

**Ministry of Water Resources and Meteorology,
Ministry of Agriculture, Forestry and Fisheries,
The Kingdom of Cambodia**

**THE STUDY
ON
COMPREHENSIVE AGRICULTURAL DEVELOPMENT
OF PREK THNOT RIVER BASIN
IN
THE KINGDOM OF CAMBODIA**

FINAL REPORT

**Volume - IV
Pilot Projects**

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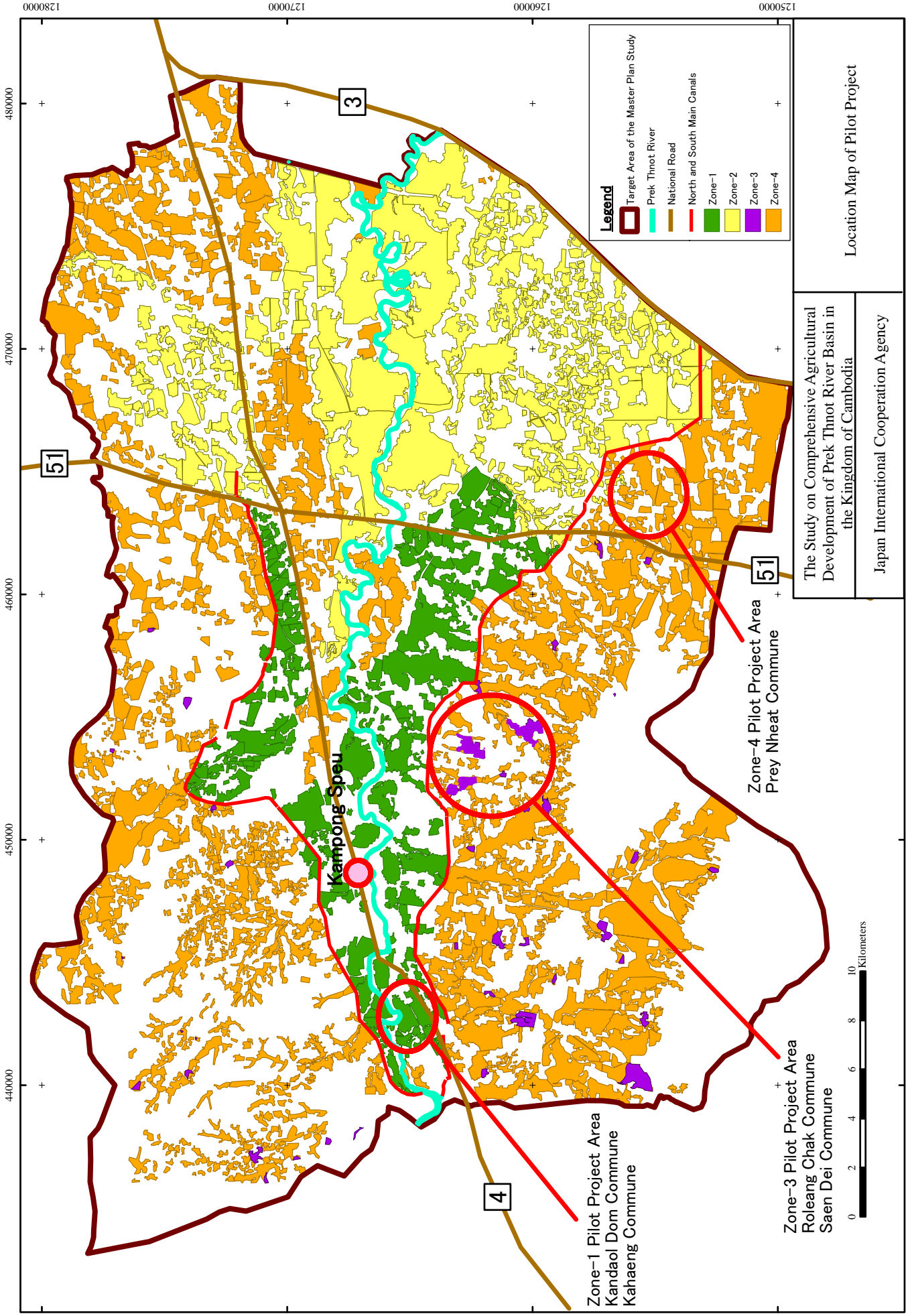
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Outline of Activities in Zone 1

Irrigated Agriculture On-farm Technology Improvement Pilot Project

Activity-1 Participatory Irrigation Management and Development

Objective
To distribute irrigation water based on water demand by a model FWUC

Activities

- (1) Preliminary land holding map preparation practice
- (2) Water use map preparation practice
- (3) Water loss identification and reduction practice
- (4) FWUC administration improvement practice
- (5) FWUC sub-group establishment practice
- (6) Proper irrigation water use education practice
- (7) Irrigation service plan preparation
- (8) On-farm irrigation facility construction practice
- (9) Watercourse construction practice
- (10) Water management training practice
- (11) FWUC meeting building construction practice

Results

- (1) Preliminary land holding maps were used for collection of ISF and O&M of facilities.
- (2) Water use maps were prepared and used for clarifying water supply method.
- (3) Water loss became 16% only.
- (4) The collection rate of ISF attained at 86 %.
- (5) WUGs were formed based on division boxes and field outlets.
- (6) Farmers understood the need of timely maintenance of irrigation facilities.
- (7) Rotational water supply was carried out based on the irrigation service plan.
- (8) 6 division boxes, 2 field outlets and one cross drain were constructed.
- (9) Construction of watercourses was made by FWUC members without any incentive.
- (10) The gate operator conducted the gate operation based on water demand.
- (11) The administrative activities could be carried out at FWUC meeting building.



Preparation of Land Holding Map



Construction of Watercourse



Construction of Division Box

Activity-2 Participatory Agricultural Extension

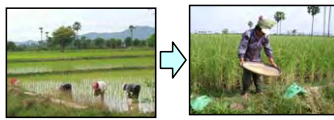
Objective
To disseminate of low cost and low input type SRI by farmer-to-farmer extension

Activities

- (1) Farmer-to-farmer low inputs SRI extension practice
 - 1) Initial guidance
 - 2) Study tour
 - 3) Village training
 - 4) Inter-village workshop
 - 5) Supporting and monitoring to experimental farmers
 - 6) Village general meeting
- (2) Farmer-to-farmer ecological chicken raising extension practice
 - 1) Study tour
 - 2) Village training
 - 3) Inter-village workshop
 - 4) Village general meeting
- (3) Farmers' group strengthening practice
 - 1) Study tour
 - 2) Village training
 - 3) Inter-village workshop
 - 4) Village general meeting

Results

- (1) - The number of farmers applying low inputs SRI attained 82.
- Total area of plots applying low inputs SRI reached 31.46 ha.
- The yield of SRI was 4.1 ton/ha, while that of traditional farming was 3.2 ton/ha.
- (2) - 11 farmers started to improve traditional chicken raising.
- There were 15 farmers who were interested in applying ecological chicken raising.
- (3) - 16 farmers' groups were organized as saving group with 304 farmers.
- The collected amount was Riel 19,965,400.



Transplanting at low inputs SRI plot



Crop Cutting Survey



Explanation of Ecological Chicken Raising



Preparation of Ecological Chicken Farm



Discussion of Saving Group



Preparation of Regulation of Saving Group

Activity-3 Experimental Farming Practice Improvement

Objective
To verify that the targets of Master Plan are achievable based on improved farming practices on side and modify the practices for further improvement

Activities

- (1) Verification test in early rainy season
 - 1) Verification test on rice
 - 2) Verification test on mungbeans
- (2) Verification test in rainy season
- (3) Small scale adaptability test
- (4) Farmers' acceptability survey

Results

- (1) - The yield levels of rice attained are 0.5 to 1.5 ton/ha which was higher than the target of Master Plan.
- The result of a crop cut survey of mungbeans indicates the lower yield level of 0.53 ton/ha compared with the Master Plan target.
- (2) All the verification plots attained yield levels of equal or higher than the target of Master Plan.
- (3) Rice plants in all the test plots had niform and satisfactory growth throughout the growing periods.
- (4) Demonstrators assessed as "good" or "proper rate" the improved farming practices adopted.



Verification Test on Rice



Crop Cutting Survey



Verification Test on Mungbeans



Yield of Mungbeans



Field Guidance



Weeding Activity

Evaluation of Pilot Projects in Zone 1

1) Relevance: **Very High** 2) Effectiveness: **High** 3) Efficiency: **High** 4) Impact: **Positive** 5) Sustainability: **High**

Conclusion

The sustainability and replicability of the project were verified.

Outline of Activities in Zone 3

Irrigated Agriculture On-farm Technology Improvement Pilot Project

Activity-1
Participatory Irrigation Management and Development

Objective

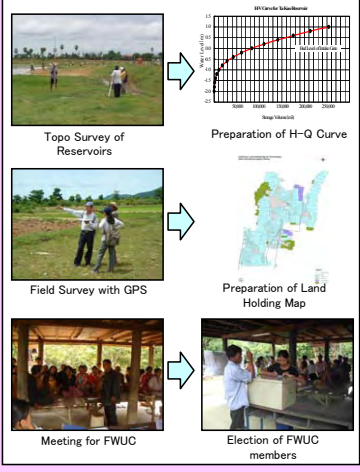
To achieve efficient use of irrigation water in the pilot project area in a sustainable and replicable way

Activities

- (1) Preliminary land holding map preparation practice
- (2) Water use map preparation practice
- (3) FWUC establishment practice
- (4) Reservoir capacity clarification practice
- (5) Irrigation service plan preparation practice
- (6) Water management training practice

Results

- (1) Preliminary land holding maps of three reservoirs were prepared by JICA Study team in cooperation of PDOWRAM staff in the participatory manner.
- (2) Canal layout and water supply method of the water harvesting irrigation systems were confirmed by preparing water use maps.
- (3) FWUC committee members were selected in three water harvesting irrigation systems.
- (4) H-V curves for three reservoirs were prepared based on the results of topo survey.
- (5) Irrigation service plans prepared under the support of JICA study team.
- (6) In order to know the water level in the reservoir, a staff gauge was installed in front of intake gate.



Activity-2
Participatory Agricultural Extension

Objective

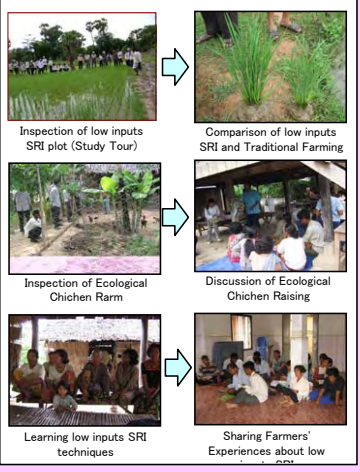
To disseminate of low cost and low input type SRI by farmer-to-farmer extension

Activities

- (1) Farmer-to-farmer low inputs SRI extension practice
 - 1) Initial guidance
 - 2) Study tour
 - 3) Village training
 - 4) Inter-village workshop
 - 5) Supporting and monitoring to experimental farmers
 - 6) Village general meeting
- (2) Farmer-to-farmer ecological chicken raising extension practice
 - 1) Study tour
 - 2) Village training
- (3) Farmers' group strengthening practice
 - 1) Study tour
 - 2) Village training
 - 3) Inter-village workshop

Results

- (1) - The number of farmers applying low inputs SRI was increased from 16 to 41.
- Total plot area applying low inputs SRI came to 38.05 ha.
- The yield of SRI was 4.0 ton/ha, while that of traditional farming 3.7 ton/ha only.
- (2) Farmers expressed that they wanted to apply ecological chicken. But it was financially difficult for them to conduct it.
- (3) 3 farmers' groups were organized as saving group with 30 farmers. The collected amount was Riel 1,826,900.



Activity-3
Experimental Farming Practice Improvement

Objective

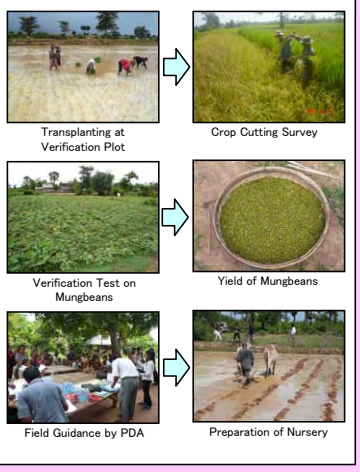
To verify that the targets of Master Plan are achievable based on improved farming practices on side and modify the practices for further improvement

Activities

- (1) Verification test in early rainy season - Verification test on rice
- (2) Verification test in rainy season
- (3) Small scale adaptability test
- (4) Farmers' acceptability survey

Results

- (1) The result of a crop cut survey indicated the lower yield level of 0.55 ton/ha compared with the Master Plan target.
- (2) All the verification plots attained yield levels of equal or slightly higher than the target of Master Plan.
- (3) Despite the delay in transplanting, rice plants in all the trial plots except for the direct sowing plot had satisfactory growth after planting to flowering.
- (4) Demonstrators assessed as "good" or "proper rate" the improved farming practices adopted.



Evaluation of Pilot Projects in Zone 3				
1) Relevance: Very High	2) Effectiveness: Relatively High	3) Efficiency: High	4) Impact: Positive/Slight Negative	5) Sustainability: Relatively High
Conclusion				
The sustainability and replicability of the project were nearly verified.				


Outline of Activities in Zone 4

Rainfed Agriculture Improvement Pilot Project


Activity-2 Participatory Agricultural Extension

Objective
To disseminate of low cost and low input type SRI by farmer-to-farmer extension
Activities
(1) Farmer-to-farmer low inputs SRI extension practice 1) Initial guidance 2) Study tour 3) Village training 4) Inter-village workshop 5) Farmers' field day 6) Supporting and monitoring to experimental farmers 7) Village general meeting
(2) Farmer-to-farmer ecological chicken raising extension practice 1) Study tour 2) Village training 3) Inter-village workshop 4) Supporting and monitoring to experienced farmers 5) Village general meeting
(3) Farmers' group strengthening practice 1) Study tour 2) Village training 3) Inter-village workshop


Results
(1) - 46 farmers applied low inputs SRI. - Total area of plots applying low inputs SRI reached 16.82 ha. - The yields of low inputs SRI were higher than those of traditional farming.
(2) There were 5 farmers to build cage, yard and house for ecological chicken raising.
(3) - 5 farmers' groups were organized as saving group in Zone-4 with 39 farmers. - Total deposit amount attained at Riel 24,537,500.




Learning low inputs SRI techniques




Comparison of low inputs SRI and Traditional Farming




Inspection of Ecological Chicken Rarm



Activity of Ecological Chichen Raising



Village Training




Activity of Farmers' Group


Activity-3 Experimental Farming Practice Improvement

Objective
To verify that the targets of Master Plan are achievable based on improved farming practices on side and modify the practices for further improvement
Activities
(1) Verification test in early rainy season - Verification test on rice
(2) Verification test in rainy season
(3) Small scale adaptability test
(4) Farmers' acceptability survey


Results
(1) The yield level of the Plot is estimated at 0.5 to 0.6 ton/ha compared with the Master Plan target.
(2) All the verification plots attained yield levels of substantially higher than the target of Master Plan.
(3) Rice plants in all the trial plots except for the direct sowing plot had fairly uniform and satisfactory growth.
(4) Demonstrators assessed as "good" or "proper rate" the improved farming practices adopted.




Transplanting at Verification Plot




Crop Cutting Survey




Verification Test on Mungbeans



Yield of Mungbeans



Field Guidance



Preparation of Nursery

Evaluation of Pilot Projects in Zone 4

1) Relevance: Relatively High	2) Effectiveness: High	3) Efficiency: High	4) Impact: Positive	5) Sustainability: High
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Conclusion

The sustainability and replicability of the project were verified.

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Abbreviations

CARDI	Cambodian Agricultural Research and Development Institute
CEDAC	Centre d'Etude de Development Agricole Cambodgien (NGO)
DAS	Days after Sowing
DAT	Days after Transplanting
EIA	Environmental Impact Assessment
EEM	Environmental Management and Monitoring
FWUC	Farmer Water User Community
FWUG	Farmer Water User Group
GIS	Geographic Information System
GPS	Global Positioning System
IRC	Inter-ministerial Resettlement Committee
ISF	Irrigation Service Fee
JICA	Japan International Cooperation Agency
MAFF	Ministry of Agriculture, Forestry and Fisheries
MOWRAM	Ministry of Water Resources and Meteorology
NGO	Non Government Organization
OJT	On-the-Job Training
OVI	Objectively Verifiable Indications
PDA	Provincial Department of Agriculture, MAFF
PDOWRAM	Provincial Department of Water Resources and Meteorology, MOWRAM
PDM	Project Design Matrix
SEILA	Foundation Stone in Khmer: This word is used as national rural development program to 1- Alleviate poverty and 2- Strengthen local governance and ownership of local government.
SRI	System of Rice Intensification
TOR	Terms of Reference
VDC	Village Development Committee
WUG	Water Users Group

Measurement Units

Extent	Volume
cm ² = Square-centimeters (1.0 cm x 1.0 cm)	cm ³ = Cubic-centimeters (1.0 cm x 1.0 cm x 1.0 cm or 1.0 m-lit.)
m ² = Square-meters (1.0 m x 1.0 m)	
km ² = Square-kilometers (1.0 km x 1.0 km)	m ³ = Cubic-meters (1.0 m x 1.0 m x 1.0 m or 1.0 k-lit.)
a = Are(100 m ² or 0.01 ha.)	lit 1 = Liter (1,000 cm ³)
ha = Hectares (10,000 m ²)	MCM = Million Cubic Meter
ac = Acres (4,046.8 m ² or 0.40468 ha.)	Weight
Length	gr = Grams
mm = Millimeters	kg = Kilograms (1,000 gr.)
cm = Centimeters (cm = 10 mm)	ton = Metric ton (1,000 kg)
m = Meters (m = 100 cm)	
km = Kilometers (km = 1,000 m)	Others
Power and Energy	ppm = parts per million
A = Ampere	°C = degree centigrade
V = Volt	% = percent
W = Watt	
kWh = Kilowatt hour	Time
HP = Horse power	sec = Seconds
Currency	min = Minutes (60 sec.)
US\$ = United State Dollars	hr = Hours (60 min.)
R, Riel = Cambodian Riel	

PART-A
GENERAL INFORMATON



*Village Meeting on FWUC Strengthening at Pongro Village
(Participatory Irrigation Management and Development Activities in Zone-1)*

PART-A: GENERAL INFORMATION

Chapter A-1 Introduction

A-1.1 Authority

This Volume-IV: Pilot Projects is part of the final report which was prepared in accordance with the Scope of Work for the Study on Comprehensive Agricultural Development of Prek Thnot River Basin, as agreed between the Ministry of Water Resources and Meteorology, the Kingdom of Cambodia (MOWRAM) and the Japan International Cooperation Agency (JICA) on April 11, 2005.

A-1.2 Composition of Final Report

The final report consists of the following volumes:

- Volume-I: Summary
- Volume-II: Master Plan
- Volume-III: Feasibility Study for Priority/Urgent Projects
- Volume-IV: Pilot Projects
- Volume-V: Hydrological Study and Environmental Management Basic Capacity Strengthening
- Volume-VI: Appendixes for Master Plan
- Volume-VII: Appendixes for Feasibility Study for Priority/Urgent Projects

This Volume-IV: Pilot Projects presents the results of pilot projects activities which were executed from May 9, 2007 to end of February 2008.

A-1.3 Composition of Volume-IV: Pilot Projects

The Volume-IV: Pilot Projects comprised four parts as follows:

- PART-A: GENERAL INFORMATION
- PART-B: ACTIVITIES OF PILOT PROJECTS (2006 /2007)
- PART-C: ACTIVITIES OF PILOT PROJECTS (2007/ 2008)
- PART-D: EVALUATION OF PILOT PROJECTS

PART-B and PART-C: ACTIVITIES OF PILOT PROJECTS consist of the following Sections.

- Section-I: Irrigated Agriculture On-farm Technology Improvement, Pilot Project in Zone-1
- Section-II: Irrigated Agriculture On-farm Technology Improvement, Pilot Project in Zone-3
- Section-III: Rainfed Agriculture Improvement, Pilot Project in Zone-4
- Section-IV: Technology Transfer
- Section-V: Lessons Learned

Chapter A-2 Background

A-2.1 Master Plan Study

The basin of the Prek Thnot River, which flows around Phnom Penh, is one of the major paddy cultivation areas in Cambodia. However, agriculture in this basin, as well as in other areas, necessarily depends on erratic rainfall due to the limited water resources and incomplete irrigation system. This results in low and unstable crop production, with some farmers in the basin not even able to cover their own consumption of rice. During the rainy season, the basin also suffers from floods due to the overtopping of Prek Thnot River almost every year. To seek for a way to improve such situation, the master plan Study was carried out for the Target Area (approximately 105,200 ha) of the basin from July 28, 2005 to February 28, 2006.

Based on the survey and study results, the “*Improvement of Agricultural Productivity Centering on Rice*” was selected as the strategic target of the master plan. To achieve this target, the “*Program Approach*” was elaborated in a concept of “*Well-harmonized Development of Irrigation and Drainage, Agriculture and Institutions*”. As shown below, the proposed projects/studies in the master plan consist of 13 approach considering scheme-wise improvement and 14 approach considering subject-wise improvement, :

Proposed Projects/Studies in the Master Plan

Scheme-wise Improvement		
Zone Based Projects (Zone-1),		
1	A.1(1)	Irrigated Agriculture Improvement Model Project
2	A.1(2)	Upper North Main Canal Irrigated Agriculture Improvement Project
3	A.1(3)	Upper South Main Canal Irrigated Agriculture Improvement Project
Zone Based Projects (Zone-2)		
4	A.2(1)	Lower North Main Canal Irrigated Agriculture Improvement Project
5	A.2(2)	Lower South Main Canal Irrigated Agriculture Improvement Project
6	A.2(3)	Ou Krang Ambel Irrigated Agriculture Improvement Project
Zone Based Project (Zone-3)		
7	A.3(1)	Water Harvesting Irrigated Agriculture Improvement Project
Zone Based Project (Zone-4)		
8	A.4(1)	Rainfed Agriculture Improvement Project
Zone Crosscutting Projects		
9	B.1(1)	Roleang Chrey Regulator Gates Urgent Improvement Project
10	B.1(2)	Roleang Chrey Regulator and Intakes Improvement Project
11	B.2(1)	Veterinary Services Strengthening and Livestock Raising Improvement Project
12	B.3(1)	Community Inland Fisheries Development Project
13	B.4(1)	Income Generation Projects for Marginal Farmers
Subject-wise Improvement		
14	C.1(1)	Coordination between MOWRAM and MAFF Strengthening Project
15	C.1(2)	Provincial Departments Strengthening Project
16	C.2(1)	Livestock Sub-sector Development Study
17	C.3(1)	Technical Guidelines Preparation Project
18	C.4(1)	Environmental Management Basic Capacity Development Project
19	C.4(2)	Environmental Management Applied Capacity Development Project
20	C.5(1)	Irrigated Agriculture On-Farm Technology Improvement Pilot Project
21	C.6(1)	Irrigation Facility Maintenance Capacity Strengthening Pilot Project
22	C.7(1)	Rainfed Agriculture Improvement Pilot Project
23	C.8(1)	Community Inland Fisheries Development Pilot Project
24	C.9(1)	River Basin Effective Water Use Awareness Raising Project
25	C.10(1)	Institutional and agricultural Support Services Strengthening Project
26	C.11(1)	Hydrological Observation Strengthening Project
27	C.11(2)	Flood Forecasting and Warning Study

It is recognized that the implementation of the master plan study would contribute to self-sufficiency in rice production in the Target Area, and also increase the farm income to about 1.5 to 2 times of the present earnings. Thus, immediate implementation of the master plan was keenly recommended.

A-2.2 Pilot Projects Proposed in Master Plan Study

A-2.2.1 Proposed Pilot Projects in Master Plan

As presented in the above table, in the subject-wise improvement portion, the master plan study proposed the following four pilot projects:

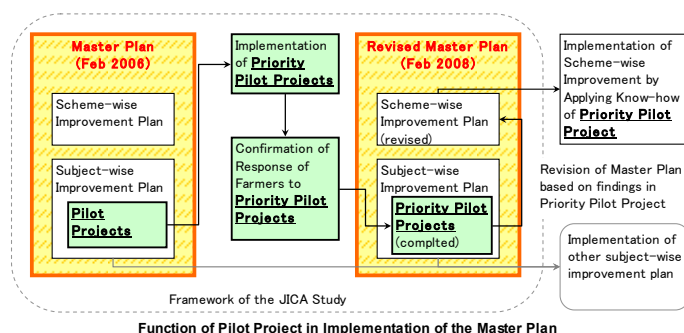
Proposed Pilot Projects

No.	Pilot Projects	Major Issues	Stakeholders
1	Irrigated Agriculture On-farm Technology Improvement Pilot Project	Improve irrigated agriculture technology such as farming practice and water management.	FWUCs Farmers Government officials
2	Irrigated Facility Maintenance Capacity Strengthening Pilot Project	Increase capacity in irrigation facility maintenance.	FWUCs Government officials
3	Rainfed Agriculture Improvement Pilot Project	Improve farming practices in rainfed agricultural areas	Farmers Government officials
4	Community Inland Fisheries Development Pilot Project	Improve inland fisheries cultivation technology in small ponds.	Farmers Government officials

A-2.2.2 Purpose and Role of Pilot Projects in Implementation of Master Plan

The purpose of pilot projects is to establish models of improvement, by confirming the response of farmers to the proposed improvement activities in the master plan. This will lead to verification of appropriateness of the master plan, and further contribute to its enhancement. The master plan was as much as possible formulated, based on the results of survey and study on the current situation in the participatory manner. However, although this may not completely reflect the farmers' intentions, it is necessary to understand the farmers' responses to the Mater Plan. In other words, to obtain a more fruitful outcome of the scheme-wise improvement projects, it was vital to confirm the farmers' responses in the field, prior to providing recommendations. For this purpose, the pilot projects are duly required for implementation.

The figure below shows the role of pilot projects in the implementation of the master plan. The practicality of the master plan has been improved based on the results of the pilot projects. After improvement of the master plan, the effects of the pilot projects will be initiated throughout the entire target area defined in the master plan, through implementation of scheme-wise improvement projects.



A-2.2.3 Prioritization of Proposed Pilot Projects

Although it is most preferred to implement all four pilot projects concurrently, financial constraints remains an issue. It is therefore essential to implement the pilot projects according to priority ratings.

Criteria for the prioritization of the pilot projects were defined as follows:

- Impact to strategic target of master plan (if results of the pilot project highly impact the achievement of strategic target of master plan, priority rating is "high".)
- Urgency (if results of the pilot project are urgently required for smooth

In addition, the following counterpart personnel were assigned to the pilot projects from Kampong Speu PDOWRAM and PDA:

Counterpart Personnel of PDOWRAM, PDA and Prey Pdao Station

PDOWRAM	PDA	Prey Pdao Station
(1) Mr.Nham Cheaphorng	(1) Mr.Soy Panha	(1) Mr.Bin Sopal
(2) Mr.Nop Prin	(2) Mr.Chou Sarem	(2) Mr.Ngoun Soy
(3) Mr.Chea Sochan	(3) Mr.Bin Rong	
(4) Mr.Choun Bunthoeun	(4) Ms.Chea Dany	
(5) Mr.Krouch Nouch	(5) Mr.Choek Sim	
	(6) Mr.Tieng Hylyna	
	(7) Mr.Sath Sim	
	(8) Mr.Svay Sarun	
	(9) Mr.Pin Tith	

Technology transfer for the above personnel has been carried out mainly through “On-the-Job training”, and explanation of the corresponding parts of report.

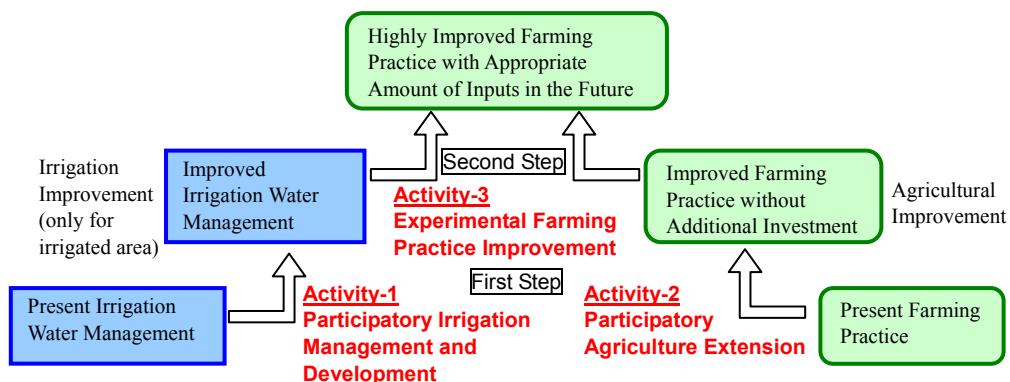
Chapter A-3 Outline of Pilot Projects

A-3.1 Proposed Two-step Improvement Process with Three Types of Activities for Achieving Master Plan Target

The improvement process for achieving the target was elaborated as follows:

To attain high agricultural productivity planned in the master plan, farming practices require sufficient requisites, such as fertilizers, irrigation water, labor etc.. However, due to poor financial condition and capacity of management of most farmers, accessing such requisites appears to be a problem. Under such situation, it is difficult to implement highly improved farming practices immediately. This means that it is necessary to demonstrate to farmers not only the future goals of the master plan, but also the proper methods to achieve them.

A two-step improvement process with three types of activities was then proposed (refer to figure below). For the first step, irrigation water management in an irrigated area will be improved through Participatory Irrigation Management and Development Activities. Concurrently, without additional investment from the farmers, farming practice will be improved, through Participatory Agriculture Extension Activities. With these two types of activities, farmers will be able to obtain higher agricultural production and improve their financial condition. As a second step, considering their increased income, farmers will purchase sufficient amount of agricultural requirements which will consequently improve their farming practices. To understand the effects of such highly improved farming practices on site, Experimental Farming Practice Improvement Activities is proposed.



Proposed Two-step Improvement Process with Three Types of Activities

A-3.2 Titles and Types of Activities of Pilot Projects

As mentioned in Sub-clause A-2.2.3, the two selected top priority pilot projects are as follows.

- 1) Irrigated Agriculture On-farm Technology Improvement Pilot Project
- 2) Rainfed Agriculture Improvement Pilot Project

A-3.2.1 Irrigated Agriculture On-farm Technology Improvement Pilot Project

The pilot project aims to establish a good model of the above mentioned two-step improvement process, with the following three types of activities in an irrigated area:

- | | |
|-------------|---|
| Activity-1: | Participatory Irrigation Management and Development |
| Activity-2: | Participatory Agricultural Extension |
| Activity-3: | Experimental Farming Practice Improvement |

The pilot project should be conducted in irrigated areas. According to the master plan zoning system, irrigated areas were classified into three Zones: Zone-1 (irrigated area

receiving water from the Prek Thnot River with sufficient water availability), Zone-2 (irrigated area receiving water from the Prek Thnot River with insufficient water availability), and Zone-3 (irrigated area with a water harvesting irrigation system).

It was determined to implement the small scale pilot project in each zone in principle, to establish suitable models for each zone. However, it was found that major irrigation facilities have not been provided in Zone-2. Since the purpose of the Participatory Irrigation Management and Development activities in the pilot project is to achieve proper water management by farmers (and not to develop major irrigation facilities), it was decided that implementation of the pilot project in Zone-2 should be conducted in the future, after the provision of major facilities.

The three types of project activities to be conducted in the project are outlined as follows.

A-3.2.1.1 Participatory Irrigation Management and Development Activities

The necessity of applying the Participatory Irrigation Management and Development concept in irrigation water management in Cambodia is clearly mentioned in the “Training Manual for Participatory Irrigation Management and Development in Cambodia” published by MOWRAM in 2003. Participatory Irrigation Management (PIM) is a common concept in the world. However MOWRAM added “Development” in the PIM feature, since improvement of new irrigation systems or facilities remains essential in Cambodia. In the training manual, the reason for introducing the Participatory Irrigation Management and Development is explained as follows.

“Participatory irrigation management and development is a practical way to encourage farmers to take over responsibility for managing their own irrigation systems and to better make use of limited government and donor resources. The logic is that farmers will invest more in irrigation management and development if they are in control of decision-making about the irrigation service and are able to increase agricultural productivity through making water delivery more responsive to their needs.”

The following four essential principles of the Participatory Irrigation Management and Development are also specified in the training manual.

- Empowerment of FWUC
- FWUC defines the water service and selects its service provider
- Partnership and mutual accountability
- Demand-driven support system based on cost sharing

It was decided that improvement of irrigation water management in the pilot project would be conducted based on these Participatory Irrigation Management and Development principles, so that lessons learned in the pilot project could be applied to other areas of Cambodia.

A-3.2.1.2 Participatory Agricultural Extension Activities

As described above, it is necessary for farmers in the pilot project areas to increase their agricultural productivity as the first step of improvement, without additional agricultural inputs. One of the ideas to improve their productivity without additional inputs is through application of low input SRI (System of Rice Intensification), which is common in Cambodia. Low input SRI is a type of SRI which aims to increase yield while reducing the amount of chemicals as agricultural inputs. Low input SRI is commonly promoted by a Cambodian NGO. This has already been applied widely in some areas but not in the pilot project areas.

The targets of the activities are to disseminate innovations in agricultural practice and to establish effective means of agricultural extension. This means that information regarding innovations, such as low input SRI, need to be disseminated to farmers for use in a sustainable and replicable way. These innovations need to be carried out with minimum

cost; otherwise no organization can continue implementing the activities after the pilot project. A participatory agricultural extension concept was then proposed. Under the concept, information regarding the innovations is disseminated from farmer to farmer, through the assistance of the project.

A-3.2.1.3 Experimental Farming Practice Improvement Activities

It is also important for farmers to have future expectations. These will enhance their willingness or motivation to engage in the necessary activities. Future expectation of farmers could be defined as their benefits to the target yield proposed in the master plan.

Experimental farming practice improvement intends to demonstrate that the master plan target yield could really be obtained if farmers follow the proposed farming practices in the master plan (called improved farming practice based on SRI). However, it might be difficult for farmers to apply the improved SRI immediately, since they do not have enough funds to buy the proper amount of agricultural requirements such as fertilizers, seeds, and labor. In the experimental farming practice improvement activities, part of the project will be to supply to the farmers with these agricultural requirements provided that they will follow the improved farming practices directed by the project. Sufficient agricultural requirements are expected to be obtained by the farmers in the future, after their financial status has improved through the participatory agriculture extension activities.

A-3.2.2 Rainfed Agriculture Improvement Pilot Project

The pilot project aims to establish a good model of the above mentioned two-step improvement process, with two types of activities in a rainfed area, classified as Zone-4 in the master plan. The two types of activities are i) Participatory Agriculture Extension, and ii) Experimental Farming Practice Improvement. Since there is no irrigation system in a rainfed area, Participatory Irrigation Management and Development activities were not included in the project.

The outlines of the two types of project activities are similar to the above mentioned “Irrigated Agriculture On-farm Technology Improvement Pilot Project”.

Chapter A-4 Basic Strategies for Implementation

A-4.1 Important Issues to be considered in Basic Strategies

It should be noted that the target of the pilot projects, which is to establish a model of improvement, needs to be achieved in a sustainable and replicable way. In the post-pilot stage, technologies introduced by the pilot project should be used continuously by the farmers (sustainability aspect) and the effects of the pilot projects should be reflected in the outer areas by the farmers (replicability aspect). Basic strategies for pilot project implementation were carefully designed to ensure its sustainability and replicability.

A-4.2 Basic Strategies

Strategy-1

Learning from Farmers' Good Practices in Cambodia

There are several farmers' good practices for successful agricultural development in Cambodia. The projects are maintained with high sustainability since they were designed with full consideration of local customs to motivate farmers for self-reliant project operation. It is necessary to incorporate such good practice projects and reflect local customs in the pilot projects as much as possible to enhance sustainability.

Strategy-2

Project Operation by United Farmer – Government – NGO Project Team

To enhance sustainability, the pilot projects were planned to be carried out by involving all the stakeholders, such as farmers, government officials (the central government and provincial government), and NGOs. The pilot projects will have need to be implemented through gathering of ideas from all the stakeholders, in order to obtain good results.

Strategy-3

Government Agencies Collaborating in Related Activities to Irrigated Agriculture

For project activities related to irrigation, collaboration of government agencies concerned such as MOWRAM with MAFF at the central government level and PDOWRAM with PDA at the provincial level, is essential. It is expected that the relationships between these government agencies will be improved through the pilot project activities.

Strategy-4

Minimum Material and Equipment Inputs from the Farmers

The introduced technology could not be used continuously and implemented in other areas if inputs from the farmers are considerable. Thus, the pilot projects need to be designed based on concept of "minimal farmers' inputs", to achieve sustainability of the pilot projects and allow effective dissemination of technology at the post-pilot stage.

Strategy-5

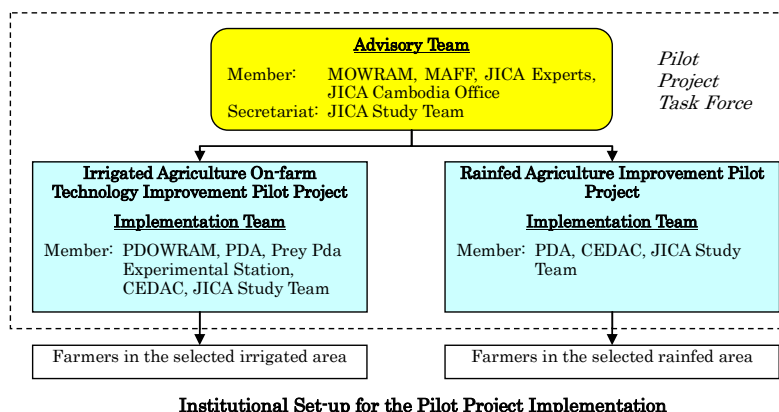
Introduction of Farmer-to-Farmer Extension

To establish a replicable dissemination process for reflecting the effects of pilot projects, external inputs for dissemination activities in the pilot projects should be minimized. This is achieved by proposing a farmer-to-farmer extension concept.

Chapter A-5 Institutional Set-up

A-5.1 Formation of a Pilot Project Task Force

To implement the pilot projects, a “Pilot Project Task Force” was formed consisting of two teams. One is the Advisory Team while the other is the Implementation Team. The Implementation Team is in charge of project implementation and operation, while the Advisory Team renders guidance to the Implementation Team. The advisory team consisted of staff from JICA Cambodia Office, MOWRAM and MAFF, and JICA experts. The implementation team meanwhile comprised staff from PDOWRAM, PDA, CEDAC (NGO), Prey PDA experimental station, and the JICA study team. This formation is based on the “Strategy-2: Project operation by Farmer – Government – NGO united project team”.



The following tables show the members nominated for the advisory team and implementation team.

Members of the Pilot Project Advisory Team as of January 2008

No.	Name	Position
JICA Cambodia Office		
1	Ms. Tomoko Tanaka	Assistant Resident Representative
JICA Experts		
1	Mr. Nobuhiro Moriyama	JICA Expert for MOWRAM
2	Mr. Yasunori Araki	JICA Expert for MAFF
MOWRAM		
1	Mr. Pich Veasna	Deputy Director General (Chief Counterpart)
2	Mr. Chear Bunrith	Director of Planning and International Cooperation Department
3	Mr. Khieu Visith	Vice Chief of Water Supply and Sanitation Office
MAFF		
1	Dr. Hean Vanhan	Deputy Director of Department of Agronomy and Agricultural Land Improvement
2	Mr. Um Phirum	Vice Chief of Growing Area Office
3	Mr. Khean Sovannara	Vice Chief of Farming System and Economics Office
4	Dr. Som Lon	Crop Zonification Office

Members of the Pilot Project Implementation Team as of January 2008

No.	Name	Position
JICA Study Team		
1	Mr. Hitoshi Shimazaki	Team Leader / Agriculture Development Plan
2	Mr. Takashi Shiraki	Farming Practice/Cultivation
3	Mr. Makoto Yokota	Irrigation & Drainage / Water Management (2)
4	Ms. Akemi Ishikawa	Socio-economy
5	Mr. Sok Vanntahan	Agriculture (Assistant)
6	Mr. Sin Khanndarith	Irrigation (Assistant)
7	Ms. Samphors Huy	Rural Society (Assistant)
8	Ms. Ches Sophy	Interpreter
PDOWRAM Kampong Speu Province		
1	Mr. Nhan Cheaphorng	Irrigation
2	Mr. Nop Prin	FWUC
3	Mr. Chea Sochan	Irrigation
4	Mr. Choun Bunthoeun	FWUC
5	Mr. Krouch Nouch	FWUC
PDA Kampong Speu Province and Prey Pda Experimental Station		

1	Mr. Soy Panha	Deputy Director of PDA Kampong Speu
2	Mr. Chou Sarem	PDA Kampong Speu (Extension)
3	Mr. Bin Rong	PDA Kampong Speu (Extension)
4	Ms. Chea Dany	PDA Kampong Speu (Agriculture)
5	Mr. Choek Sim	PDA Kampong Speu (Agriculture)
6	Mr. Tieng Hylyna	PDA Kampong Speu (Agriculture)
7	Mr. Sath Sim	PDA Kampong Speu (Agriculture)
8	Mr. Svay Sarun	PDA Kampong Speu (Agriculture)
9	Mr. Pin Tith	PDA Kampong Speu (Agriculture)
10	Mr. Bin Sophal	Prey Pda Experimental Station (Agriculture)
11	Mr. Ngoun Soy	Prey Pda Experimental Station (Agriculture)
CEDAC (NGO)		
1	Mr. Pel Chivita	Project Director (Agriculture)
2	Mr. Y Kadum	Project Officer (FWUC)
3	Ms. Chheng Nakry	Farmer Community Facilitator
4	Mr. Tan Ponleu	Field Trainer

A-5.2 Explanation of Related Organizations to Pilot Projects

A-5.2.1 Kampong Speu PDOWRAM

PDOWRAM was established to specialize in water resources management. The office building of Kampong Speu PDOWRAM is located along National Road No.4. As of June 2006, it has 37 staff (28 persons in the Provincial Office and 9 persons in District Offices). Out of the 28 staff, seven have graduated from the Institute of Technology of Cambodia and three from the Royal University of Agriculture. Kampong Speu PDOWRAM consists of 5 offices which include the Irrigated Agriculture, Water Resource Management and Conservation, Water Supply and Sanitation, and Meteorology and Hydrology, and the Administration. MOWRAM assigns the officers of PDOWRAM. Most of the officers have been working for PDOWRAM since 1999, after PDAFF was divided into 2 organizations (PDOWRAM and PDA).

A-5.2.2 Kampong Speu PDA

PDA was established to specialize in agriculture including fishery and animal husbandry. As of June 2006, it has 272 staff. The office is located near the Kampong Speu Provincial Center. It has eight offices - Agronomy, Agricultural Extension, Agricultural Machinery, Agro-industry, Animal Health and Production, Fishery, Planning and Finance, and Human Resources and Administration. Each office has its own building. Additionally, Kampong Speu PDA dispatches technical and administrative staff to all eight of the Districts' Offices. MAFF recruits the staff based on requests from PDA. Some PDA officers hold Bachelor's or Master's degrees from the Royal University of Agriculture or other universities.

A-5.2.3 CEDAC (NGO)

CEDAC (Centre d' Etude et de Development Agricole Cambodigien) is a non-profit research and development NGO specializing in the field of low input agriculture and rural development. CEDAC was established in August 1997 by a group of seven Cambodians with initial support from the French NGO, GRET, and registered as a Cambodian NGO with the Ministry of Interior in April 1998. CEDAC's mission is to work for the development of ecologically based family agriculture, and to promote a cooperative and mutual assistance movement in the rural areas of Cambodia.

Up to January 2006, CEDAC has been active in 1,300 villages in 14 provinces throughout Cambodia. Around 50,000 farmers have participated in or benefited from their agriculture and rural development programs. As of June 2006, CEDAC had 40 partners/financial sources. These include bilateral assistance agencies (JICA, USAID, GTZ, DANIDA), international NGO (Oxfam), Japanese NGO (JVC: Japan Volunteer Center) and individual private donors.

A total of 140 Cambodian staff work for CEDAC in 6 units of the center in Phnom Penh

and in 5 provincial branches.

Chapter A-6 Feedback Seminar

The seminar intended to discuss activities under the pilot projects was held on 15 February, 2008 in Kampong Speu Province. Participants consisted of three MOWRAM officer, three PDOWRAM officer, seven PDA officer, two CEDAC staff and 20 farmers. After explanation of background of the study, representatives of PDOWRAM, PDA and CEDAC discussed activities of the pilot projects, and answered questions from the other participants. Their questions were mainly, but not limited to, the following i) Why did not some farmers pay irrigation service fee? ii) How did they deal with water conflict? iii) Did some of FWUC members take water from irrigation canal? iv) How did they avoid damages of young rice plant caused by crabs?. Participants also discussed the following issues which were raised during the event; i) problems which they have encountered, ii) lessons learned and iii) prospective subject. The prospective subject is the most relevant for the farmers in order to continue their activities with their own initiative after the pilot projects. According to the results of the discussions, it was considered that most farmers understood what they should conduct in order to continue their activities. The results of the discussion were also reflected in the master plan.



Explanation of feedback seminar



Group discussion