JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT (MARD)

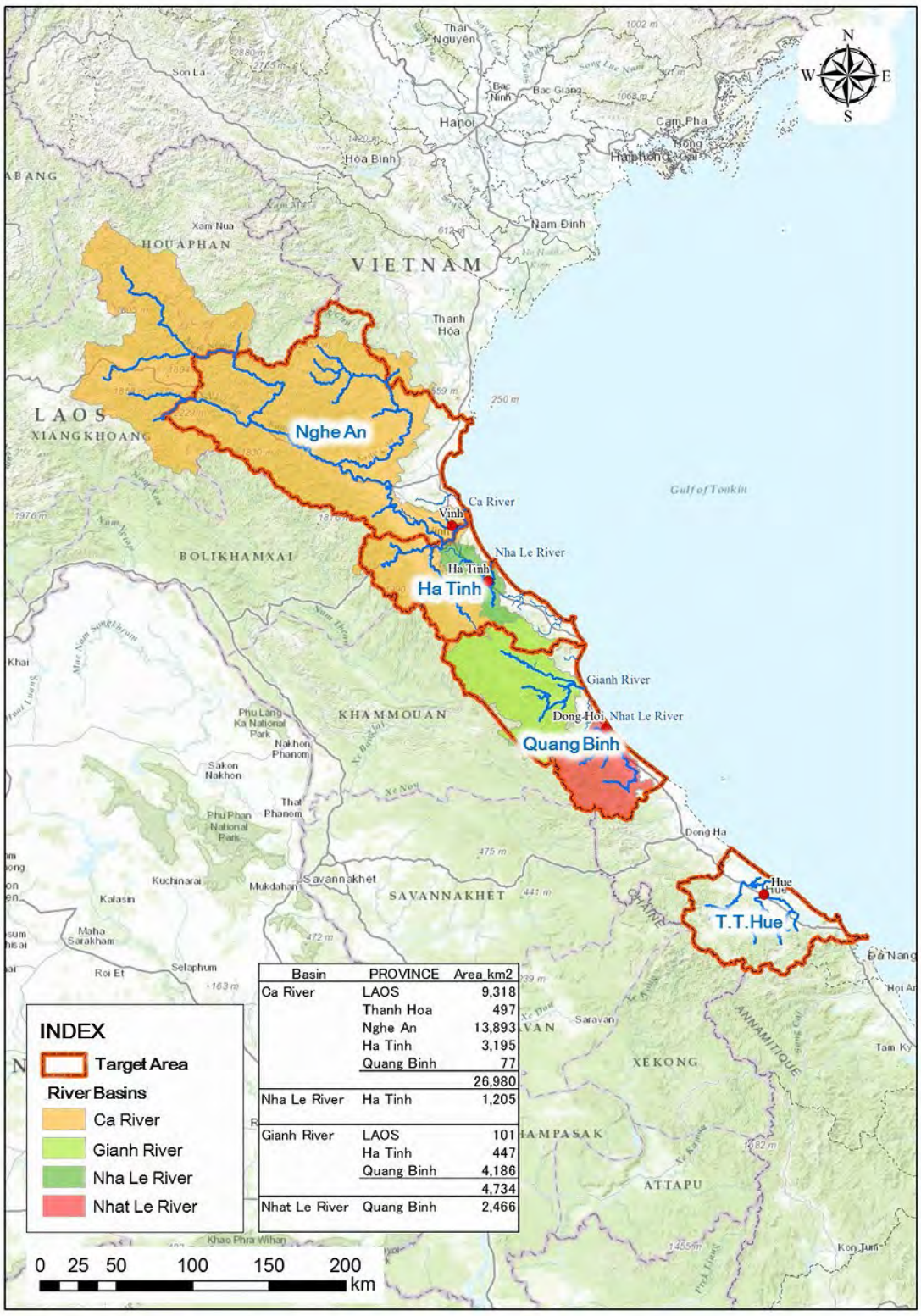
PROJECT FOR BUILDING DISASTER RESILIENT SOCIETIES IN VIETNAM PHASE 2

FINAL REPORT

AUGUST 2016

JAPAN INTERNATIONAL COOPERATION AGENCY(JICA)

JICA PROJECT TEAM
EARTH SYSTEM SCIENCE CO., LTD.
IDEA CONSULTANTS, INC.



Basin	PROVINCE	Area_km2
Ca River	LAOS	9,318
	Thanh Hoa	497
	Nghe An	13,893
	Ha Tinh	3,195
	Quang Binh	77
		26,980
Nha Le River	Ha Tinh	1,205
Gianh River	LAOS	101
	Ha Tinh	447
	Quang Binh	4,186
		4,734
Nhat Le River	Quang Binh	2,466

PROJECT TARGET AREA

INDEX

Page

TABLE INDEX

FIGURE INDEX

PHOTO INDEX

APPENDIX

ABBREVIATIONS

Abbr.	Full Name of English
C/P	Counterpart
CBDRM	Community Based Disaster Risk Management
DARD	Department of Agriculture and Rural Development
DE	Disaster Education
DEM	Digital Elevation Model
DSTIC	Department of Science, Technology and International Cooperation
DMC	Disaster Management Center
DNDPC	Department of Natural Disaster Prevention and Control
DOC	Department of Construction
DOET	Department of Education and Training
DOF	Department of Finance
DOH	Department of Health
DOIT	Department of Industry and Trade
DONRE	Department of Natural Resources and Environment
DOT	Department of Transportation
DPI	Department of Planning and Investment
DWR	Sub-department of Water Resources
GIS	Geographic Information System
HMS	Hydro-Meteorological Services
HT	Ha Tinh Province
ICHARM	International Center of Excellence for Water Hazard and Risk Management
IFM	Integrated Flood Management
IFMP	Integrated Flood Management Plan
JCC	Joint Coordination Committee
M/M	Minutes of Meeting
MARD	Ministry of Agriculture and Rural Development
MOET	Ministry of Education and Trainings
MOF	Ministry of Finance
MONRE	Ministry of Natural Resources and Environment
MPI	Ministry of Planning and Investment
NCRHMS	North Central Region Hydro Meteorological Services
NgA	Nghe An Province
NHMS	National Hydro Meteorological Services
OJT	On the Job Training
PDM	Project Design Matrix
PMU	Project Management Unit
PPC	Provincial People's Committee
PPP	Public-Private Partnership
QB	Quang Binh Province
TWG	Technical Working Group
VAWR	Vietnam Academy for Water Resources
W/G	Working Group
W/S	Workshop
WRD	Water Resources Directorate

CHAPTER 1
INTRODUCTION

CHAPTER 1: INTRODUCTION

1.1 Outline of the Project

1.1.1 Project Target Area & Project Period

The purpose of the project is to build a disaster resilient society in Vietnam under an Integrated Flood Management (IFM) system through capacity enhancement in the fields of IFM Plan (IFMP) formulation, flood risk analysis, structural measures and non-structural measures in the target provinces of Nghe An, Ha Tinh, Quang Binh and T. T. Hue, as well as developing institutional structure to implement IFM in the central levels. Accordingly it will be conducive to flood disaster prevention and mitigation in Vietnam.

The project was carried out in three (3) years from August 2013 to August 2016. The project target area is shown on the first page of the report.

1.1.2 Project Purpose, Outputs and Activities

The project purpose, outputs and activities are indicated below:

Overall Goal:
Resilience of society against water-related natural disasters is strengthened under the integrated flood management (IFM) system.

Project Purpose
Capacity for IFM planning and implementation is strengthened at central level and in target provinces.

Output 1
Institutional arrangements for IFM are strengthened at the central level.

1-1: Conduct baseline study to analyze current problems / constraints for flood and disaster management in MARD/DARDs and related organizations (including MONRE/DONRE, NHMS, and CCFSC).
1-2: Clarify institutional arrangements (from central to commune level), including roles and responsibilities, required for implementation of IFM based on the results of the baseline study conducted under activity 1-1.
1-3 Clarify issues and challenges as well as good practices of IFMP implementation to consolidate into MARD through Output 2 to 5
1-4 Formulate an action plan at the central level jointly with MARD and MONRE to improve hydro-meteorological information services including monitoring, collection and utilization of river information (such as rainfall, water level of rivers and ponds and other information. required for IFM), as well as flood forecasting.
1-5 Consider improvement of legal systems for IFM (especially river management)

Output 2
Capacity of DARD for formulating IFMPs is strengthened in Quang Binh Province (two river basins i.e. Gianh River and Nhat Le River).

2-1 Conduct a baseline survey on natural and social conditions, as well as basic information including flood disaster records, hydro-meteorological data, run-off analysis and flood simulation.
2-2 Conduct flood disaster impact analysis based on flood hazard risk mapping of different scenarios.
2-3 Formulate plan(s) of structural and non-structural measures based on the results of risk and impact analysis.

Output 3
Capacity of DARDs for flood risk analysis is strengthened (in Nghe An and Ha Tinh Provinces).

3-1 Conduct training on run-off analysis and flood simulation in Nghe An and Ha Tinh

Provinces.

3-2 Conduct flood disaster impact analysis based on flood hazard risk mapping of different scenarios.

3-3 Conduct on-the job training (OJT) on effective use of satellite information in flood forecasting in Nghe An Province.

Output 4

Structural measures for flood resilience are strengthened in the target four (4) provinces.

4-1 Implement small-scale, low-cost river bank protection works in Ha Tinh and Quang Binh Provinces

4-2 Develop operation manual(s) for effective use of the four (4) existing major reservoirs in Quang Binh Province.

4-3 Develop an embankment inspection manual in Nghe An Province.

4-4 Conduct on-the job training (OJT) on bathymetric survey in Nghe An Province.

4-5 Provide recommendation for implementation of IFMP in Hue Province

Output 5

Non-structural measures for flood resilience are strengthened in the four (4) target provinces.

5-1 Conduct community-based disaster risk management (CBDRM) activities in selected communes.

5-2 Conduct disaster education activities in coordination with CBDRM under activity 5-1.

1.2 Inputs

1.2.1 Dispatch Experts

Dispatched experts are shown in Table 1-2-1.

Table 1-2-1 Dispatched Experts

Category	Discipline	Period
Long-term Experts	Chief Advisor / Disaster Management Policy	35.0 MM
	Assistant Chief Advisor	7.0 MM
	Integrated Flood Management Planning	35.0 MM
	Project Coordinator	33.0 MM
Short-dispatched Expert	River Management	0.5 MM
	Flood Forecasting using Satellite Rainfall	0.23 MM
Short-term Experts	Integrated Flood Management Planning	8.58 MM
	Flood Forecasting and Warning	10.0 MM
	Hydrology / Meteorology, Flood Analysis 1	15.0 MM
	Hydrology / Meteorology, Flood Analysis 2	8.5 MM
	River Structural Measures	8.0 MM
	Dam Operation Management	6.5 MM
	Social Survey / Development Planning	3.0 MM
	GIS / Land Use Planning	7.0 MM
	River Planning	3.0 MM
	CBDRM / Disaster Education	10.5 MM
	Training Coordinator	3.0 MM

1.2.2 Counterpart Training in Japan

Three (3) batches of counterpart trainings in Japan were carried out on August 2014, May 2015 and May 2016. The details are described in Section 2.3

1.2.3 Subcontract Works

Subcontract works in the Project are shown in Table 1-2-2.

Table 1-2-2 Subcontract Works

Item	Province	Remarks
River cross-section survey for flood modeling	Quang Binh	100 cross-sections along the Gianh River
River cross-section Survey for riverbank protection works	Quang Binh	10 cross-sections at riverbank protection work site along the Rao Nan River
River cross-section survey for riverbank protection works	Ha Tinh	14 cross-sections at riverbank protection work site along the La River
Preparatory works for riverbank protection works	Quang Binh	Topographical & geological study / historical flood survey at river bank protection work site
Preparatory works for riverbank protection works	Ha Tinh	Topographical & geological study / historical flood survey at river bank protection work site
Riverbank protection works	Quang Binh	Quang Son Commune (Bank protection and six (6) groins)
Riverbank protection works	Ha Tinh	Duc La commune (six (6) groins)
Repair work for flood staff gauge	T. T. Hue	Repainting of 50 staff gauges
Runoff analysis for Phu Hoa dam	Quang Binh	Rainfall / run-off analysis upper PhuHoa dam
Inventory survey for riverbank erosion	Quang Binh	Inventory survey for potential riverbank erosion site along Gianh River and Nhat Le River

1.2.4 Procured Equipment

Procured equipment by the project is shown in Table 1-2-3.

Table 1-2-3 Procured Equipment

Procured in	Items	Province	Name / Model
Japan	Acoustic Probing Machine	Nghe An	Lawrence HDS-5Gen2 HST-WSBL
	3D Visualization Software	Nghe An	Reef Master 3D
Vietnam	Total Station and Survey Equipment	Nghe An	
	Digital Elevation Map	3 Provinces	10m×10m Mesh
	Workstation	3 Provinces	Dell 5521
	Plotter	Quang Binh	HP Designjet T520
	FAX	Quang Binh	Canon MX370
	Projector	3 Provinces	Sony DX100
	PC and Monitor for IFAS system	Nghe An	Dell 3847 / Sony 43”
	Motorboat and other equipment	T. T. Hue	For CBDRM
	Motorboats	Ha Tinh	For CBDRM
	PC and broadcast facilities	Nghe An	For CBDRM
	Community broadcast facilities	Quang Binh	For CBDRM

1.2.5 Work Flow

Work flow chart of the project activities is shown in Figure 1-2-1.

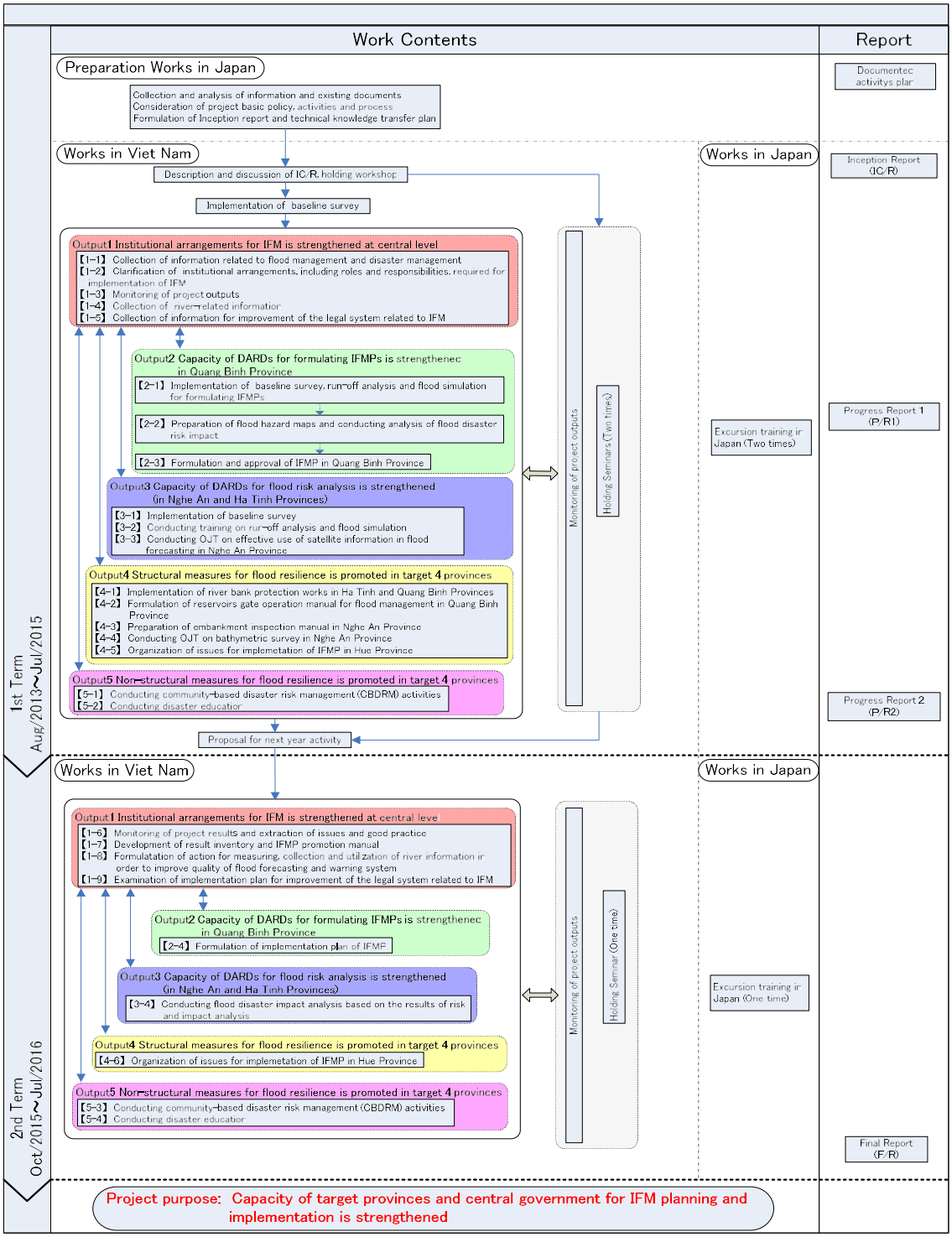


Figure 1-2-1 Work Flow

CHAPTER 2
OVERALL ACTIVITIES

CHAPTER 2: OVERALL ACTIVITIES

2.1 Joint Project Evaluation

2.1.1 Mid-term Evaluation

Outline of Evaluation

A mid-term evaluation was carried out from November 21 to December 12, 2014 one (1) year after from the project kickoff. A JCC meeting was held on the 12th of December to conclude the M/M between Mr. Thang, Vice Minister of MARD and Mr. Baba, Leader of evaluation mission team. The M/M is attached in the ANNEX.

Recommendations from the Mid-term Evaluation

According to the mid-term evaluation, eight (8) recommendations were indicated. The recommendations and implementation progress as of August 2015 are shown in Table 2-1-1.

Table 2-1-1Recommendation and Implementation after Mid-term Review

Recommendation	Implementation after Review
■IFMP Implementation	
For T.T. Hue, it is important to facilitate the implementation of IFMP. For this purpose, DARD should report to PPC and closely cooperate with other relevant agencies to secure a budget for the implementation of programs specified in the action plans. In this context, MARD and JICA should discuss measures with such important stakeholders as MOF and MPI to secure financial resources for the implementation of IFMP based on the case of T.T. Hue.	‣ Kickoff meeting with the relevant agencies for IFMP reviewing was held on April 2015. PPC and DPI also participated in the meeting. The reviewing works will be continued through the IFMP reviewing meetings in the next phase.
To date, the private sector has not been involved in the development of IFMP. Given the importance of the private sector, the team recommends that representatives from the private sector should be involved in the development of IFMP.	‣ In IFMP working group meeting on July 2015, DPI recommended to attract private investment and employ PPP in the IFMP. The applicable measures into IFMP implementation plan will be discussed in the next phase. ‣ A PSC meeting in Quang Binh province will be held on August 2015 to review the prepared draft IFMP. A representative from the Quang Binh Enterprises Association will be invited.
In order to further capacitate CPs to develop IFMP in Quang Binh Province, the CPs should increase their role in facilitation of IFMP at the working group meetings while the expert team acts as the advisors.	‣ IFMP working group meetings have been led by DARD and PPC. All of the facilitating and progress reporting were carried out by C/P side after the IFMP meeting on April 2015.
■Capacity Development on Flood Risk Analysis	
In order for NCRHMC and HMC to build sufficient capacity for simulation work without external assistance, the Project should provide sufficient training based on real-cases. The Project should also discuss	‣ NCRHMS staff who trained in the project conducted training to DARD and HMS in Ha Tinh province as trainers (December 2014). They are continuing to conduct several workshops on flood risk analysis for the

Recommendation	Implementation after Review
with MONRE (including NHMC, NCRHMC and HMC) to ensure the availability of technical support after the end of the project duration.	neighboring provinces by themselves. ‣ The collaboration works between DARD and HMS through the project have been reported to MONRE.
■Data Collection for Flood Risk Analysis	
In order to enhance the supporting capacity of NCRHMC, it would train the staff of HMC of Ha Tinh on flood risk analysis with support of the Japanese expert team in the latter period of the project duration.	‣ DARD and HMS shared existing data for flood risk analysis. However no budget to acquire the additional data has been secured. ‣ In the PSC meeting in Nghe An province, the project indicated that the river cross-section survey can be done as low-cost using the skills of bathymetry survey. The project will extend this skill not only to DARDs and HMSs but also to the local private consultants in the next phase.
■Structural Measures	
In order to facilitate the introduction of cost-effective measures, MARD should consider to give directions or guidelines to the provinces based on the experiences of the pilot construction work in Quang Binh and Ha Tinh.	‣ No concrete activity has been done at the moment. ‣ In the 2nd Annual Seminar, Mr. Trung, DMC, MARD, suggested the importance to prepare a guideline of small-scale and low-cost structural measures.
■CBDRM	
It is expected that the CBDRM to be conducted under the Project would be the excellent model for the pilot provinces to apply to other communes. Therefore, the team recommends that the Project should prepare the standard procedures and materials that can be utilized to other communes under Decision 1002.	‣ In Vietnam, the standard of CBDRM activities has not been established. Each project selects the contents of activities depending on its budget. DMC is also requesting this project to establish a standard model of CBDRM in Vietnam which can be applied to the other communes widely. The activities in this project are designed to cope with this issue. ‣ The activities in the pilot communes in T. T. Hue and Ha Tinh provinces have been conducted to establish the standard model in each province so that each local authority can apply this model to other communes. In Quang Binh and Nghe An province, the same strategy will be adopted.

2.1.2 Terminal Evaluation

Outline of Evaluation

A terminal evaluation was carried out in the period from January 4 to January 22 2016 before seven (7) months before project termination. AJCC meeting was held on January 21st to conclude the M/M between Mr. Thang, Vice Minister of MARD and Mr. Baba, Leader of evaluation mission team. The M/M is attached in the ANNEX.

Recommendation from the Terminal Evaluation

According to the Terminal Evaluation, 11 recommendations that shall be done within the project duration and 3 recommendations to be undertaken after the end of the project were indicated. The recommendations and implementation progress as of July 2016 are shown in Table 2-1-2 and Table 2-1-3.

Table 2-1-2 Recommendation and Implementation after Terminal Evaluation

Recommendation	Implementation after Mission
■IFMP Implementation	
(PCDPC in Quang Binh and T.T. Hue)To complete all the activities before the end of the project duration, particularly the development of implementation plan of IFMP and its budget plan in Quang Binh and the revision of IFMP and the budget plan in T.T. Hue as well as the manual for IFMP based on the experiences in Quang Binh and T.T. Hue.	▸ The IFMP implementation plan in Quang Binh province was finalized and will be submitted to PPC at the end of July 2016. ▸ The reviewed IFMP and its implementation plan in T.T.Hue province were submitted to Water Resources Directorate, MARD in June 2016. Based on some comments from MARD, it will be revised and submitted to PPC and approved in July 2016. ▸ IFMP formulation manual is under preparation by DMC, National Consultants and JICA experts. It will be finalized in August 2016.
(PCDPC in Quang Binh and T.T. Hue) To promote the provincial disaster prevention fund to the companies and individuals as well as encourage the private sector in the development of IFMP in Quang Binh and T.T. Hue	▸ As of May 30, 2016, 39/63 provinces including Nghe An and Ha Tinh provinces established the provincial disaster prevention fund, although the fund has not been established in Quang Binh and T.T.Hue provinces at the moment. ▸ The law on disaster prevention fund clearly stipulates the contribution from individuals, government officers and private companies including the payment rate. ▸ IFMP formulated in Quang Binh and T.T.Hue provinces strongly recommended the effective utilization of the provincial disaster prevention fund.
(The Japanese expert team and MARD) To invite other provinces with potentials to implement IFM at the final annual seminar and present the experiences of the Project	▸ Fore (4) provinces out of pilot provinces, Quang Nam, Quang Ngai, Binh Dinh and Ninh Thuan provinces, that have high potential to formulate IFMP in the next stage, were invited to the 3rd Annual Seminar and IFMP manual meeting to share the experiences of the Project.
(The Japanese expert team, MARD and MONRE) To share the Project's experiences for the implementation of the law on hydrometeorology and document necessary future actions in accordance with the laws.	▸ Actual discussion shall be started in the implementation of the grant aid project in T.T.Hue province.
(PCDPC in Quang Binh) To discuss the list of the projects in IFMP among all the relevant agencies to identify priority projects for the implementation plan	▸ Priority projects in IFMP were identified in the IFMP implementation plan as the projects implemented in the first stage of 2016-2020.

Recommendation	Implementation after Mission
■Flood Risk Analysis	
(NCRHMC and HMCs) To further enhance the capacity through learning from the Japanese expert team to conduct flood risk analysis so that NCRHMC can technically support HMCs after the end of the Project duration and that HMCs can conduct flood risk analysis by themselves.	▸ Technical trainings on flood risk analysis have continuously been conducted for NCRHMS. NCRHMS became able to develop full scale river model of Ca river using runoff, dam reservoir and weir models. ▸ NCRHMS has conducted workshops and trainings to neighboring provinces.
(DARDs) To distribute their respective hazard map developed by the Project to the districts for awareness building and development of disaster management plan at the district level	▸ The prepared hazard map in Quang Binh province was shared with Vietnamese Red cross who is conducting CBDRM activities supported by German Red cross. ▸ Commune level large-scale hazard maps were prepared and distributed to districts and communes in Quang Binh province. The preparation manual was also developed to disseminate the outputs.
(DARDs and NCRHMC/HMCs) To document the their achievements in terms of coordination and data sharing among DARD and HMC at the province level and submit to their respective higher authorities	▸ The collaboration and achievements among DARDs and HMSs were presented in the project Annual Seminar as well as JCC meeting. ▸ The achievements and future collaboration will be also recorded in M/M and summarized report attached at M/M
■Structural Measures	
(MARD) To share the reference materials produced by the Project with DARDs in other provinces and present the experiences of pilot construction work in Quang Binh and Ha Tinh to other provinces	▸ The materials and experiences related to the structural measures were shared with the other provinces at annual seminar and technical working group meeting. ▸ The design concept of river protection works was presented in several workshops and the concept paper was combined with the Guidelines developed in the Project Phase-1.
■CBDRM	
(The Japanese expert team and four provinces) To compile all the outputs of the Project and develop standard procedures that can be utilized by other communes under Decision 1002	▸ Recommendation for standard procedure on CBDRM through the activities in the pilot provinces was prepared and submitted to MARD DMC. ▸ The recommendation includes activity contents, procedure and necessary budget to conduct CBDRM in commune as well as guidance how to use hazard map in CBDRM.
(The Japanese expert and the four provinces) To present the outputs of the Project and standard procedures to MOET and DOET in the four provinces for scale-up.	▸ After the all activities on CBDRM and Disaster Education, workshops for summary and assessment were conducted in each pilot province with participation of DARD and DOET for scale-up. ▸ MARD DMC had a meeting with MOET to discuss promotion of CBDRM and Disaster Education.

Table 2-1-3 Recommended Measures after the end of the Project

Recommendation	Situation as of Now
■Flood Risk Analysis	
(MONRE and NCRHMC) To secure a budget to continue training on flood risk simulation by NCRHMC to HMCs on a regular basis	‣ NCRHMS has a certain amount of budget to conduct training to neighboring HMSs. However the budget is limited to be able to conduct the training regularly.
(DARD and NCRHMC/HMC) To discuss with PPC to secure a budget for cross-section survey that needs to be conducted periodically and share the survey data among the relevant organizations	‣ At the moment, there is no budget for periodical river cross-section survey excepting river gauging station operated by HMSs. ‣ Necessary data for flood analysis often exist in universities, institutes or government agencies. In the 3rd Annual Seminar, it was suggested that central level and provinces should collaborate to invest on such existing data.
■CBDRM	
(PCDPC and DARDs) To encourage the interested companies and individuals to contribute to the province's disaster management fund and use the fund for CBDRM	‣ IFMPs in Quang Binh and T.T.Hue provinces indicate the effectiveness of provincial disaster management fund.

2.2 Annual Seminar

2.2.1 1st Annual Seminar in Quang Binh Province (December 2014)

The 1st Annual Seminar was held in Quang Binh province on December 4-5, 2014. In order to enhance the ownership of the project, the annual seminars were held in each province, Quang Binh province in the first year, Ha Tinh province in the second year and Nghe An province in the 3rd year. The participants and agenda of the 1st Seminar are as follows.

Participants (Vietnamese side: 30, Japanese side: 16):

- WRD, MARD (Department of Dyke Management, Flood and Storm Control, DMC)
- Vietnam Academy of Water Resources, Water Resources University
- DWR, DARDs and NCRHMS / HMS in each province
- Relevant agencies in Quang Binh province

Agenda:

- Progress of the project and plan for the next year (JICA Expert)
- Progress of activities in the provinces (Representatives of DWR DARDs)
- Report of 1st C/P Training in Japan (JICA Expert, DARD Quang Binh)
- Lecture "Maximization of Net Benefit in the Limited Investment (JICA Expert)
- Riverbank protection works in Quang Binh province (DWR, DARD, Quang Binh)
- Closing Remarks (Leader of evaluation mission team)

Presentation by DARD DWR in the Seminar

Closing ceremony with mid-term review team

Photo 2-2-1 1st Annual Seminar

2.2.2 2nd Annual Seminar in Ha Tinh Province (July 2015)

The 2nd Annual Seminar was held in Ha Tinh province on July 13-14, 2015. Similar to the 1st Annual Seminar, the progress of activities of each province and knowledge obtained in the C/P training in Japan were presented by the counterparts. Three (3) guest speakers were invited from the Department of Disaster Prevention and Mitigation, Ministry of Interior, Thailand. They presented the newly enforced National Disaster Prevention and Mitigation Plan 2015 in Thailand. The participants and the agenda are as follows.

Participants (Vietnamese side: 42, Thai side: 3, Japanese side: 16):

- WRD, MARD (DMC, DNDPC, VAWR)
- DWR, DARDs and NCRHMS / HMS in each province

- Commune staff of Quang Thanh commune, Quang Dien district, T. T. Hue province
- Ha Tinh Red Cross
- German Agency for International Cooperation: GIZ
- Department of Disaster Prevention and Mitigation, Ministry of Interior, Thailand: DDPM

Agenda:

- Welcome speech (Dy. Director, DARD, Ha Tinh)
- Opening Remarks (Vice Director, DMC)
- Progress of activities in the provinces (Representatives of DARDs)
- Report of 2nd C/P Training in Japan (DWR, DARD, Ha Tinh)
- Riverbank protection works in Ha Tinh province (DWR, DARD, Ha Tinh)
- "National Disaster Prevention and Mitigation Plan" (Dy. Director, DDPM, Thailand)
- Closing Remarks (JICA Expert)

Presentation on IFM implementation

Mr. Anusorn, Guest speaker from Thailand

Photo2-2-2 2nd Annual Seminar

Technical Working Group Meeting

Following day 1 of the Annual Seminar, the Technical Working Group (TWG) meetings were held on July 14. The participants were divided into 3 groups of "Flood Risk Analysis", "Structural Measures" and "Local Disaster Management", and conducted inter-provincial discussion in each field.

Flood Risk Analysis TWG

Local Disaster Management TWG

Photo 2-2-3 Technical Working Group Meetings

2.2.3 3rd Annual Seminar in Nghe An Province (July 2016)

The 3rd Annual Seminar was held in Nghe An province on July 15-16, 2016. Unlike the 1st and 2nd seminar, the activities and achievements were presented as Output-bases. The discussion was facilitated by JICA experts as well as Vietnamese experts dispatched by the central government. In the seminar, the provinces out of pilot provinces, Quang Nam, Quang Ngai, Binh Dinh and Ninh Thuan provinces, that have high potential to formulate IFMP in the next stage, were also invited to share the project achievements. The participants and the agenda are as follows.

Participants (Vietnamese side: 85, Japanese side: 10)

- WRD, MARD (DMC, DNDPC, DSTIC, VAWR)
- Department of International Cooperation, MARD
- Department of Meteorology, Hydrology and Climate Change, MONRE
- National Center for Hydro-Met Forecasting, MONRE
- University of Water Resources
- DARD DWRs and HMSs, Nghe An, Ha Tinh, Quang Binh and T.T.Hue provinces and the other provinces
- Provincial Peoples Committee, Nghe An province

Agenda (Day 1):

- Project Implementation and Overall Achievement (JICA Expert)
- Activity and Achievement on IFMP in Quang Binh (DWR, DARD, Quang Binh)
- Activity and Achievement on Flood Analysis (DWR and NCRHMS, Nghe An)
- Activity and Achievement on Structural Measures (DWR, Nghe An and Ha Tinh)
- Activity and Achievement on Non-structural Measures (DWRs from each province)
- Introduction of Technology for river structure rehabilitation (JICA Expert)
- Report on 3rd C/P Training in Japan (DNDPC, MARD)
- Activity and Achievement on Inter-ministerial Action Plan (JICA Expert)

Agenda (Day 2):

- Review Coastal Dyke Plans from Quang Ninh to Quang Nam (VAWR, MARD)
- Coastal Erosion in the Central Area (UWR)
- Presentation of IFMP formulation manual (DMC, MARD)

Group photo of participants

Presentation from DWR, DARD

Photo 2-2-4 3rd Annual Seminar

2.3 Counterpart Training in Japan

2.3.1 The 1st C/P Training in Japan (August 2014)

General

The 1st C/P training in Japan was carried out as following.

- Title: Integrated Flood Management and River Infrastructure Management
- Period: August 18, 2014 – August 29, 2014
- Number of Trainees: 12
- Target: Counterparts from MARD, PPC, DARDs, HMSs

Objective

The purpose of this training is to understand the effectiveness of traditional measures for riverbank stabilization, dam integrated management and required regular inspection for the agencies in-charge of meteorology and river structures. The target trainees are high level officers of each counterpart agency of MARD, PPC, DARD and HMC who have responsibility for river, dam and food management. In addition, the training aims to strengthen the collaboration system between the agencies through joint training curriculums.

Schedule

The detailed schedule of the training is shown in Table 2-3-1. Due to the storm that hit Japan in August, a lecture in Hyogo prefecture on August 27 was canceled. Otherwise, there was no major change on the schedule.

Table 2-3-1Schedule of the 1st C/P Training in Japan

Date	Type	Contents	Venue
8/18		Arrival/Preparation	JICA Tokyo Center
8/19	Lecture	Briefing and Program Orientation	JICA Tokyo Center
	Lecture	Integrated management system of river information in Japan	Foundation of River & Basin Integrated Communications, Japan(FRICS)
8/20	Lecture	Meteorological observation and weather forecasting in Japan	Japan Meteorological Agency (JMA)
	Lecture	Flood control system in Tokyo metropolitan area	Arakawa-Karyu River Office, Kanto Regional Development Bureau
8/21	Lecture	Management of bank erosion and river condition	Hokuriku Regional Development Bureau
	Site Visit	Fascine mattress / Sekiya diversion channel / Nishikawa drainage pump station / Yasuragi Dyke	Shinanogawa-Karyu River Office, Hokuriku Regional Development Bureau
8/22	Lecture	Inspection of Sanjo flood fighting leaning building	Sanjo disaster prevention station
8/22	Lecture	Inspection of Okotsu diversion channel / Okotsu museum	Okotsu diversion channel / Okotsu museum
8/23			JICA Tokyo Center
8/24			JICA Tokyo Center
8/25	Lecture	Lecture of integrated flood	Kizugawa Dam Integrated

Date	Type	Contents	Venue
		management	Operation & Management Office
	Site Visit	Operation and Management ofHinachi and Seirengi Dam	Kizugawa Dam Integrated Operation & Management Office
8/26	Lecture	Yodo river integrated management dam	Yodogawa Dam Integrated Operation & Management Office
	Lecture	Yodo river flood management and visiting museum	Yodogawa River Office, Kinki Regional Development Bureau
8/26	Site Visit	Inspection of Yodo river Super Sluice, Kema flood gate, lock gate	Yodogawa River Office, Kinki Regional Development Bureau
8/27	Site Visit	Disaster Reduction and Human Renovation Institution	Disaster Reduction and Human Renovation Institution
		Preparation of Action Plan	JICA Kansai
8/28		Presentation of Action Plan Evaluation / Closing Ceremony	JICA Kansai

2.3.2 The 2nd C/P Training in Japan (May 2015)

General

The 2nd C/P training in Japan was carried out as following.

- Title: Flood Management in the Region
- Period: May 12, 2015 – May 26, 2015
- Number of Trainees: 12
- Target: Counterparts from MARD, DARD

Purpose

The purpose of this training is to understand the practices and issues on non-structural activity through flood fighting drill conducted in collaboration with the river management agency and the local government, and to obtain the knowledge on the regular inspection of dam and river structures, disaster information system, voluntary disaster mitigation activates and groin works. In addition, the trainees obtain the necessity of disaster history archives in river management.

Schedule

The detailed schedule of the training is shown in Table 2-3-2. There was no major change in the schedule.

Table 2-3-2 Schedule of the 2nd C/P Training in Japan

Date	Type	Contents	Venue
5/13		Briefing/Orientation	JICA Kyushu
	Lecture	River/dam management in Kyushu	Kyushu Regional Bureau, MLIT
5/14	Lecture	IFMP in Onga river	Onga River Office, MLIT
	Site Visit	Observation of river and dyke inspection work	
5/15	Lecture	IFMP in Yamakuni river	Yamakuni River Office, MLIT
	Site Visit	Observation of periodic inspection at Yamakei Dam	Yamakei Dam

Date	Type	Contents	Venue
5/16			
5/17	Site Visit	Flood fighting drill in Rokkaku river	Kamito river side
5/18	Site Visit	Groin in Kikuchi river	Kikuchi river side
	Lecture	Construction of Tateno dam	Kikuchi River Office, MLIT
5/19	Site Visit	Groin works in Midori river	Kumamoto River and Road Office, MLIT
	Lecture	Integrated prevention disaster information system	Kumamoto Prefecture
5/20	Site Visit	Operation, maintenance and inspection of Asakura Dam	Asakura Integrated office
	Site Visit	Egawa Dam construction / Koishiharagawa Dam construction site	Ryochiku Integrated office
	Site Visit	Operation, maintenance and inspection of Terauchi Dam	Terauchi dam maintenance office
5/21	Site Visit	Damage of a heavy rain at northern part of Kyushu and recovery project	Yabe river
	Site Visit	Visiting the Koga river library	Koga river library
	Lecture	Chikugo river management and observation of the facility	Chikugo river management office
5/22	Lecture	Promoting urban and personal disaster prevention organization	Fukuoka Prefecture
5/23		Preparation of Action plan	JICA Kyushu
5/24		Preparation of Action plan	JICA Kyushu
5/25		Presentation of action plan Evaluation / Closing ceremony	JICA Kyushu

2.3.3 The 3rd C/P Training in Japan (May 2016)

General

The 3rdC/P training in Japan was carried out as following.

- Title: IFMP in Watershed Management
- Period: May 16, 2016– May 27, 2016
- Number of Trainees: 12
- Target: Counterparts from MARD, DARD

Purpose

The purpose of this training is to understand how the watershed management is coordinated among the relevant agencies in Japan, and to understand the demarcation of budget between the central and the local governments on disaster prevention and emergency response. Through the training, the participants obtained a hint on how to implement IFMP in collaboration between MARD and DARDs.

Schedule

The detailed schedule of the training is shown in Table 2-3-3. There was no major change on the schedule.

Table 2-3-3 Schedule of the 3rd C/P Training in Japan

Date		Training Contents	Venue
5/16	Lecture	Briefing & Orientation	JICA Tokyo
	Lecture	Integrated River Basin Management and River Improvement Plan in Japan	River Planning Division, River Bureau, MLIT
5/17	Lecture	Weather and Flood Forecasting in Japan	Forecasting Division, Japan Meteorological Agency
	Lecture Site Visit	Flood Control in Tokyo Metropolitan	Ring-road 7 Underground Detention Pond / Floodgates Control Center, Tokyo
5/18	Lecture Site Visit	Dam Management in the Arakawa River Basin	Takizawa Dam Operation Center, Japan Water Agency
5/19	Lecture Site Visit	Watershed Management and Irrigation and Water Supply in Kanto Region	Tone Integrated Water-intake Center, Japan Water Agency
	Lecture Site Visit	River Improvement in Arakawa River Upstream Area	Arakawa Detention Pond, Overflow Dyke, Lateral Dyke
5/20	Lecture Site Visit	Dyke Breach of Kinugawa Dyke System in 2015	Serious Disaster Rehabilitation Project, Shimodate River Office
	Lecture Site Visit	Integrated Dam Operation during Kinugawa Dyke Breach	Kinugawa Integrated Dam Management Office
5/21	Site Visit	Site visit on “Tone River Comprehensive Flood Fighting Drill”	Tone River at Toride City, Ibaraki
5/22	Lecture	Utilization of Flood Hazard Map in Japan	Toyo University
5/23	Site Visit	Flood Control by Detention Pond	Watarase Detention Pond, Tone Upstream River Management Office
	Site Visit	Survey Technology for Dyke Management	
5/24	Lecture Site Visit	Operation and Maintenance of Irrigation Dam Reservoir	Kanto Region Agriculture and Water Facility Bureau, MAFF
5/25	Lecture Site Visit	Counter Measure for Coastal Erosion along Fuji Coastal Line	Fuji Coastal Office, Numazu River and Road Office
5/26		Preparation of Action Plan	JICA Tokyo
5/27		Presentation of Action Plan Evaluation / Closing Ceremony	JICA Tokyo

Explanation of dam operation system

Lecture of overview of Arakawa river basin

Photo 2-3-13rd Counterpart Training in Japan

CHAPTER 3
PROJECT ACTIVITIES

CHAPTER 3: PROJECTL ACTIVITIES

3.1 Output 1: Institutional Arrangement for IFM in the Central Level

3.1.1 Baseline Survey in the Central Level (1-1)

According to the enforcement of "Law on Natural Disaster Prevention and Control (No. 33 / 2013 / QH13: hereinafter called "Law on NDPC"), the organization structure of the Water Resources Directorate (WRD), MARD was changed in December 2014.

Previously, the Department of Dyke Management and Flood & Storm Control (DARD DWR) under WRD had dealt with the disaster management issues in the central government. In the new structure, the Department of Natural Disaster Prevention and Control (DNDPC) established in WRD holds the standing office of the Central Committee for Natural Disaster Prevention and Control.

The main tasks of DNDPC is to develop plans of natural disaster prevention and control for each river basin, to enhance hydro-meteorological monitoring and forecasting, strengthen capacity for early warning, raise awareness of community-based disaster risk management, review post-disaster recovery policy and improve institutional and individual capacity. It is necessary to maintain collaborative relationship with NHMS under MONRE and agencies concerned.

3.1.2 Clarification of Institutional Arrangement for IFM(1-2)

DNDPC is an advisory agency for the execution of state management function in the nationwide disaster prevention and control. In local governments, the Sub-department of Water Resources (DWR) in DARDs supports of the Commanding Committee for Natural Disaster Prevention and Control and Search & Rescue under the chairperson of the provincial people's committee.

As regulated in Law on natural disaster prevention and control, each locality is responsible for formulating and approving the natural disaster prevention and control plan. The IFMP is one of the contents that MARD has requested all localities to consider and add it into the provincial natural disaster prevention and control plan. Disaster prevention and control fund established as mentioned in Law on natural disaster prevention and control shall be one of the financial resources to carry out the disaster prevention and control activities in the province. The fund is a resource collected from governmental agencies, enterprises and individuals. PPC is able to invest the budget into local disaster management activities and facilities by themselves. However, the financial supports from the central government are still needed for a large scale of disaster prevention infrastructures. In IFMPs, therefore, it is required to clearly identify the financial resources for the each IFM project.

3.1.3 Clarification of Issues and Challenges for IFM Implementation (1-3)

In the project workshop on July 7, 2015, Mr. Thang, Vice Minister of MARD, clearly indicated the policy to promote IFM. The concept of IFM that should be formulated under the initiative of the local government is consistent with his idea of localization of disaster management.

As of July 2016, the project is preparing "IFMP Formulation Manual" in collaboration with DNDPC, DMC and T.T.Hue and Quang Binh provinces who formulated IFMP. The

manual will be disseminated into the other provinces before the end of the Project.

Table 3-1-1 Workshops / trainings on activity 1-3

Date	Contents	Target
Jun. 14, 2016	Kickoff meeting for IFMP formulation manual	DWRD NDPC, DMC, VAWR, WRU, NHMS
Jul. 16, 2016	Workshop for IFMP formulation manual	DWR DNDPC, DMC,NHMS, Provinces
Jul. 26, 2016	Seminar for IFMP formulation manual	DWR DNDPC, DMC,NHMS, Provinces

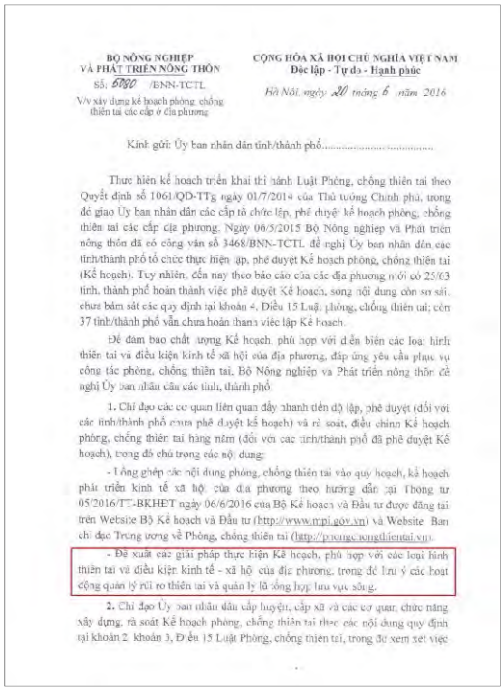
3.1.4 Formulation of Action Plan between MARD / MONRE (1-4)

The relationship between MARD, MONRE (including NHMS) and PPC under the Law on NDPC and the relationship between MONRE and PPC on the Law on Hydro-Meteorology are in accord with the concept of IFM. A JICA Grand Aid project of "Effective Dam Operation in Emergency Cases and Flood Management Plan by use of Integrated Disaster Information System" in T. T. Hue province shall be a good practice to enhance the collaboration work within those government agencies and to formulate an inter-ministerial action plan in the future.

3.1.5 Consideration of Improvement of Legal System for IFM (1-5)

According to the intention of the Vice Minister, MARD is planning to extend IFM across the county of Vietnam. In addition, MARD issued an official document to the provincial governments to ensure the formulation of disaster prevention and control plan at local level on June 20, 2016. In this document, it was clearly mentioned that the Plan should be in accordance with disaster and socio-economics conditions, in which, "IFM" should be considered.

The project has been intended to secure the budget for IFMP using the central government budget for large-scale construction or the provincial disaster prevention fund for maintenance and rehabilitation of facilities. It is expected for the central and local governments to utilize effectively the IFMP formulation manual to secure the both financial resources.



BỘ NÔNG NGHIỆP
VÀ PHÁT TRIỂN NÔNG THÔN
Số: 6797 /BNN-TCTL
V/v xây dựng kế hoạch phòng, chống thiên tai các cấp ở địa phương

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

Hà Nội, ngày 20 tháng 6 năm 2016

Kính gửi: Ủy ban nhân dân tỉnh/thành phố.....

Thực hiện kế hoạch triển khai thi hành Luật Phòng, chống thiên tai theo Quyết định số 1061/QĐ-TTg ngày 01/7/2014 của Thủ tướng Chính phủ, trong đó giao Ủy ban nhân dân các cấp tổ chức lập, phê duyệt kế hoạch phòng, chống thiên tai các cấp địa phương. Ngày 06/5/2015 Bộ Nông nghiệp và Phát triển nông thôn đã có công văn số 3468/BNN-TCTL đề nghị Ủy ban nhân dân các tỉnh/thành phố tổ chức thực hiện lập, phê duyệt Kế hoạch phòng, chống thiên tai (Kế hoạch). Tuy nhiên, cho đến nay theo báo cáo của các địa phương mới có 25/63 tỉnh, thành phố hoàn thành việc phê duyệt Kế hoạch, song nội dung còn sơ sài, chưa bám sát các quy định tại khoản 4, Điều 15 Luật phòng, chống thiên tai; còn 37 tỉnh/thành phố vẫn chưa hoàn thành việc lập Kế hoạch.

Để đảm bảo chất lượng Kế hoạch, phù hợp với diễn biến các loại hình thiên tai và điều kiện kinh tế xã hội của địa phương, đáp ứng yêu cầu phục vụ công tác phòng, chống thiên tai, Bộ Nông nghiệp và Phát triển nông thôn đề nghị Ủy ban nhân dân các tỉnh, thành phố:

1. Chỉ đạo các cơ quan liên quan đẩy nhanh tiến độ lập, phê duyệt (đối với các tỉnh/thành phố chưa phê duyệt kế hoạch) và rà soát, điều chỉnh Kế hoạch phòng, chống thiên tai hàng năm (đối với các tỉnh/thành phố đã phê duyệt Kế hoạch), trong đó chú trọng các nội dung:

- Lồng ghép các nội dung phòng, chống thiên tai vào quy hoạch, kế hoạch phát triển kinh tế xã hội của địa phương theo hướng dẫn tại Thông tư 05/2016/TT-BKHĐT ngày 06/6/2016 của Bộ Kế hoạch và Đầu tư được đăng tải trên Wetsite Bộ Kế hoạch và Đầu tư (http://www.mpi.gov.vn) và Website Ban chỉ đạo Trung ương về Phòng, chống thiên tai (http://pctwc.nongthienvn).

- Đề xuất các giải pháp thực hiện Kế hoạch, phù hợp với các loại hình thiên tai và điều kiện kinh tế - xã hội của địa phương, trong đó lưu ý các hoạt động quản lý rủi ro thiên tai và quản lý tổng hợp lưu vực sông.

2. Chỉ đạo Ủy ban nhân dân cấp huyện, cấp xã và các cơ quan, chức năng xây dựng, rà soát Kế hoạch phòng, chống thiên tai thực các nội dung quy định tại khoản 2, khoản 3, Điều 15 Luật Phòng, chống thiên tai, trong đó xem xét việc

Figure 3-1-1 Official Document to PPCs

3.2 Output 2: Formulation of IFMP in Quang Binh Province

3.2.1 Runoff and Flood Analysis in Quang Binh Province (2-1)

For the purpose of improving the C/P's technical capabilities on runoff and flood analysis, the Gianh River basin and the Nhat Le River basin flood analysis models for IFMP have been developed through the OJT activity. In the model developing process, various errors have occurred and have been solved with C/Ps through trial and error procedures. It was the most meaningful process in terms of understanding well the model structure and improving modeling techniques.

Data Collection, Rainfall and Runoff Analysis

Hourly hydrological data (rainfall, water-level and discharge records) on recent major flood events (2007, 2010, 2011 and 2013) have been collected with different formats in each observation system. Based on the collected daily rainfall records in 20 stations (1977 – 2013, 160,000 records), basin average rainfall of 1-day, 2-days and 3-days at specific points have been estimated and probable average rainfall was estimated through statistical method.

MIKE NAM which has been well used by HMS was applied for the runoff analysis model for the Gianh and the Nhat Le river basin and the model has been calibrated based on the observed records.

Flood Simulation

Preliminary flood analysis model for Gianh and Nhat Le river basins were developed by MIKE 11 (quasi 1D) model and iRIC Nays2Dflood (2D). Then it was upgraded into MIKE Flood (1D channel + 2D flood). The latest survey results were also compiled into the model. When changing the basic model structure, issues of modeling were shared and discussed with C/Ps on each change.

Table 3-2-1Workshops / trainings on activity 2-1

Date	Contents	Target
Oct. 20-22, 2014	Workshop on GIS application	QB DARD DWR, HMS
Apr. 1-3, 2015	Technical seminar on basic IFAS modeling and its application	QB HMS
Apr. 10, 2015	Technical seminar on basic IFAS modeling and its application	QB DARD DWR

3.2.2 Hazard Mapping and Impact Analysis in Multiple Scenarios (2-2)

After detailed discussions with DARD DWR, 14 scenarios for the Gianh river basin and 15 scenarios for the Nhat Le river basin were selected for impact assessment considering rainfall probability, climate change, forest conservation and flood control facilities. On the basis of impact assessment scenarios, the related project costs were also estimated by DARD DWR. The applied scenarios for the impact assessment are summarized in Table 3-2-2, Table 3-2-3, and one example of results is shown in Figure 3-2-1.

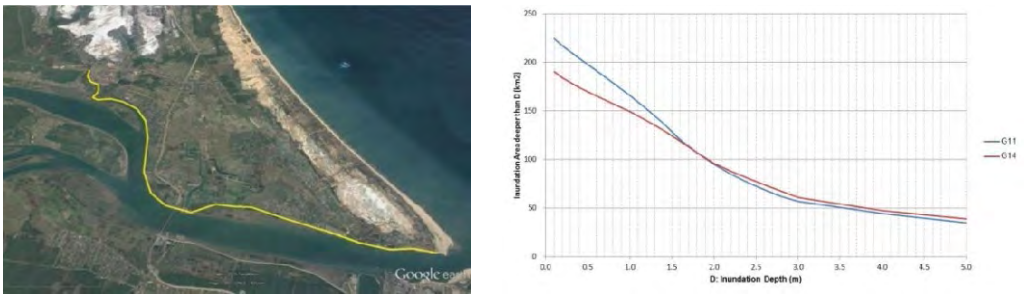
Table 3-2-2 Impact Assessment Scenarios for Gianh River Basin (14 cases)

No.	Impact	Scenarios
G01	▸Present condition	▸Present basin condition
G02	▸Flood intensifying	▸B2 scenario in 2020 ▸Rainfall Increase: +1.5%, Sea-level Rise: +12cm
G03		▸B2 scenario in 2050 ▸Rainfall Increase: +4.0%, Sea-level Rise: +30cm
G04		▸B2 scenario in 2100 ▸Rainfall Increase: +7.7%, Sea-level Rise: +75cm
G05	▸Rainfall magnitude	▸5-year probable rainfall
G06		▸10-year probable rainfall
G07		▸20-year probable rainfall
G08		▸25-year probable rainfall
G09		▸50-year probable rainfall
G10		▸100-year probable rainfall
G11	▸Rainfall magnitude ▸Flood intensifying	▸20year probable rainfall ▸B2 scenario in 2020 Rainfall Increase: +1.5%, Sea-level Rise: +12cm
G12	▸Rainfall magnitude ▸Flood intensifying ▸Reforestation	▸20year probable rainfall ▸B2 scenario in 2020 Rainfall Increase: +1.5%, Sea-level Rise: +12cm ▸Forest coverage rate: 85%
G13	▸Rainfall magnitude ▸Flood intensifying ▸Deforestation	▸20year probable rainfall ▸B2 scenario in 2020 Rainfall Increase: +1.5%, Sea-level Rise: +12cm ▸Forest coverage rate: 55%
G14	▸Rainfall magnitude ▸Flood intensifying ▸Flood protection work for urban and urban planning area	▸20year probable rainfall ▸B2 scenario in 2020 Rainfall Increase: +1.5%, Sea-level Rise: +12cm ▸Flood protection measure for Ba Don town

Table 3-2-3 Impact Assessment Scenarios for Nhat Le River Basin (15 cases)

No.	Impact	Scenarios
N01	▸Present condition	▸Present basin condition
N02	▸Flood intensifying	▸B2 scenario in 2020 ▸Rainfall Increase: +1.5%, Sea-level Rise: +12cm
N03		▸B2 scenario in 2050 ▸Rainfall Increase: +4.0%, Sea-level Rise: +30cm
N04		▸B2 scenario in 2100 ▸Rainfall Increase: +7.7%, Sea-level Rise: +75cm
N05	▸Rainfall magnitude ▸Rainfall magnitude	▸5-year probable rainfall
N06		▸10-year probable rainfall
N07		▸20-year probable rainfall
N08		▸25-year probable rainfall
N09		▸50-year probable rainfall
N10		▸100-year probable rainfall
N11	▸Rainfall magnitude ▸Flood intensifying	▸20year probable rainfall ▸B2 scenario in 2020 Rainfall Increase: +1.5%, Sea-level Rise: +12cm ▸ (Present forest coverage rate: 68%)
N12	▸Rainfall magnitude	▸20year probable rainfall

	▸Flood intensifying ▸Reforestation	▸B2 scenario in 2020 Rainfall Increase: +1.5%, Sea-level Rise: +12cm ▸Forest coverage rate: 85%
N13	▸Rainfall magnitude ▸Flood intensifying ▸Deforestation	▸20year probable rainfall ▸B2 scenario in 2020 Rainfall Increase: +1.5%, Sea-level Rise: +12cm ▸Forest coverage rate: 55%
N14	▸Rainfall magnitude ▸Flood intensifying ▸Flood protection work for urban and urban planning area	▸20year probable rainfall ▸B2 scenario in 2020 Rainfall Increase: +1.5%, Sea-level Rise: +12cm ▸Flood protection measure for along Nhat Le river
N15	▸Rainfall magnitude ▸Flood intensifying ▸Reduction of flooding impact	▸20year probable rainfall ▸B2 scenario in 2020 Rainfall Increase: +1.5%, Sea-level Rise: +12cm ▸KienGiang flood diversion channel



A scenario of Ba Don Town Flood Protection　　Example result of the Impact Analysis

Figure 3-2-1 Result of Flood Impact: Ba Don Town Flood Protection Dyke System

GIS Mapping for Development Plans, Structural Objects and Infrastructures

In order to estimate the flood impact as a basic data for IFMP formulation, the simulation results under several scenarios, development plans (economic zone, industrial park, residential area, bypass road, etc.), structural objects, infrastructures were converted into an unified format of GIS database.

In the IFMP working group meeting, the members discussed their own development plans and the flood prone area to identify the discordance on the compiled map. So that the members identified good practices in the development plans that could contribute to the mainstreaming of disaster risk reduction in province.

Multi-scenario Flood Hazard Map

Multi-scenario flood hazard maps for Gianh river and Nhat Le river were developed and printed as an IFMP Atlas. The contents of the Atlas were decided in discussion with DARD DWR. This Atlas was officially approved by PPC on October 2015 as an attachment of IFMP in Quang Binh province. The map index is shown in Table 3-2-4, and a sample map is shown in Figure 3-2-2.

Table 3-2-4 Index of IFMP Map Library

Fig	Map	Size	Scale
Fig.01	General Information Map of Gianh River Basin	A2	1/100,000
Fig.02	General Information Map of Nhat Le River Basin	A2	1/100,000
Fig.03	IFMP Impact Assessment Map (Flood in 2010, Return Period-20 years, 5%) Gianh River	A2	1/100,000
Fig.04	IFMP Impact Assessment Map (Flood in 2010, Return Period:20 years, 5%) Nhat Le River	A2	1/100,000
Fig.05	IFMP Impact Assessment Map (Flood in 2010, Return Period-20 years, 5%) Gianh River, Considering Climate Change to 2050 (B2 Scenario)	A2	1/100,000
Fig.06	IFMP Impact Assessment Map (Flood in 2010, Return Period:20 years, 5%) Nhat Le River, Considering Climate Change to 2050 (B2 Scenario)	A2	1/100,000
Fig.07	IFMP Impact Assessment Map (Flood in 2010, Return Period-50 years, 2%) Gianh River	A2	1/100,000
Fig.08	IFMP Impact Assessment Map (Flood in 2010, Return Period:50 years, 2%) Nhat Le River	A2	1/100,000
Fig.09	IFMP Impact Assessment Map (Flood in 2010, Return Period-100 years, 1%) Gianh River	A2	1/100,000
Fig.10	IFMP Impact Assessment Map (Flood in 2010, Return Period:100 years, 1%) Nhat Le River	A2	1/100,000
Fig.11	Land Use Map for Prediction of Damage Amount, Gianh River	A2	1/100,000
Fig.12	Land Use Map for Prediction of Damage Amount, Nhat Le River	A2	1/100,000
Fig.13	River Bank Erosion Map, Gianh River	A2	1/100,000
Fig.14	River Bank Erosion Map, Nhat Le River	A2	1/100,000
Fig.15	CBDRM Implementation Map, Gianh River	A2	1/100,000
Fig.16	CBDRM Implementation Map, Nhat Le River	A2	1/100,000

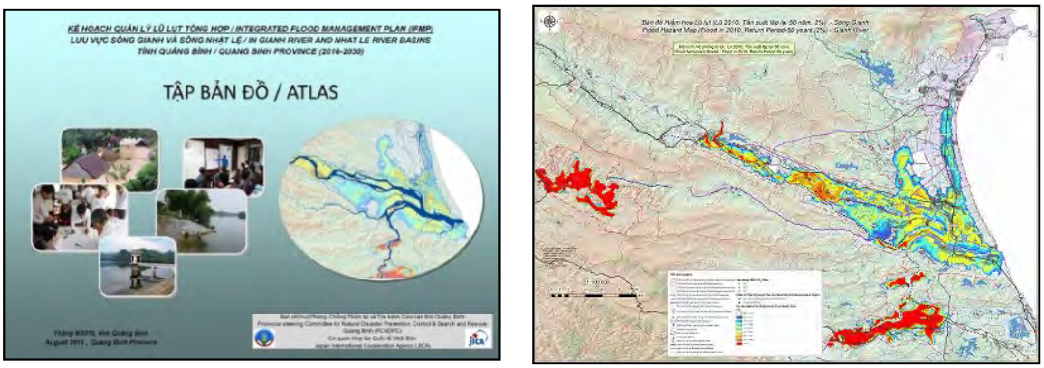


Figure 3-2-2 Image of IFMP Atlas

Development of District-level Hazard Maps

The prepared hazard maps should be utilized for CBDRM activities and formulation of community disaster management plan. Therefore, DARD DWR prepared large-scale hazard maps (1/5,000) from provincial hazard map and printed them. A workshop was conducted at DWR to learn how to adjust the output scale and to overlay the several flood scenarios on GIS database. The procedure was explained in a preparation manual, so that

the DWR is able to continuously support the district and communes for their activities. An example of district-level hazard map is shown in Figure 3-2-3.

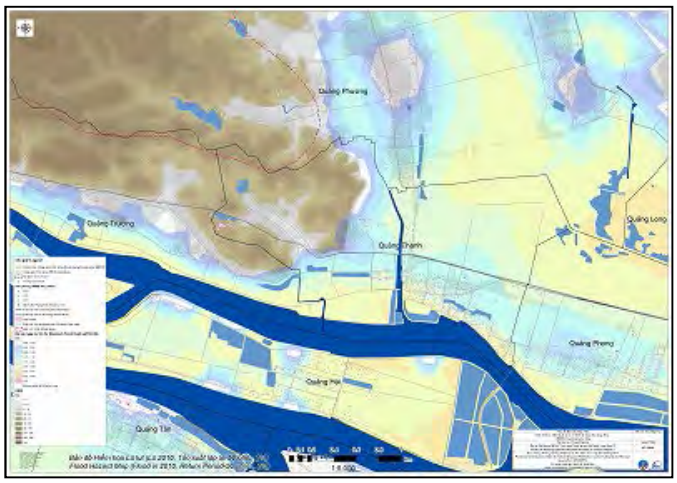


Figure 3-2-3 Example of District-level Hazard Map

Table 3-2-5Workshops / trainings on activity 2-2

Date	Contents	Target
Sep. 25, 2014	Introduction of Flood Impact Assessment Method	IFMP working group
Dec. 3, 2014	Progress of Flood Impact Assessment	IFMP working group
Dec. 12, 2014	Seminar on Results Flood Impact Assessment	IFMP working group
Apr. 23, 2015	Damage Estimate based on the Flood Impact Assessment	IFMP working group
Jan. 13, 2016	GIS database and map updating procedure	DARD DWR
May. 20, 2016	Preparation of District-hazard map on GIS	DARD DWR

3.2.3 IFMP Formulation in Quang Binh Province (2-3)

After the IFMP kickoff meeting on July 25, 2014, total of nine (9) IFMP working group meetings were held in Quang Binh province. The working group discussed the themes prescribed in collaborative works between PMU members and the project team. Through this process, the PMU and IFMP working group members obtained knowledge on the IFMP formulation process. The agendas of each meeting are shown in Table 3-2-6.

Table 3-2-6List of IFMP working group meeting and agendas

Date	Agenda
Jul. 25, 2014 Kickoff Meeting	▸Basic concept of IFMP ▸IFMP formulation in T. T. Hue province in Phase-1 project (DARD DWR Hue) ▸Proposal of IFMP working group member
Sep. 25, 2014 1st IFMP Meeting	▸Introduction of IFMP working group member ▸Progress of Quang Binh Action Plan on Disaster Prevention to 2020 ▸Introduction of impact analysis and vulnerability assessment
Dec. 3, 2014 2nd IFMP Meeting	▸Reviewing of structural / non-structural measures in Quang Binh province ▸Progress report of impact analysis and vulnerability assessment ▸Review of development plans and table-top discussion on the risk map

Apr. 23, 2015 3rd IFMP Meeting	▸Reporting of the result of impact analysis and damage assessment ▸Confirmation of basic concept of IFMP in Quang Binh province ▸Requested items to relevant agencies for formulation of draft IFMP
Jul. 9, 2015 4th IFMP Meeting	▸Report of inventory survey for river bank erosion ▸Achievement of Action Plan on Disaster Prevention to 2020 ▸Importance of securing the emergency budget into IFMP ▸Requested items to relevant agencies for finalizing of draft IFMP
Aug. 5, 2015 5th IFMP Meeting	▸Approval of IFMP draft within IFMP working group ▸Confirmation of detailed schedule for PPC approval
Dec. 15, 2015 6th IFMP Meeting	▸Report of PPC approval ▸Report of field observation on structural measures at district level ▸Report of CBDRM activities ▸Policy of IFMP implementation plan
Mar.9, 2016 7th IFMP Meeting	▸Implementation budget and agency for IFMP implementation plan ▸Quang Binh province socio-economic development plan (2016-2020) ▸Procedure of IFMP implementation plan and criteria of priority project
May. 6, 2016 8th IFMP Meeting	▸Confirmation of project list of IFMP implementation plan ▸Introduction of IFMP review in T.T.Hue province
Jul. 7, 2016 9th IFMP Meeting	▸Approval of IFMP implementation plan (draft) in working group ▸Introduction of application of ODA loan into IFMP projects

The IFMP working group meetings had been conducted with the participation of working group members from relevant agencies in Quang Binh province. The meetings were chaired by the Deputy Director of DARD. Considering the approval process, a representative from PPC was also involved. The working group members are listed in Table 3-2-7.

Table 3-2-7List of IFMP Working Group Member

No.	Name	Organization	Position
1	Dang Tien Dung (Group leader)	DARD	Vice Director/Director of DRSV-2
2	Nguyen Ngoc Phung (Member)	DARD DWR	Director/Vice Director of DRSV-2
3	Tran Van Hoai (Member)	PPC Office	Head of Economic Affairs Division
4	Ho Nhat Binh (Member)	DOIT	Head of Planning Financing Division
5	Nguyen Xuan Hoang (Member)	DOC	Head of Division of Urban Development
6	Phan Dinh Hung (Member)	DONRE	Vice Head of Division of Sea and Island
7	Pham Huu Chung (Member)	DOT	Vice Head of Division of Traffic Management
8	Pham Thi Dao (Ms) (Member)	DOF	Vice Head of Finance Division
9	Tran Tan An (Member)	DOH	Vice Head of Planning – Finance Division
10	Dinh Duy Trung (Member)	DPI	Division of Economic Affairs Division
11	Dinh Ngoc Ha (Member)	DOET	Division of Planning
12	Ha Xuan Dan (Member)	DARD DWR	Staff
13	Le Xuan Khanh (Member)	HMC	Staff

Review of Provincial Development Plans

For IFMP formulation, it is important to review the development plans of each sector (urban development, economical/industrial development, water resources development, irrigation works, environment conservation, transport infrastructures and social infrastructures of hospitals and schools) under expected flood risk. The high priority development plans

exposed to the flood risk were reviewed with related agencies individually. Then, it was discussed in the IFMP working group meetings.

On the other hand, the disaster prevention programs / projects in Quang Binh province are already listed with necessary budgets in "Quang Binh Action Plan on Disaster Prevention to 2020". These programs / project in the Action Plan should be reviewed and involved into the IFMP. Thus, the project requested IFMP working group members to submit the progress reports of the Action Plan.

Flood Vulnerability Assessment

The IFMP in Quang Binh province would priotized non-structural measures rather than structural measures because there are no large-scale dam and dyke systems. For the prioritization of non-structural measures, vulnerability assessment based on flood impact analysis is essential.

From this viewpoint, firstly, the project examined vulnerability mapping using vulnerability indicators of Exposure, Sensitivity and Adaptation. In the IFMP working group meeting, however, it was suggested that vulnerability assessment cannot directly apply for the prioritization of the communes, considering the actual interest in districts level. Therefore, the result of the vulnerability assessment was employed as a reference to design the overall non-structural measures in each sector in the process of IFMP formulation.

Approval Process of Draft IFMP

The first draft of IFMP was submitted in the 4th IFMP working group meeting held on July 9, 2015, based on discussion in the previous meetings. Working group members took back the first draft to each office to review the contents and revise necessary items. The revised version was approved in the 5th IFMP working group meeting on August 5, 2015.

On August 7, 2015, the draft IFMP was reviewed in the Project Steering Committee (PSC) composed of Deputy Directors from relevant agencies under the initiative of PPC. Then, the IFMP was approved by PPC as an official plan of Quang Binh province (PPC Decree No.2946/QB-UBND).

The IFMP working group meeting has continuously worked for the IFMP Implementation Plan. The schedule of IFMP and Implementation Plan formulation is shown in Figure 2-3-4.

In the planning process, the working group has discussed 5-years priority projects and the budgetary resources in the meeting. Though the budgetary issues still remain, the relevant agencies made consensus on the priority projects for flood and storm control. The Implementation Plan will be approved by the end of the Project.

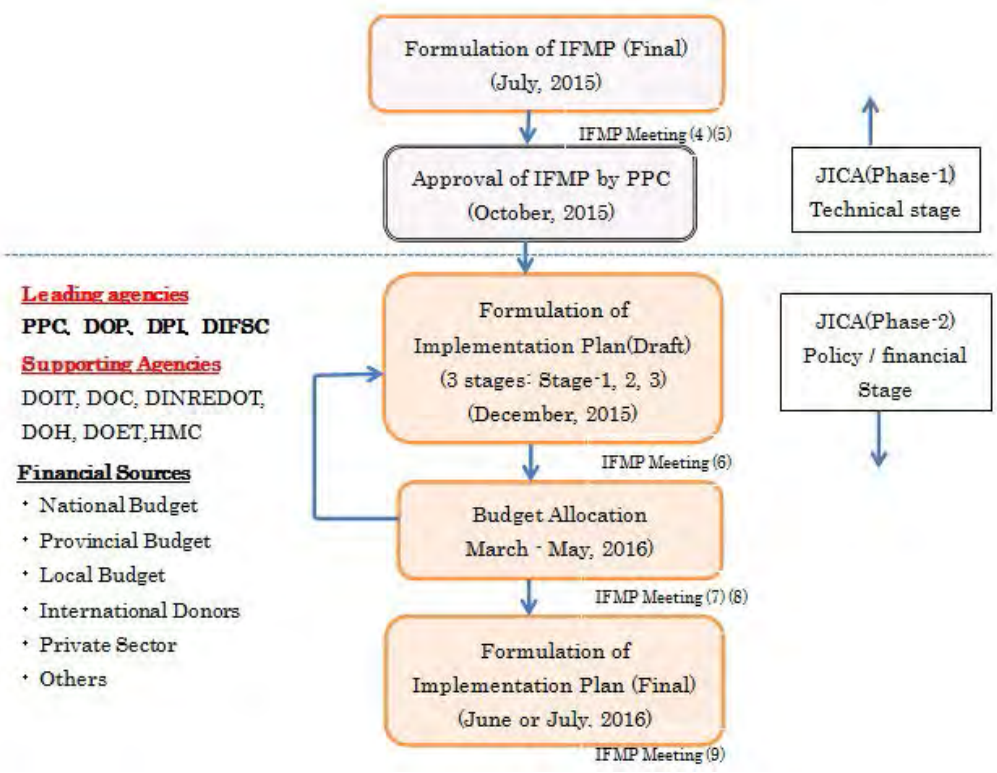


Figure 3-2-4 Formulation schedule of IFMP and Implementation Plan

3.3 Output 3: Flood Risk Analysis in Nghe An and Ha Tinh Provinces

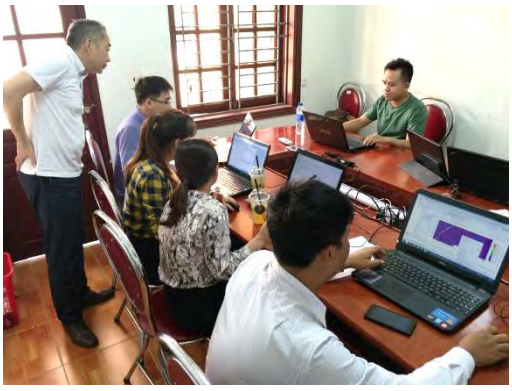
3.3.1 Flood Simulation and Impact Analysis in Nghe An Province (3-1,2)

Aiming to strengthen technical capacity of flood risk analysis, practical training workshops on flood analysis modeling for the Bung river basin and the essential skills, such as GIS, were mainly organized in the following activities;

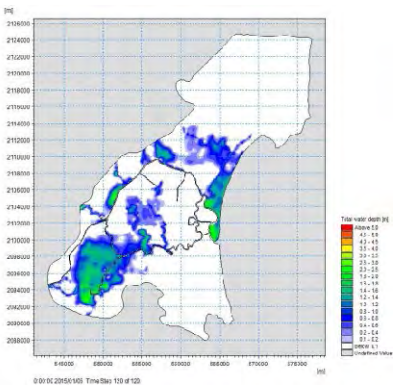
Workshop on GIS utilization (introduction of available GIS data, application of ArcHydro Tools, data conversion between ArcGIS and Google Earth, application of free satellite image data, etc.) was held for C/Ps of DARD DWR Nghe An province to enhance the GIS application skills which are required for the modeling.

A modeling method of tentative Bung river basin flood analysis model by using iRIC Nays2Dflood (2D flood analysis), and technical skills for data preparation using GIS were shared with C/Ps. However because the Nays2Dflood model is unable to consider the high density irrigation channels and small dykes that affect the flood behavior, another technical support of MIKE Flood model adopted for Quang Binh and T.T.Hue provinces, was requested by C/Ps. Firstly, training for simple MIKE Flood model targeting DARD DWR and NCRHMS was conducted. Then the final Bung river flood model was developed though OJT.

Initially, NCRHMS prepared a new Ca river basin MIKE 11 model including upper dam reservoirs based on the request from DARD DWR. However, NCRHMS face technical problems for modelling with modeling errors in the detailed new model structures. A MIKE 11 modelling expert from HMS Quang Binh province (who was trained by the Project activity in Quang Binh) joined the NCRHMS modelling team and trained them for one (1) week. Finally, a basic new Ca river basin MIKE 11 model was developed without errors.



Technical training at DARD DWR



An example of Bung river flood model

Photo 3-3-1 Development of MIKE Flood model for Bung river

Table 3-3-1 Workshops / trainings on activity 3-1,2 in Nghe An

Date	Contents	Target
Jul. 14-15, 2014	Workshop on GIS (application of ArcHydro Tools)	DARD DWR, NCRHMS
Oct. 24, 2014	Workshop on basic modeling for flood analysis (data preparation by using GIS)	DARD DWR, NCRHMS
Jun. 22-26, 2015	Training on MIKE 11 modeling for Ca river basin	NCRHMS, QB HMS

Jun. 26, 2015	Technology exchange seminar for flood simulation modelling	DARD DWR, NCRHMS
Jun. 30, 2015	Workshop of iRIC Nays2Dflood modeling for Bung river basin	DARD DWR
Apr. 6-15, 2016	Training for development of MIKE Flood simple model	DARD DWR, NCRHMS
Jun. 23-30, 2016	Training for development of MIKE Flood model for Bung river basin	DARD DWR

3.3.2 Flood Simulation and Impact Analysis in Ha Tinh Province (3-1,2)

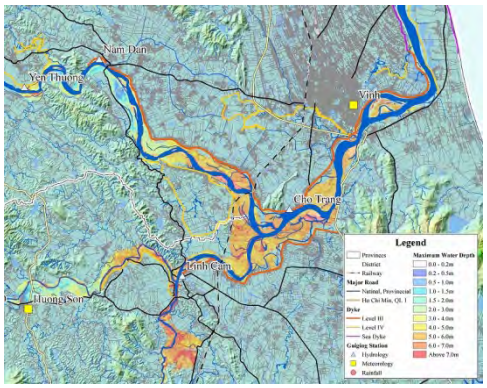
Based on the baseline survey at the beginning of the project, the OJT on runoff and flood analysis in Ha Tinh province was conducted targeting NCRHMS in Nghe An province. The NCRHMS is the supervisory authority to Ha Tinh, Nghe An and Thanh Hoa province, and has a good relationship with DARD DWR and Provincial HMSs. So the Project trained the NCRHMS first, then the trainees trained HMS in Ha Tinh province.

In the Pre-JCC meeting held in December 2013, it was agreed that the target river basins for OJT in Ha Tinh province should be Ngan Pho river basin (Catchment Area : 1,100 km^2) and Ngan Sau river basins (Catchment Area : 2,100 km^2). The former has short river length and experiences of flood flash type. The latter flow down in a mountain basin, and the flood duration is long because of the narrow channel of the basin. Using these two different river characteristics, the impacts of the training would be constructive.

In December 2014, the final training of runoff and flood simulation using GIS and MIKE 11 was held in DARD DWR Ha Tinh province. In this training, NCRHMS staff trained in the project became trainers and conducted the training on data preparation, model development and calibration for runoff and flood simulation. The trainees of Ha Tinh province learned how, and developed the skills to prepare hazard maps.

Further, NCRHMS conducted several workshops for the other provinces during the absence of the expert in order to share the experience and knowledge obtained in the project. NCRHMS staff presented the outputs of runoff and flood simulation modeling as lecturers in the workshops. HMSs other than the project target provinces have participated in these workshops. Such activities contribute to dissemination of the project outputs to the region.

Training conducted by NCRHMS staff



Prepared Flood Hazard Map (100-yr flood)

Photo 3-3-2 Training and Prepared Hazard Map

Table 3-3-2 Workshops / trainings on activity 3-1, 2 in Ha Tinh

Date	Contents	Target
Aug. 25, 2014	Application of run-off and flood model at Ban Ve Dam located at upstream of Ca River	NCRHMS
Nov.6, 2014	Discussion for Estimated Flood Scenario	DARD DWR, NCRHMS
Nov. 11, 2014	Operation of the new observation system	NCRHMS
Dec. 13, 2014	Data collection of Nam Dan hydrological station and its data management	NCRHMS
Dec. 16, 2014	Training for GIS, MIKE 11 Modeling	DARD DWR, HMS, NCRHMS
Mar. 17, 2015	Workshop for GIS MIKE 11 Modeling, IFAS	NCRHMS, HMS, Thanh Hoa HMS

3.3.3 Flood Forecasting using Satellite Information (3-3)

Because the upper catchment area of the Ca River basin is in Laos, where hydro-meteorological data are unavailable, the project supports to install an IFAS model into the Ca River basin in order to establish real-time flood forecasting system using satellite-obtained precipitation data.

The project has conducted several technical trainings targeting DARD DWR and NCRHMS in Nghe An province. The basic modeling and parameter calibration with observed discharges have been conducted in 2014. In April, 2015, the project invited a trainer from ICHARM, a developer of IFAS, in order to conduct more technical training on parameter setting and developing AutoIFAS, automatic data collection and forecasting system.

In addition to DARD DWR and NCRHMS in Nghe An province, DARD DWR and HMS in Ha Tinh province and HMS in Quang Binh provinces also participated in the training. All participants had a high level of interest in IFAS, and obtained know-how of parameter calibration between calculated and observed runoff. Since only the 2010 flood was examined in the training, the participants will continue to adjust the parameters by themselves using other flood year scenarios. HMS in Quang Binh is continuously developing IFAS model into the Gianh River basin under the support of the project.

The project also installed two sets of PC and large size hanging screen for AutoIFAS at DARD DWR and NCRHMS to monitor the forecasted discharge during flood season. NCRHMS uses this system not only for Ca river but also for the upstream of La river basin.

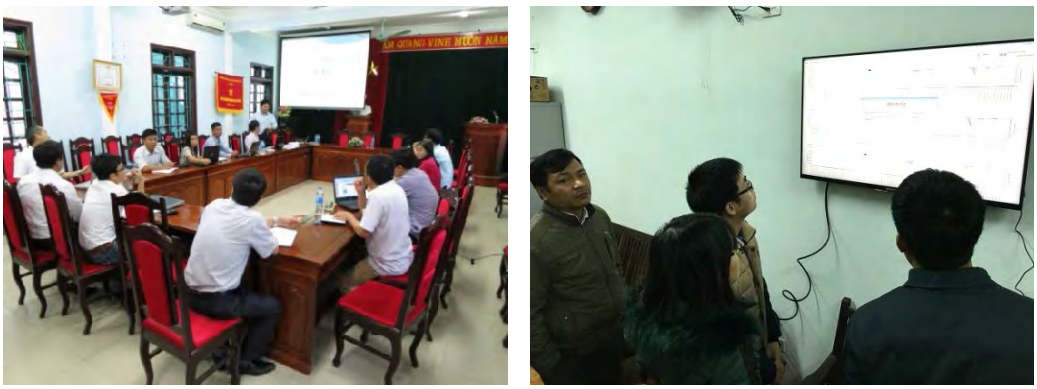


Photo 3-3-3 IFAS Training and AutoIFAS monitoring screen

Table 3-3-3 Workshops / trainings on activity 3-3

Date	Contents	Target
Nov. 19-20, 2014	Introduction of IFAS and AutoIFAS to be installed into Ca river forecasting model	DARD DWR, NCRHMS
Dec. 16-18, 2014	Developing basic model, parameter setting, tentative setting of AutoIFAS	DARD DWR, NCRHMS
Apr. 21-23, 2015	Developing Ca River basin model. Detailed parameter setting and calibration	DARD DWR, NCRHMS, HT DARD DWR, HT HMS, QB HMS
Dec. 17-18, 2015	Follow-up training for IFAS model, and set-up AutoIFAS monitoring facilities	DARD DWR, NCRHMS

3.4 Output 4: Structural Measures in the 4 Provinces

3.4.1 Small Scale, Low Cost River Bank Protection Works (4-1)

In the central region of Vietnam, washout of residential land, crop land and infrastructures such as community road frequently occurs due to river bank erosion. The counter measure for river bank erosion is one of the key projects in IFMP. The Project introduced effective small-scale and low cost river bank protection works that can be implemented by local governments and communes at the two (2) pilot sites in Quang Binh and Ha Tinh provinces.

The pilot sites were selected based on the discussion with DARD DWRs of both provinces. The criteria for site selection are 1) Number of important protective object such as community road and water pump, 2) High motivation and ownership of the community and 3) Effective advertising potential for dissemination. The candidate sites and selected sites are shown in Figure 3-4-1 and Figure 3-4-2.

In addition, the selected sites in both provinces were also the pilot sites for CBDRM activities considering synergistic effect in view of maintenance of the facilities.

Figure 3-4-1 Candidate sites and selected site in Quang Binh province
(Site 5: Tho Linh Hamlet, Quang Son Commune)

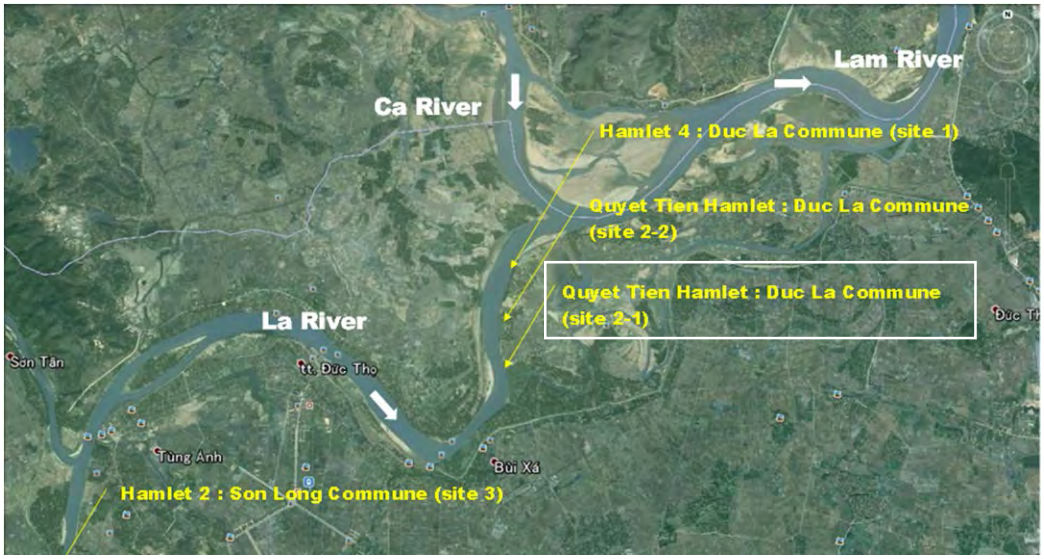


Figure 3-4-2 Candidate sites and selected sites in Ha Tinh province
(Site 2-1: Quyet Tien Hamlet, Duc La Commune)

The river protection works in the pilot sites were reduced the scale to prevent negative impact to the opposite of the river bank, and designed considering river flow characteristics in order to maximize natural sedimentation after constructions. Identifying the "Talweg Lines" that indicates flow lines of normal condition and flooding time is very important to design the river structures. Therefore, frequent mutual discussions with DARD and MARD as well as site inspections and workshops have been conducted.

The constructions were done on June to August, 2014 at the site of Quang Binh province and on April to June, 2015 at the site of Ha Tinh province. The works (community based pilot project) were implemented in collaboration with DARD, communes and villages which belong to the selected sites. Throughout the pilot projects, more than 2,000 community persons participated in the site works. From such collaboration works, it can be said that awareness for the disaster and coping capacity in the communes and villages are much improved and highly enhanced. From another viewpoint, mutual and self-help were fostered among the community members during the implementation of the river protection project.

Visitors from the neighboring commune offices and DARD, as well as officials who participated in the annual seminar reached a total of 118 officials at the 2 sites. In addition, in March 2015, the pilot project in Quang Binh province was televised and introduced nationwide by Vietnam Television (VTV). Henceforth, it is strongly expected that such pilot projects become a trigger for further replication of similar nature works in the neighboring areas.

Table 3-4-1 Workshops / trainings on activity 4-1

Date	Contents	Target
Dec. 4-5, 2014	Annual Seminar and Site Visit	MARD, DARD DWR in Hue, QB, HT, NgA
Apr. 8, 2015	Explanation of example of QB work	HTDARD DWR, Contractor
July 13-14, 2015	Annual Seminar and Site Visit	MARD, DARD DWR in Hue, QB, HT, NgA


Photo 3-4-1 Before/After of construction in Quang Binh province
(Series of 6 groins and slope protection)


Photo 3-4-2 Before / After of construction in Ha Tinh province (Series of 6 groins)

3.4.2 Formulation of Dam Reservoir Operation Manual (4-2)

Dam reservoir having gates with a total volume over 1 million m3 are the targets of the project. In Quang Binh province, there are six (6) target dam reservoirs, including Song Thai for which the operation manual has already been formulated. Those dam reservoirs are managed by the "Quang Binh Provincial Irrigation Works Exploitation 01 Member Limited Company" (hereinafter referred to as Provincial Irrigation Company).

The target dam reservoirs and the priority to formulate manuals were discussed with DARD DWR. It was confirmed that the manual of Rao Da reservoir was formulated and approved by PPC in 2009. Thus, the remaining 4 reservoirs of Phu Hoa, Vuc Tron, Phu Vinh and Minh Cam were selected as targets for manual formulation. The manuals of Phu Vinh and Vuc Tron were formulated with the cooperation of the Provincial Irrigation Company, while those for Phu Hoa and Minh Cam have been formulated by DARD DWR and the JICA team.

Through daily discussions and several study meetings with the participation of the Provincial Irrigation Company, the number of staff having capability to verify manuals has increased. Especially junior staffs have obtained the skills to verify manuals and knowledge on the concept of dam safety operation. The achievements of dam reservoir operation manuals are indicated in Table 3-4-2.

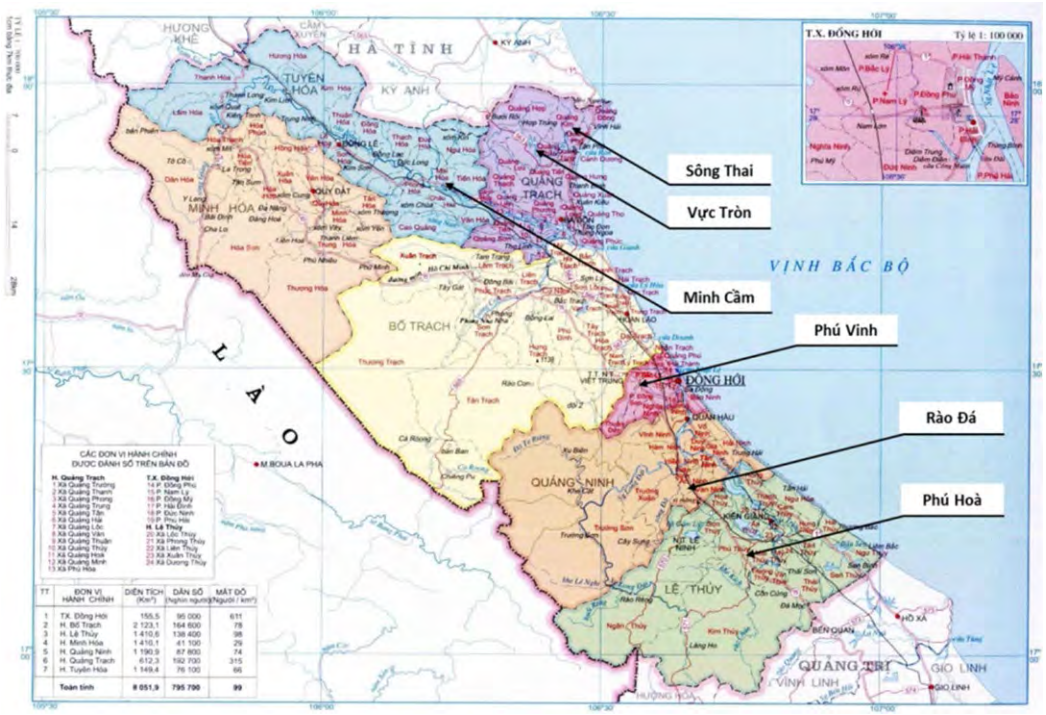


Figure 3-4-3 Location of dam reservoirs for O/M manual

The manuals for Minh Cam and Phu Hoa have been completed as references at the moment. It will be approved by PPC after the necessary calculation for the retain water of the reservoirs.

Table 3-4-2 Target dam reservoirs and achievement of manual formulation

Dam	Construction	Volume (M t)	Progress / Achievement
Minh Cam	1964	6,850	Completed as a reference by DARD DWR
PhuHoa	2000	9,300	Completed as a reference by DARD DWR
PhuVinh	1992	26,600	Completed and approved by PPC
Rao Da	2005	94,020	Manual has been formulated
Song Thai	2008	9,540	Out of target
Vuc Tron	1983	85,000	Completed and approved by PPC

Table 3-4-3 Workshops / trainings on activity 4-2

Date	Contents	Target
Aug. 12, 2014	Dam OM W/S (1) Regulation and Design	DARD DWR, Irrigation Company
Nov. 11, 2014	Dam OM W/S (2) Operation Regulation	DARD DWR, Irrigation Company
Dec. 9, 2014	Dam OM W/S (2) Maintenance for Fill Dam	DARD DWR, Irrigation Company
Jun. 24, 2015	Dam OM W/S (4) Flood Monitoring / Forecasting	DARD DWR, Irrigation Company
July 6, 2015	Reporting prepared Dam O/M manual	DARD DWR, Irrigation Company

3.4.3 Formulation of River Dyke Inspection Manual (4-3)

The dyke inspection manual focusing on river dykes was formulated under development collaboration with DARD DWR in Nghe An province and 6 Inspection Branch Offices and JICA expert team. In the course of the manual development, several joint inspection patrols, small workshops and technical meetings were conducted. MARD was also involved for the agreement on the basic outline of the manual.

On April 2 2015, a joint coordination meeting including staff of 6 dyke inspection branch offices was held to share information and data which have been arranged so far, and discuss the manual focusing on common and priority inspection items for the daily patrol. In this meeting, a lot of aggressive opinions were given and collected from the branch offices in charge of inspection patrol. Throughout such meetings and activities, adjustments were made on on the manual. Finally, the draft version was completed in June 2015. The draft manual was presented and explained to the relevant staff of MARD at a workshop in Hanoi.

The revised manual based on the comments from the Department of Dyke Management, MARD, was submitted to the department through DMC. Finally, the manual was submitted to DMC on June 2016 as the final version.


Photo 3-4-3 Coordination meeting for manual formulation

Table 3-4-4 Workshops / trainings on activity 4-3

Date	Contents	Target
Oct. 02, 2014	Dyke inspection manual	DARD DWR
Oct. 03, 2014	Dyke inspection manual(basic line)	MARD, DARD DWR
Apr. 02, 2015	Dyke inspection manual (common and priority inspection items)	DARD DWR, Branch Offices
July 6, 2015	Dyke inspection manual (presentation/discussion)	MARD, DARD DWR of Hue, QB, HT, NgA

3.4.4 OJTs on Bathymetric Survey in Nghe An province (4-4)

The DARD DWR in Nghe An province has a survey section that conducts basic surveys for river improvement and dyke construction / rehabilitation using leveler and theodolite. However, most of their survey equipment are aged and problematic. Therefore, prior to the OJT on bathymetric survey, some survey equipment including a Total Station and an Echo Sounder for wider bathymetry were procured in the Project.

River cross-section survey using the procured equipment was conducted at the river bank

erosion site of Ca River (10km southwest of Vinh city) in July 2014. After the survey theory and technical instruction by the equipment provider, field cross-section survey was conducted.

OJTs on bathymetric survey using Echo Sounder were conducted at the site of downstream of Lam river near Vinh city) and Ca river near Hung Linh commune (pilot site for CBDRM). A technical user manual was prepared for effective OJT. The manual instructs measurement procedure, visualization, calibration of the bench mark, data exporting to GIS and mosaic mapping with ground surface data.

Limitation of the river cross-section data of the Lam River is an issue to conduct flood analysis of the Ca river basin. Now the DARD DWR became able to conduct extraction of river-cross sections widely and inexpensively by use of the transferred technology.


Photo 3-4-4 OJTs on river cross-section and bathymetric survey

Table 3-4-5 Workshops / trainings on activity 4-4

Date	Contents	Target
Aug. 4-5, 2014	OJT of bathymetry survey in the downstream Lam River / Data processing	NgA DARD DWR
Dec. 8, 2014	Training of date processing and extraction river-cross section from the bathymetry data	NgA DARD DWR
Dec. 9, 2014	OJT of bathymetry survey in the Ca River near Hung Linh commune (CBDRM pilot site)	NgA DARD DWR
Dec. 19, 2014	Survey for pilot site of river bank protection work in the La River, Duc La commune	HT DARD DWR

3.4.5 Recommendation for Implementation of IFMP in T. T. Hue (4-5)

IFMP Reviewing

DARD DWR in T. T. Hue province requested the JICA team to support launching an "IFMP Reviewing Working Group" which was expected to be held about five (5) times in order to discuss the IFMP formulated in Phase-1 project among the relevant agencies in order to secure effectiveness of the said IFMP. The project basically accepted this idea to provide recommendations for implementation of the IFMP. The objectives of IFMP reviewing are to 1) revise IFMP in accordance with the newly enforced Law on NDPC, 2) reflect the flood

risk under the new regulation of dam operation into IFMP and 3) adjust the total budget of IFMP implementation plan as suitable amount with the provincial budget allocation for smooth implementation.

A kickoff meeting of the IFMP reviewing working group with participation of the relevant agencies in T. T. Hue province and JICA experts was held in April 2015. After the kickoff meeting, four (4) subsequent reviewing meetings were held from May to June 2016. The working group finally concluded and submitted the IFMP reviewing report to the PPC. The report is expected to be approved in July 2016.

Flood Vulnerability Assessment

For the purpose of providing of reference for IFMP reviewing work, additional flood simulation was conducted with DARD DWR in T.T.Hue province. A new regulation of the gate operation for three (3) dam reservoirs of Ta Trach, Binh Dien and Huong Dien was considered to input the discharges into the flood analysis model developed in Phase-1 Project. The simulation was conducted by OJT as below:

- To conduct sensitive analysis of discharges between the dam site and the gauging stations of Kim Long and Phu Oc in the downstream. In the new regulation, the dam operation shall be regulated based on the water level at these two stations.
- To prepare relationship formula between reservoir water level and maximum discharge of three (3) dam reservoirs.
- To combine the dam model into the model developed in Phase-1.
- To evaluate operation priority in the new regulation, and input the operation procedure into the model.
- To conduct flood analysis of five (5) scenarios (1999, 2009, 2011, 2013 and 2015 floods) considering the new regulation.
- To update the flood hazard maps according to the result of flood analysis.

For the above simulation, the Project collaboratively worked with VAWR in Hanoi. The VAWR has been working for UNDP project to evaluate the impact by water release from several dams in Huong river basin, and the Team provided the model developed in Phase-1.

Table 3-4-6 Workshops / trainings on activity 4-5

Date	Contents	Target
Sep. 29, 2014	Discussion of launching IFMP Reviewing	DARD DWR
Apr. 9, 2015	Kickoff meeting for IFMP Reviewing WG	DARD, Relevant Agencies in Hue
Mar. 2, 2016	IFMP reviewing PMU meeting	DMC, PPC,DARD
Mar 10, 2016	2nd IFMP reviewing meeting	PPC, DARD, Relevant Agencies in Hue
Apr. 5, 2016	3rd IFMP reviewing meeting	MARD DMC, PPC, DARD, Relevant Agencies in Hue
Apr. 27, 2016	4th IFMP reviewing meeting	MARD DNDPC, PPC, DARD, Relevant Agencies in Hue
Jun. 9, 2015	5th IFMP reviewing meeting	PPC, DARD, Relevant Agencies in Hue

3.5 Output 5: Non-structural Measures in the 4 Provinces

3.5.1 CBDRM in the Selected Communes (5-1)

Provincial level CBDRM and Disaster Education workshop

To implement CBDRM and Disaster Education activities in accordance with IFMP, CBDRM and Disaster Education Workshops for harmonious implementation were conducted in T.T. Hue and Quang Binh province in August 2014. In T.T. Hue province, they have formulated IFMP in the Project Phase-1. In Quang Binh province, IFMP is being formulated in Phase-2.

There are two objectives of the workshops. The first one is to collect the information of CBDRM and Disaster Education activities which have already been conducted in the provinces and human resources who already have capacity of facilitation of CBDRM activities. The other objective is to strengthen the cooperation among the relevant organizations. In addition, the information discussed in the workshops was used to estimate necessary budget of non-structural measures in IFMP Implementation Plans.

CBDRM Training at Quang Thanh commune in Quang Dien district in T.T. Hue province

CBDRM Training at Duc Quang commune in DucTho district in Ha Tinh province

CBDRM Facilitator Training W/S in Quang Son commune, Quang Binh province

CBDRM Training (First aid) in Hung Linh commune, Nghe An province

Photo3-5-1 CBDRM Activities at the pilot communes

CBRRM Training

The CBDRM activities at the pilot communes in four (4) pilot provinces were conducted. The CBDRM Training for formulation of commune disaster management plan to the commune staff, NGO staff and hamlet leaders was conducted as the first stage of the series

of the activities at each of the pilot communes. The following CBDRM activities were organized based on the formulated plan and the commune's needs. Trainings on "hamlet-level disaster management planning", "search and rescue", "first aid", "evacuation drill" and "improvement of facilities for disaster risk mitigation" were identified as suitable activities. The project supported these activities within the budget and reliable schedule in consultation with commune and C/Ps of provinces.

The Project prepared "CBDRM Standard Activities" based on the activities and lessons learnt in the pilot communes. It was submitted to MARD DMC as a draft.

Table 3-5-1Workshops / Trainings in Activity 5-1

Date	Contents	Participants
■T. T. Hue		
Aug. 21, 2014	Workshop for harmonious implementation of CBDRM and Disaster Education	Hue DARD DWR, Relevant Agencies in T. T. Hue provinces, MARD
Jun. 30-Jul. 1, 2015	Workshop on CBDRM Training at Quang Thanh Commune	Commune staff, hamlet leaders, school teachers in Quang Thanh commune
Apr. 12-14, 2016	CBDRM Training on search & rescue and hamlet-level disaster management planning at Quang Thanh commune	Quang Thanh and neighboring communes, Hamlet leaders, representative from hamlets
Jun. 18, 2016	CBDRM Training on evacuation drill at Quang Thanh commune	Quang Thanh and neighboring communes, Hamlet leaders, representative from hamlets
Jul. 5, 2016	Summary and assessment workshop at Quang Thanh commune (utilization to IFMP implementation plan)	Quang Thanh and neighboring communes, District DARD, District DOET
■Quang Binh		
Dec. 20-21, 2015	Workshop for CBDRM facilitator training at Quang Son commune	Quang Son commune, hamlet leaders, school teachers
Jun. 28-Jul. 2, 2016	CBDRM Training on search & rescue and hamlet-level disaster management planning at Quang Son commune	Quang Son commune, hamlet leaders, representative from hamlets
Jul. 8, 2016	Summary and assessment workshop at Quang Son commune (utilization to IFMP implementation plan)	Quang Son and neighboring communes, Ba Don town, District DARD and DOET
■Ha Tinh		
July. 9-10, 2015	Workshop on CBDRM Training at Duc Quang Commune in Ha Tinh province	Commune staff, hamlet leaders, school teachers inDuc Quang commune
Jun. 1-3, Jul. 12-13, 2016	CBDRM Training on search & rescue, hamlet-level disaster management planning and evacuation drill at Duc Quang commune	Duc Quang and neighboring communes, hamlet leaders, representative from hamlets
■Nghe An		
Mar. 17-18, 2016	Workshop for CBDRM facilitator training at Hung Linh commune	Hung Linh commune, hamlet leaders, school teachers
Jun. 11-13, 2016	CBDRM Training on search & rescue and hamlet-level disaster management planning at Hung Linh commune	Hung Linh commune, representative form hamlets

3.5.2 Disaster Education in coordination with CBDRM (5-2)

Provincial level CBDRM and Disaster Education workshop

The Provincial Department of Education and Training participated in the CBDRM and Disaster Education Workshops for Harmonious implementation in each of T.T. Hue province and Quang Binh province as shown in Section 3.5.1. The importance of harmonious implementation of CBDRM and Disaster Education was understood among relevant provincial organizations.

Disaster Education Seminar

The project has conducted CBDRM and Disaster Education collaboratively together based on a concept of "Disaster Education involved in Community". A disaster education supplemental material and the provincial IFMP were introduced to the teachers of elementary schools, secondary school and kindergarten. The importance of Disaster Education harmoniously with CBDRM was also confirmed in the workshops.

Based on this concept, the commune staff introduced the hazard maps and the disaster management schemes, which were included in the disaster education supplemental material. The school teachers trained in the workshops held a model class of disaster education at the commune schools using the developed supplemental materials.

Workshop for harmonious implementation of CBDRM and DE in Quang Binh province

Disaster Education Seminar for the schoolteachers in the target commune

Workshop to prepare supplementary DE material at Quang Thanh commune

Model class of disaster education at Duc Quang commune, Ha Tinh province

Photo3-5-2 Disaster Education Activities at the pilot communes

Table 3-5-2Workshops / Trainings in Activity 5-2

Date	Contents	Participants
■T. T. Hue		
Aug. 21, 2014	Workshop for Harmonious implementation of CBDRM and Disaster Education	Hue DARD DWR, Relevant Agencies in T. T. Hue provinces, MARD
Jun. 29, 2015	Disaster Education Seminar at Quang Thanh commune	School teachers in Quang Thanh commune, commune staff, District DOET
Mar. 25, 2016	Workshop for disaster education supplemental material at Quang Thanh commune	School teachers in Quang Thanh commune, commune staff
Apr. 15, 2016	Model class of disaster education at Quang Thanh commune (Quang Thanh II elementary school)	School teachers in Quang Thanh commune, commune staff, Quang Dien District DOET, Provincial DOET
■Quang Binh		
Aug. 29, 2014	Workshop for Harmonious implementation of CBDRM and Disaster Education in Quang Binh province	QBDARD DWR, Relevant Agencies in Quang Binh province, DOET, MARD
Dec. 20, 2015	Disaster Education Seminar at Quang Son commune	School teachers in Quang Son commune, commune staff, Ba Dong town, DOET
Apr. 8, 2016	Workshop for disaster education supplemental material at Quang Son commune	School teachers in Quang Son commune, commune staff
May. 25, 2016	Model class of disaster education at Quang Son commune (Quang Son secondary school)	School teachers in Quang Son commune, commune staff, Provincial DOET
■Ha Tinh		
Jul. 8, 2015	Disaster Education Seminar at Duc Quang commune	School teachers in Duc Quang commune, commune staff, District DOET
Apr. 2, 2016	Workshop for disaster education supplemental material at Duc Quang commune	School teachers in Duc Quang commune, commune staff
Apr. 26, 2016	Model class of disaster education at Duc Quang commune (Duc Quang elementary school)	School teachers in Duc Quang commune, commune staff, District DOET
■Nghe An		
Mar. 16, 2016	Disaster Education Seminar at Hung Linh commune	School teachers in Hung Linh commune, commune staff, District DOET
Apr. 23, 2016	Workshop for disaster education supplemental material at Hung Linh commune	School teachers in Hung Linh commune, commune staff
May. 14, 2016	Model class of disaster education at Hung Linh commune (Hung Linh elementary school)	School teachers in Hung Linh commune, commune staff, Provincial DOET

CHAPTER 4
PROJECT ACHIEVEMENT

CHAPTER 4: PROJECT ACHIEVEMENT

4.1 Capacity Development through the Activities

The change of C/P personnel, organization and institutional states regarding by the technical transfer through the project activities are summarized as shown in Table 4-1-1.

Table 4-1-1 Progress of Capacity Development

No	Activity Items	At Kickoff (September, 2013)	End of Project (July, 2016)
1-3	Clarify issues and challenges as well as good practices of IFMP implementation to consolidate into MARD	▸IFMP in T. T. Hue in Phase-1 project has been enforced.	▸IFMP formulation manual was prepared based on the experience of IFMP formulation in Quang Binh province and IFMP reviewing in T.T.Hue province. ▸The inventory of project outputs has been summarized as a video clip that can be shared with the in and out sides of the project sites.
1-4	Formulation of an action plan at the central level jointly with MARD and MONRE including monitoring, collection and utilization of river information as well as flood forecasting.	▸According to the Law on Water Resources, MONRE is responsible agency to manage the hydrological information, which is provided to MARD on demand.	▸Roles and responsibilities of MONRE, MARD and PPCs have become clear after enforcement of Law on Natural Disaster Prevention and Control and Law on Hydro Meteorology ▸It is expected that the collaboration works in JICA grant aid project in T.T.Hue province becomes a case example of action plan between MARD and MONRE.
1-5	improvement of legal systems for IFM (especially river management)	▸No consideration of legal systems	▸The legal status of IFM and budgetary provision for IFMP are under discussion with MARD.
2-1	Conduct baseline survey on natural and social conditions, as well as basic information including flood disaster records, hydro-meteorological data, run off analysis and flood simulation.	▸Hydrological database exists in QB HMS. However the data was not processed and arranged in a time-series to be utilized for input data of flood modeling ▸QB HMS has knowledge and experience of runoff models (MIKE NAM) and 1D river model (MIKE 11). However QB HMS has no experience to conduct 2D flood model development ▸Experience of GIS is not sufficient to use in actual work.	▸Recent hydrological data in flooding time was processed in a time series to be utilized for model development ▸QB HMS obtained the skills to develop 2D models for Gianh River and Nhat Le River basins. Further, they fully understand the model modification. ▸QB DIFSC and HMS staff obtained the basic skill for GIS in order to developflood model. ▸QB HMS obtained the applied knowledge of 2D model so that they became trainers for Nghe An NCRHMS.

No	Activity Items	At Kickoff (September, 2013)	End of Project (July, 2016)
2-2	Conduct flood disaster impact analysis based on flood hazard risk mapping of different scenarios.	▸There was no scenario setting for flood management. ▸No experience to prepare flood hazard maps.	▸Multiple scenarios considering various probable rainfalls, climate change, forest conservation and flood control were examined through the IFMP working group meeting. ▸Flood simulations under the multiple scenarios have been done. The results were shared in the IFMP working group meetings. ▸C/P compiled the flood impact assessment result with land objectives and development plans into the GIS data base, which can be used for hazard mapping. ▸C/P became able to prepare commune level hazard map.
2-3	Formulate plan(s) of structural and non-structural measures based on the results of risk and impact analysis.	▸"Quang Binh Action Plan for Disaster Prevention to 2020" was formulated in response to the National Strategy of Disaster Prevention and Control. There is a list of structural / non-structural measures attached. ▸The review of the Action Plan was done in 2012. However the achievement was not clear and monitoring after 2012 has not been done. ▸The responsible agencies to implement the Action Plan were not appropriate.	▸Achievement of Action Plan to 2015 was verified among the relevant agencies. ▸Awareness rising on mainstreaming of DRR among the relevant agencies was promoted through the IFMP working group meetings. Relevant agencies obtained a consensus of IFMP priority project. ▸IFMP working group members fully understood the IFMP. DARD and PPC took the initiative to conduct IFMP meeting.
3-1	Conduct trainings on run off analysis and flood simulation in Nghe An and Ha Tinh Provinces.	▸Nghe An DDFSC staff had no experience to conduct runoff and flood analysis ▸NCRHMS had experience of runoff analysis and 1D river modeling. However, these have not been utilized in the actual works. ▸There was no staff in HT DDMFSC and HMS having experience of runoff and flood analysis.	▸Nghe An DARD DWR staff obtained skills of GIS and related data processing that are required to develop flood analysis model. They also understood to develop the model of Bung river using iRIC Nays2Dflood, MIKE 21 and MIKE Flood. ▸NCRHMS staff became able to develop runoff and flood model through OJT. ▸NCRHMS staffs obtained skills to conduct trainings to the other HMSs of Ha Tinh and Thanh Hoa provinces as trainers.
3-2	Conduct flood disaster impact analysis based on	▸There is a standard level for dyke designing for Ca River.	▸Multi-scenario flood analysises considering various probable

No	Activity Items	At Kickoff (September, 2013)	End of Project (July, 2016)
	flood hazard risk mapping of different scenarios.	However no scenario for food management had been set. No experience for flood hazard mapping as well. ▸There was no record of flood hazard map preparation in Ha Tinh province. The flood mark survey was conducted by HMS after the 2010 flood.	rainfall and climate change in La River basin (Ngan Sau and Ngan Pho) were conducted. ▸Hazard maps prepared by NCRHMS were utilized in CBDRM activities in Nghe An and Ha Tinh provinces.
3-3	Conduct OJTs on effective use of satellite information in flood forecasting in Nghe An Province.	▸There is a runoff forecasting model for Ca River operated by Nghe An NCRHMS. Limitation of hydrological data from Lao is an issue to forecast. ▸Some staffs of DDFSC and NCRHMS have experience of IFAS model. However it had not been utilized in the actual works.	▸Through the training of IFAS modeling, Nghe An DARD DWR and NCRHMS obtained the skills to develop basic model and to calibrate parameters. ▸NRCHMS conducted workshop on flood analysis and IFAS to HMSs of Ha Tinh and Thanh Hoa provinces by their own effort.
4-1	Implement small-scale, low-cost river bank protection works in Ha Tinh and Quang Binh Provinces	▸The communes belonging to the pilot sites have been suffering from riverbank erosion in recent years. ▸The communes and residents did not know and understand the required process for project implementation	▸The works at two (2) pilot sites have been implemented in collaboration between DARD DWRs and commune offices (also PPC to get approval of project implementation). ▸Throughout the pilot projects, a lot of experience and knowhow have been accumulated in DARD DWRs and commune offices. ▸More than 2,000 villagers participated in the site works as laborers. Mutual and self helps have been enforced in the communities which belong to the pilot sites.
4-2	Develop operation manual(s) for effective use of existing four (4) major reservoirs in Quang Binh Province.	▸Dam operation manuals in Quang Binh province have been formulated by Provincial Irrigation Company. DIFSC is the agency to verify and submit the formulated manuals to PPC. Therefore, there was no staff in DIFSC having experience to prepare manual. ▸There is no dam reservoir that can control flood by gate operation. No concrete plan for flood control exists.	▸Through the formulation of dam operation manual, junior staffs became more involved in verifying the manual submitted by the Provincial Irrigation Company though it had been done only by senior staff before the project. ▸DARD DWR staffs obtained the knowhow of manual preparation through the collaborative works with the Provincial Irrigation Company. ▸DIFSC staff understood the importance of information sharing with relevant parties,

No	Activity Items	At Kickoff (September, 2013)	End of Project (July, 2016)
			daily inspection and safety management of dam reservoir for flood control through the study workshops.
4-3	Develop embankment inspection manual in Nghe An Province.	▸DDFSC had no manual and guideline for dyke inspection. ▸Six (6) branch offices in charge of daily patrol strongly requested to prepare inspection items for patrol as guide.	▸DARD DWR staff and six (6) branch offices understood the technical matters on the necessity of manual, clarification of inspection items for patrol, effective inspection activity, and necessity of record and reporting of inspection patrol for identified abnormal condition of the dyke, etc. ▸The developed manual will be disseminated to other organizations of inspection assisted team organized in commune in flooding season.
4-4	Conduct OJTs on bathymetric survey in Nghe An Province.	▸DDFSC had conducted survey works using leveler and theodolite before. However the equipment became aged and broken. Less experience to use total station for the survey. ▸Due to limited budget, the river-cross section data was deemed sufficient to conduct flood analysis and structural measures.	▸Staff of DARD DWR became capable to conduct river cross - section survey using the provided total station. ▸Staff of DARD DWR obtained the skills to conduct bathymetry by using the provided echo sounder. They became capable to extract river-cross sections from the digital surface data. ▸Accordingly, DARD DWR became capable to conduct river-cross section survey widely at low cost.
4-5	Implement small-scale, low-cost river bank protection works in Ha Tinh and Quang Binh Provinces	▸There is the progress of implementation of IFMP after Phase-1 project. However no reviewing and necessary revision in collaboration with relevant agencies had been conducted. ▸.It was strongly requested to revise the IFMP because of condition changes such as enforcement of Disaster Management Act and revision of dam operation regulation in T. T. Hue province. ▸Because there are a number of programs / projects in IFMP including the projects which is not directly managed by PCFSC, the total budget is larger than actual allocation	▸Five IFMP working group meetings were held to review existing IFMP. It will be approved by July 2016. ▸As a part of implementation of IFMP, a Grant Aid project to develop integrated disaster information system has been adopted by the Japanese government. ▸Hung river flood analysis model considering newly formulated dam operation regulation was developed with DARD DWR. Case studies of 5 scenarios were examined through the use of the developed model.

No	Activity Items	At Kickoff (September, 2013)	End of Project (July, 2016)
		from the province. This is the one of the difficulties to implement IFMP.	
5-1	Conduct community-based disaster risk management (CBDRM) activities in selected communes.	▸Each province formulated the 5 years and annual action plans under Decision 1002, however, the budget for realizing action plan is limited ▸Facilitators trained by the government and the other donors in the past CBDRM activities have not been effectively utilized.	▸Implementation plan of non-structural measures of disaster education and CBDRM was discussed among relevant agencies including Red Cross and DOET. ▸CBDRM Training was conducted at selected four (4) pilot communes to formulate disaster management plan at commune level. The trained commune staff facilitated CBDRM in the selected hamlet. ▸Facilitators trained by MARD and the other agencies were hired to conduct community activities. Newly trained commune facilitators also took part in the activities. ▸When the budget is secured in provincial and district level, the activity will be accelerated.
5-2	Conduct disaster education activities in coordination with CBDRM under activity 5-1.	▸Disaster education activities have been conducted by international donors and Red Cross. However some activities were not recognized by DARD or DOET. ▸There was no collaborative activity between disaster education and CBDRM. This is an issue that needed to be addressed in order to implement activities entrenched in the community. ▸No cooperation between DARD and DOET.	▸Seminars for collaborative implementation of disaster education and CBDRM were held in the pilot provinces. In the seminar, it was concluded that DARD and DOET would cooperate with each other for both activities. ▸Model classes based on the concept of “Disaster Education involved in Community” were conducted in collaboration between schools and communes. ▸Collaboration between DARD and DOET started through the Project activities.

4.2 Achievement, Issues and Lessons Learned

4.2.1 Project Purpose

The achievement of Project Purpose at end of the project is shown in Table 4-2-1.

Table 4-2-1 Achievement on Project Purpose

Verification Index	Remarks
Central government initiates to review legal systems necessary for IFM (especially regarding river basin management).	‣ Enforcements of Law on NDPC by MARD in 2013 and Law on Hydrometeorology by MONRE in 2015 will accelerate IFMP implementation. ‣ MARD issued an official letter to PPCs to promote natural disaster prevention and control plan of provinces, in which it was instructed that IFM should be considered in the formulation. ‣ Legal implication of IFMP shall be clarified through the IFMP formulation manual.
Joint Action Plan developed under Output1 is implemented.	‣ MARD and MONRE will collaborate in the Prime Minister's declaration on integrated dam operation under the Law on NDPC and Law on Hydrometeorology. ‣ Hydro-data sharing in the JICA Grant Aid project in T.T.Hue province shall be a case example of joint action plan.
Promptness of real time river information data sharing between MONRE and MARD is increased.	‣ Real time data sharing in T. T. Hue province has been done. The project will support the improvement of both quality and quantity in collaboration with the new Grant Aid project.
Authorities of target provinces initiate to find measures to secure funding for IFM implementation.	‣ T.T.Hue province decided to secure the local budget to implement IFMP through the discussion on IFMP reviewing. Quang Binh province will also decide in July 2016. ‣ The central government started to consider the implementation budget as well.

There are several challenges on legal arrangements and financial considerations to promote IFM in the central government. To achieve the Project Purpose, it is essential to deal with these challenges.

The first challenge is legal implication of IFMP in the Law on NDPC.

Hydrological information is essential in IFM implementation. Especially, real-time hydrological information in the entire basin is required to manage and operate all river infrastructural facilities. However, the hydro-meteorological data (regional base / downstream) under MONRE and the independently observed data by the facilities administrators (basin base / upstream) under MARD are separately managed. MARD has started to set up responsible division in-charge to coordinate with MONRE. The project will work together with the other JICA projects for MARD and MONRE to accelerate collaboration between the two ministries.

Moreover, as mentioned before, a MARD official letter instructing the PPCs, to formulate natural disaster prevention and control plans in consideration of IFM. Therefore, the IFM became one of the key contents in provincial disaster prevention and control plan.

Another challenge is the interlocking between planning and investment in the disaster cycle.

The local government has the primary responsibility to deal with natural disasters. They have to secure the necessary budget for prepardness, response and recovery within their

budgetary capacity. However, less frequent high impact severe disasters which are over their capacity to cope with is also unavoidable. If the local government can expect the backup financial support from the central government for such severe disasters, it will be an encouragement of IFMP formulation and self-sustaining disaster management for local government. Mr. Thang, Vice minister of MARD agreed with the concept of IFM, and commented that MARD is ready to discuss this issue with MOF to secure disaster management investment.

4.2.2 Output 1: Institutional Arrangement for IFM in Central Level

The achievement of Output 1 at the end of the project is shown in Table 4-2-2.

Table 4-2-2 Achievement on Output 1

Verification Index	Remarks
Multi-ministerial action plan for improvement of quality of flood forecasting and warning services, developed under activity 1-4, is authorized by central government as reference material.	‣ The real-time hydrological information in T. T. Hue province has been shared between DARD and HMS. It is necessary to clarify the responsibility on data attribution and management for the Joint Action Plan between MARD and MONRE.
Output inventory and Promoting IFM Manual are formulated through Output 2 to 5	‣ A draft of IFMP manual was formulated. It will be disseminated to nationwide by MARD. ‣ A video clip as output inventory will be completed at the end of July.

According to the direction of Mr. Thang, Vice Minister of MARD, the cooperation of WRD for the IFM promotion has now been activated. The draft IFMP manual will be finalized soon. For dissemination of IFMP manual to nationwide, the central government is required to discuss the answer responding to the request of financial support from local government. The project has proposed to utilize low-interest JICA loan as the backup budget.

The collaboration between MARD and MONRE (NHMS) is expected to accelerate through the provincial activities according to the Laws.

4.2.3 Output 2: IFMP Formulation in Quang Binh Province

The achievement of Output 2 at the end of the project is shown in Table 4-2-3.

Table 4-2-3 Achievement on Output 2

Verification Indicator	Reference
FMP formulated for selected river basins (Gianh River and Nhat Le River) is approved by the provincial government.	‣ Through a total nine (9) IFMP working group meetings in participation of relevant agencies in the province, a draft IFMP was formulated. ‣ After the PSC (Project Steering Committee) on August 2015, the final IFMP was approved on October 2015 on schedule. ‣ The priority projects of IFMP implementation plan were discussed and decided by relevant agencies. Though some financial issues still remain, the IFMP implementation plan will be approved by PPC in the project period.
DARD and relevant	‣ Through the IFMP working group meetings, 13 working members

Verification Indicator	Reference
agencies staff (10 persons) gain deeper understanding on the process of IFMP formulation.	of relevant agencies and DARD DWR staff understood the process and concept of IFMP formulation. The members identified the priority projects to implement IFMP. ‣ At least 2 staffs of QB HMS obtained the appropriate skills to conduct flood risk analysis and impact analysis as the bases of IFMP formulation. The other PMU member of DARD DWR also understood the analysis processes. ‣ At least 2 staffs of DARD DWR obtained enough skills to compile development plans and structural measures on GIS in order to prepare the base map for IFMP formulation.

Flood Model Development

The C/Ps of HMS in Quang Binh province have acquired excellent modeling skills for flood analysis and related essential technical skills such as utilization of GIS for pre/post processing of input and output data, etc. through these project activities. At present, they can modify and update the model by themselves to improve the model accuracy. However, they have interest in upgrading the model and its accuracy but less interest about the flexibility of the model design, such as to simplify the model in accordance with the purpose of model output. Through coordination and discussion with DARD DWR, enhancement of the technical skill to design the flood analysis model according to the practical purposes is desired

In addition, HMS in Quang Binh province is expecting the adaptation of the flood analysis model as a flood forecasting tool. However, forecasted rainfall as the key input for model is not ready for use at the present. In this Project activity, technical training of runoff prediction using satellite rainfall information (IFAS) was organized in Nghe An province. The HMS in Quang Binh province was also invited to this training.

Data Collection for IFMP

The result of flood risk analysis in various scenarios and development plans of relevant agencies were combined on the unique format of GIS in order to analyze the flood impact on the development plans. Through this process, the PMU member of DIFSC became capable to develop GIS maps such as river bank erosion risk maps.

The information on the educational buildings (kindergartens, primary schools, secondary schools and colleges) and the medical facilities (hospitals and health centers) were provided by DOET and DOH respectively. Because the coordinate list of each object often has errors, DOET and DOH were requested to review and update the coordinates. All of these steps in the process contributed to involve the relevant agencies in the process of vulnerability assessment and potential damage estimation for the IFMP formulation.

IFMP Formulation Process

Similar to the IFMP formulation in T. T. Hue province in Phase-1 project, IFMP in Quang Binh province was formulated in the IFMP working group meetings composed of relevant agencies as well as PPC in the province.

At the beginning, the project wasn't able to ask for the cooperation of relevant agencies in the IFMP formulation because the PMU in DARD had not been organized due to the delay of the project approval. The first meeting was held as "IFMP Kickoff Workshop" on July

2014. After that, five (5) IFMP working group meetings were held in the period from September 2014 to August 2015.

In the IFMP Kickoff Workshop, it was expected that most participants had no understanding of the IFMP concept, the benefit and the formulation process. Therefore, the DIFSC in T. T. Hue who was the IFMP formulation members in Phase-1 project were invited to the workshop to explain the outline of IFMP, so that the participants of Quang Binh province could understand the basic idea and select the appropriate members for the IFMP working group.

The flood impact assessment and vulnerability mapping had been almost completed by the 2nd IFMP working group meeting in December 2014. The table-top discussion on the prepared maps was examined with the participation of the relevant agencies in order to understand the flood impact on the development plans of each sector. After the meeting, the project team and PMU members visited the relevant agencies with the prepared flood impact maps and discussed more details to complete the maps. Understanding of the relevant agencies based on the visualized flood impacts could be a trigger to accelerate the IFMP formulation involving many sectors.

After the 3rd IFMP working group meeting, DARD and PPC were more motivated to participate in the meetings than before. Lively discussions have been carried out. The sense of ownership of the Vietnamese side on IFMP formulation became higher and higher. Besides, the Project Steering Committee (PSC) composed of high-ranked officers from the relevant agencies was held by PPC in order to share the importance and the need for IFMP in the province. Such initiative of PPC contributed to accelerate the approval of IFMP.

Lesson learned in formulation of IFMP Implementation Plan

In formulating the IFMP Implementation Plan, all relevant agencies were required to review their own development plans and select priority projects. In the compartmentalized governmental structure, strong leadership of PPCs is essential to lead the agencies.

DARD, who took the role of the secretariat of IFMP formulation, has organized the working group meetings with strong ownership on flood prevention and mitigation measures and the financial arrangements. Accordingly, the IFMP Implementation Plan has been finalized by DARD with the participation of all relevant agencies.

During the planning process, T.T.Hue province, who had conducted reviewing of IFMP Implementation Plan in advance, had identified some lessons which could be useful references for Quang Binh province in terms of selection of priority projects, budget allocation and documentation for PPC approval. Such case study and lessons learned are quite effective to scale-up IFMP to the other provinces.

Both IFMP target river basins in T.T.Hue and Quang Binh provinces in the project are only flowing down within the provinces. In the case of a river basin that saddles provincial boundaries like Ca river basin between Nghe An and Ha Tinh provinces, more difficult coordination among larger number of stakeholders is required. In such case, strong leadership and proactive engagement of the central government (MARD) are essential.

4.2.4 Output 3: Flood Risk Analysis in Nghe An and Ha Tinh Provinces

The achievement of Output 4 at the end of the project is shown in Table 4-2-4.

Table 4-2-4 Achievement on Output 3

Verification Indicator	Reference
DARD and North Central Regional & Provincial Hydro Meteorological Center (NCRHMC/PHMS) staff (10 persons in Nghe An, 10 persons in Ha Tinh Province) are capable of conducting flood risk analysis.	▸ Training on basic modeling of flood simulation software and GIS targeting six (6) staffs of Nghe An DARD DWR was conducted. They became capable to develop flood analysis model though the OJT. ▸ Training was conducted for NCRHMS who became trainers for Ha Tinh province. At least four (4) staff of NCRHMS obtained the skills to conduct food analysis and two (2) achieved trainer-level for Ha Tinh province. ▸ Both Nghe An DARD DWR and NCRHMS obtained the capacity to develop IFAS model and calibrate necessary parameters.

Flood Risk Analysis in Nghe An Province

The DARD DWR in Nghe An province proposes to utilize the flood analysis in order to estimate flood damages caused by various magnitudes of floods and to formulate flood prevention plan in the province. However, the DWR is an agency not tasked to develop the model itself, but give the order to the other agencies or private consultants and verify the results. Thus, DARD DWR strongly expected to enhance their capacity to identify the model structure of numeral analysis, and the sensitiveness of input data to the analysis result. It is very important skills in their job duty.

Therefore, the Project conducted a number of practical OJTs on development of simple to full-scale flood modeling of iRIC Nays2Dflood, MIKE 21 and MIKE Flood including basic skills of GIS using Bung river basin as a case sample. Through the OJTs, the staff of DARD DWR obtained the basic knowledge, necessary data, analysis accuracy and related technics to enhance their capacity on flood modeling. They also realized the need for river cross section and some other hydrological data that are essential in order to perform their duties. DARD DWR is now planning to secure the budget for modeling including additional river cross sections and to develop practical model of Ca river basin.

Flood Risk Analysis in Ha Tinh Province

Initially, the technical transfer for Ha Tinh province was conducted for the staff of NCRHMS which has jurisdiction over HMS in Ha Tinh province. The project aimed to enhance the capacity of NCRHMS as trainers and then for them to tansfers the skill to the DARD DWR and HMS in Ha Tinh province.

Through the OJT and workshops, C/P at NCRHMS became capable to conduct a series of works for flood simulation modeling such as the data preparation, model development and calibration using GIS and MIKE software. Their capacity reached the trainer's level to train the DARD DWR and HMS in Ha Tinh province. NCRHMS continues to conduct workshops by themselves to share the skills and knowhow with the HMSs in the other provinces. Besides they started to develop new models including dam reservoirs in the Ca River basin by use of the transferred skills in the project.

4.2.5 Output 4: Structural Measures in the 4 Provinces

The achievement of Output 4 at the end of the project is shown in Table 4-2-5.

Table 4-2-5 Achievement on Output 4

Verification Indicator	Reference
DARD staff (10 persons) and community people including district officers (100 persons) who participated in the pilot projects in Ha Tinh & Quang Binh Provinces gain deeper understanding on riverbank protection works.	‣ 73 officials of DARDs and related commune offices in Ha Tinh and Quang Binh provinces understood of the basic concept, effectiveness of low cost river bank protection works, and importance of maintenance works, etc. ‣ More than 2,000 local people participated in the construction site works. They gained deeper understanding of riverbank protection works.
Infrastructure and/or important facility are protected from riverbank erosion by structural measures (in Ha Tinh & Quang Binh Provinces)	‣ The riverbank protection works at the selected two (2) sites were completed in the 1st working period on schedule, to protect infrastructures, lands and residential areas. ‣ The evaluation of the completed facilities at two (2) pilot sites will be done after experience of flood attacks after completion. ‣ The responsibilities for completed facilities were transferred to the respective communes for further maintenance works by them.
Developed reservoir operation manuals of four existing dams are approved as a reference by Quang Binh Province.	‣ The manuals of Vuc Tron and Phu Vinh were completed by Provincial Irrigation Works Exploitation 01 Member Limited Company (referred to as Provincial Irrigation Company) and approved by PPC. ‣ The manuals of Minh Cam and Phu Hoa were completed by DARD DWR as reference. It is required to conduct hydrological analysis in order to be approved by PPC.
Developed embankment inspection manual in Nghe An Province is approved as a reference material by MARD.	‣ The manual developed has been drafted at the province level. The draft manual was finalized after addressing the comments from Department of Dyke Management, MARD, and submitted to MARD DMC by Nghe An DARD DWR.
Budget planning and institutional arrangement for IFMP implementation are initiated in Hue Province.	‣ IFMP reviewing report was completed. It will be approved by PPC in July 2016.

Riverbank Protection Works in Ha Tinh and Quang Binh Provinces

The construction of river bank protection works in Ha Tinh and Quang Binh provinces have been completed on the planned schedule. The timely completion is attributed to the high ownership of both the DARDs and persons concerned throughout the pilot projects.

According to an interview with community residents, it is reported that 1) Tho Linh Village in QB and Quyet Tien Hamlet in HT fully appreciated the implementation of riverbank protection works, 2) the works can somehow help residents to reduce their anxiety against riverbank erosion especially in places fronting the residential area and 3) the works have become a model to apply to other critical points in the near future. Lastly 4) there is an opinion that we cannot determine the structure reliability at present, because it has not been stricken by large floods after its construction.

In addition, according to the counterparts, it is reported that they learnt a lot from the project

implementation (site selection, investigation, design, construction and maintenance of the facilities), as follows:

- Procedure of surveys in the preliminary stage for investigation and selection of countermeasure matching the characteristic of the site;
- The coping method for low-cost countermeasures by using local materials and construction wastes(within budget and construction period and construction of high quality structure); and
- Importance of monitoring and maintenance of the completed facilities

Riverbank erosion is one of major flood damage in Vietnam that causes serious loss to communities. Under such a situation at community level, there are strong requests to implement small scale and low-cost riverbank protection works. To cope with such expectations and demands, a pilot project was conducted.

Through the above two (2) projects, experience and knowhow have been accumulated in the DARDs and Commune offices. Such experience, knowledge and knowhow can be applicable in the rivers flowing in the north-central region in Vietnam. It is highly expected that it will lead to further replication of works of similar nature in the neighboring areas.

The biggest restriction for further implementation of such works will be the financing required for the works including surveys and construction costs. For budgetary provision and PPC approval for implementation of the works, close collaboration among the questioned villages, communes and district offices, DARD and PPC will be necessarily important.

Major further issues and tasks in DIFSC and DDMFSC are as follows.

- Monitoring and maintenance system for the completed facilities which is still in need of improving
- Further replication of similar works in the province and the necessary budgetary provision
- In the pilot project of Ha Tinh province, in view of budget constraints, the protection area/length of the pilot project cannot cover by the whole eroded area of about 700 m. For this matter, it was discussed that the uncovered area is to be carried out by DARD Ha Tinh province, in the near future.

Dam Reservoir Operation Manual in Quang Binh Province

In Vietnam, the dam reservoir operation manuals are prepared by the dam administrator. In case of the project target reservoirs, the Provincial Irrigation Company hires the consultants in Quang Binh province to prepare the manuals. DARD DWR is only in-charge of verification of the prepared manuals to be approved by PPC. Thus, the project was required to prepare the manuals in cooperation with the Provincial Irrigation Company. Due to the delay of PMU establishment, however, it had been difficult to obtain the Provincial Irrigation Company and to collect the necessary information and data.

After PMU establishment, the manual preparation works have been smoothly done in collaboration between DARD DWR and the Provincial Irrigation Company. A total of four

(4) study workshops for dam safety management were conducted with the participation of both parties. In the workshops, the items that have to be added in the Vietnam-standard manuals were discussed and referred to examples of dam operation in Japan. As a result, the following items were added to the manuals.

- Operation for flood discharge in special cases / Notify local authorities to help local peoples;
- Inspection and maintenance by the Provincial Irrigation Company / Record of the inspection; and
- Reviewing and evaluation of the annual operation / Adjustment of regulation and manuals.

Additional information such as regulation of the retain water levels in dry & flood seasons based on prescribed hydraulic and hydrologic calculation is required for PPC approval as the actual operation manual. According to the baseline survey, the project only supported the preparation of the manual as reference. When the budget for the hydraulic and hydrologic calculation is secured, the manual will be completed by DARD DWR.

River Dyke Inspection Manual in Nghe An Province

The River Dyke Inspection Manuals has been developed in collaboration with the Division of Planning and Technology, six (6) Inspection Branch Offices under the direction by the Deputy Director of DARD DWR, and JICA expert team.

Several interview surveys of the inspection patrol teams by branch offices and joint inspection patrol including staff of the Division of Planning and Technology were held in the course of the manual development. In April 2015, the joint coordination meeting including the staff of six (6) dyke inspection branch offices was held to share information and data which were arranged so far, and to discuss the manual focusing on common and priority inspection items for the daily patrol. The revising work has been conducted with the Department of Dyke Management, MARD. In this sense, sustainability and scale-up of the developed manual are expected enough.

However, there are many matters to be overcome such as arrangement of required equipment for inspection patrol of camera/measurement and improvement for the modernization of dyke structural investigation method and structural repair technique. It can be said that the present dyke management system is not perfect. It is still in need of improving the system (required equipment, dyke investigation and repair technique, etc.). Further a workable system will be hopefully built up for the progress of dyke management in DARD DWR. Regarding the investigation and examination of dyke structural condition, various methods applied in Japan were explained and introduced in the 3rd Annual Seminar in Nghe An province.

In addition, the manual developed is a first version of river dyke inspection manual focusing on the existing dyke in the Ca-Lam river system. As needed based on new situation of dyke structures and by reflection of the experience, knowledge and knowhow to be accumulated, some items in the manual such as inspection timing, priority items, recording formats, etc., are requested to be reviewed and improved.

OJTs on Bathymetric Survey in Nghe An Province

The OJTs on bathymetric survey have been conducted at the three (3) sites of the Ca River basin. A manual for measurement and data processing was prepared. C/P of DDFSC in Nghe An province became capable to conduct all of the processes to profile the bathymetry and extract river cross sections. The sustainability is also expected to be high because only the cost to charter a boat is needed to conduct the survey.

Although this activity is basically targeting Nghe An province, it could be applied to other provinces as well. For example, the C/P of Quang Binh province prepared the riverbank erosion risk map downstream of the Gianh River. If the bathymetry and thalweg lines of river were described in the same map, the characteristics and causes of the erosion could become visible. This could contribute to understand the potential erosion in the future.

Recommendation for Implementation of IFMP in T. T. Hue Province

Total of four (4) IFMP reviewing meetings were held from March to June, 2016. The relevant agencies in the T.T.Hue province initiated the meeting and concluded the implementation plan including budget allocation of IFMP.

In the reviewing works, the implementation costs were divided into 1) maintenance and regular management operation cost by local budget including provincial disaster prevention fund regulated by Law on NDPC and 2) construction and rehabilitations using financial supports by the central government for large-scale facilities. The extension of target years was set from 2020 to 2030 considering the Sendai Framework. The adjustments of priority projects and equalization of financial plans were also discussed in the reviewing works.

The reviewed Plan was already submitted for approval by PPC. From now on, the financial supports of the central government shall be discussed.

On the other hand, a flood analysis model considering newly formulated dam operation regulation was developed. Five (5) scenarios of flood analysis have been conducted as case studies in collaboration with DARD DWR. Further case studies are needed in order to apply the analysis result to the actual disaster management activities. The case studies shall be conducted by DARD DWS who became capable to conduct the works through OJTs.

4.2.6 Output 5: Non-structural Measures

The achievement of Output 5 at the end of the project is shown in Table 4-2-6.

Table 4-2-6 Achievement on Output 5

Indicator	Remarks
CBDRM facilitators from target communes (at least 4 persons for each commune) are trained by the Project.	▸ CBDRM Training courses were conducted at the selected commune in 4 pilot communes.
CBDRM activities are conducted at 4 communities based on the Guidelines developed by the Phase I of the project and other projects.	▸ The trained commune staff formulated of Disaster Management plan in the 4 pilot communes. The hamlet level activities were also conducted based on the formulated plans.

Indicator	Remarks
Disaster education is conducted at 4 schools in collaboration with CBDRM activities.	▸ Disaster Education activities in the 4 pilot communes were conducted and the school teachers developed disaster education supplements in the activities. ▸ Model classes were also conducted by the trained teachers using the developed supplements.

In Vietnam, implementation of CBDRM and Disaster Education activities were ordered by Prime Minister Decision 1002. The decision requests to complete all activities by 2020. The Vietnam Government decided to allocate some budget for the implementation of Decision 1002 to 39 provinces including Ha Tinh province. Furthermore, securing the budget for disaster management is obligated by the Law on Disaster Prevention, Control executed in 2014. In accordance with this national policy, some provinces have allocated some budget for DRR activities. In the near future, CBDRM and Disaster Education activities will be conducted more widely. In Ha Tinh province, the PPC allocated some budget for CBDRM activities and the DDMFSC conducted CBDRM activities in 2014.

However, the activities which are being conducted under the Vietnamese budget are sometimes not sufficient. Prime Minister Decision 1002 requests (1) "All villages and communes in high risk areas for disaster occurrence will be able to develop natural disaster (prevention) risk reduction and response preparedness plans" and (2) "70 percent of the inhabitants in disaster-prone areas will be targeted for the dissemination of knowledge of flood and storm control and disaster mitigation". On the other hand, most of the projects funded by international donors target a few communes and input to limited communes intensively. It is difficult to adopt the method of these activities to all disaster prone communes in Vietnam because of the limited budget and time.

In order to improve this situation, formulation of the DRR plan and implementation of awareness raising activities in hamlets after CBDRM training should be obligated and the progress of those activities should be monitored regularly. After all the activities, the Project issued "Recommendations of standard procedure of CBDRM" that clarified the roles and responsibilities of provinces, districts and communes for effective implementation of CBDRM. Non-structural measures such as awareness raising in commune level can be implemented using their own budget by using the recommended implementation procedure. Besides the collaborative implementation between schools and communes under the concept of "Disaster Education involved in CBDRM" could maximize the effectiveness

The provincial disaster prevention fund will become financially stable in near future. It is expected that the more efficient and effective CBDRM and Disaster Education activities will be carried out using the funds and guidelines.

CHAPTER 5
RECOMMENDATION
TO OVERALL GOAL

CHAPTER 5: RECOMMENDATION TO OVERALL GOAL

5.1 Progress and Issue to Verifiable Indicators

5.1.1 Central government initiates to develop legal systems necessary for introduction of IFM (especially regarding river basin management)

The disaster prevention and emergency operation and hydro meteorological data accumulation/sharing were clarified in the Law on NDPC and the Law on Hydro-meteorology enforced in 2013 and 2015 respectively. Both laws regulate that such activity should be proactively done by the local governments, and supported by the central government. This policy is in accordance with IFMP formulation that should be basically formulated under the initiative of the local governments. The IFMP is considered in planning of disaster prevention and control plan per the Law on NDPC. Therefore, it is highly expected for the central government to encourage PPCs to promote IFMP formulation.

On the other hand, the financial limitation for provincial disaster management has been an issue. However, now the Law on NDPC stipulates that the provincial disaster management fund can be collected from citizens and used by PPCs. Discussion for practical utilization of the fund has just started at the moment. In the near future, the fund is expected to cover the maintenance cost of the facilities and technical survey that have been low priority in local disaster management until now. So that the facilities will be well maintained and have longer life.

5.1.2 Financial arrangements are secured for IFMP implementation (Hue and Quang Binh Provinces)

In the formulated IFMP, each project budget for the structural measures is divided into maintenance / survey costs and upgrade / improvement / construction costs. Likewise, local resources are available for non-structural measures that are are also divided into the awareness raising activities such as CBDRM and Disaster Education and semi-hard countermeasures such as improvement of hydro meteorological observation network and early warning system.

For the maintenance of facilities and the awareness raising activities, the previously mentioned provincial disaster prevention fund should be allocated. For the construction, financial supports from the central government and/or ODA fund are expected.

5.2 Issues and Recommendation to achieve Overall Goal

5.2.1 Qualitative Improvement of IFMP (especially River Management)

The IFMPs will be formulated by each province under the initiative of the central government. However, if the target river basin extends across provincial boundaries, or if there is a flood control dam outside of the target province, it may be difficult to formulate the IFMP by the target province without involving the other provinces.

On the other hand, in Vietnam, more flood control capacity of dam reservoirs is expected in the future. Improvement of the dam operation should be considered in IFMP formulation.

A close coordination between PPC and dam owners is also highly required in case the river basin has a large reservoir in the upstream area, even if the dam is outside of the province. The central government should lead the coordination to improve the dam operation and establish close information sharing between PPC and dam owners.

The project expects MARD to promote feedback of flood damages downstream of the dam to be included in the dam operation manuals.

5.2.2 Further Capacity Enhancement on Flood Risk Analysis

The IFMP is a comprehensive approach to promote flood prevention and mitigation measures in the whole river basin considering social-economic impact by current and future flood risk. Therefore, flood risk analysis is one of the most important information to formulate IFMP.

The role of DARD DWRs is to utilize the flood analysis result for flood volume and damage estimation as well as for flood control planning. DWRs intend order the flood modeling and to inspect the result for their purposes but not to develop full-scale flood model. In this regards, the Project has supported the flood analysis at HMSs rather than DARDs.

The relationship between DARD and HMS is good at the provincial level. There seems to be no obstruction for hydro-meteorological data sharing and mutual supports on flood analysis. However, the financial support to HMS is an issue to promote flood risk analysis including river cross-section survey and improvement of hydro-meteorological data. Based on the legal framework of IFMP and harmonious efforts between MARD and MONRE, it is expected that the provincial HMS will secure the budget for flood analysis and the related data collection with financial support from the central government.

5.2.3 Updating Guidelines on CBDRM and Disaster Education

As mentioned before, the provincial disaster management fund is now going to be established in each province. The fund can be a solution to conduct CBDRM activities by provincial budget. The actual budget allocation of the fund has just started at the moment.

As of now, so many CBDRM and Disaster Education activities have been conducted by government and international donors. However, due to lack of standard procedure, each activity differs from each other using different materials depending on their budget and scopes. Accordingly, each activity has been unconnected and is difficult to scale-up.

For sustainable and expanded activities of CBDRM and Disaster Education, it is required to develop standard procedures that can be applied to future CBDRM and Disaster Education using local resources of provinces and communes. Therefore, the Project referred to CBDRM manual developed by MARD DMC, but shortened the training contents into 2-day activities. After the training, the trained commune staffs formulated their disaster management plan referring to the manual for more details. This shortened procedure reduces the burden to commune staffs.

MARD DMC is required to update the existing CBDRM manual to be more effective and efficient based on the recommendation from the Project.

APPENDIX 1
PDM (0) / PDM(1)

Project Design Matrix (PDM0)

8th Jan, 2013

Project Title: Project for Building Disaster Resilient Societies in Vietnam (Phase 2)
Target Area: Hanoi City, Nghe An Province, Ha Tinh Prov. Quang Binh Province, Thua Thien Hue Province
Responsible Agency: Ministry of Agriculture and Rural Development (MARD)
Implementing Agency: Directorate of Water Resources (DWR) of MARD
Co-Implementing Agency: Department of Meteorology, Hydrology and Climate Change (DMHCC) and
National Hydro-Meteorological Service (NHMS) of Ministry of Natural Resources and Environment (MONRE)

Cooperation Period: August 2013 to July 2016 (3 Years)
Target Groups
1. Staff members from MARD
2. Staff members from DARDs in target provinces
3. People in the pilot communes
4. DOETs, Teachers and pupils in the pilot communes

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Resilience of society against water-related natural disasters is strengthened under the integrated flood management (IFM) system.	1. Central government initiates to develop legal systems necessary for introduction of IFM (especially regarding river basin management). 2. Financial arrangements are secured for IFMP implementation (Hue and Quang Binh Provinces)	1. Interview with MARD and MONRE 2. Interview with PPCs, DARDs and MARD	
Project Purpose Capacity for IFM planning and implementation is strengthened at central level and in target provinces.	1. Central government initiates to review legal systems necessary for IFM (especially regarding river basin management). 2. Joint Action Plan developed under Output1 is implemented. 3. Promptness of real time river information data sharing between MONRE and MARD is increased. 4. Authorities of target provinces initiate to find measures to secure funding for IFM implementation.	1. Interview with MARD and MONRE 2. Interview with MARD, MONRE, PPCs, and DARDs 3. Interview with PPCs, DARDs and related agencies 4. Interview with PPCs, DARDs and related agencies	*Central government reaches internal consensus on a timely manner in terms of revision of legal systems for IFM.
Outputs **[Output 1]** Institutional arrangements for implementation of IFM are strengthened at the central level.	1-1. Multi-ministerial action plan for improvement of quality of flood forecasting and warning services, developed under activity 1-4, is authorized by central government as reference material. 1-2. Output inventory and Promoting IFM Manual are formulated through Output 2 to 5	1-1. Project's Progress Reports; Interview with MARD and MONRE 1-2. Project's Progress Reports; Interview with PPCs, DARDs and MARD	*Progress of WB5 Project contributes to enhance collaboration between MARD and MONRE.
[Output 2] Capacity of DARD for formulating IFMPs are strengthened in Quang Binh Province (two river basins i.e. Giang River and Nhat Le River)	2-1. IFMP formulated for selected river basins (Giang River and Nhat Le River) is approved by the provincial government. 2-2. Number of DARD staff who gain deeper understanding on the process of IFMP formulation (xx persons)	2-1. Project's Progress Reports; Interview with PPCS, DARDs and MARD 2-2. Project's Progress Reports; Interview with PPCs and DARDs	
[Output 3] Capacity of DARDs for flood risk analysis is strengthened (in Nghe An and Ha Tinh Provinces).	3-1. Number of DARD staff who are capable of conducting flood risk analysis (xxx persons in Nghe An, xxx persons in Ha Tinh Province)	3-1. Project's Progress Reports; Interview with PPCs and DARDs	
[Output 4] Structural measures for flood resilience are strengthened in target 4 provinces.	4-1. Coverage area (xx ha) that are protected from flood risks by structural measures (in Ha Tinh & Quang Binh Provinces) 4-2. Manuals developed by the Project for reservoir operation (in Quang Binh Province) and/or for embankment inspection (in Nghe An Province) are authorized by central government. 4-3. Budget planning and institutional arrangement for IFMP implementation are initiated in Hue Province.	4-1. Project's Progress Reports; Interview with PPCs and DARDs 4-2. Project's Progress Reports; Interview with PPCS, DARDs and MARD 4-3. Project's Progress Reports; Interview with PPCS, DARDs and MARD	
[Output 5] Non-structural measures for flood resilience are strengthened in target 4 provinces.	5-1. Number of CBDRM trainers trained by the Project (xx persons) 5-2. Number of CBDRM activities conducted based on the Guidelines developed by the Phase I of the Project. 5-3. Number of teachers and pupils trained by developed material	5-1. Project's Progress Reports; Interview with PPCs and DARDs 5-2. Project's Progress Reports; Interview with PPCs and DARDs 5-3. Project's Progress Reports; Interview with PPCs and DOETs	

Activities	Inputs		Important Assumptions
1-1. Conduct baseline study to analyze current problems / constraints for flood and disaster management in MARD/DARDs and related organizations (including MONRE/DONRE, NHMS, and CCFSC). 1-2. Clarify institutional arrangements (from central to commune level), including roles and responsibilities, required for implementation of IFM based on the results of the baseline study conducted under activity 1-1. 1-3. Clarify issues and challenges as well as good practices of IFMP implementation to consolidate into MARD through Output 2 to 5. 1-4. Formulate an action plan at the central level jointly with MARD and MONRE to improve hydro-meteorological information services including monitoring, collection and utilization of river information (such as rain falls, water level of rivers and ponds, other info. required for IFM), as well as flood forecasting. 1-5. Consider improvement of legal systems for IFM (especially river management) 2-1. Conduct baseline survey on natural and social conditions, as well as basic information including flood disaster records, hydro-meteorological data, run off analysis and flood simulation. 2-2. Conduct flood disaster impact analysis based on flood hazard risk mapping of different scenarios. 2-3. Formulate plan(s) of structural and non-structural measures based on the results of risk and impact analysis. 3-1. Conduct trainings on run off analysis and flood simulation in Nghe An and Ha Tinh Provinces. 3-2. Conduct flood disaster impact analysis based on flood hazard risk mapping of different scenarios. 3-3. Conduct OJTs on effective use of satellite information in flood forecasting in Nghe An Province. 4-1. Implement small-scale, low-cost river bank protection works in Ha Tinh and Quang Binh Provinces 4-2. Develop operation manual(s) for effective use of existing five (5) major reservoirs in Quang Binh Province. 4-3. Develop embankment inspection manual in Nghe An Province. 4-4. Conduct on-the job trainings (OJTs) on bathymetric survey in Nghe An Province. 4-5. Provide recommendation for implementation of IFMP in Hue Province. 5-1. Conduct community-based disaster risk management (CBDRM) activities in selected communes. 5-2. Conduct disaster education activities in coordination with CBDRM under activity 5-1.	**Japanese side** 1 JICA Experts 1) Long-term Experts ・Chief Advisor/ Disaster Management Policy ・Integrated Flood Management and Planning ・Project Coordinator 2) Short-term Experts ・Flood Disaster Risk Analysis ・River Planning ・Meteorological Analysis ・Structural Measures ・Dam Operation and Management ・GIS/Land Use Planning ・CBDRM/ Disaster Education 2 Training courses ・Training in Japan （xx persons/year) 3 Local Cost 4 Equipment ・Equipment related river planning ・Equipment related training ・Office equipment ・Other equipment mutually agreed upon as necessary for the implementation of the project	**Vietnamese side** 1 Counterpart ・Project Director ・Project Manager ・Other counterpart personnel 2 Office spaces and facilities ・Office space for JICA Experts ・Office facilities ・Internet connection ・Rooms for training/workshops 3 Costs for local activities	*No institutional constraints appear in terms of real-time hydrometrological information sharing between MONRE and MARD. **Preconditions** *Cooperation and understanding from MONRE is secured in terms of contents of the Project.

Project Design Matrix: PDM (1)

Project Design Matrix: PDM (1) 18th Dec, 2013

Project Title: Project for Building Disaster Resilient Societies in Vietnam (Phase 2)
Target Area: Hanoi City, Nghe An Province, Ha Tinh Prov. Quang Binh Province, Thua Thien Hue Province
Responsible Agency: Ministry of Agriculture and Rural Development (MARD)
Implementing Agency: Directorate of Water Resources (DWR) of MARD
Co-Implementing Agency: Department of Meteorology, Hydrology and Climate Change (DMHCC) and National Hydro-Meteorological Service (NHMS) of Ministry of Natural Resources and Environment (MONRE)

Cooperation Period: August 2013~ July 2016 (3 Years)
Target Groups: 1. Staff members from MARD
2. Staff members from DARDs in target provinces
3. People in the pilot communes
4. DOETs, Teachers and pupils in the pilot communes

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Resilience of society against water-related natural disasters is strengthened under the integrated flood management (IFM) system.	1. Central government initiates to develop legal systems necessary for introduction of IFM (especially regarding river basin management). 2. Financial arrangements are secured for IFMP implementation (Hue and Quang Binh Provinces)	1. Interview with MARD and MONRE 2. Interview with PPCs, DARDs and MARD	
Project Purpose Capacity for IFM planning and implementation is strengthened at central level and in target provinces.	1. Central government initiates to review legal systems necessary for IFM (especially regarding river basin management). 2. Joint Action Plan developed under Output1 is implemented. 3. Promptness of real time river information data sharing between MONRE and MARD is increased. 4. Authorities of target provinces initiate to find measures to secure funding for IFM implementation.	1. Interview with MARD and MONRE 2. Interview with MARD, MONRE, PPCs, and DARDs 3. Interview with PPCs, DARDs and related agencies 4. Interview with PPCs, DARDs and related agencies	* Central government reaches internal consensus on a timely manner in terms of revision of legal systems for IFM.
Outputs **[Output 1]** Institutional arrangements for IFM is strengthened at the central level.	1-1. Multi-ministerial action plan for improvement of quality of flood forecasting and warning services, developed under activity 1-4, is authorized by central government as reference material. 1-2. Output inventory and Promoting IFM Manual are formulated through Output 2 to 5	1-1. Project's Progress Reports; Interview with MARD and MONRE 1-2. Project's Progress Reports; Interview with PPCs, DARDs and MARD	*Progress of WB5 Project contributes to enhance collaboration between MARD and MONRE.
[Output 2] Capacity of DARD for formulating IFMPs are strengthened in Quang Binh Province. (two river basins i.e. Gianh River and Nhat Le River)	2-1. IFMP formulated for selected river basins (Gianh River and Nhat Le River) is approved by the provincial government. 2-2. DARD and relevant agencies staff (10 persons) gain deeper understanding on the process of IFMP formulation.	2-1. Project's Progress Reports; Interview with PPCs, DARDs and MARD 2-2. Project's Progress Reports; Interview with PPCs and DARDs	
[Output 3] Capacity of DARDs for flood risk analysis is strengthened (in Nghe An and Ha Tinh Provinces).	3-1. DARD and North Central Regional & Provincial Hydro Meteorological Center (NCRHMC/PHMC) staff (10 persons in Nghe An, 10 persons in Ha Tinh Province) are capable of conducting flood risk analysis.	3-1. Project's Progress Reports; Interview with PPCs and DARDs	
[Output 4] Structural measures for flood resilience are strengthened in target 4 provinces.	4-1. DARD staff (10 persons) and community people including district officers (100 persons) who participated in the pilot projects in Ha Tinh & Quang Binh Provinces gain deeper understanding on riverbank protection works. 4-2. Infrastructure and/or important facility are protected from riverbank erosion by structural measures (in Ha Tinh & Quang Binh Provinces) 4-3. Developed reservoir operation manuals of four existing dams are approved as a reference by Quang Binh Province. 4-4. Developed embankment inspection manual in Nghe An Province is approved as a reference material by MARD. 4-5. Budget planning and institutional arrangement for IFMP implementation are initiated in Hue Province.	4-1. Project's Progress Reports; Interview with PPCs and DARDs 4-2. Project's Progress Reports; Interview with PPCs and DARDs 4-3. Project's Progress Reports; Interview with PPC and DARD 4-4. Project's Progress Reports; Interview with PPCs, DARDs and MARD 4-5. Project's Progress Reports; Interview with PPCs, DARDs and MARD	
[Output 5] Non-structural measures for flood resilience are strengthened in target 4 provinces.	5-1. CBDRM facilitators from target communes (at least 4 persons for each commune) are trained by the Project. 5-2. CBDRM activities are conducted at 4 communities based on	5-1. Project's Progress Reports; Interview with PPCs and DARDs 5-2. Project's Progress Reports;	

	the Guidelines developed by the Phase I of the project and other projects. 5-3. Disaster education is conducted at 4 schools in collaboration with CBDRM activities.	Interview with PPCs and DARDs 5-3. Project's Progress Reports; Interview with PPCs and DOETs	
Activities	**Inputs**		**Important Assumptions**
1-1. Conduct baseline study to analyze current problems / constraints for flood and disaster management in MARD/DARDs and related organizations (including MONRE/DONRE, NHMS, and CCFSC). 1-2. Clarify institutional arrangements (from central to commune level), including roles and responsibilities, required for implementation of IFM based on the results of the baseline study conducted under activity 1-1. 1-3. Clarify issues and challenges as well as good practices of IFMP implementation to consolidate into MARD through Output 2 to 5. 1-4. Formulate an action plan at the central level jointly with MARD and MONRE to improve hydro-meteorological information services including monitoring, collection and utilization of river information (such as rain falls, water level of rivers and ponds, other info. required for IFM), as well as flood forecasting. 1-5. Consider improvement of legal systems for IFM (especially river management) 2-1. Conduct baseline survey on natural and social conditions, as well as basic information including flood disaster records, hydro-meteorological data, run off analysis and flood simulation. 2-2. Conduct flood disaster impact analysis based on flood hazard risk mapping of different scenarios. 2-3. Formulate plan(s) of structural and non-structural measures based on the results of risk and impact analysis. 3-1. Conduct trainings on run off analysis and flood simulation in Nghe An and Ha Tinh Provinces. 3-2. Conduct flood disaster impact analysis based on flood hazard risk mapping of different scenarios. 3-3. Conduct OJTs on effective use of satellite information in flood forecasting in Nghe An Province. 4-1. Implement small-scale, low-cost river bank protection works in Ha Tinh and Quang Binh Provinces 4-2. Develop operation manual(s) for effective use of existing four (4) major reservoirs in Quang Binh Province. 4-3. Develop embankment inspection manual in Nghe An Province. 4-4. Conduct on-the job trainings (OJTs) on bathymetric survey in Nghe An Province. 4-5. Provide recommendation for implementation of IFMP in Hue Province. 5-1. Conduct community-based disaster risk management (CBDRM) activities in selected communes. 5-2. Conduct disaster education activities in coordination with CBDRM under activity 5-1.	**Japanese side** 1 JICA Experts 1) Long-term Experts ・Chief Advisor/ Disaster Management Policy ・Integrated Flood Management and Planning ・Project Coordinator 2) Short-term Experts ・Flood Disaster Risk Analysis ・River Planning ・Meteorological Analysis ・Structural Measures ・Dam Operation and Management ・GIS/Land Use Planning ・CBDRM/ Disaster Education 2 Training courses ・Training in Japan (xx persons / year) 3 Local Cost 4 Equipment ・Equipment related river planning ・Equipment related training ・Office equipment ・Other equipment mutually agreed upon as necessary for the implementation of the project	**Vietnamese side** 1 Counterpart ・Project Director ・Project Manager ・Other counterpart personnel 2 Office spaces and facilities ・Office space for JICA Experts ・Office facilities ・Internet connection ・Rooms for training/workshops 3 Costs for local activities	*No institutional constraints appear in terms of real-time hydrometrological information sharing between MONRE and MARD. **Preconditions** *Cooperation and understanding from MONRE is secured in terms of contents of the Project.

APPENDIX 2
Detailed Plan of Operation (PO)

Plan of Operation (PO) 1/2

Work Contents (Central)	2013				2014												2015												2016								
	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	9
1st Term																																						
Output1 Institutional arrangements for IFM is strengthened at central level																																						
1-1 Collection of information related to flood management and disaster management																																						
1-2 Clarification of institutional arrangements, including roles and responsibilities for implementation of IFM																																						
1-3 Monitoring of project outputs																																						
1-4 Collection of river-related information in order to improve quality of flood forecasting and warning																																						
1-5 Collection of information for improvement of the legal system related to IFM																																						
2nd Term																																						
Output1 Institutional arrangements for IFM is sterngthened at central level																																						
1-6 Monitoring of project results and extraction of issues and good practice																																						
1-7 Development of result inventory and IFMP promotion manual																																						
1-8 Formulatation of action plan for measuring, collection and utilization of river information																																						
1-9 Examination of implementation plan for improvement of the legal system related to IFM																																						

Work Contents (Nghe An Province)	2013				2014												2015												2016								
	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	9
1st Term																																						
Output3 Capacity of DARD for flood risk analysis is strengthened (in Nghe An Province)																																						
3-1 Collection of basic information																																						
3-2 Conducting training on run-off analysis and flood simulation																																						
a. Review of ground elevations																																						
b. Development of flood simulation model																																						
c. Conducting calibration works of simulation model																																						
d. Examination of scenarios for simulation																																						
e. Conducting flood simulation for different scenarios																																						
3-2 Conducting on-the-job training (OJT) on effective use of satellite information in flood forecasting																																						
Output4 Structural measures for flood resilience is promoted in Nghe An Province																																						
4-3 Preparation of embankment inspection manual in Nghe An Province																																						
a. Investigation of existing conditions of embankment																																						
b. Examination of inspection rules (in cooperation with MARD)																																						
c. Formulation of embankment inspection manual																																						
4-4 Conducting OJT on bathymetric survey in Nghe An Province																																						
Output5 Non-structural measures for flood resilience is promoted in Nghe An Province																																						
5-1 Conducting community-based disaster risk management (CBDRM) activities in Nghe An Province																																						
a. Selection of pilot communes																																						
b. Implementation of baseline survey in pilot communes																																						
c. Holding workshop for implemetation plan of CBDRM																																						
d. Conducting training of CBDRM leaders																																						
5-2 Conducting disaster education in Nghe An Province																																						
a. Collection and analysis of existing materials and output for disaster education																																						
b. Holding disaster education seminar targeting teachers and DOET staffs																																						
c. Preparation of disaster education material with project output																																						
d. Conducting disaster education with developed material																																						
e. CBDRM knoeledge and experience sharing workshop between Vietnam and Thailand																																						
2nd Term																																						
Output3 Capacity of DARDs for flood risk analysis is strengthened (in Nghe An Province)																																						
3-4 Conducting flood disaster impact analysis based on the results of risk and impact analysis																																						
Output5 Non-structural measures for flood resilience is promoted in Nghe An Province																																						
5-3 Conducting community-based disaster risk management (CBDRM) activities in Nghe An Province																																						
a. Conducting CBDRM activities																																						
b. Promoting to conduct CBDRM activities																																						
5-4 Conducting disaster education in Nghe An Province																																						
a. Conducting disaster education activities cooperating with community activities																																						

Work Contents (Ha Tinh Province)	2013				2014												2015												2016								
	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	9
1st Term																																						
Output3 Capacity of DARDs for flood risk analysis is strengthened (in Ha Tinh Province)																																						
3-1 Collection of basic information																																						
3-2 Conducting training on run-off analysis and flood simulation																																						
a. Review of ground elevations																																						
b. Development of flood simulation model																																						
c. Conducting calibration works of simulation model																																						
d. Examination of scenarios for simulation																																						
e. Conducting flood simulation for different scenarios																																						
Output4 Structural measures for flood resilience is promoted in Ha Tinh Province																																						
4-1 Implementation of small-scale, low-cost river bank protection works in Ha Tinh Province																																						
a. Selection of one (1) site to be protected in collaboration works with CBDRM activity in each province																																						
b. Selection of riverbank protection measures																																						
c. Preparation of basic design and construction drawing																																						
d. Selection of contractor for implementation																																						
e. Implementation of protection works																																						
Output5 Non-structural measures for flood resilience is promoted in Ha Tinh Province																																						
5-1 Conducting community-based disaster risk management (CBDRM) activities in Ha Tinh Province																																						
a. Selection of pilot communes																																						
b. Implementation of baseline survey in pilot communes																																						
c. Holding workshop for implemetation plan of CBDRM																																						
d. Conducting training of CBDRM leaders																																						
5-2 Conducting disaster education in Ha Tinh Province																																						
a. Collection and analysis of existing materials and output for disaster education																																						
b. Holding disaster education seminar targeting teachers and DOET staffs																																						
c. Preparation of disaster education material with project output																																						
d. Conducting disaster education with developed material																																						
e. CBDRM knowledge and experience sharing workshop between Vietnam and Thailand																																						
2nd Term																																						
Output3 Capacity of DARDs for flood risk analysis is strengthened (in Ha Tinh Province)																																						
3-4 Conducting flood disaster impact analysis based on the results of risk and impact analysis																																						
Output5 Non-structural measures for flood resilience is promoted in Ha Tinh Province																																						
5-3 Conducting community-based disaster risk management (CBDRM) activities in Ha Tinh Province																																						
a. Conducting CBDRM activities																																						
b. Promoting to conduct CBDRM activities																																						
5-4 Conducting disaster education in Ha Tinh Province																																						
a. Conducting disaster education activities cooperating with community activities																																						

Original Achieved

Plan of Operation (PO) 2/2

Work Contents (Quang Binh Province)	2013				2014												2015												2016								
	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	9
1st Term																																						
Output2 Capacity of DARD for formulating IFMP are strengthened in Quang Binh Province																																						
2-1 Implementation of baseline survey, run-off analysis and flood simulation for formulating IFMPs																																						
a. Implementation of baseline survey																																						
b. Review of ground elevations																																						
c. Development of flood simulation model																																						
d. Conducting calibration works of simulation model																																						
e. Examination of scenarios for simulation																																						
f. Conducting flood simulation for different scenarios																																						
2-2 Preparation of flood hazard maps and conducting analysis of flood disaster risk impact																																						
a. Preparation of flood hazard maps and conducting risk assessment by GIS																																						
b. Conducting flood risk and impact analysis for different scenarios																																						
2-3 Formulation and approval of IFMP in Quang Binh Province																																						
a. Data collection related to IFMP formulation (structural and non structural measures)																																						
b. Review of collected data and information obtained above																																						
c. Establishment of IFMP formulating committee																																						
e. Review of provincial plans related to disaster risk management of each relevant agency																																						
d. Drawing up roadmap of IFMP formulation																																						
f. Determination of basic criteria for IFMP formulation																																						
g. Formulation of IFMP consisting of structural and non-structural measures																																						
h. Approval of IFMP by PCC in QB province																																						
i. Holding IFMP formulating committee																																						
Output4 Structural measures for flood resilience is promoted in Quang Binh Province																																						
4-1 Implementation of small-scale, low-cost river bank protection works in Quang Binh Province																																						
a. Selection of one (1) site to be protected in collaboration works with CBDRM activity in each province																																						
b. Selection of riverbank protection measures																																						
c. Preparation of basic design and construction drawing																																						
d. Selection of contractor for implementation																																						
e. Implementation of protection works																																						
4-2 Formulation of dam/reservoir operation and management manual in Quang Binh province																																						
a. Field survey at five pilot dams/reservoirs																																						
b. Data collection																																						
c. Establishment of dam operation and management manual working group																																						
d. Review of existing dam operation and management manuals																																						
e. Identification of issues on current dam operation and management																																						
f. Formulation of dam operation and management manuals																																						
g. Holding working group of dam/reservoir operation and management manuals																																						
Output5 Non-structural measures for flood resilience is promoted in Quang Binh Province																																						
5-1 Conducting community-based disaster risk management (CBDRM) activities in Quang Binh Province																																						
a. Selection of pilot communes																																						
b. Implementation of baseline survey in pilot communes																																						
c. Holding workshop for implementation plan of CBDRM																																						
d. Conducting training of CBDRM leaders																																						
5-2 Conducting disaster education in Quang Binh Province																																						
a. Collection and analysis of existing materials and output for disaster education																																						
b. Holding disaster education seminar targeting teachers and DOET staffs																																						
c. Preparation of disaster education material with project output																																						
d. Conducting disaster education with developed material																																						
e. CBDRM knowledge and experience sharing workshop between Vietnam and Thailand																																						
2nd Term																																						
Output2 Capacity of DARDs for formulating IFMPs are strengthened in Quang Binh Province																																						
2-4 Formulation of implementation plan of IFMP																																						
a. Plan of allocation of budget and /or fund for IFMP implementation																																						
b. Formulation of implementation plan of IFMP																																						
c. Holding IFMP formulating committee																																						
Output5 Non-structural measures for flood resilience is promoted in Quang Binh Province																																						
5-3 Conducting community-based disaster risk management (CBDRM) activities in Quang Binh Province																																						
a. Conducting CBDRM activities																																						
b. Promoting to conduct CBDRM activities																																						
5-4 Conducting disaster education in Quang Binh Province																																						
a. Conducting disaster education activities cooperating with community activities																																						

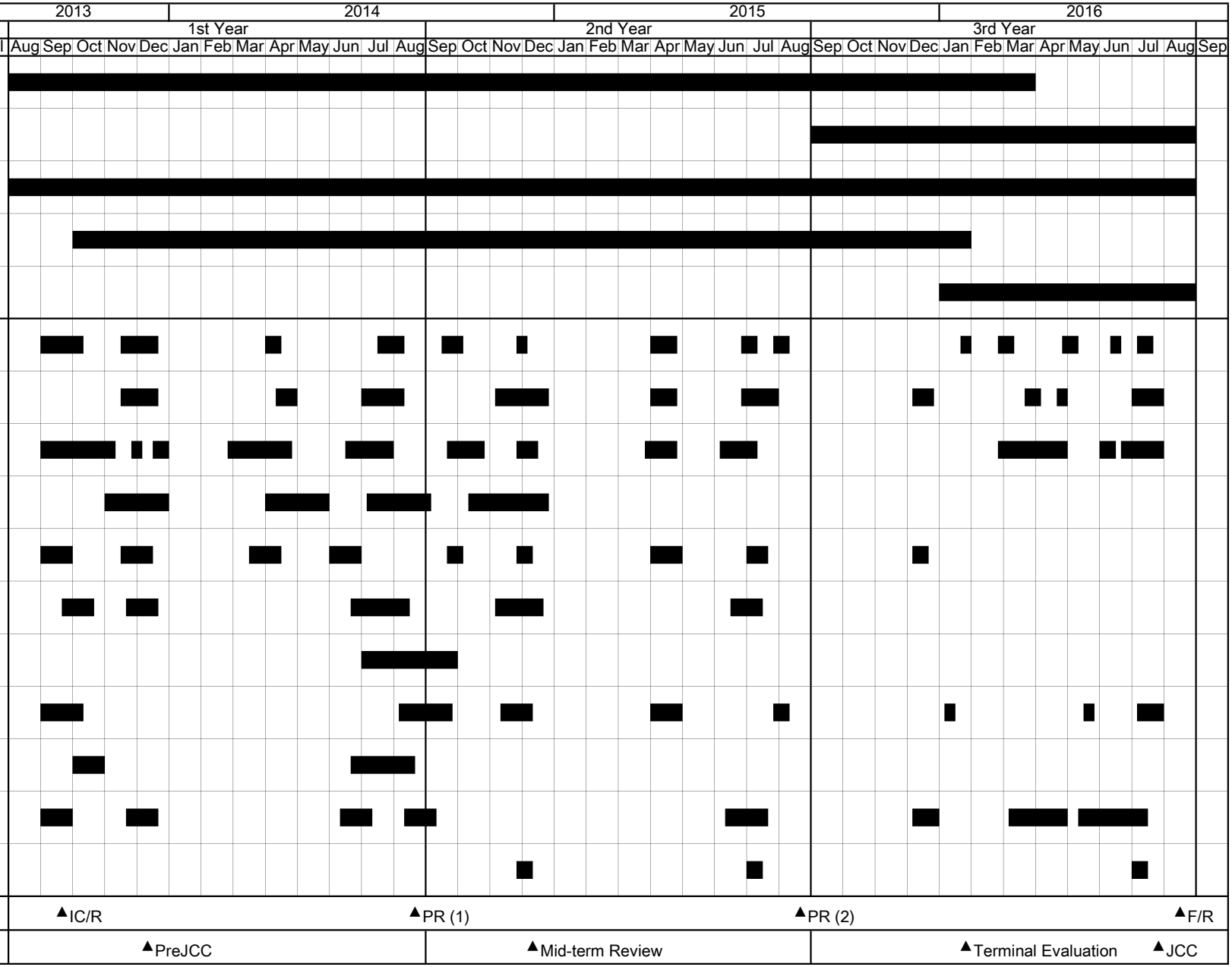
Work Contents (T.T.Hue Province)	2013				2014												2015												2016								
	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
1st Term																																						
Output4 Structural measures for flood resilience is promoted in Hue Province																																						
4-5 Provide recommendation for implementation of IFMP in Hue Province																																						
a. Review of present IFMP implementation																																						
b. Analysis of problems and constaraints hampering IFMP implementation																																						
c. Preaparation of roadmap for sequring fund for IMFP implementation																																						
d. IFMP Implemetation Committee meeting																																						
Output5 Non-structural measures for flood resilience is promoted in Hue Province																																						
5-1 Conducting community-based disaster risk management (CBDRM) activities in Hue Province																																						
a. Selection of pilot communes																																						
b. Implementation of baseline survey in pilot communes																																						
c. Holding workshop for implemetation plan of CBDRM																																						
d. Conducting training of CBDRM leaders																																						
5-2 Conducting disaster education in Hue Province																																						
a. Collection and analysis of existing materials and output for disaster education																																						
b. Holding disaster education seminar targeting teachers and DOET staffs																																						
c. Preparation of disaster education material with project output																																						
d. Conducting disaster education with developed material																																						
CBRDM knowledge and experience sharing workshop between Vietnam and Thailand																																						
2nd Term																																						
Output4 Structural measures for flood resilience is promoted in Hue Province																																						
4-5 Provide recommendation for implementation of IFMP in Hue Province																																						
a. Review of present IFMP implementation																																						
b. Recommendation for IFMP implementation																																						
c. IFMP Implemetation Committee meeting																																						
Output5 Non-structural measures for flood resilience is promoted in Hue Province																																						
5-3 Conducting community-based disaster risk management (CBDRM) activities in Hue Province																																						
a. Conducting CBDRM activities																																						
b. Promoting to conduct CBDRM activities																																						
5-4 Conducting disaster education in Hue Province																																						
a. Conducting disaster education activities cooperating with community activities																																						

Original Achieved

APPENDIX 3
Dispatch of Experts

Dispatch of Expert

Name	Discipline
MATSUKI Hirotada	Chief Advisor / Disaster Management Policy
NONAKA Mikio	Chief Advisor / Disaster Management Policy
HACHIJO Yuki	Integrated Flood Management Planning
FUJIMAKI Mitsuhiro	Project Coordinator
MATSUOTO Shoji	Project Coordinator
TOMIDA Yukishi	Integrated Flood Management Planning
KOIKE Toru	Flood Forecasting & Warning
ARAKI Hideki	Hydrology / Meteorology Flood Analysis
SASAKI Akira	Hydrology / Meteorology Flood Analysis
NOBE Takayuki	River Structural Measures
SHIRAKAWA Nobuyuki	Dam Operation & Management
ONODERA Jun	Social Survey / Development Planning
IGO Hodaka	GIS / Land Use Planning
KODAMA Makoto	River Planning
SASAKI Arata	CBDRM / Disaster Education
SAITO / MIYAMOTO	Training Coordinator
Report	
JCC Meeting	



APPENDIX 4

Procured Equipment List

Procured Equipment List

Item	Nos	Total JPY	Installed Location
Projector	3	186,740	Nghe An, Ha Tinh, Quang Binh
Copy machine	1	259,546	Quang Binh
B/W Laser Printer	3	56,258	Nghe An, Ha Tinh, Quang Binh
Color Ink Jet Printer	1	27,930	Quang Binh
Plotter	1	375,312	Quang Binh
Fax	1	16,790	Quang Binh
PC for Flood Simulation	3	297,456	Nghe An, Ha Tinh, Quang Binh
Digital Elevation Model	3	2,369,598	Nghe An, Ha Tinh, Quang Binh
Total Station / Survey Equipment	1	1,042,800	Nghe An
Echo Sounder for Bathymetry Survey	1	158,200	Nghe An
Workstation for Flood Forecasting	2	234,317	Nghe An
Monitor for Flood Forecasting	2	139,212	Nghe An
Motorboat	4	784,320	Ha Tinh, T.T.Hue
Life Jacket / Megaphone	220/30	151,620	T.T.Hue
Electric Saw	2	34,200	T.T.Hue
Flood Gauge	1	150,275	T.T.Hue
Speakers for broadcasting	1	411,385	Nghe An
Speakers and Cables for broadcasting	1	363,366	Quang Binh
Desktop PC	1	102,312	Project office in Hanoi
Office Printer	1	113,444	Project office in Hanoi

APPENDIX 5

Minutes of Meetings of JCC

MINITES OF MEETING
ON
PREPARATORY JOINT COORDINATING COMMITTEE MEETING (PRE-JCC)
FOR
THE PROJECT FOR BUILDING DISASTER RESILIENT SOCIETIES IN VIETNAM
(PHASE 2)

Based on the Minutes of Meeting on the Inception Report for the Project for Building Disaster Resilient Societies in Vietnam (hereinafter referred to as "the Project") signed on September 25, 2013, the Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Vietnamese authorities concerned (hereinafter referred to as "Vietnamese side") held the Preparatory Joint Coordination Committee Meeting to discuss the issues related to the better implementation and management of the Project on December 18, 2013 at the headquarters of Ministry of Agriculture and Rural Development in Hanoi.

As the result of the exchanges and discussions, the issues mentioned in the attached document ("ATTACHMENT") were agreed by representatives of related agencies in the meeting.

The attendant list of the meeting was shown in Annex- Ⅰ.

Hanoi, December 18, 2013

Fumihiko Okiura Senior Representative of Vietnam Office, Japan International Cooperation Agency (JICA)	Hoang Van Thang Vice Minister Ministry of Agriculture and Rural Development
Hirotada Matsuki Long Term Expert Chief Advisor/Disaster Management Policy	Nguyen Xuan Dieu Deputy General Director Water Resource Directorate, Ministry of Agriculture and Rural Development

Vu Kien Trung
Deputy Director
Department of Dyke Management and Flood and Storm Control, Water Resource Directorate, Ministry of Agriculture and Rural Development

Nguyen Anh Minh
Head of Division
International Cooperation Department, Ministry of Agriculture and Rural Development

Vu May
Official
Department of Meteorology, Hydrology and Climate Change, Ministry of Natural Resources and Environment

Do Huy Duong
Deputy Head of Division of Technological Science and International Cooperation
National Hydro-Meteorology Service, Ministry of Natural Resources and Environment

Nguyen Van De
Vice Director
Department of Agriculture and Rural Development
(On behalf of) Dinh Viet Hong
Vice Chairman
Provincial People's Committee
Nghe An Province

Bui Le Bac
Director
Sub-Department of Dike Management and Flood and Storm Control
(On behalf of) Le Dinh Son
Vice Chairman
Provincial People's Committee
Ha Tinh Province

Ha Xuan Dan
Official
Sub-Department of Water Resources and Flood and Storm Control
(On behalf of) Tran Van Tuan
Vice Chairman
Provincial People's Committee
Quang Binh Province

Tran Kim Thanh
Vice Director of DARD
(On behalf of) Le Truong Luu
Vice Chairman
Provincial People's Committee
Thua Thien Hue Province

ATTACHMENT

Participants agreed on the following:

1. Project Implementation Arrangement

   Regarding the approval of the Project in the Vietnamese Government, the Vietnamese side explained a present situation on the approval of the Project. In response, JICA strongly requested Vietnamese side to make progress in the approval of the Project as soon as possible.

2. Results of Baseline Survey and Capacity Assessment

   The baseline survey including data collection and capacity assessment was conducted by the Team from October to December in 2013 in order to clarify the current situation on flood disaster management in the target provinces, and also to assess the capacity gaps in view of technical assistance between inputs from JICA and capacity of the Vietnamese counterpart personnel at provincial level. Present challenges and solutions of flood management of the target provinces and the result of the capacity gaps were explained by the Team and they were mutually understood between JICA and Vietnamese side.

3. Target River Basins

   The following river basins were selected and agreed between JICA and Vietnamese side as target river basins for IFMP formulation in Quang Binh province [Output 2], and flood risk analysis in Ha Tinh and Nghe An province [Output 3] based on baseline survey result.

   - Gianh River basin and Nhat Le River basin (Quang Binh province)
   - Ngan Pho River basin and Ngan Sau River basin (Ha Tinh province)
   - Bung River basin (Nghe An province)

4. Comment and Request from Vietnamese Side.

   - Ngan Pho River basin and Ngan Sau River basin are two main tributaries of La River basin. Considering flood characteristic of those basins, Vietnamese side requested to conduct flood risk assessment for both river basins.
   - Vietnamese side commented that the social survey and reviewing of related disaster management plan in the target river basins are necessary for the IFMP formulation in Quang Binh province in addition to the activities of the PDM(1).

- Vietnamese side commented that flood analyses under different scenarios are required to complement the IFMP and consider a manual for reservoirs operation in Huong river basin.
- Vietnamese side commented that staff of MARD and MONRE should have opportunities to participate in project activities in provinces.

JICA side will convey the above requests to the JICA Headquarters.

5. Agreement of PDM(1) and PO(1)

Based on the results of the baseline survey and capacity assessment, several objectively verification indications and activities in PDM and PO, which were agreed in the Inception Meeting on September 25, 2013, were partly modified. Through the discussion between JICA and Vietnamese side, PDM and PO were revised into PDM (1) and PO (1) as shown in Annex-3 and Annex-4, and they were agreed by JICA and Vietnamese side.

6. Validity of PDM(1) and PO(1)

It is agreed between JICA and Vietnamese side that PDM (1) and PO (1) agreed in the meeting shall become officially effective immediately after the approval of the Project.

MINUTES OF MEETING
ON
INCEPTION REPORT
FOR
THE PROJECT FOR BUILDING DISASTER RESILIENT SOCIETIES IN VIETNAM
(PHASE 2)

Based on the Record of Discussions for the Project for Building Disaster Resilient Societies in Vietnam (hereinafter referred to as "the Project") signed on April 23, 2013, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched to Vietnam the JICA Expert Team (hereinafter referred as "the Team") composed of long term experts and short term experts, headed by Dr. Hirotada Matsuki, Project Chief Advisor, from August 26, 2013 to explain the Draft Inception Report (hereinafter referred to as "the Report") to the Vietnam authorities concerned (hereinafter referred to as " Vietnamese side").

As the result of the discussions, the contents of the Report and the issues mentioned in the attached document ("ATTACHMENT") were agreed by representatives of related agencies at the meeting held on September 25, 2013.

Hanoi, September 25, 2013

Fumihiko Okiura
Senior Representative of Vietnam Office,
Japan International Cooperation Agency
(JICA)

Nguyen Xuan Dieu
Deputy General Director
Water Resource Directorate, Ministry of
Agriculture and Rural Development

Hirotada Matsuki
Long Term Expert
Chief Advisor/Disaster Management
Policy

Vu Kien Trung
Deputy Director
Department of Dyke Management and
Flood and Storm Control, Water
Resource Directorate, Ministry of
Agriculture and Rural Development

Tran Kim Long
In-charge Deputy General Director
International Cooperation Department,
Ministry of Agriculture and Rural
Development

Nguyen Thi Binh Minh
Deputy General Director
Department of Meteorology, Hydrology
and Climate Change, Ministry of Natural
Resources and Environment

Pham Van Duc
Deputy General Director
National Hydro-Meteorology Service,
Ministry of Natural Resources and
Environment

Hoang Nghia Hieu
Vice Director
Department of Agriculture and Rural
Development
(On behalf of) Dinh Viet Hong
Vice Chairman
Provincial People's Committee
Nghe An Province

Dang Ngoc Son
Director
Department of Agriculture and Rural
Development
(On behalf of) Le Dinh Son
Vice Chairman
Provincial People's Committee
Ha Tinh Province

Phan Van Khoa
Director
Department of Agriculture and Rural
Development of Quang Binh province
(On behalf of) Tran Van Tuan
Vice Chairman
Provincial People's Committee
Quang Binh Province

Tran Kim Thanh
Vice Director
Department of Agriculture and Rural
Development
(On behalf of) Le Truong Luu
Vice Chairman
Provincial People's Committee
Thua Thien Hue Province

ATTACHMENT

Participants agreed on the following:

1. Project Inception Report

   The contents of the Project were agreed by Vietnamese side as explained by the Team. The Project will be implemented according to Draft Project Design Matrix (PDM), the Assignment Schedule of JICA Experts and Draft Work Schedule of the Project in Central and each Province as attached in ANNEX- Ⅱ , Ⅲ and Ⅳ respectively.

2. Project Implementation Arrangement

   (1) As for Project approval, the Vietnamese side promised to approve officially the Project as soon as possible.

   (2) For the allocating the counterpart budget of the Project, the Team and the Vietnamese sides confirmed to work and share relevant information continuously to process the documentation in calculating the budget provisions needed for the Vietnamese counterpart agencies to implement the Project smoothly.

   (3) The Project counterpart personnel at central and provincial levels have been tentatively assigned until getting the official approval of the Project as listed in ANNEX-Ⅳ.

   (4) Owing to kindly arrangement from the Vietnamese side, office working space and necessary facilities for the Team have been arranged by both Ministry of Agriculture and Rural Development (hereinafter referred to as "MARD") and Department of Agriculture and Rural Development (hereinafter referred to as "DARD") of each province.

3. Meeting at central and provincial levels

   (1) Joint Coordinating Committee (JCC) Meeting should be held basically at least once a year and whenever deems it necessary as well as Central Project Management Unit (CPMU) depending on the Project progress and situation.

   (2) Provincial Steering Committee (PSC) Meeting at provincial level should be held basically at least every 6 months whenever deems it necessary, as well as Provincial Project Management Unit (PPMU) depending on the Project progress and related situation.

4. Donor Coordination

MARD and other relevant Vietnamese authorities shall assist the Project by means of sharing information and coordinating with disaster management projects of other donors to prevent inefficient overlaps activities among these projects.

5. Next meeting

The first JCC meeting will be held at the middle of December in 2013. The main issues are to report the progress in the Project implementation arrangement to JCC members and to define the objectively verifiable indicators tentatively set as "XX" in PDM (Those are No.2-2, No.3-1, No.4-1 and No.5-1, No.5-2 and No.5-3 in PDM in ANNEX-2), in consideration of the results of the base line survey to be carried out in the Project.

ANNEX

ANNEX I: Attendant List

ANNEX II: Draft Project Matrix (PDM)

ANNEX III: Assignment Schedule of JICA Experts

ANNEX IV: Work Schedule of the Project in Central and each Province

ANNEX V: Tentative Project Counterpart List

MINUTES OF MEETING

BETWEEN

JAPANESE MID-TERM REVIEW TEAM

AND

AUTHORITIES CONCERNED OF THE SOCIALIST REPUBLIC OF VIETNAM

ON

THE JAPANESE TECHNICAL COOPERATION

FOR

THE PROJECT FOR BUILDING DISASTER RESILIENT SOCIETIES IN VIETNAM

(PHASE 2)

The Japanese Mid-term Review Team (hereinafter referred to as "the Team") organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Dr. Hitoshi Baba, visited the Socialist Republic of Vietnam (hereinafter referred to as "Vietnam") from Nov 20 to Dec 13, 2014, for the purpose of conducting the Mid-term Review of "the Project for Building Disaster Resilient Societies in Vietnam (Phase 2) (hereinafter referred to as "the Project").

During its stay, the Team and the Vietnamese side formulated the Joint Evaluation Team and exchanged the views and had a series of discussions on the Project with the Vietnamese authorities concerned. As a result of the discussions, the Team submitted the Mid-term Review report as attached and both sides agreed upon the description of the report.

Hanoi, December 11, 2014

Hitoshi BABA
Leader
Mid-Term Review Team
Japan International Cooperation Agency

Hoang Van Thang
Vice Minister, Director General
Directorate of Water Resources
Ministry of Agriculture and Rural Development
The Socialist Republic of Vietnam

MINUTES OF MEETINGS

BETWEEN

THE JAPANESE TERMINAL EVALUATION TEAM AND THE AUTHORITIES CONCERNED OF THE VIETNAMESE GOVERNMENT

ON

THE JAPANESE TECHNICAL COOPERATION

FOR

THE PROJECT FOR BUILDING DISASTER RESILIENT SOCIETIES IN VIETNAM

(PHASE II)

The Japanese Terminal Evaluation Team (hereinafter referred to as "the Team"), organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Dr. Hitoshi Baba, visited the Socialist Republic of Vietnam from January 4 to 22, 2016 for the purpose of conducting the terminal evaluation on the Japanese technical cooperation for the project for building disaster resilient societies in Vietnam (hereinafter referred to as "the Project").

During its stay, both the Team and the Vietnamese side formulated the Joint Evaluation Team, exchanged the views and had a series of discussions on the Project with the Vietnamese authorities related concerned. As a result of the discussions, the Team submitted the Report as attached (Annex1) and both Vietnamese and Japanese sides (hereinafter referred to as "Both sides") agreed upon the descriptions of the Report and the attached document.

Hanoi, January 20, 2016

Dr. Hitoshi Baba
Leader
Terminal Evaluation Team
Japan International Cooperation Agency

Tran Quang Hoai
Deputy General Director of Directorate of Water Resources
Standing Member of Central Committee for Natural Disaster Prevention and Control

ATTACHED DOCUMENT

1. **Joint Terminal Evaluation:**

Both sides agreed the result of the Joint Terminal Evaluation as Annex 1.

2. **Recommendations and lesson learned:**

A series of recommendations and lessons learned are written in the Report.

3. **Contribution for Implementation of Sendai framework for Disaster Risk Reduction 2015-2030:**

In March 2015, the Third UN World Conference on Disaster Risk Reduction was held in Sendai, Japan and the Sendai Framework for Disaster Risk Reduction 2015-2030 (hereinafter referred to as "SFDRR 2015-2030") was adopted. The concept of the Project is in line with SFDRR 2015-2030 and priorities for action. Particularly, the Project contributes to implement "Priority 1: Understanding disaster risk" and "Priority 2: Strengthening disaster risk governance to manage disaster risk". Below points are to be highlighted by the Team because of its importance.

(1) Strengthening capacity for flood risk analysis

The Project conducts capacity strengthening for flood risk analysis, which can promote understanding and scientific assessment of flood risk.

(2) Arrangement for IFMP(Integrated Flood Management Plan) promoting

Central government expresses IFMP promoting in some provinces and Quang Binh Province adopted IFMP which one step to Strengthening disaster risk governance to manage disaster risk in both, central level and regional level.

ANNEX:

ANNEX 1: Joint Terminal Evaluation Report

MINUTES OF MEETINGS
OF
THE 3rd JOINT COORDINATION COMMITTEE
FOR
THE TECHNICAL COOPERATION PROJECT
FOR BULIDING DISASTER RESILIENT SOCIETIES IN VIETNAM - PHASE II
BETWEEN
THE JAPAN INTERNATIONAL COOPERATION AGENCY
AND
THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF
THE SOCIALIST REPUBLIC OF VIETNAM

The Project for Building Disaster Resilient Society in Vietnam - Phase II (hereinafter referred to as "the Project") has launched in September 2013 based on an agreement on the Record of Discussion, which was signed on April 23, 2013 between Japan International Cooperation Agency (hereinafter referred to as "JICA") and Ministry of Agriculture and Rural Development (hereinafter referred to as "MARD").

The Project has been implemented for 3 years in collaboration between the implementing agency of Directorate of Water Resources, MARD (hereinafter referred to as "WRD"), the co-implementing agencies in the central and the local levels and JICA Expert Team (herein after referred to as "the Team").

The both parties organized a Joint Coordination Committee meeting on July 26, 2016 to discuss on the Final Report compiling all the activities and achievements of the Project, and accepted the report in principle. The main points discussed in the meeting are attached.

Hanoi, July 26, 2016

Mr. Kenichi YAMAMOTO
Deputy Chief Representative
Japan International Cooperation Agency
Vietnam Office

Mr. Hoang Van Thang
Vice Minister, Director General
Directorate of Water Resources
Ministry of Agriculture and Rural Development

Mr. Mikio NONAKA
Chief Advisor / JICA Expert
The Project for Building Disaster Resilient Society
in Vietnam – Phase 2 –

1. Activities progress achievement:

The achievements of the Project which were carried out for 3 years by predominantly the counterpart personnel with support from the Team was agreed upon and accepted by Vietnamese side.

2. Actions after the Terminal Evaluation Mission:

The Terminal Evaluation Mission held in January 2016, gave recommendations taken before the end of the Project duration. The implementation status attached in Annex 2 were shared and agreed in the meeting.

3. Measures taken after the end of the Project duration

The Terminal Evaluation Mission gave the following recommendations taken by Vietnamese government after the end of the Project. The Vietnamese side agreed to take actions as below:

(1) To secure a budget to continue training on flood risk simulation by NCRHMS to HMSs on a regular basis (MONRE and NCRHMS)

NCRHMS has a certain amount of budget to conduct trainings to neighboring provincial HMSs. However the budget is limited to conduct the trainings regularly. MONRE shall make effort to enhance the capacity of HMS regional centers technically and financially though the projects and programs (WB5 projects).

(2) To discuss with PPC to secure a budget for cross-section survey that needs to be conducted periodically and share the survey data among the relevant organizations (DARD and NCRHMS / HMS)

The necessary river cross-section survey data often exist in universities, specialized research institutes, central government agencies. MARD shall coordinate information sharing between the research sectors and DARDs to maximize the effective utilization of such existing data.

(3) To encourage the interested companies and individuals to contribute to the province's disaster management fund and use the fund for CBDRM

As of July 10 2016, 42/63 provinces have established the provincial disaster prevention fund. The Decree (No.94/2014/ND-CP) clearly stipulates the contribution from individuals, government officers and private companies to the fund including the rate payment. MARD shall continuously promote and monitor the status of the fund at each province.

4. Promotion of IFMP after the Project

The MARD issued an official document (No.5080/BNN-TCTL) to promote formulating natural disaster prevention and control plan in all levels of provinces. The document instructs to consider "IFM" in the natural disaster prevention and control plans. This is one of the important progresses to promote IFM nationwide. MARD shall make the following efforts after the Project.

(1) To utilize developed IFMP manual

The IFMP manual, after being adopted by Water Resources Directorate, shall be delivered to each province for their reference and implementation. IFMP should be continuously revise and update to meet with different natural and socioeconomic condition of each province; especially, IFMP beyond the provincial boundaries, integrated dam operation for flood reduction and watershed sediment management to prevent coastal erosion are key challenges in near future.

(2) To clarify the responsible department to promote IFM

MARD Water Resources Directorate shall give a direction to Department of natural disaster prevention and control – standing office of central steering committee for natural disaster prevention and control to jointly work with the Disaster Management Center in order to promulgate, disseminate the IFMP formulation manual.

(3) To enhance harmonious implementation of CBDRM and Disaster Education

In order to promote CBDRM activities base on Decision 1002, MARD shall collaborate with MOET to conduct both CBDRM and Disaster Education based on the recommendation of the Project on standard procedure of CBDRM.

ANNEX

Annex-1: JCC Meeting Participant List

Annex-2: Implementation after the Terminal Evaluation

APPENDIX 6

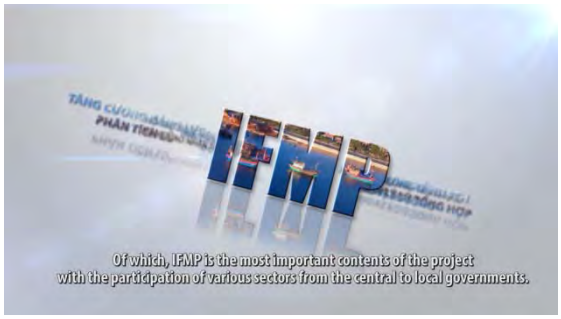
Output Inventory

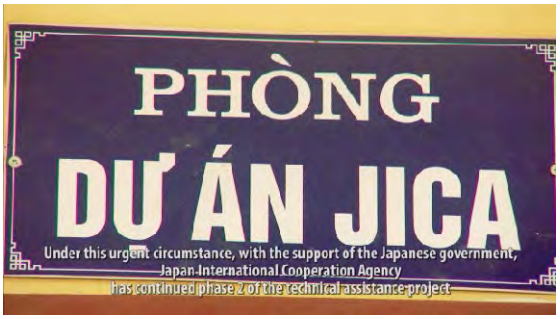
Output List

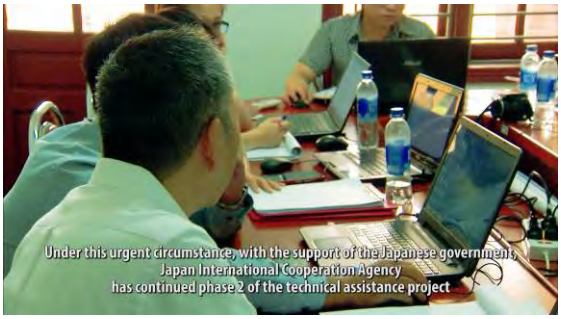
Outputs	Name	Status / Media
Output 1	IFMP Formulation Manual	Printed
	Project Video Clip (Output Inventory)	DVD (6min / 30min)
Output 2	Guide for IFMP / GIS Database	Electric File
	IFMP Map Atlas (Flood Risk Map / Vulnerability Map)	Printed (A2 size)
	IFMP in Quang Binh Province	Printed
	IFMP Implementation Plan in Quang Binh province	Electric File
Output 3	Training Materials for Run-off, Flood Analysis and GIS	Electric File
	Flood Risk Map for La River basin (Ha Tinh province)	Printed
	Flood Risk Map for Bung River basin (Nghe An prvince)	Electric File
	Technical Manual for Bathymetric Survey	Printed
Output 4	Dyke Inspection Manual	Printed
	Dam O/M Manual (Minh Cam)	Electric File (draft)
	Dam O/M Manual (Phu Hoa)	Electric File (draft)
	Dam O/M Manual (Phu Vinh)	Printed
	Dam O/M Manual (Vuc Tron)	Printed
	Revised Guideline for Riverbank Protection	Electric File
	Technical Manual for Bathymetric Survey	Printed
	Reviewed IFMP in T.T.Hue province	Electric File
Output 5	Disaster Prevention Plan for Hung Linh commune, Nghe An	Printed
	Disaster Prevention Plan for Duc Quang commune, Ha Tinh	Printed
	Disaster Prevention Plan for Quang Song commune, Quang Binh	Printed
	Disaster Prevention Plan for Quang Thang commune, T.T.Hue	Printed
	DE Supplement for Hung Linh commune, Nghe An	Printed
	DE Supplement for Duc Quang commune, Ha Tinh	Printed
	DE Supplement for Quang Song commune, Quang Binh	Printed
	DE Supplement for Quang Thang commune, T.T.Hue	Printed
	Recommendation for CBDRM / DE implementation	Electric File

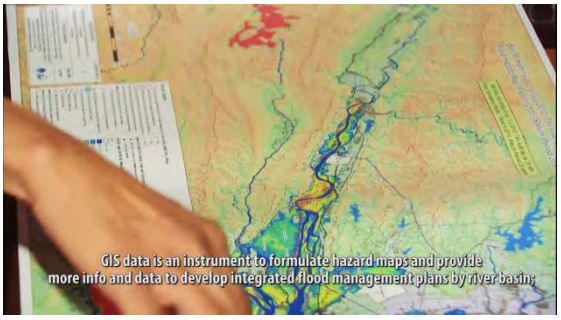
※"Output Inventory" was prepared as a video clip that introduce the overall and individual project activities in 30 minutes program.　The video clip will be broadcasted on VTC 14 Channel.

Output Inventory (Video clip for all project activities)









APPENDIX 7
IFMP Manual

MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

DIRECTORATE OF WATER RESOURCE

MANUAL FOR

THE FORMULATION OF IFMP

AT PROVINCIAL LEVEL

(Third draft)

Hanoi, July 2016

MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

DIRECTORATE OF WATER RESOURCE

MANUAL FOR

THE FORMULATION OF IFMP

AT PROVINCIAL LEVEL

(Third draft)

Hanoi, July 2016

Index

LIST OF ABBREVIATIONS

BĐKH	Climate change
BQL	Project management unit
CBDRM	Community-based disaster risk management
DMC	Disaster management centre
FHM	Flood hazard map
IFMP	Integrated flood management plan
KTTV	Hydro-meteorology
KTXH	Socio-economic
KH&ĐT	Planning & Investment
M&E	Monitoring & Evaluation
NN&PTNT	Agriculture and rural development
PCTT & TKCN	Disaster prevention & search and rescue
TN&MT	Natural resources & environment
UBND	People's committee

LIST OF FIGURES

PREFACE

The integrated and participatory approach to disaster risk management with the aim to obtain mutual consent and avoid the overlapping in disaster prevention measures among sectors has become the tendency and priority in developed countries in the region and the world, but remains new approach in Vietnam. In order to improve the disaster prevention activities, specifically the formulation of disaster prevention plan at provincial level as regulated in the Law on Disaster prevention, MARD has issued the Official document No. 5080/BNN-TCTL dated on 20/6/2016 to request People's Committee of Cities and provinces to consider the disaster prevention and integrated flood management in river basin

The Project for Building Disaster Resilient Society in Vietnam sponsored by JICA, Japan supported 2 provinces Thua Thien Hue and Quang Binh province in formulating IFMP in Huong river basin (Thua Thien Hue province) and Gianh and Nhat Le river basins (Quang Binh province). These are important outputs which are produced with the collaboration of relevant departments and agencies and the experience from other localities will be a great help to the disaster prevention activities. This manual is formulated basing on those experiences and contributions of managers, international and national experts and concretize the contents, steps and objectives to give guidance for provincial staff to carry out IFMP in the river basin as a part of the disaster prevention plan.

This manual consists of 03 main contents:

- Overviews of documents - introduction of purpose and scope of the manual;
- General introduction of IFM
- Guidance for the formulation of IFMP: give guidance for the provincial staff and relevant departments and agencies to formulate IFMP in the river basin.

With the sponsor of the *Project for Building Disaster Resilient Society in Vietnam – Phase 2 (DRSV-II)*, during the implementation, the editorial board has received the concern and instructions of the Department of Disaster Prevention, Disaster management centre (DMC) and relevant departments under DWR as well as contributive comments of experts from CEFD, University of Natural Science, HNU, VAWR, IWRP, National centre for Hydro-meteorological forcasting and other national and international experts. The editorial board highly appreciate the valuable contributions and hope to receive more comments from experts and users to finalize this manual.

All comments should be sent to:

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Phone: (84-4) 37338780 Fax: (84-4)37335702
Email: admin@wrd.gov.vn;

and

Centre for Environmental Fluid Dynamics,

University of Natural Sciences, Hanoi National University

Address: 334 Nguyễn Trãi, Thanh Xuân, Hà Nội, Việt Nam

Phone: (04)- 38584945

Email: cefd@hus.edu.vn Website:www.cefd.edu.vn

PART 1 OVERVIEW OF DOCUMENTS

1.1 BASIS OF THE FORMULATION OF THE MANUAL

This manual is formulated basing on following legal regulations and documents:

- Law on Disaster prevention and mitigation No. 33/2013/QH13 dated on 01/05/2014;
- Law on Water resource No. 17/2012/QH13 dated on 01/01/2013;
- Decision No. 172/2007/QĐ-TTg dated on 16/11/2007 by the Prime Minister on the approval of the National Strategy for Disaster prevention and mitigation until 2020;
- Decision No. 1061/QĐ-TTg dated on 01/07/2014 on the issuance of the Action plan for implementing the Law on Disaster Prevention;
- Decision No. 1002/QĐ-TTg dated on 13/7/2009 on the approval of the Plan for Awareness raising and CBDRM;
- Decision No. 44/2014/QĐ-TTg dated on 15/8/201 on the detailed promulgation on disaster risk levels;
- Circular No. 05/2016/TT-BKHĐT dated on 06/06/2016 on guiding the integration of disaster prevention activities into sector and socio-economic development plan.

1.2 PURPOSE OF THE MANUAL

To guide People's Committees of provinces and centrally-governed cities to formulate IFMP for the river basin in those provinces and cities.

1.3 MANUAL USERS

This manual can be mainly used by:

- People's Committee of provinces and centrally-governed cities
- Steering Committee for Disaster prevention and search and rescue at provincial level
- DARD and relevant departments/ agencies
- Ministries and relevant departments/ agencies at central levels
- International organizations, NGOs to support for the formulation of IFMP
- Research and consulting agencies

PART 2: INTRODUCTION OF IFMP

2.1 FLOOD AND DISASTER PREVENTION SITUATION IN VIETNAM

2.1.1 Flood situation in Vietnam

a) Characteristics of flood in the river system in Vietnam

Flood is a natural event which occurs annually in Vietnam. Flood is caused by higher river water level in rainy season and it may occur once or several times in a year. When the river water level increases (due to heavy rain or/ and reservoir discharge), it overflows the banks to the lowland area and cause inundation on the large scale in a certain time and it is called flood. Flood is considered to be big and extremely big if it causes much damage to human and property and lasts for a long time. Because of the different characteristics in river system and climate among regions in Vietnam, flood is different in each basin.

Flood in rivers in the North region: Hong river and Thai Binh river has the basin area of 164,300 km^2 in which the area belonging to Vietnam is 87,400 km^2 flowing through 23 provinces and cities accounting for 75.7% the natural area of the North region. The flood season in Hong and Thai Binh river system comes earlier than other regions from May to September. Annually, there are 3 to 5 floods occurring in this river basin on average. Depending on the flood scale, it may last from 8 to 15 days. The amplitude of water level in Hong river system fluctuate sharply, in Hanoi the fluctuation is over 10m. The fluctuation of water level in Thai Binh river at Pha Lai is over 6m. However, thanks to the recent regulations of reservoirs in the upstream area of Da and Lo river systems, flood in the downstream of Hong river is normally at warning level 1 or 2.

Flood in rivers in the Central region: Flood season comes early – from June to October in rivers from Thanh Hoa to Ha Tinh. Flood is mainly in main stream of these rivers because of the flood prevention dike systems, the fluctuation amplitude is over 7m in Ma river system and over 9m in Ca river system. For rivers from Quang Binh to Binh Thuan province, the flood season is from September to December. Rivers in this region is short and steep so the flood level increase and discharge quickly. In this area there are few or no flood prevention dike systems. Flood water, therefore, not only focuses in the main river but overflows floodplains and the fluctuation amplitude in some places gets above 8m.

Flood in rivers in the Highland region: This region has no large river system, the average rainfall is small, the scale of effect is therefore small. The flood is mainly flashflood, the flood amplitude at Dabla bridge in Dabla river is 10m.

Flood in rivers in the Southeast region: Low rainfall intensity, vegetation cover and primeval forests have made the flood in Dong Nai river basin not great but inundation time longer. However, the history has recorded some floods with dramatically heavy, especially the flood happened in October 1952 with the highest flood peak discharge in Bien Hoa of 12,500 m^3/s

b) Changes in flood in Vietnam under the impact of climate change

Under the impact of climate change, in recent years, the flood in river basins especially in the downstream area has increased and becomes more severe on the large scale

North and North Centre regions. The analysis results of the observation data at 24 hydrological stations in 3 recent decades (1980-1989, 1990-1999 and 2000-2009) on rivers in the North and North Centre regions show that the flood peak increases year by year, except for some stations in the downstream of Hong – Thai Binh river including Son Tay, Hanoi, Pha Lai which tend to decrease the flood peak thanks to the regulation for flood controll of reservoirs on Hong river and remains unchanged in the downstream area of Ma river and Ca river. If the impact of flood controll of reservoirs is excluded, it can be seen that the increase in flood peak in the upstream of river basin is higher than downstream. The increase in flood under the human and climate change impacts can be seen in the North and North Centre region. The decrease in flood peak in the downstream area of Hong and Thai Binh rivers has shown the effectiveness of reservoir countermeasures in mitigating the natural hazards (IMHEN, 2015).

Central region: The analysis results of the observation data at 18 hydrological stations in 3 recent decades in the Central region show that there is increase in flood peak, except for the downstream area of Ba river (probably because Hinh river reservoir has the role of flood absorption for the heavy rainfall area of the basin). The highest annual flood peak increases remarkably in rivers from Thua Thien Hue to Quang Ngai and Khanh Hoa province; inceases moderately in rivers in Binh Dinh province and decreases slightly in rivé in Quang Binh, Quang Tri and Phu Yen. It is identified in the calculation of the average annual flood peak in each of 3 continuous decades (1980-1989, 1990-1999 and 2000-2009) that most of the rivers from Thua Thien Hue to Quang Ngai provice tends to have the increased highest annual flood peak meanwhile other rivers see the slightly decreased tendency (IMHEN, 2015).

Highland and Southeast Region: For recent 30 years, the observation data at 14 hydrological stations in the upstream area of Dong Nai river in the Highland and

Southeast region shows that there is a remarkable increase in the highest annual flood peak on branch rivers including La Nga, Be and Sai Gon due to the dramatical changes in infrastructure in Dong Nai river basin including socio-economic development, development of irrigation and hydropower works, traffic works along with the decrease in forest vegetation cover and climate change which have great effects on river flow. The similar scene can also be seen in the downstream area of Dong Nai river; after the construction of irrigation and hydropower works in the river basin, especially the operation of Tri An hydropower plant (since 1990), the highest annual water level in the downstream in Bien Hoa and Phu An has risen dramatically (about 15 – 20 cm). The impact of tide on the operation of the hydropower plant makes the flood peak (about 15 – 30 cm) and decreases the water level in dry season (20 – 35 cm). Annual flood peak discharge has increased gradually for the past 10 years, only Be river in Phuoc Ha sees minor changes (IMHEN, 2015)

c) Damage caused by flood in Vietnam

According to the global report on disaster prevention (GAR, 2011), flood and storm are two typical types of natural disasters and cause much damage to human and property in Vietnam. The statistic results of damage in the period from 1989 to 2010 shows that the number of people died of flood hazards was 6757 accounting for 67% of total people died of natural disasters (Figure 1). The number of houses destroyed and damaged by storm makes up the highest rate with 36.6%, followed by flood (32.8%), meanwhile other disasters have much lower rate (Figure 2). Figure 3 and figure 4 present the number of people and houses which were damaged by disasters by years in the 1989 – 2010.

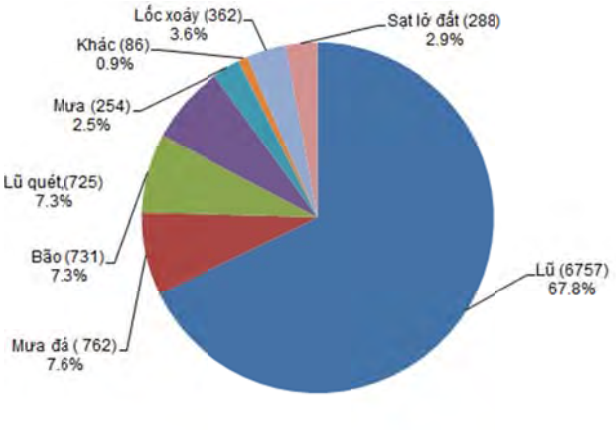

Figure 1 *The number of dead people caused by natural disasters in the period 1989 -2010 (GAR,2011)*

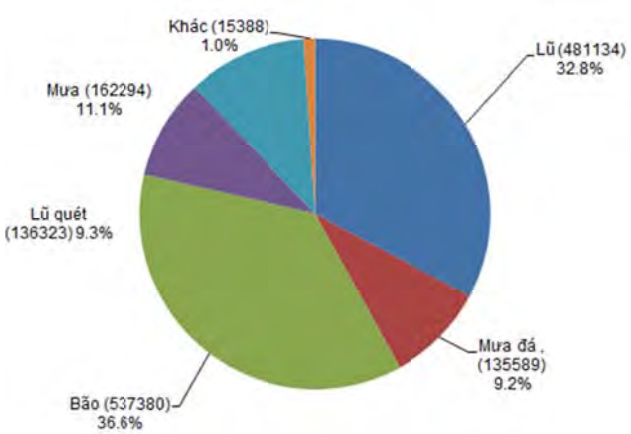

Figure 2 *The number of houses destroyed and damaged by natural disasters in the period 1989 - 2010 (GAR,2011)*

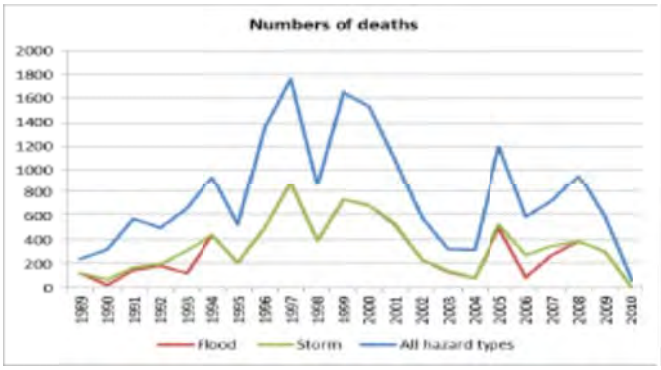

Figure 3 *The number of dead people caused by natural disaster in the period 1989 -2010 (GAR,2011)*

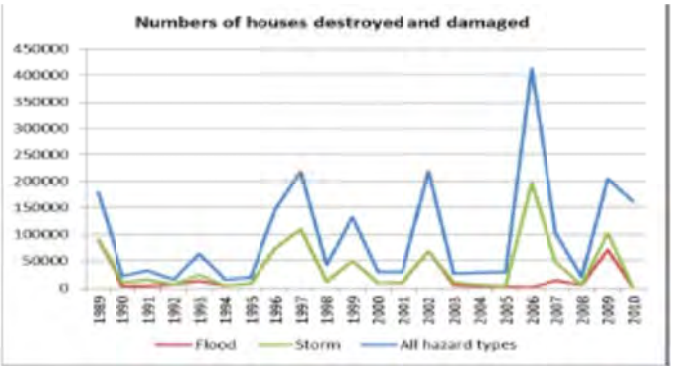

Figure 4 *The number of houses destroyed and damaged by natural disaster 1989 -2010 (GAR,2011)*

2.1.2 Disaster risk management in Vietnam

For recent years, natural disaster has become serious and irregular and has caused much damage to human, property and environment in almost all the regions in Vietnam. Vietnam is one of the nations that is dramatically impacted by climate change especially the sea water rising. Under the impact of global climate change, natural disasters in Vietnam have become more severe and complicated in the scale, frequency, intensity and time and additionally increase the possibility of the appearance of new natural disasters

Being aware of the consequences of disasters as well as impacts of climate change, Vietnamese Government has express deep concern on the disaster prevention and mitigation and disaster risk management (DRM). In this context, the issuance of the National Strategy for disaster prevention and mitigation until 2020 (in 2007) and Law n Disaster prevention (in 2013) is an important turning point in the formulation of institution and finalization legal regulations on disaster prevention and mitigation in Vietnam

DRM and Climate change adaptation in Vietnam is implemented in two-way method from Central to grassroots; additionally, the localities will report to higher levels for reviewing and adjusting strategies and plans. The basic principles in disaster prevention including active prevention, timely response, quick and effective recovery are highlighted in the Law on Disaster prevention. Active prevention is the of the most important factors for local communities to mitigate the impacts of disasters in case of occurrence.

In Vietnam, DRM and CCA has been integrated in strategies and plans including sector's plan, socio-economic development plant of the country and localities. The disaster prevention plan has been initially formulated in 25 out of 63 provinces (as to July 2016) and will later be completed in all the other provinces and finally the National disaster prevention plan will also be formulated

2.2 INTEGRATED FLOOD MANAGEMENT IN RIVER BASIN

In Vietnam, there are numerous residential areas and socio-economic centres locating in riverside floodplains and being under the impact of flood in these river basins, especially agricultural production is benefited from the fertile alluvium soil that bring high productivity for plants. Besides, the quick urbanization along with socio-economic development has lead to the appearance of many factories and economic zones in the flood prone areas. Therefore, it is necessary to consider and integrate disaster prevention activities into the socio-economic development plan especially in this context that natural disasters have become more severe and devastating.

Integrated flood management is the process of integrated management of water resources, land use resources and other resources to bring socio-economic benefits without damaging the sustainable development of the ecosystem *(Global Water Partnership Technical Advisory Committee, 2000)*.

In other words, IFMP is a process involving the participation of all relevant departments and agencies in the river basin to bring socio-economic and environment benefits

Basic objective of the IFM is to maximize the net benefits from the use of floodplains and minimize the loss of life from flooding. Therefore, this plan should be practical and secure for the building of a disaster resilient society by combining short – term and long – term countermeasures, structural and non – structural measures with the participation of all relevant departments, agencies and localities

According to the general approach in the world, IFMP is considered to be a part of Integrated management of water resources in the river basin (including drought management). However, in the context of state management in water resource management and disaster prevention and basing on the Law on water resources (2012) and Law on Disaster prevention (2013), the IFMP in the river basin is a part of Disaster prevent plan at different levels

In order to achieve the result, the specific objectives of IFMP are as follows::

- To review Action Plan for the implementing National strategy for disaster prevention and recognize current issue of flood management.
- To clarify which area has flood risks and how height of inundation by using the flood simulation maps based on the scientific basis from the view point of future impact considering climate change.

- To share the information above within the related agencies and discuss about IFMP by integrating the flood management plan with each sector's development plan comprehensively.
- To formulate implementation plan by clarifying the priority of contents in the structural/non-structural measures and to review the plan once a year.

PART 3 GUIDANCE ON THE FORMULATION OF IFMP

The procedure for the formulation of IFMP for a river basin is presented in Figure 5 as follows.

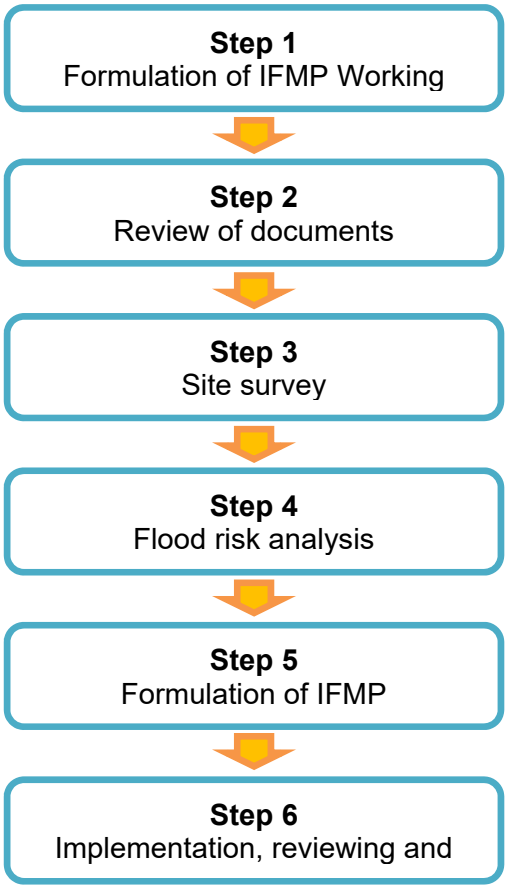

Figure 5 *Steps for IFMP Formulation*

3.1 STEP 1: FORMUATION OF IFMP WORKING GROUP

In order to form the IFMP WG, relevant parties should be initially identified. Below is the tentative list of relevant departments, agencies and localities, however, this list is not fixed and can be changed depending on the factual situation of the localities .

Relevant parties include (*See more in Annex 5.1*) but not limited to:

- PCNDPC at provincial level (DARD) take the role as the PMU (chair, hold IFMP Working group meetings and review the plan)
- Other relevant departments and agencies are members of IFMP WG and responsible for reviewing the sector's plans and plannings, propose list of priority, participate in site survey to identify the feasibility of measures and have discussion on the IFMP. Relevant departments and agencies may include:
    - PPC office
    - DOIT, DOT, DONRE, DOC, DOET, DPI, DOF, DOLISA, DOCST
    - Provincial HMS (If there is no regional HMS in the province) or Regional HMS
    - Provincial Military command, Committee for Ethnic Minority Affairs
- District People's Committee in the river basin
- Social organizations including Red Cross, Women Union, Youth Union, etc

Figure 6 *IFMP Kick-off meeting in Quang*

Figure 7*Discussion on IFMP in Quang Binh*

Binh province *province*

DARD, basing on the factual situation, make a preliminary list of IFMP working group members and submit to PPC for approval and issue the decision to establish the working group.

3.2 STEP 2: REVIEW OF DOCUMENTS

It is required to review all related legal regulations from Central to local and of all sectors that are probably affected by natural disasters or make the disasters in the area more serious. Especially it is necessary to focus on sectors' projects/ programs or socio-economic development plans in which flood and inundation factors have been considered and integrated; and then identify preliminary list of relevant and necessary projects/ programs to be put in IFMP

Step 2.1 IFMP WG members review the legal documents (but not limited to) related to their sectors/ localities including:

a) ***Related legal documents and policies***
   - Law on disaster prevention and by-law documents
   - Law on water resources and by-law documents
   - Law on Public investment and by-law documents
   - Strategy for Disaster prevention and mitigation, Stratefy for Climate change adaptation, …
   - National Action Plan for Disaster Prevention and mitigation
   - Other legal documents include Instructions, decisions .. at Central and local levels

b) ***Socio – economic development plan of the locality***

c) ***Relevant plannings:***
   - Socio-economic development planning of the locality
   - Planning on Irrigation/ Hydropower in the reagion/ river basin
   - Planning on water resources in the region/ river basin
   - Planning on the observation network of natural resources and environment
   - Planning on flood in the river system in the locality
   - Planning on dike and embankment
   - Other relevant sectors' plannings including: education, transport, healthcare, urban construction, new rural area, agro-forestry and fishery, industry, search and rescue and ect

d) ***Relevant sectors' plans***
   - Agriculture and rural development sector: Disaster prevention plan, Action plan for implementing Decision 1002 on raising community awareness and CBDRM, Action plan for implementing National strategy for disaster prevention…

- Natural resources and environment sector: Action plan for implementing National strategy for CCA …
- Other sectors

e) Relevant researches and projects

<u>Step 2.2</u> Basing on the reviewing results, IFMP WG members compile a table (Form 01) to list relevant projects/ programs, with the aim to:

a) Identify sectors' projects/ programs in which flood and inundation factors can be integrated

b) Identify sectors' projects/ programs in which flood and inundation factors have been considered and integrated

c) Identify projects/ programs which are not related to natural disaster in general and flood risks in particular

d) Identify projects/ programs which have been put in the local socio-economic development plan or which have been invested or are waiting for budget or prone to be rejected …

Note: During the reviewing process, it is required to have scheduled meetings with full participation of WG members

<u>Step 2.3</u> Basing on the table, WG members will have a meeting to agree on the list of necessary projects/ programs to be put in IFMP

3.3 STEP 3: SITE SURVEY

The site survey will be conducted if it is required to identify exact location of projects/ structural measures, scale of works and evaluate the current conditions and feasibility of the projects/ countermeasures or to take measurements of topography, channel flow, flood mark, etc, which helps the flood simulation in the river basin

Figure 8 Cross-section survey and bathymetry survey in Nghe An

<u>Step 3.1</u> Preparation:

- Discuss and agree on the contents of site survey among IFMP WG members (along with consultants if any)
- Formulate detailed plan for site survey
- Contact with relevant parties when conducting the site survey

<u>Step 3.2</u> Conducting site survey

Figure 9 *Example of measuring inundation level*

Figure 10 *Example of taking elevation by equipment Zmax serving for identifying flood mark*

<u>Step 3.3</u> Formulation of site survey report and organization the IFMP WG meeting to inform and agree on the results

3.4. STEP 4: FLOOD RISK ANALYSIS

The quantitative effectiveness of structural and non-structural flood damage mitigation measures is important for planning purposes such as prioritization of counter measures for IFMP. Therefore, each and/or combination of flood damage mitigation countermeasures for IFMP should be clarified and assessed based on the scientific approaches.

For river basins with the conditions to build flood hazard and flood risk models, it is encouraged to apply hydrological/hydraulic models to analyze causes, evaluate quantitative effectiveness and propose countermeasures for IFMP. Hydrological/hydraulic models in combination with GIS is an effective tool for analyzing, evaluating flood risks based on the assessment, update of works, infrastructures, features of livelihood, economy and society together with statistics, surveys collected in step 3; it is also an instrument of identify the impacts of flood by disaster risk levels (stipulated in Decision no. 44/2014/QĐ-TTg) and other scenarios (climate change, reservoir operation and structures, changes of land use…). Nevertheless, this is not the only instrument for flood risk analysis, depending on actual conditions of implementation; each locality shall decide proper tools.

Contents of flood risks analysis using hydrological/hydraulic models in combination with GIS include:

<u>Step 4.1 Flood Modeling</u>

a) **Data collection**

The following data and information (but not limited to) are should be collected for model development:

- ✓ Hydrological and hydraulic statistics (rainfall, water volume, water-level, discharge, etc.) at the stations along the river basin and neighbouring areas
- ✓ Topographical data (topographic map, DEM, river channel cross-section,….), especially in lowland areas that are frequently inundated
- ✓ Existing structures for flood prevention that are stipulated in master plans (technical specifications, reservoir operation procedure, culverts, pumping stations,….)
- ✓ Existing structures which affect to the flooding flow (road, railway,…)
- ✓ Current map of land use
- ✓ Plans, master plans of land use, master plans of urban development,…
- ✓ Documents on historical floods (measurement of flood marks, reports…)

For inter-provincial river basins, the model must be developed by river basins with consideration of impacts of all existing and planned structures that might affect the flows. Therefore, for inter-provincial river basins, the statistics of all basins should be collected.

***b)* Selection of applications software**

Appropriate flood flow simulation model should be applied considering the actual flooding requirements (flood phenomena and existing/planed flood damage mitigation measures such as dam, dyke, diversion, changes of land use, etc.). Following application software of unsteady flow simulation are conceivable for flood flow simulation model.

- ✓ 1D (1-Dimensional) analysis: MIKE 11, MIKE 11 GIS, HEC-RAS 4, etc. .
- ✓ 2D (2-Dimensional) analysis: MIKE 21, Rainfall-Runoff-Inundation (RRI), FLO-2D, iRIC-Nays2Dflood, etc.
- ✓ Combination of 1D and 2D analysis: MIKE Flood, HEC-RAS 5, IFAS, etc.

For big river basins where dyke systems, flood flows rarely exceed dyke altitude, it is recommended to use 1D model. For the areas surrounding river mouths and coast, wide flood plains, lowland areas that are flood-prone, it is advised to use combination models of 1D and 2D or software with GIS to simulate flood conditions and inundation the best. For large lagoons where the flows and flood levels change significantly by space, it is suggested to use 2D models.

c) Modeling

- ✓ Developing calculation river network: based on topographic materials (river basin surface, channel cross section,etc) and other river works to select calculation river network so that it covers risk areas and assure calculation time as well as satisfying statistical inputs.
- ✓ Input to the models:

- Upper limit (upstream): actual volume measured or calculated volume through hydraulic models (rain-flow) with consideration of design precipitation and climate change scenarios
- Lower limit (downstream) is the actual water level measured or design tide level at river estuary or water level in the reservoir where the river flows into.

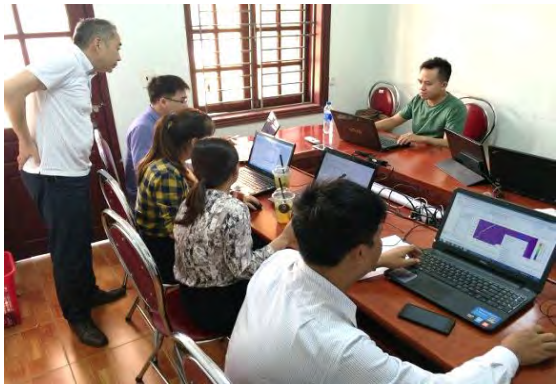

Fig 11 *Flood simulation modelling at DWR Nghệ An*

✓ Simulation of flood prevention works (dyke, dam, water diversion channel, etc) and water exploitation works (culvert, pumping station,etc).

d) Calibration of the model

The model is calibrated by comparing calculation and actual survey results of hydraulic factors (water level, volume, flood marks, etc.). The trial-error/optimization methods can be used to calibrate model parameters to stimulate actual conditions the best. To assure stability and accuracy of the model, after calibration it is required to cross-check with independent statistics.

When choosing the period of calibration and inspection, it is suggested to use historical floods (if data is sufficient). In case of insufficient data for calibration and inspection, neighboring basin method can be applied (use data of similar river basins) and/or conduct site surveys (flood marks) as instructed in Step 3. In special cases which monitoring data is lack of, if time and budget are limited, the model parameters can be temporarily used right after calibration step.

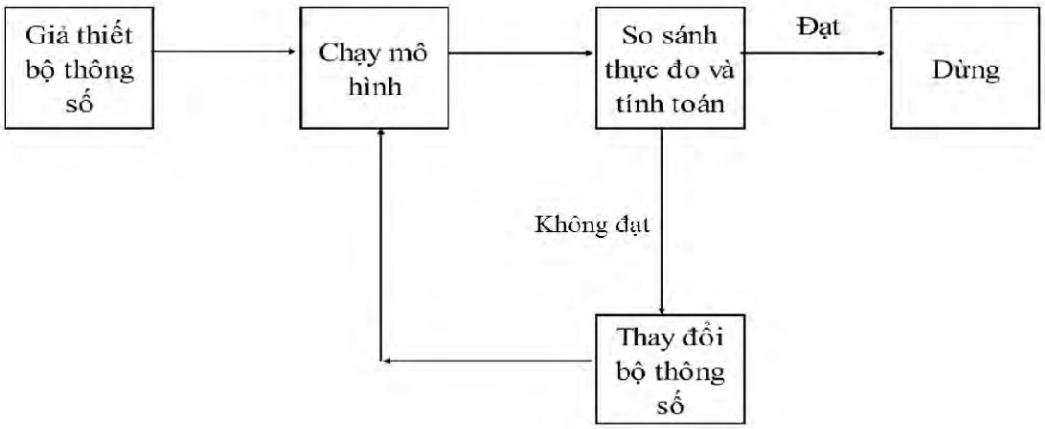

Fig.12 *Flow of the calibration process of model parameters*

Step 4.2 Formulate and simulate flood scenarios

After ensuring stability through calibration and inspection steps, the model shall be used to simulate the system following scenarios in order to: i) analyze and identify causes and factors impacting flood hazards in the river basin to propose measures; and ii) evaluate impacts and effectiveness of flood risk mitigation measures to prioritize solutions in terms of effectiveness.

Scenarios for calculation is developed based on:

- ✓ Historical floods in the area
- ✓ Disaster risk levels (stipulated in article 10, Decision no. 44/2014/QĐ-TTg)
- ✓ Climate change scenarios (changes in hydro-met inputs which include precipitation, sea-rise level) promulgated by MONRE
- ✓ Plans, master plans of land use, master plans of urban development,… (relating to scenarios of water usage, urban infrastructure changes…)
- ✓ Measures to mitigate flood damage (single or combination of measures)

Step 4.3 Develop flood hazard and flood risk maps

a) GIS database development

To serve the risk analysis, impact assessment and result presentation, GIS instruments on standardized data are vital. Standardized GIS data for IFMP should show layers of topography, land use, demographic distribution, distribution of economic basis by sector/field,…and any other layers that can be used for disaster risk analysis and evaluation.

Depending on availablity of updated topographic data of MONRE at the ratio of 1:10.000, the provinces are encouraged to develop GIS data using this ratio and apply the same ratio of 1:10.000 by MONRE for all topographic maps as the foundation map for specialized maps. GIS data includes:

- ✓ Foundation map: is DEM photos of natural conditions, administrative boundary, public infrastructures, etc.
- ✓ Results of flood hazard simulation in accordance with each scenario
- ✓ Development plans/master plans

b) Flood hazard maps

From simulation results, Flood hazard maps (FHM) shall be developed. FHM showing depth and largest inundation area, distribution of top flood velocitiy, duration of inundation by space will provide important information for the formulation, activities of CBDRM. In FHM, it is required to describe calculation conditions in flood simulation.

c) Flood risk maps

Flood risk map is developed by laying flood hazard map with information layers of administration, population, infrastructure (schools, hospitals, transport works, ect), and economic sectors (agriculture, industry, tourism,etc). Flood risk and hazard maps shall provide primary evaluation of the impacts and damage to each sector and region.

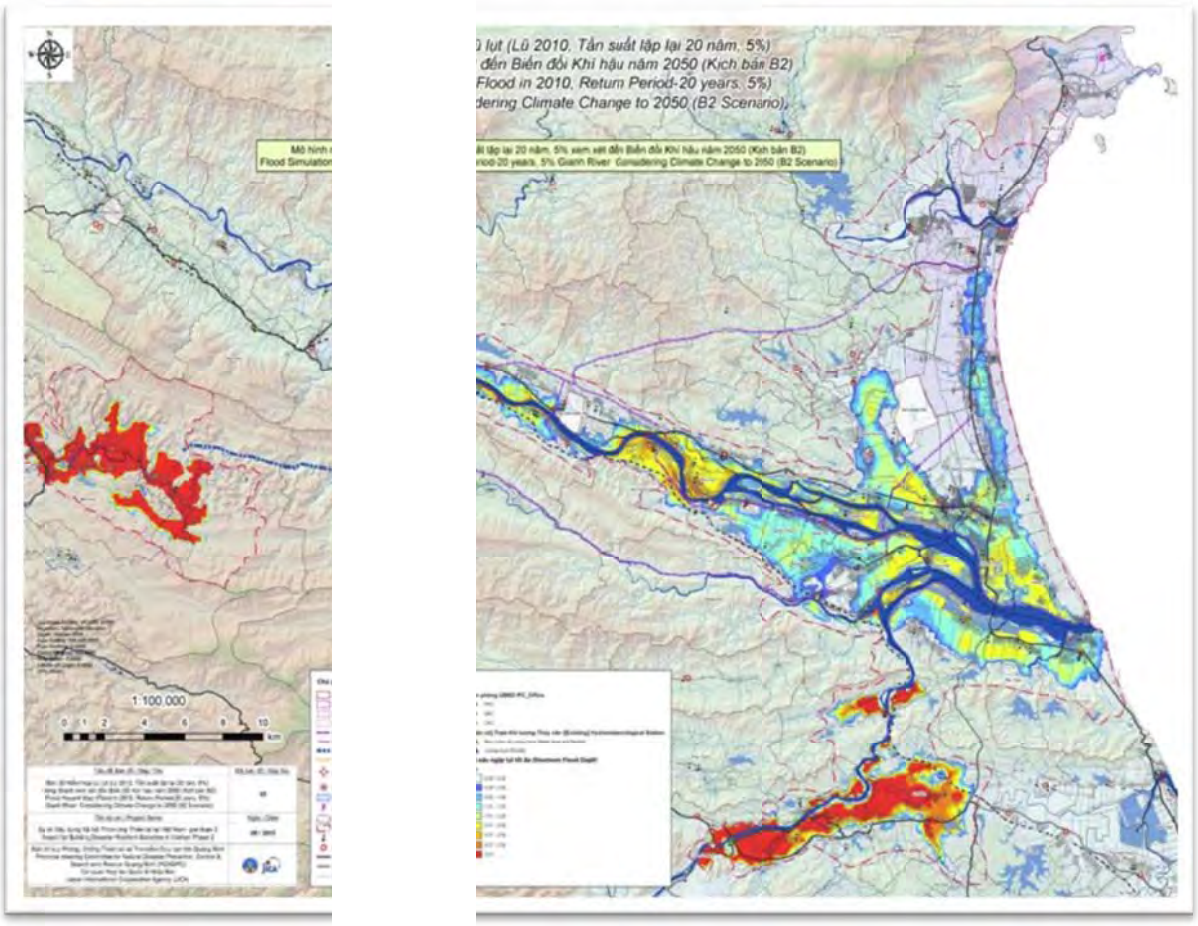

Fig.13 *An example of flood hazard map in Gianh river basin*

<u>Step 4.5</u> Flood risk evaluation and proposals of measures for IFMP shall be made using GIS tool. GIS shall be used as a supporting tool to facilitate the discussion, comparison of flood impacts in each scenario, from which priority measures shall be proposed for IFMP

Depending on time, budget and staff's competence along with statistics and available flood models, PCFSC shall decide and invite competent and experienced consultant companies to implement Step 2 to Step 4, at that time the companies will partake and support in meetings of IFMP working groups.

3.5 STEP 5: FORMULATION OF IFMP

Step 5.1 Identify measures for IFM by river basin

Based on the results of Step 2,3 and 4, identify the list of structural, non-structural measures with the following suggestions for reference:

a) Non-structural measures

- Implementing legal documents, mechanism, policies:
  - Plan on disaster prevention and control at all level implementing in 5 years, then use it as a basis for Plan of implementation for each year.
  - Establishment of the Fund on disaster prevention and approval of the Plan on implementing and using the Fund
  - Mainstreaming contents of disaster prevention into master plans, sectoral development plans and socio-economic development plans
  - Formulation of response Plans in accordance with disaster risk levels
  - Providing instructions to organizations, individuals, households on preparation of vehicles and facilities for disaster prevention
- Response to extreme phenomena such as superstorms, inundation due to upstream reservoir discharge:
  - Formulating, approving response plans for coastal provinces against superstorms
  - Formulating, approving response plans for inundation in the downstream area in case of upstream reservoir discharge
- Institutional enhancement:
  - Supporting residents to buy insurance
  - Supporting enterprises investing in disaster prevention
- Consolidating the system and enhancing capacity of Commanding committees at all levels
  - Establishment of Office of PCFSC in Department of Water Resources as a legal entity and specialized activities.
  - Establishment of Commanding committees of disaster prevention and control, search and rescue at all levels headed by Chairmen.
  - Establishment of voluntary groups, technical groups, community groups to support the core forces of police and military in the area to initially response to disaster and to be mobilized when necessary.
  - Constructing standard offices capable of responding timely and effectively to various disasters and high disaster risk levels.
- Enhancing forecasting and warning capacity

- Strengthening the system of measuring, collecting hydro-met stats, supplementing data from other monitoring systems such as radar, arial, sattlite images, …
- Enhancing capacity of officers in charge of forecasting, especially for rain, flood, drought, typhoons, saline instruction,…
- Enhancing facilities, equipment for measuring, handing mathematic models,…
- Enhancing the management of database of historical disaster, real-time to share info with communities or support decision-making process
- Having policies to encourage organizations, enterprises to build measuring warning systems in comply to the Law on Hydro-met

- Upgrading standards, construction regulations
  - Standard on flood prevention in river basins
  - Safety standard for disaster prevention works such as reservoirs, dykes …
  - Safety standard for other infrastructures such as transport, communication, construction, …
- Training, using media to enhance awareness of communities

Increase in the forces to implementing the Plan on raising awareness and CBDRM following the guidance of MARD and MOET.

- Forming technical supporting groups and community groups, concensus on organizations managing, implementing the Plan
- Mobilizing forces to implement the plans in the area together with TOT training for provincial level by the Central level and support from international, non-governmental organizations to scale up
- Put this content into education programs of various school levels, swimming lessons and student management programs to avoid drowning.

Fig 14 *Workshop on developing disaster education materials in Quảng Thành commune, Thừa Thiên Huế city*

Fig 15 *Disaster instructions for pupils at Hưng Lĩnh commune, Nghệ An*

Fig 16 *CBDRM training in Quảng Sơn commune,Quảng Bình*

Fig 17 *Rescue drills at Quảng Sơn commune, Quảng Bình*

- Programs on evacuation
  - Review resettlement programs, evacuating from high risk areas of erosion, inundation …
  - Review water resources plans, flood plans, dyke plans, of which location and number of households to be moved should be identified to assure safety and flood discharge.
  - Review resettlement programs in projects to be implemented in the area.
- Developing and managing forests
  - Review lost and recoverable forests in the upstream
  - Review protective forests, mangrove forests
  - Review forest quality
- Operation procedures of reservoirs, tide-preventing culverts and pumping stations
  - Operation procedures of reservoirs and multi-reservoirs in area that impact flood in the downstream
  - Capacity to increase flood storage volume in upstream reservoirs
  - Time and capacity of pumping stations when inundated by flood or in combination with heavy rain in the field side
  - Procedure of opening, closing tide-preventing culverts during flood using forecasting info

b) Structural measures

- Constructing, upgrading schools, community houses, etc in combination with disaster prevention
  - Relocating schools in flood-prone or high risk areas of landslide, flash flood, …
  - Reparing, upgrading or constructing new schools in the area to assure safety for teachers, pupils and act as evacuation when severe disaster occurs
- Constructing, upgrading transport roads to act as rescue roads as well

- Based on calculated flood maps in the area to identify the routes, altitude and dimension of the roads suitable for the area and still assure the aesthetic, safety while joining the traffic during normal without flood.
- If flood maps are unavailable, based on historical flood marks, routes and dimension can be identified.

Constructing, upgrading river dyke network, erosion control works

- Based on approved dyke plans, routes and scope can be identified. If no plans exist, it is suggested to upgrade existing dykes; in this case, it is necessary to calculate flood so that the river channel can still discharge flood after the dyke is upgraded. If no flood models are available, it is required to refer to historical flood marks to identify dyke altitude.
- Facilities under dykes such as culverts (drainage, irrigation), overbridge or trees should also be included in the plan.
- In areas that are prone to erosion and no flexible mesures are on hand, it is required to have protection solutions such as revetment, foot-protected mansonry embankment or groyne to diverse flows,…

Fig 18 *Before and after the construction of groynes in Hà Tĩnh*

Strenthening hydro-met observing system

To enhance accuracy of flood forecasting results, rainfall observing and measuring systems in the basin or hydraulic stations along the river are essential. Based on the plans on station arrangement, location, scope of new construction, supplement or upgrading can be identified. Neverthless, depending on characteristics of rain and flood in the basin as well as land use conditions, hydro-met agencies can make investment proposals to put into the plan.

Constructing warning, communications systems

- Constructing flood notifying poles/radios along rivers, downstream of reservoirs, at weir running through residential areas or where activities in the river, river stretches are active.
- Automatic monitoring systems of water level and warning at upstream/downstream of reservoirs or other disaster prevention works.
- Hardwire radio systems at hamlets, communes to deliver news of flood and inundation. It can be combined with television system or portable speaker

to timely inform the residents

- Constructing, upgrading systems of pumping station, drainage station

- Upgrading, repairing or constructing new pumping stations, flow diversion channels, management houses, power generation system, …
- Industrial zones, specialized tourist areas, etc are also proposed for construction, built and administered by management units.

- Dredging

For river sections, estuaries that are often deposited which affect flood drainage, dredging is required. Dredging or construction of river training works must be coordinated with river transport sector to avoid waste and affect flood drainage. There should be plans on sand exploitation to enhance flood drainage in the river channel. The identification of location, mining amount must be identified through mathematic or physics models and should be tested by actual experiments because it is a complex content so as to avoid impacts to other areas causing erosion or deposition.

- Flood distribution and retarding works

Based on natural conditions and calculated results, flood retarding areas should be identified to reduce flood in the river. In addition, it is recommended to consider the usage of existing flood retarding areas or abolishing those which are ineffective or having alternative measures. Flood retarding areas should be closely managed to optimize its usage in normal conditions, but when flood occurs it should assure safety and effectiveness of flood distribution and retarding.

- Constructing, upgrading reservoir system

Regarding multi-purpose reservoirs, especially for flood prevention, it is proposed to firstly minimize flood flows to the downstream. Besides new construction, it is suggested to repair, upgrade them to assure safety and increase flood prevention volume. Reservoir operation procedures should be used and tested in accordance with actual flood in the area. It is suggested to construct systems of measuring, monitoring, warning, spillways to assure safety for reservoirs as well as residents in the downstream.

- Constructing rural infrastructures against disaster

Coordination with various government programs, domestic and international organizations to support the locals to construct solid houses against flood. Assure multi-purposes of public houses such as schools, stations, culture houses as shelter when flood and disaster occur. For flood-prone areas, houses must have 2 floors for shelter or to transport facilities if inundated.

- Strenthening rescue facilities and equipment

During the disaster, rescue facilities and equipment shall support competent organizations and locals to assure safety when working outside or rescuing timely. The equipment can include lifeboys, boats, first-aid equipment, vehicles for transportation through inundated or eroded areas, tents,etc.

In addition to mobilizing the equipment, competent organizations can alo use private motorbikes and equipment for rescue. It is required to assign an organization or community to manage it and mobilize it quicky when necessary.

- Strenthening facilities for on-duty work

Besides the equipment inside the office and those for 24/24 on-duty watch, there exist receiving system of info from forecasting agencies, higher directing agencies, notifying and delivering systems for lower-level agencies or communities, internet, broadcasting systems in case of power incidents.

Step 5.2 Listing activities/measures by priority order

After listing programs/projects with identified head organizations, coordinated ones, fund sources, an important issue is to specify time of implementation or in other words, priority order in comparison with other programs/project. **The selection of priority order and search for fund sources in IFMP formulation is vital** because the list of projects and investment capital are huge. Therefore, depending on the conditions of each area, criteria to select priority projects shall be identified to harmonize with other sectors and purposes of flood prevention and with reduction of life loss as priority. Besides, non-structural measures should be strengthened because they are low-cost and bring about high effectiveness. Below are conventional examples of program selection based on investment resources:

- Central budget, ODA loan: investment in inundation reduction project, flood discharge project, dykes…with big scope and high investment capital
- Local budget focuses on investment in dykes serving as rural roads, erosion prevention works, evacuation projects, purchase of equipment, facilities, communications system for disaster prevention, search, rescue, recovery of the aftermath....
- Back-up fund of provinces: handles response, recovery works after the aftermath of disaster and serves the prevention, mitigation of disaster in urgent cases.
- Fund on disaster prevention and control: invests in construction of critical flood and storm prevention works, buys equipment, trainings, practical drills of disaster prevention, search and rescue, recovers damages and incidents caused by disaster …
- Fund sources contributed by organizations, individuals and managed by the Fatherland Front: supports the affected residents to recover, mitigate difficiculties and stabilize life from mobilizing fund from society.
- Investment fund from private sector and encouraging residents to upgrade their houses to assure safety: developing policies in investment, loan, service supply contracts,…

Step 5.3 Formulating IFMP report

Pursuant to clause 4 Article 15 of the Law on Disaster prevention and control, the main contents of IFMP can be based on the plan on disaster prevention and

control, which include:

- Content 1: Evaluate, update characteristics of livelihood, society, economy and infrastructures in the province

- Content 2: Identify, evaluate flood risk levels, impacts of flood to human, socio-economic activities

- Content 3: Identify contents and proper measures against flood in accordance with flood risk levels to minimize damage, pay attention to dangerous areas and vunerable subjects.

- Content 4: Identify methods, procedure to integrate the contents of disaster prevention and control into socio-economic plans and master plans.

- Content 5: Identify resources and progress every year, every 5 year, every 10 years to implement IFMP

(Refer to Annex 5.2 to see detailed contents of IFMP)

More detailed steps are given below:

a) ***DARD directs DWR to draft the contents of the Plan and present the contents to get comments from members of IFMP working group***

b) ***DARD writes and submits a document to PPC requesting them to send it to Departments, sectors, relevant districts/towns to get written comments.***

c) ***DARD directs DWR to revise and convene a meeting if there are different ideas or visit their offices to work on unagreed issues***

d) ***DARD draft a document to PPC to request for comments of DWR, MARD***

e) ***IFMP working group completes the Plan and makes a report following Central DWR's comments***

f) ***DARD in coordination with PPC office shall submit the draft plan to PPC. The dossier includes:***

- Document requesting for approval of the plan with explanation of comments from relevant units
- Draft decision approving the plan (Form 2)
- Main report (Form 3), specialized reports (if any), inundation maps …
- Written comments of Departments, sectors, relevant localities, central DWR.

3.6 STEP 6: IMPLEMENTATION, REVIEW, EVALUATATION OF IFMP

Step 6.1 Implementation

Based on the IFMP by river basin approved by PPC, IFMP working group shall develop detailed implementation plan, which defines roles and responsibilities of revevant units to lead and coordinate in implementation. Specifically, PCFSC, DARD are the leading agencies in coordination with other sectors to implement IFMP:

- Instruct, check, urge the implementation of IFMP of organizations (sectors, localities)
- Act as the contact point with domestic and international organizations
- Review, follow-up and evaluate the implementation

The implementation should ensure that projects/programs in IFMP have been integrated with other sectors and plans on socio-economic development of the provinces so as to priotize the implementation. DPI shall balance, allocate investment fund every year based on the Law on state budget, in coordination with PPC to mobilize other legal sources to implement other contents in the plan.

Departments, sectors, localities and other units shall take the lead or coordinate in the implementation as arppoved in the Detailed implementation plan.

Step 6.2 Review

PCFSC, DARD shall take the lead to evaluate and sumarize primarily every year and every 5 year, withdraw experience and make proposals/recommendations to PPC to revise the contents, solutions, plans to meet actual conditions. In special disaster conditions or river basin that have significant changes in formation conditions, flood transfer and inundation, PCFSC is responsible for reviewing and reporting to PPC to update IFMP by river basin if necessary.

Step 6.3 Follow up and evaluation

To implement IFMP effectively, monitoring and evaluation during the execution is necessary. The monitoring and evaluation are conducted through 3 levels:

- Output monitoring: is the first level which means regular and continuous supervision of the plan activities, process of implementation and produced outputs.
- Result assessment: is the second level. It relates to monitoring and evaluation of behavioral changes or system alternation, which are the results from activities in IFMP.
- Impact evaluation: is the third level. It refers to the evaluation of changes towards target purposes, which are the results of behavioral changes or system alternation thanks to the implemtation of activities in IFMP. Impacts include those affecting specific purposes toghether with contributing to achieve the overall ones, which are the optimization of effectiveness at inundated reas and mitigation of live and property losses due to flood.

With limited time and budget, the provinces are encouraged to formulate evaluation framework based on specific outputs of projects/activities in IFMP (level 1), of which PCFSC shall be the leading agency to conduct monitoring and evaluation.

In the coming time, depending on actual conditions of the province, it is necessary to formulate the plan to develop a monitoring and evaluation framework for all 3 lelves through:

- Develop M&E framework of which specifies roles of relevant stakeholders
- Develop M&E criteria: M&E criteria are developed and advised by relevant units (local and central)
- Develop basic database: DARD shall take the lead to investigate and evaluate the current situation, build basic database to serve the monitoring and evaluation of IFMP by purposes and criteria developed.

SECTION 4 FORMS

FORM 01– Table listing programs/projects related to IFM

	Sector	Transport sector	Contruction sector	….
Relevant legal documents, policies	- Project NN11 - Program NN12 - …	- Project GT11 - Program GT12 - …	- Project XD11 - program XD12 - …	
Socio-economic development plans in the area	- Project NN21 - Program NN22 - …	- Project GT21 - Program GT22 - …	- Project XD21 - program XD22 - …	
Plans of each relevant sector	- Project NN31 - Program NN32 - …	- Project GT31 - Program GT32 - …	- Project XD31 - program XD32 - …	
Master plans of each relevant sector	- Project NN41 - Program NN42 - …	- Project GT41 - Program GT42 - …	- Project XD41 - Project XD42 - …	

FORM 02 – Contents of the decision approving IFMP of PPC

PROVINCIAL PEOPLE'S COMMITTEE

SOCIALIST REPUBLIC OF VIETNAM

Independence – Freedom - Happiness

X, *date …*

DECISION

On the approval of IFMP for river basin Y province X
from 20… - 20…

PROVINCIAL PEOPLE'S COMMITTEE X

Pursuant to … (some relevant Law such as Law on the organization of People's council…, Law on disaster prevention and control, relevant Decrees …)

Pursuant to … (Decisions of Prime Minister, Central ministries, PPCs on fields relating to disaster prevention)

Pursuant to … (Establishment of IFMP working group, project steering committee,…)

Upon request of MARD in the submission document no. …

DECIDES:

Article 1. Approving IFMP for river basin Y province X from 20… - 20… (with attached report) with the main contents below:

1. Name of the plan: …
2. Scope of implementation: …
3. Time of implemenation: …
4. Purposes: …
5. Contents: …
6. Estimated total investment capital: …
7. Investment sources: …
8. Implementation:
   a. DARD
   b. DPI
   c. DOF
   d. Other departments: … (concerned with the implementation of the contents in the plan), provincial/regional HMS, social political organizations, media agencies, provincial military commanding committee, PPCs of districts, communes, cities.....in accordance with their functions, responsibilities to execute the plan …

Article 2. The Decision takes effect from the date of signing

Article 3. Head of PPC office, Head of PCFSC, relevant district, Director of DARD, Heads of departments, unions,….are responsible for implementing this Decision./.

Receivers:
- As stated in 3.
- CCFSC,…

ON BEHALF OF PPC
CHAIRMAN

FORM 03 – Contents of the report on IFMP OF PPC

IFMP FOR
THE RIVER BASIN Y
PROVINCE X (period… - …)

TABLE OF CONTENTS

ABBREVIATIONS

INSTRUCTION

PART 1. FOUNDATION TO FORMULATE IFMP

1. Evaluate, update characteristics of livelihood, society, economy and infrastructure of the province yearly
2. Overview flood and disaster conditions (evaluate flood risk levels, impacts of flood on people, society, economy)
3. Identify contents of and measures against flood in accordance with flood risk levels to mitigate damage, pay attention to dangerous areas and vunerable subjects
    a. Review relevant disaster risk management plans
    b. Conduct survey to add data: at dangerous areas and of vunerable subjects
    c. Analyze flood risk using flood simulation models
    d. Make proposals and evaluate impacts of structural and non-structural measures

PART 2. IFMP ON RIVER BASIN Y

1. Identify methods, procedure of mainstreaming disaster prevention into socio-economic development plans, master plans.
    a. Criteria of chosing measures
    b. Mainstreaming measures into relevant sectors
    c. Mainstreaming measures into socio-economic development plans
2. Plan and implementation resources
    a. Framework of the plan: measures
    b. Identify resources and progress every year, every 5 year, every 10 year, …
    c. Identify responsibilities of organizations, individuals in executing IFMP
    d. Identify responsibilities of organizations, individuals in cheing, following up the implementation and reveew IFMP
3. Proposals
4. Implementation

LIST OF APPENDICES: tables, maps, data, …

For provinces that are reviewing IFMP, the following contents should be included:

PART 1. NECESSITY OF REVIEW, SUPPLEMNT AND REVISION OF IFMP

Basis for review

Assessment of IFMP implementation in previous phases

PART 2. BASIS OF FORMULATING IFMP

Analyzing socio-economic conditions, changes of livelihoods

Congregating, investigating, analyzing data

Adding more scenarios into flood simulation models

PART 3. IFMP IN RIVER BASIN Y

REFERENCE

Vietnamese documents

1. MARD (2014). Guidance on evaluation of disaster risk based on community
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3. MARD and JICA (2015b). IFMP in Huong river basin in Thừa Thiên Huế to 2020. Project of strengthening disaster resilient capacity in the Central region (DRSC).
4. MPI (2016). Guidance on mainstreaming disaster prevention and control into socio-economic development plans, master plans stipulated in Circular no. 05/2016/TT-BKHĐT.
5. MARD (2016). Document no. 5080/BNN-TCTL on formulating disaster prevention plans at all levels issued on 20/6/2016.
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12. IMHEN(2015) Special report of Vietnam on disaster risk management and extreme phenomena to promote adaptation to climate change.
13. National Assembly (2012). Law on Water resources, no. 17/2012/QH13..
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English documents

15. GAR - Global Assessment Report on Disaster Risk Reduction (2011). A preliminary analysis of flood and storm disaster data in Viet Nam. UNDP &ISDR.

APPENDIX

5.1 LIST AND ROLES OF RELEVANT STAKEHOLDERS IN IFMP WORKING GROUP OF QUANG BINH

Members	Role and Responsibility
Leading Agency PPC	◆ Review socio-economic development plan to 2030 from view point of IFMP ◆ Check the sustainability between IFMP and relevant socio-economic development plans to 2020-2030 ◆ Check the priority order of solution in IFMP. ◆ Approve IFMP as provincial authorized plan.
DARD / DIFSC	◆ Review related plans such as plans of improvement irrigation system and forest conservation, etc. ◆ Introduce current structural and non-structural measures including CBDRM for flood prevention. ◆ Provide latest information related to IFMP formulation such as irrigation and river bank erosion, etc.
DONRE	◆ Review land use plan, integrated water resources management plan to 2030, climate change adaptation plan and environment protection plan. ◆ Provide latest information related to IFMP formulation such as land use, water resources, climate change and environmental issues
DPI	◆ Review socio-economic development plan to 2030 from view point of IFMP. ◆ Provide latest information related to IFMP formulation from point of plan and investment
DOF	◆ Review the budget allocation of the province from view point of flood prevention. ◆ Approve budget allocation to IFMP projects. ◆ Provide latest information related to IFMP formulation
DOIT	◆ Review sustainability between IFMP and operation procedure of hydropower plants upstream of target Rivers. ◆ Introduce latest industrialization and urbanization conditions ◆ Provide latest information related to IFMP formulation from view point of industrialization and urbanization
DOC	◆ Review construction plan including: the development of city infrastructure, water supply, waste treatment at urban zones, industrial zones and new resettlement, etc. ◆ Provide latest information related to IFMP formulation from the point of development of city and infrastructure, etc.
DOT	◆ Review the transportation plan including road and inland waterway. ◆ Introduce plans to construct and/or reinforce roads ◆ Provide latest information related to IFMP formulation from the point of development of transportation, etc.
HMS	◆ Review sustainability between IFMP and issues of flood warning, warning system, hydro-met observing system ◆ Introduce present hydro-meteorological observation network and its future development plan. ◆ Provide latest information and suggestion related to IFMP formulation from the point of strengthening of hydro-meteorological observation network.
DOH	◆ Review the current plan from view point of IFMP ◆ Provide latest information related to IFMP formulation such as health care center development plan, health and hygiene education, and response activity during and after flood.

DOIC	◆ Review the current plan from view point of IFMP ◆ Provide latest information related to IFMP formulation from the point of communication infrastructure development
DOET	◆ Review the current plan such as school safety plan from view point of IFMP ◆ Provide latest information related to IFMP formulation from view point of CBDRM and school safety and education.

5.2 DECISION ON THE APPROVAL OF IFMP IN GIANH AND NHAT LE RIVER BASINs, QUANG BINH PROVINCE FROM 2016-2030

QUANG BINH PROVINCIAL PEOPLE'S COMMITTEE

No: 2946/QD-UBND

VIETNAM SOCIALIST REPUBLIC
Independence – Freedom – Happiness

Quang Binh, October 21st 2015

DECISION

On the approval of the Integrated Flood Management Plan in Gianh river and Nhat Le river basins, Quang Binh Province (2016 – 2030)

QUANG BINH PROVINCIAL PEOPLE'S COMMITTEE

Pursuant to Law on the Organization of People's Council and People's Committee dated on November 26th 2013;

Pursuant to Law on Disaster Prevention No.33/2013-QH13 dated on June 19th 2013;

Pursuant to Decree No.66/2014/ND-CP by the Government on detailed promulgation and guiding the implementation of some articles in the Law on Disaster Prevention;

Pursuant to Decision No. 172/2007/QD-TTg dated on 16/11/2007 by the Prime Minister on the approval of the National Strategy for Disaster Prevention and Mitigation up to 2020;

Pursuant to Decision 744/BNN-HTQT dated on 14/4/2014 by MARD on the approval of the "Project for Building Disaster Resilient Society in Vietnam – Phase II" sponsored by Japanese Government;

Pursuant to Decision 1901/QD-UBND dated on 05/8/2008 by PPC on the issuance of the Action Plan for the implementation of the National Strategy for Disaster Prevention and Mitigation in Quang Binh;

Pursuant to Decision 2094/QD-UBND dated on 05/08/2014 by PPC on the establishment of the PSC of the Project for Building Disaster Resilient Society in Vietnam – Phase II in Quang Binh;

As requested in the Statement No. 1638/TTr-PCLB dated on 05/10/2015 by DARD Quang Binh

DECIDES:

Article 1. Approve IFMP in Gianh river and Nhat Le river basins (2016 – 2030) (including Report and Atlas) with following contents:

1. Name: Integrated Flood Management Plan in Gianh river and Nhat Le river basins (2016 – 2030)
2. Scope of application: Gianh river and Nhat Le river basins in Quang Binh province
3. Time of application: from 2016 to 2030
4. Objectives: Improve the flood prevention and mitigation in Gianh and Nhat Le river basins which helps achieve the objectives of the "Action Plan for the implementation of National Strategy for Disaster Prevention " approved in the Decision 172/2007/QD-TTg on November 16th 2007 by the Prime Minister
5. Contents

   IFMP includes:
   - Consolidation of the organizational structure; completion of the system of legal documents, mechanism and policies;
   - Formulation of flood hazard maps and socio-economic planning according to the hazard maps
   - Enhancing the capacities of provincial forecasting and warning; awareness raising and capacity building for disaster management;
   - Developing programs on the plantation and protection of coastal forests
   - Rehabilitating, upgrading and constructing disaster prevention and mitigation facilities
6. Total required investment budget: 3269 billion VND
7. Expected sources of budget:
   - Central and local budget
   - ODA budget, non-refundable loans and assistance from international organizations
   - Budget mobilized from local businesses, people and other sources
8. Implementation

   a. DARD
   - Formulate the IFMP and submit to PPC for approval;
   - Take main responsibility and coordinate with relevant departments, agencies and localities to implement duties mentioned in the Plan;

– Collect and summarize comments, evaluations and recommendations and submit to PPC to adjust IFMP to be in accordance with the practical conditions every year

b. DPI should consider, balance and counsel PPC to allocate annual budget to carry out activities as regulated; mobilize sources for effective implementation of the Action Plan

c. DOF should counsel PPC to issue policies on supporting funds for relevant agencies and localities to carry out activities in IFMP

d. Other departments and agencies including DOLISA, DoIA, DOIT, DONRE, DOET, DOST, DOT, DOC, DOH, HMS, Quang Binh newspaper, Quang Binh TV and Radio Broadcasting, Red Cross, Provincial Military Comm and DPCs, CPCs carry out activities mentioned in IFMP according to the authority and duties; report implementation results to DARD for summary and report submitted to PPC

Article 2. This decision comes into effect from the date of signing

Article 3. The Chief of PPC Secreteriat, Head of Provincial Committee for Disaster Prevention and Search and Rescue; Director of DARD; Chairmen of DPCs and Head of District and City Commitees for Disaster Prevention and Search and Rescue; leaders of relevant departments, agencies, and organizations are responsible for following this Decision

Receivers:
- As stated in Article 3;
- Central CFSC;
- National Committee of Search and Rescue;
- Chairman and Deputy Chairman of PPC;
- PPC office: LĐVP, TNMT;
- Archive: VT,CVNN.

Quang Binh Provincial People's Commitee
PP. CHAIRMAN
VICE CHAIRMAN

Trần Văn Tuân

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