riverbank erosion protection in Vientiane Capital aiming to complete the plan in 2020 was established. Based on M/P, GOL requested GOJ for a technical cooperation project to improve ability to conduct and maintain riverbank protection works using traditional river works when the Development Study ended, and "The Project on Riverbank Protection Works" (hereinafter referred to as "Phase I") was carried out for approximately two (2) years from January 2005.

In Phase I, riverbank protection works were conducted using Japanese traditional river works and broutht about good steady results with cooperation of local residents of Vientiane Capital and its surrounding areas. However, as the protection work carried out in Phase I was based on the work technology and design suggested in Development Study, it seemed difficult for the Ministry of Public Works and Transport (hereinafter referred to as "MPWT") which also acts as the Central Government to deploy

independently the new project on riverbank protection works. Through the efforts of Development Study and Phase I, the Department of Waterways (hereinafter referred to as "DoW") was newly established under MPWT and currently six (6) officials are assigned for Bank Protection and Flood Control Division in DoW. However, those officials allocated for the Bank Protection and Flood Control Division do not have enough capacities to supervise local governments appropriately and to lead the dissemination of traditional riverbank protection measures. On the other hand, although the effectiveness of the riverbank protection works using traditional river works such as Soda Mattress Work is recognized by local governments, those officials do not acquire sufficient level of knowledge and technology on traditional river works and there is an issue of mastering professional techniques.

Considering above-mentioned situations, in 2009, GOL requested GOJ for a technical cooperation project aiming mainly to enhance ability of officials of DoW, MPWT and Public Works and Transport Departments of local governments to be able to disseminate and deploy the riverbank protection works using traditional river works nationwide. After GOJ accepted the request by GOL, JICA dispatched the Detailed Planning Survey Team from February to March 2010 to conduct the preliminary study for "The Project on Riverbank Protection Works Phase II" (hereinafter referred to as "Phase II"). According to the study, implementation of Phase II was evaluated as appropriate and agreed to be conducted based on the Record of Discussion (R/D) signed in July 2010.

1.2 Objective of the Project

The purpose of this Project is to enhance ability of the target group officials to conduct and maintain low-cost and environmentally-friendly riverbank protection work projects according to request from GOL. The target group consists of DoW, MPWT and Public Works and Transport Departments of local governments such as Vientiane Capital, Bokeo Province, Luangprabang Province, and Bolikhamxay Province. Officials assigned to this Project among the target group officials are referred to as "Counterpart (hereinafter referred to as "C/P") officials" for the sake of identification.

1.3 Target Area of the Project

This Project covers river basin along main stream and tributaries of the Mekong River running through the land of Lao P.D.R., specifically from upstream in Bokeo Province to Luangprabang Province, Vientiane Capital, and Bolikhamxay Province. The pilot projects were conducted in Bokeo Province, Luangprabang Province, and Bolikhamxay Province. Whereas, the monitoring of those project sites implemented in Development Study and Phase I, is conducted in Vientiane Capital.

1.4 Project Design Matrix

This Project was conducted based on R/D and Minutes of Meeting (M/M) signed on July 30, 2010. Table 1.4-1 shows Project Design Matrix (PDM) Version 0 based on M/P agreed with GOL.

The Project was revised according to PDM in May 2012. At the time of mid-term review in May 2012, PDM (Version 1) was drafted to include newly defined (in exact score) objectively verifiable indicators against the expected outputs (refer to Table 1.4-2), which was approved by the Joint Coordination Committee (JCC) Meeting held on May 24, 2012.

Table 1.4-1 Project Design Matrix (PDM) of the Project (Version 0)

Project Title: Project on Riverbank Protection Works Phase II
Target Area: Vientiane Capital, Bokeo Province, Luangprabang Province, and Bolikhamxay Province
Target Group: DoW, DPWT Vientiane Capital, DPWT Bokeo Province, DPWT Luangprabang Province, and DPWT Bolikhamxay Province
Pilot Project Provinces: Bokeo Province, Luangprabang Province, and Bolikhamxay Province

PDM Version 0

	Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal	The other provincial DPWT staff, besides the Target Group, will be able to implement low cost and environmentally friendly protection measures against riverbank erosion.	Riverbank protection works will be implemented at least one province other than the Target Group	Report on riverbank protection works	The Budget for Riverbank Protection Works are allocated properly. The organizations for Riverbank Protection Works are set up in the province other than the Target Group.
Project Purpose	The staff of the target group (hereinafter referred to as "the Staff") will be able to implement low cost and environmentally friendly protection measures against riverbank erosion.	Riverbank protection works will be implemented a total of at least three sites in the Pilot Project Provinces.	Completion report Field investigation	The counterpart personnel of the Target Group will not resign. The materials and equipments needed for the Riverbank Protection Works can be prepared stably in Lao P.D.R.
Outputs	1 Capacity of the Staff on survey and planning for riverbank protection works is improved.	1 All the C/P staff understand the survey and planning technique on the riverbank protection through OJT.	1-1 OJT Report 1-2 Survey Result 1-3 Final Test	The constructor for the pilot project will be selected based on the appropriate procedure.
	2 Capacity of the Staff on design and construction for riverbank protection works is improved.	2 All the C/P staff understand the design and construction on the riverbank protection through OJT.	2-1 OJT Report 2-2 Report from Expert 2-3 Final Test	
	3 Capacity of the Staff on monitoring, maintenance and evaluation for riverbank protection works is improved.	3 All the C/P staff understand the monitoring, evaluation and maintenance on the riverbank protection through OJT.	3-1 OJT Report 3-2 Monitoring, Maintenance and Evaluation Sheet 3-3 Monitoring Manual 3-4 Final Test	
	4 The Staff acquire the wider knowledge on river engineering that contributes to more effective and efficient riverbank protection measures.	4 All the C/P staff understand the river management and river engineering on the riverbank protection through OJT.	4-1 Training Report 4-2 Final Test	

Activities*1	1-1 Survey on riverbank erosion in the three (3) provinces of Bokeo, Luangprabang, and Bolikhamxay is conducted. 1-2 Areas which should take prevention measures for riverbank erosion are prioritized at each of the three (3) provinces in consideration of the present situation of bank erosion and hinterland. 1-3 Riverbank protection measures suitable to the characteristics of each erosion site are selected from all possible options including recent construction methods along with traditional ones. 1-4 One pilot project site of riverbank protection works in each of the three (3) provinces is selected. 1-5 Trainings and seminars on survey and planning of riverbank protection works are organized. 1-6 Manual for Survey and Planning is prepared. 2-1 Detailed survey for design of riverbank protection works at the pilot project sites is conducted. 2-2 Detailed design of riverbank protection works suitable for the pilot project sites is conducted. 2-3 Cost estimation for the riverbank protection works is conducted. 2-4 Construction works of riverbank protection at the pilot project sites are supervised. 2-5 Study and evaluation on riverbank protection works of M/P and Phase I sites in Vientiane Capital are conducted. 2-6 Trainings and seminars on design and construction are organized. 2-7 Manual for Design and Construction are prepared. 3-1 Existing monitoring manual is reviewed and revised as necessary. 3-2 Plans for monitoring, evaluation and maintenance for riverbank protection works in each pilot project sites are prepared. 3-3 Monitoring for pilot project sites are conducted. 3-4 Evaluation for the pilot project sites are conducted. 3-5 Maintenance and repair for the pilot project sites are conducted as necessary. 3-6 Trainings and seminars on monitoring, maintenance and evaluation are organized. 3-7 Manual on monitoring, maintenance and evaluation is prepared and revised. 4-1 Trainings on river engineering and river management for effective implementation of the riverbank protection works are conducted in both Lao P.D.R. and Japan.	Input <u>Japan Side</u> 1. Dispatch short-term experts from Japan (6 persons) 2. Provision of machinery and equipment 3. Training of Lao personnel in Japan 4. Budget for construction at pilot sites <u>Lao Side</u> 1. Counterpart Personnel 1) MPWT 2) DPWT 2. Facility 1) Permanent office space 2) Space for accommodating the construction material, vehicle, and equipment 3) Other facilities mutually agreed as necessary 3. Budget for construction at pilot sites	The organization for the Riverbank Protection Works will be set up in the Target Group.

*1: All the activities are conducted On the Job Training (OJT) basis.

Table 1.4-2 Project Design Matrix (PDM) of the Project (Version 1)

Project Title: Project on Riverbank Protection Works Phase II
Target Area: Vientiane Capital, Bokeo Province, Luangprabang Province, and Bolikhamxay Province
Target Group: DoW, DPWT Vientiane Capital, DPWT Bokeo Province, DPWT Luangprabang Province, and DPWT Bolikhamxay Province
Pilot Project Provinces: Bokeo Province, Luangprabang Province, and Bolikhamxay Province

PDM Version 1

	Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal	The other provincial DPWT staff, besides the Target Group, will be able to implement low cost and environmentally friendly protection measures against riverbank erosion.	Riverbank protection works will be implemented at least one province other than the Target Group	Report on riverbank protection works	The Budget for Riverbank Protection Works are allocated properly. The organizations for Riverbank Protection Works are set up in the province other than the Target Group.
Project Purpose	The staff of the target group (hereinafter referred to as “the Staff”) will be able to implement low cost and environmentally friendly protection measures against riverbank erosion.	Riverbank protection works will be implemented a total of at least three sites in the Pilot Project Provinces.	Completion report Field investigation	The counterpart personnel of the Target Group will not resign. The materials and equipments needed for the Riverbank Protection Works can be prepared stably in Lao P.D.R.
Outputs	1 Capacity of the Staff on survey and planning for riverbank protection works is improved.	1 All the C/P staff scores 75 points when the Japanese experts evaluate abilities related to the survey and planning technique on the riverbank protection through OJT.	1-1 OJT Report 1-2 Survey Result 1-3 Final Test	The constructor for the pilot project will be selected based on the appropriate procedure.
	2 Capacity of the Staff on design and construction for riverbank protection works is improved.	2 All the C/P staff scores 75 points when the Japanese experts evaluate abilities related to the design and construction on the riverbank protection through OJT.	2-1 OJT Report 2-2 Report from Expert 2-3 Final Test	
	3 Capacity of the Staff on monitoring, maintenance and evaluation for riverbank protection works is improved.	3 All the C/P staff scores 75 points when the Japanese experts evaluate abilities related to the monitoring, evaluation and maintenance on the riverbank protection through OJT.	3-1 OJT Report 3-2 Monitoring, Maintenance and Evaluation Sheet 3-3 Monitoring Manual 3-4 Final Test	
	4 The Staff acquire the wider knowledge on river engineering that contributes to more effective and efficient riverbank protection measures.	4 All the C/P staff scores 75 points when the Japanese experts evaluate abilities related to the river management and river engineering on the riverbank protection through OJT. NOTE: Evaluation of the ability improvement of the C/P will be made based on an evaluation criteria which is prepared after the Project started. The evaluation criteria is decided as "Evaluation Criteria for Level of Understanding" ・ 50 points indicates the capacity level of fair (requires some guidance from Japanese expert(s). ・ 75 points indicates the capacity level of self-sufficiency as relatively high. ・ 100 points means the capacity level of excellent.	4-1 Training Report 4-2 Final Test	

Activities[*1]	1-1 Survey on riverbank erosion in the three (3) provinces of Bokeo, Luangprabang, and Bolikhamxay is conducted. 1-2 Areas which should take prevention measures for riverbank erosion are prioritized at each of the three (3) provinces in consideration of the present situation of bank erosion and hinterland. 1-3 Riverbank protection measures suitable to the characteristics of each erosion site are selected from all possible options including recent construction methods along with traditional ones. 1-4 One pilot project site of riverbank protection works in each of the three (3) provinces is selected. 1-5 Trainings and seminars on survey and planning of riverbank protection works are organized. 1-6 Manual for Survey and Planning is prepared. 2-1 Detailed survey for design of riverbank protection works at the pilot project sites is conducted. 2-2 Detailed design of riverbank protection works suitable for the pilot project sites is conducted. 2-3 Cost estimation for the riverbank protection works is conducted. 2-4 Construction works of riverbank protection at the pilot project sites are supervised. 2-5 Study and evaluation on riverbank protection works of M/P and Phase I sites in Vientiane Capital are conducted. 2-6 Trainings and seminars on design and construction are organized. 2-7 Manual for Design and Construction are prepared. 3-1 Existing monitoring manual is reviewed and revised as necessary. 3-2 Plans for monitoring, evaluation and maintenance for riverbank protection works in each pilot project sites are prepared. 3-3 Monitoring for pilot project sites are conducted. 3-4 Evaluation for the pilot project sites are conducted. 3-5 Maintenance and repair for the pilot project sites are conducted as necessary. 3-6 Trainings and seminars on monitoring, maintenance and evaluation are organized. 3-7 Manual on monitoring, maintenance and evaluation is prepared and revised. 4-1 Trainings on river engineering and river management for effective implementation of the riverbank protection works are conducted in both Lao P.D.R. and Japan.	Input <u>Japan Side</u> 1. Dispatch short-term experts from Japan (6 persons) 2. Provision of machinery and equipment 3. Training of Lao personnel in Japan 4. Budget for construction at pilot sites <u>Lao Side</u> 1. Counterpart Personnel 1) MPWT 2) DPWT 2. Facility 1) Permanent office space 2) Space for accommodating the construction material, vehicle, and equipment 3) Other facilities mutually agreed as necessary 3. Budget for construction at pilot sites	The organization for the Riverbank Protection Works will be set up in the Target Group.

*1: All the activities are conducted On the Job Training (OJT) basis.

1.5 Recognition of Critical Issues

Generally, Phase I could reach its goal and prove good results under the technical support and monitoring support based on Vientiane M/P as well as cooperation of local residents of Vientiane Capital and areas around it. The following issues, however, were found at the end of Phase I.

(a) Technical level to be improved

Through protection works in Sibounheuang-Muang Wa bank for 3 years without budget support, C/P has reached the technical level to conduct protection works using the work methods designated by M/P on their own. However, as the protection works are based on the work methods selected mainly by Japanese experts in the process of Development Study, C/P has not reached the level to select riverbank protection work method according to the river condition on their own. Also C/P seems to acquire further experiences to conduct protection works in various river conditions on their own.

(b) Training of young engineers

Due to shortages of human resources in Department of Roads of MCTPC, Riverbank Protection Unit as C/P has only three officials. Though the Unit got another two officials from Department of Communications, Transport, Posts and Construction (DCTPC) of Vientiane Capital, they were temporary officials only during Phase I. Thus, the number of officials for riverbank protection works is still small. To find and train young engineers as successor in Lao P.D.R. is a critical issue from the viewpoint of sustainability.

(c) Capacity enhancement of Bank Protection and Flood Control Division (former Riverbank Protection Unit), Department of Waterways, Ministry of Public Works and Transport

Based on the recommendation proposed in the Development Study, October 2007 after Phase I ended, Inland Waterway Management Section was promoted to Department of Waterways (DoW), and its lower organization, Riverbank Protection Unit became Bank Protection and Flood Control Division (BPFCD). Despite the fact that their job scope expands to include flood countermeasure, river planning, disaster crisis management planning in addition to riverbank protection works, the number of officials in the Division is small. Thus, further enhancement of organization and improvement of capacity are required.

(d) Dissemination and deployment of riverbank protection technique in rural areas and capacity enhancement of Public Works and Transport Departments of provinces

It is considered that certain level of dissemination of riverbank protection technique in Vientiane Capital has been developed through Development Study and Phase I. Meanwhile, though concept of riverbank protection technique using soda mattress work, etc. has been recognized in rural areas through workshops, etc. during Phase I, the real dissemination (= implementation) has not been achieved. Rural areas also need to learn the technique of proper riverbank protection works and to

actually implement the protection work. In order to do so, enhancement of organization and improvement of capacity in Public Works and Transport Department of each province are required.

Based on the above issues as results of Phase I and results of the preliminary survey for detailed planning of this project conducted in February and March 2010, it is considered the following three critical issues are the substances in order to conduct riverbank protection work project in Lao P.D.R.

1) Sustainability of riverbank protection work project is not sufficient.
2) Capacity of Bank Protection and Flood Control Division, Department of Waterways, Ministry of Public Works and Transport is not enough to carry out what they are required.
3) It is concerned that implementation of riverbank protection works like symptomatic therapy approach will cause adverse effect on both upstream and downstream as well as the other side of the river.

Figure 1.5-1 shows various factors and underlying causes of these critical issues.

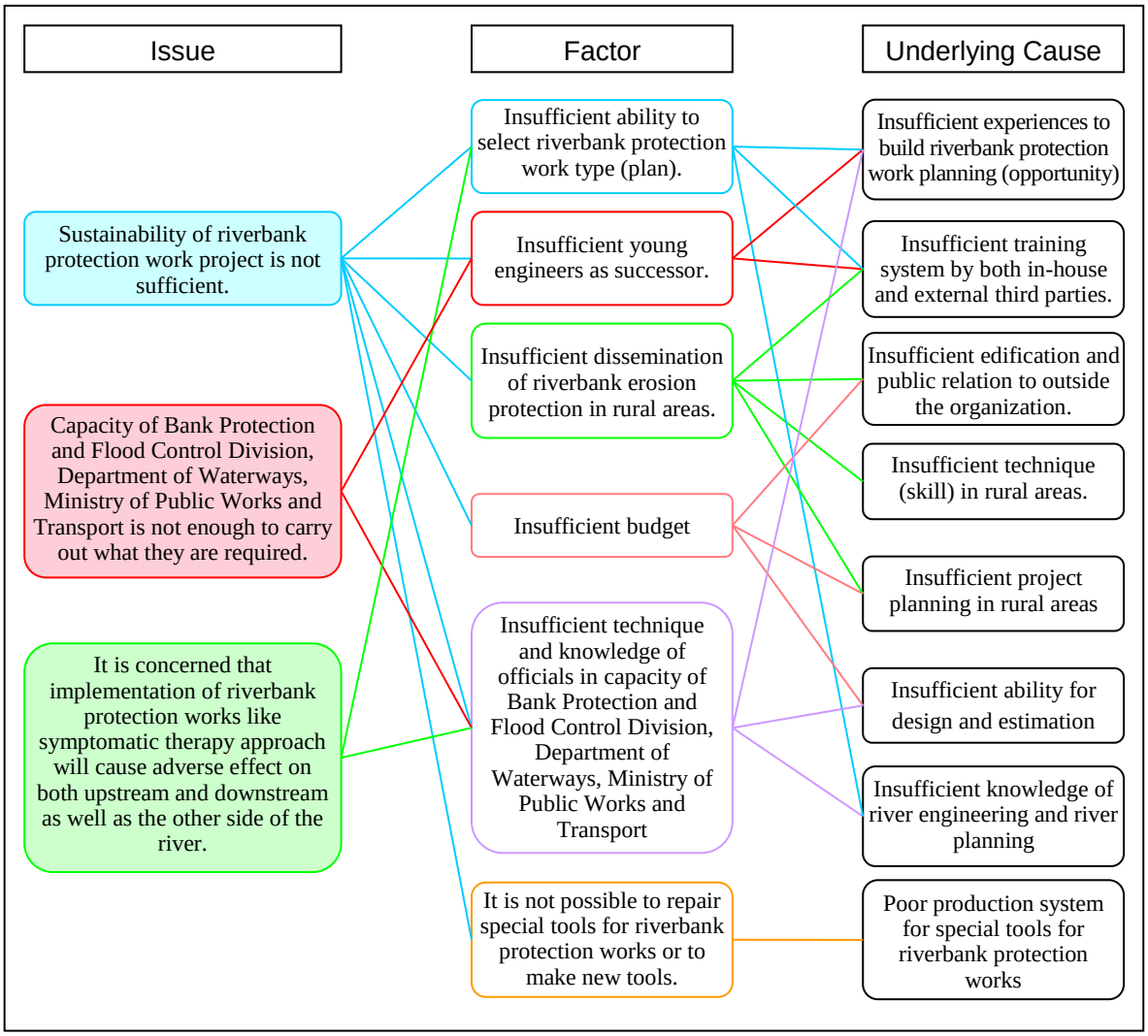


Fig. 1.5-1 Critical Issues and Their Factors

1.6 Basic Policies of Project Implementation

The basic policies of this project are provided as follows to address the above-mentioned issues and factors.

- Improve (spiral up) ability of C/P officials by conducting three pilot projects using PDCA cycle*.
- Introduce ability evaluation of C/P officials through observing their performance with dispatched experts in process of "survey and planning", "design and estimation", "construction", and "monitoring, evaluation, maintenance" for riverbank protection works, and through measuring their level of understanding by making them explain their experiences as instructor of workshop.
- Perform operational management such as schedule management and budget management setting pilot project progress, time when manual and the like are developed, and time when various workshops are held as milestone.

* A method to improve management process such as production control or quality control. Business activity is continuously improved by repeating four steps: Plan → Do → Check → Action.

Table 1.6-1 Basic Policies of Project Implementation

Underlying cause of critical issues	Basic policy of this project	Countermeasure
Insufficient experiences (opportunities) to build riverbank protection work planning.	• Improve (spiral up) ability of C/P officials by conducting three pilot projects using PDCA cycle. • Introduce ability evaluation of C/P officials through observing their performance with dispatched experts in process of "survey and planning", "design and estimation", "construction", and "monitoring, evaluation, maintenance" for riverbank protection works, and through measuring their level of understanding by making them explain their experiences as instructor of workshop. • Perform operational management such as schedule management and budget management setting pilot project progress, time when manual and the like are developed, and time when various workshops are held as milestone.	Increase experiences (opportunities) to build riverbank protection work planning.
Insufficient technique (skill) in rural areas.		Increase construction opportunity in rural areas.
Insufficient ability for design and estimation.		Establish methods for design and estimation and teach them.
Insufficient knowledge of river engineering and river planning		Teach river engineering and river planning.
Insufficient training system by both in-house and external third parties.		Train instructors and establish/enhance workshop and training system.
Insufficient edification and public relation to outside the organization.		Enhance edification and public relation.
Insufficient construction planning in rural areas		Implement construction planning in rural area.
Poor production system for special tools for riverbank protection works.		Establish on-site production and maintenance system for special tools.

1.6.1 Basic Policy on Selection of Riverbank Protection Works

Select two or more work methods from traditional or modern river works. Compare those works according to evaluation points such as applicability, construction cost, effectiveness, environmental load, then select low-cost and eco-friendly riverbank protection work for each pilot project site. There are some large scale works in Japanese traditional river work such as ring levee, secondary levee, open levee, river channel migration. Implementation of those large scale works should be considered in framework of integrated development policy for the entire Mekong River basin, which requires discussion with each country facing Mekong River basin such as Thailand. This project does not include the large scale works since they cannot be ensured to be implemented within the project term. The works this project compares should be "bank protection" or "Groyne" which are designed so that the effect on the other side of river become minimum and highly likely to be conducted by Lao P.D.R. on their own. Table 1.6.2 shows typical traditional "bank protections" and "Groyne" and their classification by their functions and structures.

Table 1.6-2 Function and Structure of Traditional River Work Methods

Work Method	Functional Classification	Description of Function	Structural Classification	Description of Structure
Bank Protection	Slope protection work	Protect river bank slope from erosion by flowing water and direct shock by driftwoods, etc.	Sodding work	Sod lawn to slope to protect slope.
			Haguchi work	Cover bank slope with straw, soda (rough bundle of brushwood), cobbled stones, straw bag, etc. to protect bank slope (haguchi) and "earth dike" parts exposed to running water.
			Hurdle work	Make hurdles in a reticular pattern using soda, cover slope by paving inside of reticular pattern with soil and gravel for protection.
			Basket work	Make baskets and fill the baskets with cobbled stones, macadam, and gravel, then cover slope with the baskets for protection.
			Stone work	Mainly apply to levee or bank with slope of 10 to 30%. Cover entire surface of deversoir and the like with stone work. Stone work is conducted either by mounding or paving stones (generally, the phrase "paving stones" is used when slope is flatter than 1:1).
	Toe protection work	Support slope protection work considering flooding water.	Foundation work	Build foundation at the lower end of the slope to support the slope.
			Hurdle work	Build hurdle at the lower end of the slope and fill the back side with soil and stones to support the slope.
			Crib work	Drive backup piles to prevent piles of hurdle from tilting and form frames by connecting each other with wood, wire, etc. for reinforcement.
	Foot protection work	Make rivetment work more solid considering riverbed evolution, etc. such as local riverbed scouring.	Riprap work, Rubble-draw work	Protect toe protection work from riverbed evolution such as local riverbed scouring by placing big rubble and cobble stones in front of revetment (Riprap work) or by drawing only big cobbled stones to riverbank (Rubble-draw work). They are easy-to-implement works and highly effective.
			Mattress work	Insert stones into soda, etc. and sink them in water to protect revetment work from riverbed evolution such as local riverbed scouring. Mattress work also serves as foundation of groyne works.
Groyne	Groyne work	Groyne work serves as roughness element against water flow and slows flow velocity to protect riverbank from erosion. Or they directly obstruct water flow and change direction of water flow to protect riverbank.	Skeleton work	Skeleton work is permeable groyne, which is mountain-ridge-shaped wooden frame weighted by gabions so that it does not turn over. Skeleton work is used in riverbed consisting of sand gravel since it is difficult to drive piles into sand gravel. It is said that the origin of this frame is ledge used to dry sheaves. Various frames have been developed depending on river characteristics.
			Crib work	Crib work is non-permeable groyne, which is wooden frame weighted by cobbled stones. Crib work is also used in riverbed consisting of sand gravel as skeleton work is.
			Various dike works	Dike extends to the center of the river. There are many methods of works using pebble, soil, pile, etc.

Source: "*Kasen Dento Kogei Donyu-no Kangaekata* (How to approach implementation of traditional river work)", *Kasen Kankyo Sogo Kenkyusho* Report, No. 10, 2004

1.6.2 Basic Policies on Ability Evaluation of C/P Officials

(1) Abilities required to implement riverbank erosion protection

It is considered that abilities required to implement riverbank protection works are basic knowledge such as hydrology, hydraulics, river engineering and practical abilities applying the knowledge to various process such as survey, planning, design, construction, maintenance and management when riverbank protection work is actually conducted.

C/P officials of Ministry of Public Works and Transport and C/P officials of Public Works and Trasnport Department in each province have different roles. C/P officials of Ministry of Public Works and Transport are required to promote riverbank protection work in nationwide scale while C/P officials of Public Works and Trasnport Department in each province are required to promote riverbank protection work in a specific region. Thus, C/P officials of Ministry of Public Works and Transport need abilities for survey, planning, outline design as well as abilities for securing budget, coordinating among the interests

of stakeholders, etc., while C/P officials of Public Works and Trasnport Department in each province are supposed to need abilities for specific design, estimation, instruction of construction method, supervising, maintenance after construction work, etc.

The detailed description of the above required abilities is as follows.

1) C/P officials of Ministry of Public Works and Transport

a) Basic knowledge such as hydrology, hydraulics, river engineering

The following wide range of knowledge regarding riverbank protection such as river engineering is required in order to promote riverbank protection work project while instructing C/P officials of Public Work Department in each province.

- Hydrology characteristics, hydraulic characteristics, and river channel characteristics of the subject river
- Methods and functions of riverbank protection works such as groyne and bank protection
- Method to apply required basic hydraulics to design in riverbank protection work
- How to approach river management and how to manage river focusing on riverbank protection work project.

b) On-site practical abilities

Fully understand objectives, need, and planning method of survey on river channel characteristics for riverbank protection and teach them to C/P officials of Public Work Department in each province accurately. Learn abilities to evaluate the given results of study and advise for improvement.

The following are items of river channel characteristic which officials are required to be able to survey and analyze.

- Geological condition, soil property of riverbed
- Condition of external force such as water level, flow velocity (it is required to acquire information on plain view/vertical section view/cross section view of river channel, grain size distribution of riverbed meterial, riverbed evolution, etc.)
- Riverbank erosion mechanism
- The current and possible future erosion area
- Usage conditions of land along the river
- Relation between the river and local residents
- Aesthetic (Landscape)

The following are items of planning which officials are required to be able to review.

- Consideration on priority of riverbank erosion protection and selection of protection work site
- Comparison, examination and selection of work methods

- Determination of specification and scope of protection work method

2) C/P officials of Public Works and Transport Department in each province

C/P officials of Public Works and Transport Department in each province also need basic engineering knowledge as C/P officials of Ministry of Public Works and Transport do. Practical abilities they need are ability to fully understand purpose, necessity, and planning method of survey on river channel characteristics for riverbank protection, ability to perform comparison of work methods, study, specific design, estimation, measurement, monitoring and maintenance after construction, and ability to report the progress/results and make proposals to Ministry of Public Works and Transport. The following are items to be required at the moment.

a) Design

- Comparison and selection of work methods (construction cost, availability of materials, difficulty of implementation, etc.)
- Detailed design (as-needed design calculation: diameter of riprap stone, stability check of slope, embedded length of piles, etc.)
- Drawing (based on topographical survey, create drawings of structures using CAD tools)

b) Measurement

- Topographical survey (to create land-based river cross-section drawing)
- Bathymetry (to create undersurface river cross-section drawing)
- Survey of materials in riverbed (to know approximate averaged diameter of materials in riverbed)

c) Monitoring

- Understanding of monitoring need (as supplementary measures for low-cost bank protection)
- Periodic photo shoot from same point at same time (e.g., once a month in dry season, two or three times a month in rainy season, once a week when water level is not normal)
- Further investigation in unusual situation (Photo shoot, measurement, sketch, documentation, etc.)

d) Maintenance

- Planning and implementation of emergency measure for river structures (riverbank protection work) having abnormal conditions
- Implementation of restoration plan, survey, design, and construction work for river structures

(2) Specific policies based on critical issues

There are the following five specific policies to realize the above-mentioned critical issues and countermeasures as Fig. 1.6-1 shows.

- Ability improvement of survey, planning, design, construction, and maintenance through the pilot projects in three provinces
- Ability improvement through developing and updating manuals and the like
- Organizational ability improvement through training instructors and establishing training system
- Evaluation of level of understanding through survey and planning activities and manual development and through performance as instructor
- Survey, planning, edification and public relation by C/P in provinces other than the target group

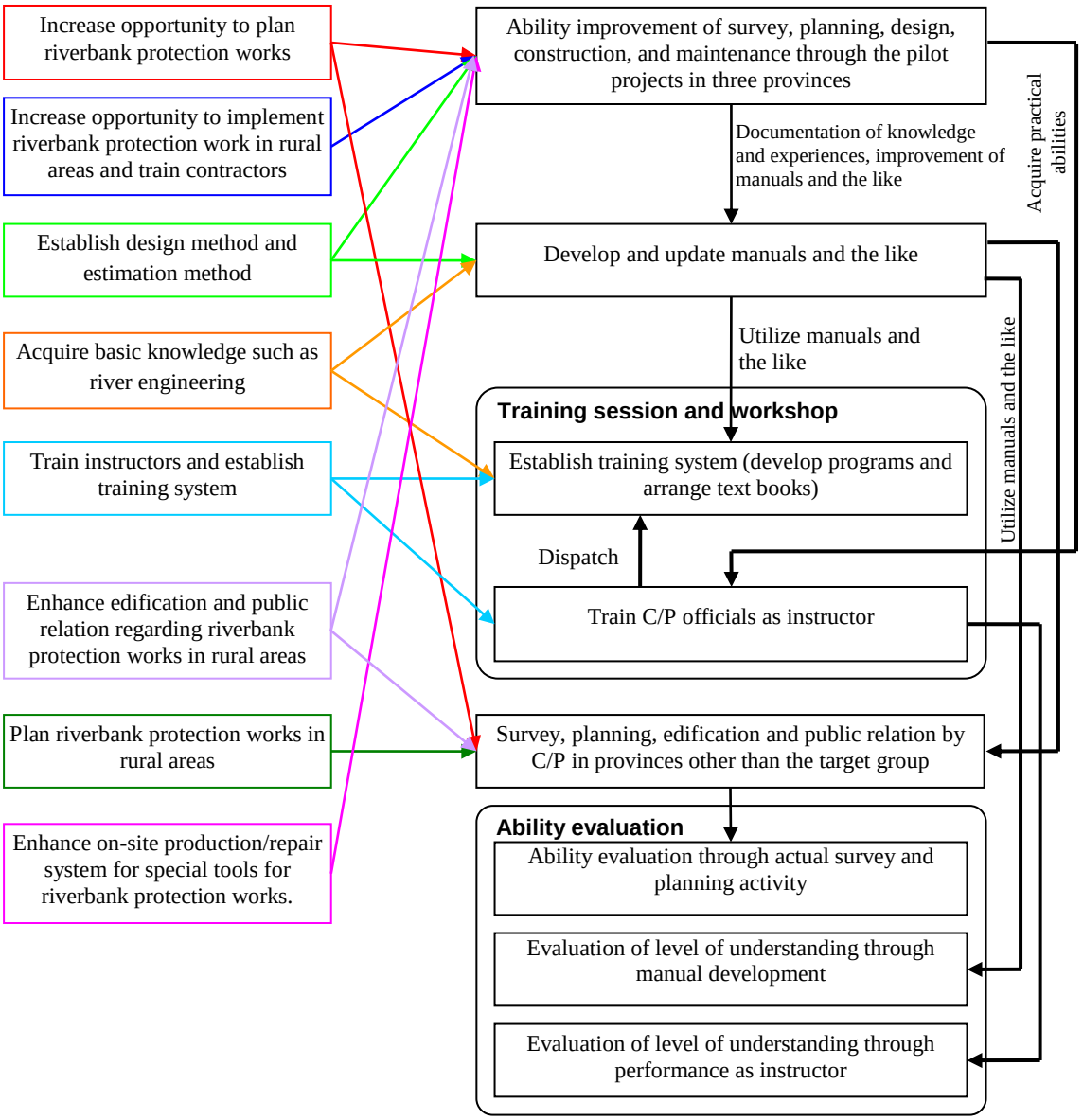


Fig. 1.6-1 Specific Policies to Realize Critical Issues and Countermeasures

The detailed description of those policies is as follows.

1) Ability improvement of survey, planning, design, construction, and maintenance through the pilot projects in three provinces

Improve (spiral up) C/P official's ability in survey, planning, design, construction, and maintenance by conducting pilot projects in three provinces using PDCA cycle.

In the step of "PLAN", list abilities required for riverbank protection derived from experiences of the past Development Study and Phase I and review instruction method for actual construction work. In the step of "DO", instruct methods of survey, planning, design, construction, and maintenance using manuals and the like. According to OJT principle, JICA experts do the job as instructor first and explain methods and approach to C/P based on actual cases. In the step of "CHECK", C/P do the job on their own, know what they do not understand, and deliberate why they do not understand. Finally, in the step of "ACTION", improve manuals and the like based on reasons they do not understand.

By the C/P's practices in actual job by themselves through the pilot projects, this firsthand experience makes it possible for C/P to explain their job in training session or workshop based on their own experiences.

2) Ability improvement through developing and updating manuals and the like

Four kinds of manuals are planned to be developed and updated: survey and planning manual, design/cost estimation/construction manual, monitoring/evaluation/maintenance manual and maintenance manual on survey equipment. Those manuals should include knowledge and regional characteristics which C/P officials recognized through the pilot projects in three provinces as well as basic knowledge such as river engineering through JICA expert's instruction.

Translating these manuals into Lao language is also conducted because of low English literacy rate in Lao P.D.R. The manuals in Lao language are expected to produce various effects after translation. For example, C/P can use the translated manuals for edification activity to officials of the province where C/P promote riverbank protection work project, and also can use the manuals for public relation with powerful local figures and the related parties.

3) Organizational ability improvement through training instructors and establishing training system

Enhance to develop and update programs and manuals and the like (as textbook) for training session and workshop in this project. In particular, by training C/P officials of Ministry of Public Works and Transport as instructor so that they can explain riverbank protection as a whole including survey planning, design, construction and maintenance, establish a system so as to enable Lao P.D.R. to continuously hold training session and workshop on their own even after the projects is completed.

4) Evaluation of level of understanding through survey and planning activity and manual development and Evaluation of level of understanding through performance as instructor

In evaluation of ability regarding riverbank erosion protection, it is possible to evaluate basic knowledge such as river engineering with written examination, while it is difficult to evaluate practical abilities regarding actual survey, planning, design, construction and maintenance with written examination.

Thus, possible way to evaluate C/P official's level of understanding is to observe their performance without help in survey, planning, design, construction and maintenance, or to make them serve as instructor in training session or workshop and examine how well they perform instruction and answer for questions, etc.

5) Survey/planning activities and edification/public relation by C/P in provinces other than the target group

Aim to create a framework where officials of Bank Protection and Flood Control Division, Department of Waterways, Ministry of Public Works and Transport serve as technical contact regarding riverbank protection in entire Lao P.D.R., while officials of Waterways Administration Unit in Bokeo Province, Bolikhamxay Province, and Luangprabang Province serve as local core technical contact regarding riverbank protection in neighboring provinces.

In order to do so, it is desirable that officials of Waterways Administration Unit of the above-mentioned provinces should understand the condition of bank erosion in neighboring provinces based on knowledge and experiences through this Project and should provide opportunity to discuss protection methods. Specifically, in the second year and the third year, officials of provinces play the main role to conduct field survey to confirm validity of riverbank protection work in the pilot project site selected in the first year, and to conduct field survey regarding condition of bank erosion in neighboring provinces.

It is proposed that the above-mentioned items are performed as a part of Activity 1-3) in PDM of this Project (See Table 1.4-1 and Table 1.4-2) in terms of "riverbank protection measures suitable to the characteristics of each erosion site are selected from all possible options including recent construction methods along with traditional ones."

1.7 Implementation of Project Activities

1.7.1 Yearly Action Plan

This Project is composed of the following four (4) components. Fig. 1.7-1 shows the framework of overall project.

I. Support to improve ability through the pilot projects in three provinces.
II. Support to improve ability through developing and updating manuals and the like.
III. Support to improve organizational ability through training instructors and establishing training system by providing trainings and workshops.
IV. Ability evaluation and instruction based on evaluation criteria according to level of understanding.

Integrated adjustment should be made so that knowledge, applicability and evaluation acquired step by step mainly from the pilot projects could be reflected with each other.

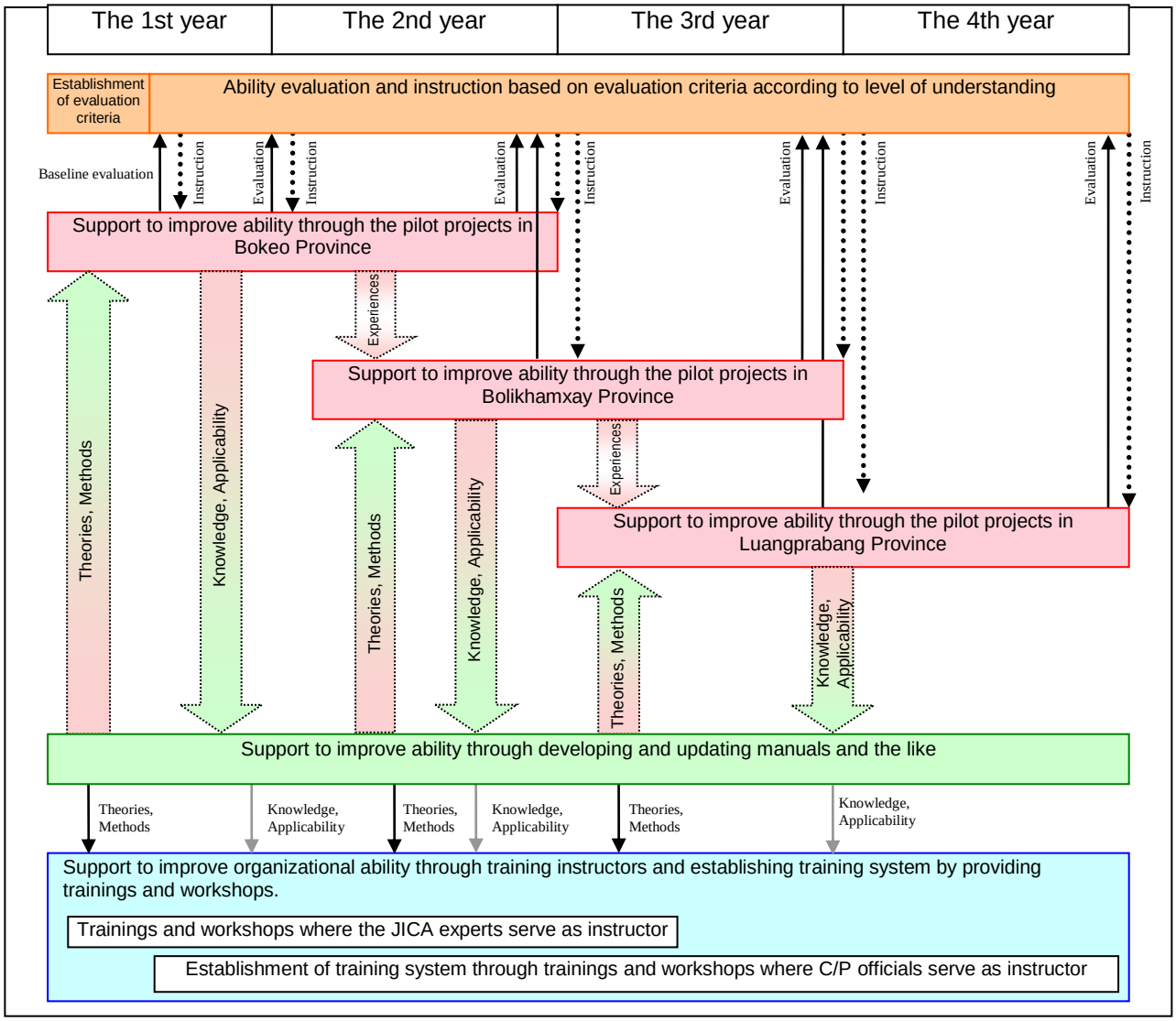


Fig. 1.7-1 Framework of Overall Project

Workflow of the Project is shown in Fig. 1.7-2. At the start of the second year, period between the second year and the third year was changed from the end of March 2012 to the end of September 2012. Also one (1) sub-activity was added in the third year and fourth year, respectively. As the result, number of sub-activities through the Project was increased from 64 mentioned in Inception Report (IC/R) to 68.

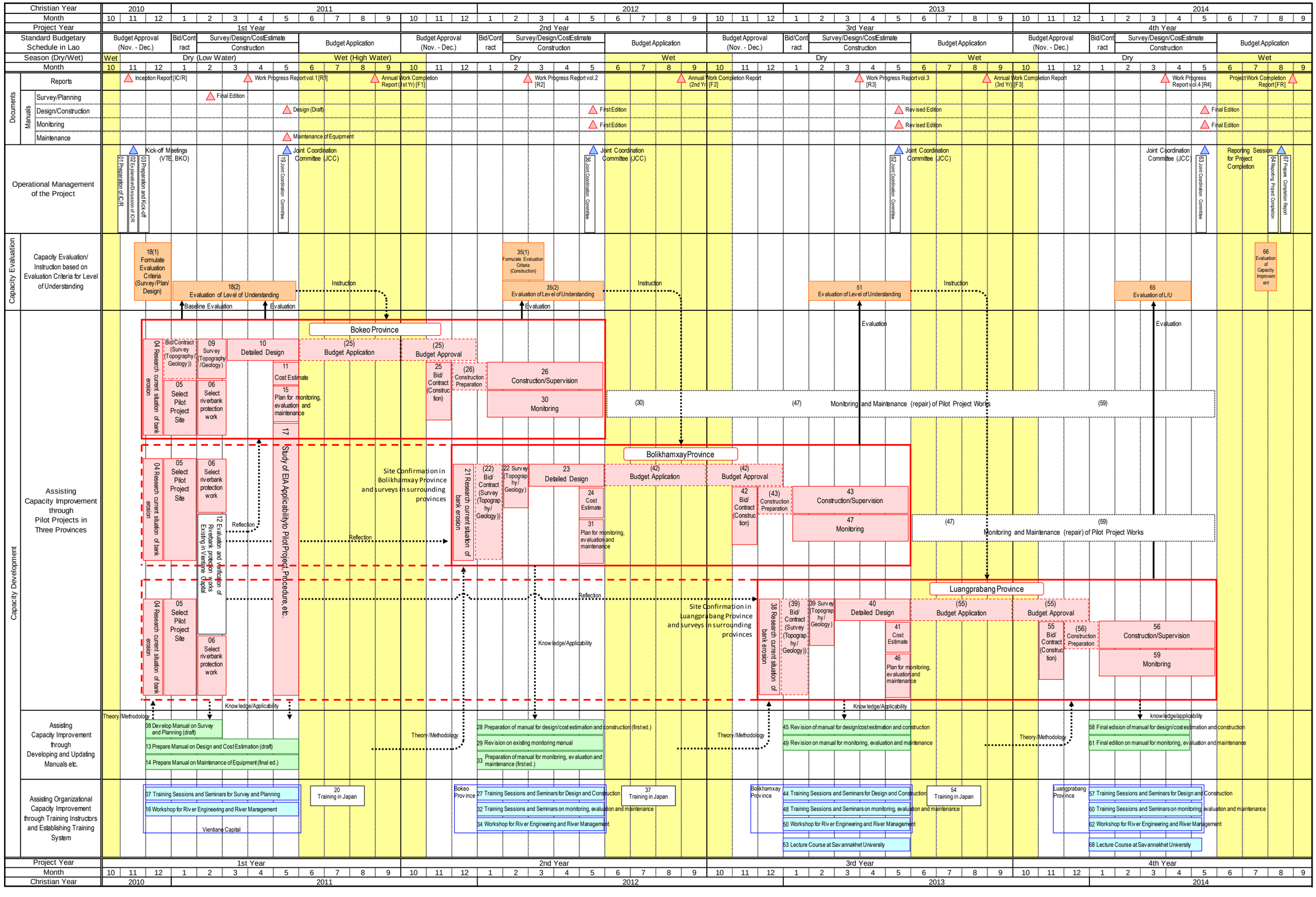


Fig. 1.7-2 Work Flow of the Project

1.7.2 Implemented Sub-activities

Project Design Matrix (PDM) agreed with Lao side consists of four (4) outputs and 21 activities to achieve the project purpose (refer to Table 1.4-1 and Table 1.4-2). For the sake of convenience, some activities continuing over years are segmentalized by each year and total of 68 sub-activities is listed in Fig. 1.7-2.

From November 2010 to August 2014, total of 20 sub-activities from [01] to [20] was implemented as the first year activities, total of 17 sub-activities from [21] to [37] was implemented as the second year activities, total of 17 sub-activities from [38] to [54] was implemented as the third year activities and total of 14 sub-activities from [55] to [68] was implemented as the fourth year activities as shown below.

Preliminary work in Japan [1st Year]

[01] Gather information and prepare inception report (IC/R)

Work in Lao P.D.R. [1st Year]

[02] Explanation and discussion of IC/R
[03] Preparation to launch the projects and holding kick-off meeting
[04] Surveying the current situation of river bank erosion in Bokeo Province, Luangprabang Province, and Bolikhamxay Province
[05] Selecting one pilot project site in each province
[06] Selecting low-cost and environmental-friendly riverbank protection work to be applied to each site
[07] Holding training sessions and seminars regarding survey and planning of riverbank protection work
[08] Developing manual regarding survey and planning of riverbank protection work
[09] Implementing survey needed for executing the riverbank protection work in Bokeo Province
[10] Executing the design of the riverbank protection work selected in Bokeo Province
[11] Determining cross-section and range of construction work so that whole construction work remains within the project budget for Bokeo Province
[12] Implementing evaluation and verification of riverbank protection works conducted in Development Study and Phase I in Vientiane Capital
[13] Preparing draft manual on design and cost estimation
[14] Developing manual on maintenance of equipment required for survey
[15] Establishing a plan for monitoring, evaluation and maintenance of the pilot project work in Bokeo Province
[16] Holding training and workshop regarding river engineering and river management
[17] Surveying whether or not environmental impact assessment to be applied to the pilot project, application procedure for the project, etc.
[18] Establishing "evaluation criteria for level of understanding" to measure level of C/P's understanding and evaluating level of C/P official's understanding
[19] Holding Project Joint Coordination Committee (JCC)

Work in Japan [1st Year]

[20] Implementing training in Japan

Work in Lao P.D.R. [2nd Year]

[21] Survey on the state of riverbank erosion implemented by the C/P officials
[22] Implementing survey needed for executing the riverbank protection work in Bolikhamxay Province
[23] Executing the design of the riverbank protection work selected for Bolikhamxay Province
[24] Determining the executional cross-section and the range of work within the project budget of Bolikhamxay Province
[25] Determining the construction contractor who participates in the pilot project work in Bokeo Province based on an appropriate method
[26] Administering/supervising the contractor for completing the pilot project work in Bokeo Province

[27] Holding training sessions and seminars in Bokeo Province for the design and construction of riverbank protection work

[28] Preparation of manual (first edition) for design/cost estimation and construction

[29] Revision on existing monitoring manual as needed

[30] Executing monitoring and maintenance together with repair as necessary on the pilot project work in Bokeo Province

[31] Preparation of plan for monitoring, evaluation and maintenance of the pilot project work in Bolikhamxay Province

[32] Holding training sessions and seminars in Bokeo Province on monitoring, evaluation and maintenance

[33] Preparation of manual (first edition) for monitoring, evaluation and maintenance

[34] Holding training sessions and seminars on river engineering and river management

[35] Evaluating comprehension level of C/P officials

[36] Holding Project Joint Coordination Committee (JCC)

Work in Japan [2nd Year]

[37] Implementing training in Japan

Work in Lao P.D.R. [3rd Year]

[38] Survey on the state of riverbank erosion implemented by the C/P officials

[39] Implementing survey needed for executing the riverbank protection work in Luangprabang Province

[40] Executing the designs for the riverbank protection work selected for Luangprabang Province

[41] Determining the executional cross-section and the range of work within the project budget of Luangprabang Province

[42] Determining the construction contractor who participates in the pilot project work in Bolikhamxay Province based on an appropriate method

[43] Administering/supervising the contractor for completing the pilot project work in Bolikhamxay Province

[44] Holding training sessions and seminars in Bolikhamxay Province for the design and execution of riverbank protection work

[45] Revision of manual for design/cost estimation and construction

[46] Preparation of plan for monitoring, evaluation and maintenance of the pilot project work in Luangprabang Province

[47] Executing monitoring and maintenance together with repair as necessary on the pilot project works in Bokeo Province and Bolikhamxay Province

[48] Holding training sessions and seminars in Bolikhamxay Province on monitoring, evaluation and maintenance

[49] Preparation of revised manual for monitoring, evaluation and maintenance

[50] Holding training sessions and seminars on river engineering and river management

[51] Evaluating comprehension level of C/P officials

[52] Holding Project Joint Coordination Committee (JCC)

[53] Lecture Course at Savannakhet University

Work in Japan [3rd Year]

[54] Implementing training in Japan

Work in Lao P.D.R. [4th Year]

[55] Determining the construction contractor who participates in the pilot project work in Luangprabang Province based on an appropriate method

[56] Administering/supervising the contractor for completing the pilot project work in Luangprabang Province

[57] Holding training sessions and seminars in Luangprabang Province for the design and construction of riverbank protection work

[58] Preparation of manual (final edition) for design/cost estimation and construction

[59] Executing monitoring and maintenance together with repair as necessary on the pilot project works in Bokeo Province, Bolikhamxay Province and Luangprabang Province

[60] Holding training sessions and seminars in Luangprabang Province for monitoring, evaluation and maintenance

[61] Preparation of manual (final edition) for monitoring, evaluation and maintenance

[62] Holding training sessions and seminars on river engineering and river management

[63] Holding Project Joint Coordination Committee (JCC)

[64] Holding reporting session for the project completion

[65] Evaluating comprehension level of C/P officials

[66] Assessment of competence level advancement of the C/P officials for riverbank protection works

[67] Preparation of project work completion report

[68] Lecture Course at Savannakhet University

2. OPERATION OF THE PROJECT

2.1 Actual Operation

Table 2.1-1 shows Plan of Operation (PO) Version 0 when R/D and M/M were signed on July 30, 2010. Table 2.1-2 shows revised PO (Version 1) when mid-term review mission was conducted in May 2012.

Table 2.1-3 shows actual operation based on PO Version 1 as of the end of May 2014 when terminal evaluation mission was conducted.

Table 2.1-1 Plan of Operation (PO) of the Project (Version 0)

Plan of Operation version 0 — Original (July 2010)

	Year	2010				2011												2012												2013												2014							
	Month	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	7	8	9	10	11	12	1	2	3	4	5	6	7	8
	season	Rainy				Dry					Rainy							Dry					Rainy							Dry					Rainy							Dry					Rainy		
1. Capacity of survey and planning on riverbank protection works is improved.																																																
1-1 Survey on riverbank erosion in the three (3) provinces of Bokeo, Luangprabang, and Bolikhamxay is conducted.																																																
1-2 Areas which should take a prevention measures for riverbank erosion are prioritized at each of three (3) provinces in consideration of the present situation of bank erosion and hinterland.																																																
1-3 Riverbank protection measures suitable to the characteristics of each erosion site are selected from all possible options including recent construction methods along with traditional ones.																																																
1-4 One pilot project site of riverbank protection works in each of the three (3) provinces is selected.																																																
1-5 Trainings and seminars on survey and planning of riverbank protection works are organized.																																																
1-6 Manual for Survey and Planning is prepared.																																																
2. Capacity of design and construction on riverbank protection works is improved.																																																
2-1 Detailed survey for design of riverbank protection works at the pilot project sites is conducted.						BKO												BLM												LPB																			
2-2 Detailed design of riverbank protection works suitable for the pilot project sites is conducted.							BKO												BLM												LPB																		
2-3 Cost estimation for the riverbank protection works is conducted.								BKO												BLM												LPB																	
2-4 Construction works of riverbank protection at the pilot project sites are supervised.									BKO												BKO												BLM														LPB			
2-5 Study and evaluation on riverbank protection works of M/P and Phase Ⅰ sites in Vientiane Capital are conducted.																																																
2-6 Trainings and seminars on design and construction are organized.																						BKO												BLM												LPB		
2-7 Manual for Design, and Construction are prepared.																																																
3. Capacity of monitoring, maintenance and evaluation on riverbank protection works is improved.																																																
3-1 Existing monitoring manual is reviewed and revised as necessary.																																																
3-2 Plans for monitoring, evaluation, and maintenance for riverbank protection works in each pilot project sites are prepared.																																																
3-3 Monitoring for pilot project sites are conducted.																																																
3-4 Evaluation for the pilot project sites are conducted.																																																
3-5 Maintenance and repair for the pilot project sites are conducted as necessary.																																																
3-6 Trainings and seminars on monitoring, maintenance, and evaluation are organized.																						BKO												BLM												LPB		
3-7 Manual on monitoring, maintenance, and evaluation is prepared and revised.																																																
4. Wider knowledge on river engineering that is helpful to measures against riverbank erosion is attained.																																																
4-1 Trainings on river engineering and river management for effective implementation of the riverbank protection works are conducted in both Lao P.D.R. and Japan.									VTE													BKO												BLM												LPB		
Others																																																
C/P training in Japan											△												△											△														
Ability Evaluation			○						○													○												○												○		
Joint Coordinating Committee (JCC)			△								△											☆											△												☆		
Project Final Report																						mid-term evaluation																								terminal evaluation		○

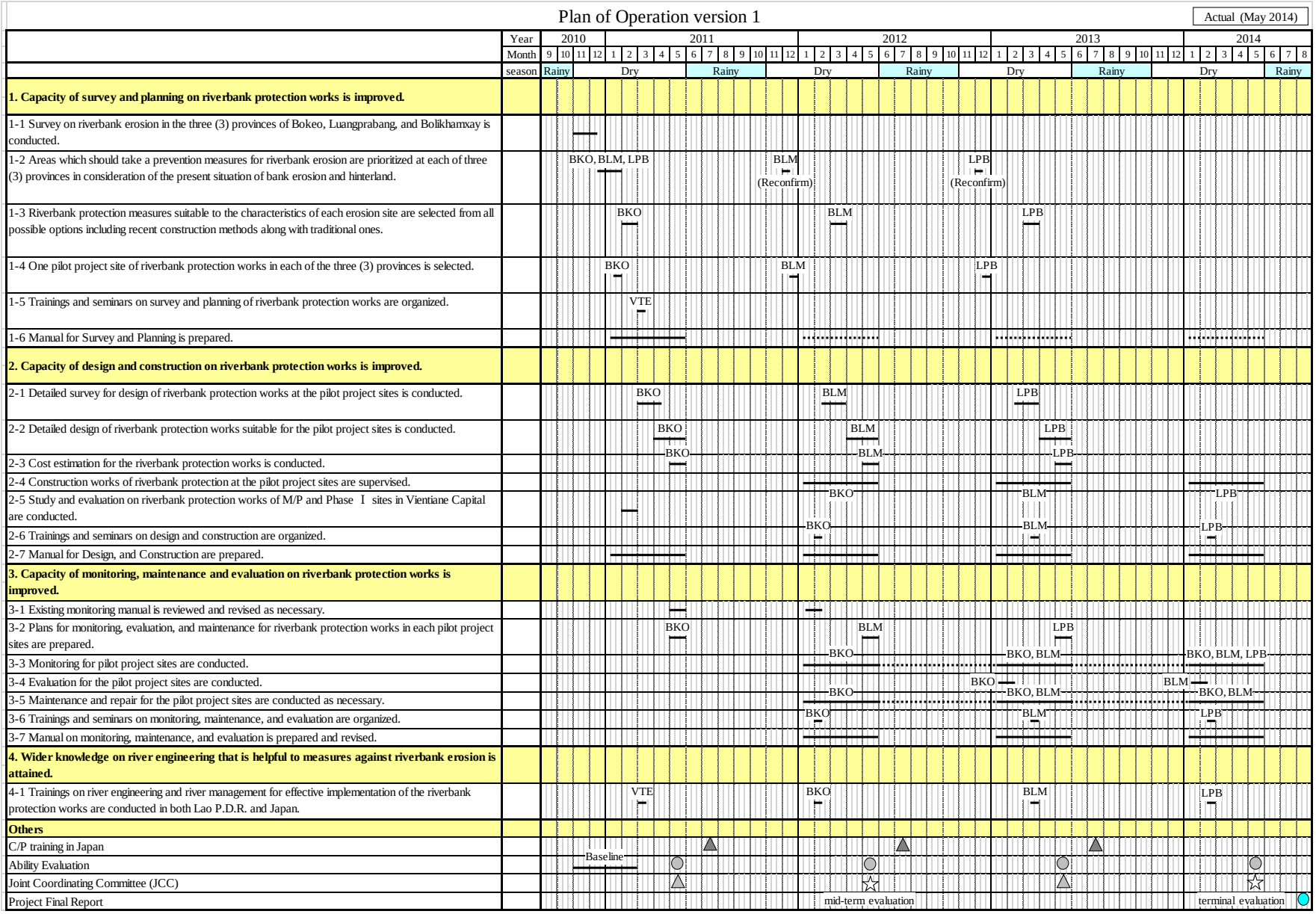
Table 2.1-2 Plan of Operation (PO) of the Project (Version 1)

Plan of Operation version 1

Revised (May 2012)

	Year	2010				2011												2012												2013												2014							
	Month	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	7	8	9	10	11	12	1	2	3	4	5	6	7	8
	season	Rainy				Dry					Rainy							Dry					Rainy							Dry					Rainy							Dry					Rainy		
1. Capacity of survey and planning on riverbank protection works is improved.																																																
1-1 Survey on riverbank erosion in the three (3) provinces of Bokeo, Luangprabang, and Bolikhamxay is conducted.				BKO																																											
1-2 Areas which should take a prevention measures for riverbank erosion are prioritized at each of three (3) provinces in consideration of the present situation of bank erosion and hinterland.				BKO, BLM, LPB											BLM (Reconfirm)												LPB (Reconfirm)																			
1-3 Riverbank protection measures suitable to the characteristics of each erosion site are selected from all possible options including recent construction methods along with traditional ones.						BKO												BLM												LPB																	
1-4 One pilot project site of riverbank protection works in each of the three (3) provinces is selected.						BKO											BLM											LPB																			
1-5 Trainings and seminars on survey and planning of riverbank protection works are organized.						VTE																																										
1-6 Manual for Survey and Planning is prepared.																																																
2. Capacity of design and construction on riverbank protection works is improved.																																																
2-1 Detailed survey for design of riverbank protection works at the pilot project sites is conducted.							BKO												BLM												LPB																	
2-2 Detailed design of riverbank protection works suitable for the pilot project sites is conducted.								BKO												BLM												LPB																
2-3 Cost estimation for the riverbank protection works is conducted.								BKO												BLM												LPB																
2-4 Construction works of riverbank protection at the pilot project sites are supervised.																																																
2-5 Study and evaluation on riverbank protection works of M/P and Phase Ⅰ sites in Vientiane Capital are conducted.																				BKO												BLM																LPB	
2-6 Trainings and seminars on design and construction are organized.																				BKO												BLM																LPB	
2-7 Manual for Design, and Construction are prepared.																																																
3. Capacity of monitoring, maintenance and evaluation on riverbank protection works is improved.																																																
3-1 Existing monitoring manual is reviewed and revised as necessary.										BKO																																					
3-2 Plans for monitoring, evaluation, and maintenance for riverbank protection works in each pilot project sites are prepared.										BKO												BLM												LPB													
3-3 Monitoring for pilot project sites are conducted.																				BKO												BKO, BLM																BKO, BLM, LPB	
3-4 Evaluation for the pilot project sites are conducted.																																BKO																BLM	
3-5 Maintenance and repair for the pilot project sites are conducted as necessary.																																																
3-6 Trainings and seminars on monitoring, maintenance, and evaluation are organized.																		BKO		BKO										BLM		BKO, BLM										LPB		BKO, BLM					
3-7 Manual on monitoring, maintenance, and evaluation is prepared and revised.																																																
4. Wider knowledge on river engineering that is helpful to measures against riverbank erosion is attained.																																																
4-1 Trainings on river engineering and river management for effective implementation of the riverbank protection works are conducted in both Lao P.D.R. and Japan.							VTE												BKO												BLM												LPB						
Others																																																
C/P training in Japan											△												△											△													
Ability Evaluation				Baseline							○												○											○												○			
Joint Coordinating Committee (JCC)											△												☆											△												☆		
Project Final Report																							mid-term evaluation																							terminal evaluation			○

Table 2.1-3 Actual Operation (Based on PO Version 1)



2.2 Japan Side Input

2.2.1 Dispatch of Short-Term JICA Expert Team

During November 2010 to August 2014, total of 11 short-term experts (7 JICA experts, 2 project coordinators and 2 experts who dispatched by firm's expense) conducted the technical assistance on site for the project implementation performed by C/P officials. Table 2.2-1 shows actual assignment schedule of the expert team.

Table 2.2-1 (1) Actual Assignment Schedule of the Expert Team

No.	Field of Expertise	Name (Firm)	Rank	Fiscal Year	Dispatch Period		Man Days		Man Months			
					From	To	Official	(Firm)	1st Year	2nd Year	3rd Year	4th Year
1	Chief Advisor/ River Management	Mr. Taketoshi MATSUNAGA (NEWJEC Inc.)	3	1st Year	07/Nov/2010	16/Dec/2010	40		5.63			
					09/Jan/2011	30/Jan/2011	22					
					20/Feb/2011	27/May/2011	97					
					14/Aug/2011	23/Aug/2011	10					
				2nd Year	10/Nov/2011	16/Dec/2011	37			5.33		
					08/Jan/2012	26/Feb/2012	50					
					02/Apr/2012	30/May/2012	59					
					05/Aug/2012	18/Aug/2012	14					
				3rd Year	24/Nov/2012	23/Dec/2012	30				5.10	
					06/Jan/2013	13/Feb/2013	39					
					14/Mar/2013	22/May/2013	70					
					10/Jun/2013	19/Jun/2013		(10)				
					11/Aug/2013	24/Aug/2013	14					
				4th Year	19/Nov/2013	23/Dec/2013	35					5.60
					09/Jan/2014	21/Feb/2014	44					
					24/Feb/2014	29/Mar/2014	34					
					21/Apr/2014	23/May/2014	33					
					15/Jun/2014	22/Jun/2014	8					
					07/Aug/2014	20/Aug/2014	14					
				Sub Total			**650**	**(10)**	**21.66**			
2	Vice Chief Advisor/ River Management	Dr. Hideki OTSUKI (NEWJEC Inc.)	2	1st Year	11/Nov/2010	12/Dec/2010	32		3.70			
					09/Jan/2011	06/Mar/2011	57					
					05/May/2011	26/May/2011	22					
				2nd Year	12/Nov/2011	16/Dec/2011	35			2.87		
					23/Jan/2012	21/Feb/2012	30					
					08/May/2012	28/May/2012	21					
				3rd Year	27/Nov/2012	21/Dec/2012	25				2.90	
					21/Jan/2013	01/Mar/2013	40					
					30/Apr/2013	21/May/2013	22					
				4th Year	12/Nov/2013	14/Dec/2013	16	(17)				1.63
					02/Feb/2014	01/Mar/2014	18	(10)				
					20/Apr/2014	23/May/2014	15	(19)				
				Sub Total			**333**	**(46)**	**11.10**			
3	Geological Survey	Mr. Mitsuhiro TOKUSU (NEWJEC Inc.)	3	1st Year	19/Nov/2010	08/Dec/2010	20		1.20			
					19/Feb/2011	06/Mar/2011	16					
				2nd Year	26/Jan/2012	10/Feb/2012	16			0.53		
				3rd Year	22/Jan/2013	03/Feb/2013	13				0.43	
				4th Year	11/Mar/2014	22/Mar/2014	12					0.40
				Sub Total			**77**		**2.56**			
4	River Engineering/ Riverbank Protection Planning & Design/ Topographic Survey	Dr. Rokuro KOBAYASHI (Deer Consultants Inc.)	3	1st Year	07/Nov/2010	12/Dec/2010	36		5.13			
					09/Jan/2011	06/Mar/2011	57					
					28/Mar/2011	27/May/2011	61					
		Mr. Yoshihiro MIWA (NEWJEC Inc.)		2nd Year	22/Nov/2011	16/Dec/2011	25			3.30		
					15/Jan/2012	10/Feb/2012	27					
					10/Apr/2012	26/May/2012	47					
				3rd Year	26/Nov/2012	20/Dec/2012	25				3.30	
					13/Jan/2013	21/Feb/2013	40					
					15/Apr/2013	18/May/2013	34					
				4th Year	25/Nov/2013	12/Dec/2013	18					2.47
					03/Feb/2014	01/Mar/2014	27					
					25/Apr/2014	23/May/2014	29					
				Sub Total			**426**		**14.20**			

Table 2.2-1 (2) Actual Assignment Schedule of the Expert Team

No.	Field of Expertise	Name (Firm)	Rank	Fiscal Year	Dispatch Period From	Dispatch Period To	Man Days Official	Man Days (Firm)	Man Months 1st Year	Man Months 2nd Year	Man Months 3rd Year	Man Months 4th Year
5	Construction Supervision/ Cost Estimation	Mr. Tsutomu KAMEYAMA (Yachiyo Engineering Co., Ltd.)	2	1st Year	31/Mar/2011	17/Apr/2011	18		1.83			
					20/Apr/2011	26/May/2011	37					
				2nd Year	10/Nov/2011	09/Dec/2011	30			3.36		
					14/Jan/2012	05/Feb/2012	23					
					16/Mar/2012	02/May/2012	48					
				3rd Year	30/Nov/2012	21/Dec/2012	22				3.37	
					09/Jan/2013	02/Feb/2013	25					
					14/Mar/2013	06/May/2013	54					
				4th Year	19/Nov/2013	21/Dec/2013	33					4.10
					08/Jan/2014	06/Feb/2014	30					
					03/Mar/2014	10/Apr/2014	39					
					05/May/2014	25/May/2014	21					
				Sub Total			**380**		**12.66**			
6	Traditional Riverbank Protection/ Construction Advice	Mr. Shingo OHASHI (Shidacho Construction Co., Ltd.)	3	1st Year	19/Nov/2010	12/Dec/2010	24		1.53			
					12/Feb/2011	05/Mar/2011	22					
				2nd Year	15/Jan/2012	16/Feb/2012	33			1.10		
		Mr. Yoshiharu HASEGAWA (WAKATSUKI Corporation)		3rd Year	30/Jan/2013	13/Feb/2013	15				1.10	
					14/Mar/2013	31/Mar/2013	18					
				4th Year	03/Feb/2014	20/Feb/2014	18					1.23
					23/Mar/2014	10/Apr/2014	19					
				Sub Total			**149**		**4.96**			
7	River Vegetation Works/ Maintenance	Ms. Ikuko KAWABATA (NEWJEC Inc.)	3	1st Year	12/Feb/2011	06/Mar/2011	23		1.73			
					28/Apr/2011	26/May/2011	29					
				2nd Year	28/Jan/2012	16/Feb/2012	20			1.43		
					27/Apr/2012	19/May/2012	23					
				3rd Year	05/Mar/2013	24/Mar/2013	20				1.47	
					23/Apr/2013	16/May/2013	24					
				4th Year	31/Jan/2014	15/Feb/2014	16					1.50
					20/Apr/2014	18/May/2014	29					
				Sub Total			**184**		**6.13**			
8	Project Coordinator 1/ Assist. Riverbank Protection Plan & Design/ Assist. Cost Estimation	Mr. Chanthavong SOUKCHALEUNE (NEWJEC Inc.)	6	1st Year	28/Apr/2011	25/May/2011	28		0.93			
		Mr. Sho SHIBATA (NEWJEC Inc.)		2nd Year	15/Jan/2012	12/Feb/2012	29			0.97		
				3rd Year	11/Feb/2013	31/Mar/2013	30	(19)			1.00	
				4th Year	30/Mar/2014	10/Apr/2014	12					1.00
					06/May/2014	23/May/2014	18					
				Sub Total			**117**	**(19)**	**3.90**			
9	Advisor on River Administration	Mr. Tatsuo HAMAGUCHI (NEWJEC Inc.)	2	4th Year	04/Dec/2013	12/Dec/2013		(9)				0.00
					18/Feb/2014	01/Mar/2014		(12)				
				Sub Total				**(21)**	**0.00**			
10	Assist. Traditional Riverbank Protection/ Assist. Construction Advice	Mr. Takashi KUROI (WAKATSUKI Corporation)	3	3rd Year	30/Jan/2013	13/Feb/2013		(15)			0.00	
				4th Year	03/Feb/2014	10/Feb/2014		(8)				0.00
				Sub Total				**(23)**	**0.00**			
11	Project Coordinator 2	Mr. Keiichi INOUE (NEWJEC Inc.)	6	1st Year	07/Nov/2010	12/Dec/2010		(36)	0.00			
					14/Feb/2011	05/Mar/2011		(20)				
		Ms. Rumi KATO (NEWJEC Inc.)		2nd Year	08/May/2012	26/May/2012		(19)		0.00		
		Ms. Miki HAGA (NEWJEC Inc.)		4th Year	07/Aug/2014	20/Aug/2014		(14)				0.00
				Sub Total				**(89)**	**0.00**			
Total		**JICA Experts Only (No.1 to 7)**					**2199**	**(56)**	**73.27**			
		JICA Experts and Project Coordinator 1 (No.1 to 8)					**2316**	**(75)**	**77.17**			
		All Members Incl. Experts Who Dispatched by Firm's Expense (No.1 to 11)						**(208)**				

2.2.2 Counterpart Training in Japan

As a part of technical training, approximately two-week training program was provided in Japan three (3) times during the project period for C/P officials and other officials concerned. Officials participated in the counterpart training in Japan are listed in Table 2.2-2. Main objective of this training program is for the participants to learn and enrich their understanding of current river management including riverbank protection measures carried out by GOJ and local communities.

Table 2.2-2 (1) List of Officials Participated in the Counterpart Training in Japan (1st Batch)

1st Training in Japan					
Name	Training Period	Field	Training Content	Occupation (as of the Training Period)	Occupation
Mr. Souksavanh THITHAVONG	From: 17/Jul/2011 To: 02/Aug/2011	River and Sabo Engineering	[Site visits includes facilities etc] 1. Japanese traditional river work techniques in the Fuji River system 2. River management facilities and Japanese traditional river work techniques in the Yodo River 3. Japanese traditional river work techniques in Hokuriku region and current conservation status of "SATOYAMA" [Lectures and Practices] 1. River management in Japan (General) 2. Japanese traditional river work techniques: Types, merit/ demerit and examples of application 3. Modern river work technique: Examples and merit/ demerit (comparing to Japanese traditional river work techniques) 4. River work techniques taken consideration to environments 5. Design of river structures 6. Explanation of visited facilities [Organization Accepted] - JICA Tokyo - JICA Osaka - NEWJEC Tokyo Head Office - NEWJEC Osaka Head Office - Yamanashi Prefectural Disaster Prevention Center - Kinki Regional Development Bureau of MLIT - Hokuriku Regional Development Bureau of MLIT - Hokuriku Soda Business Promotion Association	Project Manager (Bank Protection and Flood Control Division, DoW, MPWT)	ditto
Mr. Anouxay MONGKHOUN	From: 17/Jul/2011 To: 02/Aug/2011	River and Sabo Engineering		Technical Staff (Waterways Transport Division, DoW, MPWT)	Central China Normal University (China scholarship program)
Mr. Som Ock MANICHANH	From: 17/Jul/2011 To: 02/Aug/2011	River and Sabo Engineering		Deputy Project Manager (Waterways Administration Unit, DPWT Bokeo Province)	ditto
Mr. Deth Oudom HEUANMISAVATH	From: 17/Jul/2011 To: 02/Aug/2011	River and Sabo Engineering		Technical Staff (Waterways Administration Unit, DPWT Bokeo Province)	ditto
Mr. Somboun KERTKONG	From: 17/Jul/2011 To: 02/Aug/2011	River and Sabo Engineering		Member of Joint Coordinating Committee (Deputy Director General, DPWT Bokeo Province)	ditto

Table 2.2-2 (2) List of Officials Participated in the Counterpart Training in Japan (2nd Batch)

2nd Training in Japan					
Name	Training Period	Field	Training Content	Occupation (as of the Training Period)	Occupation
Mr. Nouansavanh SENGMANY	From: 15/Jul/2012 To: 31/Jul/2012	River and Sabo Engineering	[Site visits includes facilities etc] 1. Japanese traditional river work techniques in the Fuji River system 2. River management facilities and Japanese traditional river work techniques in the Yodo River 3. Japanese traditional river work techniques in Hokuriku region and current conservation status of "SATOYAMA" [Lectures and Practices] 1. River management in Japan (General) 2. Japanese traditional river work techniques: Types, merit/ demerit and examples of application 3. Modern river work technique: Examples and merit/ demerit (comparing to Japanese traditional river work techniques) 4. River work techniques taken consideration to environments 5. Design of river structures 6. Explanation of visited facilities [Organization Accepted] - JICA Tokyo - JICA Kansai - NEWJEC Tokyo Head Office - NEWJEC Osaka Head Office - Kanto Regional Development Bureau of MLIT - Kinki Regional Development Bureau of MLIT - Hokuriku Regional Development Bureau of MLIT - Hokuriku Soda Business Promotion Association - Niigata Soda Business Promotion Association	Member of Joint Coordinating Committee (Director General, DPWT Bolikhamxay Province)	ditto
Mr. Kham Phong THEPKHAMHEUANG	From: 15/Jul/2012 To: 31/Jul/2012	River and Sabo Engineering		Deputy Project Manager (Waterways Administration Unit, DPWT Bolikhamxay Province)	ditto
Mr. Khamsene PHAGAXAY	From: 15/Jul/2012 To: 31/Jul/2012	River and Sabo Engineering		Technical Staff (Waterways Administration Unit, DPWT Bolikhamxay Province)	ditto
Mr. Phonesay SOULIYAVONG	From: 15/Jul/2012 To: 31/Jul/2012	River and Sabo Engineering		Technical Staff (Bank Protection Unit, DPWT Vientiane Capital)	ditto
Mr. Khampheiuy LEEFHUNG	From: 15/Jul/2012 To: 31/Jul/2012	River and Sabo Engineering		Technical Staff (Port and Navigation Channel Division, DoW, MPWT)	ditto

Table 2.2-2 (3) List of Officials Participated in the Counterpart Training in Japan (3rd Batch)

3rd Training in Japan					
Name	Training Period	Field	Training Content	Occupation (as of the Training Period)	Occupation
Mr. Bounkhong SOUKSAVATH	From: 14/Jul/2013 To: 30/Jul/2013	River and Sabo Engineering	[Site visits includes facilities etc] 1. Japanese traditional river work techniques in the Fuji River system 2. River management facilities and Japanese traditional river work techniques in the Yodo River 3. Japanese traditional river work techniques in Hokuriku region and current conservation status of "SATOYAMA" [Lectures and Practices] 1. River management in Japan (General) 2. Japanese traditional river work techniques: Types, merit/ demerit and examples of application 3. Modern river work technique: Examples and merit/ demerit (comparing to Japanese traditional river work techniques) 4. River work techniques taken consideration to environments 5. Design of river structures 6. Explanation of visited facilities [Organization Accepted] - JICA Tokyo - NEWJEC Tokyo Head Office - NEWJEC Osaka Head Office - Kanto Regional Development Bureau of MLIT - Kinki Regional Development Bureau of MLIT - Hokuriku Regional Development Bureau of MLIT - Niigata Soda Business Promotion Association	Member of Joint Coordinating Committee (Deputy Director General, DPWT Luangprabang Province)	ditto
Mr. Sombath CHAREUNPHONH	From: 14/Jul/2013 To: 30/Jul/2013	River and Sabo Engineering		Deputy Project Manager (Waterways Administration Unit, DPWT Luangprabang Province)	ditto
Mr. Soukkasane SISOUPHAN	From: 14/Jul/2013 To: 30/Jul/2013	River and Sabo Engineering		Technical Staff (Waterways Administration Unit, DPWT Luangprabang Province)	ditto
Mr. Phimmasone SENGSOURIYAVONG	From: 14/Jul/2013 To: 30/Jul/2013	River and Sabo Engineering		Technical Staff (Bank Protection and Flood Control Division, DoW, MPWT)	ditto
Ms. Moukmany VANNASY	From: 14/Jul/2013 To: 30/Jul/2013	River and Sabo Engineering		Technical Staff (Bank Protection and Flood Control Division, DoW, MPWT)	ditto

2.2.3 Provision of Equipment

The equipment shown in Table 2.2-3 was provided to DoW in order to promote implementation of project activities by C/P official's own initiative.

Table 2.2-3 (1) List of Equipment Provided in the First Year

1st Year							
No.	Name of Equipment	Type	Maker	Section in Use	License	Procurement	Purpose for Install
RSE-01	Echo Sounder	TDM-5000B	TAMAYA TECHNICS INC.	1 Unit	DoW	In Japan	River Survey
RSE-02	Portable Propeller-Type Current Meter	MCM-1	MTPrecision Inc.	1 Unit	DoW	In Japan	River Survey
RSE-03	Water Level Staff Gages (L=1m)		TAKUWA Corporation	60 Units	Riverbank of 3 Provinces	In Japan	River Survey
RSE-04	Total Station	TS-02 7" (2mgon)	Leica Geosystems	1 Unit	DoW	In Lao P.D.R.	River Survey
RSE-05	Portable GPS	eTrex H	Garmin Ltd.	4 Units	DoW and 3 Provincial DPWT	In Lao P.D.R.	River Survey
STE-01	Ya (Steel Arrow)		Shidacho Construction Co., Ltd.	12 Units	3 Provincial DPWT	In Japan	Soda Technique
STE-02	Kakeya		Shidacho Construction Co., Ltd.	12 Units	3 Provincial DPWT	In Japan	Soda Technique
STE-03	Measuring Wire		Shidacho Construction Co., Ltd.	6 Units	3 Provincial DPWT	In Japan	Soda Technique
STE-04	Other Tool Kit		Shidacho Construction Co., Ltd.	3 Units	3 Provincial DPWT	In Japan	Soda Technique
OAE-01	Personal Computer	Aspire M3910	Acer	4 Units	DoW and 3 Provincial DPWT	In Lao P.D.R.	Office Automation
OAE-02	Uninterruptible Power Supply (UPS)	UPS 1000VA	LEONICS CO., LTD.	4 Units	DoW and 3 Provincial DPWT	In Lao P.D.R.	Office Automation
OAE-03	Inkjet Printer (A3 Size)	PIXMA IX5000	Canon Inc.	3 Units	3 Provincial DPWT	In Lao P.D.R.	Office Automation
OAE-04	Digital Camera	Powershot A3000 IS	Canon Inc.	3 Units	3 Provincial DPWT	In Lao P.D.R.	Office Automation
OAE-05	Computer Aided Design (CAD) Software	AutoCAD LT 2011	Autodesk, Inc.	1 License	DPWT Bokeo Province	In Lao P.D.R.	Office Automation

Table 2.2-3 (2) List of Equipment Provided in the Second Year

2nd Year							
No.	Name of Equipment	Type	Maker	Section in Use	License	Procurement	Purpose for Install
OAE-06	Computer Aided Design (CAD) Software	AutoCAD LT 2011	Autodesk, Inc.	3 Licenses	DoW, DPWT BLM & LPB	In Lao P.D.R.	Office Automation
OAE-07	Desktop Computer	Pavilion P6-2082L	HP	2 Units	DoW	In Lao P.D.R.	Office Automation
OAE-08	Laptop Computer	Inspiron N4050	Dell	4 Units	DoW and 3 Provincial DPWT	In Lao P.D.R.	Office Automation
OAE-09	Uninterruptible Power Supply (UPS)	UPS 500VA	APC	2 Units	DoW	In Lao P.D.R.	Office Automation
OAE-10	Digital Camera	EOS 600D	Canon Inc.	1 Unit	DoW	In Lao P.D.R.	Office Automation
OAE-11	Inkjet Printer (A3 Size)	PIXMA IX6560	Canon Inc.	1 Unit	DoW	In Lao P.D.R.	Office Automation
OAE-12	Multipurpose Copy Machine	Copier Digital IR2530	Canon Inc.	1 Unit	DoW	In Lao P.D.R.	Office Automation
OAE-13	Multimedia Projector	EB-S9	EPSON	1 Unit	DoW	In Lao P.D.R.	Office Automation
OAE-14	Projector Screen	Tripod 70"x70"		1 Unit	DoW	In Lao P.D.R.	Office Automation
OAE-15	Transceiver	V80T	Icom	2 Sets	DoW	In Lao P.D.R.	Office Automation

2.2.4 Local Cost

Local cost shown in Table 2.2-4 was provided by Japanese side for the project implementation. Total cost was approx. 70.1 million Yen (0.68 million US Dollars). Breakdown by major expenses indicates that sub-contract cost provided for three (3) pilot constructions (40.8 million Yen, 58.2 %) was the largest portion, travel expenses (8.9 million Yen, 12.6 %) was the second largest and provision of equipment (5.4 million Yen, 7.7 %) was the third.

Table 2.2-4 Local Cost Provided by Japanese Side

(Unit: Japanese Yen)

Items	1st Year (Settled) I	2nd Year (Settled) II	3rd Year (Settled) III	4th Year (Approx.) IV	**Total I+II+III+IV**	Remarks
(1) General Cost	2,776,000	2,931,000	5,436,000	5,875,000	**17,018,000**	24.3%
[1] Personnel expenses	445,000	417,500	2,209,000	41,000	**3,112,500**	4.4%
[2] Maintenance cost for equipment	0	0	0	0	**0**	0.0%
[3] Expendables	0	18,000	0	6,500	**24,500**	0.0%
[4] Travel expenses	1,956,500	1,873,000	2,281,000	2,753,000	**8,863,500**	12.6%
[5] Communications	75,500	77,000	67,000	90,000	**309,500**	0.4%
[6] Material Preparation Cost	82,000	41,000	0	975,000	**1,098,000**	1.6%
[7] Rental/depreciation expenses	0	0	5,000	3,500	**8,500**	0.0%
[8] Heating, lighting and water expenses	0	0	0	0	**0**	0.0%
[9] Expense for capacity building	0	0	0	0	**0**	0.0%
[10] Maintenance cost for facilities	25,000	0	0	0	**25,000**	0.0%
[11] Training expenses	0	0	0	0	**0**	0.0%
[12] Activity expenses in Japan	0	0	0	0	**0**	0.0%
[13] Subcontract cost in Japan	0	0	0	0	**0**	0.0%
[14] Unclassified expenses	192,000	504,500	874,000	2,006,000	**3,576,500**	5.1%
(2) Equipment (for Grant)	4,121,000	1,310,000	0	0	**5,431,000**	7.7%
(3) Shipping of Equipment (for Grant)	604,000	0	0	0	**604,000**	0.9%
(4) Equipment (General)	0	0	0	0	**0**	0.0%
(5) Shipping of General Equipment (Taxable)	0	0	0	0	**0**	0.0%
(6) Other Equipment	0	0	0	0	**0**	0.0%
(7) Shipping of Other Equipment (Taxable)	33,000	32,000	11,000	42,000	**118,000**	0.2%
(8) Report Preparation Cost (Printing & Binding)	1,210,000	1,149,000	1,133,000	1,794,000	**5,286,000**	7.5%
(9) Report Preparation Cost (Others)	861,000	0	0	0	**861,000**	1.2%
(10) Sub-contract Cost (for Pilot Construction)	0	12,321,000	17,779,000	10,690,000	**40,790,000**	58.2%
Total	**9,605,000**	**17,743,000**	**24,359,000**	**18,401,000**	**70,108,000**	100.0%

2.2.5 Output

(1) Reports

As the technical cooperation output of the Project, the reports listed in Table 2.2-5 were produced and submitted to the related organizations.

Table 2.2-5 List of Reports

Year	Name of report	Time submitted	Number of copies			Total
			Lao	English	Japanese	
1st year	Inception Report [IC/R]	Early November 2010	15	10	10	35
			CD-ROM (Lao, English and Japanese)			3
	Project Work Progress Report (Vol. 1) [R1]	Late March 2011	-	15	5	20
	Annual Work Completion Report (1st year) [F1]	Late August 2011	15	10	10	35
			CD-ROM (Lao, English and Japanese)			3
2nd year	Project Work Progress Report (Vol. 2) [R2]	Late February 2012	-	15	5	20
	Annual Work Completion Report (2nd year) [F2]	Early September 2012	15	10	10	35
			CD-ROM (Lao, English and Japanese)			3
3rd year	Project Work Progress Report (Vol. 3) [R3]	Late March 2013	-	15	5	20
	Annual Work Completion Report (3rd year) [F3]	Early September 2013	15	10	5	30
			CD-ROM (Lao, English and Japanese)			3
4th year	Project Work Progress Report (Vol. 4) [R4]	Late March 2014	-	15	5	20
	Project Work Completion Report [FR]	Late August 2014	15	10	5	30
			CD-ROM (Lao, English and Japanese)			3

(2) Technical Cooperation Output

As the technical cooperation output of the Project, the following manuals were produced and distributed to to the related organizations. Final edition of these manuals ((1), (2), (3): Lao version, (4): English version) are attached to annex of this report.

(1) Manual for survey and planning on riverbank protection works

(2) Manual for design, cost estimation and construction on riverbank protection works

(3) Manual for monitoring, evaluation and maintenance on riverbank protection works

(4) Maintenance manual on survey equipment for riverbank protection works

2.3 Lao Side Input

2.3.1 Implementation Structure

Through the organizational reform carried out in December 2007 after the Phase I project completion, the Ministry of Communication, Transport, Post and Construction (MCTPC) changed its name to the Ministry of Public Works and Transport (MPWT), and Inland Waterways Administration Division which had been in charge of waterways transportation of the Mekong River under the Department of Roads was promoted to the Department of Waterways (DoW). In addition, five (5) divisions including Riverbank Protection and Flood Control Division have been allocated under DoW. Fig. 2.3-1 shows the new organization chart of DoW under MPWT.

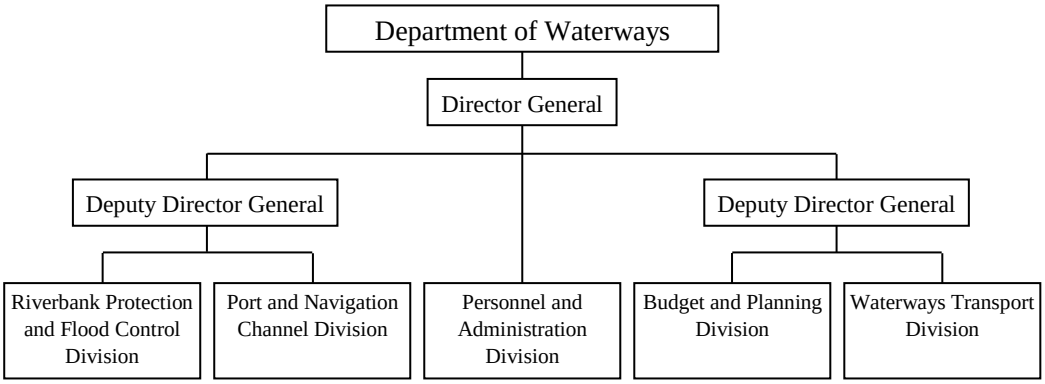


Fig. 2.3-1 Organization Chart of Department of Waterways, MPWT

At provincial level, the Department of Communication, Transport, Post and Construction (DCTPC) which had been one of the provincial department of MCTPC, was changed to the Department of Public Works and Transport (DPWT).

In addition, this reform facilitated a set up of Water Administration Unit including riverbank protection measures independent from Road and Bridge Unit under the provincial DPWT. As of August 2012, Waterways Administration Unit has been set up in each DPWT of Bokeo Province, Luangprabang Province and Bolikhamxay Province.

2.3.2 Counterpart Personnel

C/P officials assigned to the Project are shown in Table 2.3-1. Mr. Houngla SENGMUANG, Director General of DoW, MPWT is assigned as Project Director (PD).

In addition, other officials from DPWT of 13 provinces participated in training sessions and seminars as observers.

Table 2.3-1 Composition of C/P Officials

Name	Occupation	Field	Training Period	Working Period	Remarks
Mr. Souksavanh THITHAVONG	Project Manager Bank Protection and Flood Control Division, DoW, MPWT	River Engineering	Nov. 2010 to Aug. 2014	Year 2002 to Present	Counterpart in Phase I
Mr. Phimmasone SENGSOURIYAVONG	Technical Staff Bank Protection and Flood Control Division, DoW, MPWT	River Engineering	Nov. 2010 to Aug. 2014	Year 2008 to Present	Participate fully from April 2011
Mr. Khampheiuy LEEFHUNG	Technical Staff Port and Navigation Channel Division, DoW, MPWT	River Engineering	Nov. 2010 to Aug. 2014	Year 2001 to Present	Participate fully from April 2011
Mr. Anouxay MONGKHOUN	Technical Staff Waterways Transport Division, DoW, MPWT	River Engineering	Nov. 2010 to Aug. 2012	Year 2008 to Present	Central China Normal University from Sep. 2012 (China scholarship program)
Ms. Moukmany VANNASY	Technical Staff Bank Protection and Flood Control Division, DoW, MPWT	River Engineering	Nov. 2010 to Aug. 2014	Year 2009 to Present	Concurrently serving as technical staff and secretary from Dec. 2012
Mr. Som Ock MANICHANH	Deputy Project Manager Waterways Administration Unit, DPWT Bokeo Province	River Engineering	Nov. 2010 to Aug. 2014	Year 1998 to 2003 Year 2008 to Present	
Mr. Deth Oudom HEUANMISAVATH	Technical Staff Waterways Administration Unit, DPWT Bokeo Province	River Engineering	Nov. 2010 to Aug. 2014	Year 2002 to Present	
Mr. Kham Phong THEPKHAMHEUANG	Deputy Project Manager Waterways Administration Unit, DPWT Bolikhamxay Province	Road Engineering	Nov. 2010 to Aug. 2014	Year 1986 to 1989 Year 1993 to Present	
Mr. Khamsene PHAGAXAY	Technical Staff Waterways Administration Unit, DPWT Bolikhamxay Province	River Engineering	Nov. 2010 to Aug. 2014	Year 1988 to 1996 (MCTPC) Year 1996 to Present	
Mr. Sombath CHAREUNPHONH	Deputy Project Manager Waterways Administration Unit, DPWT Luangprabang Province	River Engineering	Nov. 2010 to Aug. 2014	Year 1986 to Present	
Mr. Nakasu SOUMPHONEPAKDY	Technical Staff Road and Bridge Unit, DPWT Luangprabang Province	Road Engineering	Nov. 2010 to May 2012	Year 2008 to Present	
Mr. Soukkasane SISOUPHAN	Technical Staff Waterways Administration Unit, DPWT Luangprabang Province	River Engineering	May 2012 to Aug. 2014	Year 1986 to 1996 (DCTPC) Year 1996 to Present	
Mr. Phonesay SOULIYAVONG	Technical Staff Bank Protection Unit, DPWT Vientiane Capital	River Engineering	Nov. 2010 to Aug. 2014	Year 2002 to Present	

2.3.3 Provision of Services

As the office space for the Project, annex building of MPWT located in Vientiane Capital was provided to JICA experts and C/P officials from DoW. Air conditioning, desks and chairs, heating, lighting and water expenses were also provided as well as visa arrangements for JICA experts.

In addition, office spaces were provided to the Project at DPWT compound of Bokeo Province, Bolikhamxay Province and Luangprabang Province in order to implement project activities at provincial level including three (3) pilot constructions smoothly.

2.3.4 Budget Allocation

Lao side budget for the Project is secured by DoW including budget allocation to each province implementing the pilot projects. The project budget is mainly classified into the following 3 items.

(1) Operational cost for the project

(2) Construction cost for pilot projects

(3) Survey cost for the implementation of pilot projects (such as topographic survey, boring test, etc.)

Table 2.3-2 shows cost-sharing by both Japanese side and Lao side for the implementation of pilot projects. Construction cost paid by Lao side with 10% service tax correspond to item (2) above.

Table 2.3-2 Cost-sharing by Both Sides for the Implementation of the Pilot Projects

(Unit: US Dollars)

Name of Pilot Project	Target Province	Fiscal Year	Construction Cost	Japanese Side			Lao Side			Total
				Share	Construction Cost	Tax (0%)	Share	Construction Cost	Tax (10%)	
			I	II	III = I * II	IV	V	VI = I * V	VII	III+IV+VI+VII
Pilot Construction Work 1 for Riverbank Protection	Bokeo Province	2nd Year	222,200.00	**70%**	155,540.00	0.00	**30%**	66,660.00	6,666.00	**228,866.00**
					155,540.00			73,326.00		
Pilot Construction Work 2 for Riverbank Protection	Bolikhamxay Province	3rd Year	368,280.00	**50%**	184,140.00	0.00	**50%**	184,140.00	18,414.00	**386,694.00**
					184,140.00			202,554.00		
Pilot Construction Work 3 for Riverbank Protection	Luangprabang Province	4th Year	346,970.00	**30%**	104,091.00	0.00	**70%**	242,879.00	24,287.90	**371,257.90**
					104,091.00			267,166.90		
Total (From 2nd Year to 4th Year)			**937,450.00**		**443,771.00**			**543,046.90**		**986,817.90**

The first year budget of Lao side for item (1) and item (2) was secured at 25 million kip (300,000 Yen, equivalent) and 500 million kip (6.0 million Yen), respectively. Implementations of pilot projects were proposed to be executed from the second year onward; however, item (2) of the first year budget could not be allocated to other items such as item (1) and item (3) due to the restriction of accounting regulations. Therefore item (2) of the first year budget was allocated to other projects under the control of DoW and it was disbursed within the fiscal year* 2010 of Lao P.D.R.

* Fiscal year of Lao P.D.R. for the year 2010 is from October 1, 2010 to September 30, 2011.

With regard to the expenses incurred by C/P officials such as transportation fees, daily allowance and accommodation fees, they were accommodated in item (1). However, only a half of requested budget was approved by the National Assembly, therefore, total budget of item (1) was insufficient. Lao side requested Japanese side to cover the part of their operational cost for the first year only during discussion for IC/R in November 2010. In addition, because of different interpretations for item (3) between Lao side and Japanese side, Lao side requested Japanese side to cover item (3) for the first year and further discussion had been continuously held about the cost allocation of item (3) from the second year onward.

The second year budget of Lao side for item (1) and item (2) was secured 65 million kip (780,000 Yen) and 586.5 million kip (7,038,000 Yen), respectively. However, Japanese side disbursed approximately 40 million kip (480,000 Yen) to cover shortage of budget for item (1) prepared by Lao side. Japanese side also compensated 4,100 US Dollars (420,000 Yen) for item (3).

The third year budget of Lao side for item (1) and item (2) was secured 65 million kip (780,000 Yen) and 1,607.7 million kip (19.3 million Yen), respectively. In addition, the budget of Lao side for item (3) was also secured 68 million kip (816,000 Yen) for the first time.

The fourth year budget of Lao side for item (1) and item (2) was secured 65 million kip (780,000 Yen) and 2.5 billion kip (30.0 million Yen), respectively.

2.4 Project Joint Coordination Committee (JCC)

During the project period, JCC meetings for the project were held four (4) times in total at Vientiane Capital. JCC acts as the most important meeting in the project, which was to be attended by all relevant stakeholders from both Lao and Japanese sides, with aims to discuss the project progress, annual work plans for the following years and other concerned issues.

Table 2.4-1 shows discussion points at JCC meetings. Related materials for JCC meetings such as M/M are attached in Appendix-1.

Table 2.4-1 Dicussion Points at JCC Meetings

Date, Place and Number of Participants	Discussion Points
The 1st JCC Meeting May 19, 2011 Vientiane Capital 23 Participants	1. JCC membership accepted the result of project activities for the first year. 2. JCC membership accepted the annual work plan for the second year. 3. JCC membership and attendance confirmed the following project policy; • C/P officials need to have proper knowledge to be able to choose appropriate methods suit for river conditions. • The Project should aim at the dissemination of eco-friendly and low-cost

	riverbank protection for all provinces in the future. • C/P officials should possess comprehensive knowledge for materializing eco-friendly and low-cost riverbank protections by themselves. 4. Other concerned issues discussed at the JCC meeting were summarized as follows: (1) JCC membership accepted to organize the training course at the target provinces such as Bokeo, Bolikhamxay and Luangprabang before and after pilot construction of the Project. (2) JCC membership accepted that local contractors, if they meet the conditions required for the enrollment, will be able to participate to the above-mentioned training course. (3) JCC membership confirmed that Lao side will request to JICA via the Team regarding the additional office facility such as personal computers, photocopy machine, digital cameras and so forth for the smooth project implementation after further discussion on its necessity between both sides. (4) JCC membership accepted the further site selection for Bolikhamxay with priority for Ban Pakthoay and Ban Keng Sadok. (5) JCC membership confirmed that Lao side will consult the Ministry of Planning and Investment for dissemination of eco-friendly and low-cost riverbank protection for all provinces in the future. (6) JCC membership confirmed that Lao side will make more efforts for allocating the budget for the pilot projects and the dispatch of C/P to the sites. (7) JCC membership confirmed that C/P from DPWT Vientiane Capital was changed from Mr. Bounkhoung PHOUMDOUNGDY who had been listed as C/P in R/D signed on July 2010 to Mr. Phonesay SOULIYAVONG.
The 2nd JCC Meeting May 24, 2012 Vientiane Capital 30 Participants	1. JCC membership accepted the result of project activities for the second year. 2. JCC membership accepted the annual work plan for the third year. 3. JCC membership accepted the result of evaluation prepared by the Mid-term Joint Evaluation Team. 4. Recommendations from Mid-term Joint Evaluation Team were summarized as follows: (1) Importance of producing manuals in Lao language (2) Importance of utilization of the lessons learned from pilot projects (3) Promotion of involving DPWT staff member for planning and survey (4) Importance of effective communication (5) Importance of securing adequate budget (6) Importance of institutionalizing a system for capacity development 5. Lessons learned from Mid-term Joint Evaluation Team were summarized as follows: (1) Cost sharing leading to increase the ownership of the counterparts and the project's sustainability

	(2) Effectiveness to other sectors
The 3rd JCC Meeting May 10, 2013 Vientiane Capital 22 Participants	1. JCC membership accepted the result of project activities for the third year. 2. JCC membership accepted the annual work plan for the fourth year. 3. JCC membership and attendance confirmed the following; • DoW and DPWT of Bolikhamxay Province will ensure that the assigned three (3) C/Ps will supervise the pilot construction works at Pakthoay village in Bolikhamxay Province, so that they can receive technical transfer from the JICA experts. DoW and DPWT of Bolikhamxay Province also promised to instruct the contractor to recover the delay so far. • Five (5) trainees nominated to attend the "counterpart training in Japan (third batch)" are bound to be the project members as well as the supervisors for the up-coming pilot construction works at Souan Louang village in Luangprabang Province, in order to ensure the impact of the training and maximize the technical transfer. The trainees who participated in the training in Japan are advised to share their experience with the other DoW and provincial DPWT engineers. • The initial evaluation scores presented by the JICA expert team on the level of understanding defined in PDM were confirmed by the JCC membership. The JCC membership encouraged more active engagement in the project activities so that the scores reach the target of 75 points, by the end of the project. 4. Other concerned issues discussed at the JCC meeting were summarized as follows: (1) Director General of DoW assured that Lao side will make more efforts for allocating the budget for riverbank protection works with using traditional method such as Soda Mattress. (2) JCC membership confirmed that Lao side will improve visa-application process more smoothly for Japanese experts with collaboration from Ministry of Planning and Investment (MPI).
The 4th JCC Meeting May 21, 2014 Vientiane Capital 31 Participants	1. JCC membership accepted the result of project activities for the fourth year including the preliminary figures of terminal evaluation scores presented by the JICA expert team on the level of understanding defined in PDM. 2. JCC membership accepted the result of evaluation prepared by the Terminal Joint Evaluation Team. 3. Recommendations from Terminal Joint Evaluation Team and responses from Lao side were confirmed as shown below: (1) To ensure the manual with appendices in Lao language to be completed and distributed to potential users. ➔ Lao side also understand the necessity for translation of manuals in Lao language. Translation will be implemented by the completion of this Project. Manuals will be distributed to concerned organization. MPWT hopes to receive the financial support from JICA for the publication of manuals. (2) To produce promotional materials (leaflet and DVD) based on the three pilot projects that shows the cost-effectiveness and

	environmentally-friendliness as well as the pictures showing before and after the Projects to mainstream the Soda method. ➔ Promotion materials are very important to expand this method. MPWT will prepare materials. Promotional activities such as the upload of the video to MPWT website can be considered. (3) To ensure that all the C/P officials from DPWT should retain in the same unit. ➔ C/P officials of both DoW, MPWT and provincial DPWTs will retain in the same unit. (4) To take strong initiative to implement projects with the Soda method including the planned extension works at Paoy site in Bokeo. Also Lao side should identify priority sites for riverbank protection in other provinces and make proposals and plans. ➔ Extension of riverbank protection works at Paoy site is planned to be implemented. Lao side is willing to expand the riverbank protection projects in other provinces. (5) To create a market for riverbank protection using the Soda method by setting a qualification (e.g., the number of Soda specialists) required of the contractors for bidding. ➔ Although there are few contractors who can implement the Soda method, it is expected to be developed with nationwide expansion. (6) (DPWT) To earmark a budget for monitoring and maintenance of the three pilot sites after the end of the project period. ➔ It is important for Lao side to allocate necessary budget to implement the appropriate monitoring and maintenance sustainably. Budget for the monitoring and maintenance will be allocated in three pilot sites. (7) To make efforts to conduct a training course on environmentally-friendly and cost effective methods as part of the regular training program of MPWT. ➔ Using manuals, instruction of these methods will be involved in the training program of MPWT. 4. Other important discussions were the following; (1) Chief Representative of JICA Laos office asked if GOL set high priority on the riverbank protection measures with using Japanese traditional construction methods which are environmentally-friendly and cost effective. DG of DoW confirmed its priority and ensured to disseminate this method across the whole country. DG of DoW requested JICA to consider further cost sharing projects (e. g., Lao side: 70%, Japanese side: 30%) in future. DG of DoW also requested JICA for further training in the fields of river engineering because most of officials in DoW, MPWT and provincial DPWTs are road engineers. (2) Chief Representative of JICA Laos office also asked if translation of manuals into Lao language would be done by C/P officials. DG of DoW responded that translation and finalization of manuals would be a good

	practice for C/P officials to understand riverbank protection methods. DG also expressed that Lao side would like to receive suggestion and/or comments from professors of National University of Laos (NUOL) after C/P officials completed manual translation. Manuals are expected to be utilized for training materials of MPWT, provincial DPWTs and educational institutions such as NUOL. (3) DG of DoW informed that the MPWT will make public announcement of the project activities in the three pilot sites on the MPWT's bulletin board and plan to broadcast on the Lao TV program. DG also informed that MPWT is planning to conduct the training program on Soda Mattress in the Public Works and Transport Training Center (PTTC) (4) Chief Representative of JICA Laos office requested MPWT to make sure that all the remaining payment by Lao side to the Contractor should be duly made by Lao side. DG, DoW replied that application for the payment prepared by DoW, MPWT had been already submitted and approved by the National Assembly and just waiting for the disbursement to the Contractor by Ministry of Finance. (5) C/P officials of DPWT Bokeo Province asked if local damage on slope protection works at Paoy site had been caused by steep slope angle of protection works. Chief Advisor of JICA expert team replied that possible cause of local damage was insufficient penetration depth of short piles and designed slope angle (1:1.8) would not induce local damage. (6) C/P officials of DPWT Bokeo Province also asked if Soda Mattress would be combined with slope protection works by modern method such as concrete revetment. Chief Advisor of JICA expert team replied with a yes and encouraged to install foot protection works beneath slope protection works by modern methods as well as traditional one. Chief Advisor of JICA expert team also complemented that lack of foot protection works leads to collapse or damage of slope protection works caused by local scouring.