

Appendix 4 Project Sheets

Approach Title	01: Institutional Development for Effective Agricultural Development Planning and Implementation		
Project Title	01-01: Establishment of an “Agriculture Development Committee (ADC)”		
Project Period	Three years		
Related Ongoing Programme			
Project Area / Target Group	Project Site	Aizawl	
	Applicable Zone		
	Target Group	Higher level officers (directors or joint-directors) of Agriculture Allied Department and others	
Implementing Organisation	Chief Secretariat	Related Organisation	Agriculture Allied Department, MID, RDD, ATMA, TCD, ID, Private Sector
Background / Activities			
<p>Background</p> <p>The Department of Agriculture (DOA) raises the vision and mission for agriculture development in Mizoram and prepared KVK Vision 2020. It seems that the KVK Vision 2020 is at least in accordance with national-level visions (Vision 2020 by Ministry of Agriculture, NE Region Vision 2020, etc.). However, the DOA was not prepared with the involvement of other agriculture-related departments in fully reflecting the reality and the features of agriculture in Mizoram. Although there are such organisations that are participating with concerned departments in other states in India where their agriculture vision and policies are discussed and agriculture –related activities are coordinated, Mizoram does not have such an organisation. Thus, it is necessary to establish such an organisation with the participation of higher-level officers of concerned departments (Minor Irrigation, Agriculture, Horticulture, Fisheries, Rural Development, Animal Husbandry and Veterinary, Sericulture, etc.) as well as to make this organisation functional in order to prepare an appropriate vision, policy and plan for agriculture development in Mizoram. Moreover, to put the vision and the policy into action, it is essential to involve farmers’ organisations and private sectors in all of the development processes. Therefore, it is required to encourage these organisations’ active participation in the committee. The aims of the committee are not only to formulate the vision/policy for agriculture development in Mizoram but also to coordinate the programmes and projects for more effective and efficient implementation.</p> <p>Activities</p> <p>(1) Organise a preparatory committee</p> <p>As the initial step to establish an “agriculture development committee (ADC)”, a preparatory committee consisting of representatives from the concerned departments and an external expert (agriculture policy advisor) shall be organised.</p> <p>(2) Conduct preparatory work for establishment of an “agriculture development committee”</p> <p>(a) Study cases (good practices) of other states</p> <p>The preparatory committee shall review other states’ cases where agriculture policy and vision were prepared with sufficient involvement of agriculture-related departments in reflecting their agriculture reality. Members of the committee shall visit other states to observe good practice of policy/vision preparation and to exchange opinions with concerned parties in those states.</p> <p>(b) Examine institutional arrangements for the ADC</p> <p>The preparatory committee shall examine the institutional arrangements for the ADC (organisational setups, members, mandate, authorities, functions, procedure/schedule of preparing agriculture policy/vision, etc.).</p> <p>(c) Implement necessary procedures.</p> <p>Based on results of the above examination, the preparatory committee shall undertake necessary procedures such as preparing by-laws and registrations.</p> <p>(3) Organise an “agriculture development committee”</p> <p>An agriculture development committee shall be organised with the approval of the state government.</p> <p>(4) Support for operation of the “agriculture development committee”</p> <p>An external expert shall monitor the actual operation of the ADC and the progress of preparing agriculture policy/vision and coordinating programmes/projects, and propose needful actions in accordance with necessity.</p> <p>(a) Analyse the lines of command in each state department and make clear the scope of responsibilities of each department;</p> <p>(b) Advise on the policy and vision for agriculture development prepared by the committee;</p> <p>(c) Analyse the coherency between the vision/policy and the programmes/projects;</p> <p>(d) Advise on the coordination and effective implementation of the programmes/projects;</p> <p>(e) Enhance capacity of each state department in coordinating the programmes/projects;</p> <p>(f) Make clear the roles of the state government, farmers’ organisations and private sectors; and</p> <p>(g) Enhance collaboration among all stakeholders of agriculture development.</p>			

Overall Goal	To establish an institutional setup for effective agriculture development.																				
Project Purpose	To effectively and efficiently establish and operate an “agriculture development committee (ADC)”.																				
Outputs/Outcomes	<p>A preparatory committee is organised. An ADC) is established. Policy, vision, and plan for agriculture development in the state are prepared by ADC. Programmes and projects relating to agriculture development are coordinated by ADC.</p>																				
Activities		Year																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Activity 1: Organise a preparatory committee																					
Activity 1-1: Select a chair and members of the committee		■																			
Activity 1-2: Prepare an operation plan		■																			
Activity 2: Conduct preparatory work for establishment of ADC																					
Activity 2-1: Study good practices of other states		■																			
Activity 2-2: Examine institutional arrangements for ADC		■																			
Activity 2-3: Implement necessary procedure		■	■																		
Activity 3: Organise an ADC																					
Activity 3-1: Appoint committee members			■																		
Activity 3-2: Select a chair and executives by members			■																		
Activity 3-3: Establish guidelines for operation			■																		
Activity 3-4: Be approved by the state government			■																		
Activity 4: Support for operation of ADC																					
Activity 4-1: Analyse lines and responsibility of each Dept.			■	■																	
Activity 4-2: Advise on the policy and vision			■	■																	
Activity 4-3: Analyse the coherency			■	■																	
Activity 4-4: Advise on the coordination			■	■																	
Activity 4-5: Enhance capacity of each Dept.			■	■																	
Activity 4-6: Make clear the roles of stakeholders			■	■																	
Activity 4-7: Enhance collaboration among stakeholders			■	■																	
Input																					
Human Resources, Materials, Etc.												Budget									
<ul style="list-style-type: none"> • Expert (agriculture policy) • Assistants • Officers from concerned departments 												<ul style="list-style-type: none"> • Office • Study tour <p style="text-align: center;">Rs.1.3 crore</p>									
Remarks																					
<ul style="list-style-type: none"> • Since departments related to agriculture development tend to implement public services within their own command lines, one of the major functions of the proposed ADC is to adjust the compartmentalised state administration from a broad perspective. 																					

Approach Title	01: Institutional Development for Effective Agricultural Development Planning and Implementation		
Project Title	01-02: Establishment of State-wide System for Collecting and Managing Agriculture-related Data and Information		
Project Period	Five years		
Related Ongoing Programme			
Project Area / Target Group	Project Site	Aizawl	
	Applicable Zone		
	Target Group	Officers in Agriculture Allied Departments	
Implementing Organisation	Directorate of Economics and Statistics (DES)	Related Organisation	Agriculture Allied Departments, KVK, TCD
Background / Activities			
<p>Background</p> <p>For preparing agriculture policy and vision as well as planning the project, data and information to grasp present agriculture situations in Mizoram is required. Agriculture-related data and information, such as production of crop/livestock/fish and price in the market, is collected and aggregated. The data/information is included in such publications as “Agriculture Statistical Abstract” and “Statistical Handbook Mizoram”. However, it is hard to say if the data/information is appropriately and timely compiled at the head offices and utilised as reference for preparing policy and development schemes. It is sometimes found that some methods of data/information collection and aggregation are not reasonable and the final figures are not reliable.</p> <p>Thus, it is required to establish a system where the data/information on current agriculture status in Mizoram is appropriately collected and compiled and then utilised for preparing agriculture policy and planning development schemes.</p> <p>Activities</p> <p>The project team consisting of experts, technical staff, and assistants will be placed under DES. The task force team, with representatives from other departments and project team, will be organised, where issues and improvement measures will be discussed and progress of the project will be shared.</p> <p>(1) Survey current situation on collection and compilation of agriculture-related data and information</p> <p>Regarding agriculture-related data and information that is collected and compiled by each department, the current situation with regard to i) the kinds of data/information, ii) methods and frequencies of collection, iii) methods of aggregation/compilation, and iv) utilisation of compiled data/information, will be surveyed. Survey results will be analysed and issues will be identified.</p> <p>(2) Introduce improved data/information collection and compilation system</p> <p>The good systems will be collected and the gap between the issues identified and the systems will be analysed. Based on the result of analysis, the improved data/information collection and compilation system will be established (e.g., improved methods of data collection and analysis, utilisation of improved data collection forms, improved compilation methods/procedures, digitisation, and networking). This improved system will be introduced to the concerned departments through trainings on new methods of data collection and compilation for officers in charge. Monitoring and evaluation to the trainees will be implemented.</p> <p>(3) Monitor newly introduced collection and compilation system</p> <p>A monitoring unit will be set up under DES, and the monitoring methods will be developed. Utilisation situation of the newly introduced system will be regularly monitored and improvement measures will be applied.</p> <p>(4) Promote utilisation of compiled data and information for policy and plan formulation and monitoring</p> <p>The new mechanism will be examined so that compiled data and information will be effectively utilised for preparing agriculture policy, plan formation, and monitoring. This new mechanism will be added to the system. Data and information will also be disclosed adequately.</p>			
Table: Major Issues on Collecting and Managing Agriculture-Related Data and Information			
	Item	Major Issues	
	Sampling method	Gap with statistical theory	
	Data collection	Shortage of human and fund resources/less-skilled officers/difference of jurisdictional area among related departments	
	Aggregate calculation	Undeveloped data processing and networking infrastructure/lack of coordination and information sharing among related departments	
<i>Source: JICA Study Team</i>			

Overall Goal	To establish institutional setups for effective agriculture development.																			
Project Purpose	To establish state-wide system for collecting and managing agriculture-related data and information.																			
Outputs/Outcomes	Issues regarding data/information collection and compilation are identified. New system for data/information collection and compilation is introduced to the concerned departments. New mechanism for effectively utilising data for agriculture policy and plan formulation and monitoring is added to the system.																			
Activities	Year																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Activity 1: Survey current situation																				
Activity 1-1: Organise a task force team	■	■																		
Activity 1-2: Prepare a survey plan and items	■	■																		
Activity 1-3: Implement a survey	■	■																		
Activity 1-4: Analyse survey results	■	■																		
Activity 1-5: Identify issues	■	■																		
Activity 2: Introduce improved system																				
Activity 2-1: Collect and study good systems	■	■																		
Activity 2-2: Analyse the gap between issues & good systems	■	■																		
Activity 2-3: Establish improved system		■	■	■																
Activity 2-4: Prepare a training plan			■	■	■															
Activity 2-5: Compile training materials			■	■	■															
Activity 2-6: Conduct training courses			■	■	■	■														
Activity 2-7: M&E activities conducted by trainees			■	■	■	■	■													
Activity 3: Monitor newly introduced system																				
Activity 3-1: Organise monitoring unit				■	■															
Activity 3-2: Develop monitor method				■	■															
Activity 3-3: Implement monitoring of the system				■	■	■														
Activity 3-4: Improve the system				■	■	■														
Activity 4: Promote utilisation of data for policy/plan formulation																				
Activity 4-1: Provide timely data/info to the state govt.				■	■															
Activity 4-2: Disclose data/info				■	■															
Input																				
Human Resources, Materials, Etc.	<ul style="list-style-type: none"> • Expert (statistics and data management) • Expert (system development) • Technical staff • Assistants • Task force members from the state departments • Computers • Trainings 										Budget									
											Rs. 7.6 crore									
Remarks	<ul style="list-style-type: none"> • Since data and information on agriculture is also essential to develop the agricultural value chain and needed by all the stakeholders of the chain including input supplier, producer, processor, trader, wholesaler, retailer and private investor, it is required to disclose data and information adequately. • Accurate data and information also contributes to the precise monitoring and evaluation of the impact of policies, programmes, and projects. 																			

Approach Title	01: Institutional Development for Effective Agricultural Development Planning and Implementation		
Project Title	01-03: Capacity Strengthening of Government Officers for Planning and Good Agriculture Extension		
Project Period	Four years		
Related Ongoing Programme			
Project Area / Target Group	Project Site	Entire Mizoram	
	Applicable Zone		
	Target Group	Officers of Agriculture Allied Department and MID	
Implementing Organisation	DOA, KVK, DOH, MID, DOF	Related Organisation	SWCD, AHVD, DOS, RDD, ATMA
Background / Activities			
Background			
<p>In case of some agriculture-related CSSs such as NLUP, committees were organised in the state, district, and village levels where concerned government departments have participated. However, lack of collaboration among these departments, such as agriculture-allied departments including MID, has impeded their respective inputs to generate synergetic effects at the village and individual farmer levels. Furthermore, due to insufficient number and capacity (knowledge and skills) of staff, these departments have not appropriately followed up and monitored farmers' activities.</p> <p>Thus, strengthening of capacity of officers of concerned departments, particularly in terms of planning, implementing, and monitoring the agriculture development schemes, is a crucial and urgent issue. Strengthening of capacity shall be facilitated through seminars and trainings on relevant particular issues as well as field practice through actual implementation of State Extension Programmes for Extension Reforms (ATMA) Scheme, which is one of the agriculture-related CSSs.</p> <p>The integrated training under the Project shall improve knowledge and skills of officers and advance efficiency on planning, management, implementation, monitoring, and evaluation in sequence for agriculture development in Mizoram, and it is anticipated that agriculture development projects and/or schemes could be implemented in accordance with the planning and could achieve better outcome. The expected subjects are: (i) project cycle management, (ii) participatory land use planning and resources management, (iii) regional agriculture and irrigation development planning, (iv) extension of wet rice cultivation technologies, (v) extension of horticulture cultivation technologies, (vi) agriculture marketing, (vii) strengthening of WUA and irrigation water management (viii) extension of fish culture technologies, and so on.</p>			
Activities			
(1) Strengthening of officers' project planning and management skills			
(a) Implementation of basic training based on project cycle management (PCM)			
Training will be implemented utilizing existing facilities and institutions such as SAMETI, KVK, and other institutions under the state or the central government. The project shall collaborate with ATMA State Nodal Cell.			
(b) Implementation of advanced training and seminar based on Participatory Development Approach			
An advanced training for project formulation, implementation, monitoring, and evaluation will be conducted. Practical training for participatory development approach and preparation of project design matrix (PDM) will be provided specially for district, divisional offices, and circle officers.			
(2) Preparation of guideline and manuals for agriculture extension and water management and improvement of officers' technical skills			
(a) Conduct of basic survey for grasping the issues and needs of officers involved in the extension activities on all fields of agriculture and irrigation development;			
(b) Preparation of training plan and materials based on the results of basic survey;			
(c) Conduct of trainings for officers on agriculture extension and water management;			
(d) Analysis of feedbacks from the officers during the implementation of Activity (3) mentioned below and regular activities, and			
(e) Formulation of guideline and manuals for technical extension works.			
(3) Formulation of Mizoram extension system in selected RD block			
The prepared guideline and manual necessary for the technical extension in agriculture development are tested in the selected RD block. After verifying the applicability and feasibility of the prepared manual, the manual will be finalised and Mizoram extension system for agriculture and irrigation technologies will be formulated. During the verification in the selected RD block, on-the-job training for related government extension officers are carried out.			
(a) Selection of the model RD Block for field testing (2 blocks);			
(b) Formulation of draft Mizoram extension system in block basis;			
(c) Conducting the field test to check the applicability and feasibility of the prepared extension guideline and manual and formulated block basis extension system;			
(d) Monitoring and evaluation of the activities and getting feedback; and			
(e) Finalisation of guideline and manuals and Block Basis Mizoram Extension System.			

Overall Goal	To establish institutional setups for effective agriculture development.																			
Project Purpose	Strengthening of capacity of government officers of concerned departments and formulation of Mizoram's consolidated agricultural extension and planning system for effective implementation of agriculture development.																			
Outputs / Outcomes	Project planning and management skills of government officers of concerned departments are enhanced. Technical expertise and extension skills of the officers are improved. Mizoram's agricultural extension system and planning system are formulated. Collaboration among concerned departments is promoted and strengthened.																			
	Year																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Activity 1: Strengthening of project planning and management skills																				
Activity 1-1: Implementation of basic training	■																			
Activity 1-2: Implementation of advanced training and seminar	■																			
Activity 2: Improvement of technical expertise and extension skills																				
Activity 2-1: Conduct of basic survey	■																			
Activity 2-2: Preparation of training plan and materials	■																			
Activity 2-3: Conduct of trainings to the officers	■																			
Activity 2-4: Analysis of feedbacks from the officers	■																			
Activity 2-5: Formulation of training Guideline and Manuals	■	■																		
Activity 3: Formulation of extension and planning systems																				
Activity 3-1: Selection of the model RD Block for field test (2 blocks)	■																			
Activity 3-2: Formulation of draft Mizoram Extension System in Block Basis	■	■																		
Activity 3-3: Conducting the field test to check the applicability		■	■	■																
Activity 3-4: Monitoring and evaluation		■	■	■																
Activity 3-5: Finalization of guideline and manuals and Block Basis Mizoram Extension System			■	■																
Input																				
Human Resources, Materials, Etc.											Budget									
<ul style="list-style-type: none"> • Expert (agriculture/project management) • Expert (capacity development, community development) • Technical staff • Assistants 											<ul style="list-style-type: none"> • Seminars and trainings • Planning workshops, etc. <p style="text-align: center;">Rs.15.4 crore</p>									
Remarks																				

Approach Title	01: Institutional Development for Effective Agricultural Development Planning and Implementation		
Project Title	01-04: Preparation of Regional Agriculture Development Plan		
Project Period	Six years		
Related Ongoing Programme	Rashtriya Krishi Vikas Yojana (RKVY), Soil Conservation for Enhancing Productivity of Degraded Lands in the Catchments of the River Valley Project and Flood Prone River (RVP and FPR), Integrated Watershed Management Programme (IWMP)		
Project Area / Target Group	Project Site	All villages in the state	
	Applicable Zone	All zones	
	Target Group	VC, CBO	
Implementing Organisation	DOA	Related Organisation	DOH, SWCD, MID, RDD, AHDV, DEF, DOF, DOS, ATMA, MIRSAC

Background / Activities

Background

In order to develop agriculture as a key sector in Mizoram, where sloping lands account for a large proportion, appropriate utilisation and management of the land and water resources constitutes one of the high priority issues. However, people in the community hardly recognise that the land is a valuable resource for them. They neither fully understand the potential of development of the land and water resources, nor know the effective methods for their utilisation and the appropriate methods for their management. Therefore, it is required to prepare appropriate plans for land use and resource management. Based on such plans, an agricultural action plan also need to be formulated in order to increase agricultural production and improve farmers' livelihoods. In addition, the land use, resource management, and agricultural action plans should be integrated based on the vision for future development, and it is required to prepare an integrated plan for each village, which is called "regional agriculture development plan" and to become the basis for agricultural development in Mizoram. The project targets 52 model villages (two villages in each rural development block) at first, and then the activities are extended to the other villages.

Activities

(1) Preparation of land use and resources management plan in the model village

This activity targets to change the mind-set of the community at the beginning to create a sense of ownership of resources in the village. In addition to it, people's own efforts to work on a land use plan for appropriate utilisation of local resources will further enhance the sense of ownership, which will lead to the development of local agriculture. Utilising the participatory land use and resources management planning manual prepared under Project 01-02, the following steps will be taken for planning. The necessary awareness of Mizoram land and revenue rules are given to the community.

- Step 1:** Formation of the working group and preparation of the work plan.
- Step 2:** Preparatory survey of the target village and formation of the village land use committee.
- Step 3:** Mapping of present land use.
- Step 4:** Planning of future land use.
- Step 5:** Review of traditional rules in the past.
- Step 6:** Preparation of draft village regulations.
- Step 7:** Consultation with local communities about the future land use plan and draft village regulations.
- Step 8:** Coordination with the relevant government offices for approval/endorsement.
- Step 9:** Ceremony to announce the village regulations and future land use plan to local communities in and around the village.
- Step 10:** Monthly monitoring of the enforcement and implementation of the village regulations and future land use plan.

(2) Preparation of agricultural action plan of the model villages

- (a) Compilation of guidance on the agricultural action plan.
- (b) Conduct of workshops to the officers concerned.
- (c) Conduct of verification trial on the guidance in the model villages selected in section (1)-(a).
- (d) Establishment of the plan preparation method.

(3) Promotion of regional agricultural development plan for the entire Mizoram

- (a) Compilation of guidelines for the integrated plan, which involve land use, resource management, and agricultural action plans.
- (b) Holding of seminar for awareness of the plan and training to the officers concerned.
- (c) Preparation of regional agricultural development plan based on the guidelines.
- (d) Review and revision of the plan every five years based on monitoring of plan implementation.

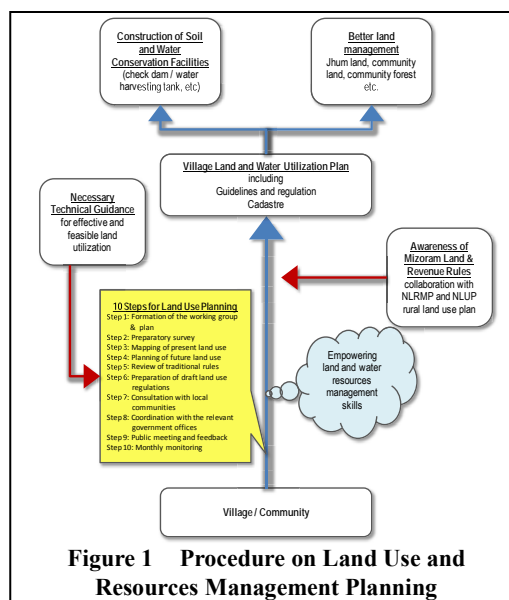


Figure 1 Procedure on Land Use and Resources Management Planning

Overall Goal	Agricultural production in Mizoram is increased. Farmers' livelihoods in Mizoram are improved.																			
Project Purpose	Regional agricultural development plans are prepared in all villages in the state.																			
Outputs / Outcomes	<ul style="list-style-type: none"> Land use plans are prepared in the model villages. Resource management plans are prepared in the model villages. Agricultural action plans are prepared in the model villages. Regional agricultural development plans are promoted in the entire Mizoram. 																			
Activities																				
	Year																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1 Preparation of land use and resources management plan																				
Activity 1-1 Basic survey & model village selection	■	■																		
Activity 1-2 Compilation of the manual on PLUP	■																			
Activity 1-3 Conduct of workshops to the officers	■																			
Activity 1-4 Conduct of verification trials	■	■																		
Activity 1-5 Establishment of plan preparation method	■	■																		
2 Preparation of agriculture action plan																				
Activity 2-1 Compilation of guidance (under project 01-02)	■																			
Activity 2-2 Conduct of workshops to the officers	■	■																		
Activity 2-3 Conduct of verification trial	■	■																		
Activity 2-4 Establishment of plan preparation method	■	■																		
3 Promotion of regional agri. development plan																				
Activity 3-1 Compilation of guideline (under project 01-02)		■																		
Activity 3-2 Holding of seminar		■	■																	
Activity 3-3 Preparation of regional agri. develop. Plan		■	■	■	■															
Activity 3-4 Review and revision of the plan				■	■	■														
Input																				
Human Resources, Materials, Etc.	Budget																			
Experts in the following relevant fields: <ul style="list-style-type: none"> Participatory natural resource management Farm planning and management Soil and water conservation Farming in sloping land 	Machinery and equipment: <ul style="list-style-type: none"> Vehicles Office Computers Machinery, tools, equipment, and materials for training, workshop, and plan preparation activities 	Rs.37.8 crore																		
Remarks																				
<ul style="list-style-type: none"> Rural land use plan prepared by the NLUP should be referred to for basic information. Various projects relating to the utilisation and management of land and water have been implemented, however, it is essential to create a unique manual on PLUP based on the natural conditions and socio-economic environment of Mizoram. For proper plan preparation, the officers concerned require a high level of participatory facilitation skills. Facilities for soil and water conservation shall be constructed by "Project 2-8: Construction of Soil and Water Conservation Facilities". SWC measures in WRC shall also be covered in "Project 2-7: Irrigation and Command Area Development for WRC Potential Area". 																				

Approach Title	01: Institutional Development for Effective Agricultural Development Planning and Implementation		
Project Title	01-05: Strengthening of Village Based Self-reliant Organisations (CBOs) for Taking on Key Roles for Agricultural Development		
Project Period	Five years		
Related Ongoing Programme			
Project Area / Target Group	Project Site	Entire Mizoram	
	Applicable Zone		
	Target Group	Local NGO, VC, CBO	
Implementing Organisation	RDD	Related Organisation	DOA, DOH, DOF, MID, AHVD, DOS, SD

Background / Activities

Background

Many CBOs (including SHGs) have been organised in villages under government development schemes while receiving guidance from the concerned departments. Although these CBOs have been functioning as recipients of government assistance, those who have continued economic activities based on government assistance are limited, and such organisations will not contribute to future development in a sustainable way. It is necessary to nurture and strengthen CBOs as self-reliant organisations with their own norms and sufficient organisational and financial capacity that could take on key roles for agricultural and rural development with their spontaneous action. Although many CBOs exist at present in villages in Mizoram, most of the CBOs should be reorganised to improve their management and organisation structure. CBOs could be organised newly or transformed from their existing organisation with the villagers' intent. Moreover, NGOs are important organisations to assist CBOs as partners at the village level. The project shall firstly identify potential NGOs to enhance their capacity, and the project team together with these NGOs shall undertake activities for nurturing and strengthening CBOs in Mizoram.

Activities

The Rural Development Department (RDD) shall be a major implementing organisation for the project.

(1) Strengthening of potential NGOs or other organisations

(a) Identifying potential NGOs that could strengthen CBOs.

It is desirable that an NGO, as shown in Figure 1, shall comprise groups and leaders in a village. Because there are many CBOs in the village, the NGO shall assign a facilitator in the village, who received relatively higher education.

(b) Capacity enhancement of NGOs for strengthening CBOs.

Selection of two to four NGOs depending on their capacity in consideration of project scale.

Preparation of CBO strengthening system shown in Figure 1. Facilitators keep close communication with ATMA cell and provide necessary supporting services to the village CBOs.

*The term "NGO" is used as partner organisations for strengthening CBOs in the Project Sheet for convenience's sake.

(2) Formation of village level federation among existing CBOs

With the help of trained NGOs, the federation of existing CBOs in the village is formulated. The regulation and rules of the federation will be discussed and decided with the participation and facilitation of NGOs.

(3) Preparation of framework, materials, and tools for strengthening the federation

(a) Preparation of organisational framework: action plan, guideline, model by-law, and setting up easy system for registration.

(b) Preparation of training plan and materials.

(c) Preparation of CBO management manual and record keeping book set.

(d) Preparation of monitoring and follow-up guidelines and manual.

(4) Implementation of the federation strengthening programme

The project team together with these NGOs shall undertake activities for nurturing and strengthening CBOs in collaboration with relevant departments related to the ATMA system in the block.

(a) Setting up a federation of CBOs in each target village and nominating persons for training.

* If a suitable key CBO exists in a village, it is not necessary to organise a federation.

(b) Holding workshops and providing technical guidance for making CBOs functional in each village.

- Providing CBO organising and strengthening guideline, manual books, and other necessary form;

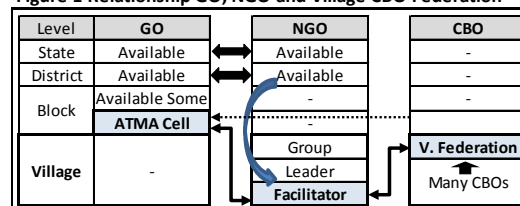
- Preparing basic and necessary regulations, accounting and recording system, and related books and lists;

- Providing institutional strengthening training along with leadership training who can be key persons in the areas; and

- Preparing community action plan, etc., with officers of relevant departments.

(c) Monitoring of CBOs' activities: operational status, performance, and networking.

Figure 1 Relationship GO, NGO and Village CBO Federation



Overall Goal	Institutional setups for effective agricultural development are established.																													
Project Purpose	Village based self-reliant organisations (CBOs) which should take key roles for agricultural development are strengthened.																													
Outputs / Outcomes	Capacity of NGOs that could strengthen CBOs is enhanced. Framework, materials, and tools for strengthening CBOs are prepared. Knowledge and skill level of CBO members are enhanced. CBOs have organisational and financial capacity. Federations of CBOs are established.																													
Activities	Year																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20										
Activity 1: Strengthening of potential NGOs																														
Activity 1-1: Identifying of potential NGOs	■	■																												
Activity 1-2: Capacity enhancement of NGOs	■	■																												
Activity 2: Formation of Village Level Federation of CBOs																														
Activity 2-1: Formation of Village Level Federation of CBOs	■	■	■	■																										
Activity 2-2: Preparation of Rules and Regulation	■	■	■	■																										
Activity 3: Preparation of framework, materials and tools																														
Activity 3-1: Preparation of organisational framework	■	■																												
Activity 3-2: Preparation of training plan and materials	■	■																												
Activity 3-3: Preparation of CBO management manual etc.	■	■																												
Activity 3-4: Preparation of monitoring & follow up guideline	■	■																												
Activity 4: Implementation of CBO strengthening programme																														
Activity 4-1: Setting up of a federation of CBOs	■	■	■	■	■																									
Activity 4-2: Holding of workshop & providing of guidance	■	■	■	■	■																									
- Providing organizing and strengthening guideline, etc.	■	■	■	■	■																									
- Preparing basic and necessary regulations, etc.	■	■	■	■	■																									
- Providing institutional strengthening training	■	■	■	■	■																									
- Preparing community action plan etc.	■	■	■	■	■																									
Activity 4-3: Monitoring of CBOs' activities	■	■	■	■	■																									
(Note) Activity 4: 2 districts/ year x 4 years																														
Input																														
Human Resources, Materials, Etc.	<ul style="list-style-type: none"> • Expert (project management) • Expert (community development) • Technical staff • Assistants • C/Ps from concerned departments • C/Ps from NGOs 										<ul style="list-style-type: none"> • Office • Study tour • Trainings, workshops, meeting • Preparation of guidelines • Technical guidance, extension activities 										Budget Rs.16.2 crore									
Remarks																														

Approach Title	01: Institutional Development for Effective Agricultural Development Planning and Implementation		
Project Title	01-06: Establishment of Agrarian Services Centre (ASC)		
Project Period	Ten years		
Related Ongoing Programme	ATMA		
Project Area / Target Group	Project Site	Entire Mizoram	
	Applicable Zone	All zones	
	Target Group	Agriculture development subcommittee and officers concerned	
Implementing Organisation	DOA	Related Organisation	Agriculture Allied Departments, MID, EFD, DCRR, PWD, ATMA, RDD

Background / Activities

Background

Due to substantial geographical constraints, it is difficult for farmers to obtain adequate farm inputs as well as agricultural technical guidance and marketing information on time. Therefore, it is one of the big issues hindering the growth of agricultural production in Mizoram. To improve agricultural development, lateral cooperation amongst farmers, farmer groups and officers of agriculture-related departments, shall be strengthened. In order to materialise such cooperation, an "Agrarian Services Centre" (ASC) is established in Block, where all of the agricultural activities are concentrated. Comprehensive services, including cultivation skills, materials such as seeds and fertiliser, agriculture credit, agriculture diversification with income generation, and marketing, shall be provided at the ASC in relation to ATMA system. By establishing ASC, not only agricultural activities but also agriculture-related income generating activities especially for youths, could be developed. The main functions of ASC will be providing beneficial information and consultation for farmers by relevant departments and private sector, and it will be convenient for farmers because the centre is located nearby. Related to ATMA, relevant departments' officers, banks, and private sector will provide their services at the main building of ASC for farmers.

Activities

(1) Construction of agrarian services centre (ASC)

Twenty-six ASCs will be constructed in each RD Block. A sketch of ASC and its attached facilities is shown in Figure 1. ASC and attached facilities are as follows: i) ASC and hall, ii) rental services centre/workshop for agricultural implements and machineries, etc., iii) agricultural/livestock products collection and sales centre/sales shops/kiosks of farm inputs and others, iv) storage house for agricultural products and seeds, etc., and v) rice/oil mills/agro-product processing centre. In addition to this, vi) a production yard of compost and bio-based farm inputs with storage shed and sales outlet, vii) experimental plots for farm school including bee and livestock, and a plant nursery will be established close to the ASC premises.

(2) Establishment of agriculture development subcommittee (ADSC)

Agriculture Development Sub-Committee (ADSC) shall be established under the guidance of Agriculture Development Committee (ADC: reference Project Title No. 01-01). In addition, although the composition of ASSC members will be representatives from farm community, government officers, and any other representatives of the block, representatives from the farm community shall make up more than half of the total ASSC members in order to encourage the farmer community's initiative. The committee will enact a maintenance and operation system and regulations of ASC in collaboration with ADC and ATMA.

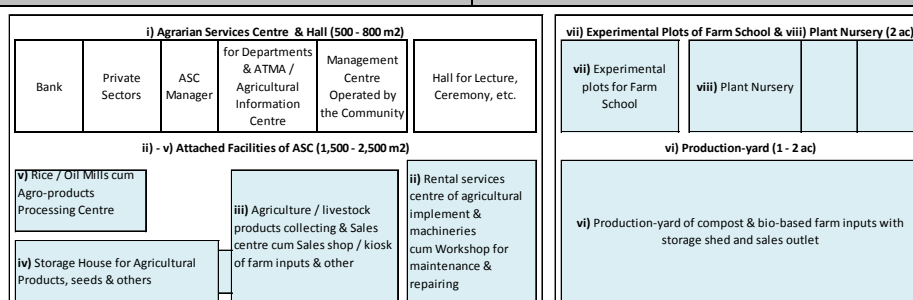
(3) Enhancement of activities of ASC in order to enforce interaction between ASC and private sector/KVK

The function of ASC is divided into three sections. The first section is the services such as trainings, information, consultation, and finance, as indicated in (1) above. The second section is agro-economic activities including marketing of products and inputs, and processing, as discussed in (ii)-(v) above. The third section is the community resources development and technical improvement of farming to utilise locally available resources and to enhance farming technology as indicated in (vi)-(viii) above.

The first section shall provide outposts of departments, banks, private institutions, and so on at ASC in order to facilitate interactions between these organisations. In the second section, lending out of farming machinery and tools, maintenance and repair services, installation of rice and/or oil mills, and so on, are to be provided, as required machinery and tools are to be arranged by the Project. In this regard, operation of these sections are managed by farmers' organisation on a stand-alone basis with guidance from ASSC, and the operation plan are to be prepared with the full participation of farmers. At the time, cooperation with private institutions and banks should be studied. In the third section, for utilisation and improvement of local resources and technology development, technical guidance from KVK in relation to activities of ATMA scheme will be implemented including production of compost from locally available resources. After such activities take root, activities are continued on a stand-alone basis.

Figure / Table / Photo

Figure / Table / Photo



Source : JICA Study Team

Figure 1 Sketch of Agrarian Services Centre and Attached Facilities

Overall Goal	To increase income-generation activities of famers and farm communities by receiving proper extension and supporting services through ASC.																			
Project Purpose	To develop overall capacity of farmers’ organisation and farmer community to be able to manage ASC and utilised its functions, and stabilised farmer household income.																			
Outputs / Outcomes	Established ASC and agriculture-related attached facilities.																			
Activities	Year																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Cobstruction of ASC																				
1-1 Selection of the Suitable Location																				
1-2 Necessary Land acquisition																				
1-3 Plan and Design																				
1-4 Construction of Building																				
1-5 Development & procurement of necessary facilities																				
2. Establishment of ADSC																				
2-1 Selection of member																				
2-2 Awareness training or study tour																				
2-3 Preparation of Rules and Regulations of ADSC																				
2-4 Monitoring & evaluation, and follow up																				
3. Enhancement of Activities of ASC																				
3-1 Preparation of Regulation for Utilization of ASC																				
3-2 Attracting private firm to ASC																				
3-3 Exchanging the knowledge among KVK and depts.																				
3-4 Necessary activities to upgrading ASC's facilities																				
Input																				
Human Resources, Materials, eEc.											Budget									
· Expert x 3 (agriculture/project management, organic agriculture, extension)											· Attached facilities x 8 · Agricultural machineries									
											Rs.86.8 crore									
Remarks																				

Approach Title	01: Institutional Development for Effective Agricultural Development Planning and Implementation		
Project Title	01-07: Production of Appropriate and Good Quality Paddy Seeds		
Project Period	Ten years		
Related Ongoing Programme	NFSM		
Project Area / Target Group	Project Site	At selected rural development blocks	
	Applicable Zone	All zones	
	Target Group	Seed Producer Group	
Implementing Organisation	DOA, KVK	Related Organisation	-
Background / Activities			
Background			
<p>The potential paddy area in Mizoram is limited. Therefore, improvement of productivity of paddy is inevitable. In Mizoram, people traditionally prefer sticky rice of Japonica type. However, such types of paddy seeds have very limited production in India, while DOA recommends seeds of Indica type. Farmers obtain seed paddy from neighbouring states or countries, and seed replacement has not been made properly. Therefore, paddy productivity in Mizoram is declining. For improvement of paddy productivity, introduction of superior quality seed is easier and less expensive, and quick results could be anticipated, and it can be easily accepted by farmers. The project will assist DOA to research and select the seed paddy most suitable to the farmers' intention, and establish farmer seed producing system at block level in collaboration with SMSP (seed village programme) of ATMA and improve government seed production and quality control systems at the state and district levels in collaboration with ICAR. Apart from paddy seeds, supply of good quality seed of other crops and vegetables, seedling, input materials, and machineries with technical guidance, are also required at block levels. The proposed ASC related to the SMSP and extension system, shall take a key role on the subject. With this project, farmers will be able to obtain quality seeds in their vicinity at a moderate price, and seed replacement ratio and productivity would be improved accordingly.</p>			
Activities			
(1) Strengthening of existing seed farms and other potential farms under DOA & KVK			
<p>Two DOA farms for seed production under research and education of DOA are not being utilised well at present due to the lack of infrastructure and fund. The project structures a system that will produce foundation seeds at the seed farms and other farms owned by DOA and KVK, which shall be strengthened, and will supply quality foundation seed paddies to farmers to produce certified seeds, and will reinforce control of the foundation seed production through improvement of the existing laboratories under the DOA and KVK.</p>			
(2) Selection of suitable variety of paddy and verification test at the seed farm and selected potential farmers			
<p>After selecting the suitable variety of paddy for Mizoram farmers at the DOA farm and selected KVK farm based on the preference survey of farmers and consumers, verification tests shall be carried out in the whole district. While conducting verification tests, training of potential farmers, a few selected in each block, to produce certified seeds, shall be conducted. The state government shall strengthen "the State Seed Certificate Agency", the agency that authenticates the certified seeds.</p>			
(3) Establishment of seed production association and diffusion of high quality paddy seeds			
<p>The project emphasise to increase the suitable seeds chosen at the DOA farm and selected KVK farms in accordance with the following procedures:</p>			
(a) Selection of paddy fields suitable for production of certified paddy seeds, where the environment is good for paddy cultivation and irrigation is available even in dry season, and formulation of seed production plan based on possible seed production in each district.			
(b) Based on the seed production plan, improvement and/or construction of rice puller, sorter, and other facilities like storage and construction.			
(c) Implementation of training for seed production farmers, establishment of seed production farmers' association, then handing over the facilities listed in (b) above to the association.			
(d) Extension of the paddy seed production-related ATMA village seed programme.			
(e) Maintaining sustainability of seed quality through monitoring by DOA and KVK.			

Overall Goal	Improvement of productivity of paddy by using quality seeds at state level.
Project Purpose	To distribute good quality paddy seeds to farmers.
Outputs / Outcomes	Suitable variety of paddy seed is selected. Existing paddy seed farms are strengthened. Seed producers groups are formulated and strengthened.

Activities	Year																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Strengthening of Existing Seed Farm and Other Potential Farms																				
1-1 Preliminary study / survey on seed production	■																			
1-2 Selection of seed farm to be strengthened	■																			
1-3 Develop & finalize implementation plan	■																			
1-4 Rehabilitation or upgrading of existing seed farm	■	■	■	■	■															
1-5 Procurement of necessary equipment and facilities	■	■	■	■	■															
2. Selection of Suitable Variety of paddy and Verification Test																				
2-1 Survey on present availability of seed paddy	■																			
2-2 Survey on preferable variety of farmer and consumer	■																			
2-3 Selection of suitable variety	■																			
2-4 Field test		■	■	■	■	■														
3. Establishment of Seed Prod. Association and Diffusion of Seeds																				
3-1 Establishment of Seed Production Association				■	■	■														
3-2 Handing over seed paddy production facilities						■	■	■	■	■										
3-3 Expansion of seed paddy production						■	■	■	■	■										
4. Monitoring and follow up activities				■	■	■	■	■	■	■										

Input	
Human Resources, Materials, Etc.	Budget
<ul style="list-style-type: none"> · Expert x 3 (Agriculture/Project Management, Organic Agriculture, Breeding) · Local expert for breeding · Storage warehouse for paddy seed · Breeder and foundation seeds · Seed processing machineries · Equipment for laboratory 	Rs.34.0 crore

Remarks

- Basic knowledge and experience about quality seeds are generally insufficient amongst farmers. Some farmers exchange their paddy seeds with other farmers to avoid risks.
- Actual seed replacement ratio is unknown, and farmers prefer Mizoram's traditional taste of rice. Therefore, it is necessary to find such seeds for wet rice cultivation.
- The project shall be designed to utilise ASC and ATMA in order to strengthen RDB areal agricultural system.

Approach Title	01: Institutional Development for Effective Agricultural Development Planning and Implementation		
Project Title	01-08: Rehabilitation and Upgrading of Existing Fish Farms for Sustained Fingerling Production		
Project Period	Five years		
Related On-going Programme	Fish seed production/farming (sponsored by GOM)		
Project Area / Target Group	Project Site	Sites of FSFs	
	Applicable Zone	All zones (where FSFs are located)	
	Target Group	Staff in Fish Seed Farm	
Implementing Organisation	DOF	Related Organisations	CIFE, CIFA, CIFRI

Background / Activities

Background

Eleven government fish seed farms (FSFs) have been established in Mizoram to produce fry/fingerlings and distribute them to fish farms. These FSFs were established with varying physical capacity to produce 5 to 10 million fry/fingerlings per farm. However, the FSFs are facing weak manpower capacity, financial constraints, and deteriorated state of physical structures preventing them from adequately fulfilling DOF's mandate to produce and distribute fry/fingerlings to fish farmers. The FSFs supply less than one per cent of the distributed fry/fingerlings to fish farmers; the remainder of the fish seed demand is sourced from three private hatcheries in Mizoram and neighbouring states (refer to Table 1). The farms are not utilised adequately and effectively throughout the year, and are lying idle and deteriorating rapidly. This situation is due to the unavailability of operational budget on time, which reflects on a lack of state planning. In other words, the operation is irregular and depends only on operational funds from project schemes. As such, prospective fish farmers are unable to procure fingerlings on time for stocking. Additionally, due to the intermittent operation of the farms, healthy and quality brood fish (spawners) are not maintained, whereby the spawns and fry produced result in high mortality. Stocked fry/fingerlings are also known to show stunted growth or slow growth during grow-out due to inbreeding of spawners without regular insertion of new spawners to produce quality eggs and spawns. There is also a lack of trained fisheries staff in the farms; even those who had short-term training are not putting their skills and knowledge to practice in the field. The fingerlings sourced from neighbouring states are of such low quality that they are susceptible to high mortality in fishponds, and also likely to bring in fish diseases and parasites.

Table 1 Fish Seed Produced and Distributed

Year	FSFs	Distri	Private
2010	0.90	22.90	22.00
2011	0.85	70.50	69.65
2012	1.00	64.50	63.50

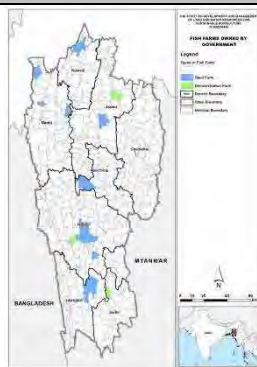
Remarks: Figures are in million.

Source: DOF Mizoram

Activities

- (1) Conduct an inventory survey of all FSFs to grasp the condition of buildings, facilities, equipment, etc., and undertake a complete evaluation of all farms.
- (2) Rehabilitate the damaged and deteriorating buildings, facilities, and equipment.
- (3) Acquire and build a stock of healthy and quality brood fish (spawners) from neighbouring states or other parts of India to maintain the genetic quality of the carps.
- (4) Strengthen fisheries with manpower discipline and provide in-service training on hatchery operation and management, pond ecosystem, management, etc. and staff them in FSFs.
- (4) Provide regular refresher courses in hatchery operation and management to farm managers and technicians to keep up with latest developments in aquaculture.

Photo-1



Source: JICA Study Team

Locations of government-owned fish farms

Photo-2



Source: JICA Study Team

Newly constructed prawn hatchery (Lengpui) lying idle

Approach Title	02: Enhancement of Sustainable Agricultural Production through Proper Resources Utilisation and Management		
Project Title	02-01: Improvement of Jhum-based Agriculture		
Project Period	Five years		
Related Ongoing Programme	NLUP		
Project Area / Target Group	Project Site	At selected rural development block	
	Applicable Zone	Zones 3 and 4	
	Target Group	VC, Individual Farmers	
Implementing Organisation	DOA	Related Organisation	DOH, AHVD, SWCD, EFD

Background / Activities

Background

Although jhum-based agriculture is a traditional cultivation in Mizoram, the state government has put efforts on reducing jhum areas, in consideration of the environment. Since subsistence farmers in remote areas, whose major livelihood depend on jhum cultivation, are marginal, reducing the extent of jhum agriculture shall be carefully planned and implemented considering their livelihood as well as the environmental deliberation. Unless analysing the present condition of subsistence farmers and implementing some measures, reduction of jhum cultivation may drive such farmers to the corner. Improved jhum cultivation can be considered as a transition process to settled farming, and farmers' capacity needs to be strengthened through jhum cultivation with improved measures as shown in Table 1.

Activities

(1) Awareness of Village Council (VC) for proper utilisation of jhum land

Reviewing the past jhum concerned management system with former and present VC members, and conducting awareness programmes for VC members with other stakeholders in order to reform the system of jhum to prevent jhum in steep hill or hill top. The project will set up the improved selection criteria of jhum cultivators and selection system of jhum cultivation and potential areas based on decadal long-term schedule.

(2) Prolonging the cycle of jhum cultivation

With limited natural resources, it is better to prolong the cultivation period from one year to three years. For that purpose, the following activities are recommended: i) Applying intensive conservation agricultural methods (see Tables 1 and 2), and ii) Helping reforestation process by planting useful trees such as alder*. Based on the abovementioned conditions, guideline and other handbooks shall be prepared. In order to implement the conditions mentioned above, guideline and other handbooks shall be prepared selecting five (5) blocks (RDB) as pilot projects.*Note: The Alder tree has root nodules, which improve soil fertility by fixing atmospheric nitrogen into the soil.

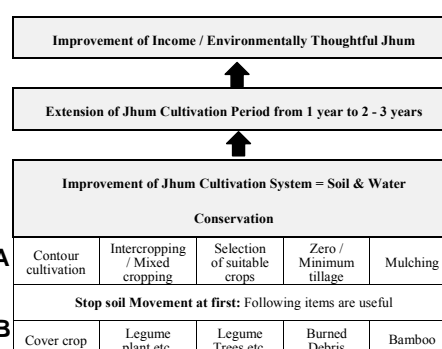
(3) Create additional income through promotion of production forest after jhum cultivation

By planting useful plants, such as legume trees and vetiver grass, during the jhum cultivation period, it will be possible to harvest several cash crops such as traditional vegetables, essential oil plants and grass, and fodder.

(4) Preparation of long- and short-term action plans

When considering the jhum cycle and forest and forestry preservation, short-term planning will be insufficient. Based on the prepared guidelines, the long-term action plan for jhum cultivation areas shall be prepared by the cultivation community and all stakeholders. The long-term action plans have to consider decadal scale and the future generation. After preparation of the long-term action plan for jhum cultivation areas, the Jhum Cultivation Action Plan (three-year plan) will be prepared by members of cultivators and relevant supporting institutions and departments, and the following activities will be implemented: a) Conducting training, seminar, and study tours for beneficial farm community, VC, and relevant officers, b) Organising CBOs by jhum farming community and providing training on operation and management of CBO, c) Conducting training to farmers and officers on agriculture, soil and water conservation, post-harvesting, processing, marketing, etc., d) Constructing cooperative plant nurseries and other facilities by the community, and e) Commencement of the first three-year plan, KVK will evaluate cultivation activities and provide technical assistance, training, etc., accordingly.

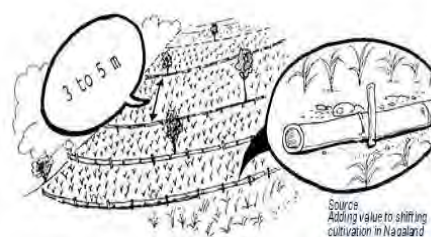
(4) Monitoring and evaluation / follow-up activities



*for forage, essential oil, edible use etc.

Source: JICA Study Team

Table 1 Procedures for Improving Jhum-Based Agriculture



Source: Adding Value to Shifting Cultivation, Nagaland

Table 2 Placement of Bamboo along Contour

Approach Title	02: Enhancement of Sustainable Agricultural Production through Proper Resources Utilisation and Management		
Project Title	02-02: Enhancement of Environmentally-balanced Slope Area Cultivation		
Project Period	Three years		
Related Ongoing Programme	National Food Security Mission		
Project Area / Target Group	Project Site	At selected rural development block	
	Applicable Zone	Zones 1, 2, 5, and 7	
	Target Group	Horticulture Farmers' Organization, Individual Farmers	
Implementing Organisation	DOA	Related Organisation	DOH, AHVD, DSWC, EFD

Background / Activities

Background

As the most prioritised areas for environmental conservation, sloping farmlands, sloping suburban agricultural areas, and monocropping plantation areas have been implemented with less environmental measures for profit-oriented agriculture, etc. Table 1 shows soil erosion depending on land slopes and crops. Generally, to avoid soil erosion, it is common to apply civil works method by constructing terraces, etc., which require substantial funds for stable agriculture on sloping land. Instead of expensive methods such as the structural measures shown in Table 2, farmers can implement low-cost agronomic and vegetative measures, as shown in the same table. Therefore, farmers should appropriately understand what they should do if they are going to implement slope cultivation. Promotion of education about soil conservation is the most important to habituate them to take proper agriculture practices on sloping land. It is important to adopt a plan that requires low input but secures steady production, by taking farmers' situation on labour, fund availability, and real data into account.

Land Use	Slope	Soil Loss (Mt/ha/year)
1. Ginger cultivation (Kolasib)	30%	28.1
2. Sugarcane cultivation (Kolasib)	40%	12.9
3. Eucalyptus cultivation (Kolasib)	70%	21.7
4. Jhum paddy cultivation (Kolasib)	20%	23.5
5. Jhum paddy cultivation (Kolasib)	40%	31.0
6. Dense forest (Kolasib)	50%	6.0
7. Squash cultivation (Aizawl)	30%	7.8
8. Teak plantation (Aizawl)	2%	3.7

Source : Department of Agriculture

Activities

(1) Preparation of guidelines for environmentally-balanced farming system

Guidelines shall be prepared based on the farming systems mentioned below in Table 2, in consideration of useful resources and regional biodiversity in Mizoram. In addition, since small farmers are dependent on jhum cultivation, an economically viable strategy is important in expanding the system through a wide area.

Table 2 Complementary Measures for Environmentally Balanced Farming System

Complementary Measure	Protective Cover	Soil Structure	Less Runoff	Applicable Land
Agronomic	Cover crop, mulch, mixed cropping / intercropping	Minimum / zero tillage, increasing organic matter	Contour cropping, mix perennial crops / relay cropping for the soil is kept covered throughout the year	Jhum land, sloping land, flatland area
Vegetative	A strip of slope covered with grass all the period such as vetiver grass	Utilise the nitrogen-fixing trees and shrubs: also utilise them as green manure and fodder	A strip planted with grass, shrubs and trees (hedgerow)	Sloping land, flatland hills, partially for jhum land
Structural	Flagstones		Stone lines, contour ridge and cross-ties, terrace (soil ridge, bench, half-moon), placement of poles / bamboo along contour	Sloping land and flatland hills, partially for jhum land: poles and bamboo placement

(2) Assembling data on soil loss and interpretation of data

- Selecting verification and control places categorised by slope range and jhum cultivation area in each district.
- Providing training on farming system to farmers in each of the selected places. On this occasion, examine the most suitable combination of farming system taking into account the farmers' capability.
- Installing instruments for collecting soil loss data at verification test and control places, and data collection will be done by DOA in collaboration with KVK.
- Making a comparative review of collected data, and improving guidelines and training methods.
- Arranging plant nurseries for distributing legumes, vetiver grass, etc., as vegetative measure in each selected block in collaboration with farmers.

(3) Finalising extension system based on the results of verification test

- Finalising the extension system 'Environmentally Balanced Farming System'.
- Holding seminars for concerned departments about the extension system of farming, and providing practical training to nominated officers of the relevant departments. The general day-to-day awareness activities to farmers other than the selected block by the project will be implemented by the trained officers of each department.
- Implementing awareness programme of the farming system for school students and NGO staff to promote the conservation farming system in Mizoram.

Overall Goal	Increased agricultural productivity through environmentally-balanced farming system.																	
Project Purpose	Improve slope agricultural technology and farmlands management system, and environmentally-balanced slope agriculture is established to sustain productivity of subsistence farmers.																	
Outputs / Outcomes	Farmers obtain appropriate technology to improve their cultivation system and conservation methods utilising low-cost local resources.																	
Activities	Year																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Preparation of guideline for the farming system																		
1-1 Establishment of committee to promote project	█																	
1-2 Study & Preparation of guideline	█																	
1-3 Selection of six (6) RDBs to implement pilot project	█																	
1-4 Implementation of survey at selected each RDB	█																	
1-5 Holding of workshop seminar in each RDB	█																	
2. Assembling data of soil loss and interpretation of data																		
2-1 Arrangement of facilities and implementation mechanism	█																	
2-2 Training for construction work and CMC	█																	
2-3 Implementation of data collection of soil loss	█	█																
2-4 analysis of data & improve guideline	█	█																
2-5 formulating extension system		█																
3. Finalizing extension system based on the results of verification																		
3-1 Finalizing extension system		█																
3-2 Implementation of awareness through each department		█	█	█	█													
3-2 Implementation of awareness for school & NGO		█	█	█	█													
3-2 Implementation of extension by the project		█	█	█	█		█	█	█	█								
4. Implementation of monitoring and evaluation	█	█	█	█	█		█	█	█	█								
Input																		
Human Resources, Materials, Etc.	<ul style="list-style-type: none"> Three experts (Agriculture/project management, organic agriculture, and extension) Equipment for contour cultivation Plant nursery for producing materials for agronomic and vegetative conservation 									Budget								
										Rs.9.7 crore								
Remarks																		
	<ul style="list-style-type: none"> Burning issue on slope cultivation is conservation of soil and water for sustaining Mizoram agriculture and production. Therefore, agronomic and vegetative measures will be applied for subsistence farmers but it will take some years to consolidate the system. It needs to establish good habits among farmers to maintain farmlands at low costs by utilising local resources. How to change their present habits will be a main theme of this project. A vegetative strip is a strip planted with grass, shrubs, or trees that runs across the slope. It slows the velocity of water flowing down the slope, and catches sediments that have been eroded uphill. Over time, soil may build up behind the strip, forming a terrace. Vegetative strips are cheap and easy to establish. Once they are growing, they are easy to maintain, and they can provide valuable fodder for animals. 																	

Approach Title	02: Enhancement of Sustainable Agriculture Production through Proper Resources Utilisation and Management		
Project Title	02-03 Enhancement of WRC Cultivation and Promotion of Winter Crop		
Project Period	Four years		
Related Ongoing Programme	XII 5 Year Plan: Horticulture and National Food Security Mission		
Project Area / Target Group	Project Site	At selected rural development blocks	
	Applicable Zone	Zones 1 and 6 (mainly)	
	Target Group	WUA	
Implementing Organisation	DOA	Related Organisation	DOH, AHVD, DSWC, EFD

Background / Activities

Background

Much flatlands and high potential areas for wet rice cultivation (WRC) are available in Zones 1 and 6. In case of Zone 1, namely, the northern parts of Kolasib and Marmit District, 27% of WRC in Mizoram is developed, and relatively large WRC farmlands are available. However, since almost all landowners are either non-residents or non-farming households, many Assamese are working as tenant farmers under landowners. Thus, without a real agricultural development along with legal arrangement on tenancy, it is difficult to increase agricultural productivity in WRC areas in Zone 1. Other areas other than Zone 1, WRC is one of the high-potential income-generating activities especially in rural areas. However, the following basic constraints exist; 1) Shortage of labour force and funds for paddy and winter crops, 2) inactive winter crop cultivation, 3) very low seed replacement ratio in paddy, 4) absence of effective on-farm and water management, 5) lack of extension and training of departments, and 6) little amount of fertiliser application (inorganic and organic).

Activities

(1) Assessing major issues on WRC development approaches

The present issues are assessed and divided into two broad categories, namely, i) legal and institutional issues especially concerning the tenant system and ii) farm community's issues, as listed in Table 1, on WRC development. Based on the assessment mentioned above, six rural development blocks (RDB) were selected to implement the project as pilot and model project.

(2) Introduction of appropriate WRC farming system for improvement of productivity and promotion of winter crop

Setting up a state level committee to develop the legal system and other laws concerning the tenancy system, and reforming WRC farming system drastically in order to develop and improve relevant farming practices and management systems. Some recommendable actions and approaches to attend main issues are listed in Table 1.

Basic concept of reformed farming system is showing in Fig. 1. Especially, paddy harvesting should be completed during the same period by all farmers in consideration of efficient utilisation of irrigation water and appropriate cultivation of winter crops. Furthermore, selection of a seed variety is also important for planned cultivation. Thus, reforms will be implemented by preparing elaborate and profitable 'Cropping Pattern' and 'Agriculture Action Plan' based on the farm community's intention. Simultaneously, it is necessary to improve the farming system by introducing farm machinery, financial assistance, marketing, etc.

(3) Necessary training and assistance for farmer groups

Since it is difficult and unprofitable for farmers to arrange all farm inputs, machineries, labourers, etc., individually every time, the team recommends taking cooperative activities to increase individual profit by cutting costs with an elaborate agricultural action plan. For that purpose, the following assistance will be required:

a) Training items: i) Group farming system, ii) External assistance, iii) Marketing and processing, iv) Incentives for paddy, winter crops, and mixed crops with on-farm and water management, v) Record keeping and preparation of cropping patterns and agriculture action plan, etc., and vi) Livestock farming and compost making, etc.

b) Training: i) Cooperative farming system, ii) External organisations and collaboration system, iii) Marketing and processing, iv) Incentive agricultural training for paddy, winter crops, and mixed crop with on-farm and water management, v) Record keeping and accounting, preparation of cropping patterns and agriculture action plan, etc., vi) Livestock and compost making, and vii) Financial assistance and forward contract cultivation system with the private sector, etc.

b) Provision of equipment and machinery: i) Manual transplanter, seeder, and weeder, ii) Two-wheel tractors and trailers, etc.

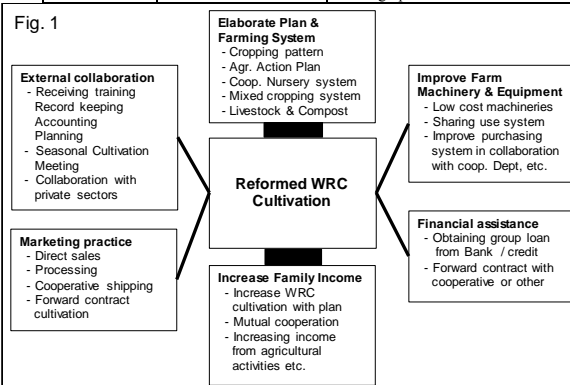
(4) Seasonal cultivation meeting with relevant organisations to confirm cropping pattern and action plan



Conducting seasonal cultivation meeting before starting cultivation activities twice a year to materialise all planned activities in collaboration with relevant departments and the private sector.

(5) Monitoring and follow-up

Table 1 Major Issues and Countermeasures on WRC Cultivation

Issues	Measures	Possible Activities by Farmer
Labour shortage	Mechanisation	Purchase low-cost machines Shared use of machines
	Utilise tenant farmers	* Need to improve the legal system
Funds shortage	Loan from cooperative or bank	Raising group funds Group loan from cooperative/bank
	Cooperative and shared activities	Labour exchange Cooperative purchasing: farm inputs Cooperative shipping Setting up 'Rota system' Cooperative livestock farming
Low profitability	Record keeping	Preparing crop budget
	Preparation of a proper action plan	Profitable cropping pattern Develop winter crop cultivation Effective land and water use Mixed crop cultivation Direct selling / processing
	Apply fertiliser	Keeping livestock and applying compost or manure
	Improve skills / knowledge	Receiving training Collecting information Setting up farm school



Overall Goal	Increased agricultural productivity through environmentally-balanced farming system.																												
Project Purpose	Increase in agricultural production of paddy and winter crops in WRC areas.																												
Outputs / Outcomes	Appropriate farming system for WRC area is introduced. Appropriate cropping calendar for WRC area is prepared and maintained by the farmers. Appropriate agriculture action plan for WRC area is prepared and implemented by farmers.																												
Activities	Year																												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20									
1. Assessing major issues on WRC development approaches																													
1-1 Establishment of committee to promote project / Guideline	■																												
1-2 Selection of six (6) Rural Development Blocks (RDB)	■																												
1-3 Implementation of survey at selected each block	■																												
2. Reforming WRC farming system																													
2.1 Setting up a state level committee to develop legal system	■																												
2.2 Develop legal system	■	■																											
2.3 Preparation of a guide for reforming WRC farming system	■																												
2.4 Conducting seminar to explain the project & collect opinions	■	■																											
3. Introduction of new farming systems with farm machineries etc. with group actions																													
3-1 Holding of workshop seminar in each block	■	■																											
3-2 Preparation of implementation plan in each block	■	■																											
3-3 Mobilization of the project																													
4. Necessary training and assistance for farmer group																													
4-1 Preparation of training manual etc. & implementation of TOT	■	■																											
4-1 Conducting training for farm community	■	■																											
4-2 Provision of equipment and machineries etc.	■	■																											
5. Seasonal cultivation meeting with relevant organizations to confirm cropping pattern and action plan																													
4-1 Conducting seasonal cultivation meeting and preparing seasonal cropping schedule / revise AAP		■	■	■	■	■	■	■	■																				
4-2 Conducting seasonal cultivation training at farms school		■	■	■	■	■	■	■	■																				
4-3 Conducting participatory monitoring based on AAP		■	■	■	■	■	■	■	■																				
4-4 Holding of agricultural fair		■	■	■	■	■	■	■	■																				
5 Monitoring and follow up	■	■	■	■																									
Input																													
Human Resources, Materials, Etc.										Budget																			
<ul style="list-style-type: none"> Three experts (Agriculture/Project management, Paddy, and Horticulture) Social mobilisers 										<ul style="list-style-type: none"> Printed materials, CD for extension and training Manual seeding machine, planting machine, etc. 										Rs.29.7 crore									
Remarks																													
					<p>Mixed cultivation cauliflower, leafy mustard and radish in winter</p> <p>Source: JICA Study Team</p>										<p>Paddy fields with no crops in the winter season, Kolasib</p> <p>Source: JICA Study Team</p>														

Approach Title	02: Enhancement of Sustainable Agriculture Production through Proper Resources Utilisation and Management		
Project Title	02-04 Integration of Livestock Farming into Crop Cultivation		
Project Period	Three years		
Related Ongoing Programme	-		
Project Area / Target Group	Project Site	At selected rural development blocks	
	Applicable Zone	Zones 2, 3, 4, 5 and 6	
	Target Group	SHG, Individual Farmers	
Implementing Organisation	DOA, DOH, AHVD	Related Organisation	-

Background / Activities

Background

Generally, farmers live in the mountainous areas of Mizoram, and their residences and farmlands are located separately. The distance between their residences and farmlands is from 3 to 5 km on average according to the findings of the team. Since it is difficult for farmers to transport farm inputs, subsistence farmers, especially, could not apply adequate fertilisers in time due to this reason. Considering areal growth of crop cultivation or productivity, some sort of possible measure such as fertiliser application is necessary especially for subsistence farmers. In addition, poor farmers deal with unexpected incidents such as rodent outbreaks by increasing jhum farming, as their income sources are limited. To improve such situation, introduction of backyard poultry and goat farming integrated with crop cultivation may help increase their income, and utilisation of livestock manures would help increase agricultural production. Accordingly, it is appropriate for poor farmers to diversify their income to small-scale livestock farming, and it is easy for women and children to rear such livestock. While it may be suitable to organise and strengthen women groups with livestock farming, a small credit for safety net of family for emergency, from the funds raised by group saving, shall be arranged as a countermeasure for disaster, as it shall also be one of the objectives of this project.

Activities

(1) Technical transfer of resources circulation of agriculture with livestock farming

Raw organic materials such as crop residues, animal waste, food garbage, some municipal waste, and other suitable wastes are good materials for application to the soil as a fertilising resource after composting, and it will be environmentally accepted as circulating such resources via agricultural activities (refer to Figure 1 below). Compost plays an important role in sustaining soil fertility and sustainable agricultural production. From this point of view, agriculture with livestock farming will be introduced under this project. The following types of composting methods will be transferred through training on composting livestock or poultry manure. Small-scale aerobic composting methods are listed in Table 1, and training demonstration for composting will be implemented as indicated in the same table. In addition, training on i) feeding for backyard livestock, and ii) group marketing of surplus products and group savings are also implemented.

Table 1 Composting Method

Method	Duration
Indian pit method	4 months
Indian heap method	4 months
Heap high temperature method	3 months
EM-based quick composting	4-5 weeks
Backyard compost	2 months
Compost with bin	2 months

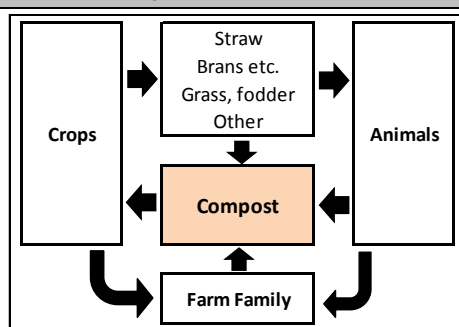
(2) Development of necessary skills for diversification of income sources

Observing the progress of livestock farming of each farming family, marketing and processing of goat milk to long-life milk, cheese, yogurt, etc., shall be taken into consideration. If they are positive, construction of a collecting centre and processing facility shall materialise. Funding the construction of facilities shall be basically a loan to women groups with assistance from the Cooperative Department.

(3) Provision of necessary equipment and materials

- Improvement of goat farms under AHVD and production of a variety of goats appropriate to the area;
- Construction of growing sheds with necessary equipment as chicks to be distributed shall be 45 days old;
- Construction of model livestock sheds and demonstration facilities raising at the backyard;
- Supply of materials for constructing sheds and providing construction training; and
- Collection centre of milk and facilities to process milk and bio-gas plant, if necessary.

Figure / Table / Photo



Source: JICA Study Team

Figure 1. Outline of Resources Circulation


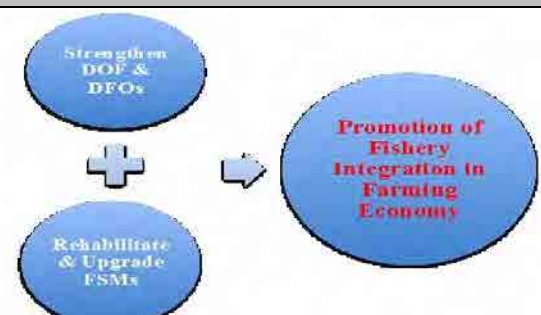
Figure / Table / Photo



Source: JICA Study Team

A small girl and a goat in India, easily managed by women

Overall Goal	Enhancement of sustainable agricultural production and productivity.																			
Project Purpose	Increase of agricultural production and income security.																			
Outputs / Outcomes	The farmers' technologies for resources circulation with livestock farming are enhanced. Livestock production of subsistence farmers is increased.																			
Activities	Year																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Technical Transfer of Resources Circulation of Agriculture with Livestock farming																				
1-1 Establishment of committee to promote project	■	■																		
1-2 Selection of six (6) Rural Development Blocks (RDB)	■	■																		
1-3 Implementation of survey at selected RDB	■	■																		
1-3 Selection of beneficial farm families	■	■																		
1-4 Holding of workshop seminar in each RDB	■	■																		
1-5 Establishment / Re-organizing of CBOs or Group	■	■	■																	
1-6 Conducting training for beneficial farm families	■	■	■																	
2. Introduction of Necessary Equipment and Materials																				
2-1 Improvement of farms under AHVD and production of variety of goat and raising chicks	■	■	■																	
2-2 Supply of materials for constructing shed and providing construction training	■	■	■																	
2-3 Collecting centre of milk and facility to process milk and bio-gas plant, if necessary	■	■	■																	
3. Diversification of livestock in the area																				
3-1 Implementation of livestock farming	■	■	■																	
3-2 Evaluate farming progress and construct milk collecting centre and other attached facilities	■	■	■																	
4. Monitoring and follow up	■	■	■																	
Input																				
Human Resources, Materials, Etc.											Budget									
• Three experts (Agriculture/Project management, Organic agriculture, and Milk processing)											Rs.15.1 crore									
• Social Mobilisers for Community Action Activities																				
• Milk collection centre and facilities																				
• Small-scale biogas unit																				
• Dual purpose poultry																				
• Group managed pasture plot																				
Remarks																				
<ul style="list-style-type: none"> • The budget includes only pilot projects in six rural development blocks. • It is possible to enhance women's activities of subsistence farm households in this project in order to create earning opportunities in the rural area by organising small women groups. To form good habits among group members is the most important activity, such as habituation of holding group meeting periodically and solving problems through discussion, habituation of thrift and saving, and habituation of planning. • During the process of the project, development of strong organisation, good funds/resources, and good norms/unity should be put into effect for sustainability of group activities. • Liquid organic fertilisers, biochemicals, etc., shall be included in the training items. 																				

Approach Title	02: Enhancement of Sustainable Agriculture Production through Proper Resources Utilisation and Management		
Project Title	02-05: Integration of Fish Farming into Crop Cultivation		
Project Period	Six years		
Related On-going Programme	None		
Project Area / Target Group	Project Site	Selected sites in the vicinity of FSFs	
	Applicable Zone	All zones (with suitable land, access to water and FSFs)	
	Target Group	Prospective and innovative farmers with interest in fisheries	
Implementing Organisation	DOF	Related Organisation	DOA
Background / Activities			
<p>Background</p> <p>Fish farming (aquaculture) is one of the variety of activities that can be combined to maximise food security of small holding farmers. It needs to be viewed as a part of the overall agricultural system, and it can be one of the economic activities for rural farmers, which can diversify source of income and contribute to livelihood improvement. Aquaculture is also necessary to supplement fisheries (fishing in rivers, streams, reservoirs, etc.).</p> <p>Aquaculture in Mizoram is still in its infancy state, and it lags behind other states in India. Mizoram has substantial development potential in terms of water resources, sub-tropical climate, culturable fish species, government fish farms, prospective fish farmers, etc., that can be tapped for aquaculture development. Several bottlenecks will tend to hinder the programme in its efforts to promote fishery integration with the farming economy, such as limited and weak support services (extension and training) of DOF, severe shortage of fry/fingerlings, and less motivated and inadequately supported fish farmers/farmers. Hence, it must be noted that the fishery integration for stabilisation of farm cannot be successful unless a practical and efficient DOF and DFOs are in place, and the FSFs are rehabilitated/upgraded to function effectively.</p> <p>Implementation of integrated aquaculture with crop farming will no doubt motivate and empower fish farmers and farmers to take an approach toward financial independence (not too much dependent on subsidies), achieve market-oriented fish farming (not for subsistence), and realise to work in groups and self-help spirit in order to resolve issues/problems on their own. Finally, it will contribute to sustainable use of limited resources (multiple use of water for fish culture and crop farming).</p> <p>Activities</p> <ol style="list-style-type: none"> (1) Identify locations and suitable sites (on the basis of topography, size, number of ponds, water supply, soil, etc.). (2) Identify progressive fish farmers and agro-farmers wishing to participate in group-oriented projects. (3) Organise and conduct PRA with identified fish farmers to get their views on group formation and activities. (4) Form groups (with office bearers, etc.), and sensitise the groups on the roles and functions expected of them. (5) Raise awareness on aquaculture practices by training at the farmers training centre (Lengpui), demonstration activities on site, and provision of practical manuals/booklets on aquaculture practices (pond management, feeding, fertilisation, etc.). (6) Encourage the groups to prepare their own aquaculture plan with assistance from fisheries extension officers (DFOs). 			
Figure 1 Integrated Fish Farming in an Agriculture System		Figure 2 Prerequisites to Promotion of Fishery Integration	
 <p>Source: Farm ponds for water, fish, and livelihoods (FAO Diversification Booklet 13)</p>		 <p>Source: JICA Study Team</p>	

Approach Title	Approach-2 Enhancement of Sustainable Agriculture Production through Proper Resources Utilisation and Management		
Project Title	02-06: Irrigation and Command Area Development for WRC Potential Area		
Project Period	20 years		
Related Ongoing Programme	Irrigation ; AIBP,CAD, Land Development; RKVY		
Project Area / Target Group	Project Site	High potential WRC development area	
	Applicable Zone	Zones 1, 6 (mainly)	
	Target Group	WUA	
Implementing Organisation	MID	Related Organisation	DOA, DOH, DOF

Background / Activities

Background

The irrigation facilities are fundamental infrastructure for supporting agriculture development in the state. There are 439 irrigation projects of 14,000 ha of CCA that have been developed during the past years by MID. These facilities are being utilised to some extent to provide necessary water for cultivation. The JICA study entitled “Development and Management of Land and Water Resources for Sustainable Agriculture in Mizoram” estimated that 51,000 ha of WRC potential area have no irrigation facilities so far considering the area’s slope, water resources accessibility, present land use, and scale of the project. The project aims to develop these irrigation facilities as well as the command area. Although the MID’s 12th Five-Year Plan (2012 to 2017) targets to achieve 2,600 ha of CCA development per annum, the WRC development area is conservatively proposed at 1,600 ha per annum for the initial ten years and 2,600 ha per annum for the next ten years with the following reasons:

- The new development plan review (DPR) procedure that will be applied from 2015 is a time-consuming procedure and requires necessary capacity development of field staff at the initial stage.
- The proposed project on the “improvement of water resource utilisation of the existing minor irrigation schemes” is also one of the major tasks of MID. Some resources will be spent for this project, and the resources for WRC potential area development will be decreased.
- Some of the WRC potential areas are located in the western part of the state and accessibility to those areas is poor at the moment. Access road construction will be a precondition for such potential area development.

Activities

(1) Application of the priority MI scheme from community

Based on the prepared regional agriculture plan and resources management plan prepared under Project 02-01, members of the community will send the application form to the Divisional Office of MID. The priority MI scheme will be selected based on the preliminary survey carried out by MID.

(2) Preparation of DPR under the new guidelines

The DPR for priority project will be prepared according to the new guidelines prepared by MID and the JICA Study Team. Although necessary training have been carried out in the preparatory stage, additional training of SDOs or JEs are required at the initial stage.

(3) Construction of irrigation facilities and execution of command area development

Construction works will be implemented according to the prepared DPR. Construction management training for MID staff may be required before starting the construction.



Source: JICA Study Team

Diversion from Major River



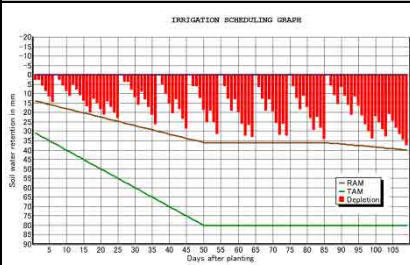


Source: JICA Study Team

Extending paddy field in Kolasib






Source: JICA Study Team

WRC Potential Area

Approach Title	Approach-02 Enhancement of Sustainable Agriculture Production through Proper Resources Utilisation and Management		
Project Title	02-09: Improvement of Water Resource Utilisation for Existing Irrigation Schemes		
Project Period	Ten years		
Related Ongoing Programme	Nil		
Project Area / Target Group	Project Site	Where MID projects were conducted	
	Applicable Zone	All zones	
	Target Group	WUA	
Implementing Organisation	MID	Related Organisation	DOA, DOH, DOF
Background / Activities			
<p>Background</p> <p>According to the inventory survey results, season-wise irrigation water sufficient rates are as follows: 72% in <i>Kharif</i>, 14% in <i>Rabi</i>, and 8% in summer seasons. Insufficient irrigation water in the <i>Rabi</i> and summer seasons is the main hindering factor in promoting winter crop farming, which is crucial for increase of farmers' income.</p> <p>The project focuses on improvement of water utilisation of the existing MI scheme through (1) increment of impounding capacity of the MI scheme such as reservoir or regulation ponds in WRC as well as upland cultivation area, (2) increment of irrigation efficiency through rehabilitation of the canal system and providing the necessary water regulation and control facilities, (3) introduction and enhancement of micro irrigation facilities, and (4) development of agro-wells or lift irrigation facilities in some cases.</p> <p>Although the development of reservoir or regulation ponds has been planned in past development, it did not materialise due to difficulty in land acquisition and shortage of funds in many cases. The program suggests to create a win-win partnership among land providers for reservoir or ponds and other cultivators by incorporating fish farming into reservoir or regulation ponds management.</p> <p>Activities</p> <p>(1) Rehabilitation and upgrading of existing MI scheme</p> <p>(1-1) Selection of Candidate MI Scheme</p> <p>Although the inventory survey of the existing 439 MI schemes was carried out in 2013, additional surveys will be conducted. Based on such survey data, the possible schemes include improved water resources utilisation.</p> <p>(1-2) Preparation of DPR based on the New Guidelines</p> <p>The DPR for selected schemes are prepared according to the new guidelines, "DPR Preparation Guideline", prepared by MID and the JICA Study Team.</p> <p>(1-3) Rehabilitation or Upgrading of Irrigation Facilities</p> <p>According to the DPR, construction works will be carried out.</p> <p>(2) Introduction of water saving irrigation</p> <p>(2-1) Demonstration at Selected Sites</p> <p>Demonstration and trial of various water utilisation and management technologies at selected model sites. Water utilisation technologies include water-storing facilities, intake facilities from river, utilisation of groundwater, and water-harvesting in sloping areas. Water management technologies include distribution planning, soil moisture control, and paddy water level management.</p> <p>(2-2) Preparation of Application Manual and Implementation Plan</p> <p>The results of the above survey, analysis, demonstration and experimental trials are to be studied and summarised in the "water utilisation and management technologies application manual" and "implementation plan".</p> <p>(2-3) Dissemination of Water Saving Irrigation</p> <p>By using the prepared manual, water-saving irrigation systems will be disseminated by MID staff.</p>			
Figure / Table / Photo			
			
Source: JICA Study Team Water-saving irrigation plan	Source: JICA Study Team Image of soil moisture-controlled irrigation	Source: DOSW Farm pond cum fish pond	

Overall Goal	The goal is to provide fundamental infrastructure for agricultural production and marketing activities by extracting the potential for available infrastructure (or new development) with proper O&M capacity development to the responsible organisation.																									
Project Purpose	Effective utilisation of limited water resources for existing irrigation schemes.																									
Outputs / Outcomes	Water-saving irrigation system is introduced. Existing irrigation schemes are rehabilitated or upgraded.																									
Activities		Year																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20					
(1) Rehabilitation &Upgrading of existing facilities																										
Selection of Possible Scheme		█	█																							
Preparation of DPR		█	█	█	█	█	█	█	█	█	█															
Construction Work			█	█	█	█	█	█	█	█	█															
(2) Dissemination of Water Saving Irrigation																										
(2-1) Demonstration trial at selected sites																										
Preparation works				█																						
Trials of various water saving technologies				█	█	█	█	█	█	█																
(2-2) Preparation of application manual																										
Evaluation of above Demonstration trial results								█	█	█																
Preparation of the manual and Implementation plan								█	█	█																
(2-3) Dissemination of Water Saving Irrigation																										
Study tour to domestic advanced sites									█	█	█															
Training and Work-shops to MID staffs									█	█	█															
Training and Work-shops to farmers										█	█	█														
Input																										
Human Resources, Materials, Etc.																	Budget									
<ul style="list-style-type: none"> • Consultant/Expert (Irrigation) • Manual, Text, Plan • PC, Internet • Domestic Study Tour • Workshops 																	<ul style="list-style-type: none"> • Experimental trial materials, tools, and machines • Demonstration site construction • Extension activities • Rehabilitation and upgrading of existing facilities 					Rs.402 crore				
Remarks																										
<ul style="list-style-type: none"> • The policy on land acquisition for pond and reservoir should be formulated. • Study of water-saving technology from farming and crops methodology should be conducted altogether. • The budget is tentative, and it should be revised based on the prepared DPR. 																										

Approach Title	02 Enhancement of Sustainable Agriculture Production through Proper Resources Utilisation and Management		
Project Title	02-08: Construction of Soil and Water Conservation Facilities		
Project Period	Five years		
Related Ongoing Programme	Rashtriya Krishi Vikas Yojana (RKVY), Soil Conservation for Enhancing Productivity of Degraded Lands in the Catchments of River Valley Project and Flood Prone River (RVP & FPR), Integrated Watershed Management Programme (IWMP), MNREGA		
Project Area / Target Group	Project Site	Sloping areas for agriculture all over Mizoram	
	Applicable Zone	All zones	
	Target Group	VC, CBO	
Implementing Organisation	SWCD	Related Organisation	MID, DEF
Background / Activities			
Background			
<p>Appropriate utilisation and management of land and water resources is one of the high-priority issues in Mizoram where sloping lands occupy a large proportion. In order to develop agriculture in a sustainable way, it is required that both farmers and the state government take various measures to conserve soil and water resources. In fact, because of soil erosion and degradation problem, the farmers are not able to attain the expected yields in crop production, nor are they able to sustain even such a low-yield level, furthermore being obliged to live with the decreasing yield year after year. The objective of this project is to create practical models to construct soil and water conservation facilities such as water harvesting structures, check dam, bank protection, and necessary small-scale water intake structures for irrigation and other purposes, and to maintain the constructed facilities by the community. The project will be carried out based on village-based land use, resource management plans prepared under Project 02-01, and the major construction works will be carried out by the members of the community.</p>			
Activities			
(1) Preparation of guidelines for facility design and construction for standardisation of the procedure			
<p>The working group, which include SWCD, DOA, and MID, will prepare the guidelines for design and construction of target facilities. The guidelines include methodologies of survey and design, typical drawings of structures, and construction planning, including community contract documents. Construction manual and maintenance manual, which can be used by members of the community, will also be prepared.</p>			
(2) Implementation of pilot project in the 26 villages			
<p>Based on the prepared guidelines, the 26 villages (one village in one RD block) will be selected as pilot villages wherein to implement the construction works. Works should be carried out by contract basis made between SWCD and federation of CBOs or individual CBO in each village. The necessary construction management training, financial management training, and CBO management training will be given to the CBO or federation. The works should be supervised by SWCD. Also, SWCD will give the necessary technical advice to the CBO or federation. By employing the community contract methodology, the following positive outcomes are expected:</p>			
<p>(i) Ideas to preserve natural resources such as land and water for better utilisation can be created through active involvement of planning and construction works.</p> <p>(ii) Technical skills and financial management skills for future maintenance of facilities are strengthened.</p> <p>(iii) Initial funds for maintenance of facilities are secured by the CBO or federation.</p>			
(3) Giving necessary feedback to the guidelines and expanding the project to other villages			
<p>The lessons learned will be extracted from the 26 pilot projects and necessary modifications to the guidelines will be carried out. Using the modified guidelines, the project will be expanded to other villages.</p>			
Figure / Table / Photo			
			
Source: JICA Study Team Water harvesting tank for irrigation	Source: SWCD Check dam to prevent erosion	Source: SWCD River bank protection wall	

Overall Goal	Increase of agricultural production and productivity.																			
Project Purpose	The practical model for soil and water conservation measures are created.																			
Outputs / Outcomes	<ul style="list-style-type: none"> • The guidelines for facility design and construction procedure for soil and water conservation structures are formulated. • The soil and water conservation facilities in the pilot villages are constructed. • Capacity of CBO or federation of CBOs for maintenance of soil and water conservation facilities in the pilot village is developed. 																			
	Year																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Activities																				
(1) Preparation of guideline																				
Formation of Working group and coordination works	■																			
Awareness training and study tour (Nagaland)	■																			
Collection of existing guideline in surrounding state or country	■																			
Formulation of guideline	■																			
Training of officers	■	■	■	■	■															
(2) Implementation of pilot project in the 26 villages																				
Selection of pilot village	■																			
Preparation of Land Use Plan and Resource Management Plan (Under Project 02-01)	■																			
Formulation of Federation or CBOs (Under Project 02-02)	■																			
Preparation of DPR		■	■																	
Awareness Meeting		■	■																	
Training (Construction, Financial and CBO Management)		■	■	■																
Making contract		■	■	■	■															
Construction works			■	■	■	■	■													
Follow up and maintenance training					■	■														
(3) Expanding the project to other villages																				
Giving necessary feedback to the guideline					■	■														
Expanding the project to other villages							■	■	■	■	■	■	■	■	■	■	■	■	■	■
Input																				
Human Resources, Materials, Etc.	<ul style="list-style-type: none"> • Consultant/Expert (Soil and water conservation, Irrigation, construction, and GIS) • Field Survey • Planning, Design, Cost Estimation, Monitoring 									<ul style="list-style-type: none"> • Pilot projects (26 villages) • PC, monitoring tools 									Budget	
																			Rs.15.4 crore	
Remarks																				
	<ul style="list-style-type: none"> • Expansion to other villages is not included. 																			

Approach Title	02: Enhancement of Sustainable Agriculture Production through Proper Resources Utilisation and Management		
Project Title	02-09: Improvement of Farm Accessibility and Transportation		
Project Period	20 years		
Related Ongoing Programme	Potential Area Connectivity (PAC) Programme by DOA, MNREGA		
Project Area / Target Group	Project Site	Entire Mizoram	
	Applicable Zone	All zones	
	Target Group	VC, WUA	
Implementing Organisation	DOA, MID	Related Organisation	PWD

Background / Activities

Background

Construction and improvement of farm access roads have been conducted by DOA and other agri-related departments all over Mizoram. However, existing farm road information have not been organised by relevant departments, and existing road conditions, such as location, road specifications, and damage conditions, are not clear. MID schemes inventory survey by the JICA Study Team showed that only 36% of MID schemes have all-season roads, 62% have seasonal roads, and 2% do not have vehicle roads. This access and transportation problem is one major hindering factor for agricultural development in Mizoram. Improvement of accessibility is one of the most needed by farmers. Areas with relatively large development potential are left undeveloped in Zones 1 and 6 mainly because of poor accessibility.

Currently, the most common way of transportation to/from farm is by manpower on steep farm roads (refer to picture below), which makes it difficult to promote commercial farming. Promotion of mechanisation of farm transportation such as utilisation of power tillers can make a quick impact in the short term and cost lower, while road construction and improvement works are promoted.

The project aims to improve the above problems respectively. With regard to O&M of farm roads, the following activities are to be carried out in other O&M projects:

Activities

(1) Preparation of design criteria, cost norms, typical drawings, and construction scheduling for road rehabilitation and construction works

To implement road rehabilitation and development works effectively, the DPR preparation guidelines, including way of survey, typical drawings, and cost norms, and typical contract document and typical construction management guidelines will be prepared by the external experts. The necessary guidance will be given to MID and DOA which will handle the project.

(2) Rehabilitation or upgrading of existing farm access roads

The rehabilitation and upgrading of roads will mainly focus on installation of drainage facilities such as side drains and culverts on the existing farm access road. Based on the regional agricultural development plan, which will be prepared under Project 02-01, inventory survey for priority roads will be conducted. The information collected from the inventory survey include length, dimensions, pavement, number and location of the structure, and estimated number of users of the road. Then based on the collected data, the target road will be determined and the DPR will be formulated based on the prepared guidelines. The rehabilitation works will be carried out accordingly.

(3) Construction of new farm access roads to potential areas

Same as above, based on the regional agricultural development plan, which will be prepared under Project 02-01, the priority agricultural development area will be selected and the DPR will be prepared. The construction works will be carried out accordingly.

Figure / Table / Photo



Source: JICA Study Team

Common manpower transportation



Source: DOSW




Construction of farm-link road



Source: JICA Study Team

Transportation with power tiller's carrier

Overall Goal	The goal is to provide fundamental infrastructure for agricultural production and marketing activities by extracting the potential for available infrastructure (or new development) with proper O&M capacity development of the responsible organisation.																			
Project Purpose	Improvement of agri-links and farm transportation, and promotion of potential area development																			
Outputs / Outcomes	<ul style="list-style-type: none"> Accessibility to/from farm, village, and agricultural facilities is to be improved. Efficiency of farm transportation is to be improved. Selling of products is to be increased. Potential area development in Zones 1 and 6 is to be promoted. 																			
	Year																			
Activities	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
(1) Preparation of Necessary Guidelines for Implementation																				
Preparation of Guidelines for Road Design and Construction	■																			
Giving the guidance to MID and DOA	■																			
(2) Rehabilitation and Upgrading of Existing Road																				
Collecting the needs under Project 02-01	■	■	■	■	■	■	■	■	■	■	■									
Conduct Inventory Survey for Priority Road	■	■	■	■	■	■	■	■	■	■	■									
Selection of the target road to be upgrading	■	■	■	■	■	■	■	■	■	■	■									
Preparation of DPR	■	■	■	■	■	■	■	■	■	■	■									
Rehabilitation or Upgrading of the Road		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Training on Operation and Maintenance (under Project 2-12)				■		■		■	■	■	■	■	■	■	■					
(3) Construction of New Farm Access Road																				
Collecting the needs under Project 02-01	■	■	■	■	■	■	■	■	■	■	■									
Selection of the target road for new construction	■	■	■	■	■	■	■	■	■	■	■									
Preparation of DPR	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Construction of New Farm Access Road		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Training on Operation and Maintenance (under Project 2-12)				■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Input																				
Human Resources, Materials, Etc.	<ul style="list-style-type: none"> Consultant/Expert Cost for Inventory Survey Cost for Preparation of DPR 											Budget <ul style="list-style-type: none"> Construction Cost 								
												Rs.426.5 crore								
Remarks	<ul style="list-style-type: none"> PWD, which is in charge of national, state, district, and village level roads, will maintain existing road conditions properly. Improvement of major roads, such as national road and state road, which move at the east-west direction, will be promoted by PWD. DOA will promote mechanisation of farm and O&M systems. The policy of promoting the above components is to be approved by the state government. Site survey and study are necessary to decide the detailed location of the pilot projects. 																			

Approach Title	02: Enhancement of Sustainable Agriculture Production through Proper Resources Utilisation and Management		
Project Title	02-10: Capacity Development on O&M of Fundamental Infrastructure		
Project Period	Five years		
Related Ongoing Programme	PAC programme by DOA, MNREGA		
Project Area / Target Group	Project Site	Entire Mizoram	
	Applicable Zone	All zones	
	Target Group	WUA, VC	
Implementing Organisation	MID (irrigation facilities) DOA (farm roads)	Related Organisation	-
Background / Activities			
<p>Background According to the state government policy, constructed fundamental infrastructures such as irrigation facilities and farm access roads are handed over to WUAs and VCs for proper utilisation and operation and maintenance (O&M). However, the WUAs and/or VCs are not mobilised enough and do not have enough capacity to fulfil the requirement imposed by the government since no technical and financial support or awareness on O&M works are provided to them. In addition, the government side has no machinery to support WUAs before and after handing over the facilities. The project aims to develop the capacity and mind-set of the 439 existing WUAs as well as newly-formed WUAs in terms of irrigation and drainage facilities, and VCs in terms of farm access roads through the establishment of government support systems.</p> <p>Activities <i>(For Irrigation and Drainage Facilities)</i></p> <p>(1) Establishment of O&M unit or irrigation management unit in MID The mandate and required staff are decided. The necessary training and/or study tour for facilitation and participatory irrigation management will be conducted.</p> <p>(2) Introduction of WUA registration system in MID and establishment of bridging system to the Cooperation Department and the Taxation Department for official registration The registration system of WUA is established in the O&M unit of MID for developing the application format, database and bridging system to the Cooperation Department or the Taxation Department for official registration.</p> <p>(3) Formulation of O&M guidelines for irrigation and drainage facilities for WUA Based on the Trainer's Extension Manual on O&M for irrigation facilities prepared under Project 02-01, the O&M for WUA manual will be developed with field applicability test.</p> <p>(4) Providing of O&M training to existing and newly-formed WUAs Using the abovementioned manual, the necessary training is given to the existing and newly-formed WUAs for new WRC potential area development.</p> <p><i>(For Farm Access Roads)</i></p> <p>(1) Formulation of O&M guidelines for farm access roads The O&M manual includes (1) routine inspection and minor maintenance works, (2) rehabilitation planning and cost estimation, and (3) major repair works (earthworks and concrete works). The applicability of the prepared manuals will be tested in the field.</p> <p>(2) Providing of O&M training to selected committee members of VC Using the abovementioned manual, the necessary training is given to selected members of VCs for O&M works.</p>			
Figure / Table / Photo			
			
<p>Source: JICA Study Team Damaged intake and canal</p>		<p>Source: JICA Study Team Inadequate road crossing drainage</p>	
			
<p>Source: JICA Study Team WUA training</p>			

Overall Goal	Fundamental infrastructure brings maximum benefits from their expected potential.																			
Project Purpose	Existing and new constructed infrastructures are maintained and operated appropriately.																			
Outputs / Outcomes	<ul style="list-style-type: none"> Establishment of functional O&M unit in MID. Preparation of O&M guidelines for WUAs and members of VCs for irrigation facilities and farm access roads. Capacity of WUAs and VCs are developed. 																			
Activities	Year																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<i>For irrigation and drainage facilities</i>																				
(1) Establishment of operation and maintenance unit																				
Discussion and decision of mandate and regulation	■	■																		
Nomination of member	■	■																		
Study tour and/or capacity development training on PIM	■	■																		
(2) Introduction of WUA registration system in MID																				
System design and creation of database	■	■																		
Awareness of WUA for registration		■	■																	
Operation of the registration system			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
(3) Formulation of operation and maintenance guideline																				
Preparation of O&M guideline for WUA	■	■																		
Field test	■	■																		
Finalization of guideline			■	■																
(4) Providing of operation and maintenance training to WUA																				
			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
<i>For farm access road</i>																				
(1) Formulation of operation and maintenance guideline																				
Initial survey for preparation of guideline	■	■																		
Preparation of O&M guideline for VC member		■	■																	
Field test		■	■	■																
Finalization of guideline			■	■																
(2) Providing of operation and maintenance training to VC member																				
			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Input																				
Human Resources, Materials, Etc.															Budget					
<ul style="list-style-type: none"> Consultant/Expert (Farm Road) Inventory Survey Manual, Text PC, Internet Domestic study tour Workshops Extension activities Annual O&M activity budget 															Rs.15.4 crore					
Remarks																				

Approach Title	03: Establishment of Good Value Chain for Agriculture Products		
Project Title	03-01: Establishment of Market Information Provision System		
Project Period	Two years		
Related Ongoing Programme			
Project Area / Target Group	Project Site	TCD Head Office, District Offices and Check-point Offices	
	Applicable Zone	All zones	
	Target Group	Individual farmers, traders, processors and other private sector	
Implementing Organisation	TCD	Related Organisation	Agriculture allied departments

Background / Activities

Background

Collection of market information on the major market of the state and on the check-gates near the border gate to other state is the mandate of TCD. However, collection of reliable data has not been implemented and extension system of collected data has not been established yet.

Since market information is important and essential input for modern business management; and extension system of market information is a vital infrastructure for development of the state economy, both shall be established urgently.

Activities

(1) Training of staff

Awareness training of all staffs concerned on the importance of market information for business fields and development of economy in the state, together with mechanism of free market economy is necessary.

(2) Planning and designing of PC network among the head office, district offices, and check-point offices

Appropriate data collection and processing system by a network shared among organizations of TCD will be considered and designed based on the data requirements and processing condition shown in Table 1.

TCD will employ an IT engineer for designing the network facility and software to fulfil the requirements and for preparing the manuals and guidebooks for operators of the network facilities.

(3) Training of the staff on the operation of the system

Guidelines and rules will be prepared for each staff who will engage in the system operations i.e., data collection, data input, data processing, etc.

Train all staffs engaged in the operation of the system by each facility using the guidelines.

(4) Training provision to users

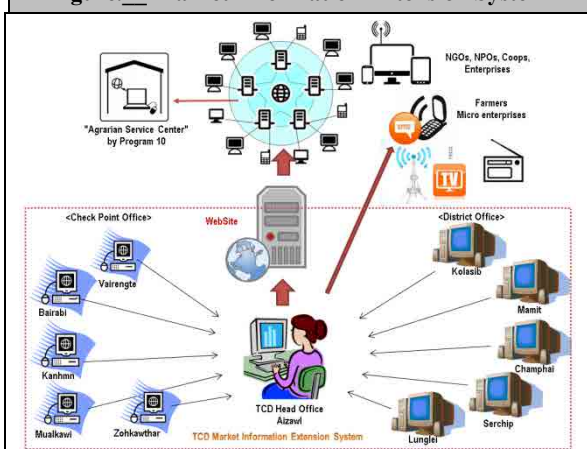
Guidebook or manuals of the system for users will also be prepared, and awareness and training seminars/workshops will be provided to ordinary users for promotion of market information use.

Table 1 Draft of Requirements

Item	Dist. Market	Check P.
No. of Commodities	60	All
Frequency of Survey	Morning on Wed. and Sat. / week	Everyday
Send to Head Office	Before 3:00 p.m. for data collected in the morning	Before noon for data collected in the previous day
Up to Public	Within the same day	Within the same day of receipt at the Head Office

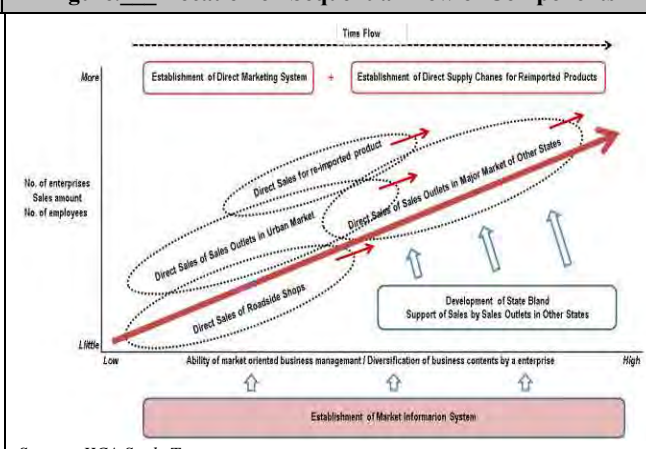
Source : JICA Study Team

Figure. Market Information Extension System



Source: JICA Study Team

Figure. Location on Sequential Flow of Components



Source: JICA Study Team

Approach Title	03: Establishment of Good Value Chain for Agriculture Products		
Project Title	03-02: Production of Import Substitution Crops Throughout the Year		
Project Period	Five years		
Related Ongoing Programme	Mission for Integrated Development of Horticulture (MIDH)		
Project Area / Target Group	Project Site	Horticultural crop production area	
	Applicable Zone	Zones 1,2,4,5,6, and 7 (except Zone 3)	
	Target Group	Horticultural farmers' organisations and individual farmers	
Implementing Organisation	DOH	Related Organisation	DOA, KVKs, ICAR

Background / Activities

Background

While the demand for locally produced vegetables remains high, the supply in the market is insufficient, and a large quantity of vegetables are imported from other states including Assam. Particularly, during the dry season and lean season, the supply of locally produced products is extremely short. In order to meet the needs of the consumers and market in the state of Mizoram for horticultural crops, which are mostly imported, it is necessary to produce and supply them to the market with proper timing, and also to increase their productivity. Consequently, it is required to strengthen the management capacity of horticultural farmers' organisations and to introduce and disseminate appropriate varieties and technologies on the cultivation timing diversification, labour saving, and cost reduction.

Activities

(1) Capacity development of horticultural farmers' organisation (HFO)

- Conduct of basic survey to grasp the current status and issues of the HFOs.
- Conduct of workshop for extension officers (EOs) on strengthening HFO.
- Preparation of guideline for strengthening HFO.
- Conduct of trainings for active 30 HFO leaders (major contents of training: refer to the remarks on the next page).
- Conduct of follow-up activities such as networking among HFOs, study tour, field day and Farmers' Field School.
- Conduct of training and follow-up for other 150 HFO leaders based on the lessons of previous trainings.

(2) Selection of appropriate varieties of horticultural crops and their dissemination

- Conduct of market research on horticultural crops in and out of the state by both DOH officers and HFO members.
- Introduction of candidate cultivars/varieties from in and out of the country based on the results of the market research.
- Selection of variety by using the PVS (refer to the remarks) in the farms of selected ten HFOs and horticulture centres.
- Determination of recommended varieties in each zone of the Master Plan based on the results of PVS (ref: Table).
- Preparation of leaflets of recommended varieties on varietal characteristics, cultivation method, and proper crop calendar.
- Conduct of training for the extension officers on the technical information of recommended varieties.
- Dissemination of seeds and seedlings of recommended varieties to the farmers with technical support.

(3) Dissemination of appropriate technologies, facilities, systems, tools, and machineries

- Introduction of appropriate technologies, facilities, systems, tools, and machineries for efficient and profitable production.
- Conduct of examination on those technologies, etc., in the farms of selected ten HFOs and horticulture centres.
- Determination of recommended technologies, etc., based on the results of the examinations (ref: Table).
- Preparation of manuals on recommended technologies, etc.
- Conduct of training for the extension officers on the recommended technologies, etc.
- Dissemination of recommended technologies, etc., by the extension officers.

Figure / Table / Photo	Figure / Table / Photo																																																																													
<p>Source: JICA Study Team Outline of the Project</p>	<p>Major target crops/ zonal importance and technologies to be proposed</p> <table border="1"> <thead> <tr> <th></th> <th>Onion</th> <th>Cabbage</th> <th>Tomato</th> <th>Brinjal</th> <th>Capsicum</th> <th>Cauliflow</th> <th>Potato</th> <th>Garlic</th> <th>Pineapple</th> <th>Mango</th> </tr> </thead> <tbody> <tr> <td>Z-1</td> <td>++</td> <td>+</td> <td></td> <td>+</td> <td></td> <td></td> <td>++</td> <td>+</td> <td></td> <td>++</td> </tr> <tr> <td>Z-2</td> <td>+</td> <td>+</td> <td>+</td> <td>++</td> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>++</td> <td>+</td> </tr> <tr> <td>Z-4</td> <td></td> <td>++</td> <td>++</td> <td>+</td> <td>++</td> <td>++</td> <td>+</td> <td>+</td> <td></td> <td></td> </tr> <tr> <td>Z-5</td> <td>+</td> <td>+</td> <td>+</td> <td>++</td> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>++</td> <td>+</td> </tr> <tr> <td>Z-6</td> <td>++</td> <td></td> <td></td> <td>+</td> <td></td> <td>+</td> <td>+</td> <td>+</td> <td></td> <td>++</td> </tr> <tr> <td>Z-7</td> <td></td> <td>+++</td> <td>+++</td> <td>+</td> <td>+++</td> <td>+++</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Technology etc.</p> <ul style="list-style-type: none"> • Rain-shelter vegetable cultivation practice and low cost greenhouse. • Water-saving irrigation technologies and systems. • Labour-saving and low-cost technologies, tools, and machineries. • Techniques of organic fertiliser making and application. • Technologies of low or free pesticide cultivation/ Integrated Pest Management (IPM). • Integrated Nutrition Management (INM). <p>Source : JICA Study Team</p>		Onion	Cabbage	Tomato	Brinjal	Capsicum	Cauliflow	Potato	Garlic	Pineapple	Mango	Z-1	++	+		+			++	+		++	Z-2	+	+	+	++	+	+	+	+	++	+	Z-4		++	++	+	++	++	+	+			Z-5	+	+	+	++	+	+	+	+	++	+	Z-6	++			+		+	+	+		++	Z-7		+++	+++	+	+++	+++				
	Onion	Cabbage	Tomato	Brinjal	Capsicum	Cauliflow	Potato	Garlic	Pineapple	Mango																																																																				
Z-1	++	+		+			++	+		++																																																																				
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Z-6	++			+		+	+	+		++																																																																				
Z-7		+++	+++	+	+++	+++																																																																								

Overall Goal	Increased production of safe and traceable horticultural products to meet the market and consumers' needs.																													
Project Purpose	Import substitution crops are produced throughout the year and are increased in production.																													
Outputs / Outcomes	<ul style="list-style-type: none"> Capacities of horticultural farmers' organisations are developed. Appropriate varieties of horticultural crops are introduced and disseminated with technical services. Appropriate technologies, facilities, systems, tools, and machineries for horticultural crop production are introduced and disseminated with technical services. 																													
Activities	Year																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20										
Activity 1 Capacity development of HFO																														
Activity 1-1 Conduct of basic survey	■																													
Activity 1-2 Conduct of workshop for EOs	■																													
Activity 1-3 Preparation of guideline	■																													
Activity 1-4 Conduct of trainings for active HFO leaders		■																												
Activity 1-5 Conduct of follow-up activities (FU)			■	■	■																									
Activity 1-6 Conduct of training and FU for other HFOs			■	■	■																									
Activity 2 Selection & dissemination of appropriate varieties																														
Activity 2-1 Conduct of market research	■																													
Activity 2-2 Introduction of candidate cultivars/variety	■																													
Activity 2-3 Selection of variety through PVS	■	■	■	■																										
Activity 2-4 Determination of recommended varieties			■	■	■																									
Activity 2-5 Preparation of leaflets of varieties			■	■	■																									
Activity 2-6 Conduct of training for EOs			■	■	■																									
Activity 2-7 Distribution of seeds and seedlings			■	■	■																									
Activity 3 Dissemination of appropriate technologies etc.																														
Activity 3-1 Introduction of appropriate technologies etc.	■																													
Activity 3-2 Conduct of examination	■																													
Activity 3-3 Determination of recommended tech. etc.	■	■	■	■																										
Activity 3-4 Preparation of manuals			■	■	■																									
Activity 3-5 Conduct of training for EOs			■	■	■																									
Activity 3-6 Dissemination of recommended tech. etc.			■	■	■																									
Input																														
Human Resources, Material, etc.											Budget																			
Experts in the following relevant fields: <ul style="list-style-type: none"> Horticulture Farmers' Organisation Seeds and Seedlings Micro Irrigation Systems Agricultural Structures Marketing 											Machinery and equipment: <ul style="list-style-type: none"> Vehicles Office Computers Seeds, machinery, facilities, tools, equipment, and materials for seed and technology selection, trials, training activities, extension services, and construction works 										Rs.37.8 crore									
Remarks																														
<ul style="list-style-type: none"> Farmers' organisations are mainly categorised into: i) Cooperative Societies which are registered under the "Mizoram Cooperative Societies Act 2006"; ii) Associations or Societies which are registered under the "Mizoram Societies Act 2005"; and iii) Self Help Groups (SHGs) which are not registered. About 278 cooperative societies are registered on the category of "farming including fruit and vegetable grower" in 2010/11, however, according to officials, a large number of cooperative societies are non-functional and not viable. It is estimated that only 3 to 4 horticultural farmers' organisations in each district are active. Major contents of the training for HFO leaders: Management of farmer's organisation; Skills of individual farm management; Market-oriented approach; Market research by farmers' organisation; Selection of target crops; Formulation of action plan; Introduction of appropriate varieties and technologies; and Post-harvest management (storage, processing and marketing). PVS (Participatory Varietal Selection): Farmers are given a wide range of new cultivars; varieties to test for themselves in their own farmlands; or they evaluate cultivars/varieties together with the officers in the demonstration fields. 																														

Approach Title	03: Establishment of Good Value Chain for Agriculture Products		
Project Title	03-03: Establishment of Safe and Traceable Crop Certification System		
Project Period	Five years		
Related Ongoing Programme	Mission for Integrated Development of Horticulture (MIDH)		
Project Area / Target Group	Project Site	Horticultural crop production area	
	Applicable Zone	Zones 2, 4, and 7	
	Target Group	400 farmers belonging to Horticultural Farmers' Organisations	
Implementing Organisation	DOH	Related Organisation	DOA, KVK, ICAR

Background / Activities

Background

Since both producers and consumers are highly conscious of producing/obtaining safe agricultural products, and it is anticipated in the future that quality will count, agricultural activities should aim at producing safe and high quality horticultural crops. In order to promote a healthful horticulture after taking into consideration the different demands from farmers and consumers, it has taken such safety agriculture management measures i.e., organic agricultural product certifications and Good Agriculture Practices (GAP) to ensure agricultural product safety in India. Those certification systems can also create high added value, however, procedures are quite complicated with high certification cost, time, and effort; and farmers are not familiar with the operation of information system. Nevertheless, there is a growing demand for supplying safe and traceable crops by introducing the certification system in the domestic and international markets.

Activities

(1) Preparation of guidelines for the introduction of Organic Farming (OF) and Good Agriculture Practices (GAP) (refer to remarks on the next page)

- Conduct of basic survey on the current situation, issues, and future perspectives of OF and GAP.
- Conduct of workshop for the extension officers to prepare the guidelines for introduction of OF and GAP.
- Conduct of verification trial with the cooperation of advanced ten farmers.
- Finalisation of the guidelines by extension officers.

(2) Conduct of orientation on OF and GAP

- Selection of farmers for the training.
- Conduct of orientation on the introduction of OF and GAP for the farmer to promote better understanding.

(3) Conduct of training for adoption of OF and GAP

- Conduct of training course for adoption of OF.
- Conduct of training course for adoption of GAP.

Farmers can select the course by themselves.

Major subjects: input management, field and crop management, post-harvest management, and packing and labelling.

(4) Supply of basic inputs and farm facilities

Basic inputs: bio-fertiliser, bio-pesticides, traps, botanical pesticides, and organic fertiliser

Farm facilities: vermin compost production, vermin wash, and compost tea production, bio/botanical preparation

(5) Support for certification procedures

Certification procedures such as registration and cluster formation, record keeping and internal control system (ICS), internal inspection, external inspection and certification, shall be supported.

(6) Exploration of possibilities for establishing new marketing channels

Possibilities for establishing new marketing channels of certified products shall be explored.

Figure / Table / Photo	Figure / Table / Photo																
<p>Source: JICA Study Team</p> <p>Outline of the Project</p>	<p>Main Steps to Organic Certification</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Contents</th> </tr> </thead> <tbody> <tr> <td>Study</td> <td>Standards required, market condition, value chain, potential advantages</td> </tr> <tr> <td>Planning</td> <td>Crop/variety selection, plan of conversion, production and sales</td> </tr> <tr> <td>Conversion</td> <td>2 - 3 years for changing from conventional to organic production</td> </tr> <tr> <td>Production</td> <td>Compliance with the standards on every aspect of farming</td> </tr> <tr> <td>Traceability</td> <td>Documentation of all activities, record keeping, Internal Control System (ICS)</td> </tr> <tr> <td>Inspection</td> <td>Annual surveillance by the inspector of the inspection and certification agency</td> </tr> <tr> <td>Certification</td> <td>Decision by the certification committee of the certification agency</td> </tr> </tbody> </table> <p>Source: JICA Study Team</p>	Step	Contents	Study	Standards required, market condition, value chain, potential advantages	Planning	Crop/variety selection, plan of conversion, production and sales	Conversion	2 - 3 years for changing from conventional to organic production	Production	Compliance with the standards on every aspect of farming	Traceability	Documentation of all activities, record keeping, Internal Control System (ICS)	Inspection	Annual surveillance by the inspector of the inspection and certification agency	Certification	Decision by the certification committee of the certification agency
Step	Contents																
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Planning	Crop/variety selection, plan of conversion, production and sales																
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Certification	Decision by the certification committee of the certification agency																

Overall Goal	Increased production of safe and traceable horticultural products to meet the market and consumers' needs.																												
Project Purpose	Safe and traceable horticultural crops are produced and supplied through the certification system.																												
Outputs / Outcomes	<ul style="list-style-type: none"> Guidelines for introduction of OF and GAP are prepared. Farmers gain further understanding of OF and GAP through the orientation. Farmers obtain necessary skills of OF or GAP through the training. Farmers receive basic inputs. Farmers receive support for the certification procedures. Possibilities for establishing new marketing channels are made explicitly. 																												
Activities	Year																												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20									
Activity 1 Preparation of guidelines																													
Activity 1-1 Conduct of basic survey	■																												
Activity 1-2 Conduct of workshop for EOs	■																												
Activity 1-3 Conduct of verification trial	■																												
Activity 1-4 Finalisation of the guidelines	■																												
Activity 2 Conduct of orientation																													
Activity 2-1 Selection of farmers for the training		■	■	■	■																								
Activity 2-2 Conduct of orientation		■	■	■	■																								
Activity 3 Conduct of training																													
Activity 3-1 Preparation of implementation plan		■	■	■	■																								
Activity 3-2 Application and selection of trainee		■	■	■	■																								
Activity 3-3 Conduct of training for adoption of OF		■	■	■	■																								
Activity 3-4 Conduct of training for adoption of GAP		■	■	■	■																								
Activity 4 Supply of basic inputs																													
Activity 4-1 Application and selection of basic inputs		■	■	■	■																								
Activity 4-2 Preparation of implementation plan		■	■	■	■																								
Activity 4-3 Distribution of inputs		■	■	■	■																								
Activity 5 Support for certification procedures																													
Activity 5-1 Preparation of implementation plan		■	■	■	■																								
Activity 5-2 Provision of support		■	■	■	■																								
Activity 6 Exploration on new marketing channels																													
Activity 6-1 Establishment of survey team		■	■	■	■																								
Activity 6-2 Implementation of survey		■	■	■	■																								
Input																													
Human Resources, Material, etc.												Budget																	
Experts in the following relevant fields: <ul style="list-style-type: none"> Organic Farming Horticulture Farmers' Organisation Marketing 												Machinery and equipment: <ul style="list-style-type: none"> Vehicles Office Computers Equipment and materials for training and supporting activities 									Rs.22.1 crore								
Remarks																													
<ul style="list-style-type: none"> In order to carry out OF/ GAP, it is essential to empower the horticultural farmers' organisation and to acquire appropriate skills on farm management and crop cultivation. Therefore, it is recommended to conduct this project after the implementation of the project entitled "Production of import substitution crops throughout the year" as described above. Through carrying out of the "Production of import substitution crops throughout the year", it is important to assess if the organic market is active and if organic business is successful. Based on the assessment, timing of implementation of this project should be determined ultimately. Organic farming is an agricultural production system that relies on natural means like crop rotation, compost, biological pest control, and mechanical cultivation to maintain soil fertility and control pests, excluding the use of synthetic fertilisers and synthetic pesticides, plant growth regulators, livestock feed additives, and genetically modified organisms. (Source: <i>The Organic Business Guide, IFOAM, 2010</i>) Good agricultural practices are "practices that address environmental, economic, and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products". In India, the Agricultural and Processed Food Products Export Development Authority of India had initiated the development of an India GAP standard. One of the objectives of the standard is to gain benchmarked recognition with GLOBALGAP so as to open the European market to Indian agricultural producers. (Source: <i>Food Safety and Good Practice Certification, FAO</i>) 																													

Approach Title	03: Establishment of Good Value Chain for Agriculture Products		
Project Title	03-04: Establishment of Direct Marketing System		
Project Period	Three years		
Related Ongoing Programme			
Project Area / Target Group	Project Site	In selected roadside sales facilities and urban markets	
	Applicable Zone	Zones 1, 2, 4, 5, and 7	
	Target Group	Farmers' group or any private enterprise	
Implementing Organisation	State organisations under MOA and TCD	Related Organisation	ID

Background / Activities

Background

Agricultural practices in Mizoram State has been steadily transforming from traditional subsistence farming to commercial production. But market-oriented movement for development has not been realised yet even in the area of better accessibility to urban markets. In addition, distribution system of agricultural products is mainly managed and controlled by traders in Assam State and market price is fixed in each stage of distribution channel by forming associates. As it is, trading condition is consolidated, and producers as well as consumers cannot have an option for price negotiation.

Therefore, the project aims to establish a direct sales business model by using roadside facilities and a stall in urban markets separately to the consolidated existing distribution system, and display and extend it. The planned activities will cover the areas of production, post-harvest processing, sales, distribution, and processing by using market information. Additionally, the project will provide for an official support program to these model business activities, and extend it to more recipients in the private sector while improving the contents of support through experiences and foster the motives in the private sector for the development of economic sector in the state.

Activities

(1) Selection and matchmaking of site and organisation

(a) Matchmaking of selected group or enterprise and potential roadside facilities.

Roadside facilities among the existing facilities will be selected and prioritised by inventory survey and traffic survey.

Qualified leaders and organisations suited to the project activities at the roadside facility will be found out.

(b) Matchmaking of selected group or enterprise and a stall of urban market.

Stall of urban market is provided by TCD.

Qualified leaders and organisations suited to the project activities at the stall in urban market will be found out.

(2) Training of basic business management skills

Training of key members on business skills and mind-set by subject like bookkeeping, utilisation of market information, and business management cycle.

(3) Establishment of procurement network and supply chain of products

Establishment and management of purchasing network among member producers and others, and organising members to manage sales of products at the roadside shop or stall in urban market.

(4) Improvement of activities by market information

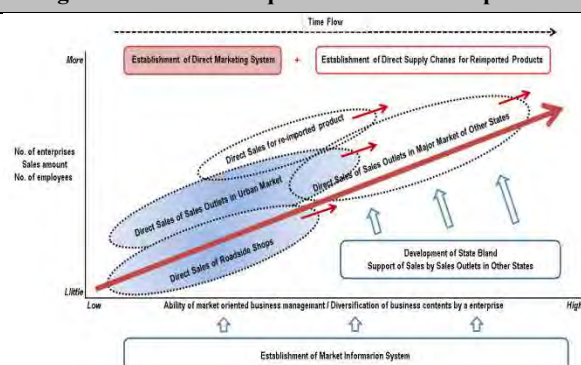
Improvement of activities from the cycle of production to sales that leads to more sales and income by analysis of collected market information such as responses of buyers and trends of product sales.

Photo Roadside Market, Dulte, Champhai Dist.



Source: JICA Study Team

Figure Location on Sequential Flow of Components



Source: JICA Study Team

Overall Goal	Creation of development movement by extension of market-oriented business skills and way of thinking.																	
Project Purpose	Creation of market-oriented business model by direct supply chains out of the existing market system and increase the number of people who can manage their business by themselves.																	
Outputs / Outcomes	Increasing income and job opportunities directly, and mobilising the state economy indirectly.																	
	Year																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Organizing the project coordination committee																		
1-1 Selection of members among Dept. under MOA and TCD																		
1-2 Preparation of plan of operation for project promotion																		
2. Selection of potential roadside facilities*/urban market**																		
2-1 Inventory survey and selection of potential facilities*																		
2-2 Traffic survey of major roads*																		
2-3 Selection of priority facilities* and provision of a stall in market**																		
3. Selection of implementing group / organization																		
3-1 Survey of existing leaders and organizations and select candidates																		
3-2 Awareness seminar of project to candidates and others concerned																		
3-3 Selection or organizing of implementation organization																		
4. Preparation of starting activities																		
4-1 Training to leaders and key persons for management																		
5. Preparation of activities plan of business model																		
5-1 Preparation of annual purchasing plan of products																		
5-2 Preparation of activities plan as business model																		
5-3 Consultation to experts for finalize activities plan of business model																		
5-4 Preparation of guide book, manual, record book, etc																		
6. Starting business activities																		
6-1 Review and improvement of activities every 3 months																		
6-2 Preparation of annual activities plan for next year																		
6-3 Following consultation by experts every year																		
Input																		
Human Resources, Materials, Etc.	Experts in the following relevant fields: • Traffic Survey • Business Management										Budget Rs.8.2 crore							
Remarks	<ul style="list-style-type: none"> • Officers engaged in the project will be trained about market mechanism and basic way of market-oriented business management. • Selection of implementation group/organisation: 1) attach the project to model farming group activities is an effective way, 2) existing groups or enterprises that already started such business is one of the effective candidates because their business will be improved and developed more, and 3) organise group focusing on farmers who collect products and sell at the urban market is an option. • For market reform, the central government announced the strategies in the Model Act, where one of the major issues is the promotion of a producer or their group's direct participation to the market and it is recommended that public organisations and agencies concerned give sufficient support to it. 																	

Approach Title	03: Establishment of Good Value Chain for Agriculture Products		
Project Title	03-05: Establishment of Direct Supply Chain for Re-imported Products		
Project Period	Three years		
Related Ongoing Programme			
Project Area / Target Group	Project Site	Production areas of target products	
	Applicable Zone	Zones 1,2,4, and 7	
	Target Group	Farmers' group and/or any private enterprises	
Implementing Organisation	State organisations under MOA and TCD	Related Organisation	ID

Background / Activities

Background

Agricultural practice of Mizoram State has been steadily transforming from traditional subsistence farming to commercial production. But market-oriented movement for development has not been realised yet even in an area of better accessibility to urban markets. In addition, distribution system of agricultural products is mainly managed and controlled by traders in Assam State and market price is fixed in each stage of distribution channel by forming associates. Then, trading condition is consolidated and producers as well as consumers cannot have an option for price negotiation.

Target products of the project are betel nuts and oranges produced in Mizoram that are purchased by traders from Assam State. These products are transported to their home area in Assam once and re-transport in to major markets in Mizoram after storage or processing. Such products are used to be sold by number of trees prior to the time of harvesting. Then the buyers harvest the products by themselves. As a result, sales price of producers shares very low in the retail price. It means almost all products' market value contributes to the Assam economy.

Against such situation, the project aims to ensure fair allocation of income to people who will be engaged in the project by the establishment of direct supply chains to local market without via Assam.

Activities

(1) Preparation by implementation body

(a) Feasibility study

Clarifying profitability of collective activities of harvesting and sales through a feasibility study of planned activities of producers' group. Explanation to producers and organisation of producers' group showing the results of the study.

(b) Arrangement of management staff and skills

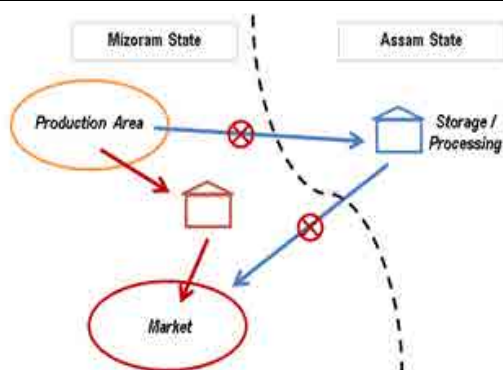
A skilled management staff is necessary especially for storage/processing and sales management.

It will be necessary to consider recruitment if there is no qualified member in the producers' group. Collaboration with experienced enterprise may be one of the practical and effective options. In addition, the enterprise that will gain experience of such direct sales business by the project under this program would be one of the partners to producers' group.

(2) Establishment of supply chain

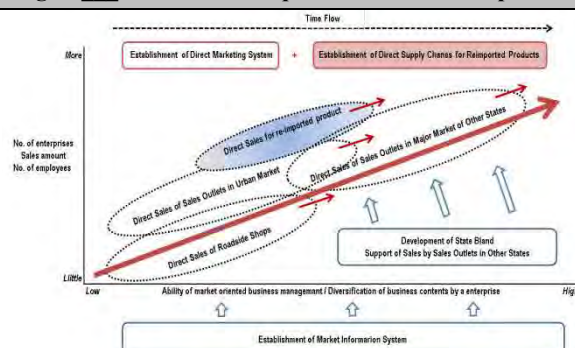
The urban market(s) will be selected based on planned quantity of products. If the direct sales enterprise will be a partner such as mentioned above, the product would be distributed and sold in their supply chain.

Figure ___ Replacement of Supply Chain



Source: JICA Study Team

Figure ___ Location on Sequential Flow of Components



Source: JICA Study Team

Overall Goal	Creation of development movement by extension of market-oriented business skills and way of thinking																			
Project Purpose	Creation of market oriented business model by direct supply chains out of the existing market. system and attaching storage and processing activities. Increase the number of people who can manage their business by themselves.																			
Outputs / Outcomes	Increasing income and job opportunities directly, and mobilising the state economy indirectly.																			
Activities	Year																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Selection of product and place	■																			
1-1 Select candidate products	■																			
1-2 Survey and select leaders and organizations of producers	■																			
1-3 Design business model of collective activities of producers	■																			
1-4 Awareness seminar of the business model to candidates	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1-5 Select or organize implementation organization (IO)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2. Plan of intermediate activities like storage (if needed*)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2-1 Plan of staff allocation	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2-2 Preparation of facility design	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2-3 Feasibility study of activities	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2-4 Installation of facilities / equipment	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3. Plan of direct sales activities	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3-1 Plan of supply chain development	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3-2 Plan of staff allocation	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4. Plan of total business model activities	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4-1 Train leaders and key persons for business management	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4-2 Train operators/managers for facilities/equipment*	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4-3 Prepare activities plan from collection to sales of products	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4-4 Consult to experts for finalizing activities plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4-5 Prepare guide book, manuals, record forms, etc.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
5. Starting business activities	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
5-1 Review and improve activities every 3 months	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
5-2 prepare annual activities plan for the next year	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
5-3 Following consultation by experts every year	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Input																				
Human Resources, Materials, Etc.												Budget								
Experts in the following relevant fields: • Plant engineering • Business Management • Marketing												Rs.10.5 crore								
Remarks																				
<ul style="list-style-type: none"> • For introduction of storage and/or processing activities, additional operation and management skills will be necessary for cash flow management more than the facility itself, because products will be stored for a certain period. If they will incur shortage of cash, a short-term credit will be provided by official support. • As mentioned above, business activities will be diversified and expanded compared with simple direct sales activities, the fluctuation of cash balance will be wider by time gap of payment and receipt of money. To maintain and develop their business, appropriate financial support must be provided. 																				

Approach Title	03: Establishment of Good Value Chain for Agriculture Products		
Project Title	03-06: Development of State Brand and Support to Sales of Brand Products by Sales Outlets in Other States		
Project Period	Four years		
Related Ongoing Programme			
Project Area / Target Group	Project Site	Production areas and big city markets in other states	
	Applicable Zone	Zones 1, 2, 4, and 7	
	Target Group	Producers, processors, traders and others	
Implementing Organisation	State organisations under MOA and TCD	Related Organisation	ID

Background / Activities

Background

Agricultural practice of Mizoram State has been steadily transforming from traditional subsistence farming to commercial production. But market-oriented movement for development has not been realised yet. In addition, distribution system of agricultural products is mainly managed and controlled by traders in Assam State and market price is fixed in each stage of distribution channel by forming associates.



While enterprises that can be managed through market-oriented business by themselves will be needing support in their sales efforts for expanding their market out of Mizoram State.



The support program consists of sales promotion by state brand development and establishment of outlets (Antenna Shops) in major markets in other states.

Activities

(1) State-Brand Strategy Management and Implementation Committee (SSMIC) <Temporary name>

Management and implementation organisation of the project will be established by inviting producers, processors, traders, experts, universities, colleges, financial organisations, state departments concerned and others.

(2) Development of state brand

Designing a state brand with logo, symbol mark, and image story will be developed based on the analysis of state resources, this will not only be done for products but also for people, history, culture, and nature.

(3) Selection of state brand products

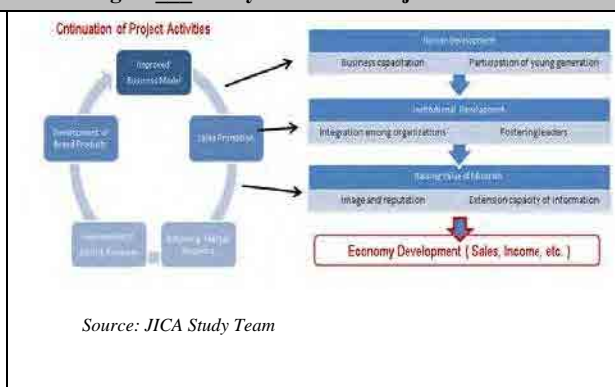
The first 2–3 products that suit to the State Brand will be selected and the business model for sales promotion to other states will be planned. Mizo Antenna Shop (Sales outlet) #1 will be established at a stall in the big city market behind Assam State and will provide sales promotion activities such as retailing, advertising, and extension of the Mizo brand, coordination of wholesale business between Mizo sellers and buyers, and market information collection on Mizo products and feedback to local suppliers.

(4) Continuation of activities

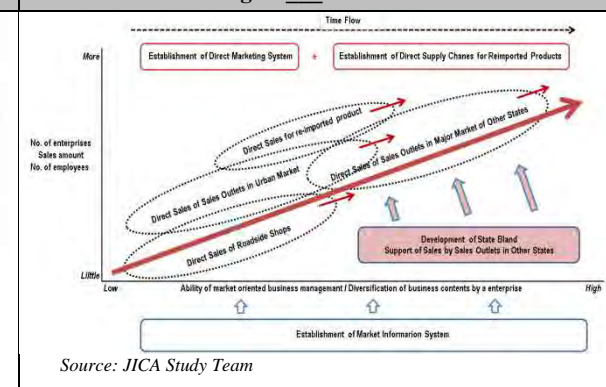
Continue the activities by improving them through Plan-Do-See management, adding more branded products.

In line with the expansion of activities by the project, Antenna Shop will expand its locations in the big cities of India. And if its sales amount would increase and would encounter difficulty in management of the stall in the market, a separately owned outlet shop would be established near the market where more attractive events can be done for sales promotion and advertisement of Mizo Brand.

Figure__ Many Effects of Project Activities



Figure__ Location



Overall Goal	Creation of development movement by extension of the Mizo brand promotion activities.																		
Project Purpose	Sales increase of products sold in the other states by extension of the Mizo brand. Increase in number of people who can manage their business by themselves.																		
Outputs / Outcomes	Increasing income and job opportunities directly, and mobilising the state economy indirectly.																		
Activities	Year																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Organization of Management and Coordination Committee	■																		
2. Establishment of Mizo State Brand	■																		
2-1 Study of recourses of Mizo	■																		
2-2 Seminar of Mizo identification for Mizo Brand Strategy	■																		
2-3 Designing of Mizo Brand and Image story	■																		
2-4 Regulation of qualification for Mizo Brand products	■																		
3. Selection of Mizo Brand products	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3-1 Select products having characteristics of Mizo images	■	■	■	■															
3-2 Prepare support program to Mizo Brand products	■	■	■	■															
3-3 Review and improvement of support program a year		■	■	■	■														
4. Preparation of sales promotion plan of Mizo Brand products	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4-1 Market survey out of Mizoram for branded products	■	■	■	■															
4-2 Preparation of sales promotion plan	■	■	■	■															
4-3 Training of key persons of producer and supplier	■	■	■	■															
5. Advertisement of Mizo Brand and branded products	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
6. Starting sales in the other state markets <Suppliers>	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
6-1 Review and improvement of activities every 3 months	■	■	■	■															
6-2 Preparation of annual activities plan for next year	■	■	■	■															
<Sales outlet shops>																			
1. Establishment of sales outlets in city markets out of Mizoram	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1-1 Study of market potential and preparation of priority list of cities	■																		
1-2 Forming management body of shops	■	■	■	■															
1-3 Preparation of management plan of shop	■	■	■	■															
1-4 Training of staffs of outlet shop	■	■	■	■															
2. Establishment outlet shop	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2-1 Review and improvement of activities every 3 months	■	■	■	■															
2-2 Preparation of annual activities plan for next year	■	■	■	■															
Input																			
Human Resources, Materials, Etc.	Experts in the following relevant fields: • Marketing • Business Management • AD Designer • AD Planner • Facilitator of the Seminar										Budget Rs.14.3 crore								
Remarks	<ul style="list-style-type: none"> • The implementation organisations of direct sales model project and other experienced enterprises such as CIDAR, HCP and ZEP & ZAGS will be invited to serve as members of SSMIC. • Ability of the Antenna Shop's staff in the big cities out of Mizoram State is very important for the success of the project. Selection and recruitment of management staffs of the shop will be done carefully. Recruiting from the organisation that will be implementing direct sales business at a stall in the urban market supported by the programme is one of the options. • Does the business have enough number of people managing well will be fostered through the activities of other direct sales projects under the programme will be an important pre-condition for the success of this project. The skilled workers and knowhow obtained from the activities of the project stated earlier shall be utilised fully in starting this project. 																		

Approach Title	03: Establishment of Good Value Chain for Agriculture Products		
Project Title	03-07: Development of Horticulture Agro-industry		
Project Period	Five years		
Related Ongoing Programme	Mission for Integrated Development of Horticulture (MIDH)		
Project Area / Target Group	Project Site	Horticultural crop production area and major urban area	
	Applicable Zone	Zones 4 and 7	
	Target Group	All stakeholders involved in the horticultural agro-industry	
Implementing Organisation	DOH	Related Organisation	DOA, TCD, DOI, KVK, ICAR, Mizoram University

Background / Activities

Background

In order to sustain and develop appropriately the agriculture sector in Mizoram State, the development of horticultural crops holds an important position. In a long-term perspective, it is essential not only to enhance the agricultural production but also to create new employment by developing ancillary industries based on agriculture. Under such circumstances, there is a sign of new initiative shown like the operation of a winery managed by a group of grape growers, and there are also signs of floricultural industry such as the investment of private flower exporting enterprise and organisation of an independent marketing network by flower growers' association. It is expected that the industry- academia-government collaboration becomes a leading force to develop the saleable products that consumers demand, and to promote the horticulture agro-industrialisation.

Activities

(1) Establishment and operation of the steering committee (SC) and working group (WG)

- (a) Establishment of a steering committee consisting of producers and their organisations, ICAR, KVK, state government of Mizoram, Mizoram University, food processors, distributors, and retailers.
- (b) Establishment of a working group within the committee to assist its operation.
- (c) Setting up of the operating procedures of the steering committee and working group.
- (d) Operation of the steering committee and working group using the operating procedure.


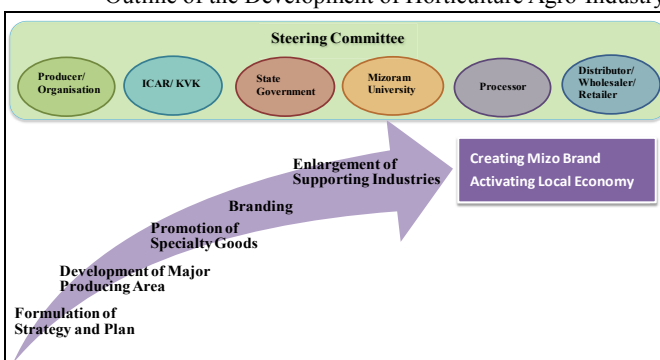
(2) Preparation of the brand creation plan in Mizoram



- (a) Study on the trends and consumers' preferences within the state and international markets by the working group.
- (b) Preparation of the draft plan of brand creation by the working group.
Candidate target: Grape/wine, flower, high-class fruit, essential oil/skin lotion, juice/jelly, health/medical benefits
- (c) Finalisation of the plan by the steering committee.

(3) Product-wise implementation of the brand creation plan

- (a) Construction of new measures to develop each target product by integrating various know-hows owned by committee members.
- (b) Preparation of action plan to implement new measures of each target product.
- (c) Creation of the support system among all stakeholders related to the target product.
- (d) Provision of support services by the state government.

New product development, vocational training, product promotion, trade fair/ exhibition (domestic/ international)

Figure / Table / Photo	Figure / Table / Photo
 <p style="text-align: center;"><i>Source: JICA Study Team</i></p> <p style="text-align: center;">Bottling and labelling in the winery, Champhai</p>	<p style="text-align: center;">Outline of the Development of Horticulture Agro-Industry</p>  <p style="text-align: center;"><i>Source : JICA Study Team</i></p>

Approach Title	03: Establishment of Good Value Chain for Agriculture Products		
Project Title	03-08: Development and Enhancement of Industrial Crop Production and Processing		
Project Period	Three years		
Related Ongoing Programme	National Mission on Oilseeds and Oil Palm, NLUP		
Project Area / Target Group	Project Site	At selected rural development blocks	
	Applicable Zone	Zones 3 and 5	
	Target Group	Farmers cultivating TBO and other oil related plants	
Implementing Organisation	DOA	Related Organisation	DOH, AHVD, SWCD, EFD, DCRR
Background / Activities			
<p>Background</p> <p>Tree-borne oil (TBO) seeds have been promoted by the government; and tung, jatropha, etc., have been planted in Mizoram, but are not utilised efficiently due to: i) lack of oil milling facility and ii) lack of market for the produced oil in accordance with the hearing survey made by the Study Team. Other than TBO, oil seed crops are cultivated and material plants of essential oils and aromatherapy oils are naturally grown. In case of oil palm, three (3) private companies are purchasing oil palm in the proper manner. But tung and jatropha harvesting have not been properly implemented, likewise, monitoring and follow-up have not been carried out by the departments, and so farmers are not acquainted with the market of their products. Cultivation of TBOs fits to the geographical characteristics of Mizoram and TBOs could be planted in the slope land where crop cultivation is not appropriate. In addition, TBOs are good as measures for soil and water conservation on the slope area. Since essential oil extracted from natural plants and flowers might be of high value in the market, oil production will contribute to the income enhancement of subsistence farmers for further income generation development. Considering the situation discussed above, it is very much necessary to carry out research for valuable plants available in Mizoram and development production, processing, and marketing in the industry-academia-government collaboration.</p> <p>Activities</p> <p>(1) Establishment of steering committee (SC) for industry-academia-government collaboration</p> <p>A steering committee for the promotion of industrial crops shall be set up and consist of representatives of plant growers, University of Mizoram, ISOPOM, ICAR / KVK, state government and relevant departments, oil companies, and distributors.</p> <p>(2) Implementation of study and survey</p> <p>(a) Organise a study and research team on listing up of useful TBOs, oil seeds crops, indigenous plants and flowers in Mizoram.</p> <p>(b) Prepare the proposals on production, processing, and marketing based on the results of study and research.</p> <p>(c) Prepare a guideline, extension manuals, and draft action plan.</p> <p>(d) Select five RDBs for the pilot project implementation.</p> <p>(3) Implementation of the pilot project</p> <p>(a) Hold a workshop/ seminar in each RDB with relevant stakeholders: Introducing the project outline and objectives and preparing a community action plan. Establish a FO/FG and introduce the mechanism based on the ATMA extension system.</p> <p>(b) Arrange basic facilities through community action planning and management: Construct and procure basic facilities and equipment through community managed construction system.</p> <p>(c) Conduct trainings and seminars for strengthening farmer's group.</p> <p>(d) Provide materials with technical services.</p> <p>(e) Monitor and evaluate the pilot project and finalise guidelines and other extension manuals, etc.</p> <p>(4) Formulation of the state action plan to promote plant oil production and marketing</p>			
Figure / Table / Photo		Figure / Table / Photo	
 <p>Source: JICA Study Team Tung trees in Lawngtlai District</p>		 <p>Source : JICA Study Team Photos of essential oil and plants</p>	

Approach Title	03: Establishment of Good Value Chain for Agriculture Products		
Project Title	03-09: Development of Business-Oriented Post-harvest Skills		
Project Period	4 years		
Related Ongoing Programme	Sub-Mission on Agricultural Mechanisation		
Project Area / Target Group	Project Site	At selected rural development blocks	
	Applicable Zone	All zones	
	Target Group	Farmers' group or any private enterprise	
Implementing Organisation	KVK, DOA	Related Organisation	DOH, DOF, DOAV, DCRZ

Background / Activities

Background

In villages in mountainous areas, subsistence farmer's income is unstable because of limited agricultural products. Meanwhile, as described in the project entitled 'Establishment of Direct Supply Chain for Re-imported Products', some agricultural products are stored or processed in Assam State and re-imported to Mizoram. Furthermore, the problem of unemployment of young people has been worsening even though some villages are facing lack of young labourers, who decided to leave their villages. Under this situation, the project aims to increase farmers' income and job opportunities for young people by raising the market value of agricultural products through introduction and extension of mechanisation especially in the field of post-harvest processing, distribution and processing of agricultural products. Then, the project will create a new technical supporting system on mechanisation for fostering regional business models in the fields under the establishment of an appropriate agricultural extension suited to the farming circumstance in Mizoram. Practically, the project plans to attach the facilities and service provision activities to the proposed Agrarian Service Centre.

Activities

(1) Preparation of implementation plan and selection of potential group

The project promotion and coordination committee will be established by organising all representatives of stakeholders especially young people having a mind-set of business to establish appropriate project policy.

(2) Survey of the farming practice and selection of potential machineries and equipment

The following activities will be conducted by KVK / ATMA together with the youth as supporters to make them learn the basic knowledge about this field: (a) clarification of farming practices and post-harvest loss assessment survey for major crops in the areas, (b) selection of potential machineries and equipment that can be used, and (c) assessment of benefits that will be returned by each machinery, and equipment to be used.

(3) Preparation of business management plan and selection of machineries, etc.

Management plan of this business model will be evaluated in the committee, and simulation analysis of cost and profit shall be conducted. Under the above procedure, machineries and equipment will be selected, and candidate farmers/youths will be trained through the support of KVK and other organisations concerned to gain the necessary skills for the operation and maintenance of machineries and equipment.

(4) Facility construction and starting the regional business model activities

Expected facilities will be a godown for machineries and equipment, a workshop, and an office. Also preliminary works and construction work will be carried out by the candidate farmers/youths through CMC system (please refer to Project Title No. 01-4) to strengthen candidates' capacity and to create funds for operation. A facility for rice mill and/or a flourmill will be attached on the basis of needs.

(5) Expansion of processing activities

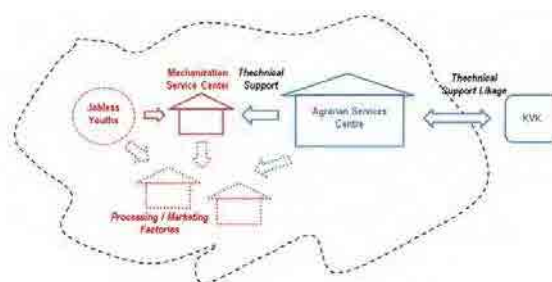
After the achievement of proper and sustainable management condition of the business, various follow-up processing and/or marketing business models will be considered in the same procedure starting from the confirmation of villagers' needs and the committee will establish business activities one by one under this business enterprise or separately.

Figure __ Coordination Committee



Source: JICA Study Team

Figure __ Location on Sequential Flow of Components



Source: JICA Study Team
Relation of ASC and Project Activities

Appendix 5 DPR Preparation Guideline

DPR PREPARATION GUIDELINE

FEBRUARY 2015

**MINOR IRRIGATION DEPARTMENT
STATE GOVERNMENT OF MIZORAM**

1. AIMS OF THE GUIDELINE

The minor irrigation facilities are one of the most important agriculture infrastructure in the state and 439 minor irrigation schemes were developed in the past years. However, the inventory survey carried out from October 2013 to February 2014 showed that 49% of the created irrigation potential under minor irrigation facilities is not in use and only 7% of the facilities are properly maintained by established water users' association (WUA).

Analysing the present situation of the minor irrigation scheme, the state government requested the JICA Study Team to improve the procedure for the preparation of the Detailed Project Report (DPR) with field verification and the guidelines for preparation of DPR on minor irrigation scheme development have been prepared.

The guideline is mainly focusing on the stakeholders' involvement in the planning process such as the beneficiaries, Department of Agriculture (DOA), and Department of Horticulture (DOH), to encourage and motivate the maximum and proper utilisation of the irrigation facilities and necessary supporting activities from relevant governmental organisations.

The guideline recommends 12 steps for the finalisation of the DPR. The guideline shows the main activities under each step and the main and sub responsible organisation to implement them. The guideline was made as simple as possible and necessary forms to be used were attached with useful reference.



2. OVERALL PROCEDURE FOR DPR PREPARATION

There are 12 steps for improved DPR preparation. The contents of each step and main and sub responsible organisations are summarised below.

STEP 1	Publication of Minor Irrigation (MI) Scheme Selection and Implementation Procedure and Receipt of Application	<u>Main Responsibility</u> MID
	<u>Points Improved</u> <ul style="list-style-type: none"> Standardize the application procedure by development of application format. Imposing Minor Irrigation Department (MID) to publish the selection and implementation procedure to maintain transparency. 	<u>Sub Responsibility</u> -
STEP 2	Preliminary Technical Site Survey for Scheme Selection	<u>Main Responsibility</u> MID
	<u>Points Improved</u> <ul style="list-style-type: none"> Standardize the preliminary survey procedure and items with development of format. 	<u>Sub Responsibility</u> -
STEP 3	Preparatory Meeting among Relevant Departments in Divisional Level	<u>Main Responsibility</u> MID, DOA, DOH, Other department concerned
	<u>Points Improved</u> <ul style="list-style-type: none"> Make preparatory meeting among the relevant departments compulsory in the beginning for better coordination of DPR preparation. 	<u>Sub Responsibility</u> -
STEP 4	Evaluation and Selection of MI Development Project	<u>Main Responsibility</u> MID, DOA, DOH, Other department concerned
	<u>Points Improved</u> <ul style="list-style-type: none"> Setting clear selection criteria. Involving departments other than MID in the selection procedure. 	<u>Sub Responsibility</u> -
STEP 5	Establishment of Water Users' Association (WUA)	<u>Main Responsibility</u> MID
	<u>Points Improved</u> <ul style="list-style-type: none"> Having compulsory awareness workshop to make the farmers understand the objective and responsibility of WUA. 	<u>Sub Responsibility</u> -
STEP 6	DPR Preparatory Survey	<u>Main Responsibility</u> MID
	<u>Points Improved</u> <ul style="list-style-type: none"> Making joint walkthrough survey by stakeholders compulsory to share the present problem in the field Necessary survey items are clarified and checklist was made for the survey. 	<u>Sub Responsibility</u> DOA, DOH Other concerned departments

STEP 7	Preparation of Agriculture Action Plan	<u>Main Responsibility</u> WUA, MID, DOA, DOH, Other concerned departments
	<u>Points Improved</u> <ul style="list-style-type: none"> Involving farmers and agriculture-allied departments in preparation of proposed cropping pattern. Imposing the preparation of action plans to materialize the proposed crop cultivation. 	<u>Sub Responsibility</u> VCP
STEP 8	Irrigation Planning	<u>Main Responsibility</u> MID
	<u>Points Improved</u> <ul style="list-style-type: none"> Improvement of the way of assessing the water resource and crop water requirement 	<u>Sub Responsibility</u> -
STEP 9	Facility Design and Preparation of O&M Plan	<u>Main Responsibility</u> MID, WUA
	<u>Points Improved</u> <ul style="list-style-type: none"> Imposing the preparation of operation and maintenance (O&M) plan for the proposed facilities. 	<u>Sub Responsibility</u>
STEP 10	Preparation of Construction and Quality Control Plan	<u>Main Responsibility</u> MID
	<u>Points Improved</u> <ul style="list-style-type: none"> Imposing the preparation of construction plan and quality control plan for construction works. 	<u>Sub Responsibility</u> -
STEP 11	Cost Estimation, Benefit and Other Impact Assessment	<u>Main Responsibility</u> MID
	<u>Points Improved</u> <ul style="list-style-type: none"> Cost estimation format was standardized. Economic assessment format was standardized. 	<u>Sub Responsibility</u> DOA, DOH, DOF
STEP 12	Consensus Building and Finalization of DPR	<u>Main Responsibility</u> WUA, MID, DOA, DOH, Other concerned departments
	<u>Points Improved</u> <ul style="list-style-type: none"> Imposing to have the ratification meeting among the stakeholders for the contents of DPR 	<u>Sub Responsibility</u> -

ANNUAL PREPARATION SCHEDULE														
CONTENTS		DEC	JAN	FEB	MAR	APR	MAY (KHARIF)	JUN (KHARIF)	JUL (KHARIF)	AUG (KHARIF)	SEP (KHARIF)	OCT	NOV	DEC
STEP 1	PUBLICATION OF MI SCHEME SELECTION AND IMPLEMENTATION PROCEDURE AND RECEPTION OF APPLICATION	▲												
STEP 2	PRELIMINARY TECHNICAL SITE SURVEY FOR SCHEME SELECTION		■	■	■									
STEP 3	PREPARATORY MEETING AMONG RELEVANT DEPARTMENTS IN DIVISION LEVEL				■									
STEP 4	EVALUATION AND SELECTION OF MI DEVELOPMENT PROJECT					■								
STEP 5	ESTABLISHMENT OF WUA					■	■	■						
STEP 6	DPR PREPARATORY SURVEY					■	■	■						
STEP 7	PREPARATION OF AGRICULTURE ACTION PLAN							■	■	■				
STEP 8	IRRIGATION PLANNING								■	■	■			
STEP 9	FACILITY DESIGN AND PREPARATION OF O/M PLAN										■	■	■	■
STEP 10	PREPARATION OF CONSTRUCTION AND QUALITY CONTROL PLAN										■	■	■	■
STEP 11	COST ESTIMATION, BENEFIT ASSESSMENT AND OTHER IMPACT ASSESSMENT												■	■
STEP 12	CONSENSUS BUILDING AND FINALIZATION OF DPR													■

3. STEP WISE PROCEDURE

**STEP 1
PUBLICATION OF
MINOR IRRIGATION
SCHEME SELECTION
AND
IMPLEMENTATION
PROCEDURE**

**RECEIPT OF
APPLICATION**

[MAIN RESPONSIBILITY]

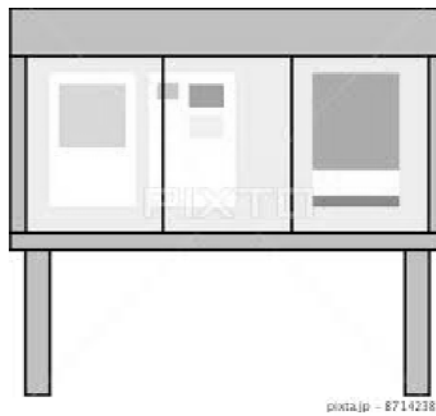
MID divisional officers such as executive engineer, sub-divisional engineer or junior engineer

[SUB RESPONSIBILITY]

-

[DESCRIPTION OF STEP]

The Minor Irrigation Department (MID) notifies the eligibility, schedule, selection procedure and criteria and necessary application form through official letters and/or bulletin board in the division office every year to ensure the transparency of the selection and to encourage stakeholder’s necessary involvement.



A group of farmers who would like to apply for minor irrigation scheme development, discusses and collects the information necessary to fill in the application form (refer to the “FORM 1 Application Form for Minor Irrigation Development”) and submits the application to MID Divisional Office by the due date. The MID divisional officers such as executive engineer, sub-divisional engineer or junior engineer facilitate or support the applicants to fill in the forms if necessary. The application form mainly requires the following information:

- (1) Name and address
- (2) Location and area of proposed development land and legal document of ownership
- (3) Proposed water resources
- (4) Objectives and proposed crop to be cultivated

After receiving the application form, MID divisional officers will check its conformity and helps the applicants to fill in missing details if required. The application is disqualified at this stage if the form is not filled out properly. Considering the effectiveness of the project, the project whose command area is less than 10 ha is disqualified at this stage.

[FORM AND REFERENCE]

FORM 1-1: Application Form for Minor Irrigation Development

STEP 2 PRELIMINARY TECHNICAL SITE SURVEY FOR SCHEME SELECTION

[MAIN RESPONSIBILITY]

MID divisional officers such as executive engineer, sub-divisional engineer or junior engineer

[SUB RESPONSIBILITY]

-

[DESCRIPTION OF STEP]

After receiving the application form, the preliminary technical site survey is carried out for the selection of the project. In the preliminary technical site survey, the following information are collected at the site or through analysis of the existing data. After conducting the survey or analysis, the result is compiled in the Preliminary Technical Site Survey Sheet (FORM 2-1).

Major Information Collected	Source or Way of Collection
Geological and geographical information	GIS (topographic map) or satellite map
Beneficiaries and land ownership	Interview with farmers
Present land use and farming	Interview with farmers
Availability of water resource and present water right	Site survey and interview with farmers
Relevant projects/ schemes nearby	Collected from relevant departments.
Risk of disasters (floods, landslide, erosion, etc.)	Site survey and interview with farmers
Any considerable impacts on surrounding environment	Site survey and interview with farmers

Since the site survey takes time and money, it is recommended to collect any necessary information in the office first and then conduct the site survey.

Method of Water Resources Measurement

The discharge measurement of the respective water sources is one of the most important survey items in the preliminary technical site survey. The objective of the discharge measurement is to estimate the lean discharge, which is crucial for the improvement of farmers' income generation. On the other hand, water resource availability during karif (monsoon) season can be estimated in Step 8 (irrigation planning) just like in the existing DPR preparation.

Basically, there are three types of discharge measurement methodologies, namely: floating method, V-Notch, and pipe and bucket, as shown below. Floating method is suitable for rivers or relatively large-scale measurement. Otherwise, pipe and bucket method is recommendable during rabi season's stream discharge measurement as it is more accurate and easy to measure.



Floating method



V-Notch method



Pipe and bucket method

Measurement of water discharge from targeted stream or river should be conducted from the middle of January to early February. Measurement should be conducted near the proposed intake site and where flow of stream is stable and straight.

MID surveyor should confirm with farmers that the measured discharge value is not extraordinary compared with the usual year.

**STEP 2
PRELIMINARY
TECHNICAL SITE
SURVEY FOR
SCHEME
SELECTION**

Measurement should be conducted at least five times. Also, the average value is to be used after excluding extraordinary values. When stream flow is blocked or below the level of the V-Notch, surveyor must wait until the upper stream water level is raised to a stable level.

Picture of measurement should be taken together with the board which shows measuring conditions and result.

When it comes to assessment of water resource availability in the rabi season, smaller discharge value is used as design rabi season water resource availability, comparing measured discharge and calculated estimation discharge. (Refer to Step 8 for details.)

Other general water measurement reference materials are attached in the appendix.

Example of discharge water measurement result is shown below.

Date of Measurement	**/ ** / 2014
Surveyor	**** division SDO
Measured discharge	Thingkhuanglui -11.10 (L/S)

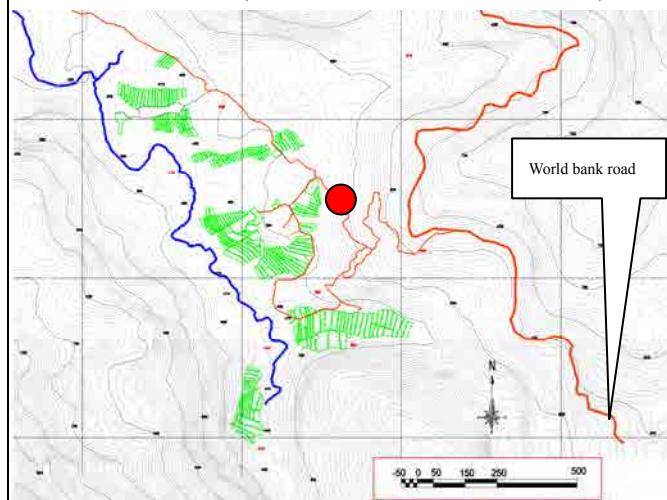


Pipe and bucket method



V-Notch method

Coordinate (X=477686.9918 Y=2579861.6455)



[FORM AND REFERENCE]

Forms

- FORM 2-1 : Preliminary technical site survey sheet
- FORM 2-2 : Discharge measurement result sheet

**STEP 3
PREPARATORY
MEETING AMONG
RELEVANT
DEPARTMENTS IN
DIVISION LEVEL**

[MAIN RESPONSIBILITY]

Executive engineer in MID divisional office

[SUB RESPONSIBILITY]

District agriculture officer, DOA

District horticulture officer, DOH

District fishery officer, DOF

Other departments concerned

[DESCRIPTION OF STEP]

The initial preparatory meeting is held at this time with officers concerned in the division level. Concerned departments are DOA, DOH, DOF, and DOSWC.

In this meeting, the implementation procedure, selection procedure, time schedule, and responsibility of each department are confirmed in the beginning and divisional priority on the candidate schemes is discussed based on the result of preliminary technical site survey.



[FORM AND REFERENCE]

None

STEP 4 EVALUATION AND SELECTION OF MI DEVELOPMENT PROJECT

[MAIN RESPONSIBILITY]

Chief engineer in MID
Director of Agriculture
Director of Horticulture

[SUB RESPONSIBILITY]

Other department concerned

[DESCRIPTION OF STEP]

Among the candidate projects endorsed by the group of farmers, the possible projects are selected in this step. The possible projects are selected based on the selection criteria which is agreed and published in advance by the state-level stakeholders and divisional officers. Equal responsibilities are given to DOA, DOH and MID since these departments are mainly involved in further steps for DPR preparation and O&M stage of the scheme.

The overall section procedure is shown in Figure 4.1.

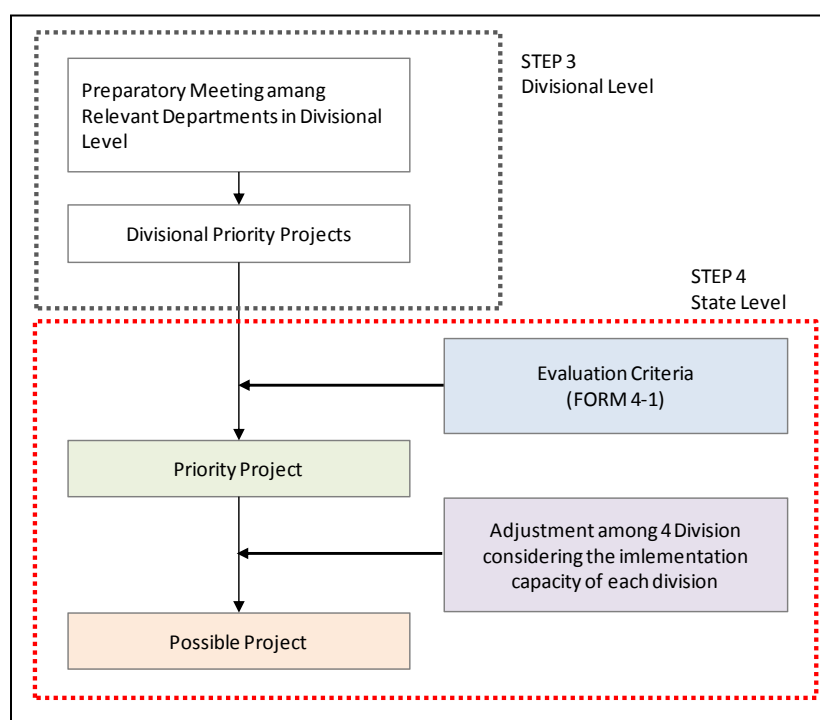


Figure 4-1 Procedure for Step 4

The criteria is shown in FORM 4-1: Evaluation Criteria and Evaluation Sheet. In the aspects of rationality, effectiveness, efficiency, impact and sustainability, 11 criteria are employed. The evaluator gives the mark for each criteria, namely: “High (Big)”, “Middle (Medium)” or “Low (Small)”, and gives 1 to 3 points for each criteria. After that, the evaluator sums up the points for each candidate project in divisional basis and gives the priority in each division.

Based on the divisional priority, the possible projects are selected considering the implementing capacity of each divisional staff.

The criteria should be reviewed and revised yearly based on the adaptability of the expected fund, if needed.

[FORM AND REFERENCE]

FORM 4-1 Evaluation Criteria and Evaluation Sheet

STEP 5 ESTABLISHMENT OF WATER USERS' ASSOCIATION (WUA)

[MAIN RESPONSIBILITY]

MID divisional officers such as executive engineer, sub-divisional engineer or junior engineer

Respective officers in MID head office

[SUB RESPONSIBILITY]

-

[DESCRIPTION OF STEP]

Although MID is handing over responsibility for the operation and maintenance of the irrigation facilities to established WUAs, almost all WUAs in Mizoram do not understand their roles and responsibilities and they do not have necessary fund either. This step encourages them to be aware of the importance of autonomous operation and maintenance of WUA and gives them the kickstart to initiate the activities. For this purpose, audio-visual aids such as video that introduces a good model of WUA activities will be useful to change or deepen their awareness in the first session of the step. In this regard, it is also necessary that the facilitator/MID staff should have basic and practical ideas on how to manage and develop WUAs in a sustainable way. This is to be provided to farmers accordingly during this step. In order to promote a strong awareness, this step will be conducted under a workshop style.

Necessary tools and materials for the workshop, and sample agenda and time schedule are attached in REFERENCE 5-1 and in REFERENCE 5-2, respectively. The outline of the workshop is as follows:

(1) Introduction



KEY NOTE

Explain the objectives, time schedule, and responsibility of each participant.
Ice breaker among the participants for active discussion in the workshop.

(2) Discussion on the Current Concern on Cooperative Activities or Existing CBOs including WUA if available.



KEY NOTE

If some CBOs are available, explain the existing CBO such as their members, activities, and regulations.
During this session, facilitator and officials find farmers' spontaneous activities or good behaviour that could be brought in WUA. In this point of view, give several kinds of questions to farmers.

(3) Introduction of a Model WUA or Farmer's Organisation by Showing Video



KEY NOTE

Introduce the key organisational characteristics of successful WUAs, using an audio-visual display
Key organisational characteristics will be pointed out: degree of spontaneous action, periodic discussions, planning by members, record keeping, fund raising and credit activities, cooperative/group actions, and unity.
Discuss each point with the farmers/group and decide which of those points are important for the WUA they would like to establish and mark them on the paper.

STEP 5 ESTABLISHMENT OF WATER USERS' ASSOCIATION (WUA)

(4) To Recognise WUA's Function, Discuss Benefit of Group Activities



KEY NOTE

According to the findings from the video for advanced WUA, the officer facilitates the discussion on the benefit of group activities such as operation and maintenance of irrigation facilities, any type of negotiations with government and private sector (purchasing of inputs or selling of harvest), and cooperative purchasing and shipping. Officer also facilitates the necessary actions to achieve the above.

(5) Discussion on Vision, Objective, Rules and Regulations of WUA



KEY NOTE

Review previous activities and try to set up a self-organised WUA based on farmer's positive ideas. At this stage, farmers have basic knowledge and sense of anticipation to establish their WUA. However, it is better to show model rules and regulations, basic document list, and other legal matters concerning registration. The following output will be expected:

- Creation of vision and long-term objectives
- Role and function of WUA in general
- Definition of who the members of the organisation are
- Basic documents for the establishment of the WUA
- Preparation of draft rules and regulations
- Nomination of committee members and officers (if necessary)

It is better to implement a model committee meeting among the participants in order to guide them on how to hold meetings. It is also possible to prepare a short-term action plan in this occasion to facilitate further activities after the workshop.

(6) Preparation of Documents for Registration of WUA

KEY NOTE

Explanation of registration methods and necessary items. Prepare further registration schedule.

[FORM AND REFERENCE]

REFERENCE 5-1: Necessary Tools and Materials for Establishment of WUA Workshop

REFERENCE 5-2: Sample Agenda and Time Schedule for Establishment of WUA

REFERENCE 5-3: List of Documents Necessary for WUA Management

REFERENCE 5-4: Reference for WUA Rules and Regulations

STEP 6 DPR PREPARATORY SURVEY

[MAIN RESPONSIBILITY]

MID divisional officers such as executive engineer, sub-divisional engineer or junior engineer

Respective officer in MID head office

[SUB RESPONSIBILITY]

District agriculture officer and agriculture extension officer, DOA

District horticulture officer and horticulture extension officer, DOH

District fishery officer, DOF

Other department concerned

[DESCRIPTION OF STEP]

The DPR preparatory survey is carried out to collect the necessary technical data and information for irrigation planning and facility design. Major survey items and activities to be carried out in this step are as follows:

- (1) Preparation of base map for planning
- (2) Conduct of soil classification test
- (3) Conduct of topological survey (if necessary)
- (4) Conduct of walkthrough survey to identify potential disaster site, present land use and land ownership, and existing facilities

(1) Preparation of Base Map for Planning

Base map can be the foundation data for various survey works, planning, and design works. Therefore, base map should have scale, coordinates, and contours, and it has to be referred to the aerial picture. Preparation step of base map and roles of each office are shown in the table below.

S/N	Item	Work to Do	Role	Tools to Use
1	Specify the area and inform to CE Office	Specify the targeted area for the project and identify the coordinates of the corners	Division office	GIS or Google Earth
2	Preparation of contour map	Convert GIS DEM data into contour lines within above specified area and save the data as DWG data	CE Office	Arc GIS
3	Tracing of existing facilities	Trace existing facilities like road, river, paddies, and structures with GIS and save the data as DWG data	CE Office	Q-GIS or Arc GIS
4	Capture of aerial picture data	Capture aerial picture data from website with Q-GIS or others	CE Office	Q-GIS or other
5	Overlay of above data	Overlay above data (contour line, existing facilities, aerial picture data) and prepare base map	CE Office	AutoCAD
6	Send base map to division office	Send above data to division office by email or SUMO service.	CE Office	

Contour lines are created from DEM data of GIS. However, they cannot reflect detailed geological condition. Recommended contour interval is 5 m.

STEP 6 DPR PREPARATORY SURVEY

Arc GIS should be used to create contour map, although it can be done with Q-GIS software.

Coordinate type of the base map is universal transverse mercator (UTM).

Although base map has coordinate information, the map is not so accurate for detailed facility design use. Also, several meters are expected to be the tolerance of accuracy.

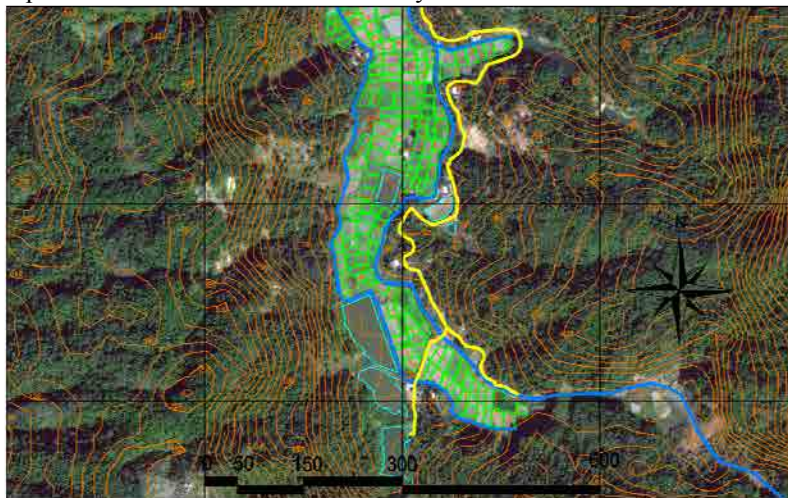


Figure 6-1 Sample of base map

(2) Conduct of Soil Classification Test

Soil classification test result form (Form 6-2) is used to show the test result.

With regard to soil sample taking, surveyor should choose typical soil in the scheme area in consultation with the farmers. In case there are several different typical soils, soil test shall be conducted for each type. Soil classification test should be conducted after removing small stones and organic materials.

When soil sample needs adjustment of soil moisture, water spray should be used for detailed adjustment.

Picture of the test should be taken together with the board that shows the measurement conditions and result.

Result of the soil classification test shall be an attachment to the DPR and the result can be used for cropwat irrigation calculation.



Photo 6-1 Image of soil classification test

**STEP 6
DPR
PREPARATORY
SURVEY**

(3) Conduct of Topological Survey

Topological survey is recommended for the following structure design:

Survey	Machine	Target Facility
Ground level profile and section survey	Dumpy level or Total station	- Gentle slope canal and drainage - Pressured pipe profile - Dam or pond area
River profile and section survey	Dumpy level or Total station	- Relatively large-scale river diversion weir - Improvement of drainage
Area survey	Total station	- Gentle slope land development area - Dam or pond area

MID keeps two total station machines in Aizawl as of 2014. Total station survey result can be converted into Autocad data. Therefore, division office can receive the data even through internet.

Total station survey data has UTM coordinates. Also, the survey data can be imported with GIS software and Google Earth. Division office has to check the coordinates of the total station survey, as surveyor sometimes makes mistakes in the direction of the coordinates. An example of total station survey result is shown below.



Figure 6.2 Sample of Total Station Survey Result

(4) Walkthrough Survey, Especially Potential Disaster Site Survey

Disaster survey is to be conducted to clarify existing conditions of flooding-, erosion and landslide-damaged area and grasp potential risky area. Then, the result shall be reflected in facility planning and design. The following are the main targets of the survey:

- Facility planned area
- Along canal, candidate alignment
- Along existing river, drainage and canal



Canal Blocked with Landslide sediments

Surveyor shall visit the proposed area and conduct field survey together with WUA. The surveyor shall also take necessary measurement of damaged or potential risk area, and show the result in the base map. (Example of disaster survey result is shown below.)

**STEP 6
DPR
PREPARATORY
SURVEY**

Survey tools are levelling staff, tape measure, GPS, camera, base map, and shovel.

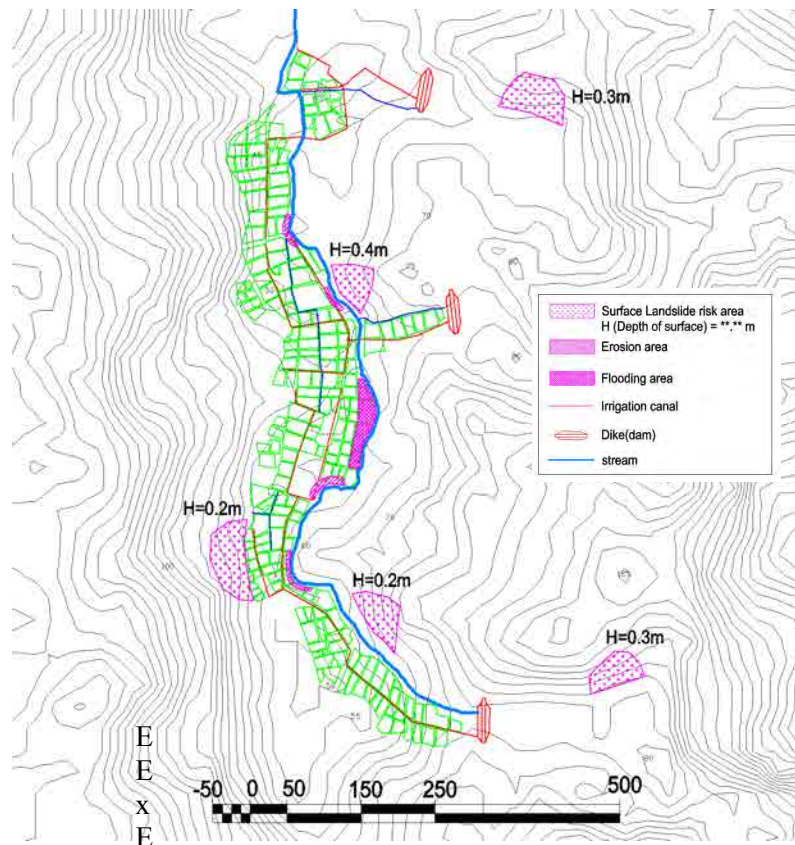


Figure 6.3 Sample of Disaster Survey Result

[FORM AND REFERENCE]

- FORM 6-1; DPR preparatory survey check sheet
- FORM 6-2; Soil classification test result form

STEP 7 PREPARATION OF AGRICULTURE ACTION PLAN

[MAIN RESPONSIBILITY]

MID divisional officers such as executive engineer, sub-divisional engineer or junior engineer

Respective officer in MID head office

District agriculture officer and agriculture extension officer, DOA

District horticulture officer and horticulture extension officer, DOH

Other concerned department officers

[SUB RESPONSIBILITY]

VCP in respective village

[DESCRIPTION OF STEP]

The objectives of Step 7 are: (1) preparation of proposed cropping pattern and (2) preparation of action plan to materialise the proposed cropping pattern. According to the inventory survey carried out in January 2014, only 51% of the created irrigation potential is used and there is a big gap between the plan and actual situation. To mitigate this gap and enforce the maximum utilisation of the developed scheme, the new guideline encourages stakeholders' involvement such as farmers, DOA and DOH in the beginning of the preparation of cropping pattern. Since the present farmers' capacity such as amount of information and other knowledge are insufficient to prepare the action plan by themselves, participating government officers should provide necessary crop-wise information, namely: market price, water consumption, and cultivation risks, to the farmers to prepare a better cropping calendar. In addition, the collection of basic agriculture data is also an important objective in this step.

The outline of Step 7 is shown below. The sample agenda and time schedule are given in REFERENCE 7-1.

1. Preparatory Arrangement for the Workshop

- Appoint full-time officials from relevant departments for the preparation of the agriculture action plan.
- Compile the following necessary data for the workshop and preparation of presentation document (REFERENCE 7-2: Reference for Crop Selection).
- Finalise agenda, time schedule, venue and responsibility for the workshop after necessary discussion with participants. The agenda and time schedule should be printed on a large paper for the workshop.
- Finalise preparation of necessary materials/documents/facilities for the workshop. In addition, prepare supply of tea, snacks, and meals (see REFERENCE 5-1).

2. Discussion of Current Agriculture Practice

- Discussion of current cropping pattern (FORM 7-1) and discussion of the profitability of the crop.
- Discussion of current problems faced in agriculture (problems should be listed and categorised).
- Preparation of resource map of the cultivation area including road connection (FIGURE 7-1).

3. Discussion of Proposed Cropping Pattern

- Sharing the information on seasonal availability of the water resources in the proposed water resources development site.

STEP 8 IRRIGATION PLANNING

[MAIN RESPONSIBILITY]

MID divisional officers such as executive engineer, sub-divisional engineer or junior engineer

[SUB RESPONSIBILITY]

-

[DESCRIPTION OF STEP]

Irrigation planning is carried out based on the cropping pattern prepared in Step 7. Step 8 includes the following activities:

- (1) Assessment of Availability of Water Resources
- (2) Calculation of Water Requirement and Water Balance Study
- (3) Irrigation System Design

(1) Assessment of Availability of Water Resources

Since the water resources in kharif is quite enough according to current rainfall data, estimation of water resource availability for irrigation planning is carried out focusing mainly on seasonal availability in rabi. Generally speaking, the estimation of the runoff discharge in the small catchment is not easy so this guideline recommends to assess the availability of water resources based on the field data collected in Step 2. However, this guideline also recommends to cross check field observed data with the data calculated based on basin-wise specific discharge. The overall estimation procedure is shown in Table 8-1.

Table 8-1 Estimation Procedure

Step		Description
1	Measurement of discharge from targeted streams	Measurement of discharge water from targeted stream or river should be conducted at least two times from the middle of January to early February in one year. (Refer to Step 2 for details.)
2	Measurement of catchment area of targeted streams	Measurement work can be conducted with GIS or Google Earth Pro. Also, catchment area map is to be prepared.
3	Identification of river basin name	Mizoram can be divided into 27 river basins. (Refer to Table 8-2.) Also, the river basin name of the targeted stream is to be identified.
4	Calculation of water resource availability	<ul style="list-style-type: none"> - Rabi season's water resource availability is to be estimated from river basin-wise specific discharge table, which is shown in the following pages. - Specific discharge value of "December-March (Winter)" period is to be used. - Water resource of each stream can be calculated by "specific discharge multiplied by catchment area"
5	Setting of water resource availability	Compare the result of actual measurement (Step 1) with the calculation result (Step 4). Then, the smaller value shall be used as the estimated value of water resource availability during the rabi season.

Table 8-2 below was originally prepared by WAPCOS for Mizoram Irrigation Master Plan (1995). Thereafter, the JICA Study Team (2014) checked the data with some of the available CWC data and updated rainfall data, which is equivalent to 75% dependable rainfall value (rainfall data from 1999 to 2014).

STEP 8 IRRIGATION PLANNING

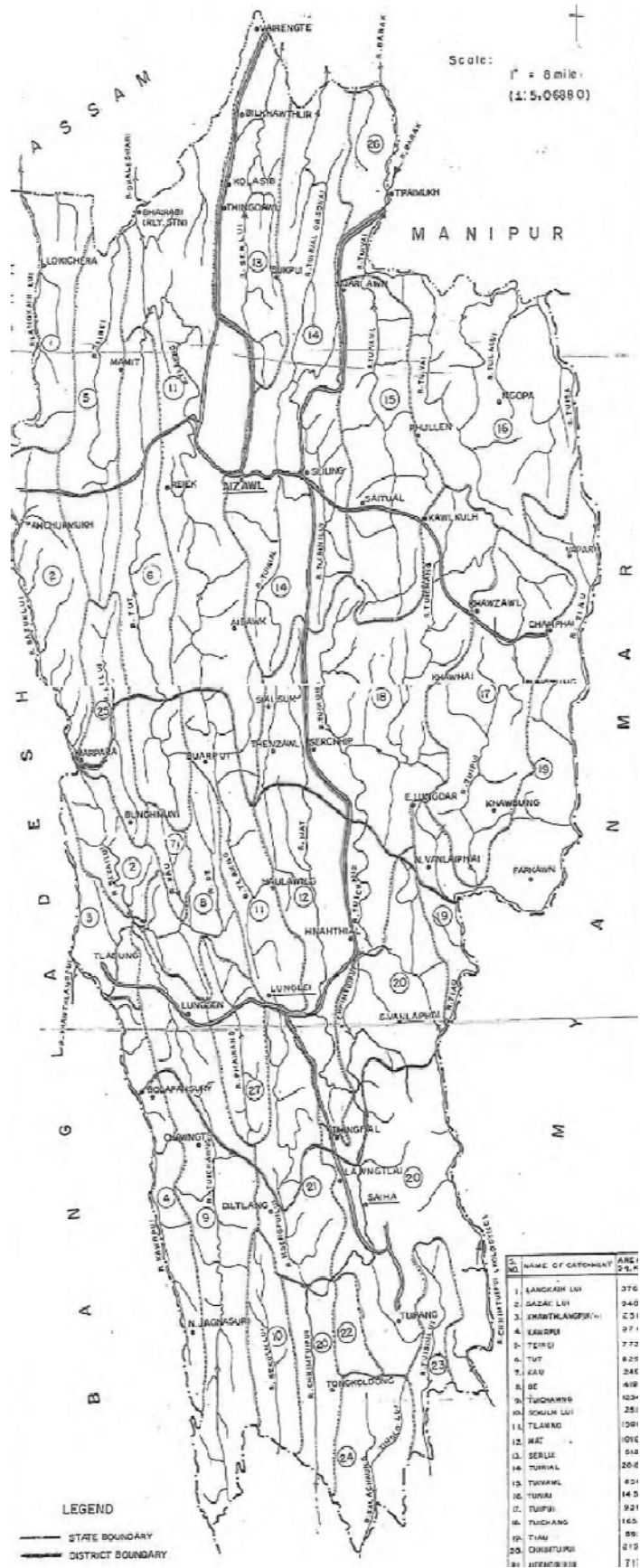


Figure 8-1 River Basin

STEP 8 IRRIGATION PLANNING

Table-8.2 Periodic Availability of Surface Water and Specific discharge in River Basin of Mizoram

(Unit: m³/s/km²)

No	Name of River Basin	Periodic water Resource Availability (Specific discharge)			
		June -Sept (Monsoon)	Oct-Nov (Post -Monsoon)	Dec-March (Winter)	April -May (Pre-Monsoon)
1	Lunglath lui	0.04325	0.01413	0.00155	0.00353
2	Sazai Lui	0.04834	0.01554	0.00186	0.00384
3	Khawthlungtuipui (Karnaphuli)	0.06402	0.02041	0.00232	0.00529
4	Kawrpui	0.06291	0.02046	0.00236	0.00511
5	Teirei	0.04875	0.01571	0.00189	0.00393
6	Tut	0.06496	0.02083	0.00246	0.00504
7	Kau	0.07914	0.02515	0.00312	0.00610
8	De	0.08104	0.02626	0.00302	0.00634
9	Tuichawng	0.07186	0.02306	0.00268	0.00569
10	Sekoh lui	0.07317	0.02343	0.00271	0.00605
11	Tlawng (Dhaleswar)	0.07289	0.02340	0.00272	0.00569
12	Mat	0.07273	0.02349	0.00279	0.00564
13	Ser lui	0.07337	0.02364	0.00283	0.00583
14	Tuinal	0.06700	0.02155	0.00251	0.00527
15	Tuivawl	0.06694	0.02150	0.00250	0.00532
16	Tuival	0.05972	0.01929	0.00227	0.00469
17	Tuipui	0.05856	0.01895	0.00218	0.00466
18	Tuichung	0.06822	0.02192	0.00259	0.00539
19	Tiau	0.05438	0.01769	0.00206	0.00421
20	Chhaintuipui (Kolodene)	0.07310	0.02355	0.00275	0.00571
21	Ngengpui Lui	0.08245	0.02646	0.00312	0.00662
22	Palak Lui	0.07104	0.02232	0.00286	0.00558
23	Tuisit lui	0.06646	0.02134	0.00234	0.00533
24	Tinglo lui	0.07098	0.02280	0.00275	0.00536
25	Mar Lui	0.06475	0.02061	0.00244	0.00529
26	Barak	0.05755	0.01769	0.00247	0.00482
27	Phainang	0.08294	0.02694	0.00323	0.00631

(1) Calculation of Water Requirement and Water Balance Study

To simplify the planning, the guideline recommends studying the water balance during the lean period in January. The smaller figure between the observed discharge in the field and those calculated by specific discharge is taken as the supplied discharge for water balance study and the demand is estimated based on Table 8-1 showing the crop-wise basic water requirement during the rabi season.

Diversion water requirement is estimated by using the irrigation efficiency of open channel of 45% and of pipeline of 55%.

Table 8-3 Crop Water Requirement

Crops		Water Requirement (mm/d)
Group 1	Paddy	12
Group 2	Cabbage Knol-khol (Kohlrabi)	5
Group 3	Leaf Mustard / Seamum Lettuce / Potato Table beet / Maize	4
Group 4	Cow Pea / Lady's finger Soya Bean/French Bean Field pea / Chilly Brinjal / Tomato Broccoli / Cauliflower Coriander	3
Group 5	Onion	2

STEP 8 IRRIGATION PLANNING

(2) Irrigation System Design

There are several options in water resources development such as diversion of river water, construction of reservoir, and/or pumping the groundwater. Since the state has steep ground slope in general, the unit cost for development of reservoir will be relatively high. Agriculture in Mizoram is still extensive, and intensive farming through utilization of groundwater is not feasible all the time either. Considering this situation, the diversion of river water using gravity irrigation system can be a priority in the water resources development planning in principle.

In the selection of the canal type, open channel system is more economically feasible with easy maintenance than the closed canal system. However, the pipeline system, which has high efficiency, can be employed where water shortage is observed.

[FORM AND REFERENCE]

REFERENCE 8-1 : Irrigation Schedule and Monitoring Plan for Winter Crop

STEP 9 FACILITY DESIGN AND PREPARATION OF O&M PLAN

[MAIN RESPONSIBILITY]

MID divisional officers such as executive engineer, sub-divisional engineer or junior engineer

WUA

[SUB RESPONSIBILITY]

-

[DESCRIPTION OF STEP]

Step 9 focuses on the design of facilities such as intake, reservoir, irrigation and drainage canal, canal-related structure, and access road, and operation and maintenance of these facilities. The facility design is carried out based on the irrigation plan prepared in Step 8 taking the following procedure:

- (1) Preparation of facility layout map
- (2) Facility design
- (3) Design review
- (4) Preparation of operation and maintenance plan

(1) Preparation of Facility Layout Map

The facility layout map is prepared based on the “base map” prepared during DPR preparatory survey stage. Layout map will include but not limited to the following information:

- Existing road, stream, river and farmland
- Direction and scale
- Grid of coordinates and contours (if necessary)
- Location and name of irrigation facilities
- Irrigation facility list, which includes name, quantity, size, and dimension

The prepared layout map will be shared with the members of WUA and other relevant government organisations for the ratification of the project and for the preparation of operation and maintenance planning. The map should be prepared in detail but in an uncomplicated way.

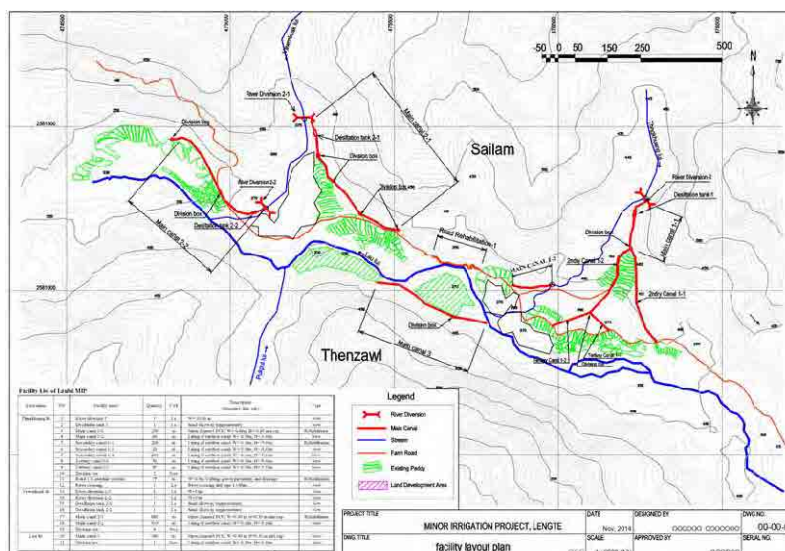


Figure 9-1 Typical Facility Layout Map

STEP 9 FACILITY DESIGN AND PREPARATION OF O&M PLAN

(2) Facility Design

The target facilities to be designed are based on the list of facilities in the facility layout map. Facility design basically includes “Basic Conditions”, “Hydraulic Calculation and Drawings”, and “Quantity and Preparation of DPR” as shown in Figure 9-1.

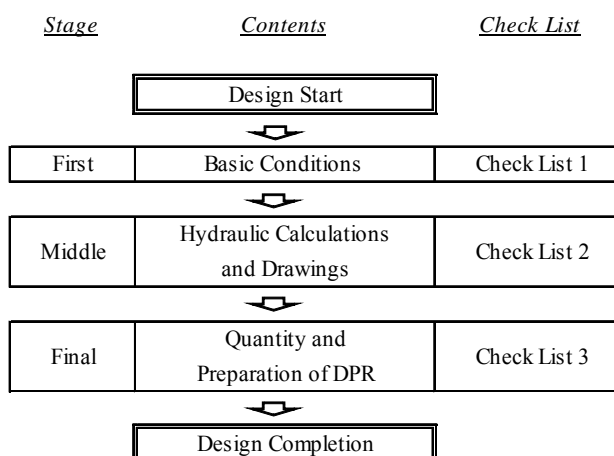


Figure-9.1 Procedure of Step 9 (Facility Design)

Setting Basic Conditions

Basic conditions include water requirement for canal design, design flow based on the peak flood for intake design, and reservoir capacity for ponds based on the irrigation water shortage during rabi season. These conditions are arranged as design conditions.

Hydraulic Calculation and Preparation of Drawings

Hydraulic calculation method depends on the kind of structure (open channel, pipeline). Input data for the calculation is based on the above basic conditions. Facility dimensions are decided by the calculation. Facility drawings are prepared based on the dimensions.

Structural Calculation and Preparation of Drawings

Basically, minor irrigation facilities in Mizoram do not require structural calculation considering the existing facilities' conditions.

However, reinforcement concrete structures like reservoir tank and retaining walls whose height is higher than 2.0 m, are recommended to be checked with structural calculation.

Installation of structure shall be based on cutting foundation, not filling foundation. In case the base of the structure is to be constructed on filling foundation, bearing capacity checking is needed.

Rural road manual or other official standards should be followed for the design and construction of culvert in case the width of the culvert is more than 1.5 m.

The following items should be considered to prolong the durability of facilities and promote dry season irrigation. (Refer to model DPR drawings for details.)

- Haunch at corners of channel
- Using pipe or installation of concrete cover on channel in landslide risk section
- Installation of de-siltation tank after intake
- Simplified and cost-saving structure of intake
- Installation of division pipe in division box and channel for winter crop irrigation

STEP 9 FACILITY DESIGN AND PREPARATION OF O&M PLAN

Calculation of Work Quantity

Quantity and cost are calculated based on the drawings. DPR is prepared based on the above study.

(3) Design Review

Design check is basically carried out based on the list (Form 9-1) with the targeted diversion weir, canal, and pond as the main irrigation facilities. The design check is prepared in three stages, namely: first (basic conditions), middle (hydraulic calculations and drawings), and final (quantity and preparation of DPR) as shown in Figure-9.1. The list is prepared by the junior engineer, checked by the sub-divisional officer, and supervised by the executive engineer.

(4) Preparation of Operation and Maintenance (O&M) Plan

The O&M plan is prepared based on Form 9-2 by WUA in association with MID division office after the irrigation facility design. The plan targets all irrigation facilities such as diversion weir, intake, canal, and pond which are developed by MID. WUA selects all O&M works regarding the irrigation facilities. Items of the works are generally patrol, water management, removing sedimentation soil, removing weeds, and rehabilitation. The implementer and frequency are decided for each O&M work.

[FORM AND REFERENCE]

FORM 9-1: Design Check List 1, 2, 3

FORM 9-2 O&M Plan

STEP 10 PREPARATION OF CONSTRUCTION AND QUALITY CONTROL PLAN

[MAIN RESPONSIBILITY]

MID divisional officers such as executive engineer, sub-divisional engineer or junior engineer

[SUB RESPONSIBILITY]

-

[DESCRIPTION OF STEP]

The construction plan and construction work quality control plan are prepared in Step 10. Both plans are prepared considering the following points:

Construction Plan

Standard construction plan form is to be used for this part. The following items are components of the plan. Example of construction plan is to be referred to the model DPR of the four sites.

Items	Description
1. Project outline	Extraction and description of project outline from DPR.
2. Management organisation	-
2.1 MID supervision team	Description about role and responsibility of division office team members for construction supervision works .
2.2 Safety management	(1) Preparation of contact list like hospital, police outpost, WUA, village council, relevant departments and so on. (2) Description about special safety management, safety measures and facilities, crime and pollution control measures, safety management meeting, safety patrol, and inspection, if necessary.
3. Temporary work plan	Description about work restrictions, major temporary facilities and temporary work like diversion of drainage or pumping, and temporary access road, if necessary.
4. Construction plan	-
4.1 Machinery utilisation plan	List to describe the name, type, specification, quantity, and use of construction machinery, like excavation machine and concrete mixer.
4.2 Major materials	List to describe the name, specification and expected source of major construction materials, like cement, sand, aggregate, brick, stone, and wood plank.
4.3 Meeting /Inspection plan	Item should include at least kickoff meeting, regular meeting, and regular inspections.
5. Time Schedule	Construction works schedule chart is to be prepared in consultation with EE. Progress of actual construction works should be compared and checked with this schedule chart.

Quality Control Plan

Proposed quality control works are to be conducted using mainly the

STEP 10 PREPARATION OF CONSTRUCTION AND QUALITY CONTROL PLAN

following quality control materials.

- Document control checklist (before and after construction)
- Checklist for site works management
- Daily site report form
- Quality control checklist (embankment works, concrete works, canal works)
- Quality control methodology using pictures

Then, the quality control plan of each scheme shall show how and when the quality control materials are to be used. An example of quality control plan is shown in the following page.

[FORM AND REFERENCE]

FORM 10-1: Standard construction plan form

FORM 10-2: Standard Quality control plan form

STEP 11 COST ESTIMATION, BENEFIT ASSESSMENT AND OTHER IMPACT ASSESSMENT

“Note for earthwork rate study for irrigation pond”

Although MID uses the Schedule of Rates of Mizoram PWD (Building) for cost estimation, it does not include appropriate rates for relatively large-scale earthworks like open space mechanical excavation for pond.

On the other hand, the Schedule of Rates of Mizoram PWD (PMGSY) includes more suitable rate for pond earthworks, as the work is more similar to road machinery earthworks.

Therefore, the JICA Study Team proposes to use the following schedule of rates for excavation and embankment works, which was quoted from PWD (PMGSY).

Table-11-1 Proposed Schedule of Rates

	Current Rate	Proposed Rate
Excavation	PWD (Building) 2.06 Earthwork in excavation over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 m ² on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed. (a) Ordinary and Hard Soil	PWD (PMGSY). 8.3 1600&300 Earthwork in Hill Road (ii)Excavation in hilly areas in soil by mechanical means A) Excavation in soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with a lift up to 1.5 m and a lead up to 20 m as per Technical Specification Clause 1603.1 B) Extra for every additional lift of 1.5 m or part thereof *(for dam embankment)
	INR 284.3/m ³	A) 80.62 + B) 21.66 = INR 102.28/m ³
Embankment	PWD (Building) 2.18 Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations, etc., in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.	PWD (PMGSY) 3.3 301.5 Construction of Embankment with Material Obtained from Roadway Cutting Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures, graded and compacted to meet requirement of Tables 300.1 and 300.2 as per Technical Specification Clause 301.5
	INR 90.3/m ³	INR 106.44/m ³

The project cost is calculated based on the following conditions:

Interest on capital is 10% of the total cost of the project.

Depreciation of the project is 4% of the project cost.

Annual operation and maintenance cost is INR 1,175.00 per ha of CCA.

Maintenance cost of head works is 1% of the cost of head works.

Total annual cost is (a) + (b) + (c) + (d)

(2) Benefit Analysis and Economic Evaluation

It is better to evaluate benefit assessment based on farm revenue and

STEP 11 COST ESTIMATION, BENEFIT ASSESSMENT AND OTHER IMPACT ASSESSMENT

expenditure in each local area according to the proposed cropping pattern. However, it is difficult to obtain reliable data on farm-gate price, man-days of farm work (hired and family labour), and other expenditure for farm operation at present in the state because most farmers have not kept any records of their farming practice. Therefore, basic data collection and analysis by the relevant departments based on systematic extension and monitoring activities would be indispensable.

Preparation of Cost Benefit Analysis (CBA) for Each Crop Using Format XX.

The analysis would be helpful in selecting beneficial crops for farmers, and it is better to provide CBA of typical common crops in the areas so that farmers can compare these crops with the crops of proposed cropping pattern. At the same time, it is important to give a demonstration of CBA calculation to farmers in this occasion in order to develop their sense of farming management and economy.

Preparation of Benefit Assessment with Cropping Pattern

Based on the results of CBA, prepare an easy-to-understand chart/table for farmers and it will be utilized for the ratification meeting in Step 12.

In addition, many farmers are interested in organic agriculture. Furthermore, most of them cannot properly obtain chemical fertilisers and agrichemicals on time. Therefore, if possible, it is better to calculate CBA in two ways to be able to compare organic and common farming system.

Benefit/cost ratio is calculated as total annual benefit/total annual cost. The ratio must be more than 1.

[FORM AND REFERENCE]

FORM 11-1 : B/C Calculation Sheet

REFERENCE 11-1 : Estimated Crop Budget 2014

STEP 12 CONSENSUS BUILDING AND FINALIZATION OF DPR

[MAIN RESPONSIBILITY]

MID divisional officers such as executive engineer, sub-divisional engineer or junior engineer

Respective officer in MID head office

Department of Agriculture

Department of Horticulture

VCP of respective village

Other concerned departments

[SUB RESPONSIBILITY]

-

[DESCRIPTION OF STEP]

Step 12 is the last step for DPR preparation, and involves building the consensus on the contents of the prepared DPR among the stakeholders. This step will be the most important process for both government and farmers/WUA to mitigate any risks caused by misunderstanding in the plan. Each concerned farmer should thoroughly understand and agree with each item. Therefore, the elucidator of the DPR should explain each item to the farmers in a polite way and using visual materials as needed.

The following are important points in the consensus building:

MID Side

- Make necessary effort for sanctioning the respective minor irrigation scheme implementation.
- Construct and/or rehabilitate the facilities based on the prepared DPR with sanctioned budget.
- Give the necessary support to WUA for proper operation and maintenance of the facilities based on the prepared O&M plan.

WUA Side

- Cooperate with MID and provide necessary support during and after construction works.
- Utilise the facilities effectively based on the prepared crop calendar and agriculture action plan.
- Take over the facilities from MID and operate and maintain the facilities in accordance with the O&M plan for 25 years after the construction and/or rehabilitation of the facilities.

Other Government Departments and Stakeholders Side

- Provide follow-up activities which are stipulated in the agriculture action plan like extension services.
- Strengthen mutual cooperation with MID and WUA for further necessary actions for effective utilisation of the respective minor irrigation scheme, if required.

If the above points are not agreed in the meeting, the DPR will be revised accordingly.

[FORM AND REFERENCE]

FORM 12-1 Minute of Ratification Meeting

LIST OF FORMS

FORM 1-1

APPLICATION FORM FOR MINOR IRRIGATION DEVELOPMENT

Date: _____ / _____ / _____

To ; Executive Engineer of _____ Division, Minor Irrigation Department

From; _____

Name of Applicant _____

Address: _____ Contact No. _____

Signature

Scheme Information	
District / Village of Site	
Proposed Name of scheme	
Type of Project	<input type="checkbox"/> New Development <input type="checkbox"/> Rehabilitation
Target CCA (ha)	
Farm accessibility by vehicle	<input type="checkbox"/> Throughout year <input type="checkbox"/> Only in Rabi <input type="checkbox"/> None
Expected Water Source (Name of river or stream)	(1) (2) (3)
Present Land Use	Farm Land ____ (ha) Forest ____ (ha) Others ____ (ha)
Crop to be Cultivated	(Kharif) : (Rabi) : (Summer) :

Beneficiaries' Information						
Name / Father's Name		Village / Address	Owned Land under respective scheme (ha)	Type of Farming		
				Full time	Part time	Other
1	(Leader)			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	(Sub Leader)			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note : The scheme location map should be attached

FORM 2-1**PRELIMINARY TECHNICAL SITE SURVEY SHEET**

Scheme Name				S/N		
Survey Date		Name of surveyor/Position				
General						
1	Location	District				
		Name of Village				
		Coordinate		X:	Y:	
2	Type of Project	<input type="checkbox"/> New Development <input type="checkbox"/> Rehabilitation				
3	Development of Land <i>(Check existing conditions with Google earth, GIS data and Topo-map)</i>	Target CCA (ha)				
		Present Land Use		WRC : _____ (ha)		
				Upland : _____ (ha)		
				Forest : _____ (ha)		
				Others : _____ (ha)		
		Slope of Land development area (%)				
		Average Elevation of farm (E.L.m)				
4	Accessibility	Distance from major town (km)				
		Distance from district headquarter (km)				
		Distance from main road (km)				
		Distance from farmers' village (km)				
		Distance from market (km)		Market Name () () km		
		Farm Accessibility by Vehicle		<input type="checkbox"/> Throughout year <input type="checkbox"/> Only in Rabi <input type="checkbox"/> None		
Water Resources						
5	Water resource	1	Name of river/ streams			
			Existing utilization of water source			
			Measured lean discharges (L/S)		() L/s	Date ()
		2	Name of river/ streams			
			Existing utilization of water source			
			Measured lean discharges (L/S)		() L/s	Date ()
		3	Name of river/ streams			
			Existing utilization of water source			
			Measured lean discharges (L/S)		() L/s	Date ()
		4	Name of river/ streams			
			Existing utilization of water source			
			Measured lean discharges (L/S)		() L/s	Date ()
Farming and Soil						
6	Farming	Existing major crops and area (ha)		(Kharif) :		
				(Rabi) :		
				(Summer) :		
7	Soil condition	Expecting major crops and area (ha)		(Kharif) :		
				(Rabi) :		
				(Summer) :		
		Any Soil problem for agriculture				
		Farm Drainage condition				
Beneficiaries' Information						
8	Existing WUA	Name :		(Registration No.)		
		Name :		(Registration No.)		
		Name :		(Registration No.)		
9	List of Beneficiaries					
Name		Village	Owned Land under respective scheme (ha)	Type of Farming		
				Full time	Part time	
(1)	(Leader)			<input type="checkbox"/>	<input type="checkbox"/>	
(2)	(Sub Leader)			<input type="checkbox"/>	<input type="checkbox"/>	
(3)				<input type="checkbox"/>	<input type="checkbox"/>	
(4)				<input type="checkbox"/>	<input type="checkbox"/>	
(5)				<input type="checkbox"/>	<input type="checkbox"/>	

(6)				<input type="checkbox"/>	<input type="checkbox"/>
(7)				<input type="checkbox"/>	<input type="checkbox"/>
(8)				<input type="checkbox"/>	<input type="checkbox"/>
(9)				<input type="checkbox"/>	<input type="checkbox"/>
(10)				<input type="checkbox"/>	<input type="checkbox"/>
(11)				<input type="checkbox"/>	<input type="checkbox"/>
(12)				<input type="checkbox"/>	<input type="checkbox"/>
(13)				<input type="checkbox"/>	<input type="checkbox"/>
(14)				<input type="checkbox"/>	<input type="checkbox"/>
(15)				<input type="checkbox"/>	<input type="checkbox"/>
(16)				<input type="checkbox"/>	<input type="checkbox"/>
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(18)				<input type="checkbox"/>	<input type="checkbox"/>
(19)				<input type="checkbox"/>	<input type="checkbox"/>
(20)				<input type="checkbox"/>	<input type="checkbox"/>
(21)				<input type="checkbox"/>	<input type="checkbox"/>
(22)				<input type="checkbox"/>	<input type="checkbox"/>
(23)				<input type="checkbox"/>	<input type="checkbox"/>
(24)				<input type="checkbox"/>	<input type="checkbox"/>
(25)				<input type="checkbox"/>	<input type="checkbox"/>
Others					
10	Relevant Existing schemes nearby	(Name) (Year Completion) (Activity) (Implementing Agency) (Total Budget)			
		(Name) (Year Completion) (Activity) (Implementing Agency) (Total Budget)			
11	History of disaster	Land-slide, including small scale			
		Flooding (Location, frequency, water level)			
12	Impact	Anticipated negative impact			
13	Other Remarks				

Note : Discharge measurement result should be attached

FORM 2-2

DISCHARGE MEASUREMENT RESULT SHEET

Date	
Surveyor	
Measured discharge	Stream Name; ***** (L/S)
Picture	
Location: Coordinates (*****, *****)	
Location map	

FORM 4-1

EVALUATION CRITERIA AND EVALUATION SHEET

Evaluation Criteria		Aspects to be considered	High (Big)	Middle (Medium)	Low (Small)
			3 points	2 points	1 points
Rationality	Conformity to Existing Plans	(1) Conformity to Master Plan, Regional Agriculture Development Plan or Department 5 years plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Conformity to Opinion of Relevant Government Departments and Others	(1) Opinion of Agriculture related department (2) Opinion of VCP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Effectiveness	Characteristic of farmers	(1) Rate of owner farmer (2) Rate of full-time farmer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Marketability	(1) Access to the market	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Availability of Water Resources	(1) Water discharge in lean period (2) Number of water source and catchment area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Efficiency	Accessibility to Project Site	(1) Road condition from main road to the site (2) Distance from farmer's house to the site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Government Support	(1) Number and availability of government officer concerned (2) Capacity and attitude of above officers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Impact	Project Scale	(1) Number of beneficiaries (2) Scale of CCA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Considerable Synergy Effect to Other Projects	(1) Number and scale of on-going, past or future project available in the same village	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sustainability	Cooperation among Applicants	(1) Uniformity of native village of farmer (2) Present cooperative activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Positive Impact to the Surrounding Environment	(1) Included new development area (ha) (2) Distance from environmentally sensitive area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sub Total Points					
				Total Points	

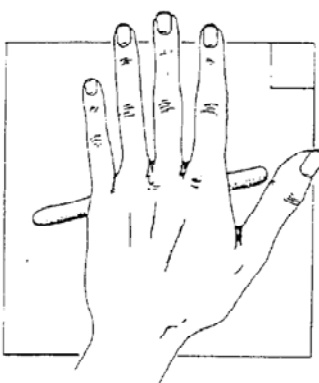
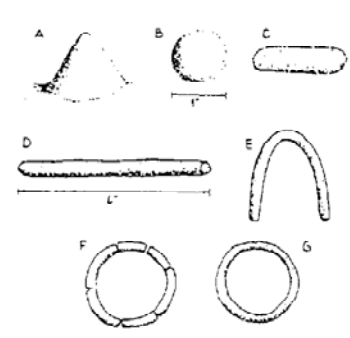
FORM 6-1

DPR PREPARATORY SURVEY CHECK SHEET

Scheme Name			S/N	
Survey Period			Name of surveyor/Position	
S/N	Items	Content	Yes	Remarks
1	Preparation of base map	• Whether Contour Map is created with GIS?	<input type="checkbox"/>	Map should be attached
		• Existing facilities are traced?	<input type="checkbox"/>	
		• The result of walking survey reflected to the base map?	<input type="checkbox"/>	
		• The land owners and boundaries data are incorporated?	<input type="checkbox"/>	
2	Soil clarification	• Soil samples are collected properly?	<input type="checkbox"/>	
		• Site soil testing is to be conducted.	<input type="checkbox"/>	
3	Potential disaster site survey	<ul style="list-style-type: none"> • Following survey is conducted ? Disaster survey is to be conducted to clarify existing condition of flooding, erosion and land sliding damaged area and grasp potential risky area. And the result is to be reflected to facility planning and designing. Followings are main target of the Survey <ul style="list-style-type: none"> - Facility planned area - Along canal candidate alignment - Along existing river, drainage and canal 	<input type="checkbox"/>	Map should be attached
4	Topological survey for specific area	• Dam or Pond construction work is planned?	<input type="checkbox"/>	
		Whether area survey is conducted?	<input type="checkbox"/>	
		Whether profile and cross section survey for dam axis is conducted?	<input type="checkbox"/>	
		• Relatively large-scale river diversion weir is planned?	<input type="checkbox"/>	
		Whether river profile survey is conducted?	<input type="checkbox"/>	
		• Gentle slope land canal work is planned?	<input type="checkbox"/>	
		Whether profile and cross section survey is conducted?	<input type="checkbox"/>	
		• Gentle slope Land development is planned?	<input type="checkbox"/>	
Whether area survey is conducted?	<input type="checkbox"/>			
5	Preparation of layout map	• Whether facility layout map is drafted?	<input type="checkbox"/>	Map should be attached

FORM 6-2

SOIL CLASSIFICATION TEST RESULT FORM

Soil classification test(In-situ)	Date																																								
Scheme Name	Name of Surveyor																																								
<u>Instruction</u>																																									
<p>1) Visit the survey together with village chairperson and villagers. Visit the proposed area and choose typical soil in the area with the consultation of the village chairperson and villagers.</p> <p>2) Sampling of the soil Gather a soil sample from the soil surface (sample should be about 10 x 10 x 10 cm).</p> <p>3) Knead the soil with water. Add some water to the soil sample so it is moist but not wet. Knead it well. Pebbles should be removed.</p> <p>4) Try to create ring shapes with the soil sample and choose the most advanced shape that can be made.</p>																																									
	<div style="display: flex; align-items: center;">  <div style="border: 1px solid black; padding: 5px; margin-left: 10px; font-size: 0.8em;"> <p>A: Soil can only be shaped into a cone. No other shapes hold together.</p> <p>B: Soil can be formed into a circle, but not a rod shape.</p> <p>C: Soil can be formed into a stout rod shape.</p> <p>D: A thin rod (about 6 mm diameter) can be formed but not bent.</p> <p>E: Thin rod can be bent without breaking</p> <p>F: Circle can be formed with some breaks.</p> <p>G: Complete circle with no breaks can be formed.</p> </div> </div>																																								
<p>5) Evaluate the soil texture According to the result of 4), <u>circle one of the detailed soil texture types</u> and choose a General soil texture type by conversion of the detailed soil texture type.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Detail soil texture type</th> <th style="width: 10%;"></th> <th style="width: 30%;">conversion</th> <th style="width: 10%;"></th> <th style="width: 10%;">General soil texture type</th> </tr> </thead> <tbody> <tr> <td>Shape A Sand</td> <td style="text-align: center;"><input type="checkbox"/></td> <td>if you choose Shape A</td> <td style="text-align: center;">→</td> <td>Sand <input type="checkbox"/></td> </tr> <tr> <td>Shape B Loamy sand</td> <td style="text-align: center;"><input type="checkbox"/></td> <td>if you choose Shape B or C</td> <td style="text-align: center;">→</td> <td>Sandy Loam <input type="checkbox"/></td> </tr> <tr> <td>Shape C Silty Loam</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Shape D Loam</td> <td style="text-align: center;"><input type="checkbox"/></td> <td>if you choose Shape D or E</td> <td style="text-align: center;">→</td> <td>Clay Loam <input type="checkbox"/></td> </tr> <tr> <td>Shape E Clay Loam</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Shape F Light Clay</td> <td style="text-align: center;"><input type="checkbox"/></td> <td>if you choose Shape F or G</td> <td style="text-align: center;">→</td> <td>Clay <input type="checkbox"/></td> </tr> <tr> <td>Shape G Heavy Clay</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Detail soil texture type		conversion		General soil texture type	Shape A Sand	<input type="checkbox"/>	if you choose Shape A	→	Sand <input type="checkbox"/>	Shape B Loamy sand	<input type="checkbox"/>	if you choose Shape B or C	→	Sandy Loam <input type="checkbox"/>	Shape C Silty Loam	<input type="checkbox"/>				Shape D Loam	<input type="checkbox"/>	if you choose Shape D or E	→	Clay Loam <input type="checkbox"/>	Shape E Clay Loam	<input type="checkbox"/>				Shape F Light Clay	<input type="checkbox"/>	if you choose Shape F or G	→	Clay <input type="checkbox"/>	Shape G Heavy Clay	<input type="checkbox"/>			
Detail soil texture type		conversion		General soil texture type																																					
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Shape C Silty Loam	<input type="checkbox"/>																																								
Shape D Loam	<input type="checkbox"/>	if you choose Shape D or E	→	Clay Loam <input type="checkbox"/>																																					
Shape E Clay Loam	<input type="checkbox"/>																																								
Shape F Light Clay	<input type="checkbox"/>	if you choose Shape F or G	→	Clay <input type="checkbox"/>																																					
Shape G Heavy Clay	<input type="checkbox"/>																																								
<p>6) Notable Soil Characteristics If there are any notable soil characteristics such as high rock outcrop, shallow soil depth and symptom of salt accumulation, please note. Note:</p>																																									

Note: Picture of the test is to be attached in following page.

FORM 7-3
AGRICULTURE ACTION PLAN

Agriculture Action Plan (Overall Actions)													Name of WUA :											
Main Target !!													Name of MI Scheme :											
No	Action Item	Schedule												Responsibility	Technical Assisted by									
		2015				2016				2017														
		M	A	M	J	J	O	S	O	N	D	J	F			M	A	M	J	J	O	S	O	N
Cultivation Season		← Rabi		← Kharif		← Summer		← Rabi		← Kharif		← Summer		← Rabi		← Kharif		← Summer						
Sub Target 1:																								
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
Sub Target 2 :																								
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
Prepared by :													Approved by											
_____ President of WUA													_____ SDO, MID											
_____ Vice President of WUA													_____ Agriculture Extension Officer, DOA											
													_____ Horticulture Extension Officer, DOH											
													_____ Fishery Extension Officer, DOF											

FORM 9-1

DESIGN CHECK LIST 1, 2, 3

Check List 1

Canal

[First Stage] : Basic Conditions

1. Outline

1.1 Land Use Paddy Upland Both

1.2 Type Open Channel Pipeline Both

1.3 Canal Type and Dimension

Name	Type	Length (m)	Flow (m ³ /s)	Slope	Remarks
[Example] No.1 Canal	Open Channel	1,000	0.200	1/1,000	

1.4 Supplementary facilities of Canals

Facilities	Number	Remarks
Divisin works		
Regulating reservoir		
Management Road		
Culvert/Bridge		
Regulator (gate)		
Other ()		

1.5 Consultation 1.5.1 River Need No need

1.5.2 Drinking Water Need No need

1.5.3 Other () Need No need

2. Basic Conditions

SN.	Items	Contents	Object	Confirmation	Reasons
[Example] 3	Field survey	3.1 Whether the pictures are taken.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DPR Annexure II
1	Design purpose	1.1 Whether the purpose is understood.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.2 Whether the scope, quantity, items of design are understood.	<input type="checkbox"/>	<input type="checkbox"/>	
2	Basic design conditions	2.1 Whether the irrigation system is understood.	<input type="checkbox"/>	<input type="checkbox"/>	
		2.2 Whether the intake points are understood.	<input type="checkbox"/>	<input type="checkbox"/>	
		2.3 Whether the water users are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		2.4 Whether the consultation items are understood.	<input type="checkbox"/>	<input type="checkbox"/>	
3	Field survey	3.1 Whether the pictures are taken.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.2 Whether the field conditions (topography, soil, landuse etc.) are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.3 Whether the river and road conditions are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.4 Whether the points of the planned main facilities are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.5 Whether the difficulty or issues are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.6 Whether the important points of the construction are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
4	Design plan	4.1 Whether the selected canal types are suitable.	<input type="checkbox"/>	<input type="checkbox"/>	
		4.2 Whether the facility layout is suitable.	<input type="checkbox"/>	<input type="checkbox"/>	
		4.3 Whether the canal standard structure is suitable.	<input type="checkbox"/>	<input type="checkbox"/>	
		4.4 Whether the maintenance is considered.	<input type="checkbox"/>	<input type="checkbox"/>	

Certification

Date : _____ Checked by : _____ (Sub-Divisional Officer) Countersigned by : _____ (Executive Engineer)
 Place : _____ Prepared by : _____ (Junior Engineer)

Check List 2

Canal

[Middle Stage] : Drawings

1. Detailed Conditions

SN.	Items	Contents	Object	Confirmation	Reasons
	[Example]				
3	Drawings	3.1 Whether the cross drawings are prepared,	<input type="checkbox"/>	<input type="checkbox"/>	DPR Chapter 6
1	Design Plan (supplementary facility)	1.1 Whether the following supplementary facility layout and scale are suitable.			
		- Division works	<input type="checkbox"/>	<input type="checkbox"/>	
		- Regulator reservoir	<input type="checkbox"/>	<input type="checkbox"/>	
		- Management road	<input type="checkbox"/>	<input type="checkbox"/>	
		- Bridge/Culvert	<input type="checkbox"/>	<input type="checkbox"/>	
		- Regulator (gate)	<input type="checkbox"/>	<input type="checkbox"/>	
		- Other ()	<input type="checkbox"/>	<input type="checkbox"/>	
2	Hydraulics Calculation	2.1 Whether the formulas and coefficients used in hydraulic calculation are suitable.	<input type="checkbox"/>	<input type="checkbox"/>	
3	Drawings	3.1 Whether the cross drawings are prepared,	<input type="checkbox"/>	<input type="checkbox"/>	
		3.2 Whether the drawings are consistent in hydraulics calculation.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.3 Whether the indication of drawings is appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.4 Whether the special mention is appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	
4	Construction Plan	4.1 Whether the access road for construction is appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	

Certification

Date : _____ Checked by : _____ (Sub-Divisional Officer) Countersigned by : _____ (Executive Engineer)
 Place : _____ Prepared by : _____ (Junior Engineer)

Check List 3

Canal

[Final Stage] : Quantity and DPR

1. Quantity

SN.	Items	Contents	Object	Confirmation	Reasons
	[Example]				
1	Quantity	1.2 Whether the quantity is prepared for each material.	<input type="checkbox"/>	<input type="checkbox"/>	DPR Chapter 6
1	Quantity	1.1 Whether the sizes used in the quantity calculation are consistent in the drawings.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.2 Whether the quantity is prepared for each material and each facility.	<input type="checkbox"/>	<input type="checkbox"/>	

2. DPR

SN.	Items	Contents	Object	Confirmation	Reasons
	[Example]				
1	DPR	1.1 Whether the table of contents of DPR is based on the "Guidelines of preparation of DPR".	<input type="checkbox"/>	<input type="checkbox"/>	DPR Contents
1	DPR	1.1 Whether the table of contents of DPR is based on the "Guidelines of preparation of DPR".	<input type="checkbox"/>	<input type="checkbox"/>	
		1.2 Whether the reasons of the formulas and coefficients are wrote clearly.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.3 Whether the calculation process are arranged clearly.	<input type="checkbox"/>	<input type="checkbox"/>	

Certification

Date : _____ Checked by : _____ (Sub-Divisional Officer) Countersigned by : _____ (Executive Engineer)
 Place : _____ Prepared by : _____ (Junior Engineer)

Check List 1

Diversion Weir

[First Stage] : Basic Conditions

1. Outline

1.1 Name of Diversion		
1.2 Rive conditions	1.2.1 Gross Catchment Area of the Weir	sq.km
	1.2.2 Droughty Water Discharge	cumec
	1.2.3 River Width	m
1.3 Weir	1.3.1 Crest Length	m
	1.3.2 Intake Flow	cumec

1.4 Gates

SN.	Function	Type	Number	Size (m)	
				Height	Width
1	[Exampe] Intake	Slide	2	0.80	0.40
1					
2					
3					

1.4 Consultation	1.4.1 River	<input type="checkbox"/> Need <input type="checkbox"/> No need	1.4.2 Drinking Water	<input type="checkbox"/> Need <input type="checkbox"/> No need
	1.4.3 Fisheries	<input type="checkbox"/> Need <input type="checkbox"/> No need	1.4.4 Other ()	<input type="checkbox"/> Need <input type="checkbox"/> No need

2. Basic Conditions

SN.	Items	Contents	Object	Confirmation	Reasons
1	[Example] Design Purpose	1.1 Whether the purpose is understood.	<input type="checkbox"/>	<input type="checkbox"/>	DPR Chapter 4
1	Design purpose	1.1 Whether the purpose is understood.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.2 Whether the scope, quantity, items of design are understood.	<input type="checkbox"/>	<input type="checkbox"/>	
2	Basic design conditions	2.1 Whether the water users are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		2.2 Whether the maximum intake quantity is grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		2.3 Whether the intake point is understood.	<input type="checkbox"/>	<input type="checkbox"/>	
		2.4 Whether the consultation items are understood.	<input type="checkbox"/>	<input type="checkbox"/>	
3	Field survey	3.1 Whether the pictures are taken.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.2 Whether the flood and scour conditions are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.3 Whether the both bank conditions of the planned point are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.4 Whether the road conditions are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.5 Whether the difficulty or issues are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.6 Whether the important points of the construction are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
4	Design plan	4.1 Whether the river flow is steady.	<input type="checkbox"/>	<input type="checkbox"/>	
		4.2 Whether the irrigation water can be certainly taken during the dry season.	<input type="checkbox"/>	<input type="checkbox"/>	
		4.3 Whether the soil inflow does not happen.	<input type="checkbox"/>	<input type="checkbox"/>	
		4.4 Whether the weir structure is staedy and reasonable.	<input type="checkbox"/>	<input type="checkbox"/>	
		4.5 Whether the maintenance is considered.	<input type="checkbox"/>	<input type="checkbox"/>	
		4.6 Whether the scouring measures are considered.	<input type="checkbox"/>	<input type="checkbox"/>	

Certification

Date :		Checked by :	(Sub-Divisional Officer)	Countersigned by :	(Executive Engineer)
Place :		Prepared by :	(Junior Engineer)		

Check List 2

Diversion Weir

[Middle Stage] : Drawings

1. Detailed Conditions

SN.	Items	Contents	Object	Confirmation	Reasons
1	[Example] Drawings	1.2 Whether the water and ground level are shown.	<input type="checkbox"/>	<input type="checkbox"/>	DPR Chapter 6 Estimates & Drawings
1	Drawings	1.1 Whether the layout and cross and profile drawings are prepared.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.2 Whether the water and ground level are shown.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.3 Whether the indication of the drawings is appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.4 Whether the special mention is considered.	<input type="checkbox"/>	<input type="checkbox"/>	
2	Construction Plan	2.1 Whether the access road for the construction is appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	
		2.2 Whether the temporary drainage of the river is considered.	<input type="checkbox"/>	<input type="checkbox"/>	

Certification

Date : _____ Checked by : _____ (Sub-Divisional Officer) Countersigned by : _____ (Executive Engineer)
 Place : _____ Prepared by : _____ (Junior Engineer)

Check List 3

Diversion Weir

[Final Stage] : Quantity and DPR

1. Quantity

SN.	Items	Contents	Object	Confirmation	Reasons
1	[Example] Quantity	1.2 Whether the quantity is prepared for each material.	<input type="checkbox"/>	<input type="checkbox"/>	DPR Chapter 6
1	Quantity	1.1 Whether the sizes used in the quantity calculation are consistent in the drawings.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.2 Whether the quantity is prepared for each material and each facility.	<input type="checkbox"/>	<input type="checkbox"/>	

2. DPR

SN.	Items	Contents	Object	Confirmation	Reasons
1	[Example] DPR	1.1 Whether the table of contents of DPR is based on the "Guidelines of preparation of DPR".	<input type="checkbox"/>	<input type="checkbox"/>	DPR Contents
1	DPR	1.1 Whether the table of contents of DPR is based on the "Guidelines of preparation of DPR".	<input type="checkbox"/>	<input type="checkbox"/>	
		1.2 Whether the reasons of the formulas and coefficients are wrote clearly.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.3 Whether the calculation process are arranged clearly.	<input type="checkbox"/>	<input type="checkbox"/>	

Certification

Date : _____ Checked by : _____ (Sub-Divisional Officer) Countersigned by : _____ (Executive Engineer)
 Place : _____ Prepared by : _____ (Junior Engineer)

Check List 1

Pond

[First Stage] : Basic Conditions

1. Outline

1.1 Purpose Irrigation Fisheries Other

1.2 Pond Dimension

1.2.1 Embankment Length m Height m

1.2.2 Gross Catchment Area ha

1.2.3 Reservoir Volume Approx cum

1.2.4 Command Area ha

1.3 Supplementary Facilities

1.3.1 Spillway Need No need

1.3.2 Intake Facility Need No need

1.4 Consultation

1.4.1 River Need No need

1.4.2 Drinking Water Need No need

1.4.3 Fisheries Need No need

1.4.4 Other () Need No need

2. Basic Conditions

SN.	Items	Contents	Object	Confirmation	Reasons
	<i>[Example]</i>				
3	Field survey	3.1 Whether the pictures are taken.	<input type="checkbox"/>	<input type="checkbox"/>	DPR Annexure
1	Design purpose	1.1 Whether the purpose is understood.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.2 Whether the scope, quantity, items of design are understood.	<input type="checkbox"/>	<input type="checkbox"/>	
2	Basic design conditions	2.1 Whether the water users are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		2.2 Whether the gross catchment and command area are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		2.3 Whether the layout of the embankment and supplementary facilities are appropriate as topography and irrigation.	<input type="checkbox"/>	<input type="checkbox"/>	
		2.4 Whether the necessity of the emergency discharge is considered.	<input type="checkbox"/>	<input type="checkbox"/>	
		2.5 Whether the consultation items are understood.	<input type="checkbox"/>	<input type="checkbox"/>	
3	Field survey	3.1 Whether the pictures are taken.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.2 Whether the land use of the plan site is grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.3 Whether the road conditions are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.4 Whether the difficulty or issues (downstream fisheries etc.) are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.5 Whether the borrow pit conditions are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
		3.6 Whether the important points of the construction are grasped.	<input type="checkbox"/>	<input type="checkbox"/>	
4	Design plan	4.1 Whether the embankment layout is suitable.	<input type="checkbox"/>	<input type="checkbox"/>	
		4.2 Whether the embankment structure is suitable.	<input type="checkbox"/>	<input type="checkbox"/>	
		4.3 Whether the location and structure of the spillway are appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	
		4.4 Whether the location and structure of the intake facility are appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	
		4.5 Whether the land acquisition and compensation are confirmed.	<input type="checkbox"/>	<input type="checkbox"/>	
		4.6 Whether the maintenance is considered.	<input type="checkbox"/>	<input type="checkbox"/>	

Certification

Date : _____ Checked by : _____ (Sub-Divisional Officer)

Place : _____ Prepared by : _____ (Junior Engineer) Countersigned by : _____ (Executive Engineer)

Check List 2

Pond

[Middle Stage] : Drawings

1. Detailed Conditions

SN.	Items	Contents	Object	Confirmation	Reasons
	<i>[Example]</i>				
2	Construction Plan	2.1 Whether the access road for the construction is appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	DPR Chapter 8
1	Drawings	1.1 Whether the layout and cross and profile drawings are prepared.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.2 Whether the water and ground level are shown.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.3 Whether the indication of the drawings is appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.4 Whether the special mention is considered.	<input type="checkbox"/>	<input type="checkbox"/>	
2	Construction Plan	2.1 Whether the access road for the construction is appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	
		2.2 Whether the temporary drainage of the river is considered.	<input type="checkbox"/>	<input type="checkbox"/>	

Certification

Date : _____ Checked by : _____ (Sub-Divisional Officer) Countersigned by : _____ (Executive Engineer)
 Place : _____ Prepared by _____ (Junior Engineer)

Check List 3

Canal

[Final Stage] : Quantity and DPR

1. Quantity

SN.	Items	Contents	Object	Confirmation	Reasons
	<i>[Example]</i>				
1	Quantity	1.2 Whether the quantity is prepared for each material.	<input type="checkbox"/>	<input type="checkbox"/>	DPR Chapter 6
1	Quantity	1.1 Whether the sizes used in the quantity calculation are consistent in the drawings.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.2 Whether the quantity is prepared for each material and each facility.	<input type="checkbox"/>	<input type="checkbox"/>	

2. DPR

SN.	Items	Contents	Object	Confirmation	Reasons
	<i>[Example]</i>				
1	DPR	1.1 Whether the table of contents of DPR is based on the "Guidelines of preparation of DPR".	<input type="checkbox"/>	<input type="checkbox"/>	DPR Contents
1	DPR	1.1 Whether the table of contents of DPR is based on the "Guidelines of preparation of DPR".	<input type="checkbox"/>	<input type="checkbox"/>	
		1.2 Whether the reasons of the formulas and coefficients are wrote clearly.	<input type="checkbox"/>	<input type="checkbox"/>	
		1.3 Whether the calculation process are arranged clearly.	<input type="checkbox"/>	<input type="checkbox"/>	

Certification

Date : _____ Checked by : _____ (Sub-Divisional Engineer) Countersigned by : _____ (Executive Engineer)
 Place : _____ Prepared by _____ (Junior Engineer)

FORM 9-2 O&M PLAN

Operation and Maintenance Plan

1. Outline of WUA

1.1 Name of MIP : _____

1.2 Name of WUA : _____

1.3 Location of WUA : _____ Division : _____

Village/Town : _____

1.4 Command Area :

Paddy [Example] 30.0	Command Area (ha)			Beneficiary (household)
	Upland	Orchard	Total	
	5.0	15.0	50.0	45

2. List of facilities managed by WUA

SN.	Name of Facilities	Completion Year (Plan)	Outline of Facilities	
			Structure	Dimension
[Example]				
1	No.1 Diversion Weir	2017	Reinforced Concrete	Weir L = 10 m
4	No.3 Main Canal	2019	Brick, Cement Lining	L = 2,000 m
1				
2				
3				
4				
5				

3. Operation and Maintenance Plan

[Example]					Schedule											
SN.	Name of Facilities	Items	Implementer	Frequency	Jan.	Feb.	Mar.	Apr.	May	Jun	Jnl.	Aug.	Sep.	Oct.	Nov.	Dec.
					1	No.1 Diversion Weir	Patrol	Person in charge	Every week							
Water management	Person in charge	Every day														
Maintenance	Removing sedimentation soil	All beneficiaries	Every month													
Rehabilitation	Removing weeds	All beneficiaries	4 times per year													
4	No.3 Main Canal	Patrol	Person in charge	Every week												
		Water management	Person in charge	Every day												
		Maintenance	Removing sedimentation soil	All beneficiaries	Every month											
		Rehabilitation	Removing weeds	All beneficiaries	4 times per year											
Crop season					Dry (Rabi)		Summer			Rainy (Kharif)				Dry (Rabi)		
SN.	Name of Facilities	Items	Implementer	Frequency	Jan.	Feb.	Mar.	Apr.	May	Jun	Jnl.	Aug.	Sep.	Oct.	Nov.	Dec.
1		Patrol														
		Water management														
		Maintenance	Removing sedimentation soil													
		Rehabilitation	Removing weeds													
2		Patrol														
		Water management														
		Maintenance	Removing sedimentation soil													
		Rehabilitation	Removing weeds													
3		Patrol														
		Water management														
		Maintenance	Removing sedimentation soil													
		Rehabilitation	Removing weeds													
4		Patrol														
		Water management														
		Maintenance	Removing sedimentation soil													
		Rehabilitation	Removing weeds													
5		Patrol														
		Water management														
		Maintenance	Removing sedimentation soil													
		Rehabilitation	Removing weeds													
Crop season					Dry (Rabi)		Summer			Rainy (Kharif)				Dry (Rabi)		

Date: _____ Place: _____
 Checked by: _____ Prepared by: _____ Countersigned by: _____
(Sub-Divisional Engineer) (Junior Engineer and WUA) (Executive Engineer)

FORM 10-1**STANDARD CONSTRUCTION PLAN FORM****1. Project outline**

Name of Project	
MID office in charge	
Site location	
Construction budget	
Construction facilities	
Objective of the Project	

2. Management organization**2-1 MID supervision team ;**

Position	Responsibility

2-2 Safety management;**(1) Contact list**

Organization/status	Name	Contact number
Hospital		
Police Post		
Water users organization		
Village council		
Relevant Department		

(2) Safety measures

Description about special safety management, safety measures and facilities, crime and pollution control measures, safety management meeting, safety patrol, inspection, if necessary. General Safety measures should be referred to Contractors agreement Form 8.

3. Temporary work plan

Describe equipment specified in design documents and major temporary facilities (temporary work, diversion drainage, access road), if necessary.

4. Construction plan**4.1 Construction machinery utilization plan:**

Machine Name	Specification	Nos	Work to use	Remarks
Excavator				
Concrete Mixer				

4.2 Major materials:

Name of materials	Description	Quantity	Unit	Source of Procurement	Remarks
Cement					
Aggregate					
Sand					
Reinforcement bar					
Brick					
Wood plank					

FORM 11-1

B/C CALCULATION SHEET

1. Total Estimated cost of the Project			
			(lakhs)
2. Total cost of the headworks			
a1. Diversion weir (1 nos.)			(lakhs)
a2. Intake (1 nos.)			(lakhs)
a3. Desilting tank (1 nos.)			(lakhs)
	Total headworks	0.0	(lakhs)
3. GCA			(ha)
4. CCA			(ha)

SN	Description	Pre-Project (lakhs)	Post-Project (lakhs)
1	a. Gross Receipts		
	Gross annual receipts (estimated value of farm produce)		
	b. Expenses (Cost of Production)		
	c. Net Value of Farm Produce (a.-b.)	0.00	0.00
2	d1. Estimated Annual Benefits after Project Completion (Post benefits - Pre benefits)	-	0.00
3	Annual Cost		
	d2. Interest on capital @ 10% of total cost of the project	-	0.00
	e. Depreciation of the project @ 4% of the project cost	-	0.00
	f. Annual operation & maintenance const @ Rs 1,175.00 per ha of CCA	-	0.00
	g. Maintenance cost of head works @ 1% of cost of head works	-	0.00
	h. Total Annual Cost (Σ d2. ~g.)	-	0.00
	i. Benefit Cost Ratio (d1./h.)	-	
	j. Potential to be Created (ha)		
	k. Total Project Cost per Hectare (1./4.)		

FORM 12-1
MINUTE OF RATIFICATION MEETING

Minute of Ratification Meeting Laului Minor Irrigation Scheme
(Draft)

The ratification meeting on **Laului Minor Irrigation Scheme** was held on 4th December, 2014 discussing the contents of DPR prepared by MID and other stakeholders based on the result of the workshop held from 8th to 10th October, 2014.

Each party have clearly understand the contents of the DPR and mutually agreed the followings if the DPR is sanctioned.

MID

- ◆ Making necessary effort for sanctioning the respective Laului Minor Irrigation Scheme implementation.
- ◆ Construct and/or rehabilitate the facilities based on the prepared DPR with sanctioning budget.
- ◆ Giving the necessary support to WUA for proper operation and maintenance of the facilities based on prepared O&M plan.

WUA

- ◆ Cooperate with MID and provide necessary support during and after construction works
- ◆ Utilizing the facilities effectively based on the prepared crop calendar and agriculture action plan
- ◆ Taking over the facilities from MID and operates and maintains the facilities in accordance with O&M plan for 25 years after construction and/or rehabilitation of the facilities

Other Government Departments and Stakeholders

- ◆ Giving follow-up activities which are stipulated in the agriculture action plan, like extension services.
- ◆ Strengthening mutual cooperation with MID and WUA for further necessary actions for effective utilization of the respective Laului Minor Irrigation Scheme, if required.

The President of WUA
Laului Minor Irrigation Project

ms Dawng Liana
18/12/14
(MS. DAWNG LIANA)
Chairman
Laului User Association
Sailam, Mizoram

Executive Engineer
Aizawl Irrigation Division

18/12/14
18/12/14
(S. H. SAITHANTLUANG)
Executive Engineer
Aizawl Irrigation Division
Aizawl, Mizoram

District Agriculture Officer
Aizawl District

18/12/14
(S. H. SAITHANTLUANG)
District Agriculture Officer
Aizawl District, Aizawl

District Horticulture Officer
Aizawl District

18/12/14
(LALTHLAMUANA)
Divisional Horticulture Officer
Aizawl Division Aizawl.

Witness:
VCP, Sailam Village

18/12/14
(LALTHANSANGA)
Secretary
Village Council/Court
Sailam, Aizawl District

LIST OF REFERENCE

REFERENCE 5-1**NECESSARY TOOLS AND MATERIALS FOR WUA ESTABLISHMENT
WORKSHOP**

(All listed items are available in Mizoram)

No.	Description of Items	Spec.	Unit	No	Remarks
1	Flip Paper (Chart paper / Newsprint paper)	white	no.	20	Using for presentation etc.: Do not purchase expensive one, and select paper, available even in local shop
2	Do.	yellow	no.	4	
3	Do.	Pink	no.	4	
4	Do.	red	no.	4	
5	Do.	Green	no.	4	
6	Do.	Total		<u>36</u>	
7	Typing paper (A-4)	-	bundle	0.25	for making draft, calculation, memo etc.
8	Felt-tip pen (sketch pen)	set	no.	3 - 5	Locally available sketch pen is the most suitable.
9	Marker Pen (permanent)	Red	no.	1	not absolutely necessary
10	Do.	Black	no.	1	
11	Do.	Blue	no.	1	
12	Masking paper (white colour)	off-white	roll	1	
13	Hard Paper for Name Card	(A-3)	no.	5	with pin
14	Plastic rope or string to fix Flip paper with clip	1	roll	1	Thick and strong string is better
15	Field book	-		30	Provide only for the first occasion
16	Ball-point pen (blue or black)	-	no.	30	Provide only for the first occasion
17	Carbon paper	Blue	sheet	5	to make copy
Other Equipment					
1	Display Easels	-	no.	1	if it is available
2	Projector to show Power-Point Doc.	-	no.	1	
3	Speaker for Projector / Computer	-	no.	1	
4	Extension code for electricity	5	meter	3	
5	Generator for Projector	1 KVA	no.	1	
Note: Name of paper and size in India					
1)	Bristol Board (572mm x 724mm)				
2)	Double Demy (572mm x 889mm)				
3)	Quad Demy (889mm x 1143mm)				
4)	News print paper is cheap and easy to handle				

REFERENCE 5-2

SAMPLE AGENDA AND TIME SCHEDULE FOR ESTABLISHMENT OF WUA

Session -1

- | | |
|--|---------------|
| 1. Introduction of the day's agenda and objective | 09:00 - 09:15 |
| 2. Introduction of participants | 09:15 - 09:35 |
| 3. Introduction of workshop | 09:40 - 10:00 |
| - Explanation of agenda & goal | |
| - Preparation of ground rules etc. | |
| 4. Introduction about present WUA | 10:00 - 10:30 |
| - Explain according to given items | |
| 5. Comments on present WUA activities (refer to Action Plan) | 10:30 - 10:45 |
| 6. Break | 10:45 - 11:00 |
| 7. Video showing (*need Electricity / Generator) | 11:05 - 11:45 |
| 8. Free Discussion about Video | 11:45 - 12:10 |
| 9. Introduction of CBO development concept & Discussion | 12:10 - 12:40 |
| 10. Lunch (snack) | 12:40 - 13:40 |

Session – 2

- | | |
|---|---------------|
| 11. Game or sing a song for refreshment | 13:40 - 13:55 |
| 12. Preparation of WUA's vision and objectives | 13:55 - 14:25 |
| - Group Discussion: 'What is vision / objective and tasks/functions of our WUA?' | |
| - Presentation by each group about 'Our WUA' refer to Vision & Objectives | |
| 13. Preparation of rules and regulation of WUA | 14:25 - 15:50 |
| - Introducing necessary items for preparation of WUA's rules and regulation (by-law) | |
| - Preparation of draft rules and regulation based on a model documentation of WUA by-law | |
| - Presentation of draft rules and regulation | |
| - Finalization of the draft rules and regulation | |
| 14. Tea break | 15:50 - 16:05 |
| 15. Implement Model General / Committee meeting by WUA | 16:05 - 17:15 |
| - Selection of Committee member and Office-bearers if necessary. | |
| - Express each one's wishes as office-bearer | |
| - *Assent and seconded WUA's vision and tasks, draft rules & regulation , etc. | |
| - Hand over necessary document to MID for the next step. | |
| 16. Wrap-up & Closing session | 17:15 - 17:45 |

REFERENCE 5-3

LIST OF DOCUMENT NECESSARY FOR WUA MANAGEMENT

I	General
1.	Registry of WUA
2.	Rules and Regulation
3.	WUA Members Information List with Land-use Map
II	For Accounting and management
1.	Receipt Book
2.	Cash book
3.	Petty Cash a/c
4.	Asset Register
5.	Invoice Book
6.	Requisition Book
7.	Order Book
8.	Bank Account Details
III	Other Management (Reporting / Recording / Schedule)
1.	Farmers Demand for Water Register and Irrigation Schedule
2.	Minutes book
3.	Financial Report
4.	Financial Audit
5.	Crop area record book
6.	Register of members' fee due and paid

REFERENCE 5-4**REFERENCE OF WUA RULES AND REGULATION****[SAMPLE]****1. Area of Operation and WUA's Vision**

The area of operation of a WUA will be the area served by **XX**.

The Vision of WUA shared among members is; -----

2. Formation of WUA

The following persons shall be eligible for the membership of a WUA:

- 1) All the shareholders of Irrigation **XX** as per approved **Current System** under Section of **ZZ Act, 201X**.
- 2) Actual owner or his/her representative of the owner of land located within the jurisdiction of a WUA.
- 3) **XXX** Engineer of **YYY** Minor Irrigation Department as an ex-officio member, without any voting right.

3. The other conditions for membership are;

- 1) That the person should be- (i) major, (ii) having sound mind and (iii) is not insolvent.
- 2) In case the Board of Committee or the General Body / Meeting refuses to admit an otherwise eligible person, it shall record the reasons and communicate to the person.
- 3) Such a person can appeal to the Divisional Office within **XX** week of communication of such decision and the decision of the Divisional Office will be a binding on the society.

4. Aims and Objectives of Water User's Association

The main aims of the WUA shall be as under:

- 1) Equitable and uniform distribution of available canal water among all users on the basis of approved **Current System under Section YY of the ZZ Irrigation Act, 201X**.
- 2) Adequate operation & maintenance of watercourses and keep it in running condition by clearance of the silt & vegetation etc.
- 3) Ensure efficient and economical use of irrigation water.
- 4) Agriculture Action Plan to decide type of crop & Cropping Pattern for optimum utilization of available water.
- 5) Activities for the welfare of all the users / members.
- 6) Protection of environment and ecological balance by involving shareholders in implementation of water budget and operational plan.

5. Functions of WUA

The WUA will have following functions in general:

- 1) Help prepare **Current System** under section **XX of XX Irrigation Act, 201X** and implement the approved Water Schedule for each cultivation season.
- 2) Prepare an action plan for O&M of irrigation system and carry out work as per plan.
- 3) Regulate supply of canal water among shareholders economically.
- 4) Assist in various activities like water charges assessment (booking), raising of water charges and collection etc.
- 5) Maintain a register of landowners as per the revenue record and also keep record of tenants.
- 6) Maintain an inventory of the irrigation system within the area of operation.
- 7) Generate resources and maintain accounts of WUA.
- 8) Get annual audit of the accounts and report.
- 9) Assist in the conduct of elections to the Board of Committee.
- 10) Settle conflict among shareholders amicably.
- 11) Keep close liaison with **the XX Division** of Minor Irrigation Department for technical assistance and other necessary assistance.
- 12) Conduct General meetings as scheduled.
- 13) Arrange agricultural extension programs / training etc. to determine the most suitable crop for the area and marketing etc.
- 14) Conduct water budgeting and crop budgeting with the help of DOA, DOH and MID.

6. General Body / General Meeting

The General Body / Meeting of a WUA will consist of the members as detailed above. The powers and functions of the General Body will be as under;

- 1) The General Body / Meeting will elect a Board of Committee by ballot, which will perform essential functions of the WUA.
- 2) It may suspend or remove the elected members of the Managing Committee.
- 3) It will have minimum two meetings in a year, one before each cultivation season.
- 4) The meeting can also be convened at the request of at least one third of total members.
- 5) The meeting will be convened with a clear notice of seven days by the manner prescribed under rules.
- 6) It will approve the program of the WUA for each year with a clear agenda of improving irrigation efficiency.
- 7) The General Body / Meeting will be the final authority in finalizing the yearly budget and accounts, as submitted by the Board of Committee.

7. Model Guidelines for formation

Water User's Association

- 1) It will take all major decisions for fulfilment of the objectives and for betterment of the shareholders of the WUA.
- 2) It will authorize its elected chairman (to execute MOU with the Government).
- 3) It may amend bylaws.

Managing Committee

Constitution

- 1) The Board of Committee shall consist of **XX** members or as fixed by the General Body / Meeting and will be duly democratically elected by the General Body / Meeting of WUA.
- 2) The term of the members of Board of Committee will be **YY** year(s) and fresh elections will be held on completion of term.
- 3) It will elect its Chairman, Vice-chairman, Secretary, Asst. Secretary, Treasurer, Financial Secretary and other functionaries as per requirement.
- 4) If one-third members desire not to serve the as members of Board of Committee, elections for the same shall be held by calling the meeting of General Body / Meeting.
- 5) If less than one-third members resign, the Board of Committee will co-opt the members of the same area.
- 6) If more than half members resign, fresh elections for the Board of Committee shall be held.
- 7) No person shall be eligible for election as a member of the Board of Committee if he/she is;
 - Paid employee of the society.
 - Of unsound mind.
 - Defaulter under **XX Irrigation Act, 201X**.
 - Held any place of profit under the society/outlet society.

Duties

- 1) It will observe all the rules laid down in the by-laws, adopted by the General Body / Meeting.
- 2) It will perform all activities to fulfil the objectives of the WUA as laid down in the adopted by-laws.
- 3) It will manage the entire finances of the WUA as per the adopted by-laws.
- 4) It will maintain true and accurate account of funds received and spent.
- 5) It will keep a register of members correct and up to date.
- 6) It will summon General Body Meeting as per by-laws.
- 7) It will meet monthly or earlier, if required earlier to discuss the affairs of the WUA.
- 8) It will discuss and finalize operation and maintenance plan, action taken and action to be taken to fulfil the objectives of the WUA.
- 9) It will carry out beneficial schemes as prepared by the State Govt. from time to time.

Funds

The WUA may raise funds for its functions and other activities such as group loan etc.

- 1) Voluntary deposits from its members.

- 2) Contributions in emergency.
- 3) Budget grant from the Govt. and other financial assistance from the Govt.
- 4) Any savings from the works / contract undertaken by the WUA.
- 5) Resources raised from other financing agency for undertaking any economic development activities in the area.
- 6) Money received from any other source.

Management of funds

- 1) All the capital investment of WUA will be in long term fixed deposits, with instructions to deposit the interest in the savings account every **XX** month(s).
- 2) The WUA will deposit its operative funds in a savings account in the approved Bank.
- 3) The savings account will be operated jointly by the treasurer and any other member, nominated by the Board of Committee.
- 4) The Board of Committee can spend **Rs.XXX/=** at one time subjected to a maximum of **Rs.YYY/=** in one year without obtaining prior formal technical/administrative sanction from the competent authority in **XXX MID**.
- 5) Only such amount should be drawn from the savings account (operational fund), which is required to cover running expenses for approved work. The maximum cash in hand be restricted to **Rs.ZZZ/=**.

Default in payment

If a shareholder fails to pay his share as fixed by the WUA and it remains unpaid for **XX** month(s), penalty as deemed appropriate by the WUA will be imposed.

Financial Year

The financial year of the WUA shall be from **X month to Y month**. The accounts should be audited and placed in the General Body Meeting.

Winding Up

In case the society has to be wound up, the property and funds remaining after discharge of liability shall be transferred to **XXX Department**, which is already engaged in similar activities. Further, if the WUA is dissolved on the request of the General Body / Meeting or MID, the funds shall be returned to the same authority from where these were collected.

Miscellaneous

- 1) The services of the members of the Board of Committee shall be honorary.
- 2) Any person employed by the WUA shall be appointed with the approval of the General Body / Meeting & pay, allowances, terms of services shall be decided by the General Body / Meeting and such a person shall work under the guidance of the Managing Committee / Meeting of the WUA.
- 3) Once a year a list giving details of the members of the Board of Committee of the WUA shall be filed in the month of January with the Registrar of Firms and Societies.
- 4) The movable and immovable property of the WUA shall be deemed to be vested in the Board of Committee of the WUA and in all proceedings of the civil & criminal may be described as the property of the WUA by its proper title.
- 5) The society may sue or may be sued in the name of the Chairman, Secretary or Treasurer, Financial Secretary or any other member as determined by the General Body / Meeting.
- 6) In the normal course, the Secretary of the society may sue or be sued.

REFERENCE 7-1**SAMPLE AGENDA AND TIME SCHEDULE FOR AGRICULTURE ACTION PLANNING****DAY 1st****Session -1**

- | | |
|--|---------------|
| 1. Welcome & Key-note Speech by MID & others | 09:00 - 09:20 |
| 2. Introduction of participants | 09:20 - 09:40 |
| 3. Introduction of workshop | 09:40 - 10:00 |
| - Explanation of agenda & goal | |
| - Preparation of ground rules etc. | |
| 4. Forming Group (if necessary) | 10:00 - 10:10 |
| - Nominating Group Leader and Assistant (if necessary) | |
| 5. Preparation of Current Cropping Pattern / Resources Maps & Lists | 10:10 - 11:30 |
| - Current Cropping Pattern: Irrigated Paddy Land (paddy & horticulture), Permanent Cropping Land, Jhum Cultivation (paddy & other crop): | |
| 6. Problem Analysis | 11:30 - 12:30 |
| - Prioritization of problems | |
| - Presentation and discussion with resources persons | |
| - Make clear core problems and share them among participants | |
| 7. Lunch | 12:30 - 13:30 |

Session -2

- | | |
|--|---------------|
| 8. Game or sing a song for refreshment | 13:30 - 14:00 |
| 9. Review last activities and explain this session's activity & goal | 14:00 - 14:20 |
| 10. Preparation of Proposed Cropping Pattern | 14:20 - 15:30 |
| - Review area map, resources map, list & priority issues | |
| - Review current cropping pattern | |
| - Explanation of present irrigation system & improvement plan etc. | |
| - Receiving information from DOA / DOH / DOF, Market price etc. | |
| - Checking up suitable crop in the area from soil, pH, technology, etc. | |
| Finalization of Strategic crops & Prepare Draft Proposed Cropping Pattern | |
| 11. Tea break | 15:30 - 15:45 |
| 12. Presentation of Draft Proposed Cropping Pattern | 15:45 - 16:45 |
| - Receiving comments from resources person | |
| - Taking final confirmation among farmers | |
| - Finalization of Proposed Cropping Pattern | |
| 13. Wrap-up & Closing session | 16:45 - 17:00 |

DAY 2nd**Session -1**

- | | |
|---|---------------|
| 1. Introduction of the day's agenda and objective | 09:00 - 09:15 |
| 2. Review last day's work | 09:15 - 09:40 |
| 3. Preparation of Agriculture Action Plan | 09:40 - 11:00 |
| - Review of priority problem list & resources list etc. of the previous day | |
| - Prepare draft Action Plan by group through discussion | |
| - Presentation of the draft Action Plan | |
| - Discussion with relevant departments and make clear all issues concern to the draft Action Plan | |
| 4. Tea break | 11:00 - 11:15 |
| 5. Finalization of Agriculture Action Plan | 11:15 - 12:00 |
| - Receiving practical ideas from relevant departments | |
| 6. Lunch | 12:00 - 13:00 |

Session -2

- | | |
|--|---------------|
| 7. Presentation of Agriculture Action plan | 13:00 - 13:45 |
| - Receiving comments from relevant resources persons | |
| 8. Finalize set of document for the Agriculture Action Plan for each relevant departments and signed each other, and submit them | 13:45 - 14:30 |
| 9. Wrap-up & Closing session | 14:30 - 15:00 |

REFERENCE 7-2

REFERENCE FOR CROP SELECTION

The selection of crops is one of the key elements to prepare a proper cropping pattern, meanwhile most of the farmers have difficulty accessing to the necessary information. In the DPR workshops, basic information was provided by the JICA study team as mentioned below. It is required that concerned departments of the state government revise such information appropriately to meet the needs of farmers.

1. Classification of Crops

It is important to select appropriate crops based on a thorough examination of the water condition and availability, the level of farmers' skills, the profitability, and the risks of cultivation. The classification of crops under each condition is shown in the table below.

Crop	Water requirement	Level of farming skills	Profitability	Risks/ Remarks
Leaf Mustard	Middle	Low	Mid	Use labour intensively for harvesting & bundling/ Replant failure
Cabbage	High	Mid	Mid	Insect damage/ High transportation cost/ Price fluctuation/ Replant failure
Cowpea	Low	Low	Low	Low-temperature damage/ Use labour intensively for harvesting
Lady's finger	Middle	Mid	Mid	Low-temperature damage
French bean	Low	Low	Low	Acidic soil damage / Replant failure
Maize	Middle	Mid	Mid	High demand for nutrients/ Insect damage
Field pea	Low	Low	Mid	Acidic soil damage/ / Replant failure/ Use labour intensively for harvesting
Chilly	Low	Mid	Mid	Low-temperature damage/ Replant failure
Brinjal	Low	Mid	Mid	Low-temperature damage/ Replant failure
Tomato	Low	High	High	Replant failure/ High transportation cost/ Postharvest loss (spoil quickly)
Onion	Low	Mid	Mid	Acidic soil damage/ High transportation cost
Broccoli	Low	High	High	Difficult to access market channels/ Postharvest loss (spoil quickly)/ Replant failure
Cauliflower	Low	High	High	Difficult to access market channels/ Postharvest loss (spoil quickly)/ Replant failure
Knol-khol	High	High	High	Difficult to access market channels/ Postharvest loss (spoil quickly)/ Replant failure
Lettuce	Middle	High	High	Difficult to access market channels/ Postharvest loss (spoil quickly)/ Acidic soil damage/ Replant failure
Potato	Middle	Mid	Mid	High transportation cost/ Difficult to procure seed potato
Table beet	Middle	High	Mid	High transportation cost/ Uncertainty of market demand
Coriander	Low	Mid	Mid	Difficult to access market channels/ Postharvest loss (spoil quickly)/ Use labour intensively for harvesting

Note 1: Profitability is estimated by (Average Yield) x (Market Price)

Note 2: If a hybrid variety is selected; higher profitability is expected, meanwhile, very high level of farming skills and high input cost are required.

2. Remarkable Points for Sales of Products

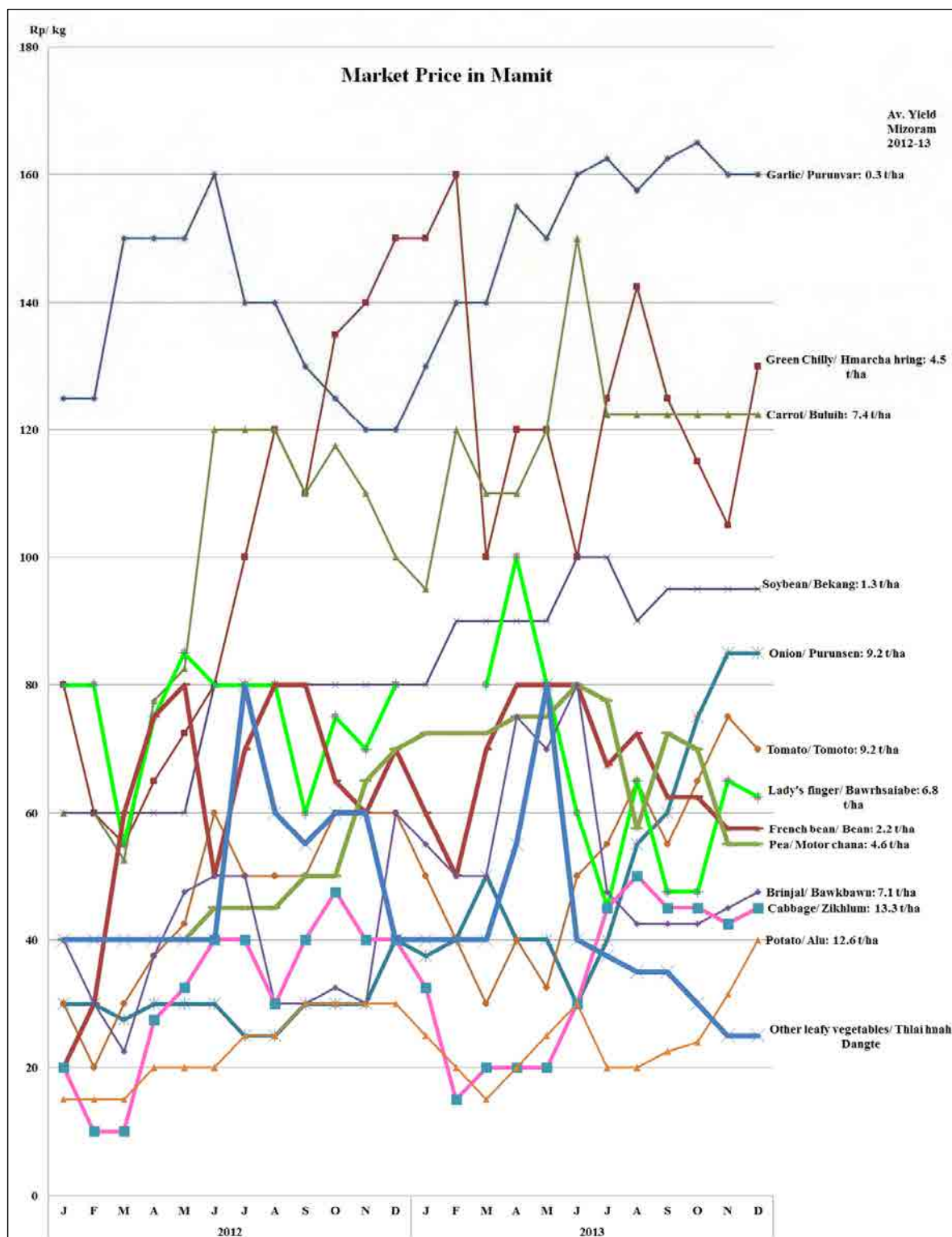
It is important to take into account of not only the production condition but also the sales environment in order to select appropriate crops. Furthermore, diversification of sales channels contributes to the improvement of profit and the reduction of risks. Remarkable points for sales are shown in the table

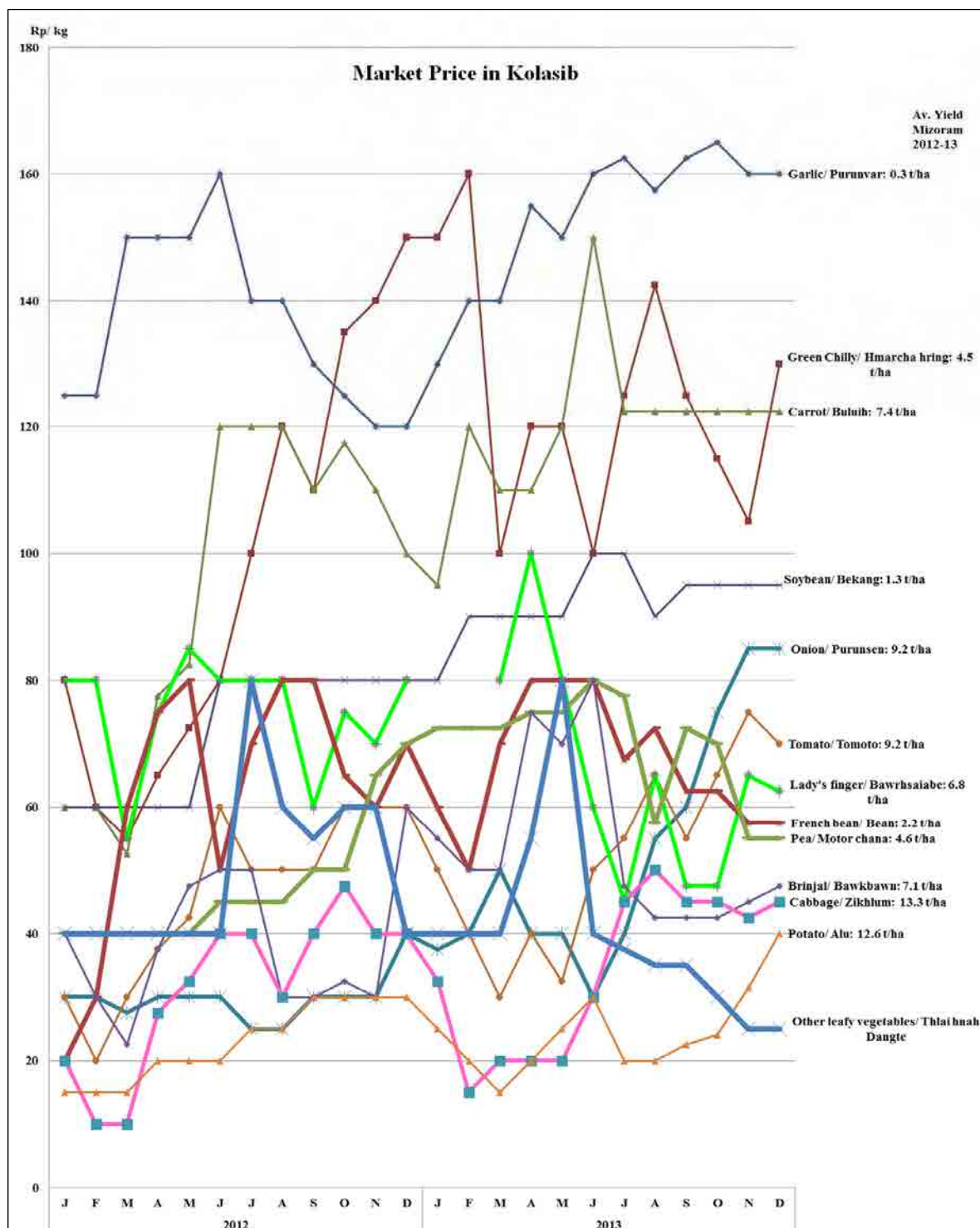
below.

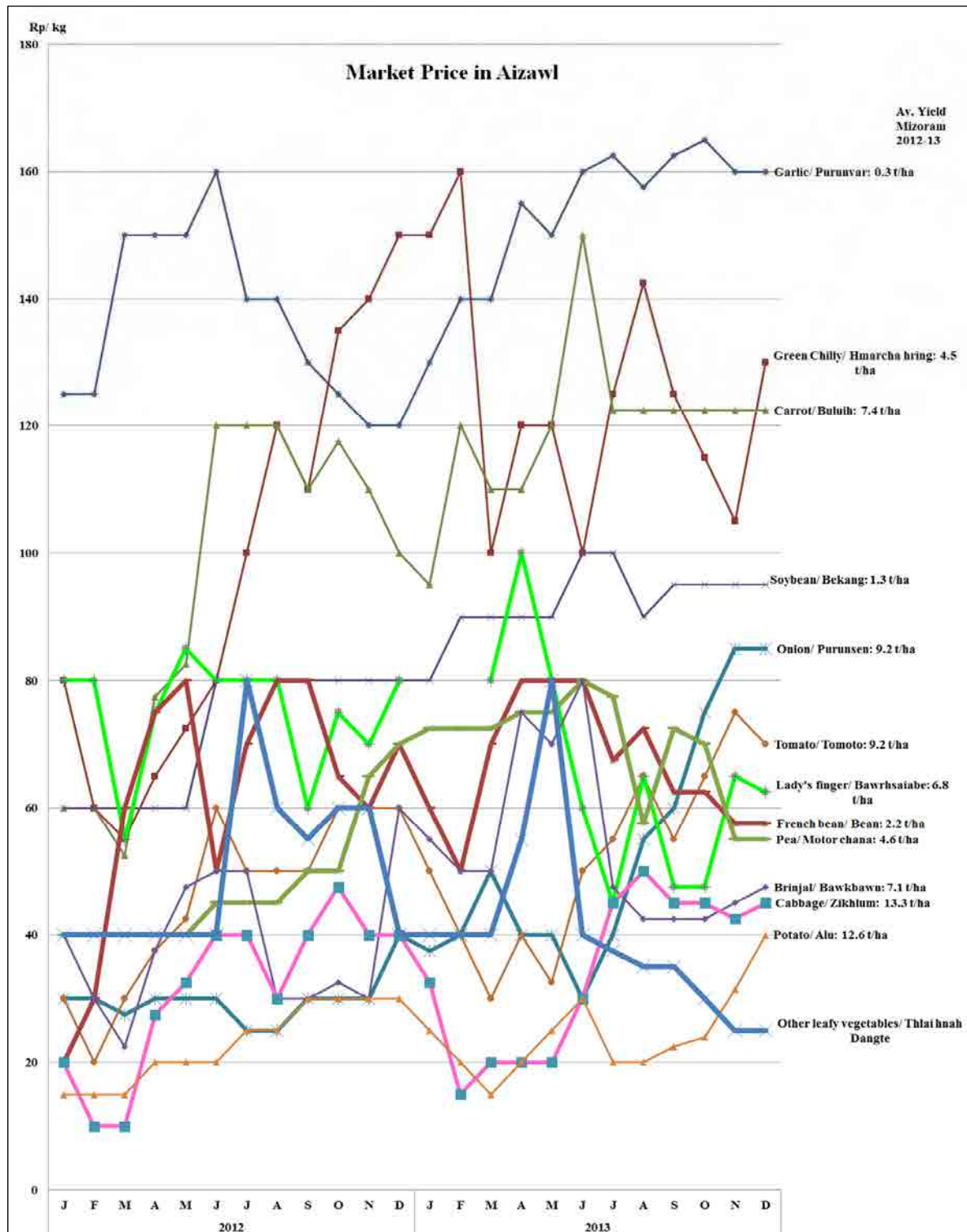
To whom/ <i>Tu hnenah</i>	Where/ <i>Hralhna hmun</i>	Sales price/ <i>Hralhna man</i>	Sales volume/ <i>A tam zawng</i>	Cost & time of Transportation & packaging/ <i>Thlai phurhna leh dahna a senso</i>	Skills for selling/ <i>Zuar tur a thiamna neih</i>
Trader/ <i>Sumdawng</i>	Pickup point/ <i>Lak khawmna</i>	Low/ <i>Tlawm</i>	As much as you want/ <i>Duh zah zah</i>	Very low/ <i>Tam lo</i>	Very low/ <i>Hniam tak</i>
Wholesaler & Retailer/ <i>Zuar chhawngtu</i>	Market in Town/ <i>Bazarah</i>	Middle/ <i>Pangai</i>	Negotiation/ <i>Inbiakremna</i>	Low to middle/ <i>A laihawl</i>	High/ <i>Sang</i>
Neighbours / <i>Thenawmte</i>	Town or Village/ <i>Khaw chhungah leh veng chhungah</i>	Low to middle/ <i>Tlawm atanga pangai</i>	Small/ <i>Tlem</i>	Low/ <i>Tlem</i>	Low/ <i>Hniam</i>
Produce stand/ <i>Thutpuitute</i>	Roadside/ <i>Kawngsirah</i>	High/ <i>To</i>	Dependent on your effort/ <i>Mimal theihna azirin</i>	Low to middle/ <i>A laihawl</i>	High/ <i>Sang</i>
Farmers' Organisation/ <i>Kuthnathawktute pawl</i>	Collection centre/ <i>Lak khawmna hmunah</i>	Middle to high/ <i>Pangai atanga to</i>	Dependent on organisation's capacity/ <i>Pawl ina a theih tawk</i>	Middle/ <i>A laihawl</i>	Middle/ <i>Pangai</i>
Customer directly/ <i>Dawr tu te</i>	Each customer's house/ <i>Dawr tut e inah</i>	Very high/ <i>To lutuk</i>	Dependent on your effort/ <i>Mimal theihna azirin</i>	Very high/ <i>Tam lutuk</i>	Very high/ <i>Sang lutuk</i>

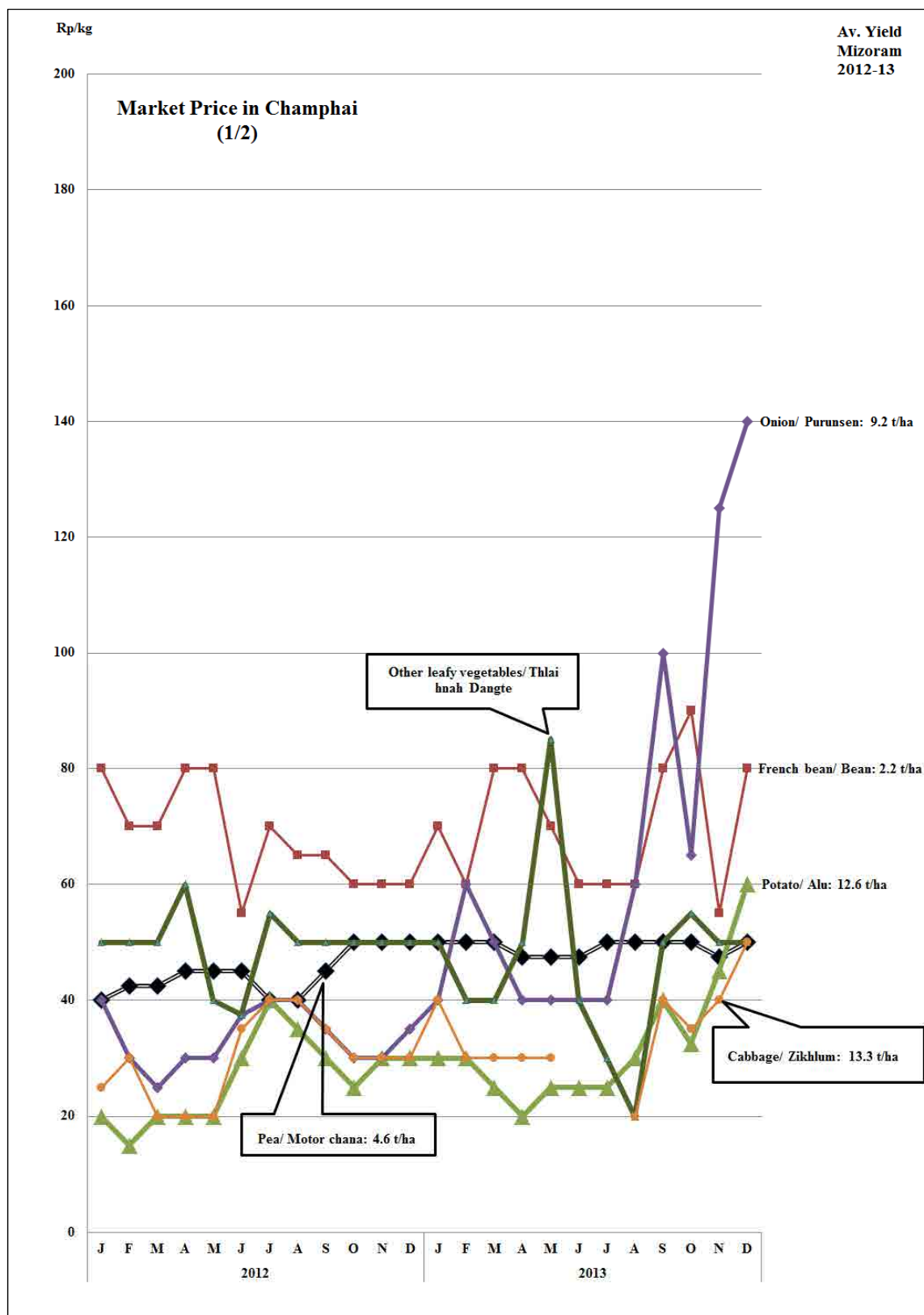
3. Trends in Market Price and Crop Yield

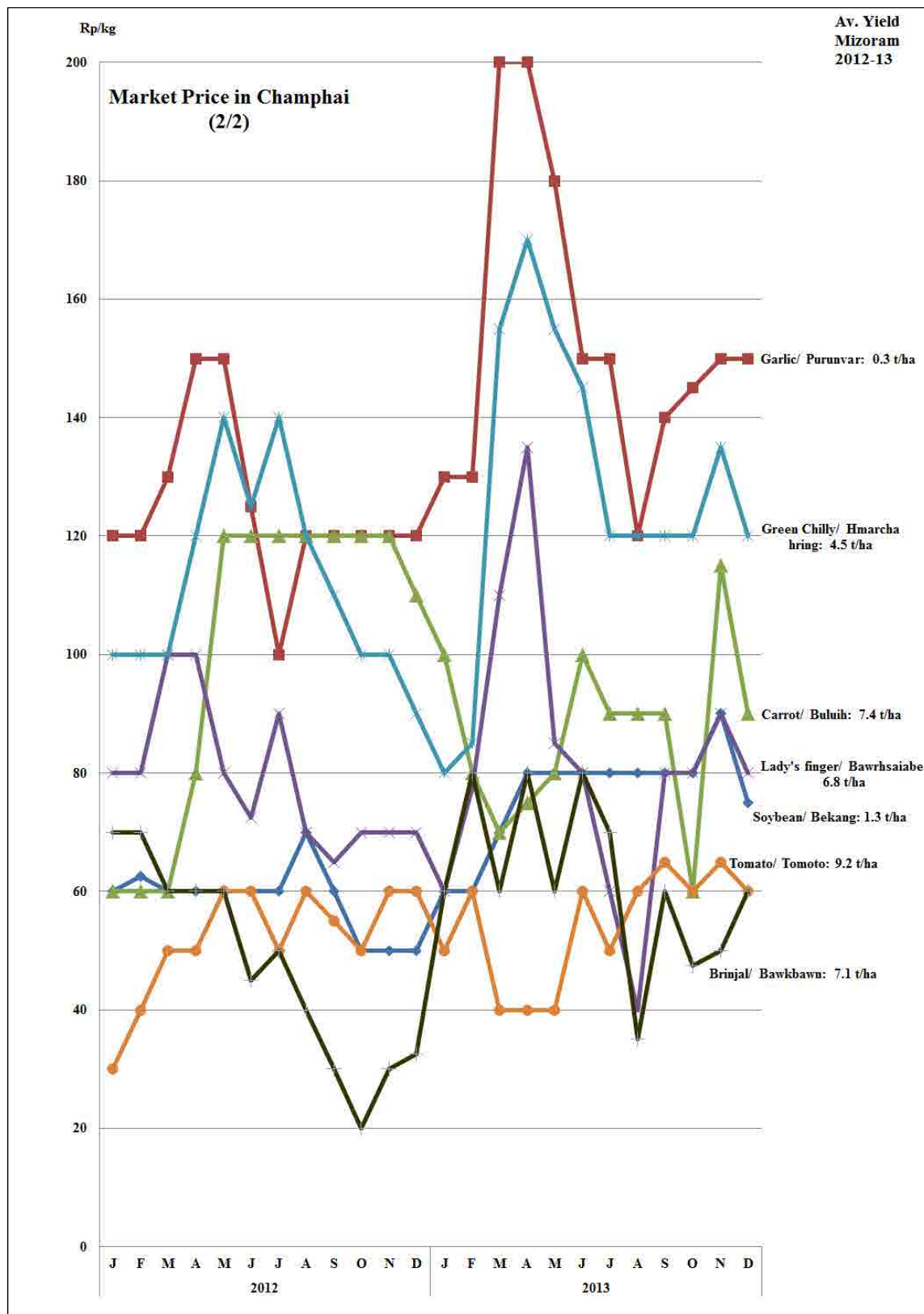
Since the price of crops fluctuates a lot, it is necessary to collect the market information to obtain a reasonable benefit. The crop selection with a market-oriented approach provides more benefit to the farmers. The benefit is calculated by multiplying the volume of product by the unit price, therefore the selection of crops is also needed to concern the balance between the crop yield and the sales price. The trends of market price in the seven towns are shown in the figures below.

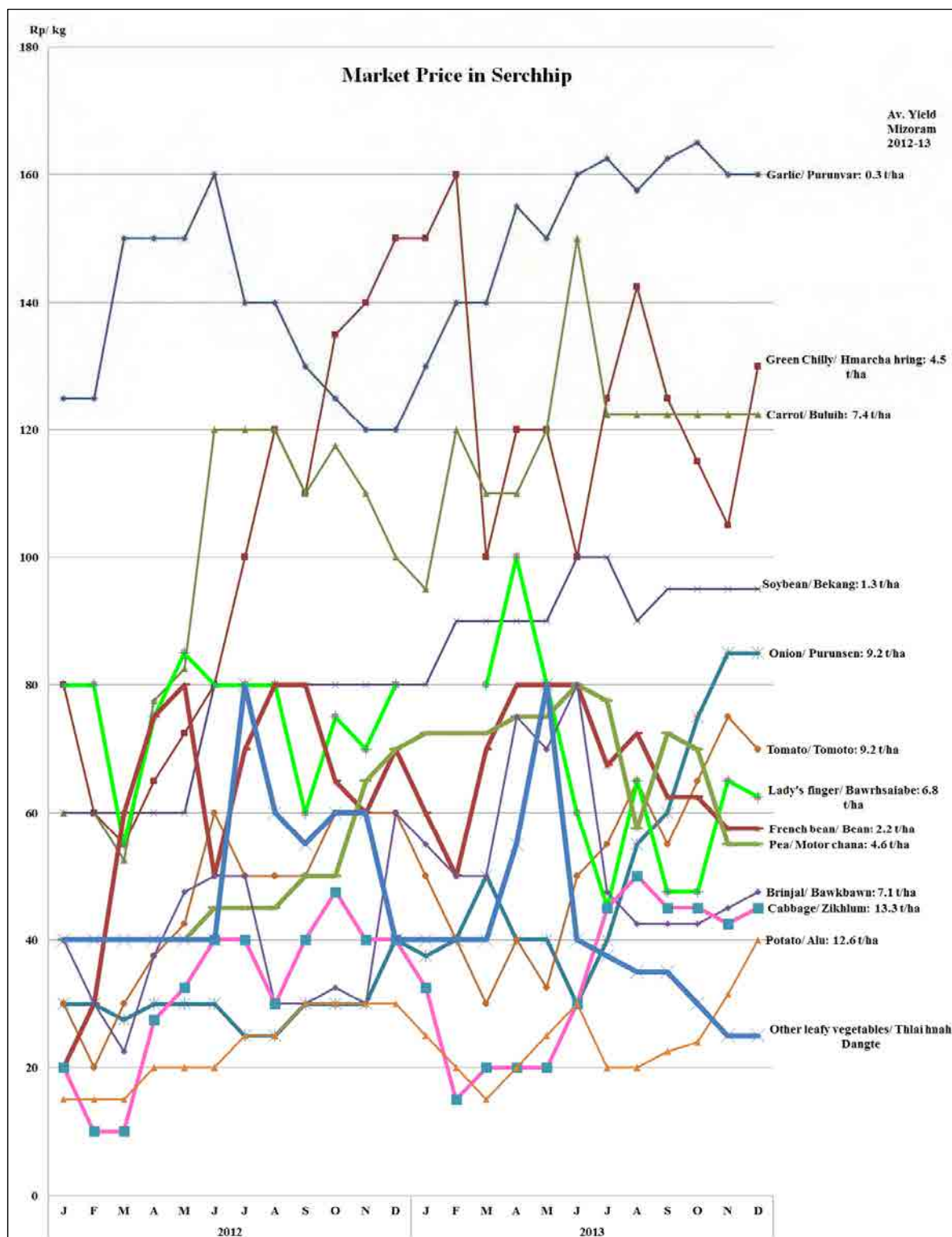


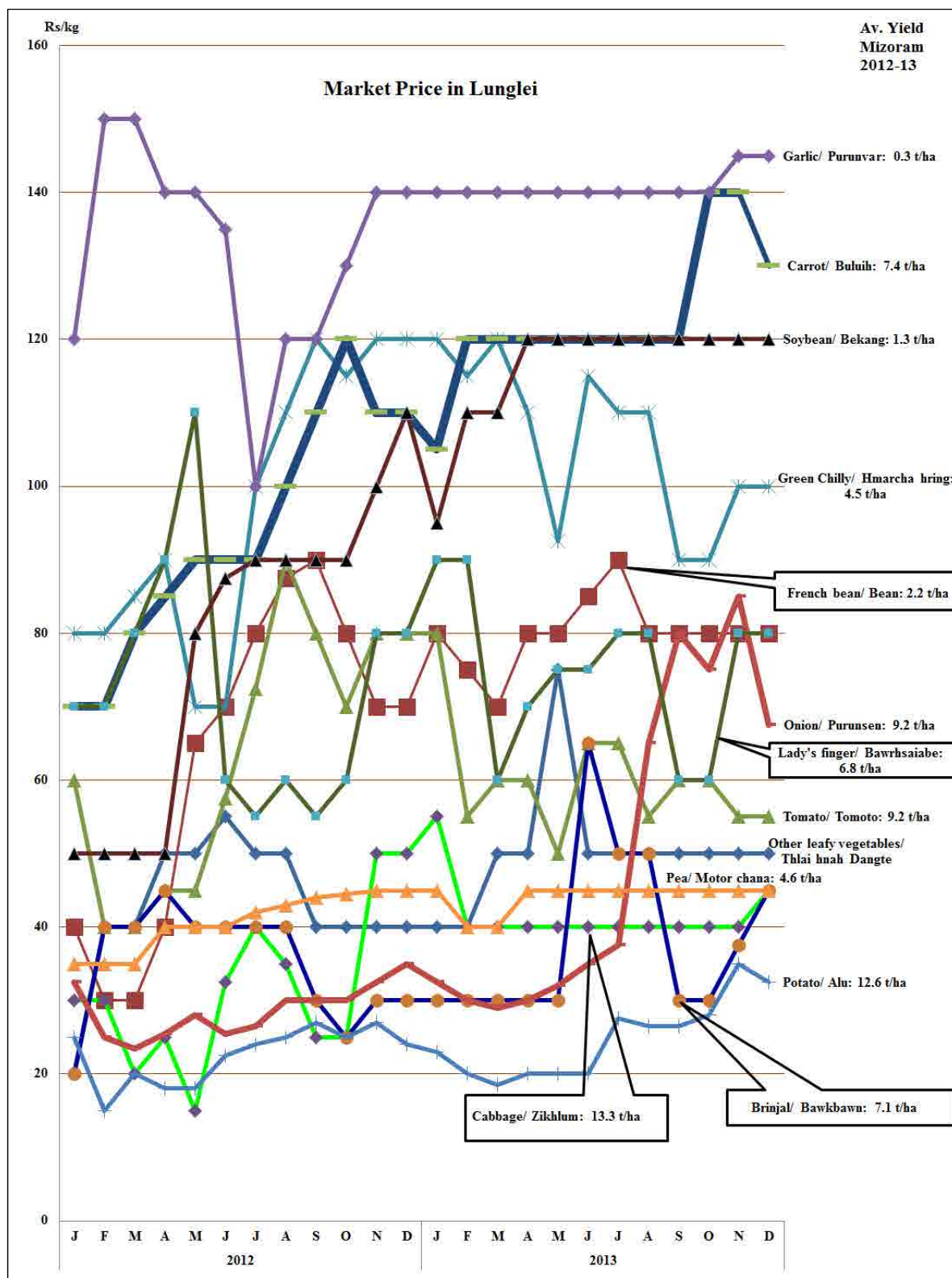


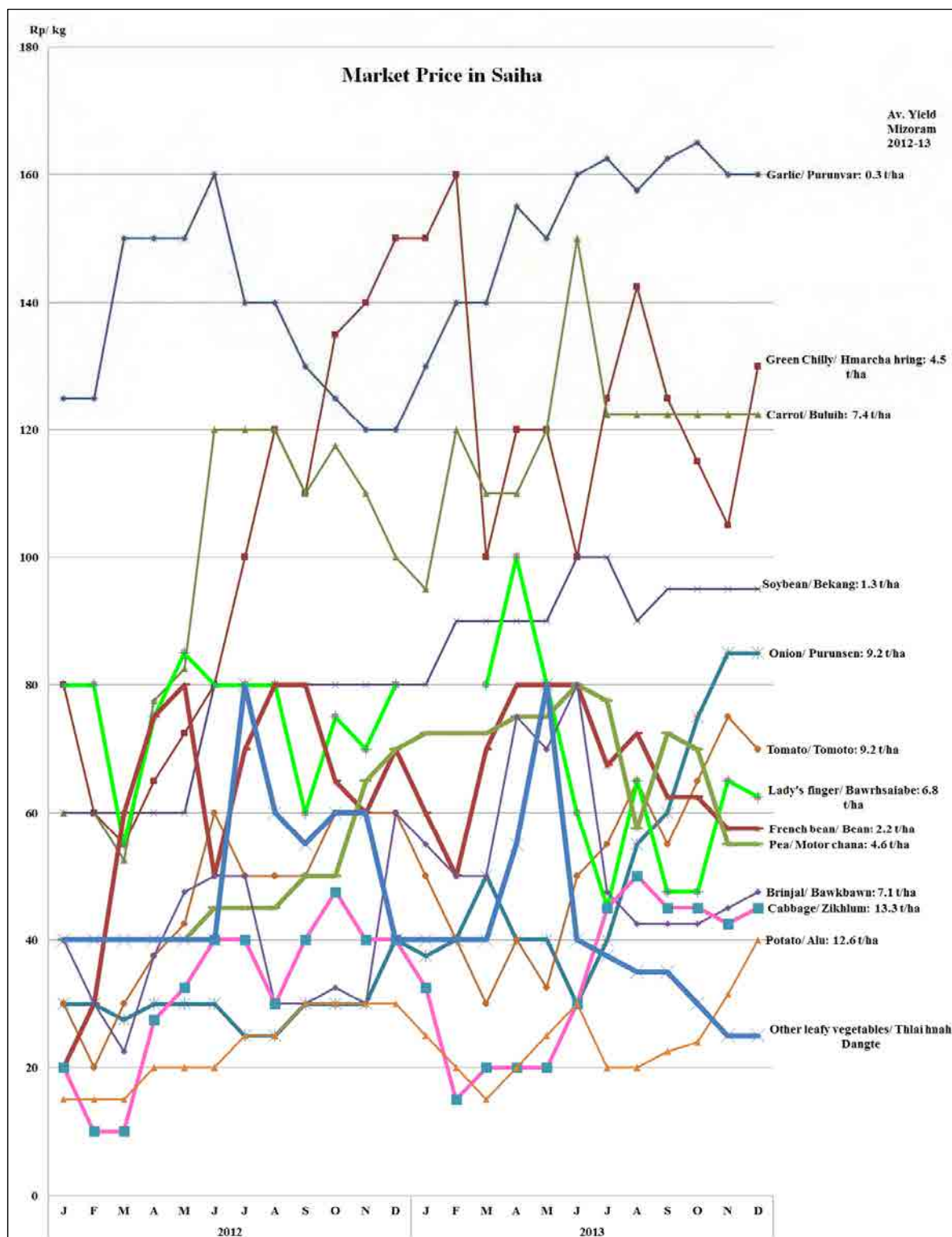












REFERENCE 8-1**IRRIGATION SCHEDULE AND MONITORING PLAN FOR WINTER CROP****(a) General**

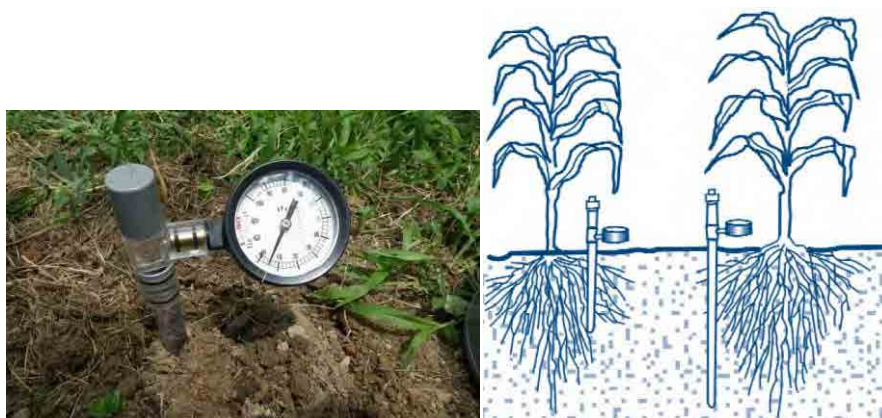
- ✓ As Non-monsoon season irrigation water resource is limited and precious, farmers have to be aware that winter-crops irrigation water is not free to use unlike monsoon season water, and well-planned and monitored utilization of water is crucial for winter-crop irrigation. However, while MI scheme farmers have lots of experience of Paddy irrigation, Most of them do not have experience of winter-crops irrigation.
- ✓ Therefore MID has to provide instructions for winter-crops irrigation management before and after the project. Besides, it is recommendable that each WUA sets water use fees for winter-crops water separately from paddy water, as winter-crops can be cash crops and source of income generation.
- ✓ From above mentioned reason, here standard “Irrigation schedule and Monitoring plan for winter crops” are prepared.

(b) Irrigation schedule plan

- ✓ MID should be able to prepare theological Irrigation schedule plan to provide instruction to farmers.
- ✓ Cropwat (FAO free softare) can be easily operated and used to calculate irrigation schedule based on Penman-Monteith method.
- ✓ Typical Irrigation schedule plan result, which was calculated on small vegetable and Aizawl meteorological condition, is shown in following page.
- ✓ Following page Typical Irrigation schedule plan can be also used for other part of Mizoram as a reference result, supposing that there are not so big differences of Penman-Monteith method calculation factors. However, In case MID needs special calculation, changing calculating conditions like variety of crops, season, soil condition and meteorological condition, calculation with Cropwat should be conducted.
- ✓ JICA study had provided training of Cropwat software operation to MID engineers, subsequent instructions within MID should be conducted by each division office.

(c) Irrigation monitoring plan

- ✓ Monitoring of available soil moisture of the farmland is the best way to check water requirement condition of winter crops indirect method. In other words, sufficiency of water in canal or intake point cannot be enough condition for winter crops growth. Therefore, Irrigation monitoring for winter crops will be conducted with soil moisture checking by the tensiometer, which is widely used, reasonable cost, easy to handle.
- ✓ Typical monitoring plan is shown in the page one after the next

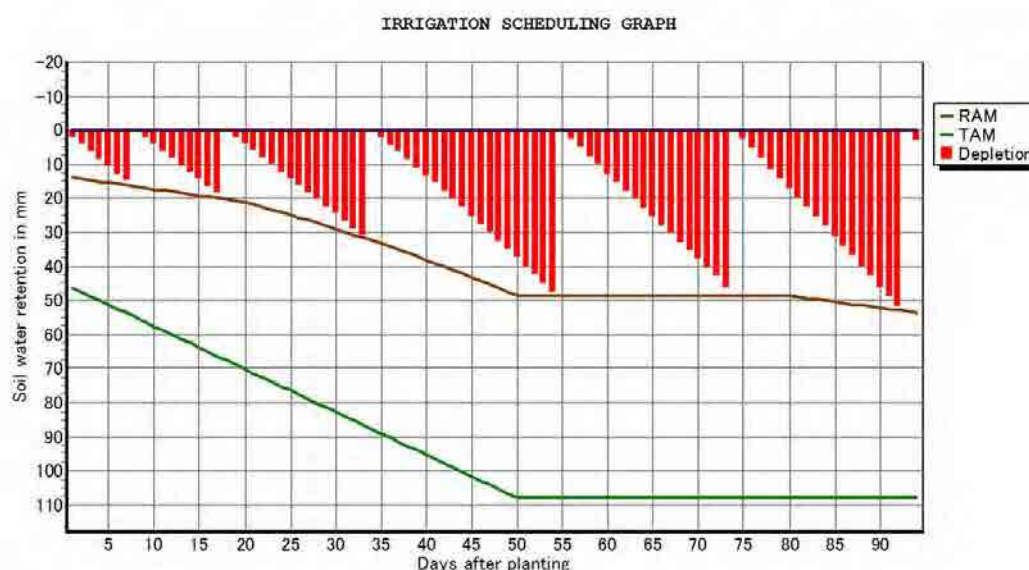


Typical Irrigation schedule and Monitoring plan for winter crops (Example)

1. Irrigation schedule

Result of typical Irrigation schedule calculation, which was prepared with cropwat software, is attached below.

CROP IRRIGATION SCHEDULE													
ETo station: aizawl			Crop: small vegetable			Planting date: 10/11							
Rain station: Aizawl			Soil: RED LOAMY			Harvest date: 12/02							
Yield red.: 0.0 %													
Crop scheduling options													
Timing: Irrigate at 100 % depletion													
Application: Refill to 100 % of field capacity													
Field eff. 50 %													
Table format: Irrigation schedule													
Date	Day	Stage	Rain mm	Ks fract.	Eta %	Depl %	Net mm	IrrDeficit mm	Loss mm	Gr. Irr mm	Flow l/s/ha		
17 Nov	8	Init	0.0	1.00	100	31	17.1	0.0	0.0	34.1	0.49		
27 Nov	18	Init	0.0	1.00	100	30	20.4	0.0	0.0	40.8	0.47		
13 Dec	34	Dev	0.0	1.00	100	38	33.3	0.0	0.0	66.5	0.48		
3 Jan	55	Mid	0.0	1.00	100	47	50.2	0.0	0.0	100.4	0.55		
22 Jan	74	Mid	0.0	1.00	100	45	48.8	0.0	0.0	97.6	0.59		
10 Feb	93	End	0.0	1.00	100	51	54.9	0.0	0.0	109.9	0.67		
12 Feb	End	End	0.0	1.00	0	3							
Totals:													
Total gross irrigation				449.3 mm		Total rainfall				0.0 mm			
Total net irrigation				224.7 mm		Effective rainfall				0.0 mm			
Total irrigation losses				0.0 mm		Total rain loss				0.0 mm			
Actual water use by crop				227.8 mm		Moist deficit at harvest				3.1 mm			
Potential water use by crop				227.8 mm		Actual irrigation requirement				227.8 mm			
Efficiency irrigation schedule						100.0 %		Efficiency rain				- %	
Deficiency irrigation schedule						0.0 %							



2. Monitoring plan

Water in the soil can be measured by measuring the soil water potential. A relationship exists between soil water content and matric potential, which is sometimes called the soil moisture retention curve and/or desorption curve. It describes the relationship between the volumetric water content (SM_v) and matric potential (y_m).

This potential can be measured with a tensiometer. Tensiometers operate by allowing the soil solution to come into equilibrium with a reference pressure indicator through a permeable ceramic cup placed in contact with the soil. Their use is widespread in irrigated fields of the world.

Monitoring point of Tensiometer should be selected with farmers, selecting representing points of the winter crops farm land.

It is expected that 30-40centibar will be the irrigation start point from the table below. And actual irrigation should be adjusted in accordance with actual field conditions.

READING	INTERPRETATION	ACTION
ZERO	Can be expected after heavy rain or deep irrigation. Signifies surrounding soil is completely saturated with water.	If it persists, it can result in oxygen starvation and the development of plant diseases. Could be indicative of poor drainage conditions
0-10 Centibar (0.0-1 Bar)	Large surplus available for fostering plant growth. Will drain off within a few days	Could be indicative of poor drainage conditions.
10-20 Centibar (0.1-0.2 Bar)	Shows there is ample moisture and air in the soil. It means the soil has reached its capacity for water. Additional water will drain out of the root zone in a couple of days.	Heavy clay soils & medium textured soils : No irrigation required Sandy soils : irrigation usually not required. But if water-sensitive plants such as potatoes are grown, irrigation could commence particularly if in coarse sandy soil.
20-40 Centibar (0.2-0.4 Bar)	Available moisture and aeration good for plant growth	Heavy clay soils & medium textured soils : irrigation not required Coarser sandy soils : irrigation should be started in the 20-30 Centibar range Finer sandy soils : irrigation should be undertaken in the 30-40 Centibar range.
40-60 Centibar (0.4-0.6 Bar)	Available moisture and aeration good for plant growth in finer textured soils	Heavy clay soils : irrigation not required Medium textured soils : irrigation should be started. The finer the texture, the later you start Sandy soils : start irrigating immediately This is too dry : plant damage can result
60-80 Centibar (0.6-0.8 Bar)	Readily available moisture scarce, except in heavy clay soil	Heavy clay soils : as soon as soil suction values reach 70-80 Centibar, irrigation should be initiated Medium textured soils : plant damage can result because it is too dry Sandy soils : irreversible plant damage may result

Suggested tensiometer installation depths (cms)

CROP TYPE	TENSIOMETER 1	TENSIOMETER 2	TENSIOMETER 3
Apples	50	100	150
Bananas	30	60	
Broccoli	30	50	
Brussel sprouts	30	50	
Cabbage	30	50	
Carrots	30	50	
Cauliflower	30	60	
Celery	20	40	
Cherries	60	120	
Citrus fruits	40	80	
Coffee	50	100	
Cotton	40	80	120
Cucumber	40	80	
Grapes	60	120	150
Hops	60	120	150
Lettuce	30		
Maize	40	80	
Melons	40	80	
Olives	60	120	150
Onions	20	30	
Parsnips	40	80	
Peas	40	80	
Pears	40	80	120
Potatoes	20	30	50
Raspberries	40	80	
Sorghum	40	80	
Spinach	30	60	
Strawberries	15	30	
Sugar beet	40	80	
Sugar cane	40	80	
Sunflowers	60	120	150
Tea	30	60	
Tobacco	20	40	70
Tomatoes	40	80	
Turnips	40	80	

1 bar = 100 centibar (cbar)

1 bar = 1000 millibar (mbar)

1 centibar (cbar) = 10 millibar (mbar)

1 millibar (mbar) = 1 hectoPascal (hPa)

1 kiloPascal (kPa) = 10 hectoPascal (hPa)

1 atmosphere (atm) x 1013.25 = 1 millibar (mbar)

1 pounds / square inch (psi) x 68.946 = 1 millibar (mbar)

1 millimetres of mercury (mmHg) x 1.33322 = 1 millibar (mbar)

1 inches of mercury (inHg) x 33.864 = 1 millibar (mbar)

REFERENCE 11-1
ESTIMATED CROP BUDGET 2014

Description						
1. Unit Cost of Materials / Others	Units	Paddy	Maize	Green Chilli	Onion	Leaf Mustard
1 Seed	Rs./Kg	45	120	416	4,500	110
2 Fertilizer: Urea	Rs./Kg	11	11	11	11	11
3 Fertilizer: SSP	Rs./Kg	25	25	25	25	25
4 Fertilizer: MOP	Rs./Kg	12	12	12	12	12
5 Organic Manure	Rs./Kg	-	-	-	-	-
6 herbicide	Rs./Ltr.	300	300	300	300	300
7 Pesticides	Rs./Ltr.	60	60	60	60	60
8 Cattle-draft	Rs./ha	2,625	2,625	2,625	2,625	2,625
9 Others cost / transport	Rs./ha	900	900	900	1,500	900
10 Machinery cost-harvest/threshing	Rs./ha	1,800	-	-	-	-
11 Supports (pole)	Rs./pole	-	-	-	-	-
2. Requirements of Materials						
1 Materials-Seed	Kg/ha	100	20.0	0.6	3.0	20
2 Fertilizer: Urea	Kg/ha	-	-	-	-	-
3 Fertilizer: SSP	Kg/ha	-	-	-	-	-
4 Fertilizer: MOP	Kg/ha	-	-	-	-	-
5 Manure	ton/ha	20	25	25	20	20
6 herbicide	Unit/ha	1	2	2	2	-
7 Pesticides	Unit/ha	2	5	5	1	-
8 Animal-Drafting: Plough etc.	Times/ha	1	1	1	1	1
9 Others, Transport	Times/ha	5	3	20	5	10
10 Machinery cost-harvest/threshing	Times/ha	1	-	-	-	-
11 Supports (pole)	Bundle/ha	-	-	-	-	-
Total of Material Cost (A)	Rs./ha	13,845	8,625	21,775	24,285	13,825
3. Unit cost of Labour						
1 Labour	Rs./day	250	250	250	250	250
4. Labour Requirement						
a) Land preparation						
1 Drains	Md/ha	5	10	10	10	5
2 Cleaning	Md/ha	5	5	5	5	5
3 Ploughing & Harrowing	Md/ha	8	12	12	12	15
5 Plastering bunds	Md/ha	3	-	-	-	-
7 Nursery preparation	Md/ha	2	-	6	15	-
b) Planting						
1 Digging holes	Md/ha	-	15	30	15	5
2 Filling holes or / Transplanting	Md/ha	28	9	40	15	5
3 Irrigation	Md/ha	8	10	15	15	10
c) Maintenance						
1 Weeding	Md/ha	30	40	45	20	45
2 Irrigation	Md/ha	13	20	30	10	25
3 Fertilize application	Md/ha	-	-	-	-	-
4 Pest and disease control	Md/ha	6	6	20	10	6
d) Harvesting						
1 Harvesting	Md/ha	38	25	80	34	80
2 Processing / Threshing / Bagging	Md/ha	26	10	40	24	40
Total Labour (including family labour)	Md/ha	172	162	333	185	241
Total Labour cost (B)	Rs./ha	42,938	40,500	83,250	46,250	60,250
5. Total Cultivation Cost (A) + (B)	Rs./ha	56,783	49,125	105,025	70,535	74,075
Excluding Family Labour Cost: 85% (C)	Rs./ha	6,441	6,075	12,488	6,938	9,038
6. Total Cultivation Cost (A) + (C)	Rs./ha	20,286	14,700	34,263	31,223	22,863
1 Yield Current (25% to Expect. Yield)	Kg/ha	1,250	1,250	4,500	5,000	5,000
2 Estimated Producer Price *1	Rs./kg	28	18	39	28	18
7. Sales Income (Gross Income)	Rs./ha	35,000	22,500	175,500	140,000	90,000
8. Net Income	Rs./ha	14,714	7,800	141,237	108,777	67,137

Description						
1. Unit Cost of Materials / Others	Units	Leaf Coriander	Cabbage	Cauliflower	Potato	Carrot
1 Seed	Rs./Kg	510	520	1,300	50	565
2 Fertilizer: Urea	Rs./Kg	11	11	11	11	11
3 Fertilizer: SSP	Rs./Kg	25	25	25	25	25
4 Fertilizer: MOP	Rs./Kg	12	12	12	12	12
5 Organic Manure	Rs./Kg	-	-	-	-	-
6 herbicide	Rs./Ltr.	300	300	300	300	300
7 Pesticides	Rs./Ltr.	60	60	60	60	60
8 Cattle-draft	Rs./ha	2,625	2,625	2,625	2,625	2,625
9 Others cost / transport	Rs./ha	900	900	900	900	900
10 Machinery cost-harvest/threshing	Rs./ha	-	-	-	-	-
11 Supports (pole)	Rs./pole	-	-	-	-	-
2. Requirements of Materials						
1 Materials-Seed	Kg/ha	20	0.5	0.6	1,200	4
2 Fertilizer: Urea	Kg/ha	-	-	-	-	-
3 Fertilizer: SSP	Kg/ha	-	-	-	-	-
4 Fertilizer: MOP	Kg/ha	-	-	-	-	-
5 Manure	ton/ha	20	25	25	25	25
6 herbicide	Unit/ha	-	2	1	1	1
7 Pesticides	Unit/ha	-	2	2	1	1
8 Animal-Drafting: Plough etc.	Times/ha	1	1	1	-	1
9 Others, Transport	Times/ha	10	5	5	3	3
10 Machinery cost-harvest/threshing	Times/ha	-	-	-	-	-
11 Supports (pole)	Bundle/ha	-	-	-	-	-
Total of Material Cost (A)	Rs./ha	21,825	8,105	8,325	63,060	7,945
3. Unit cost of Labour						
1 Labour	Rs./day	250	250	250	250	250
4. Labour Requirement						
a) Land preparation						
1 Drains	Md/ha	5	5	5	10	5
2 Cleaning	Md/ha	5	5	5	5	5
3 Ploughing & Harrowing	Md/ha	10	15	15	10	15
5 Plastering bunds	Md/ha	-	-	-	-	-
7 Nursery preparation	Md/ha	-	10	10	-	-
b). Planting						
1 Digging holes	Md/ha	5	10	10	10	10
2 Filling holes or / Transplanting	Md/ha	5	15	15	25	5
3 Irrigation	Md/ha	10	10	10	10	10
c) Maintenance						
1 Weeding	Md/ha	30	40	40	30	30
2 Irrigation	Md/ha	20	20	20	-	20
3 Fertilize application	Md/ha	-	-	-	-	-
4 Pest and disease control	Md/ha	6	6	6	6	6
d) Harvesting						
1 Harvesting	Md/ha	80	25	25	50	50
2 Processing / Threshing / Bagging	Md/ha	40	15	15	10	40
Total Labour (including family labour)	Md/ha	216	176	176	166	196
Total Labour cost (B)	Rs./ha	54,000	44,000	44,000	41,500	49,000
5. Total Cultivation Cost (A) + (B)	Rs./ha	75,825	52,105	52,325	104,560	56,945
Excluding Family Labour Cost: 85% (C)	Rs./ha	8,100	6,600	6,600	6,225	7,350
6. Total Cultivation Cost (A) + (C)	Rs./ha	29,925	14,705	14,925	69,285	15,295
1 Yield Current (25% to Expect. Yield)	Kg/ha	2,500	6,250	6,250	5,000	5,000
2 Estimated Producer Price *1	Rs./kg	18	15	22	21	46
7. Sales Income (Gross Income)	Rs./ha	45,000	93,750	137,500	105,000	230,000
8. Net Income	Rs./ha	15,075	79,045	122,575	35,715	214,705

Description						
1. Unit Cost of Materials / Others	Units	Pumpkin Leaf	Brinjawl	Field Pea	Chick Pea	Soyabean
1 Seed	Rs./Kg	358	468	98	120	110
2 Fertilizer: Urea	Rs./Kg	11	11	11	11	11
3 Fertilizer: SSP	Rs./Kg	25	25	25	25	25
4 Fertilizer: MOP	Rs./Kg	12	12	12	12	12
5 Organic Manure	Rs./Kg	-	-	-	-	-
6 herbicide	Rs./Ltr.	300	300	300	300	300
7 Pesticides	Rs./Ltr.	60	60	60	60	60
8 Cattle-draft	Rs./ha	-	2,625	2,625	2,625	2,625
9 Others cost / transport	Rs./ha	900	900	900	900	900
10 Machinery cost-harvest/threshing	Rs./ha	-	-	-	-	-
11 Supports (pole)	Rs./pole	-	-	-	-	-
2. Requirements of Materials						
1 Materials-Seed	Kg/ha	1.0	0.2	45	80	70
2 Fertilizer: Urea	Kg/ha	-	-	-	-	-
3 Fertilizer: SSP	Kg/ha	-	-	-	-	-
4 Fertilizer: MOP	Kg/ha	-	-	-	-	-
5 Manure	ton/ha	10	20	5	10	5
6 herbicide	Unit/ha	-	1	1	-	-
7 Pesticides	Unit/ha	-	2	1	1	1
8 Animal-Drafting: Plough etc.	Times/ha	-	1	1	1	1
9 Others, Transport	Times/ha	5	10	2	2	2
10 Machinery cost-harvest/threshing	Times/ha	-	-	-	-	-
11 Supports (pole)	Bundle/ha	-	-	-	-	-
Total of Material Cost (A)	Rs./ha	4,858	12,139	9,195	14,085	12,185
3. Unit cost of Labour						
1 Labour	Rs./day	250	250	250	250	250
4. Labour Requirement						
a) Land preparation						
1 Drains	Md/ha	-	12	5	5	5
2 Cleaning	Md/ha	5	5	5	5	5
3 Ploughing & Harrowing	Md/ha	12	15	12	12	12
5 Plastering bunds	Md/ha	-	-	-	-	-
7 Nursery preparation	Md/ha	-	50	-	-	-
b). Planting						
1 Digging holes	Md/ha	5	30	5	5	5
2 Filling holes or / Transplanting	Md/ha	5	15	5	5	5
3 Irrigation	Md/ha	5	15	5	5	5
c) Maintenance						
1 Weeding	Md/ha	30	60	30	30	30
2 Irrigation	Md/ha	12	30	20	10	10
3 Fertilize application	Md/ha	-	-	-	-	-
4 Pest and disease control	Md/ha	6	20	6	6	6
d) Harvesting						
1 Harvesting	Md/ha	30	80	40	40	30
2 Processing / Threshing / Bagging	Md/ha	10	40	20	15	15
Total Labour (including family labour)	Md/ha	120	372	153	138	128
Total Labour cost (B)	Rs./ha	30,000	93,000	38,250	34,500	32,000
5. Total Cultivation Cost (A) + (B)	Rs./ha	34,858	105,139	47,445	48,585	44,185
Excluding Family Labour Cost: 85% (C)	Rs./ha	4,500	13,950	5,738	5,175	4,800
6. Total Cultivation Cost (A) + (C)	Rs./ha	9,358	26,089	14,933	19,260	16,985
1 Yield Current (25% to Expect. Yield)	Kg/ha	45	6,000	2,750	600	600
2 Estimated Producer Price *1	Rs./kg	240	30	22	35	37
7. Sales Income (Gross Income)	Rs./ha	10,800	180,000	60,500	21,000	22,200
8. Net Income	Rs./ha	1,442	153,911	45,567	1,740	5,215

Description			
1. Unit Cost of Materials / Others	Units	Pigeon Pea	French bean
1 Seed	Rs./Kg	120	202
2 Fertilizer: Urea	Rs./Kg	11	11
3 Fertilizer: SSP	Rs./Kg	25	25
4 Fertilizer: MOP	Rs./Kg	12	12
5 Organic Manure	Rs./Kg	-	-
6 herbicide	Rs./Ltr.	300	300
7 Pesticides	Rs./Ltr.	60	60
8 Cattle-draft	Rs./ha	2,625	2,625
9 Others cost / transport	Rs./ha	900	900
10 Machinery cost-harvest/threshing	Rs./ha	-	-
11 Supports (pole)	Rs./pole	-	10
2. Requirements of Materials			
1 Materials-Seed	Kg/ha	20	25
2 Fertilizer: Urea	Kg/ha	-	-
3 Fertilizer: SSP	Kg/ha	-	-
4 Fertilizer: MOP	Kg/ha	-	-
5 Manure	ton/ha	5	5
6 herbicide	Unit/ha	-	1
7 Pesticides	Unit/ha	1	2
8 Animal-Drafting: Plough etc.	Times/ha	1	1
9 Others, Transport	Times/ha	2	10
10 Machinery cost-harvest/threshing	Times/ha	-	-
11 Supports (pole)	Bundle/ha	-	300
Total of Material Cost (A)	Rs./ha	6,885	20,095
3. Unit cost of Labour			
1 Labour	Rs./day	250	250
4. Labour Requirement			
a) Land preparation			
1 Drains	Md/ha	5	5
2 Cleaning	Md/ha	5	5
3 Ploughing & Harrowing	Md/ha	12	12
5 Plastering bunds	Md/ha	-	-
7 Nursery preparation	Md/ha	-	-
b) Planting			
1 Digging holes	Md/ha	5	5
2 Filling holes or/ Transplanting	Md/ha	5	5
3 Irrigation	Md/ha	5	5
c) Maintenance			
1 Weeding	Md/ha	30	30
2 Irrigation	Md/ha	10	15
3 Fertilize application	Md/ha	-	-
4 Pest and disease control	Md/ha	6	6
d) Harvesting			
1 Harvesting	Md/ha	30	80
2 Processing / Threshing / Bagging	Md/ha	15	40
Total Labour (including family labour)	Md/ha	128	208
Total Labour cost (B)	Rs./ha	32,000	52,000
5. Total Cultivation Cost (A) + (B)	Rs./ha	38,885	72,095
Excluding Family Labour Cost: 85% (C)	Rs./ha	4,800	7,800
6. Total Cultivation Cost (A) + (C)	Rs./ha	11,685	27,895
1 Yield Current (25% to Expect. Yield)	Kg/ha	480	2,000
2 Estimated Producer Price *1	Rs./kg	25	31
7. Sales Income (Gross Income)	Rs./ha	12,000	62,000
8. Net Income	Rs./ha	315	34,105