Guidelines for Institutional Arrangements, Training, Irrigation and Agriculture Production Improvements under On-Farm Water Management Programme

Binod Saha, Ph.D
Kishor Raj Pant, Ph.D

Food and Agriculture Organization of the United Nations

2005
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Foreword

Five decades of continuous effort by the Government of Nepal and cooperation of the farmers have led to the development of a large network of irrigation facilities in the country. The present day challenge for Nepal is achieving optimal benefits from the investment already made through improvement in system management and promotion of suitable technologies, rather than just expansion of facilities through construction of newer schemes. It is often pointed out that the potential created by irrigation development in the past has not been fully exploited and considerable scope exists for intensification and improvement of agricultural production and enhancement of water use efficiency in irrigation schemes.

The On-Farm Water Management Pilot Programme was implemented with technical assistance from the Food And Agriculture Organization of the United Nations (FAO). It aimed at exploiting the existing potentials in irrigated areas (especially in areas where farmer managed irrigation schemes have been developed and rehabilitated through interventions related to water management and agricultural production improvement.

I have had the pleasure of being associated with the programme and to closely follow the developments in many of the districts supported by it. Experience from the programme shows that farmers are able and willing to enhance performance of the created irrigation facilities and improve agricultural production if they are provided with the requisite support to enhance their knowledge and skills through collaborative efforts from agencies dealing with irrigation and agriculture.

These guidelines are the product of five years of piloting with the On-Farm Water Management Programme. It is based on the experiences gained in various programme supported districts of the country in the Western, Mid-Western and Far-Western Development Regions. Methods and procedures, especially those related to Systematic Planning and Implementation Procedures of Agricultural Production Improvement, Procedures for Farmer-to-Farmer Training and Extension, and institutional arrangements of the OFWM programme were developed, introduced and refined within the framework of the programme. I appreciate the contribution made by Dr. Binod Saha, Team Leader and National Irrigation Agronomist of the project, in developing these methods and procedures.

I trust that the guidelines will provide insight and a succinct step-by-step procedure for all those stakeholders involved at various levels in planning and implementation of irrigation and agricultural production improvement in irrigated areas.

I would like to thank the people and the Government of Nepal for accepting our offer of partnership and providing us the opportunity to make a meaningful contribution to their efforts.

Kazuyuki Tsurumi
FAO Representative in Nepal
Preface

There is no doubt that the future of irrigation development in Nepal lies not only in the expansion of irrigation facilities to newer areas but even more so in making effective use of the existing facilities. Department of Irrigation, which is the main agency responsible for the development and management of irrigation in the country, often faces the criticism of service delivery of the existing irrigation system not being up to the desired level. In this context, On-farm Water Management Pilot Program has been a bold new step of trying to address the issues of irrigation efficiency, performance and sustainability.

Five years of piloting with the On-farm Water Management Program has been a highly enriching experience. The need to document the experiences comes not only from the fact that the program has been able to make significant achievements which has been clearly reflected by the Impact assessment Study but also from the fact that throughout the endeavour the program went through a continuous refinement process. The established methodologies and procedures of the program towards its end like ‘Systematic Procedures of Annual and Seasonal Planning’, ‘Implementation Procedure of Agricultural Production Improvements’, ‘Methodology of Farmer to Farmer Training and Extension’, etc. were those introduced and developed within the framework of the program. These have been tested and verified in the pilot sites and have been appreciated by both technicians as well as the farmers.

Production of a technical guideline with detailed documentation of the activities and their sequence was not only a mandatory obligation of FAO, which provided the technical assistance for the program, but has great significance on the future of the program. Especially in the present context where DOI has already made the commitment of further upscaling the program activities. This document is expected to be valuable not only to the program implementers of the future program for whom it has been mainly targeted but also to the planner and designers at the central level.

Finally, I would like to thank FAO and especially Dr. Binod Shah, National Consultant, who has taken great pains in contributing and compiling all the information that make this valuable document.

Suman Sijapati
National Coordinator
On-farm Water Management Pilot Program
Acknowledgements

The present guidelines are the outputs of continuing cooperation between the Government of Nepal and Food and Agriculture Organization of the United Nations (FAO) towards improving the performance of farmers-managed irrigation systems through irrigation and agricultural production improvement implemented under the On-Farm Water Management Pilot Programme (OFWMPP). The Department of Irrigation (DOI) and Department of Agriculture (DOA) implemented the programme jointly with technical support from FAO.

The programme accumulated significant experience during the course of its implementation. Being a pilot programme, the modality and procedures for programme management, planning and implementation were continuously reviewed and refined responding to the emerging challenges. Some specific elements such as systematic approach to participatory programme planning on irrigation and agricultural production improvement, and diffusion of introduced technologies through farmer-to-farmer training and extension were introduced, and their functionality tested, verified and adopted. The programme has also gathered valuable experiences in mobilising support from irrigation and agriculture related agencies at various layers in a collaborative manner. These guidelines basically reflect those experiences.

It should be noted that these guidelines heavily draw on the various reports and documents prepared during the course of implementing the programme. In the course of preparing the guidelines various reports and guidelines prepared by the FAO Technical Backstoppers and their recommendations made in were also used. We would like to acknowledge the contributions of Mr. Martin Smith, Former Senior Water Management Officer, FAO, Rome, Mr. Therirr Facon, Senior Water Management Officer, FAO Bangkok and Mr. J. Vandepol, FAO Consultant Training Specialist in particular in this respect.

Compilation of these guidelines has been made possible by the interest and inquisitiveness of the colleagues from the DOI and DOA involved at various levels of programme implementation. Their contribution in sharing the experiences is highly appreciated.

Thanks are also due to Dr. K.R. Sharma and Mr. S. K. Hyoju, the then National Programme Coordinators of the project for their guidance and support in the earlier stages of programme implementation.

We would like to express our gratitude to FAO especially to Mr. Kazuyuki Tsurumi, FAO Representative in Nepal, for his support, cooperation and guidance as and when we needed.

We also extend our sincere thanks to Mr. L.K Gautam, Assistant FAO Representative, for his continuous guidance, incisive comments and advice, and untiring effort in bringing this
document to its present shape. Similarly, we extend our sincere thanks to Mr. Suman Sijapati, National Coordinator of OFWMP, for his continuous encouragement for compilation of these guidelines. Our sincere thanks are due to Ms. Sonam D. Genpo, Administrative Officer, and other Kathmandu based staff of FAO, for their kind support provided during implementation of the programme.

Dr. Devendra P. Chapagain, who thoroughly reviewed and edited the manuscript of the document and deserves our special thanks for his meticulous efforts in editing of the report.

Finally, we are very much thankful to all the farmer collaborators and officials of Water Users Associations who are enthusiastic to continue the efforts initiated by the On-Farm Water Management Pilot Programme. Needles to state that we are responsible for any shortcoming.

Binod Saha, Ph. D., Team Leader and Agronomist
and Kishor Raj Panta, Ph. D., Irrigation Engineer,
On-Farm Water Management Pilot Programme (UTF/NEP/053/NEP)
### Acronyms and Abbreviations

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<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ADBN</td>
<td>Agricultural Development Bank of Nepal</td>
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<td>AESA</td>
<td>Agro Ecosystem Analysis</td>
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<td>AIC</td>
<td>Agricultural Inputs Corporation</td>
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<td>AO</td>
<td>Association Organiser</td>
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<td>AP</td>
<td>Annual Planning</td>
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<td>ASC</td>
<td>Agricultural Service Centre</td>
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<td>CP</td>
<td>Cropping Pattern</td>
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<td>CI</td>
<td>Cropping Intensity</td>
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<td>DCC</td>
<td>District Coordination Committee</td>
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<td>DDG</td>
<td>Deputy Director-General</td>
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<td>DIO</td>
<td>District Irrigation Office</td>
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<td>DOA</td>
<td>Department of Agriculture</td>
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<td>DOI</td>
<td>Department of Irrigation</td>
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<td>DADO</td>
<td>District Agriculture Development Office</td>
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<tr>
<td>DDC</td>
<td>District Development Committee</td>
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<td>DHM</td>
<td>Department of Hydrology and Meteorology</td>
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<td>DLW</td>
<td>District Level Workshop</td>
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<td>DTT</td>
<td>District Technical Team</td>
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<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
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<td>FFS</td>
<td>Farmers' Field School</td>
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<td>F to F</td>
<td>Farmer-to-Farmer Training</td>
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<td>FMIS</td>
<td>Farmer Managed Irrigation System</td>
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<td>Ha.</td>
<td>Hectare</td>
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<td>HMG/N</td>
<td>His Majesty's Government of Nepal</td>
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<td>IDA</td>
<td>International Development Association</td>
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<td>ILC</td>
<td>Irrigation Line of Credit</td>
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<td>IMD</td>
<td>Irrigation Management Division</td>
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<tr>
<td>JT</td>
<td>Junior Technician</td>
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<td>JTA</td>
<td>Junior Technical Assistant</td>
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<tr>
<td>MoA</td>
<td>Ministry of Agriculture</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>NCC</td>
<td>National Coordination Committee</td>
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<td>NCO</td>
<td>National Coordinator's Office</td>
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<td>NISP</td>
<td>Nepal Irrigation Sector Project</td>
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<td>O &amp; M</td>
<td>Operation and Maintenance</td>
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<td>OFWM</td>
<td>On-Farm Water Management</td>
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<tr>
<td>RAD</td>
<td>Regional Agriculture Directorate</td>
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<td>RATC</td>
<td>Regional Agriculture Training Centre</td>
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<td>RCC</td>
<td>Regional Coordination Committee</td>
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<td>RID</td>
<td>Regional Irrigation Directorate</td>
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<td>RTDB</td>
<td>Research and Technology Development Branch</td>
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<td>SLAM</td>
<td>System Level Mass Meeting</td>
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<tr>
<td>SMS</td>
<td>Subject Matter Specialist</td>
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<td>SPIN</td>
<td>Special Programme for Production in Support of Food Security in Nepal</td>
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<tr>
<td>TST</td>
<td>Technical Staff Training</td>
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<tr>
<td>TOFT</td>
<td>Training of Farmers' Trainers</td>
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<td>TOT</td>
<td>Training of Trainers</td>
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<tr>
<td>VDC</td>
<td>Village Development Committee</td>
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<td>WB</td>
<td>World Bank</td>
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<td>WECS</td>
<td>Water and Energy Commission Secretariat</td>
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<td>WUA</td>
<td>Water Users' Association</td>
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Agriculture plays a dominant role in the Nepalese economy and constitutes a major portion of the gross domestic product (GDP). During the eighties, Nepal was recognised as a net exporter of food grains. However, the country has been increasingly importing food grains in recent years as the population has grown and agricultural growth has been low. Increase in crop production in the past was mainly due to expansion in the area under cultivation rather than an increase in productivity.

Development of Agriculture in Nepal is severely constrained by limited availability of cultivable land. Various other factors such as declining soil fertility, insufficient and unbalanced use of chemical fertilizer, unavailability of quality seeds and other inputs, lack of credit facilities as well as lack of adequate know-how on improved crop production practices among the majority of the farmers have limited growth in this sector. Since the potential for expansion of arable land is almost nonexistent, the only option available for the country is to increase productivity. For this, it has been widely accepted that irrigation plays an important role. Substantial scope still exists in improving the performance of the country’s agricultural sector through improvement in irrigation.

Recognising the importance of irrigation in the development of agriculture, several irrigation development projects have been implemented in Nepal over the past fifty years. However, despite the continued emphasis given to this sector by His Majesty’s Government of Nepal (HMG) and substantial investment, satisfactory output could not be achieved from the developed infrastructure. The following are some observations regarding the performance of the irrigation sector:

- Effectively irrigated areas after completion of irrigation development and improvement works proved to be much less than originally planned;
- Water use efficiency at the farm level is found to be quite low. Many schemes lack sufficient on-farm irrigation infrastructures like water courses, field channels and water distribution structures and suffer from wastage of irrigation water due to lack of proper land levelling, grading and faulty selection of irrigation methods and adequate drainage facilities;
- Performance of irrigated agriculture is unsatisfactory as cropping intensity and crop productivity remains low and farmers continue to use traditional rainfed production systems and practices;
Aspects related to operation and maintenance of irrigation schemes are not adequately addressed, resulting in rapid degradation of irrigation infrastructure and requiring recurrent cycles of rehabilitation investments.

Since irrigation development is capital intensive, it is essential to derive maximum benefits from the created infrastructure by properly utilising every unit of water in order to achieve optimal returns from irrigated agriculture in terms of crop production and yields.

**1.1 The On-Farm Water Management Pilot Programme**

Considering the status of irrigation schemes already developed, it was realised that there is plenty of scope for their improvement through implementation of on-farm improvement activities in areas where the government has already made investments in system construction and improvement. One of the potential areas identified for such improvement was the command area of small to medium sized farmer managed irrigation systems, which were rehabilitated under either the Irrigation Line of Credit (ILC) or Nepal Irrigation Sector Project (NISP).

Thus, the On-Farm Water Management Pilot Programme (OFWMPP) was formulated as a sub-component of the NISP with the intention of introducing on-farm water management improvements on a pilot basis in the irrigation systems constructed/rehabilitated by ILC or NISP in the districts of Western, Mid-Western, and Far-Western Development Regions of Nepal. The Departments of Irrigation (DOI) and Agriculture (DOA) implemented OFWMPP jointly with technical support from FAO under the DOI/FAO agreement signed on 28 April, 1999.

The programme was launched in 20 districts of the Western, Mid-Western, and Far-Western Development Regions of the country covering 4,000 ha of command area and 42 irrigation schemes. Selection of districts for implementing this programme was done in stages. In the first and second lot, 18 irrigation schemes were selected as OFWM pilot sites from nine districts. Similarly, ten irrigation schemes were chosen from five districts as pilot sites in the third lot. Lately, at the concluding phase of the programme 12 irrigation schemes were selected in the fourth lot from six districts.

The main objective of OFWMPP was to complement improvements of performance and sustainability of irrigation rehabilitation works completed under ILC/NISP, through improvements in on-farm water management and agricultural production, which would effectively increase the irrigated command area, raise agricultural productivity and production as well as introduce effective operation and maintenance procedures by the Water Users Associations (WUAs) of respective irrigation systems.

A key element of the on-farm water management pilot programme comprised undertaking a series of well scheduled and need based training programmes implemented over the period of five years. Supporting government staff from both DOI and DOA worked together in
collaboration with the farmers to introduce, adapt and ensure sustainability of irrigation and agricultural improvements. In doing so, options and priorities were discussed and accepted in a participatory manner. Comprehensive and seasonal work plans were developed and implemented. In the seasonal planning and training sessions, results of the previous season were critically reviewed and adjusted for implementation during the subsequent season. Each year three seasonal planning and training courses were conducted directly in the field in a participatory manner through the farmer’s field schools and farmer-to-farmer training. In the technical training sessions scheduled over the growing season, specific topics related to the introduction of agriculture and irrigation management improvement technologies were discussed and practically tested, verified and adopted by the farmers in situ. Specific issues related to institutional strengthening of WUA and operation and maintenance (O&M) of irrigation systems were addressed by conducting separate training courses for the members of WUAs.

In order to enhance the capacity of the district technical staff, a series of parallel staff training courses were also conducted preceding the planning and training programmes for the farmers. Topics covered in these courses included the approach, methodology and techniques to be adopted in participatory need identification and planning, and procedures for implementation of irrigation and agriculture production programmes in irrigated areas.

The national and international consultants, national team members, regional directors of DOI and DOA and office heads of the concerned divisional and sub-divisional offices or the ground water resource development outfits of the DOI (IDDO/IDSDO/GWRDP) and DADO organised in-service monitoring and backstopping activities for the technical staff as well as the participant farmers. The Regional Directors of Irrigation (RID) and Agriculture (RAD) from the respective regions provided supervisory and coordinating support to their district offices during implementation of the OFWM programme.

At the project level, the system of monitoring and reporting was directly linked to the contents of the staff training and workshops. Similarly, regular monitoring and backstopping support to the concerned technical staff at the district level was provided through district coordination committee (DCC) meetings held under the supervision of the respective chiefs of IDDO/IDSDO/GWRDP and DADO.

1.1.1 Achievements of the Programme

OFWMPP has gathered a lot of experience during the last five years of piloting. Learning from this experience, its implementation procedures also have been continuously modified and refined. Some new elements of planning and implementation modalities such as the concept of systematic approach of programme planning for irrigation, agricultural production improvements, and farmer-to-farmer diffusion of introduced technologies through training and extension were introduced, and their functionality tested, verified and adopted. Similarly, procedures for conducting training and workshops for the staff and farmers were systematised and improved.
As a positive impact of OFWMPP, the level of knowledge of the farmers about modern agricultural and irrigation techniques has been enhanced. This has been reflected in terms of diversification of their cropping pattern and increased cropping intensity on the OFWM pilot sites especially through introduction of cash and high value crops such as potato, seasonal and off-seasonal vegetables, green manuring, and grain legume crops. New crops have been introduced in the spring season, which was previously left fallow. Introduction of improved crop cultivation practices and their increasing adoption by the farmers through regular seasonal support activities of this programme have resulted in significant increases in crop productivity and production.

Studies commissioned by the OFWMPP noted some of the specific impacts of the Programme including the followings.

**Capacity Building within DOI and DOA**

One important objective of OFWMPP was to develop institutional capacity of the concerned agencies to enable them in increasing the performance and sustainability of irrigation schemes developed under ILC/NISP. Improvement was expected through the introduction of on-farm water management and by introducing effective operation and maintenance (O&M) procedures for the Water Users Associations (WUAs).

OFWMPP has developed a coordinating mechanism between DOI and DOA. This is being pursued since long by both the departments. With the new institutional arrangement for OFWMPP implementation, the Irrigation Management Division (IMD) of DOI and the Crop Development Directorate (CDD) of DOA are closely linked. The project has successfully established a process that facilitates a joint work programme for both DOI and DOA for implementation of OFWM activities. Technical capabilities of the personnel of these two departments in on-farm water management and introduction of agricultural programmes has been significantly improved through technical staff training (TST) and other training programmes.

The District Technical Team (DTT) members gained experience from TSTs and this facilitated further learning through periodic TSTs and the Farmers’ Field Schools (FFSs). Thus, capability of the national staff working as DTT members was improved on agricultural technology, on-farm water management techniques and WUA strengthening activities. They also knew the participatory way of working together and helping one another. WUAs and the farmers gained knowledge about various agricultural technologies. WUAs were trained on supervision and quality control of construction activities. Their skills were significantly enhanced enabling them to construct and manage physical improvement works with the technical assistance from the IDD officials.

While the necessary arrangements for the supply of essential inputs and services were made by the respective District Agriculture Development Offices (DADOs) the actual supply of inputs like fertilizers, seeds, plant protection aids, credit, tools and equipment was done by other organisations or by the private sector.
Optimum Utilisation of Irrigation Potential

The main objective of the OFWMPP included achieving self-reliance among WUAs by optimising available irrigation potentials through the development and improvement of on-farm irrigation infrastructures, improvement in the irrigation practices and methods, and improvement in the O&M of irrigation systems. Institutional capacity building constituted a key element of the objective. The following impacts were observed during the evaluation study.

Physical improvement works like canal lining and extension of distribution canals reduced leakage and construction of structures reduced the operational water loss making more water available in the field. Farmers are highly impressed with this effect particularly during winter and spring seasons, when water is generally scarcer. Similarly, extension of water distribution systems in lift irrigation schemes and deep tube-wells (DTWs) reduced distribution loss of water thereby increasing water availability by about one-third on the average.

Implementation of OFWM has increased irrigated crop area particularly during winter and spring. Knowledge about improved water application methods and practices such as applying water intermittently led to reduced uptake of water per application and increased number of irrigation. Similarly, improved physical works helped to increase water availability and also to expand service beyond the design command area.

WUAs have started to recognise the importance of irrigation water management and the potential to grow a number of high value crops. They have been motivated to work cooperatively on small schemes adopting improved O&M.

Cropping Patterns and Crop Diversification

After the project intervention, there has been substantial improvement in the existing cropping patterns. Growing crop diversification has replaced to a large extent the practice of growing cereals after cereals. Land parcels that used to remain fallow especially in dry seasons have been converted into potential croplands. Availability of irrigation water during the dry seasons in the mid-hill and Terai districts of Nepal has contributed to higher cropping intensity and greater crop diversification.

Cropping Intensity

Cropping intensity (CI) has increased across the sites as a result of OFWMPP. It was found that overall increase in CI was 30 percentage points. A number of factors determine the cropping intensity such as the farmers’ resource base and resource management capacity, their education, average size of land holding, land type, availability of household labour, market access, irrigation and availability of other production inputs. In the first and second lot sites cropping intensity increased by 37 percent and 19 percent, respectively.
Farmers’ capacity enhancement

Farmers’ knowledge and skills gained from FFS training were gradually transferred to other farmers and farmer-to-farmer technology diffusion among neighbouring farmers became more common. Farmers also gradually started adopting water saving irrigation methods and practices that reduced the quantity of water required in each irrigation. The farmers realised that physical improvement had led to increased distribution and more efficient application of water. This contributed to command area expansion in some schemes.

WUA strengthening

The programme has been successful in reviving the WUAs in most of the pilot sites where they were previously defunct. Inactive WUAs have been made active after the introduction of OFWMP in the respective irrigation schemes. As the WUAs have become the central focus of programme implementation, the WUAs have been quite active in improving the operation and maintenance of the irrigation system.

1.1.2 Lessons learned

Despite the encouraging successes and achievements, the OFWMPP has fallen short in achievement in some aspects of irrigation and agricultural improvement. As it was implemented as a pilot programme, the strategy and approach to implementation will have to be adjusted and modified for better impact when the programme is extended to other areas.

Presented below are some lessons learned, which could be crucial for planning and implementation of future OFWM programmes.

Selection of districts/sites

Districts for this programme were first selected by higher governmental authorities and suitable sites were identified from those districts. In the course of implementation, more districts were added and more sites were accordingly included under the OFWMPP. This led to selection of even unsuitable sites in some of the districts. Furthermore, expansion in the number of districts and irrigation schemes caused stretching of the efforts leading to reduced effectiveness in providing support to the districts. In hindsight, it can be said that it would rather have been wise to consolidate interventions on sites in the selected districts first before moving on to other sites and districts. Further, OFWMPP interventions should not be restricted only to irrigation schemes with smaller command areas. Experience from OFWM implementation in the command areas of branch canals of large irrigation schemes has shown that such programmes can be effectively implemented in irrigation schemes with larger command areas.
**Institutional Strengthening**

The programme focused on taking WUA as a central focus in implementation of the programme activities. Some efforts were made to enhance the capability of WUA as well. Despite such efforts, effective involvement of WUA in some of the sites was not encouraging as the WUAs were not adequately institutionalised or strengthened to assume the roles and responsibilities envisaged by the programme. It was learnt that the first and foremost activity should be WUA strengthening if such kind of programmes are to succeed.

**Physical deficiency**

One of the major problems observed in implementation of OFWMPP in most of the sites was the deficiency of physical facilities in the irrigation schemes. Problems were observed in the main and branch canal system on most of the sites and even at the intake in some of the sites. These problems were due to incomplete rehabilitation of those schemes or due to damages in the system because of poor maintenance over the years. As a result, a significant part of the command area could not receive irrigation water. There was lack of interest among the water users in O&M of the system as well as lack of enthusiasm in participation in OFWM activities. The beneficiaries put higher priority on the repair and maintenance works along the main and branch canals during the course of implementation of OFWMPP which led to less importance given to on-farm development works as there was little resources left for on-farm improvements. The learning from this is that a comprehensive development plan needs to be developed for the irrigation schemes taking care of the problems at all levels of the irrigation network.

**Comprehensive planning**

During the implementation of OFWMPP it was found that agricultural improvement activities were focused on the plots while irrigation improvement and management was centred at the main and branch level of the irrigation system. During implementation, the programme took the approach of addressing the most prioritised problems first. More efforts and resources were concentrated in the highly prioritised activities (by farmers as well as by the implementers). This approach led to significant improvement in aspects related to management that were inadequately addressed before. One of the reasons for such an outcome is the lack of a comprehensive long term planning and action plan from the very beginning.

**Linkages between the farm level and system level operation**

Despite the successes achieved in increasing the irrigated command area and enhanced irrigation with OFWMPP intervention, a sound operational plan or mechanism could not be developed establishing close linkages at the farm level with water allocation and distribution at the system level with improved water management practices at the both levels. Development of such linkages in the operation at different levels is quite crucial for sustainability of improved irrigation management and enhanced agricultural production in the irrigation system.
Capacity building of the implementers

OFWMPP was observed to be quite successful in enhancing the capacity of the implementers through TSTs and specific training targeted specifically at the officer level of the DTT. It was observed during implementation of the programme that it is the non-officer level members of DTT who have a greater role to play in interacting with the farmers. Specific training courses on institutional strengthening, operation and maintenance of irrigation schemes, and crop and water management were not delivered to those DTT members. Similarly, specific training courses for WUA members were found to be inadequate. Hence the important lesson that was learnt is that without development of adequate competence among the implementers, success in programme implementation would be greatly affected.

Operation and maintenance

Operation plans could not either be developed or effectively implemented in most of the irrigation schemes due to higher variation (temporal and spatial) in the supply of irrigation water at source and lack of proper records of water availability. Besides, contingency plans were not prepared against cases when there would be shortage of water in some parts of the command area or during some time of the year. This limited the success of the OFWMPP interventions in some of the sites. Introduction of the OFWMPP interventions led to development of mechanisms for regular maintenance like canal clearing and minor repairs in most of the sites. On the other hand, no mechanism was developed for periodic and emergency maintenance of the system in most of the sites. This may be due to the resource constraint on the part of the beneficiaries. Development of such a mechanism has been observed to be quite crucial for sustainable management of irrigation schemes.

Duration of implementation

At the time of inception of OFWMPP it was envisaged that two years of implementation of the OFWM improvement activities would be sufficient to achieve the desired success. OFWM activities were however continued for almost five years with two extensions of one year each. These extensions were not foreseen earlier and this led to confusion over the implementation schedule of activities. It has thus been realised that at least three years of implementation period is necessary and the support should be gradually reduced over the following two years period of time with a clear planning and action plan for full support, withdrawal and follow up support activities.

Mechanism and modality of follow-up support

It has been noticed that WUAs and their members need follow up support even after the withdrawal of active support. A sound mechanism for follow up support should have been developed before the withdrawal of external support. In addition to the support for irrigation improvements and agricultural development, the beneficiaries require other assistance such
as linkages with markets and supply of inputs. Similarly, the WUAs need to be recognised as pre-cooperatives as a matter of policy. Levying demand charge to the users of electricity for lifting water (both groundwater irrigation as well as lift irrigation) continues to be an issue and this levy should be abolished in order to reduce the burden on the beneficiaries.

Encouraged by the positive results achieved in the OFWM pilot programme, His Majesty’s Government of Nepal has initiated a follow up programme with the government’s own resources. It is called Integrated Crop and Water Management Programme, which is a regular programme of the government. This follow up programme is based on the experiences gained and lessons learned from OFWMPP.

These guidelines are expected to provide insight and serve as a tool for planning and implementation of the programme.

1.2 About the Guidelines

The main objective of these guidelines is to share the experiences and modality of support developed and adopted during the implementation of the piloting phase of OFWM programme over the past years. The objective of this guidelines is also to introduce the concept of participatory technique and present systematic guiding steps for planning and implementation of irrigation and agriculture production interventions.

The content of this guidelines is predominantly based on the experiences gained and lesson learnt during the five years of programme implementation in various selected districts of Western, and Mid- and Far-Western regions of Nepal. The procedures such as participatory planning and implementation of agriculture production improvement, farmer-to-farmer training and institutional arrangements of the OFWM programme developed, introduced and refined in the course of implementing the programme are thoroughly discussed in the guidelines.

This guidelines deals with the general approach of OFWM programme planning and implementation. It does not however deal with the specific elements of irrigation and crop production technologies that might vary from system to system depending on their specific requirements.

1.2.1 Target Group

The target group of these guidelines basically comprises two groups of people:

- Programme implementers at the field level, viz., members of the District Technical Team,
- Planners from core institutions and line agencies complementing the programme at the central, regional, and district levels.
These guidelines are prepared for those technical staff who are responsible for the development and implementation of training and extension programmes related to irrigation and agricultural production in the farmers managed irrigation schemes. It provides basic guidance to the District Technical Teams in selection of sites, in planning and implementation of preparatory activities prior to actual launching of the programme as well as in conducting participatory programme planning and training in the selected sites in close collaboration with the farmers and Water Users Associations.

For planners and executors at the national, regional and district levels, the guidelines explains the modality of institutional setup and its functioning, service delivery mechanisms, and monitoring procedures for the programme activities. The guidelines clearly spells out the roles and responsibilities of various actors involved in programme management at various levels. It also provides insights for the executors on management procedures of various programme level events such as meetings, training and workshops.

1.2.2 Structure of the Guidelines

The guidelines are structured in five chapters.

Chapter 1 provides a brief introduction to the OFWM pilot programme. It briefly describes the rationale, objectives, outcomes and lessons learned from the implementation of the piloting phase of the programme.

Chapter 2 describes the institutional arrangements for programme management at various administrative levels. It also provides guidance to the users about the objectives and responsibilities of various coordinating committees at the central, regional and district levels, and arrangements for the provision of coordinated support services for efficient and transparent implementation of programme activities.

Chapter 3 contains the approach, modality and procedures of programme planning and implementation and site level activities. It describes the nature of programme support and detailed procedures for designing and implementation of various farmers' planning and training activities in the selected sites. This chapter also describes the basic procedures to be followed in conducting programme level training of staff involved in the district technical teams and organising workshops at various levels. The concept of farmers’ field school and farmer-to-farmer training and procedures to be followed are discussed here. The guidelines for monitoring and reporting on programme activities carried out by the different stakeholders at various levels are also highlighted in this chapter.

Chapter 4 explains the selection criteria and detailed procedures for the selection of irrigation schemes to be brought under the programme support. It also describes some of the farmers' sensitisation activities to be conducted on the sites and in the selected district at the beginning of programme inception in order to ensure active collaboration and support of the farmers, WUA, and local leaders and related line agencies.
Chapter 5 describes a step-by-step procedure to be followed in designing and implementing irrigation and agriculture production improvement programmes in participation with the farmers. The chapter provides detail guidelines for the concerned DTTs about how to diagnostically analyse the performance of irrigation schemes and procedures to be followed in designing and implementation of improvement programmes. This chapter also describes detailed procedures for analysing the existing cropping pattern, cropping intensity and crop yields.

Relevant supporting documents such as checklists and data collection and reporting and formats are presented in the annexes.
On–farm water management is complex in nature. It integrates the hardware and software components of irrigation and agriculture and emphasises a participatory approach. Various actors from the grass-roots to higher levels are involved in the process of planning and implementation. In contrast to the conventional top-down approach, the process adopted by the program implies that information flows from the bottom climbing upward to higher levels and then descending back again to the beneficiaries.

The programme operates in an environment in which appropriate linkages and close coordination are ensured between the beneficiaries and the supporting actors as well as amongst the supporting actors. Thus sharing of knowledge, skills and information amongst the different actors is of crucial importance.

In the existing administrative structure of HMGN, irrigation and agriculture related components fall under the jurisdiction of separate ministries and departments and the mandate to provide support to the beneficiaries is also fragmented within the respective department. Each department has its own mechanism to provide support services following specified bureaucratic procedures. Since both the components are an integral part of production activities, OFWM requires that support to the beneficiaries is provided in an integrated way.

In recognition of the above, the pilot OFWM programme has developed a functional institutional setup, which guarantees greater linkages and coordination amongst the actors at different levels, viz., central, regional and district in order to ensure a coordinated delivery of support services to the beneficiaries.

Figure 1 depicts the linkages and mechanism for the flow of support/information across various actors involved in the OFWM programme at different levels. For better outcome, duties and responsibilities of each participating actor have to be clearly spelled out and practically followed. Similarly, to achieve sustainability of the programme, empowerment of these structures will be a necessary condition.
2.1 OFWM National Coordination Committee

At the start of the programme, a National Coordination Committee (NCC) is formed to ensure essential co-operation between different agencies involved in the programme and to provide overall policy level guidance to the implementing partners.

2.1.1 Specific Tasks of NCC

The NCC is expected to:

- advise on policy matters related to implementation of the OFWM programme;
- ensure necessary coordination between the various line agencies;
- provide necessary guidance to the National Execution Team in implementation of the programme;
- review the overall progress of the programme and constraints faced by it during implementation at different levels; and
- suggest appropriate strategy for overcoming identified constraints.

2.1.2 Composition, Roles and Responsibilities

The steering or coordination committee consists of higher level officials from the concerned departments and representatives from relevant line agencies. It is essential that the entire members of the National Execution Team (described later) are also represented in the NCC.
A chairperson is selected among the NCC members. The chairperson could be an official from any represented agency. However, priority should be given to selecting the head of the agency that plays a lead role in funding and implementation of the programme. In case there are two or more such agencies, the chairperson can be selected on a rotational basis.
The committee should also select a member-secretary. Again, preference has to be given to selecting an official from the lead agency. Preferably, the National Programme Coordinator who leads the National Execution Team should be assigned this position since he/she has the responsibility to coordinate the overall planning, implementation and monitoring of programme activities at various levels.

**Role of the Chairperson**

- Provide suggestions to the member-secretary in fixing agenda and meeting arrangement;
- Preside over the meeting and provide overall leadership in achieving the objectives of the committee;
- Coordinate the discussion and facilitate members in making decisions as per the agenda;
- Facilitate in resolving any issues faced by the programme.

**Role of the Member-Secretary**

- Collect proposals and suggestions for discussion at the meeting;
- Fix venue and agenda of each meeting in consultation with the chairperson and members of the committee;
- Call meeting on the advice of the chairperson;
- Present progress reports and other matters related to programme activities at different levels of the programme hierarchy;
- Document proceedings of the meeting and correspond with member agencies regarding the decisions made in each meeting;
- Facilitate execution of meeting decisions in close consultation with the chairperson and committee members and in collaboration with different implementing partners at various level of programme implementation.

**2.1.3 Venue and timing of the meeting**

Meetings are convened on a bimonthly basis. Two meetings are conducted in each season. The first one is convened prior to the start of a season. Its objective is to support the implementing actors with adequate guidelines and policy instructions for planning of activities. The second meeting is conducted after completion of seasonal activities so that the outcome, results and issues encountered during implementation are discussed, and future strategy is formulated for the succeeding season.

In addition to the above meetings, emergency or special meetings can be called if necessary with prior consultation with the committee members and upon approval by the chairperson.

It is proposed that the venue of the meeting is rotated among the participating agencies. This will ensure adequate coordination as well as promote a greater sense of responsibility among the agencies towards the programme.
2.1.4 Meeting procedures

Preparation for the meeting

- Formulate the programme and agenda of the meeting.
- Decide the date, time and venue of the meeting and communicate these to the members of the committee in due time.
- Make arrangements for the meeting such as procurement of stationary, preparation of the meeting hall with presentation aids if necessary, refreshment, and logistics.

Holding the meeting

The meeting starts with the opening remarks of the chairperson who sheds light on the objectives of the meeting, followed by a discussion on the meeting agenda. If required, and with the general consensus of the participating members, additional agenda can be included, or initially fixed agenda can be modified.

Before starting a serial discussion on the agenda, the member-secretary appraises the participating members on the progress achieved with regard to the execution of the decisions made in the previous meeting and new issues encountered during implementation.

After reviewing the decisions of the previous meeting, serial discussion starts on the agenda of the current meeting, decisions are made, and minutes are prepared.

The meeting concludes with closing remarks by the participating members and finally by the chairperson.

2.2 National Execution Team

The National Execution Team (NET), comprising the representatives from the Departments of Irrigation and Agriculture—the two lead agencies in the programme—coordinates actions of all the concerned agencies in overall planning, implementation, monitoring and evaluation of OFWM. It also acts as a bridge between the executing actors at the district and regional levels and policy level stakeholders at the central level for smooth flow of policy decisions from above and feedback from the bottom.

2.2.1 Specific Tasks

- To define the objectives and scope of the programme in line with policy guidelines;
- To identify the area of programme support and course of OFWM interventions.
- To facilitate the institutional arrangements at the regional and district levels for adequate support delivery for the implementation of the programme in close coordination with the respective agencies.
To ensure support from the local government, other line agencies and NGOs (if required) in programme implementation and to define the role and responsibilities of various actors at the regional and district levels involved in the programme.

To provide necessary technical guidance in programme planning, implementation, monitoring and evaluation of the programme to the actors/collaborators engaged in the programme at the regional and district levels.

To arrange training for the technical team members and facilitate organisation of workshops at various levels and stages of programme implementation.

To review and endorse the programme budget in line with the policy guidelines and as per the work plan.

To periodically monitor and evaluate the progress and constraints of the programme and suggest measures for further improvement.

To provide necessary feedback to the National Coordination Committee for further policy refinement related to efficient and smooth implementation of the programme.

To ensure timely preparation of various progress reports of the programme at different levels and their submission to the concerned authorities.

2.2.2 Composition, Roles and Responsibilities

The National Execution Team consists of senior officials from the appropriate divisions of the Department of Irrigation and Department of Agriculture. In addition, officials from other line agencies such as ADB, NARC, and WUA Federation are represented in the team as and when required. There should be a provision on the National Execution Team for a National Programme Coordinator (NPC), who is selected by the leading department responsible for funding and overall implementation of the programme.

The National Coordinator is assigned on a full time basis and given full authority to extend overall management support in achieving the programme objectives and targets in close consultation and collaboration with the team members and National Coordination Committee, as well as in coordination with line agencies at the central, regional and district levels.

To facilitate the work of NPC, additional core technical staff members such as irrigation engineers and agronomists are assigned to the team by the DOI and DOA, respectively.

As participatory training and extension are the basic approach followed in the OFWM programme, it requires some additional inputs from the training-cum-institutional development specialist. Hence provision is made in the team for this specialist.

Similarly, there should be a provision on the team for a national monitoring and evaluation officer, whose role could be vital at each stage of programme execution in order to point out any shortcomings and guide the actors/implementers in streamlining the programme toward the desired direction. This is especially important for a programme like OFWM where multiple stakeholders and actors are involved.
Some support staff such as an administrator-cum-secretary need to be made available to assist the NPC and NET members for timely and efficient delivery of support services.

**Responsibilities of the National Programme Coordinator**

The overall responsibility of the NPC is to provide management support to the national, regional and district level actors in planning, implementation, monitoring, and evaluation of programme activities in close consultation and cooperation with the National Execution Team members and line agencies, and under the guidance of the National Coordination Committee.

Specific responsibilities of the National Programme Coordinator include the followings:

- Prepare and update the annual work plan and plan of operation and the budget in concert with programme objectives and scope of interventions and as per the policy guidelines;
- Ensure timely assignment of national staffs in coordination with involved departments;
- Ensure coordination between lead (DOI & DOA) and other line agencies in implementation of OFWM programme;
- In the capacity of the member secretary of National Coordination Committee, arrange timely conduction of meetings in consultation with Chairperson and committee members and share the minutes with respective member agencies;
- Prepare minutes of each meeting and circulate to the concerned members and to the actors involved in the programme at various layers of programme hierarchy;
- Facilitate execution of policy decisions made by the National Coordination Committee in close coordination with National Execution Team members, experts and involved agencies;
- Ensure cooperation from Regional and District Coordination Committees regarding assignment of district staff and in execution of programme activities.
- Maintain effective communication, information flow and coordination between the beneficiaries, and district, regional and central level stakeholders;
- Arrange disbursement of field budgets related to training, agricultural inputs and irrigation and agriculture improvement works to be carried out in the districts in line with budgetary provisions and norms;
- Facilitate preparation of progress and technical reports by the concerned national staff attached to the National Execution Team; and
- Provide managerial support to the staff assigned to NET in achieving the objectives and targets of the programme and supervise the work of support staff.

**Responsibilities of NET members (other than professional staff)**

- Cooperate and assist the National Programme Coordinator in fulfilling the above tasks.
- Periodically monitor the status of the programme, identify the constraints, and suggest remedies for improvement.
Responsibilities of National Irrigation Engineer(s)

The National Irrigation Engineer included in NET works under the guidance of the National Programme Coordinator and NET members. The irrigation engineer has to be assigned to the programme by the DOI on a full time basis and should be involved in supporting the district technical teams in planning and implementation of on-farm water management improvement in the districts and schemes.

His/her specific tasks include the following.

- Identify suitable schemes in close consultation and coordination with the National Programme Coordinator, agronomist and other professional staff of NET and respective Irrigation Development Division and Sub-divisions and Ground Water Resource Development Project (IDDO/IDSDO/GWRDP) and District Agriculture Development (DADO) offices in the selected districts for OFWM interventions.
- Carry out a rapid appraisal in the selected schemes together with the District Teams and National Agronomist in consultation with the IDDO/IDSDO/GWRDP and DADO offices;
- Prepare and assist in conducting training programmes for the OFWM staff on planning and implementation of OFWM programme related to the introduction of efficient on-farm irrigation and drainage systems while closely liaising with IDD/IDSDO/GWRDP offices;
- Advise the district teams on appropriate water management technologies related to the specific agro-climatic conditions in the district and to the crops grown in the district, including construction of on-farm irrigation structures such as water courses, field channels, outlets and relevant regulating structures and provisions of adequate field drainage to ensure optimal utilisation of the irrigated command area;
- Review and verify the on-farm irrigation improvement proposals prepared by the District Technical Teams in close cooperation with WUA and beneficiaries and obtain endorsement of the proposals, and provisions for construction materials and farmer contributions from NET;
- Advise the District Teams on introduction of appropriate procedures for the distribution and rotational water supply and the maintenance of irrigation systems including drainage;
- Advise the District Teams and assist in the training on institutional capacity building of WUA, and in resource generation and mobilization.
- In consultation with NET members, National Programme Coordinator and National Agronomist, design and conduct technical staff training, workshops, and other events related to the programme.
- Prepare relevant training and technical reference materials to assist district staff and WUA in the introduction of appropriate OFWM technologies.
- Maintain close links with other units of the Departments of Irrigation and Agriculture and other line agencies for smooth execution of programme activities.
- Prepare progress and technical reports on the implementation of the programme on on-farm water management improvements and field visit reports after each field visit.
Responsibilities of National Agronomist

The National Agronomist works under direct technical supervision of the Division Chief of DOA designated to the NET and under the management support of the National Programme Coordinator. The agronomist has to be assigned to the programme by DOA on a full time basis and should be involved in supporting the District Technical Team in planning and implementation of the agricultural components of the OFWM programme in the selected districts and schemes.

Specific tasks of the National Agronomists include the following.

- Identify suitable schemes together with the National Irrigation Engineer, District Team, respective IDDO/IDSDO/GWRDP and DADO, and in close consultation with the Division Chief of DOA represented in NET, National Programme Coordinator, and other professional staff of NET for on-farm water management and agriculture production interventions;
- Carry out rapid appraisal on the feasibility of agricultural production improvement in the selected schemes together with the District Teams and National Irrigation Engineer, and under close supervision of the respective Division Chief of DOA, National Programme Coordinator, other professional staff included in NET and respective DADO and IDDO/IDSDO/GWRDP offices;
- Prepare and assist in the training of the District Teams in planning and implementation of OFWM programme related to the introduction of agricultural production improvement while closely liaising with the respective DADO offices in the selected schemes;
- Advise on appropriate components of agricultural production technologies such as suitable crops and crop rotations, HYVs, optimal plant nutrition and fertilizer application practices, and weed and pest control measures to be introduced under the specific conditions of the district and in the command areas of the schemes with a view to optimising the cropping patterns, cropping intensities and crop yields;
- Review and verify the comprehensive and seasonal work plan prepared by the District Teams together with the beneficiary farmers, get the programme proposal endorsed, and ensure timely supply of agricultural inputs;
- In close liaison with line agencies at various levels, facilitate the District Teams and farmers in procuring quality seeds and other essential agricultural inputs;
- Advise the District Teams and assist them in organising training on capacity building of farmers regarding improved crop production technologies, utilising the farmers’ field schools and farmer-to-farmer training approach;
- In close cooperation with the National Irrigation Engineer and in consultation with NET members, National Programme Coordinator and other professional staff included in NET, design and conduct technical staff training courses, workshops and other events of the programme;
- Prepare relevant training and technical reference materials to assist the District Teams and farmers in the introduction of appropriate components of improved crop production technologies;
- Maintain close links with other units of the Departments of Agriculture and Irrigation and with other line agencies involved in the implementation of the OFWM programme;
- Prepare progress reports of the programme and other reports such as field visit reports.
Institutional Development-cum-Training Specialist

The water users’ association and farmers’ groups are the focal point for planning and implementation of the OFWM programme at the grass-roots level. Hence emphasis needs to be given to strengthening the capacity of these organisations. Similarly, participatory training and extension constitute critical interventions in the programme. A series of well designed farmer and staff training are conducted at various stages of programme intervention. Hence the role of the Institutional Development-cum-Training Specialist is crucial in addressing issues related to institutional development of focal grass-roots organisations. This specialist is assigned to the programme on a full time basis by the respective department and works in close consultation with the NET members and under the management support of the National Programme Coordinator.

Specific tasks of the Institutional Development-Specialist include the following.

- In close collaboration with the District Teams, carry out a rapid appraisal of the functioning of the WUAs in the selected schemes and, based on this appraisal, propose actions needed for their institutional strengthening;
- In close collaboration with the District Teams and WUAs carry out rapid appraisal of the status of the irrigation schemes with respect to their operation and maintenance, assess WUA involvement, and develop a proposal on measures to strengthen the O&M components to be implemented by the WUAs;
- Design and conduct training for the district staff on institutional capacity building of WUAs for sustained O&M, resource generation and mobilization;
- Assist the District Teams in designing and conducting training for WUAs on institutional capacity building, O&M, resource generation and mobilization;
- Prepare relevant training materials and technical references for the District Teams and WUAs;and
- Prepare progress, technical and other report as well as mission reports after each field visit.

Specific task as Training Specialist include:

- assists in design, preparation, and implementation of training for district technical staff in close co-operation with the National Irrigation Engineer and Agronomist.
- assists in design, preparation, and implementation of farmers comprehensive/seasonal planning in close cooperation with the National Irrigation Engineer and Agronomist.
- in close cooperation with NET members and professional staffs involve in design & preparation of the curricula and methodologies of staff trainings and prepare appropriate materials for the training courses to be implemented by the programme at different stages of programme for irrigation and agricultural staffs of districts teams;
- assists in design, preparation and organisation of workshops and other events foreseen in the programme at various stages of implementation;
- advises on the design, methods and procedure for the training of farmers and water users associations, and facilitate introduction and diffusion of improved irrigation and agricultural technologies to be implemented by the district teams in the selected schemes; and
- assists in the preparation of relevant training and extension materials.
2.2.3 Procedures for the OFWM National Execution Team Meeting

Regular meeting of NET members is essential to monitor progress, discuss constraints and streamline programme activities in line with the set goal and objectives. The meeting is also important for timely flow of necessary information, circulars and guidelines among the various actors involved in the programme at different levels. Agenda for discussion at the NET meeting also includes monitoring the inputs of various professional staff members attached to the programme and suggesting future course of support to be provided by them.

The NET meetings coincide with the timing of seasonal activities. Generally, two meetings are called in a given season. The first meeting is held prior to the start of each season well ahead of the initiation of actual seasonal activities and after the first National Coordination Meeting.

Objectives of the first NET meeting are to:

- discuss among the NET members decisions made in the past National Coordination Committee meeting and to formulate necessary implementation guidelines for regional and district level partners;
- orient the professional staff members about the policy decisions made in the NCC meeting for readjustment in support services; and
- to share necessary guidelines/instructions with the regional and district level partners for planning and readjustment in seasonal activities and budgets.

The second and the subsequent meeting are convened after completion of each seasonal activity and prior to the second NCC meeting in the season.

Objectives of the second NET meeting are to:

- discuss progress/outcome of the seasonal activities and to identify the constraints to smooth implementation of activities;
- discuss remedies for the issues/constraints and prepare recommendations for discussion at the NCC meeting;
- assess the efficiency of technical support services provided by the professional staff members during implementation of seasonal activities and provide suggestions for improvement in organizational support;
- assess the efficacy of management support services provided by the NPCO during implementation of seasonal and other related activities and suggest measures for further improvement; and
- to make necessary preparation for the NCC meeting.

In addition to the above two meetings, separate meetings can be called if the NET members desire it. The overall responsibility for timely organization of meetings lies with the National Programme Coordinator. The meeting agenda are prepared in due time by the NPC in consultation with the NET members.
The NPC will communicate to the NET members on the timing and venue of the meeting.

Venue

The NET meeting is convened at the venue decided by the NET members. However, to ensure better coordination among the members and to promote greater sense of responsibility towards the programme, the venue of the meeting is rotated among the agencies represented in the committee.

The head of the agency/department that hosts the meeting may presides over it.

### 2.3 Regional Coordination Committee

As per the administrative structure of HMG Nepal, the regional level agencies are provided with the responsibility to provide necessary directives to the district level institutions for programme planning and implementation of activities. Majority of the national level agencies are represented at the regional level through their respective regional directorates. Adequate procedures have been developed to support their district offices through the regional level in fulfilling the goal, objectives and targets of the respective agencies.

The OFWM programme seeks support from various agencies in achieving the set goals and objectives. Thus due attention needs to be given to promoting and strengthening coordination among the lead and potential line agencies and with ongoing programmes and projects in the region with a view to obtaining needed support for smooth implementation of the programme.

As DOI and DOA are entrusted with the major role in the implementation of the OFWM programme, prime emphasis has to be given at the regional level on establishing and strengthening the working relations and coordination between these two institutions to ensure delivery of support services to the beneficiaries in an integrated manner. In the OFWM programme, this is achieved by creating a platform called the Regional Coordination Committee (RCC). The regional level institutions under the lead departments directly involved in the programme are represented in the committee. The main objective of this committee is to provide support and policy guidelines to the district level institutions for effective organisation and delivery of support services to the beneficiaries. Similarly, it seeks to mobilise the needed support from relevant line agencies working in the region for smooth implementation of the programme. Thus representation of the regional level line agencies in the RCC could ensure better coordination and effective programme planning and implementation.
2.3.1 Specific Tasks of the RCC

The specific tasks of the committee include:

- introduction of the central level policy guidelines and plan of operation of the OFWM programme to the regional and district level stakeholders;
- advising on the implementation of the programme in line with the regional development priorities;
- ensuring supply of necessary inputs, coordination and cooperation from the different line agencies;
- monitoring and evaluation at regular intervals the progress made in the programme activities undertaken in districts;
- analysis of the constraints and providing feedback to the districts for further improvement of the programme in line with the set goal and objectives.

2.3.2 Composition, Roles and Responsibilities

The Regional Coordination Committee consists of the following members.

- Regional Director, DOI
- Regional Director, DOA
- Regional Director of other line agencies
- Chiefs of Irrigation Development Division/Sub-Division/GWRDP
- Chiefs of District Agriculture Development Office
- Chiefs of district level line agencies collaborating in the programme.

Specific responsibilities of the Regional Directorate of Irrigation

- Provide policy guidelines of DOI, NCC & NET related to the OFWM programme to the respective IDDOs/IDSDOs/GWRDPs and ensure proper implementation of the programme in line with the provided guidelines;
- Ensure adequate staff allocation to the OFWM programme for timely and efficient service delivery at the district and beneficiary level;
- Ensure necessary inputs, coordination and cooperation from different DOI related programmes/projects and line agencies operating in the region for smooth and efficient implementation of the OFWM programme.
- Monitor and evaluate the progress of programme activities undertaken by the IDDOs/IDSDOS/GWRDP in close cooperation with the respective DADOs through field visits, identify the constraints/issues impeding progress, and provide necessary suggestions/backstopping for improvement.
- Assess the efficiency of support services provided by the respective IDDOs/IDSDOs/GWRDPs in implementation of the OFWM programme and provide necessary feedback/instructions for improvement.
Specific responsibilities of the Regional Directorate of Agriculture

- Provide policy guidelines of DOA, NCC and NET related to the OFWM programme to the respective DADOs and ensure proper implementation of the programme in line with the provided guidelines.
- Ensure adequate staff allocation to the OFWM programme for timely and efficient service delivery at the district and beneficiary levels;
- Ensure necessary inputs, coordination and cooperation from different DOA related programmes/projects and line agencies operating in the region for smooth and efficient implementation of the OFWM programme;
- Monitor and evaluate progress of the programme activities at regular intervals undertaken by the DADOs in close cooperation with the respective IDDO/IDSDO/GWDP through field visits, identify the constraints/issues impeding the progress, and provide necessary suggestions/backstopping for improvement;
- Assess effectiveness of the support services provided by the respective DADOs in implementing the OFWM programme and provide necessary feedback/instructions for improvement.

The other line agencies directly or indirectly participating in the programme and represented in the RCC have to bear similar responsibilities in relation to their agencies/institutions as mentioned in the case of RAD and RID.

2.3.3 Procedures of the RCC meeting

Meetings of the Regional Coordination Committee are called at regular intervals. At least 3 meetings are convened in a year. In order to avoid frequent travelling of personnel from the districts exclusively for the purpose of attending this meeting, it is proposed that it coincide with the regular fourth monthly review meeting of DOA and/or DOI conducted at the Regional Headquarters in each fiscal year.

In order to achieve better coordination between DOA and DOI and promote a greater sense of responsibility among the agencies represented in the RCC, venue of the meeting needs to be rotated among the agencies. The meeting could be conducted immediately before or after the fourth monthly review meeting. To make this happen in practical terms, a yearly schedule of the RCC meeting is prepared based on the schedule of the fourth monthly review meetings of both DOA and DOI.

Either of the regional directorates that hosts the meeting presides over it. The respective directorate has also the responsibility to fix agenda of the meeting in due time and consultation with the RCC members. The department that will host the meeting will also be responsible for preparation and circulation of the minutes of the meeting to the respective members as well as to central level stakeholders.
2.4 District Coordination Committee

At the district level, the overall responsibility for programme planning, implementation, monitoring and evaluation of OFWM activities are entrusted to the Irrigation Development Divisions/Sub-Divisions (for surface schemes) or GWRDP (for deep tubewell schemes) and to the District Agricultural Development offices.

As both the offices operate individually based on the administrative procedures of their respective departments, it is therefore essential that close functional relationship is established among these two agencies and among the personnel responsible for the OFWM programme in delivering support services to the beneficiaries in an integrated manner. This is ensured through the formation of a District Coordination Committee that provides guidance to the District Technical Teams, farmers, and WUAs to plan and implement the programme in an efficient, transparent and coordinated manner through regular interactions between the involved agencies and the personnel.

2.4.1 Specific tasks of the DCC

- To provide necessary guidelines to the concerned members of District Technical Teams (DTT), farmers and WUAs for smooth, efficient and transparent implementation of the programme in line with its goal and objectives and as per policy guidelines.
- To provide support in organising the work of District Technical Teams for efficient service delivery.
- To discuss and endorse the district comprehensive and seasonal work plans prepared jointly by the farmers/WUAs and the DTT;
- To discuss and endorse the annual and seasonal budgets and send recommendation to the concerned authorities for release.
- To coordinate the financial management of the programme and endorse the expenditure statements prepared by the DTT after completion of the seasonal activities and ensure timely clearance of advances.
- To discuss constraints/issues facing by the DTT, farmers and WUAs in the planning and implementation of programme activities and suggest remedies for improvement.
- To monitor and evaluate the progress made in programme implementation, identify constraints and suggest remedies.
- To advice the DTT on timely preparation of progress and completion reports and their timely submission to the concerned authorities.

2.4.2 Composition, Roles and Responsibilities

Composition of the DCC is as follows:

- Chief of the Irrigation Development Divisions/Sub-Divisions/GWRDP
- Chief of District Agriculture Development Office
- An engineer assigned to the district technical team from IDDO/IDSDO/GWRDP
- An agriculture subject matter specialist assigned to DTT from DADO
- An overseer assigned to DTT from IDDO/IDSDO/GWRDP
- A JT or JTA from the nearest agriculture service centre/sub-centre under the DADO supporting the farmers of the selected scheme
- A WUA representative from the selected scheme(s)

Membership of the DCC may be extended based on the requirement of support services from other district line agencies.

**Specific Responsibilities of IDDO/IDSDO/GWRDP**

- Provide programme guidelines and supervisory support to the concerned engineer and overseer attached to the DTT in planning (Comprehensive and seasonal plans) and implementation of irrigation management improvement activities in the selected irrigation schemes;
- Provide programme guidelines and supervisory support to the concerned engineer and overseer attached to the DTT in planning (survey and design) and implementation of irrigation infrastructure improvement works in the selected irrigation schemes;
- Review and endorse the proposal on irrigation infrastructure improvement works prepared by the engineer and the overseer jointly with the WUA/farmers and recommend to the concerned authority for approval, release of budget and authorisation for the implementation of the works upon endorsement in the DCC;
- Monitor through on-the-spot visit (at least once in a season) implementation of software and hardware irrigation improvement works and provide necessary technical backstopping to the DTT engineer and overseer as well to the WUA/farmers for proper implementation of the works;
- Provide feedback to the concerned authorities of respective departments on the progress and constraints of the undertaken activities.

**Specific Responsibilities of DADO**

- Provide supervisory support to the DTT (SMS & JT/JTA) in preparation of farmers’ comprehensive and seasonal work plans on agricultural production improvements and training programmes in the selected schemes through adopted planning procedures;
- Review and endorse the comprehensive and seasonal work plans on agricultural production improvements and training programmes and recommend to the concerned authority for the release of budget upon endorsement in the DCC meeting;
- Provide technical, managerial and supervisory support to the DTT (SMS & JT/JTA) in the implementation of farmers’ work plans and training activities;
- Monitor through on-the-spot visit (at least once in a season) implementation of agriculture production improvement activities and provide necessary technical backstopping to the DTT and farmers/WUA in proper implementation of activities related to agricultural production improvements;
- Review the progress and constraints faced while undertaking the activities and provide necessary feedback to the concerned authorities at the regional and central levels;
Provide management support to the DTT in the preparation of financial statements upon completion of each of the activities and make recommendation for fund clearance to the concerned authorities upon endorsement by the DCC;

Ensure timely preparation and submission of progress and completion reports on agricultural production improvements to the concerned stakeholder at the central and regional levels.

The role and responsibilities of DTT members are presented in section 2.5.2 below.

2.4.3 Venue and Frequency of DCC meetings

The DCC meetings are conducted at regular intervals in order to keep pace with the programme events and streamline the programme activities as per the set targets and objectives. The meetings are convened at either of the IDDO/IDSDO/GWRDP or of DADO offices. However, to promote better coordination and greater sense of responsibility among the participating institutions and related personnel, it is proposed that the venue of the meeting be rotated among the involved agencies. The hosting agency presides over the meeting.

The meeting is conducted following a formal proceeding based on a fixed agenda. Serial discussions are held on each item on the agenda and decisions that are made are documented in a register allocated specifically to the DCC meetings.

After the completion of each meeting, the agency hosting the meeting prepares minutes of the meeting and shares these with all the involved stakeholders at the national, regional and district levels.

2.5 OFWM District Technical Team

In each district where the OFWM programme is to be introduced a District Technical team (OFWM-DTT) is formed. The team includes an Irrigation Engineer and an Overseer from the Irrigation Development Division/Sub-Division/GWRDP office and an Agriculture Subject Matter Specialist (SMS) and Junior Technicians (JT) or Junior Technical Assistant (JTA) from the respective Agriculture Service Center/ Sub-Centre under the District Agriculture Development Office. The overall responsibility to plan and implement the activities of OFWM programme at the site level is entrusted to the DTT.

The District Irrigation Engineer will be responsible for planning and implementation of training programmes for the farmers and members of the Water Users Association and other field activities related to on-farm irrigation management in coordination with DTT members from DADO. The technical personnel in the DTT from DADO will carry out the training to the farmers and other field activities related to agricultural production improvement in the selected irrigation schemes in coordination with DTT members from IDDO/IDSDO/GWRDP.
Supervision and monitoring of the activities carried out by the DTT at the scheme level is entrusted to the chief of IDDO and DADO. Appropriate guidelines to plan and implement the activities in line with the programme objectives are provided to the DTT from the National Execution Team in consultation with the National Irrigation Engineers and Agronomists.

2.5.1 General Criteria for Selection of DTT members

The success of the programme will much depend on the assignment of proper personnel to the DTT and the level of enthusiasm and motivation possessed by them. Thus due attention needs to be paid by the office heads of both irrigation and agriculture development offices in assigning staff members to the DTT.

In order to assist the office heads in the selection of DTT members, the following general criteria are proposed.

The technical persons to be considered should have the following attributes.

- Self motivated and dedicated towards developmental activities;
- Field oriented and possessing good interpersonal communication qualities;
- Possessing basic knowledge on participatory processes of farmer involvement in programme activities;
- Possessing ability to work on a team and in coordination with other team members;
- Senior members of the DTT should possess the ability to motivate and mobilise inputs from the junior members of the DTT;
- Senior members should possess the skill to mobilise other human resources from their own agency as well as from other line agencies on a as-and-when-required basis and should coordinate mobilisation of inputs expected from the resource persons;
- Senior members should possess the ability to process field information/data and reporting;
- Senior members also should possess general ideas about financial resource mobilisation, record keeping and preparation of financial statements;

2.5.2 Specific Tasks of the individual DTT Member

Irrigation Engineer

- Facilitate in the selection of suitable irrigation schemes for OFWM programme interventions and conduct rapid appraisal on the existing status of the irrigation systems;
- Participate in the technical and in-service training organised for the OFWM District Teams (DTT) by the OFWM National Execution Team;
- Facilitate the farmers and WUA in conducting participatory programme planning (comprehensive and seasonal) for irrigation improvement in the selected irrigation schemes as per the adopted guidelines;
Together with the farmers and WUA prepare Comprehensive and Seasonal Work Plans for irrigation improvement based on the needs identified during programme planning and prepare the related budget;

Adopting a participatory discussion and survey process prepare the detailed proposal, including budgetary requirements and procurement of construction materials, and implementation plan for the on-farm irrigation infrastructure improvement works in the selected irrigation schemes;

Present to the DCC meeting the farmers’ comprehensive and seasonal work plans and budget on various training and irrigation improvement works to be implemented in the selected schemes and get these endorsed;

Design and conduct need based training courses for WUA members on operation and maintenance and institutional strengthening of WUA;

Facilitate in the training of farmers/WUA members on introduction of appropriate irrigation methods and practices of various seasonal crops by conducting on-the-spot farmer’s field school and farmer-to-farmer training;

Provide technical, supervisory and advisory support to the DTT overseer in proper implementation of irrigation improvement plan and training activities;

Monitor and collect periodically the required data/information on the activities implemented and provide feedback to the DCC, RCC and NET and other concerned authorities and assess the impacts of interventions on irrigation improvement;

Prepare proceedings of the training of farmers and WUAs, and progress and seasonal completion reports after completion of each activity;

Coordinate and collaborate with other members of the DTT in planning, implementation, and monitoring of OFWM activities;

Prepare financial statements on each of the implemented activities together with the other team members, submit these to the DCC for endorsement, and forward these to the concerned authorities for clearance.

Agronomist/Agriculture Extension Specialist/Plant Protection Specialist

Facilitate in the selection of suitable irrigation schemes for OFWM programme interventions and conduct rapid appraisal on the existing status of the irrigation systems and agricultural production activities;

Participate in the technical and in-service training organised for the OFWM District Teams (DTT) by the OFWM National Execution Team;

Facilitate the farmers and WUA in conducting participatory programme planning (comprehensive and seasonal) on agricultural production improvement in the selected irrigation schemes as per the adopted guidelines;

Together with the farmers and WUA prepare comprehensive and seasonal work plans on agricultural production improvement based on the needs identified during programme planning and prepare the related budget;

Present to, and seek endorsement from, the DCC meeting farmers’ comprehensive and seasonal work plans and budget on various training and other activities related to agricultural production improvement to be implemented in the selected schemes;
Facilitate in the training of farmers/WUA members on introduction of appropriate components of improved crop production technology, marketing of various seasonal crop produces by conducting on-the-spot farmer's field school and farmer-to-farmers training;

Provide technical, supervisory and advisory support to the DTT JT/JTA in the implementation of agriculture production improvement and training activities;

Orient and facilitate in procurement of agricultural supplies (seeds, fertilizers, pesticides, etc.) demanded by the farmers in each season in coordination with related line agencies;

Provide feedback and assist in the preparation of necessary training and extension materials on improved crop production;

Monitor and collect periodically the required data/information on implemented activities and provide feedback to the DCC, RCC and NET and other concerned authorities and assess the impacts of interventions on agriculture production;

Prepare proceedings of the farmers’ training, progress and seasonal completion reports upon completion of the activities;

Coordinate and collaborate with other members of the DTT in planning, implementation and monitoring of OFWM activities;

Prepare financial statements on each of the implemented activities together with other team members and submit to the DCC for endorsement and forward these to the concerned authorities for the clearance.

**JT/JTAs**

Assist other members of the DTT in the selection of suitable irrigation schemes for OFWM programme interventions and in conducting rapid appraisal of the existing status of the irrigation systems and agricultural production activities;

Participate in the technical and in-service training organised for the OFWM District Teams (DTT) by the OFWM National Execution Team;

Assist and facilitate the farmers and WUA in conducting participatory programme planning (comprehensive and seasonal) on agricultural production and irrigation management in the selected irrigation schemes as per the adopted guidelines;

Assist and facilitate the farmers and WUAs in the preparation of comprehensive and seasonal work plans on agricultural production improvement based on the needs identified during programme planning and in preparation of related budget;

Assist farmers in procuring required agricultural inputs well ahead of each season (such as demand on quality seeds, fertilizers and pesticides), facilitate in the procurement, and monitor their judicial use;

Under close supervision and technical backstopping of SMS facilitate in the training of farmers/WUA members on introduction of appropriate components of improved crop production technology on various seasonal crops by conducting on-the-spot farmer’s field school and farmer-to-farmer training;

Provide technical and advisory support to the farmers and WUA in the implementation of agriculture production improvement plan and training activities;
Provide frequent feedback to the concerned SMS and DADO chiefs on the progress and constraints faced while implementing the activities and seek remedies for the identified constraints;

Periodically monitor and collect the required data/information on the implemented activities in the schemes and assess the impacts of interventions on agriculture production at the end of each season together with SMS;

Assist the concerned SMS in the preparation of the proceedings of the farmers’ training, progress and seasonal completion reports upon the completion of the activities;

Coordinate and collaborate with other members of the DTT in planning, implementation and monitoring of OFWM activities;

Under the guidance of the concerned SMS, maintain close linkages with other line agencies working in the vicinity of the selected command area and seek support in smooth implementation of the programme as per the need;

Assist other members of the DTT in the preparation of financial statements on each of the implemented activities;

Prepare simple field reports on the progress of implemented activities.

**Overseer**

- Assist other members of DTT in the selection of suitable irrigation schemes for OFWM programme interventions and in conducting rapid appraisal on the existing status of the irrigation systems and irrigation management and agriculture production activities;
- Participate in the technical and in-service training organised for the OFWM District Teams (DTT) by the OFWM National Execution Team;
- Assist and facilitate the farmers and WUA in conducting participatory programme planning (comprehensive and seasonal) for irrigation and agricultural improvement and management in the selected irrigation schemes as per the adopted guidelines;
- Assist and facilitate the farmers and WUAs in the preparation of annual and seasonal work plans on irrigation and agricultural production improvement based on the needs identified during programme planning and in preparation of related budget;
- Conduct surveys together with WUAs and assist the concerned DTT engineer in the preparation of proposals on OFWM irrigation improvement works required in the selected irrigation schemes;
- Prepare procurement plans and estimates on construction materials together with WUAs for the OFWM irrigation works in line with the norms adopted by the programme and assist in procurement;
- Under supervision and technical backstopping of DTT engineer assist in the training of farmers/WUA members on introduction of appropriate components of on-farm water management technology (land preparation and levelling, appropriate irrigation methods and practices, provision for drainage, etc.) by conducting on-the-spot farmer’s field school and farmer-to-farmer training;
- Assist in conducting need based training for the members of the WUA on operation and maintenance and institutional strengthening of WUA;
Provide frequent feedback to the concerned DTT Engineer and IDDO/IDSDO/GWRDP chiefs on the progress and constraints on undertaken activities and seek remedies for the identified constraints;

Monitor and periodically collect the required data/information on the activities implemented in the schemes on irrigation improvement and management and assess the impacts of interventions at the end of each season together with the Engineer;

Assist the concerned DTT engineer in the preparation of proceedings of the WUA/farmers' training, progress and seasonal completion reports upon completion of activities;

Coordinate and collaborate with other members of the DTT in planning, implementation and monitoring of OFWM activities;

Under the guidance of concerned DTT Engineer, maintain close linkages with other line agencies working in the vicinity of the selected command area and seek support in smooth implementation of the programme as per the need;

Assist other members of the DTT in the preparation of financial statements on each of the implemented activities;

Prepare simple reports on the progress achieved in implementing field activities.
3.1 General Approach

3.1.1 Programme Planning and Implementation Strategy

Development of complete package of improvement

While planning and implementing an on-farm water management programme, one should not be confined to the issues and problems at the farm level alone. Rather, the development plan should address physical improvements and system functionality at all levels of water distribution from the intake to the farm plot. As operation at one level is closely linked to and affected by operation at both lower and higher levels of distribution, removing the bottlenecks just at one level may not bring the desired improvement in the operation of the entire system. Accordingly, a complete package of irrigation development should be developed.

Comprehensive planning with short-, medium- and long-term goal and action plans

A detailed investigation of the issues and constraints of an irrigation scheme may suggest a number of improvement activities that are needed to develop the irrigation scheme to a fully operational level. All the activities may not be implemented due to lack of resources or other constraints. More important and crucial problems are likely to be addressed first. Nevertheless, a comprehensive plan needs to be prepared incorporating all the necessary improvements. Thus the development goals and objectives need to be translated into short-, medium- and long-term action plans allowing adequate flexibility in their implementation.

Focus on WUA strengthening and capacity enhancement of beneficiaries

Active participation of the beneficiaries is vital for the success of the programme. Participation is fostered through the beneficiary institutions. Hence the programme should give the first priority to enhancing the capacity of WUAs.
**Actions for capacity building**

Proper orientation from the very early stage of the programme and technical capability of the staff is important. Without this a good planning cannot be expected. Furthermore, institutional capability of the implementers is the backbone of programme planning and implementation. It may be desirable to devote initial six months of the programme to orientation and capability enhancement of the implementers including the farmers and WUA members.

**External support to the beneficiaries**

The programme has a greater chance for success if it is backed by favourable policies on marketing, credit, and input supply.

**Mechanism and modality of support**

Experience from OFWMPP has shown that irrigation systems may need follow up support even after conclusion of active project support. Hence from the early planning stage, the implementers and beneficiaries should have a clear idea and understanding of the nature of such support and mechanism for its delivery.

### 3.1.2 Planning and Implementation Approach

The general approach to planning and implementation of an OFWM Programme includes the following elements.

- Needs identification through a participatory approach, and planning and implementation of activities based on farmers’ seasonal work plans;
- WUA given the central focus in programme planning, implementation, monitoring and evaluation at the scheme level;
- Training programmes tailored to local needs and scheduled in such a way that it covers all the aspects of agricultural production and irrigation management, implemented through Farmers’ Field Schools and supported by staff training;
- Scaling up of programme interventions to a wider area of the scheme through farmer-to-farmer training and extension;
- District level technical staff entrusted the responsibility for planning and implementation of the programme, including technical support and training for the farmers;
- Coordination among line agencies at the central, regional and district levels for delivery of inputs and services through various coordination committees;
- Technical backstopping by a team of national experts associated with the OFWM National Execution Team;
- In-service monitoring and backstopping of the programme entrusted to the chiefs of the organisations at the central, regional and district levels as well as to the professional staff assigned to NET; and
- Programme level monitoring and evaluation of activities supported by staff training, workshops, and coordination committee meetings.
3.2 Planning and Implementation Process

The programme is implemented according to the crop growing seasons, i.e., spring (March-June), monsoon (July-October) and winter (November-February). Each season determines the type of activities and technologies to be introduced for agricultural production and irrigation management.

At the very beginning, a comprehensive participatory planning exercise is conducted to appraise the existing status of the irrigation system and management practices adopted by the farmers/WUA. Based on the results of this appraisal, a comprehensive (mid-term) plan is developed identifying irrigation and agriculture related activities to be carried out in the selected irrigation schemes over the given time period. The comprehensive plan incorporates various options for intervention which could be implemented by the users themselves from their own internal resources as well as from external support.

Based on the comprehensive plan, a seasonal plan is developed well ahead of the start of each season.

After the completion of a one-year implementation cycle, a programme review is carried out and adjustments made in the comprehensive plan. The process applies the same methodology adopted for the comprehensive participatory planning exercise. This ensures tracking down deviations in the targets and determining the progress made compared to the initial status.

Training is a fundamental component of the planning and implementation process in the OFWM Programme. There are two major categories of training programmes for each season: one on seasonal planning, and another on technical training both for the farmers as well as the facilitators (DTT members). During the Farmers’ Seasonal Planning (FSP), farmers review the seasonal activities prepared during the planning exercise and update these through a process of problem identification related to irrigation and crop production. The objective of the technical training is to equip the farmers as well as facilitators with the knowledge and skill to implement the plan. Technical training to the farmers are provided through farmers Field Schools (FFS).

Scaling up of the technologies introduced through FFS is done through farmer-to-farmer training and extension. The core farmers trained during the FFS play a key role in diffusion of the introduced technologies through on-the-spot farmer-to-farmer training at different locations of the scheme. The programme provides the required backstopping to the core farmer trainers.

Supervisory and monitoring support for efficient implementation of farmer-to-farmer training is provided by the respective WUAs.

Members of the District Technical Team, who are responsible for facilitating farmers’ training activities, upgrade their know-how during Technical Staff Training (TST). In each season, two TSTs are scheduled. The first TST of each season prepares the DTT in facilitating farmers’ seasonal planning, whereas the objective of the second TST is to discuss the seasonal plan and determine its implementation procedures.
The implementation of various seasonal and farmers training activities are monitored through in-service monitoring cum backstopping programme (ISM/B), which determines the progress and constraints as well as provides on-the-spot guidance to the field staff (DTTs) and farmers on proper implementation of programme activities. After each season, the results of the previous season are reviewed during the System Level Mass Meeting and subsequent seasonal planning together with the farmers and WUA. Programme level evaluation of implemented activities is carried out in the Technical Staff Trainings (TST). The experiences of the previous season are taken into account in the subsequent season.

The planning and implementation modality of the OFWM programme and its components is illustrated in Figure 2

3.2.1 Technical Staff Training

The objective of the staff training is to develop technical capacity of the district staff members in providing support to the farmers in the implementation of the on-farm water management programme.

More specifically, the training aims to:

- introduce the concept and techniques of participatory training and extension approach for planning and execution of irrigation and agriculture development;
- enhance the knowledge and skills of the staff on technical aspects of irrigation and agriculture;
- enhance skills of the technical staff in facilitating farmers’ comprehensive and seasonal planning, and in conducting training;
- introduce know-how on developing an appropriate programme proposal/work plan and budget related to the programme activities; and
- introduce procedures for monitoring progress, identify constraints, and make adjustments in the programme.

A team of national experts associated with the National Execution Team conducts training for the technical staff with the help of selected resource persons at the central level. For each training session, specific objectives need to be set. The TST includes organisational issues, facilitation skills, and technical training. Each of the training sessions needs to be based on a detailed time schedule and an appropriate balance between lectures, group activities, practical exercises, and field demonstrations/visits. Topics to be covered in the training sessions are related to the expected field activities and designed based on the actual needs of the technical staff and programme objectives. The duration of the TST is about 3 to 7 days, depending on the need. An example of the programme and scheduling of the Technical Staff Training is given in Annex 1.

In general, two TST sessions are organised in each season. The first TST is held before the Comprehensive/Farmers Seasonal Planning focusing on the objectives and procedures of the comprehensive participatory planning exercise and FSP, and technical issues related to expected field activities. The second TST is held shortly after the planning exercise.
Figure 2: Planning and Implementation Modality of OFWM Programme
Staff training courses are conducted separately in each region for convenience. The training venue should be approachable and equipped with the required training facilities including logistics for the participants.

**First Technical Staff Training:** In the first Technical Staff Training, DTT members are familiarised with the programme objectives, approach, and modality of programme implementation. Shortly after the TST, staff members are involved in the final site selection and rapid participatory appraisal of the selected irrigation schemes. Then they are given training on methods, techniques, and procedures of participatory planning. Further, the staff members are trained on how to develop comprehensive and seasonal plans with farmers’ participation and how to execute them during the season. The technical staff are responsible for facilitating the core FFS farmers to conduct FFS and farmer-to-farmer training.

The output of the first Technical Staff Training is the guidelines on planning for irrigation improvement and agricultural development, and preparation of comprehensive and seasonal plans and budget. The technical staff are also exposed to the methodology of conducting the FFS and farmer-to-farmer training.

**Second Technical Staff Training:** The second technical staff training needs to be conducted shortly after the completion of farmers’ comprehensive and seasonal planning exercise. In the second Technical Staff Training, the overall plan for irrigation and agricultural development prepared for the specific sites, and the seasonal work plan for implementation during the current season, are reviewed.

The farmers’ seasonal plans are also presented in the TST to get endorsed by the National Execution Team for allocation/authorisation of required budget to conduct the planned activities and for field allowances of the facilitators (DTT).

**Specialised Training:** In addition to these two training courses, specialised technical training on the basics of on-farm water management, irrigation infrastructure improvement and crop production technologies may also be organised. However, these training courses should be based entirely on the actual need expressed by the members of the district technical teams. Such training courses could be organised inside the country or overseas depending on the need and resources available with the programme. Organisation of such training courses could bring the desired results if conducted at the initial stage of programme implementation.

### 3.2.2 Comprehensive and Farmers’ Seasonal Planning

**Comprehensive Appraisal and Planning Exercise**

As mentioned already, a comprehensive participatory appraisal is conducted assessing the existing status of the irrigation system and agricultural practices adopted by the farmers/WUA. Based on the outcome of this appraisal, a comprehensive (mid-term) plan of intervention is developed comprising activities relating to irrigation and agriculture in the selected irrigation schemes during the given period of time. The comprehensive plan foresees
Various options for intervention which could be implemented by the users themselves from their own internal resources as well as with external support.

Specific objectives of comprehensive planning are to:

- Collect general information on topography, soil type, land use, cropping pattern, crop management practices, canal structure in the system and on the, and irrigation methods and practices currently adopted by the farmers;
- Appraise the functional status of irrigation facilities in the main and distributory system, (physical status of the main and branch canals, and farm channels), status of irrigation services (adequacy, reliability and equity in water distribution), system management (operation, maintenance, resource mobilisation), institutional functioning of WUA (WUA, Main Committee, Branch Committee, other groups or committees formed to facilitate activities of the organisations), identify the problems and outstanding issues, and prepare a plan for improvement;
- Appraise the existing practices of OFWM in the schemes, particularly the linkages between the system level operation and plot level crop and water management (drainage provision, water flow measurement at source, main, branch and tertiary canals, and water distribution practices at farm and system levels), and develop a plan for improvement;
- Appraise the existing cropping pattern, cropping intensity and productivity level of crops, identify the gaps/problems, and develop an improvement plan with participating farmers;
- Appraise production and marketing constraints, identify the needs and develop a plan for improvement;
- Identify the technical training requirements for crop and irrigation management improvement based on the identified gaps/problems, and prepare curricula for seasonal FFS and farmer-to-farmer training; and
- Identify training requirements for WUA strengthening based on the identified gaps, and prepare detailed training curricula.

Methodology: The planning exercise applies the participatory appraisal technique based on problem census and problem solving meetings, which through a process of problem identification and solution, identifies constraints in irrigation management practices, agricultural production, marketing, and other support services. It then analyses the causes and reaches agreement on a workplan for improvement both for enhancement of agricultural production and for improving management in the irrigation system.

The process includes a mapping exercise, transect walk, field observation, interviews, group exercise, split group and plenary discussions and exercises.

Venue: The participatory comprehensive appraisal and planning exercise should be conducted in the command area of the selected irrigation schemes. Venue for the meeting is fixed based on the opinion of the farmers and WUA.

Participants: Participants in the participatory comprehensive appraisal and planning exercise are the representative farmers (both male and female) from the head, middle and tail reach of the irrigation schemes and entire members of the Water Users’ Association. The number of participants varies in the range of 50-70. Adequate care is given for representation.
of women farmers in the appraisal process as they are the ones who carry out most of the farm work and are better aware of the constraints and problems.

**Duration and Timing:** The participatory comprehensive appraisal and planning exercise is conducted in each scheme for a duration of seven days. Exact timing of the planning exercise is fixed after discussion with the farmers and WUA. It should be held well ahead (about a month) of the agricultural season.

**Procedure**

- Fix venue for farmers’ gathering in consultation with the farmers and WUA and inform them about the agenda of the planning exercise;
- Arrange required materials such as stationeries, brown and white papers, cameras for visual documentation of the proceeding, and refreshment for the participants;
- Prior to the start of the exercise explain to the participants the objectives, agenda and procedures of the planning exercise;
- Conduct the planning exercise following the guidelines on agricultural production and irrigation management improvement;
- At the end of each exercise summarise its outcome of the day and discuss the agenda for the next day;
- Start the next day with a review of the previous days’ proceedings;
- After the completion of the planning exercise settle all financial obligations and collect all documents required to prepare a detailed report to be used in preparing the work plans;
- Having finalised the proceedings report and work plans based on the outcome of the exercise, present these in the DCC meeting for endorsement. The endorsed report and work plan should then be submitted to the National Execution Team for approval and authorisation for implementation of the planned activities.

Detailed schedule of the seven-day planning exercise is presented in Annex 2.

The basic steps to be followed in planning of irrigation management and agricultural production are elaborated later in Chapter 5.

**Farmers’ Seasonal Planning**

A farmer’s seasonal planning (FSP) meeting is organised in each season well ahead of the start of actual seasonal activities (about one to one-and-a-half months). The main purpose of the exercise is to review activities that had been formulated during the comprehensive planning exercise and plan the activities for implementation during the given season.

The seasonal planning exercise includes agenda for planning of seasonal irrigation and crop production activities as well as planning for FFS and WUA training relevant to the season. It also includes agenda on planning the farmer-to-farmer training and extension activities to be conducted by the core resource farmers in the wider command area of the irrigation schemes.
Specific Objectives of Farmer’s Seasonal Planning are to:

- review the outcomes of the comprehensive planning exercise and functional status of irrigation facilities in the main system and at the distributory level, status of irrigation services, and management and institutional functioning of WUA, reassess the identified problems and outstanding issues, and prepare a plan for improvement for the season;
- review and discuss the crop coverage plan for the given season as per the improved cropping pattern developed during the comprehensive planning exercise;
- assess the input requirements of the farmers including quality seeds for the given season and prepare a procurement plan;
- review and plan irrigation and crop production and marketing activities to be addressed through FFS during the season;
- plan for diffusion of irrigation and crop production technologies through the farmer-to-farmer training and extension and conduct sequential activities relevant in the season;
- establish study plots in the command area and discuss the layout design of the plots as venue for FFS and F-to-F training and CP demonstration with separate provision for irrigation and drainage, as well as finalise irrigation and crop management treatments/practices to be demonstrated on the plot;
- discuss the seasonal work plans and the training plan in the WUA Working Group meeting and seek its endorsement and make arrangements for proper monitoring of implementation of the planned activities by the WUA.

Details of the activities to be undertaken during the farmers’ seasonal planning including the venue, timing, and participants are given in Annex 3.

**Procedure:** The methods and procedures for conducting a participatory farmers’ seasonal planning are the same as those for comprehensive planning.

A comparison of the characteristic features of a participatory comprehensive appraisal and planning and seasonal planning exercise are presented Table 1.

### 3.2.3 Farmers’ Technical Training

Technical training of the farmers is fundamental in implementing the programme at the scheme level. Activities developed during the comprehensive and subsequent seasonal planning are implemented through these training sessions.

In a given season two types of trainings are to be conducted. The objective of the first training is to increase the knowledge and skills of farmers about new techniques and technologies related to improving irrigation management and to increasing irrigated crop production through participatory on-the-spot OFWM Farmers’ Field School. The objective of the second training is to diffuse the introduced technologies to a wider area in the irrigation scheme through OFWM farmer-to-farmer training at different locations by mobilising the other interested farmers. Selected core farmers trained in the FFS serve as facilitators in the F-to-F training.
Table 1: Comparison between Farmer’s Comprehensive and Seasonal Plan

<table>
<thead>
<tr>
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<th>Comprehensive Plan</th>
<th>Farmers’ Seasonal Plan</th>
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<tr>
<td><strong>Contents</strong></td>
<td>List of selected activities on OFWM and agriculture production improvement (techniques and technologies) to be introduced during the time span of the project period and beyond.</td>
<td>Activities for OFWM and agriculture improvement plan for the given season, including curriculum of FFS and F-to-F training</td>
</tr>
<tr>
<td><strong>Objective</strong></td>
<td>To guide OFWM and agricultural production improvement in the irrigation scheme</td>
<td>To guide activities during a given season</td>
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<td><strong>Time span</strong></td>
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<td><strong>Developed during</strong></td>
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<td><strong>Adjusted during</strong></td>
<td>Subsequent FSPs</td>
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**Farmers’ Field School**

Farmer’s Field School (FFS) in the OFWM programme serves as the means to impart intensive on-the-spot training to the farmers on crop production and water management technologies. The “school” itself is without walls. It is a field plot on which the participants work together to carry out studies and learn activities facilitated by the OFWM technical staff (DTT). This study plot is an integral component of FFS to test and validate the performance of improved crop production and water management technologies and practices and compare it with farmers’ traditional technologies and practices. It serves as a venue for the farmers to learn and exchange experiences on different aspects of crop and water management technologies.

**Objectives of the Farmers’ Field School**

The objective of the OFWM-FFS is to improve decision-making skills of farmers and WUA officials and to empower them to take greater control of the process of improving their crop production and water management practices. It aims at giving farmers necessary skills to actively evaluate the information, which they gathered through observation and exchange of experiences on the study plot together with fellow farmers and facilitators. The school also gives farmers skill and opportunity to test the usefulness of their own practices, and modify and adopt them as the case may be. As managers of their own field, it is up to them to make decisions based on the acquired information and knowledge and the field school provides farmers with tools to make these decisions.

**Learning Approach**

Since FFS is field based, it has built-in elements of “learning by doing” and “believing by seeing”. The learning approach in the farmers field school is based on the following major principle:

*Doing is better than hearing*: Learning by doing is the key approach applied in the FFS. Farmers learn by carrying out for themselves various activities related to crop and water management. The key thing is that farmers conduct their own field studies with the help of the facilitators. Working in groups, they collect data in the field, analyse those data, make
decisions based on their analysis of the data, and present their decisions to other farmers in the field school for further discussion, questioning, and refinement. Through this process of experimentation and comparison, farmers become experts in crop and water management. They gain the means to find solutions for the problems on their own.

FFS develops a pool of trained resource farmers who can be mobilised to train others within or outside the irrigation schemes under the guidance of respective WUAs.

*The field is a classroom:* The field epitomises the irrigation system and canal network where the farmers work. Thus learning should take place here to make it relevant to the farmers. Because learning in the FFS takes place in a field similar to their own, it is easy for the farmers to apply what they have learned in the FFS in their own field.

*Technicians as facilitators, not teachers:* The role of the technical staff is very much that of a facilitator rather than a conventional classroom teacher. Once the farmers know what they have to do, and they can observe in the field, the technical staff takes a back seat role, only offering help and guidance when asked to do so. Presentations during the meetings are the work of the farmers and not of the technical staff, with the members of each working group assuming responsibility for presentation their findings in turn to their fellow farmers. The technical staff may take part in the subsequent discussion but as a contributor, rather than a leader, in arriving at an agreed consensus on what action needs to be taken at that time.

*Regular Gatherings/meetings and field observation-AESA:* Farmers meet at agreed regular intervals weekly or bi-weekly. The time between each meeting would depend on critical periods of irrigation and crop management. During each gathering the farmers carry out field observation, collect information, process and analyse the information gathered, present their findings to the fellow farmers and make decisions regarding water and crop management.

*Integrated Curriculum:* Crop and water management practices are considered together holistically combining the technical and socio-economic aspects. Problems confronted in the field represent a range of these aspects and therefore these need to be reflected in the curriculum.

**Preparations for FFS**  
Prior to actual implementation of FFS sessions, the following activities are accomplished in collaboration with the farmers and WUA officials:

*Selection of Participating Farmers of FFS:* The success of farmer’s field school depends on proper selection. If the farmers are interested to attend the FFS and the FFS suits their needs and expectations, then they will participate actively in the discussions and attend FFS sessions regularly throughout the growing season. It is important therefore that the selected farmers are motivated and enthusiastic to participate in the OFWM programme.

The programme has developed a selection criterion considering the above. Accordingly, the WUA of each irrigation scheme selects 25-30 user farmers including functionaries of WUA
for regular participation in the FFS to be conducted in each crop season throughout the year. This is done in close consultation with OFWM-DTT. Selection of the participants is done during the Scheme Level Awareness Mass Meeting (SLAM) organised before the start of the actual programme and prior to the annual planning.

The criteria used for the selection of farmers are as follows:

- Farmers cultivating irrigated or potentially irrigable land and sharing the same command area.
- Farmers should be willing and enthusiastic to attend all FFS meetings throughout the crop seasons of the year.
- Participants should be full time farmers as well as persons trusted and respected by other farmers in the community and by the WUA.
- Progressive farmers responsive to new initiatives and development activities.
- The total number of participants should not exceed 25-30 farmers, as larger groups would be difficult to manage in one FFS session.
- Farmer representation should be equal from various branches or reach of the irrigated command area. However, not more than one participant should be selected from one household.

**Selection of the Main Study Plot:** The main study plot for conducting FFS is set up in one of the field channels’ command area in order to study the linkages between the system level operation and plot level crop and water management. Specific observations/studies are carried out in the field plot of the participating farmers, based on the willingness of the farmer to spare the plot without any cost or compensation and to carry out all cultural operations as advised by the technicians.

General criteria for selection of the study plot are the following.

- The field channel should be in a better operating condition;
- The field channel command area should be representative of the land type in the irrigation scheme in terms of soil fertility and access to irrigation and drainage;
- The field channel command area should be located in an area which could be reached easily by the farmers and close to the village so that other farmers could see the performance of the technologies adopted in the study plot.
- The size of the study plot should be in the range of 3-5 katha (1 katha equals 1/30th of a hectare) in the terai and equivalent in ropani in the hills. This size of study plot is preferred because:
  - there is more demonstration effect compared to a smaller plot;
  - it is appropriate for use during field days to convince other farmers; and
  - the plot size is convenient to carry out seed production activities, and this plot size is easier to manage by the farmers.

**Orientation on FFS management:** A meeting is organised prior to the start of the actual FFS session where participant farmers are oriented on management and procedural aspects of the FFS. During the meeting an FFS leader is selected who in turn will be responsible for management of the FFS affairs. The FFS leader also works as the communicator between the farmers and the FFS facilitator/DTT during the gap period.
Procedure to conduct FFS
In each season, farmers participating in the FFS establish a study plot where different activities related to crop growing and irrigation practices are carried out by the farmers themselves. During each gathering, farmers organised into sub-groups observe and monitor the field, assess the status of the crop grown, and evaluate other aspects of crop production such as plant nutrient and water requirement, weed incidence, and disease and pest infestation. During each observation, farmers gather relevant data, analyse them, take appropriate decisions and determine types of immediate activities to be implemented in the field. The decisions are then presented by the leader of each group to other participant farmers of the field school for further discussion, refinement and endorsement. Then the identified activities are implemented in the field by the farmers themselves with technical assistance from the DTT. Acting as supervisor, the leader farmer of the FFS ensures equal participation of each participant in implementing the activities. Technical discussions on different topics/activities are facilitated by members of the District Technical Team trained through specialized Training of Trainers (ToT)/TST.

The following sequential activities are essential for each FFS session.
- Introduction to topic of the day;
- Field Observation and group work, collection of relevant data/information on irrigation and crop performance-AESA;
- Group discussion and presentation of field data in the plenum;
- Identification of immediate activities to be performed in the field;
- Deliberation and discussion on the topics of the current session;
- Discussion and technical backstopping by the DTT on activities to be performed in the field including immediate activities identified by the farmers during field and crop performance observation/monitoring;
- Implementation of activities and supervision and backstopping by the DTT;
- Discussion on important issues related to the activities performed;
- Collection of farmers’ reaction on the implemented activities;
- Follow up on the progress and constraints of farmer-to-farmer training and necessary backstopping to the core resource farmers;
- Planning for next FFS session and wrap-up;
- Preparation of the proceedings of the session and session report.

Documentation of FFS Proceedings
Proper documentation of each FFS session is essential in order to prepare final proceedings and to prepare the seasonal completion report based on the outcome of the seasonal activities addressed through FFS. Some of the documents like individual session reports will be required even to settle expenditures incurred in conducting season long training. The individual session reports also justify the field visit remuneration entitled by the DTT.

The following documents are prepared during the course of implementation of FFS and after the completion of the FFS:
- A register book is maintained to document the proceedings of individual sessions and to register attendance of participating farmers, maintaining separate records of male and female farmers in each session.
A separate register is maintained to document the comments and suggestions of outsiders visiting the FFS sites and for monitoring visits of officials from the central, regional and district levels assigned to monitor the field activities. The registers are kept with a responsible farmer entrusted by the WUA, or with the FFS leader.

In each FFS session, specific data on crop and irrigation management practices performed in the study plot are recorded as per the checklist provided in Annex 4.

At the end of each session, a session report is prepared by each DTT reflecting the proceedings of each session as per the reporting format given in Annex 5. The data/information required is extracted from the register book on FFS proceedings.

After completion of seasonal activities and training, the seasonal completion report is prepared by the DTT for submission to the concerned authorities. The outline of the report is given in Annex 6. The seasonal completion report is a prerequisite for clearance of expenditures incurred in implementing the seasonal activities and training courses.

All the poster-materials developed during each session are kept with WUA or with FFS leader as reference materials for future use by the farmers.

Farmer-to-Farmer Training

The farmer-to-farmer training and extension programme aims at disseminating the impact of technologies and training courses introduced through the main study plots and FFS to a wider area under the scheme by encouraging other farmers to participate in the programme.

The farmers/WUA members trained in the FFS play a key role in the farmer-to-farmer training and extension of technologies. The trained core farmers organised into groups share the know-how acquired on the study plots and in the regular FFS with fellow non-participant farmers. In order to create a venue for exchanging experiences and facilitating the process of "learning by doing", a sub-study plot is established in each location (mainly at the head and tail reach), incorporating the same technologies as displayed in the main study plots.

The farmer-to-farmer training sessions are conducted at regular intervals after completion of each FFS session, although in a much simplified way in comparison to the FFS. The sessions are designed according to the components of crop cultivation and irrigation practices. Theoretical sessions are avoided as these may not be addressed adequately by the core resource farmers.

The programme provides backstopping support to the core farmer trainers through the DTT for planning and implementing activities in a sequential order. These activities include building awareness about the approach and procedures of the F-to-F training, holding of system level mass awareness meeting (SLAM), training of farmer trainers (TOFT) on planning and implementation procedures, seasonal planning at individual reach of the scheme, WUA Working Group meetings (WUA-WGM), and implementation of seasonal plans.

In planning and implementation of the F-F activities, the backstopping role is primarily assigned to the junior members of the DTT (JT/JTA/overseers) while senior DTT members (SMS/Engineer) provide backstopping to the junior members as well as the farmers through field visits. In addition, senior DTT members regularly follow up the progress and constraints of the farmer-to-farmer training during each regular FFS session.
Supervisory and monitoring support for efficient implementation of F-to-F training at the local level is entrusted to the respective WUAs. Besides, various actors responsible for the seasonal activities and FFS monitor the training activities.

**Salient features of the Farmer-to-Farmer Training**

- It aims at disseminating the impact of technologies and training courses to a wider area of the scheme by encouraging participation of other farmers in the programme.
- Farmer-to-farmer diffusion of technologies is facilitated by the core farmers/WUA members participating in OFWM-FFS.
- Trained core farmers organised into groups in their respective command area share the know-how acquired at the study plots and in the FFS with the non-participant farmers.
- Sub-study plots established in each branch canal serve as venues to conduct the farmer-to-farmer training.
- Role of the DTT is limited to need based follow up and technical support.
- Farmer-to-farmer training is conducted based on the agreed action plan endorsed in the WUA meeting.
- WUA officials bear the responsibility to facilitate holding of the farmer-to-farmer training on time.

**Seasonal Planning And Implementation Cycle**

The seasonal planning and implementation cycle of the farmer-to-farmer training and extension activities is depicted in Figure 3.

![Figure 3: Seasonal Planning and Implementation Cycle of Farmer-to-Farmer Training and Extension](image-url)
Stepwise details of the programme and procedure for planning and implementing the farmer-to-farmer training and extension are elaborated below:

**Step 1: System Level Mass Meeting (SLAM)**

**Objectives**

**In the first season**
- Familiarise the WUA/farmers on the approach of programme planning, implementation and monitoring procedures of OFWM activities under the farmer-to-farmer training and extension.
- Select core resource farmers to facilitate the farmer-to-farmer training in the selected command area (head and tail reach) of pilot sites;
- Prepare, in consultation with WUA, the list of participant farmers and WUA officials to be involved in the seasonal farmer-to-farmer training on a regular basis at each reach.
- Discuss the arrangements to be made for the farmer-to-farmer training and provide orientation on the procedures.

Following objectives should be pursued in the subsequent season
- Review the activities planned and launched, achievements made, and problems encountered in implementing OFWM programme activities in the past season.
- Discuss the approach and procedures of programme planning, implementation and monitoring carried out through the farmer-to-farmer training and extension under the supervision of WUA and with technical backstopping from the DTT.
- Identify the constraints and discuss actions suggested for further improvement and institutionalisation of the farmer-to-farmer training and extension within the regular activities of WUA.
- Review the performance of the selected core resource FFS farmers and WUA officials involved in facilitating the farmer-to-farmer training and extension activities conducted at different locations of the pilot schemes during the past season.
- Review the level of participation of farmers in the farmer-to-farmer training and extension activities conducted in the past season, identify the constraints and discuss actions suggested for greater involvement of farmers in these activities.
- Discuss WUA procedures for arranging inputs required by the farmers of the scheme in the current season.
- Assess the efficiency of WUA management and monitoring support in conducting the farmer-to-farmer training and extension activities.

Facilitators : DTT
Participants : WUA officials and farmers (Approximately 75 in number)
Venue : Irrigation schemes
Duration : One day in each scheme
Step 2: Training of Farmer Trainers (Facilitators) on Planning Method and Procedures

Objectives

☐ To evaluate the progress made and constraints faced in the past seasonal activities and discuss remedies for the identified problems;
☐ To prepare core resource farmers from upper and lower parts of the irrigation scheme for seasonal planning to be carried out together with the respective farmers of the identified command area specifically on the following aspects.
    • Preparation of crop coverage plan based on the improved CP for the season.
    • Preparation of seasonal water distribution and allocation plan based on the crop coverage plan in the selected command area in consultation with WUA.
    • Planning and development of canal operation and maintenance plan in the command area upon discussion with WUA.
    • Demand collection of inputs (viz., quality seeds, fertilizers, etc.) based on the crop coverage plan and preparation of a procurement plan.
    • Identification of training needs on irrigation and crop management practices for selected crops to be studied in the study plots.
    • Development of an action plan for the F-to-F training to be facilitated by the core FFS farmers and with backstopping support from junior DTT members;
    • Selection of field channel/distributaries in the command area and exploration of suitable plots to serve as venue for farmer-to-farmer training.
    • Design of study plots including treatments to be compared on crop management, irrigation method, and husbandry practices of selected crops.

Facilitators : DTT Members
Participants : Selected core FFS resource farmers (5 each from upper and lower reach of each irrigation scheme) and WUA officials (4 from each scheme) responsible for supervision of the F-to-F extension activities.
Venue : Nearest Agriculture Service Centre (ASC) under DADO
Duration : Two days

Step 3: WUA/Farmer Seasonal Planning in Upper and Lower Reach of the Irrigation Scheme

Objectives

☐ To discuss and prepare the seasonal crop coverage plan based on the improved CP for the respective command area upon discussion with the user farmers.
☐ To discuss and prepare the seasonal water distribution and allocation plan based on the crop coverage plan in the selected command area in consultation with WUA.
☐ To discuss and develop the seasonal canal operation and maintenance plan in the command area upon discussion with WUA.
☐ To discuss and collect farmers’ demand for inputs (quality seeds, fertilizers, etc.) required for growing the seasonal crops in the identified command area.
To identify the training needs of the farmers of the identified command area on O&M, and water and crop management practices to be addressed through the farmer-to-farmer training during the season;

- To select the field channel command area and study plots for the seasonal F-to-F training on irrigation and crop production.

- To develop an action plan and schedule of the seasonal F-to-F training on the selected crops and water management practices to be facilitated by the Core Resource Farmers, and assess the inputs required to establish the study plots;

- To discuss the arrangements and procedures of the F-to-F training and allocate responsibilities.

Facilitators : Core resource farmers, overseer and JT/JTA.
Participants : User farmers of upper and lower reach.
Venue : Command area of upper and lower reach, separately.
Duration : Two days in each scheme (first day in upper part and second day in lower part of the scheme).

**Step 4: WUA-Working Group Meeting (WUA-WGM)**

**Objectives**

- To discuss the farmer’s seasonal action plan for each command area to be addressed through the F-to-F training and endorse it.

- To select the responsible WUA members and assign them the responsibility to monitor and supervise implementation of the F-to-F training as per the action plan and assigned responsibilities.

- To Discuss and prepare the O&M and water allocation plan for the season and assign the responsibility to WUA members for proper and timely implementation.

- To Discuss the required amounts of inputs for the season, prepare the procurement plan, and coordinate actions for proper arrangements with the DTT.

- To Identify the institutional constraints and shortcomings and provide feedback to the DTT regarding WUA training needs to enhance the organisational capabilities of WUA.

Facilitators : DTT
Participants : Core FFS resource farmers of upper and lower reach and WUA officials (including four officials responsible to supervise the F-to-F training).
Venue : Pilot irrigation schemes.
Duration : One day in each scheme.

**Step 5: Training of Farmer Trainers (Facilitators) on Implementation Procedure and Technical Aspects**

Its objectives are to:

- discuss the seasonal plan developed by the core farmer trainers with other farmers;
provide technical training and guidelines to the core resource farmers on the procedures for implementation of the seasonal plan and farmer-to-farmer training on the sub-study plots and in the field channel command area;

provide technical refresher training on major aspects of irrigation and crop cultivation practices of seasonal crops intended to be grown during the season in the command area and on the study plots;

provide technical training on O&M and water distribution procedures relevant to the season.

Facilitators: DTT.
Participants: Selected core FFS resource farmers (5 each from upper and lower reach of each irrigation scheme) and WUA officials (4 from each scheme) responsible to supervise the F-to-F extension activities.
Venue: Nearest ASC under DADO.
Duration: Two days

Activities foreseen under Step 5 should be carried out after the seasonal planning endorsement of the work plan in the WUA working group meeting.

Step 6: Implementation of Seasonal Farmer-to-Farmer Training and Extension Activities

Procure inputs such as seed, fertilizer and pesticides;
Establish study plots at the upper and lower reach of the command area as venue to conduct the F-to-F training on crop and water management;
Facilitate implementation of the action plan developed at the planning stage by conducting individual sessions;
Provide regular backstopping support to the farmers (by the JT/JTAs and overseers) as required by the farmers and farmer trainers;
Provide backstopping support to the JT/JTAs and overseer, and monitor the progress (by SMS and engineer);
Ensure regular monitoring and supervision by the responsible WUA members and other stakeholders responsible for monitoring of field activities.
Provide regular feedback on the progress and constraints faced by the farmers in the individual FFS sessions and seek solution to the identified constraints.

Facilitators: Regular facilitation by Core FFS farmer trainers, JT and JTA, and occasional technical backstopping by the engineer and SMS (up to a maximum of four in a season)
Participants: Regular participants of the F-to-F extension (25 farmers each from upper and lower reaches)
Venue: In the selected command area and on the study plots of each upper and lower reach
Duration: Season long (as per the developed action plan under F-to-F training and extension activity)
Procedure for Conducting the Farmer-to-Farmer Training

Procedure for conducting the farmer-to-farmer training is the same as that adopted for the FFS. The only difference is that the trained members of the DTT facilitate the FFS, whereas the core resource farmers with support from the JT/JTAs and overseers carry out the F-to-F training. Senior members of the DTT monitor implementation of the programme activities and provide backstopping to the junior members and farmers.

The documentation procedure adopted for the FFS applies to the Farmer to Farmer training as well.

Field day: The field day is arranged at the time of crop maturity. The purpose of the field day is to demonstrate the outcomes and results of the various activities carried out in the observation plots as well as to observe results of the activities done in the FFS. A field day graduation ceremony is generally organised by awarding certificates to the participants. The field day activities also aim to motivate the non-participating farmers, local leaders and community based organisation for their cooperation and commitment in favour of the programme.

In the FFS and farmer-to-farmer training programmes, field day is a compulsory activity and needs to be reflected in the respective curriculum of the FFS and F-to-F training for each season.

The field day is organised jointly for the farmers involved in the FFS and farmer-to-farmer training. On the field day adequate arrangements are made to invite local leaders and majority of the farmers of the focused irrigation scheme in order to appraise them on the performance of introduced technologies and for further dissemination to other areas.

A typical proceeding of the field day is as follows:
- Opening session;
- Objectives, brief presentation of season long activities;
- Field visit to the field channel command area, and the main and F-to-F extension study plots;
- Discussion and feedback collection from farmers (participants of FFS and others) on the introduced/displayed technologies;
- Collection of feedback from local community leaders;
- Certificate distribution to the outstanding participant farmers of FFS and F-to-F training;
- Closing session
- Field day report preparation.

3.2.4 Farmer’s Observation Tour

Farmers’ observation tours are one of the effective tools for transferring on-farm water management and crop production technology to the farmers. These tours provide opportunity for farmers of one site to observe and exchange ideas about the impact of technology introduced in another site. These also contribute to confidence building among the farmers and change their attitude positively toward adopting technologies new to them.
The programme organises observation tours for the farmers of selected districts based on identified need. The tours could be intra- as well as inter-district depending on the need of the farmers.

Prior to the observation tour, a detailed proposal is prepared by the concerned DTT based on the needs of the farmers and WUA officials along with the objective and expected outputs from the visit, and submitted to the National Programme Coordinator for discussion and approval.

The detailed proposal on Farmers’ Observation Tour includes:
- Rationale of the observation tour
- Objectives
- Expected output
- Place(s) to be visited
- No of participants and accompanying DTT members
- Detailed programme and schedule of the visit
- Estimated cost of the visit

After completion of the observation tour, a detailed report is prepared by the concerned DTT members on the proceeding and outcome of the visit and submitted to the concerned authority. The report is also a prerequisite for clearance of expenditures incurred while conducting the observation tour.

3.2.5 In-Service Monitoring and Backstopping of Field Activities

In order to assess the progress and impact of the training and field activities implemented according to the comprehensive and seasonal work plans, a series of monitoring and backstopping visits are to be carried out from different levels through in-service monitoring and backstopping. It provides guidance to the field staff for efficient implementation of agricultural and irrigation improvement activities and ensures continuous flow of feedback from different levels that assist in streamlining the programme activities.

The results/feedback from monitoring should also be communicated to higher level stakeholders in order to allow constant adjustment and improvement in the strategy of the programme and in policy guidelines.

In-service monitoring and backstopping envisages the following visits during the course of implementation of seasonal activities:
- Monitoring visits by the Chief of IDDO/IDSDO/GWRDP and DADO;
- Monitoring visits by Regional Directors of DOI and DOA;
- Monitoring visits by the members of the National Execution Team;
- Monitoring visits by the members of the National Coordination Committee.
The seasonal activities undertaken in the selected schemes have to be monitored by the above personnel at least once in a season (except for the NCC members). Visits by NCC members are based on willingness of individual members. The DTT members should compulsorily accompany the visiting personnel in order to brief the nature and details of the activities implemented in the schemes and on the problems encountered.

After the visit, officials need to prepare a report as per the attached reporting formats enclosed in Annexes 7 and 8, incorporating the findings of the visit and suggestions/recommendations provided to the concerned DTTs, farmers and WUAs for improvement in the performance of programme activities.

In addition to the above visits, technical experts attached to the National Execution Team will closely monitor at regular intervals the progress and constraints of the activities as per the seasonal work plan. The experts will also provide technical support to the concerned DTTs in implementation of the targeted activities.

Professional staff members visiting the schemes will prepare a detailed field visit report incorporating all aspects of seasonal programme activities.

### 3.2.6 Workshops

In the OFWM programme workshops are considered an effective tool for transparent and efficient implementation of the programme in a coordinated way and with greater involvement of stakeholders. The workshops are also designed to discuss the achievements and constraints, and based on this, streamline the project activities to achieve the set goal and objectives. The various workshops foreseen under the OFWM programme from the site to the national level at various stages of programme implementation are presented below.

#### System Level Mass Meeting/Workshop (SLAM)

This one-day workshop is conducted immediately after site selection prior to actual launching of the programme. Its main objective is to sensitise the farmers, WUA officials and local leaders on the programme objectives and approach to planning and implementation. The workshop also seeks to obtain commitment from the farmers, WUA officials and local leaders and their active collaboration and participation in the programme activities as per the adopted approach and procedure. During this workshop, farmers are made clear about the arrangements of the programme including financial arrangements.

At the end of the workshop, farmers and WUA officials are asked about their willingness to participate in the programme, and programme activities are moved forward only if they are interested.

The detailed objectives, programme and procedure of SLAM are dealt with in Chapter 4.
District Level Workshops

Similar to the System Level Mass Meeting/Workshop, a one-day District Level Workshop is arranged to familiarise the concerned agencies functioning in the district on the programme objectives, approach and modality of programme implementation. This workshop also seeks to obtain commitment from the relevant line agencies on their cooperation and collaboration in smooth and timely implementation of programme activities in the selected schemes of the district.

Detailed objectives and programme of the workshop are provided in Chapter 4 under sub-heading 4.2.2.

Regional Workshops

Two types of regional workshops are foreseen under the OFWM programme. These are (a) a preparatory workshop and (b) a series of followup works.

The main objective of the Preparatory Regional Workshop is to discuss and agree on the institutional and other operational arrangements required for the success of the OFWM programme. It is organised prior to actual launching of the programme in each development region where programme is planned to be implemented.

The respective Regional Irrigation and Agriculture Directorate play the lead role in organising this workshop in consultation and coordination with the National Execution Team. This workshop is conducted after the preparatory national workshop discussed below.

The Specific Objectives of the Workshop are to review and agree on:

- the institutional setup at the regional level and define the role and responsibilities of implementers and related line agencies;
- the current status of the institutional setup and other arrangements including the formation of District Technical Teams in the selected districts and also review the specific responsibilities of each of the DTT members;
- arrangements for the Regional and District Coordination Committees including definition of the role and responsibilities of each of the committees as well as procedures to be followed in organising subsequent workshops;
- the monitoring arrangements of the programme activities by the regional and district level stakeholders and define the procedures;
- the immediate tasks and work schedule of districts for launching of the programme;
- the financial arrangements of the programme at the regional and district levels, including the budget flow and payment mechanisms.

Venue: At the regional headquarters of each of the region

Participants: Regional Directors of RID and RAD, District chiefs of respective IDDOs/ IDSDO’s/GWRDP and DADOs, entire members of DTT, representatives of relevant line agencies, members of the National Execution Team
Subsequent Regional Workshops: After the preparatory workshop, the other regional workshops will be arranged on a yearly basis after completion of each yearly implementation cycle of programme implementation, i.e., after completion of monsoon, winter and spring seasonal activities.

The main objective of the workshop will be to review the progress of the activities implemented in the various districts, identify the constraints and deviation from the initial targets (if any), and to streamline programme activities in line with the programme goal and objectives.

The specific objectives of these workshops are to review the:
- progress of programme activities by individual districts vis-à-vis the work plan;
- constraints and reson(s) behind deviation if any from the set targets and agree on strategy for further improvement;
- functional status of regional and district coordination committees, and measures to improve their functioning;
- organisation of the individual DTT, identify the constraints and discuss measures to remove the identified constraints;
- requirements of support services from other line agencies of the region and districts for smooth implementation of the programme in the coming fiscal year;
- the status of financial transactions related to programme activities, including due amounts to be settled, and suggest strategies for better financial management; and
- to provide policy guidelines for the preparation of a work plan for the forthcoming fiscal year in line with the programme goal and objectives and as per the directives from higher level agencies.

National Workshops

National workshops are foreseen to discuss and define the policy guidelines related to efficient, timely, and transparent management of the programme at various levels. As in the case of regional workshops, two types of national workshops are foreseen in the programme.

Preparatory National Workshop: This workshop is one of the first among all programme activities and precedes the preparatory regional workshop. The main objective of the workshop is to discuss and define the strategy, goal, objectives and approach of programme implementation. It also discusses the arrangements related to programme management, including the institutional setup at various levels and defines the role and responsibilities of each of them.

Specific Objectives
- To discuss the programme strategy, goal, objectives, approach and modality of the OFWM programme and make appropriate adjustments;
- To discuss the institutional arrangements of the programme at various levels and make appropriate adjustments;
- To discuss the programme support flow mechanism and roles and responsibilities of the various agencies, committees and teams to be involved in the programme at various levels and make appropriate adjustments;
To discuss the budgetary provisions of the programme and flow mechanism and make appropriate adjustment;
To discuss the project level work plan for the current fiscal year and endorse it.

**Venue:** At the national level
**Participants:** All central level stockholder and representatives of central level line agencies

**Subsequent National Workshops:** After the preparatory national workshop, the other national workshops will be arranged on a yearly basis after completion of each yearly implementation cycle of the programme, i.e., after completion of monsoon, winter, and spring seasonal activities and after completion of the second year regional workshop.

The main objective of the workshop will be to review the progress of the programme implemented during the fiscal year, identify the constraints and deviations from the set targets (if any), and to make adjustment in the programme strategy, management procedure and support flow mechanisms. The workshop also reviews the programme level work plan and arrangements for the forthcoming fiscal year for timely and smooth implementation of the programme activities.

Specific objectives are;
- to review the annual progress of the programme as per the annual work plan;
- to identify the constraints and deviations from the set targets and to discuss strategies for further improvement, and formulate policy guidelines for the forthcoming fiscal year;
- to review the functional status of various coordination committees at different layers of the programme, discuss the constraints and provide guidelines for improvement;
- to review the functional status of the programme support flow mechanism and the role and responsibilities of the various agencies, committees and teams involved in programme implementation at various levels, and make appropriate adjustments;
- to review requirements for support services from other line agencies for smooth implementation of the programme in the coming fiscal year and make adjustment in the coordination policy and guidelines;
- to review the programme work plan for the forthcoming fiscal year, make appropriate adjustments and endorse it.
- to review the financial status of the programme, budgetary provisions for the forthcoming fiscal year and make adjustment in the guidelines and norms.

While the venue is to be decided by the organisers in consultation with the participants the participants are the same as for the preparatory national workshop.
4.1 Selection of Irrigation Schemes

The ultimate goal of the OFWMP pilot phase is to transfer the experiences and lessons learned to wider areas both in small and large farmer managed irrigation systems in the Terai as well as in the hills. Hence success of the future OFWM programme will depend on proper selection of irrigation schemes to be brought under the umbrella of the programme.

Since the support modality of the OFWM programme is based on a participatory approach, it is essential that the beneficiaries extend their full support and collaborate with the programme from the beginning till the end. Also, outcome of the OFWM interventions could be tangible only in those schemes where potentials exist for improvement.

Thus while selecting irrigation schemes a thorough analysis has to be done based on the minimum criteria adopted for site selection. It is mandatory the candidate irrigation schemes for selection should pass the various selection criteria so that real issues related to OFWM could be addressed adequately as per the need of the beneficiaries.

4.1.1 Irrigation Scheme Selection Criteria

In selecting irrigation schemes, criteria based on technical suitability, accessibility, farmers attitude towards the programme, willingness of agencies working in the districts to cooperate in the programme, and potential for OFWM improvement have been developed.

The selection criteria that are used are given in Table 2. These criteria are listed in order of importance given to specific selection parameters.

Table 2: Criteria for Selection of Irrigation Schemes under OFWM Programme

<table>
<thead>
<tr>
<th>Selection Parameter</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical suitability</td>
<td>□ Farmer managed irrigation scheme</td>
</tr>
<tr>
<td></td>
<td>□ Main system (intake and main canal) in satisfactory operating condition</td>
</tr>
<tr>
<td></td>
<td>□ Scheme size: 100-600 ha for Terai surface irrigation scheme (40-300 ha for hill surface irrigation schemes 20-80 ha for ground water scheme)</td>
</tr>
</tbody>
</table>
Guidelines for Institutional Arrangements, Training, Irrigation and Agriculture

Production Improvements under On-Farm Water Management Programme

<table>
<thead>
<tr>
<th>Selection Parameter</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility</td>
<td>□ Reasonable ease of access since selected irrigation schemes are to be intensively supported</td>
</tr>
</tbody>
</table>
| Motivation of farmers | □ Farmers motivated and willing to cooperate and contribute to OFWM improvement works  
□ No major/potential social and political tension to divide the farmers and WUA  
□ Socio-economic condition of the users relatively homogeneous |
| Institutional support | □ DDC and VDC conform to the selection of the scheme  
□ Willingness and cooperation from technical staff of IDDO/IDSDO/GWRDP and DADO  
□ Assurance for the assignment of field level technical staff from IDDO/IDSDO/GWRDP and DADO to the programme  
□ Availability of facilities for farmer training in the vicinity such as agricultural service centre and sub-centre (ASC/ASSC) |
| Potential for OFWM improvements | □ Clear benefit expected from OFWM improvement works, such as:  
□ expansion in irrigated command area  
□ expansion in the area under crops and crop diversification  
□ improvement in cropping intensity  
□ improvement in the yield level of crops |
| Others              | □ Irrigation system command area not under the Agriculture Perspective Plan (APP) Pocket in order to avoid duplication of inputs/efforts. |

### 4.1.2 Irrigation Scheme Selection Procedure

Prior to selection of pilot irrigation schemes the OFWM Programme constitutes a survey team comprising members of the National Execution Team, and technical personnel from the District Irrigation and District Agriculture Development Offices of the concerned district. Before proceeding to the sites, the survey team receives orientation on a systematic surveying process developed based on the criteria for selection of irrigation schemes.

Using the systematic surveying process, the team conducts a field survey of the potential irrigation schemes.

Following is the stepwise process to be followed by the survey team for the selection of schemes in a particular district.

- Explain objectives of the OFWM Pilot Programme and the purpose of survey to the concerned IDDO/IDSDO/GWRDP and DADO staff.
- Collect relevant information from the IDDO/IDSDO/GWRDP on irrigation schemes rehabilitated in the district.
- Assess the irrigation schemes proposed by the IDDO/IDSDO/GWRDP against the technical suitability and accessibility criteria together with the technical personnel of IDDO/IDSDO/GWRDP and DADO and narrow down the list of schemes for detailed survey.
- Conduct field verification and collect further information through walk through/survey and meetings.
- Analyse the collected information about irrigation schemes against the selection criteria and identify suitable irrigation schemes. Upon identification of the irrigation scheme that passed through all the criteria, the survey team should seek confirmation of IDDO/IDSDO/GWRDP and DADO. Those identified to be the best within the technical and
administrative capabilities, and resources of IDDO/IDSDO/GWRDP and DADO are selected for implementation as pilot schemes. Further confirmation on the selected scheme is done with the representatives of DDC and VDC.

4.2 Sensitisation

Before starting implementation of on-farm water and agriculture improvement in the sites, some preparatory activities such as district level workshop and scheme level mass meeting are organized in order to ensure smooth, transparent and efficient implementation of the OFWM Programme with active involvement of the targeted beneficiaries and local support agencies.

4.2.1 Awareness Raising

A one day scheme level awareness meeting is organised in each selected scheme in order to sensitize the WUA functionaries and user farmers about the objectives and implementation approach of the OFWM Programme, ensure their active participation in its activities, and seek support from grass-roots level leaders in the command area of the selected irrigation scheme.

The meeting is conducted with the following objectives.

- To disseminate the objectives of the OFWM Programme and its implementation approach among WUA functionaries and user farmers of the scheme.
- To achieve commitment from the farmers, WUA officials and local leaders for active collaboration and participation in the programme.
- To select farmers in consultation with WUA functionaries who would participate in season long participatory training activities through the Farmers’ Field School (FFS).

Program

- Overview of system level mass meeting by DTT members;
- General mass discussion on current status of irrigation (system and farm level as well as functioning of WUA) and agricultural production (CP, CI, crop productivity) practices adopted in the scheme and awareness building on the need for further improvement based on the gaps observed by the DTT members;
- Deliberations on OFWM objectives and approach of OFWM-PP and its relevance to the current status of the irrigation scheme by the DTT members;
- Obtaining commitment from the farmers, WUA officials and local leaders to active participation and collaboration in the planning and implementation of programme activities;
- Selection of participant core farmers for FFS Training by WUA;
- Discussion and preparation of a seven-day schedule for Comprehensive programme planning on irrigation and agricultural production improvement as well as planning for F-to-F training and extension, by the –DTT, WUA and farmers;
- Wrapping up.
4.2.2 District Level Workshop

To disseminate the objectives of the OFWM Programme and its implementation approach among the functionaries of DDC and line agencies working in the districts as well as to seek support and co-operation from them in programme implementation, a one day district level workshop is organised in each selected district.

Objectives
- To introduce the objectives and approach of the OFWM Programme among the district line agencies;
- to share experiences on OFWM activities and impact from other supported districts in the past; and
- to discuss about areas of support needed from line agencies and to seek support from them for smooth implementation of the programme.

Program
- Briefing on the objectives of the OFWM Programme and the approach to programme implementation, by the OFWM-DTT personnel.
- Gathering of opinion of selected WUA members/farmers about the respective scheme on OFWM programme and expression of their commitment;
- Deliberation on areas of support and co-operation expected from district level line agencies, such as IDDO/IDSDO/GWRDP and DADO.
- Discussion.
- Wrap-up.
Participants

A. Core participants (participant whose involvement is essential in the programme)
   - Local Development Officer
   - Chief of Irrigation Development Division/Sub-Division
   - Chief of DADO
   - Chief of ADBN
   - Chief of AIC (Seed and Fertilizer Companies)
   - Chief of District Women Development Branch
   - Representatives of W UA/farmers (2 from each site)

B. Participants (who will be directly or indirectly supporting the programme)
   - Chief, District Officer
   - Chief, District Land Revenue Officer
   - Chief, NARC Station (Nearest) in the district
   - Chairperson, District WUA Federation
   - Chairperson, District Agri. Committee
   - Engineers, Irrigation Development Div./Sub-Div.
   - SMS, DADO
   - Overseers, Irrigation Development Div./Sub-Div.
   - JT/JTA, DADO
   - AO, Irrigation Development Div./Sub-Div.

C. DTT Members
   - Engineer
   - SMS
   - Overseer
   - JTA
5.1 Purpose of Participatory Planning and Implementation

- Sensitise the WUA/farmers about the existing problems and participatory solution;
- Select appropriate technology or elements of technology that addresses the identified needs and problems;
- Ensure quicker adoption of introduced technologies by encouraging farmers’ involvement from the very initial stage of need identification, programme planning, implementation, monitoring and evaluation;
- Ensure ownership and sense of responsibility towards the improvement works intended to be introduced.

5.2 Benchmark Survey

It is extremely important to collect scheme level baseline data from each irrigation scheme to establish the initial characteristics and performance of the irrigation scheme prior to implementation of the OFWM programme. Base line data should be collected at the scheme and at the household levels in each irrigation scheme selected for support.

Scheme level base line data should include:
- Characteristics and performance of physical and structural system;
- Characteristics and performance of social, institutional and irrigation organisation;
- Characteristics and performance of operation and maintenance and resource mobilisation;
- Characteristics and performance of agricultural systems

Household level baseline data should include:
- Farmers' perceived benefit from irrigation
- Agricultural production, inputs use and cost of production
- Household income and gross and net return from farming

The OFWM DTT will complete collection of the baseline data both at the scheme as well as household level before starting the first seasonal activities. Among the personnel of OFWM
DTT, the engineer and overseer are expected to be more involved in scheme level baseline data collection while the SMS and JT/JTA will be more involved in the collection of household level baseline data.

Format for collecting baseline data are presented in Annex 9.

5.3 Participatory Appraisal and Planning for Irrigation Improvement

Two problems are mainly faced in irrigation schemes. One of the common problems is inadequacy of irrigation water in some or whole part of the command area during certain season or in the whole year. Another problem could be availability of excess water in some or whole part of the command area during certain season or during the whole year with potential danger of water overuse. To identify the issues, constraints and problems related to water management, a thorough diagnostic observation and analysis is a prerequisite for proper planning of activities to improve water management in the scheme. Participatory diagnostic evaluation and analysis would be an appropriate tool for this purpose. Some of the key aspects and approach to be followed in a participatory diagnostic evaluation and analysis of water management aspects are given in Annex 10.

5.3.1 Participatory Planning Procedures

Strengthening of Water User’s Association

Objective: Defining targets for strengthening of the Water Users Association

Output 1: Setting targets for the functions and tasks of the WUA
Exercise: What do we expect the WUA to do?; What does the WUA expect of their tasks? (define FFS Ballot Box exercise)

Output 2: Preparing a Sketch Map
- indicate irrigation, drainage and road systems with salient features and divide the area in sub-blocks,
- determine the area and number of farmers in each block,
- identify FFS farmers in different blocks

Output 3: Preparing a Water Distribution Plan
Evaluate problems in water distribution and prepare a water distribution plan.
- identify areas which are receiving inadequate water
- evaluate water control for each block: division structure or off-take gate
- who regulates the discharge to each block/to each farm?
- evaluate if water supply to each area is proportional to size of the area
  - Water supply is: time X discharge: (empty bottle with small and big neck)
  - Is rotational supply applied? (are canals closed and opened for certain times?)
Is proportional distribution applied? (rice):
Is time allocation to each block in proportion to the size and discharge?
Is the discharge opening equal to size of the area?
establish who is receiving water first and for how long, how will it be for the next recipient, and so on.
can agreement be reached on irrigation at a fixed day of the week?

Output 4: Preparing a Maintenance Plan
Assessment of problems in the irrigation system, which require maintenance:

- list of canal sections which require cleaning, desilting, or realignment
- list of structures which require repair or adjustment
- Identification of amount of work for each maintenance job
- Allocation of tasks to individual farmers
- Fees und penalties to be levied.

Output 5: Preparing an Irrigation Improvement Plan
- Assessment of potentials for improvement:
  - Canal extension
  - Canal improvement
  - Regulating structures
  - Crossing structures
- Prioritisation and estimate of costs
- Determine financing of works to be done and contribution by each member

Output 6: Preparing a Drainage and Flood Protection Plan
- Drawing areas with water logging problems
- Drawing the existing drainage system
- Identifying ways to facilitate drainage at field and system level
- Assessment of flooding and bank erosion problems
- Cost estimates of works to be done and prioritisation
- Determine financing of works to be done and contribution by each member

Output 7: Preparing a Crop Intensification Plan
- drawing the present crop calendar
- mapping the area cultivated in the winter, spring and summer seasons
- identifying new crops to be grown
- identifying potentials for extension of irrigated areas for each season
- identifying constraints (water, seeds, inputs, credit, labour)

Output 8: Preparing a Crop Improvement Plan
- Identify crops for which an improvement plan is needed
- Identify demonstrations of improved practices together with the SMS and FFS
- Ascertained quantities of inputs required
- implementation of FFS
Output 9: Joint Procurement of Inputs (seeds, fertilizers) or Marketing of Produce
- Define which inputs are required for the cropping plans
- Identify suitable suppliers and prices
- Identify transport requirements
- Work out financing and contribution of each farmer
- Determine which produce could be marketed jointly

Output 10: Record Keeping
- Define which records should be kept
  - expenditures made by WUA and financial contributions of each farmer
  - water supply schedule and water received by each farmer
  - contributions in cash and kind for maintenance works by each farm household
  - contributions in cash and kind for irrigation and drainage improvement works by each farm household
  - cropping plan and areas under various crops, and agreed allocation of water
  - Financial management of procurement of supplies and marketing of produce
  - collection of relevant production figures from each farm household
- Identify assistance required in setting up a reliable book keeping system
- Opening and auditing of bank accounts

Output 11: Organisational Structure
- Identify the required organisational structure to implement the various identified tasks
  - Executive Committee (Chair, Secretary, Treasurer)
  - Sub-committees (Water distribution, Maintenance and Repair, Agriculture)
  - Block representatives
- Identify the consultation process and election procedures
  - identify frequency of meetings and farmers consultations
- Identify registration and legal status

Output 12: Rules and Regulations
- Identify rules and regulations for each task and responsibilities between the different office bearers, sub-committees and block representatives

5.3.2 Diagnostic Planning Process

There are five exercises of the diagnostic and seasonal planning activity which are as follows.
- Participatory assessment of irrigation and drainage layout mapping exercise.
- Participatory assessment of farm irrigation technologies and practices: transect walk with ballot box questions
- Problem identification and prioritisation
- Identification of solutions and appropriate technologies
- Preparation and presentation of overall and seasonal planning
Irrigation and Drainage Layout Mapping

Before discussing possible improvements in on-farm water management, it is important to conduct, with farmers’ participation, an assessment of the present on-farm water management situation, constraints farmers are facing, and potentials of certain technologies and practices which will improve water control for better crop production. The assessment starts with a mapping exercise. During the mapping exercise an assessment is made of the conditions of the irrigation and drainage system.

Objectives

- To identify and locate the present irrigation and drainage system
- To define irrigation command areas and irrigation units (blocks).
- To group farmers according to the irrigation sub-units (blocks).
- To define present land uses in relation to on-farm water management, soil and geomorphic conditions.

Expected outputs

- An irrigation map of the area indicating the layout of the irrigation system, location of intake, irrigation pumps, wells, structures, canals, rivers and drainage system.
- Extent of irrigated areas
- Farmers grouped according to irrigation sub-units (blocks).
- An analysis of constrains and potentials of the on-farm water management situation.

Preparations required: A sketch map of the command area that indicates the main characteristics of the area: village(s), roads, rivers, main canals, characteristic points and FFS meeting place.

Materials required

- Pre-prepared sketch map.
- Example of an irrigation and drainage layout map prepared by farmers
- Large sheets of paper.
- Coloured markers.

Time required: Two-and-a-half hours

Timing: Few weeks prior to the start of the season

Procedure (Steps):

Step 1. Explain the specific objectives and expected output.
Step 2. Present the pre-prepared sketch map of the area.
Step 3. Ask each farmer to mark the location(s) of his or her field(s) on the map.
Step 4. Identify the various sub-irrigation units.
Step 5. Group the farmers according to location of their fields in different subirrigation units.
Step 6. Present the drawing materials: paper, coloured pens, and show an example of an irrigation map prepared by farmers.
Step 7. Ask each group to make a detailed map of their sub-irrigation unit indicating the intake(s) to the irrigation unit, location of possible irrigation pumps, wells, structures, canals, drainage and water flow directions.

Step 8. In case the farmers are unable to finish the map during the session, ask them to complete it at home and present it during the next session.

Step 9. Ask the different groups to present their maps

Step 10. Combine the different maps into one big map for the entire area and discuss the final product.

Step 11. Ask the farmers to indicate flooding areas, irrigation areas, and areas where irrigation can be extended.

Step 12. Take care that the map will be preserved well (framed and/or protected with plastic) for further use during the following FFS sessions.

Check lists/questions for discussion during the Mapping Exercise are listed in Annex 11.

**Transect Walk With Ballot Box Questions**

Before discussing possible improvements in on-farm water management, it is important to conduct, with farmers’ participation, an assessment of the present on-farm water management practices, define constraints faced by the farmers, and identify technologies and practices to improve water supply or to increase irrigated areas. During the transect walk the assessment focuses on farmers’ knowledge in relation to the irrigation and drainage situation and their ideas for improvement.

**Objectives**

- To review farmers’ knowledge about the irrigation and drainage systems in the area, and constraints and potentials for further improvements.

**Expected Outputs**

- Assessment of farmers’ knowledge and priorities in relation to on-farm water management.
- A list of identified potential improvements in relation to identified on-farm water management problems.

**Preparations required**

- A few days in advance, conduct, with the local extension officer, a one-day field visit in the area to identify locations representing interesting (learning) elements, constrains and/or areas of potential improvement related to the existing irrigation and drainage systems
- Design a course for transect walk (1-2 km long) passing most of the identified locations.
- Develop ballot-box questions related to the identified learning elements, constrains and potential improvement areas.
- Prepare the ballot-box boards and place them in the field along the route of the transect walk.
- Prepare numbers for the participating farmers
Materials required

- Pieces of cardboard or folders
- tape, rubber bands, markers, thread, thumb tacks
- Bamboo sticks.

Time required: Two hours

Timing: After completion of the mapping exercise.

Procedure

Step 1. Explain the specific objectives and expected output.

Step 2. Split the farmers into small groups of 4-5 persons. Use the groups as already formed.

Step 3. Inform the farmers about the course and procedure for the ballot box:
   - The small groups walk along the indicated course.
   - On the route, questions will be found written on a board attached to a stick on the ground, related to specific situations in the field.
   - Each group will discuss the question and select the right answer from three indicated answers (A, B or C) on the board.
   - Each group will drop its number in the ballot box with the letter corresponding with the answer it has selected.
   - They will proceed to the next question, etc., until they have completed the transect walk and have answered all the questions.

Step 4. Explain the course to follow using the map prepared by the farmers.

Step 5. Before starting the transect walk ensure that all farmers have understood what is expected from him or her and ask if there are no further questions. Give each group a set of numbered voting coins.

Step 6. Allow each group to start with the transect walk with intervals of 10 minutes.

Step 7. As facilitator, follow the last group and assist the groups where needed.

Step 8. Process the results of the ballot-box questions, if possible by walking the same route again with the entire group and discuss the questions on the spot.

Step 9. Ask the first group what their answer was on the first question and why they have selected that answer. Ask the other groups for their comments on the question and selected answer.

Step 10. Go to question two, ask the second group how they have answered the question, why, and ask comments from the other groups. etc.

Step 11. Summarise the main points mentioned during the discussion in the field and back at the meeting place.

Guidelines for formulating ballot box questions are presented in Annex 12.

Identification And Prioritisation of Irrigation Related Problems

The FFS should only address those problems that farmers have experienced regarding on-farm water management, and introduce only appropriate technologies and practices that will improve
their water management. It is therefore important that during the diagnostic and seasonal planning farmers identify and prioritise their main problems in on-farm water management as well as identify potential solutions and appropriate technologies and practices. Based on the results of the discussions a plan can be made for the introduction and demonstration of water management improvement and to address the related learning needs through the FFS.

**Objectives**
- To identify and list the main shortcomings and constrains farmers’ experience in their onfarm water management, existing irrigation and drainage systems.

**Expected outputs**
- Lists of identified shortcomings farmers’ experience for each of the six categories:
  - Water sources
  - Irrigation system improvements
  - Crop water management
  - Drainage and Flood control
  - Water Users Association (WUA)
  - Crop management
- A priority list of problems in relation to on-farm waters management which farmers would like to address during the FFS.

**Preparations required**
Based on the results of the mapping and transect and ballot box exercises prepare a first analysis of what farmers experience as their main problems for each of the five categories.

**Materials required**
- Irrigation and drainage layout map prepared by the farmers.
- Results of the ballot box questions.
- Large sheets of paper and markers

**Time required:** Two hours

**Timing:** After preparation of map and discussion of ballot box questions.

**Procedure:**
Step 1. Explain the specific objectives and expected output.
Step 2. Ask the farmers to mention for each of the six on-farm water management related categories (Water sources, Irrigation system improvements, Crop water management, Drainage and food control, water Users Association (WUA) and crop production), all the problems they experience and group the mentioned problems for each category on a large sheet of paper.
Step 3. Ask the farmers to recall the problems already observed during the mapping and transect/ballot box exercises and include them in the list of problems.
Step 4. Discuss briefly all the problems mentioned. Where possible reduce the list.
- If some of the problems mentioned, although described in different ways, are related to one and the same problem, select one covering description and take out the others.
Reduce the list to only those problems that are affecting most of the participating farmers and not only a few individuals.

Step 5. Split the participating farmers into small groups of 4-5 persons.
Step 6. Assign to each group one or two of the problems listed and ask the groups to identify and discuss the cause(s) and impact of the problems.
Step 7. Ask all the groups to report the identified cause(s) and impact(s) in one prepared table on a large sheet of paper.
Step 8. Discuss the different causes, problems and identified impacts.
Step 9. Discuss with the farmers if the produced list represents the main problems they have experienced in on-farm water management and if the farmers would like to address that problem during the FFS.

Questions for discussion
- Are there descriptions of problems on the list which represent one and the same problem or overlapping each other?
- Which of these problems listed do represent the main problems in the area?
- Do they affect most of the farmers in the community?
- Which of the listed problems would you like to see addressed during the FFS?
- What causes these problems?
- What impact does this problem have on the crop yield, farm management, etc.?

Identification of Solutions and Appropriate Technologies

The next step after identifying the main shortcomings and constraints is identification of potential solutions and/or appropriate technologies and practices to address them. It is therefore important that during the diagnostic and seasonal planning activity farmers together with the facilitators continue to identify potential solutions and appropriate technologies and practices to address the main shortcomings and constraints identified. In comparing the identified improvements, the costs and resources needed to implement those improvements should be identified, and a basis for prioritisation.

Objectives
- To identify solutions to the problems and appropriate technologies, which will be introduced and implemented during the FFS.

Expected outputs
- A list of possible solutions to the identified main problems in each of the five categories.
- A list of appropriate technologies identified to improve on-farm water management.
- For each of the improvements proposed, the expected benefits in terms of water saving, increased irrigated area and agricultural production.
- For each of the technologies and practices specification of inputs and resources required
- A priority list of solutions and/or technologies in relation to on-farm water management which farmers would like to learn more about during the FFS.

Preparations required
Try to identify at least one solution for each of the main problems identified.
**Materials required**
- Irrigation and drainage layout map prepared by the farmers.
- List of identified main problems
- Large sheets of paper and markers

**Time required:** Two hours

**Timing:** After identification of the main problems.

**Procedure**
Step 1. Explain the specific objectives and expected output. Recall the list of identified shortcomings and constraints.
Step 3. Split the participating farmers into small groups of 4-5 persons. Divide the listed shortcomings and constraints among the different groups.
Step 4. Ask each group to discuss, for each of their assigned shortcomings and constraints, possible solutions they know or have thought of, and to write the identified solutions on a large sheet of paper.
Step 5. Ask each group to present the results of their discussion.
Step 6. Discuss with the farmers the presented solutions to the assigned shortcomings and constraints.
Step 7. Introduce for discussion possible additional solutions and/or appropriate technologies to further improve the on-farm water management.
Step 8. Ask the farmers to go back to their groups and to discuss for each identified solution to the shortcomings and constraints assigned to the group, labour and financial requirements as well as the responsibility for implementation.
Step 9. Ask the groups to list the results of their discussion in a table on a large sheet of paper.
Step 10. Ask the groups to present the results of their discussion
Step 11. Ask the farmers to compare the requirements as well as expected impacts of the solutions and try to decide which solution would be the most appropriate one for each of the identified shortcomings and constraints.
Step 12. Prioritise solutions and technologies and practices, which can be realistically introduced in one season, and define plans and requirements for long term solutions.

**Questions for discussion**
- Have potential solutions been mentioned during the mapping and transect walk exercise for each of the main listed problems?
- Have you already tried to solve each of the main problems, and what were your experiences?
- Do you know of some other possible solution(s)?
- What do you think of the possible solutions mentioned?
- Are the possible solutions mentioned for you realistic?
- Would you like to try out one of the mentioned solutions? Which one?
- What needs to be done to implement the proposed solution, technology, or practices?
- What are the inputs needed?
Do farmers have to invest money?
Is credit needed?
What kind of outside support is needed?
Will it earn enough to pay for the investment?

5.4 Participatory Appraisal and Planning for agriculture Improvements

One of the objectives of on-farm water management is to maximise benefits from irrigated agriculture through diversification of cropping pattern, introduction of appropriate combination of crops and production packages. To plan and implement crop production improvements in the irrigated command area, a diagnostic approach should be followed analysing the most critical indicators, viz., cropping pattern, cropping intensity, cropping calendar and irrigated crop yields.

5.4.1 Cropping Pattern and Cropping Calendar

Diversification of cropping pattern and intensification of the cropping plan is an essential means to increasing agricultural production per unit of irrigated area. It can be achieved by introducing/diversifying and expanding the irrigated area for a second and third cropping season. Solutions to achieving an intensification of the cropping plan can be identified for two conditions of water availability:

- If sufficient water is available for a second and third cropping season the following should be followed:
  - Analysis of the existing cropping pattern and cropping calendar and identification of the potential to diversify/introduce suitable crops under the prevailing socio-economic condition of the farmers and climatic variations;
  - Assessment of present crops and crop varieties and identification of constraints and potentials to shorten the cropping season;
  - Assessment of water management practices, constraints and options for optimisation, including suitable irrigation and drainage practices;
  - Identification of possibilities to reduce cultivation and harvest period.

- If insufficient water is available efforts should be concentrated on more efficient use of irrigation water by:
  - Reducing crop coverage requiring frequent irrigation (such as rice) during water scarce periods and introducing crops with low irrigation requirements;
  - Reducing water losses, excessive and uncontrolled water off-takes particularly in head reach of the system. Identification of options for increasing supply through alternate irrigation facilities such as shallow and deep tubewells.
  - Introduction of rotational supply of irrigation water based on the crop water requirement at different crop growth and development stages.
5.4.2 Irrigated Crop Yields

Evaluating yield levels of the crops represented in the cropping pattern provides an indication of the potential to increase crop performance in the irrigated area. Improvement in crop productivity and production per unit area in a given season requires analysis of the following factors:

- Existing status of crop yield and gaps between attainable and actual yield currently harvested by the farmers;
- Level of adopted crop cultivation practices by the farmers including crop varieties and seeds and potential for improvement;
- Level of adopted field irrigation methods and land preparation techniques and potential for improvement;
- Condition of field drainage and water logging and potential for improvement.

5.4.3 Product Marketing

The following analysis should be done together with farmers to improve the marketing of farm products:

- Marketing potential of the crops represented in the cropping pattern
- Existing marketing linkages and potential for improvement
- Price fixation mechanism and marketing procedures and potential for improvement
- Level of marketing skill among the farmers and potential for improvement.

5.4.4 Stepwise Procedures for Planning of Agriculture Production & Productivity Improvements

A general programme planning meeting is called in consultation with WUA officials and user farmers, ensuring adequate representation of male and female farmers in the meeting from each branch canal or head, middle and tail reach of the irrigation scheme. During the general information gathering and walk through no limitations are imposed on farmer participation. However, during further planning exercise only active farmers from each branch canal, or head, middle and tail reach of the system, are mobilised. While selecting the farmers it is ensured that they regularly participate in each gathering throughout the planning period. The number of farmers for the intensive planning exercise is kept at the limit of 50-60. This number of farmers is convenient for various group exercises and easier to manage.

A. General Information gathering

Step 1. Conduct walkthrough in head, mid and tail end of the command area dividing the farmers in sub-groups.

Step 2. Collect general information on soil type, land use, cropping pattern, level of crop management practices adopted by the farmers, disease and pest problems, irrigation methods and practices adopted in head, mid and tail end of the scheme.
Step 3. Discuss and facilitate in the preparation of seasonal calendar by the farmers on seasonal temperature variation and rainfall pattern etc experienced by the farmers.

Step 4. Conduct gender analysis with emphasis on involvement of male and female farmers in agricultural production activities.

B. Participatory Analysis of Existing Cropping Pattern and Cropping Intensity and Optimisation of Cropping Pattern

Step 1. Duly prepare the cropping pattern and cropping intensity analysis format (as per Table 3) on brown or white paper in Nepali version.

Step 2. Divide the farmers in sub-groups as per their representation from head, middle, and tail reach of the irrigation scheme. Under ground water scheme the sub-groups can be formed as per convenience. While dividing the groups it is ensured that adequate representation of female farmers is made in each groups.

Step 3. Facilitate the farmers of each sub-group to select a group leader, who can at least read and write.

Step 4. Facilitate each sub-group to list down the crops presently grown during each season, i.e., monsoon, winter and spring, along with area coverage under each crop. Listing down of the crops under each season as per the crop coverage should be in descending order based on the present area coverage.

Step 5. After listing down the crops by each sub-group along with crop coverage, facilitate them to prepare crop calendar based on actual timing of major cultural operations, viz., seedbed preparation, transplanting, intercultural operations and harvesting. Ensure that the interval of each cultural operation and overlapping is clearly shown through two way arrows.

Step 6. Explain to the farmers in practical terms the meaning of cropping intensity taking the example of the average land cultivated by the individual farmers and facilitate the sub-groups to calculate the cropping intensity using the formula:

$$CI \% = \frac{Area(\text{monsoon}) + Area(\text{winter}) + Area(\text{spring})}{Area(\text{Total})} \times 100$$

Step 7. Facilitate the leader of each group to present the outcome of the exercise in the plenary

Step 8. Discuss in the plenary the present status of cropping pattern, cropping intensity and cropping calendar, and identify potentials for introduction of new crops and need for crop diversification.

C. Participatory Analysis of Gross Margin

Step 1 Divide the farmers into various sub-groups each with 3-4 members. There are as many farmer groups formed as the number of crops grown in the monsoon, winter, and spring seasons according to the existing cropping pattern.

Step 2. Provide the benefit-cost analysis format (Nepali version) to each sub-group prepared on brown or white paper as illustrated in Table 4.

Step 3. Orient each sub-group on the parameters, unit, rate and procedures based on which the benefit-cost analysis is done. The analysis is done on crops currently included in the cropping pattern as well as on some other crops that could be potentially introduced.

Step 4. After completion of the group exercise, facilitate the group leaders to present the findings of benefit-cost analysis in the plenary.
Step 5. initiate discussion on the presented data by each sub-group, make amendments, and finalise the cost-return data corresponding to each crop.

Step 6. Carry out a comparative analysis of the gross margin/net benefit and benefit-cost ratio of the crops and sensitise the farmers on the economically beneficial crops that need to be promoted in future.

D. Matrix Ranking of the Crops Included in the Cropping Pattern

Step 1. Prepare the matrix ranking table on brown or white paper in Nepali version as illustrated in Table 5, on the basis of which prioritisation of crops will be done. Ranking of the crops is based on the maximum score equal to the total number of crops grown in a season. For instance, if the total number of crops grown (only irrigated crops) is 6, then the highest score under each parameter would be 6.

Step 2. Initiate ranking of the crops in the plenary discussion taking as base each parameter included in Table 5. After ranking the crops based on the 1st parameter, move to the second, third, and so on. At the end, sum up the individual scores assigned in ranking under each parameter to obtain the total score under each crop.

Step 3. After completion of the ranking exercise, prepare an overall table listing the crops on a priority order based on the total scores.

Step 4. Conduct a comparative analysis through group discussion on the prioritised crops based on the total score and sensitise the farmers on the need to increase the area coverage of prioritised crops in the irrigation scheme.

E. Optimisation of Cropping Pattern and Crop Calendar Based on the Crops Prioritised by the Farmers

Step 1. Divide the farmers in sub-groups according to their representation from head, middle and tail reach of the system.

Step 2. Facilitate the farmers of each sub-group to identify average cultivated area owned by the farm household.

Step 3. Motivate and facilitate the farmers of each sub-group to prepare seasonal and annual crop coverage plan under identified cultivated area in a priority order for the crops ranked by the farmers.

Step 4. Facilitate the farmers to develop overall improved/alternate cropping pattern respectively for the head, middle and tail reach of the scheme based on available irrigated cultivated area and develop the crop calendar as per the format used in cropping pattern analysis (Table 3).

Step 5. Orient the farmers on various possible crop rotations taking into account factors such as morpho-physiological characteristics of the crops, nutrient depletion by the crops, disease and pest occurrence, etc., and motivate them for adoption.

F. Design and Implementation of Cropping Pattern Demonstration based on improved/alternate cropping pattern

Step 1. Discuss in the plenary the objectives, procedures and expected outcome from the cropping pattern demonstration (CPD) to be conducted on improved/alternate cropping pattern.

Step 2. Motivate WUA officials and farmers in the plenary to select at least 9 interested farmers (3 each in head, middle and tail reach of the irrigation scheme) for regular participation in CPD conducted in each season throughout the year.
Following requirements should be met by the farmers for participation in CPD:

- The participating farmers of each reach should be holding land within the same field channel command area so that crop specific irrigation management could be carried out efficiently.
- Farmers should be responsive towards adoption of improved cultivation and water management practices.
- Farmers should be willing to spare land without any cost or compensation and to implement the elements of technologies upon advice of the technicians.

**Step 3** Facilitate the farmers to develop the cropping plan and schedule of crop cultivation practices of the seasonal crops included in CPD.

**Step 4.** Facilitate the participant farmers in the assessment of input requirement and in the preparation of a procurement plan based on the schedule of crop cultivation practices.

**Step 5.** Prepare a schedule of technical backstopping and monitoring of cropping pattern demonstration by DTT members.

### G. Participatory Analysis of Crop Productivity and Planning for Improvement

#### Crop Productivity Analysis

**Step 1.** Prepare the crop productivity analysis table (illustrated in Table 6) on brown or white paper.

**Step 2.** Facilitate the farmers to list down in the second column seasonal crops prioritised by them and included in the improved/alternate cropping pattern.

**Step 3.** Facilitate the farmers to enter yields of the listed crops presently harvested by the farmers in the scheme in Column 3. In case of potential crops that are not yet grown by the farmers, use the average productivity of the crops grown in the other areas of the district.

**Step 4.** List down in Column 4 attainable yields, which could be obtained by the use of improved crop management and irrigation practices. The attainable yields could be taken from DOA/NARC recommendations made out from various farmers’ field trials/demonstrations or the average yield usually obtained by progressive farmers in the district.

**Step 5.** Facilitate the farmers to identify the gap between attainable and presently harvested yield.

**Step 6.** Discuss possible reasons behind the yield gaps and list these in Column 5.

**Step 7.** Sensitise the farmers about the need to improve crop and irrigation management practices in order to minimise yield losses presently borne by the farmers.

### H. Participatory Analysis of Crop Cultivation Practices (Farmer’s vs Improved)

**Step 1.** Prepare the format for crop cultivation practices analysis on brown or white paper (as per Table 7).

**Step 2.** Divide the farmers into various sub-groups each comprising 3-4 farmers. The number of groups formed should be in accordance with the number of seasonal crops represented in improved/alternate cropping pattern. Adequate representation of female farmers is made in each sub-group.

**Step 3** Facilitate the farmers of each sub-group through group exercise in listing down in Column 3 the elements of farmers adopted crop management practices corresponding to each crop. Ensure that the list of cultivation practices corresponds with the components mentioned in Column 2.
Step 4. Upon completion of the group exercise, facilitate the leader of each sub-group to present in plenary the outcome. The plenary then discusses the outcomes of all sub-groups and updates and validates the information presented.

Step 5. Immediately after the presentation of each sub-group, list down in Column 4 the components of improved crop cultivation practices as against the farmers’ corresponding to each crop presented (done by DTT).

Step 6. Discuss in the plenary the differences between farmers’ versus improved practices against each one of the components and demonstrate the farmers the gaps observed between improved and farmers’ practices by listing these down in Column 5.

Step 7 Sensitise the farmers about the problems observed in cultivation practices of various crops, which have held back farmers’ efforts to raise productivity levels of crops in the irrigated command area. Then make them realise that there is urgent need for improvement in the adopted cultivation practices.

5.4.5 Designing and Conducting Farmers’ Field Schools and Farmer-to-Farmer Training

Designing the Main Study Plot for FFS

Design the study plot based on the identified problems/gaps in cultivation practices of seasonal crops in order to demonstrate the potential role of improved cultivation practices in crop productivity improvement.

To facilitate the process of learning-by-doing and believing-by-seeing, compare the components of both farmers current practices and improved ones in one study plot. A clear demarcation should be made between both the practices. Prior to the establishment of the study plot orientation should be provided to the farmers on the components of improved practices and implementation schedule. Implementation of the elements of farmers’ practices should be entirely left to the farmers. It should be ensured that components of improved practices are not duplicated on the plot with farmers’ practices.

The following should be considered while establishing the study plot.

- The plot should have a larger area and located within the field channel command area selected for the study.
  - For cereal crops, 5 katha (1 Katha equivalent to 1/30th of a ha) in the Terai and equivalent in ropani in the hills.
  - For potato and vegetables, 3 katha in the Terai and equivalent in ropani in the hills.
- The plot should be representative of the land type in the irrigation schemes in terms of soil fertility and access to irrigation and drainage.

It should be approachable by majority of the farmers as the plot will serve as the venue for intensive FFS training.
Design of FFS Curricula

- Content of FFS curricula should be based on the gaps/problems identified in the crop cultivation and irrigation practices.
- Topics to be addressed in each session of the FFS training should be prepared in a logical sequence.
- The schedule of the FFS sessions and timing should correspond with the tentative timing of cultural operations based on the crop calendar.
- In the FFS curricula responsibility of each district team member should be clearly mentioned corresponding with the nature and technical requirement of the session.
- Provision of inputs required to deliver the FFS training should be clearly stated in the curricula against the individual sessions.

An example of FFS curriculum matrix prepared for onion crop based on critical growth stages is given in Table 8.

Procedure for Conducting FFS

In each season, participant farmers of FFS establish a study plot in the selected field channel command area, where different activities related to crop growing and irrigation practices are carried out by the farmers themselves. The command area of the field channel also serves as a venue for the study on linkages between system level operations and plot level crop and water management.

On the main study plot established for the study on the specific elements of crop management and related water management practices, farmers organised into sub-groups observe and monitor the field and status of crop growing condition such as nutrient and water requirement, weed, disease and pest infestation, as well as other components of crop production technologies at regular intervals using AESA methodology. In each observation, farmers gather relevant data, analyse those, make appropriate decisions and work out types of immediate activities to be implemented in the field. The decisions are then presented by the leader of each group to other participant farmers of the field school for further discussion, refinement and endorsement. Then, the activities formulated are implemented in the field by the farmers themselves with technical assistance from the FFS Facilitator/DTT. Equal participation of each participant in the implementation of activities is supervised by the leader farmer of FFS. Technical discussions on different topics/activities are facilitated by members of the district technical team.

The following sequential activities should followed during each FFS session.

- Introduction to topic of the day;
- Field observation and group work, collection of relevant data/information from the field and crop performance AESA;
- Data processing, group discussion and presentation of field data in the plenary;
- Identification of immediate activities to be performed in the field;
- Deliberation and discussion on the topics of the current session;
- Discussion and technical backstopping by the DTT on activities to be performed in the field including, immediate activities identified by the farmers during field and crop performance observation/monitoring;
- Implementation of activities and quality supervision and backstopping by the DTT;
- Discussion on important issues related to the activities performed;
- Planning for next FFS session and wrap-up;
- Preparation of the proceedings of the session and session report preparation.

**Procedures for Designing and Conducting Farmer-to-Farmer Training and Extension**

The farmer-to-farmer extension programme aims at disseminating the impact of technologies and training courses introduced in the field channel command area and main study plots through FFS to a wider area of the scheme by encouraging participation of other farmers in the programme.

The main actors in the farmer-to-farmer extension of technologies are the farmers/WUA members participating in the OFWM-FFS, who are represented from different reaches of the irrigation scheme.

The following should be considered while designing the farmer-to-farmer training:

- Interested farmers should be encouraged to participate in the F-to-F training.
- Skilled core FFS farmers should be mobilised as resource farmers to facilitate the F-to-F training.
- The responsibility to facilitate and smoothly conduct the F-to-F training should be institutionalised within the WUA and the officials should be made responsible to supervise the training.
- Periodic technical support to the core FFS and participating farmers should be provided by members of district team.
- Sub-study plots will be established on different branch canals of the irrigation scheme and in one of the participant farmer’s field. The number of sub-study plots should not exceed the total number of branch canals. The area of sub-study plots should be comparatively smaller than the main study plots.
- Crops included on the sub-study plots should correspond with those of the main study plot. Performance of farmers’ practice can be assessed using neighbouring farmers’ field growing the same crop.
- A clear Action Plan should be developed for each sub-study plot using Table 9. The prepared action plan should be discussed and endorsed in the WUA meeting.
- Procedure for conducting the F-to-F training is the same as that for FFS training.
- Detailed procedure for designing and implementation of the F-to-F training is mentioned in Chapter 3.
Table 3: Cropping Pattern and Cropping Intensity Analysis Format

<table>
<thead>
<tr>
<th>Season/Area</th>
<th>Cropping Calendar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monsoon</td>
<td></td>
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<tr>
<td>Rice</td>
<td></td>
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<tr>
<td>Maize</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Fallow</td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td></td>
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<tr>
<td>Wheat</td>
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<tr>
<td>Mustard</td>
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<tr>
<td>Maize</td>
<td></td>
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<tr>
<td>Lentil</td>
<td></td>
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<tr>
<td>Chickpea</td>
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<td>Potato</td>
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<tr>
<td>Others</td>
<td></td>
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<tr>
<td>Fallow</td>
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<tr>
<td>Spring</td>
<td></td>
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<tr>
<td>Maize</td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td></td>
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<tr>
<td>Cowpea</td>
<td></td>
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<tr>
<td>Mungbean</td>
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<tr>
<td>Vegetables</td>
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<tr>
<td>Others</td>
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<tr>
<td>Fallow</td>
<td></td>
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<tr>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Cropping Intensity</td>
<td>To be analysed separately for head, middle and tail reach of the scheme.</td>
</tr>
</tbody>
</table>
Table 4: Gross Margin Analysis Format
(To be analysed by the farmers divided into sub-groups separately for each crop included in the cropping pattern. The analysis could be done for the area of one katha (1/30th of a ha) in Terai or one ropani (1/20th of a ha) in the hills).

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Particulars</th>
<th>Unit</th>
<th>Quantity</th>
<th>Rate Per Unit, Rs.</th>
<th>Total Amount, Rs.</th>
<th>Remarks</th>
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<td>Production input cost</td>
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<td>1.1</td>
<td>Seed</td>
<td>Kg</td>
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<td>1.2</td>
<td>Nursery bed</td>
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<tr>
<td>a.</td>
<td>Compost/FYM</td>
<td>Kg</td>
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<tr>
<td>b.</td>
<td>Chemical fertilizer</td>
<td>Kg</td>
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<tr>
<td>-</td>
<td>DAP</td>
<td>Kg</td>
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<tr>
<td>-</td>
<td>Urea</td>
<td>Kg</td>
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<tr>
<td>-</td>
<td>Muriate of potash</td>
<td>Kg</td>
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<tr>
<td>c.</td>
<td>Micronutrient</td>
<td>gm/Kg</td>
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<tr>
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<td>Compost/FYM</td>
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<tr>
<td>b.</td>
<td>Chemical fertilizer</td>
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<td>-</td>
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<td>Urea</td>
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<td>-</td>
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<td>Hired labour</td>
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<td>b.</td>
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<td>Male</td>
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<tr>
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<tr>
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<tr>
<td>2.2</td>
<td>Land &amp; soil preparation</td>
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<td>d.</td>
<td>Tractor</td>
<td>Hour</td>
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<tr>
<td>S. No.</td>
<td>Particulars</td>
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<td>Intercultural operations (weeding, hoeing, earthing up, top dressing, etc.)</td>
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<td>Harvesting/transporting</td>
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<td>2.9</td>
<td>Threshing and winnowing</td>
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<td>Final product cleaning, drying, packaging and storing</td>
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<td>Any other labor cost</td>
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<td>b. Rental value of land</td>
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<td>c. Depreciation</td>
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<td>d. Interest on fixed capital</td>
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<td>4</td>
<td>Total cost (production input cost + labor cost + any other cost)</td>
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<td>5</td>
<td>Gross returns</td>
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<td>b. By-product</td>
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<td>c. Grass for livestock</td>
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<td>Net profit (5 - 4)</td>
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<td>Benefit: Cost ratio</td>
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Table 5: Matrix Ranking of Crops

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<th>SN</th>
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<th>Monsoon Season</th>
<th>Winter Season</th>
<th>Spring Season</th>
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<tr>
<td></td>
<td>Crops</td>
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<td>Crops</td>
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<tr>
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<td>Rice, Maize, Summer Vegetables</td>
<td>Wheat, Potato</td>
<td>Winter Veg.,</td>
<td>Mustard, Maize</td>
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</table>

1. Yield
2. Household Consumption/role in food security
3. Water consumption rate/water productivity
4. Labour Requirement
5. Marketability
6. Profitability
7. Crop failure risk

Total score
### Table 6: Crop Productivity Analysis Format

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Crops</th>
<th>Present Yield, Kg. per Bigaha/Ropani</th>
<th>Attainable Yield Kg. per Bigaha/ Ropani.</th>
<th>Gap in Yield Kg. per Bigaha/ Ropani</th>
<th>Possible reason of yield gap</th>
<th>Remarks</th>
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### Table 7: Crop Cultivation Practices Analysis Format*

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<th>S. No.</th>
<th>Elements of Crop Cultivation Practices</th>
<th>Farmers Practice</th>
<th>Improved Practice</th>
<th>Gap</th>
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<td>1</td>
<td>Seed management</td>
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<td>Nursery bed &amp; seedling raising</td>
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<tr>
<td>3</td>
<td>Land and soil preparation</td>
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<td>4</td>
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<td>5</td>
<td>Intercultural operations</td>
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<td>6</td>
<td>Disease and pest control</td>
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<td>7</td>
<td>Irrigation method, water application technique and drainage practices</td>
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<td>8</td>
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<td>9</td>
<td>Harvesting procedure</td>
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<td>10</td>
<td>Storage practices</td>
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<td>11</td>
<td>Marketing of crop produce</td>
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*To be analysed separately for each crop included in the improved/alternate cropping pattern
### Table 8: FFS Curriculum for Onion Cultivation (as an example)

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<th>S.N</th>
<th>Activities</th>
<th>Tentative Time</th>
<th>Responsibility</th>
<th>Inputs Required</th>
<th>Remarks</th>
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<td>Nursery bed preparation</td>
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<td>- Introduction and objective of FFS</td>
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<td>- Nursery bed site selection</td>
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<td>- Nursery bed area calculation based upon net transplanted area</td>
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<td>- Layout and land preparation</td>
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<td>- Discussion on different onion varieties</td>
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<td>- Seed rate seed treatment, seed soaking and incubation technique</td>
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<td>- Preparation of work plan for the participant farmers of F-to-F extension/training</td>
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<td>- Session report and study plot data recording sheet preparation</td>
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<td></td>
<td>Marga First week</td>
<td>Participant Farmers + WUA + DTT</td>
<td>Fuel, refreshment, stationary</td>
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<td>1.2</td>
<td>Soil preparation and seed sowing</td>
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<td></td>
<td>- Soil preparation &amp; soil treatment (type of chemical, dose and application technique)</td>
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<tr>
<td></td>
<td>- Fertilizer application (type, dose and application method)</td>
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<tr>
<td></td>
<td>- Seed sowing (spacing, sowing depth and technique)</td>
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<td></td>
<td>- Seed bed mulching, irrigation technique and frequency</td>
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<td></td>
<td>- Discussion on after care of nursery bed</td>
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<td></td>
<td>- Follow up and technical backstopping to the participant farmers of F-to-F extension activity</td>
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<td></td>
<td>Marga 1st week</td>
<td>Participant Farmers + DTT</td>
<td>Seed, fertiliser, fuel, refreshment, stationary</td>
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<tr>
<td>13</td>
<td>Land and soil preparation, seedling transplanting</td>
<td>Paush Second week</td>
<td>Participant Farmers + DTT</td>
<td>Seedlings, fertiliser, fuel, refreshment, stationary</td>
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<tr>
<td></td>
<td>- Review of previous session activities</td>
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<td></td>
<td>- Layout of transplanting bed</td>
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<td></td>
<td>- Irrigation and drainage channel planning</td>
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<td></td>
<td>- Compost application (dose &amp; application method)</td>
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<td></td>
<td>- Soil preparation</td>
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<td></td>
<td>- Chemical fertilizer application (type, dose and application technique)</td>
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<td></td>
<td>- Final soil preparation</td>
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<td></td>
<td>- Seedling selection and preparation of seedling for transplanting</td>
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<td></td>
<td>- Transplanting method (number of seedlings, spacing, depth)</td>
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<td></td>
<td>- Irrigation management (irrigation frequency, depth and technique)</td>
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<td></td>
<td>- Follow-up and technical backstopping to the participant farmers of F-to-F extension activity</td>
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<td></td>
<td>- Session report and study plot data recording sheet preparation</td>
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</tbody>
</table>

District: Irrigation Scheme: e.g. Rautela IS (Old Site)
<table>
<thead>
<tr>
<th>S.N</th>
<th>Activities</th>
<th>Tentative Time</th>
<th>Responsibility</th>
<th>Inputs Required</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4</td>
<td>Intercultural operations and first top dressing</td>
<td>Magh W1</td>
<td>Participant Farmers + DTT</td>
<td>Fertiliser, pesticides, fuel, refreshment, stationary</td>
<td></td>
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<tr>
<td></td>
<td>Review of previous session activities</td>
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<td></td>
<td>Study plot inspection and crop performance monitoring</td>
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<td></td>
<td>Group discussion on identified findings/problems</td>
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<td>Weeding, hoeing</td>
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<td></td>
<td>First top dressing (fertilizer type, dose and top dressing technique)</td>
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<td></td>
<td>Irrigation requirement assessment and management</td>
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<td></td>
<td>Follow-up and technical backstopping to the participant farmers of F-to-F extension activity</td>
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<td></td>
<td>Session report and study plot data recording sheet preparation</td>
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<tr>
<td>1.5</td>
<td>Major insects/diseases and control measures</td>
<td>Magh Second week</td>
<td>Participant Farmers + DTT</td>
<td>Pesticides, fuel, refreshment, stationary certificates</td>
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<tr>
<td></td>
<td>Review of previous session activities</td>
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<td></td>
<td>Study plot inspection and crop performance monitoring</td>
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<td></td>
<td>Group discussion on identified findings/problems</td>
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<td></td>
<td>Identification and discussion on major insects mode of damage and control measures</td>
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<tr>
<td></td>
<td>Identification and discussion on major diseases, mode of damage and control measures</td>
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<td></td>
<td>Pesticides dose calculation, mixture preparation technique, application method</td>
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<td></td>
<td>Discussion on safe handling of pesticides</td>
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<td></td>
<td>Irrigation requirement assessment and management</td>
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<td></td>
<td>Follow-up and technical backstopping to the participant farmers of F-to-F extension activity</td>
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<td></td>
<td>Session report and study plot data recording sheet preparation</td>
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<tr>
<td>1.6</td>
<td>Intercultural operations and second top dressing</td>
<td>Falgun First week</td>
<td>Participant Farmers + DTT</td>
<td>Fertiliser, pesticides, fuel, refreshment, stationary</td>
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<td></td>
<td>Review of previous session activities</td>
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<tr>
<td></td>
<td>Study plot inspection crop performance monitoring (crop growth status and stage, soil and moisture condition, weed and insects/ diseases infestation)</td>
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<td></td>
<td>Discussion on identified findings/problems</td>
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<td>Weeding, hoeing</td>
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<td>Second top dressing</td>
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<td>Irrigation requirement assessment and management</td>
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<td>Follow-up and technical backstopping to the participant farmers of F-to-F extension activity</td>
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<td></td>
<td>Session report and study plot data recording sheet preparation</td>
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</table>
### Table 9: Action Plan on Farmer to Farmer Training Activity

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Activities</th>
<th>When to Conduct</th>
<th>Responsible FFS Resource Farmers</th>
<th>Participating Farmer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Land &amp; soil preparation</td>
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<tr>
<td>2</td>
<td>Planting/transplanting</td>
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<tr>
<td>3.</td>
<td>First intercultural operation and irrigation</td>
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<td>4.</td>
<td>Disease and pest management</td>
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<tr>
<td>5.</td>
<td>Second intercultural operation and irrigation</td>
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<tr>
<td>6</td>
<td>Field day</td>
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<tr>
<td>7</td>
<td>Crop cutting</td>
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<tr>
<td>8</td>
<td>Harvesting</td>
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<tr>
<td>9</td>
<td>Post-harvest and benefit-cost analysis</td>
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</tbody>
</table>
Annex 1

Suggested Check list format for the development of program for Technical Staff Training

Objectives:
Generally the objectives of the first Technical Staff Training are to:

- familiarize the DTT members on the goal, objectives, programme arrangements and implementation modality of OFWM Programme;
- familiarize and orient the DTT members on the concept and modality of Participatory Training and Extension on irrigation management and agriculture production improvements in the irrigation schemes to be addressed through Farmer Field School, Farmer to Farmer and WUA training activities;
- orient the DTT members on the surveying process and procedures for selection for suitable irrigation schemes to be brought under the programme support and on the methods of collecting the base line information;
- develop the know-how of the DTT members on the stepwise procedures of conducting the comprehensive and seasonal plannings in the irrigation schemes in collaboration with the respective WUAs and user farmers and on process for developing the comprehensive and seasonal plans on irrigation management and agriculture production improvements to be addressed through FFS, F-to-F and WUA trainings; and
- to enhance the know-how of the DTT members on the concept and procedures of FFS and F-to-F training activities to be conducted in the irrigation schemes in collaboration with the WUAs and user farmers in the selected irrigation schemes.

The objectives of Second Technical Staff Training may include the following.

- To discuss the salient characteristics of the selected irrigation schemes, potential for irrigation and agriculture improvements and endorsed them for further programme support.
- To discuss the base line informations and comprehensive and seasonal plans prepared in collaboration with the respective WUAs and user farmers of the irrigation schemes.
- To discuss the programme and budgetary arrangements for the implementation of the comprehensive and seasonal plans.
- To orient the DTT members on the procedures and technique of implementation of comprehensive and seasonal plans through FFS, F-to-F and WUA trainings activities.
- To discuss with the DTT the supervision, monitoring, evaluation and reporting arrangements on the programme activities to be undertaken in the irrigation schemes.
- To update the technical knowledge of the DTT members on the specific aspects of irrigation and agriculture production technologies specific to the season.

Suggested objectives for the subsequent Technical Staff Trainings to:

- review the programme activities implemented, achievements made and constraints encountered in the implementation of comprehensive and seasonal plans during the past season;
- review the constraints encountered on programme management aspects, identify the critical issues and suggest possible remedies to overcome the issues;
- refresh the DTT members on the methods & procedures for planning of forth coming seasonal activities corresponding to the developed comprehensive plan of the irrigation schemes;
upgrade the know-how of the DTT members on the specific technical aspects of irrigation and agriculture production technology specific to the forthcoming season as well as on institutional strengthening of WUAs and O&m of the irrigation schemes;

upgrade the knowledge of DTT members on specific topics such as report writing, computer handling etc. based on the actual need.

**Date/Duration:** 3-7 days  
**Venue:** Regional Agriculture Training Centers or any other suitable venue,  
**Districts:** Focussed Districts  
**Participants:** DTT Members

**Schedule:**

**Day I (Day & Dates)**  
Registration  
Opening session: Moderator  
- Welcome Address  
- Overview of the of the Training Program  
- Opening Remarks  
  - Few words – Distinguished Guests  
  - Opening remarks by Chairperson.

**Tea Break**  
Training activities as per the individual objective

**Lunch**  
Continuation of the training activities  
**Tea Break**  
Continuation of the training activities and wrap of day one activities

**Day II (Day & Dates)**  
Continuation of the Training activities as per the individual objective

**Lunch**  
Continuation of the training activities  
**Tea Break**  
Continuation of the training activities and wrap of day two activities

**Day III (Day & Dates)**  
Continuation of the Training activities as per the individual objective

**Lunch**  
Continuation of the training activities  
**Tea Break**  
Continuation of the training activities  
Overall review of the training and training evaluation

**Closing Ceremony & Departure**

The actual no. of training days and programme may vary based on the actual objectives of the training. Experiences showed that the training duration of 3-7 days has been found rational for the Technical staff Training to cover the aforementioned objectives.
## Annex 2

**Suggested Schedule of Farmers’ Comprehensive Planning in the selected Irrigation Schemes**

<table>
<thead>
<tr>
<th>Day</th>
<th>Activities</th>
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</table>
| I   | Walk thru to the head, middle and tail reach of the canal(s), and the command area of the selected scheme together with farmers/WUA officials and organise a mapping exercise. Examples of the specific activities to be undertaken include the following.  
- Identify the spots/areas where the irrigation system is physically defunct or is having problems.  
- Inspect the controlling and regulating structures/facilities and identify the structures that are defunct or having problem.  
- Identify the areas with drainage problems if there are any.  
- Collect general information on topography, soil type, land use and cropping pattern,  
- Indicate the above information in the system map.  
- Facilitate the farmers to prepare seasonal calendar diagram including temperature, rainfall pattern, and cropping calendar based on the felt experiences.  
- Conduct Gender analysis with emphasis on involvement of women farmers in irrigation and agricultural production activities. |
| II  | Participatory assessment of the farm irrigation technologies and practices- Transect walk with ballot box questions. See Annex 12 for sample questions  
- Asses farmers’ knowledge, ideas and priorities in relation to on-farm water and irrigation system management.  
- List potential improvements in relation to identified on-farm and irrigation system management problems. |
| III | Identify and list the main shortcomings, constrains and farmers’ experience in their onfarm water management practice in the selected irrigation and drainage systems.  
- Identify short comings/farmers’ experience in  
  - Water sources  
  - Irrigation system improvements  
  - Crop water management  
  - Drainage and flood control  
  - Water Users Association (WUA)  
  - Crop management  
- Prioritize together with farmers and WUA officials the problems to be addressed in relation to on-farm water and irrigation system management in the long and short term period (current and succeeding two seasons i.e. monsoon, winter and spring).  
- Identify and agree on the solutions and appropriate technologies to address the problems identified that will be introduced and implemented during the long and short term period (i.e. current and succeeding two seasons say monsoon, winter and spring). |
| IV  | Participatory planning exercise on crop production and Productivity improvements:  
- Review and analyze the present cropping pattern and cropping intensity  
 Conduct participatory gross margin analysis of the crops of the existing cropping patterns. |
| V   | Conduct matrix ranking of the crops and facilitate the farmers to develop improved/alternate-cropping pattern for the command area of the irrigation scheme.  
- Review the present status of crop yield included in the improved/alternate cropping pattern, identify gaps/problems in the existing crop management practices adopted by the farmers and develop crop productivity improvement plan for current and succeeding two seasons and for the long-term.  
- Develop the design of Cropping Pattern Demonstration to be implemented during current and succeeding two seasons and in long term period and select the farmers for participation in the demonstration in the selected field channel command area (CA). |
<table>
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<tr>
<th>Day</th>
<th>Activities</th>
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</table>
| VI  | - Select crop(s) to be studied in the FFS in the current and succeeding two seasons and in long term period;  
- Identify the technical training requirements on crop cultivation and related irrigation management practices based on the identified gap and prepare the detail training curricula to be addressed through FFS.  
- Develop the design of main study plots based on the identified problems (season wise)  
- Select field channels command area in head, middle and tail reach for establishing the study plots taking in to account of:  
  - Water availability in the source and canals;  
  - Soil parameters and soil types;  
  - Land/field plot orientation.  
- Select a suitable plot and responsible farmer within each of the selected field channel command area at Upper (for F-to-F Training), middle (for FFS Training) and Lower (for F-to-F Training) reach of the scheme accessible to majority of the farmers;  
- Discuss the concept and approach of Farmer to Farmer Training/Extension of irrigation management and crop production improvements to the wider area of the irrigation scheme;  
- Select the core resource farmers from within the FFS participant farmers and WUA officials to facilitate the farmer to farmer training in Upper and Lower reach of the scheme in close supervision of WUA;  
- Develop together with FFS core farmers, selected WUA officials and user farmers from upper and lower reach, the training curricula and action plan indicating the responsibility of facilitators, technical back stoppers (JT/JTA& Overseer) and WUA officials to facilitate the implementation of sub-study plots and farmer to farmer training (Separately for upper and lower reach of command area);  
- Collect demand on quality seeds of improved crop varieties required by the FFS and other general farmers and discuss on the procurement procedure. |
| VII | Continue the water management activities to be implemented through WUA:  
- Review and identify the organizational structure requirement of WUA to implement the different tasks identified during the Farmers' comprehensive Planning;  
- Develop indicators and procedures for monitoring and evaluation for efficient and sustainable operation and maintenance of irrigation schemes.  
- Compilation and Budget Preparation  
- Collect activities to be implemented during long and short term period in a priority order;  
- Prepare detail work plan and budget for current and succeeding two seasons. |
Annex 3

Procedure to conduct Seasonal Planning on FFS and Farmer to Farmer Training

Day – 1: System Level Mass Meeting

Objectives:
- To review in general the functional status of irrigation facilities (physical status of main, branch and farm level), services (adequacy, reliability and equity in irrigation delivery), the management (operation, maintenance, resource mobilization) and organization (WUA, Main Committee, Branch Committee, other groups or committee formed to facilitate the activities of organization) and identify in general the problems, outstanding issues and constraints related to above aspects.
- To review in plenary the past activities planned, launched, achievements made by the farmers and WUA (If any) and problems encountered on on irrigation and agricultural improvements and WUA strengthening.
- To discuss in plenary the approach and procedures of program planning, implementation and monitoring activities implemented through FFS and Farmer to Farmer Training/ Extension (F-to-F) activity under the supervision of WUA and technical backstopping from DTT.
- To identify in plenary the possible constraints and discuss the suggested action for the smooth implementation of FFS and F-to-F training and institutionalization of Farmer to Farmer extension activity in the regular activities of WUA.
- To select farmers and WUA officials to be involved in FFS. Also, select core resource farmers among the FFS farmers for the facilitation of Farmer to Farmer Training to be conducted simultaneously with the FFS in the command area of irrigation schemes.
- To orient the farmers on the programme and schedule for the planning of FFS and F-to-F activities.
- To discuss and facilitate the WUA in developing the procedures for the arrangements of inputs required by the farmers of the scheme for the given season.

Facilitators: DTT Members
Participants: WUA officials & General Farmers (No. appr.75)
Venue: Irrigation Schemes
Duration: One day in each scheme

Day – 2: Planning of Irrigation and Crop Management Activities to be addressed through FFS and WUA Trainings

Objectives:
- to review in detail the functional status of irrigation facilities at the main system level (physical status of main, branch and farm level), services (adequacy, reliability and equity in irrigation delivery), the management (operation, maintenance, resource mobilization) and organization (WUA, Main Committee, Branch Committee, other groups or committee formed to facilitate the activities of organization) and identify the problems, outstanding issues and constraints to be addressed during the current season;
to review and discuss the crop coverage plan for the season based on the improved cropping pattern developed during the comprehensive planning exercise.

to select the crop(s) to be addressed in the FFS conducted during the season

to review and discuss the training needs on irrigation and crop management practices on the selected crops to be addressed through FFS;

to discuss and develop/update the cropping calendar, curricula & schedule of FFS training and backstopping schedule of DTT members;

to select study plot and responsible farmer;

to prepare the layout design of the study plot with separate provision for irrigation and drainage as well as finalize the irrigation & crop management treatments/practices to be demonstrated in the plot;

to assess the inputs including quality seeds required to establish the plot and prepare the procurement plan.

to discuss with WUA on the scheme level water allocation & distribution plan based on the crop coverage plan for the given season and facilitate for improvement (if required);

to discuss with WUA on canal operation and maintenance plan specific to the season and facilitate for improvement (if required).

Facilitators: DTT Members
Participants: Core FFS farmers-25, WUA Officials-13 (all officials)
Venue: Irrigation Schemes
Duration: One day

Day – 3: Training of Farmers Trainers on Planning Method & Procedure

Objectives:

to review the progress & constraints of past activities on irrigation and agriculture improvements implemented by the farmers and WUA (if any)

to prepare the core resource farmers from upper and lower reach of the irrigation scheme on the procedures of planning to be implemented together with the respective farmers of identified command area on the following aspects.

- Preparation of crop coverage plan for the season based on Improved CP;
- Preparation of water distribution and allocation plan based on the crop coverage plan in the selected command area in discussion with WUA;
- Development of canal operation & maintenance plan in the command area in discussion with WUA.
- Inputs (i.e. quality seeds, fertilizers etc.) demand collection based on the crop coverage plan and preparation of procurement plan;
- Training need identification on irrigation & crop management practices on the selected crops to be studied in the study plots;
- Development of action plan for F-F training to be facilitated by core FFS farmers & backstopping from DTT;
- Selection of field channel/distributaries command area and study plots as a venue to conduct Farmer to Farmer training on crop and irrigation management practices;
- Designing of layout of study plots including the treatments on crop management, irrigation method, and practices of selected crops to be studied;
Facilitators: DTT Members.
Participants: Selected core FFS resource farmers (5 each from upper & lower reach of each irrigation scheme) and WUA Officials (4 from each scheme) responsible to supervise the F-F extension activities.
Venue: Nearest Agriculture Service Center (ASC) of DADO.
Duration: Two days

Day – 4 & 5: WUA/Farmer Seasonal Planning in Upper and Lower reach of the Irrigation Schemes

Objectives.
- To review the functional status of irrigation facilities at Upper and Lower reach command area of the Scheme (physical status of main, branch and farm level), services (adequacy, reliability and equity in irrigation delivery), the management (operation, maintenance, resource mobilization) and organization (WUA, Branch Committee, other groups or committee formed to facilitate the activities of organization) and identify the problems, outstanding issues and constraints regarding the irrigation facilities, services, management and organization at each of the command area.
- To discuss and prepare the seasonal crop coverage plan based on the improved cropping pattern for the respective command area together with the user farmers;
- To discuss and prepare the water distribution and allocation plan based on the seasonal crop coverage plan in the selected command area in discussion with WUA;
- To discuss and develop the seasonal canal operation & maintenance plan in the command area in discussion with WUA;
- To discuss & collect farmer’s demand on inputs (quality seeds, fertilizers etc.) required for growing the seasonal crops in the identified command area;
- To identify the training need of the farmers of identified command area on O&M, water & crop management practices to be addressed through Farmer to Farmer Training during the season;
- To select the field channel command area and study plots as a venue to conduct seasonal F-to-F training on irrigation and crop production improvements;
- To develop the action plan & schedule of seasonal F-to-F training on selected crop(s) and water management practices and asses the inputs required to establish the study plots;
- To discuss the arrangements and procedures of F-to-F training.

Facilitators: Core Resource Farmers & Overseer and JT/JTA.
Participants: User farmers of upper and lower reach.
Venue: Command area of upper and lower reach separately.
Duration: Two days in each scheme (First day in upper part & Second day in lower part of the scheme).

Day – 6: WUA Working Group Meeting

Objectives
- To review in plenary the existing functional status of irrigation facilities (physical status of main, branch and farm level), services (adequacy, reliability and equity in irrigation
Guidelines for Institutional Arrangements, Training, Irrigation and Agriculture

Production Improvements under On-Farm Water Management Programme

To discuss the farmer’s seasonal plan of each command area to be addressed through F-F training and get endorsement of the plan.

To assign the responsibility to the selected WUA members to facilitate, monitor & supervise the implementation of F-to-F training as per the action plan.

To discuss & prepare the O&M and water allocation plan for the season and allocate responsibility to the responsible WUA members for proper and timely implementation.

To discuss on the inputs demand made by the farmers for the season and prepare the procurement plan in discussion with DTT.

To identify the institutional constraints & shortcomings and to provide feedback to DTT for required WUA training for the enhancement of organizational capabilities WUA.

Facilitators: DTT.
Participants: Core FFS resource farmers of upper and lower reach and WUA officials (including four officials responsible to supervise the F-F training).
Venue: Pilot irrigation schemes.
Duration: One day in each scheme.

(Activities foreseen under day six agenda should be carried out after the seasonal planning and after the endorsement of prepared work plan in the WUA working group meeting).

Day - 7: Training of farmers Trainers on Implementation Procedure & Technical aspects of Crop and Irrigation Management

Objectives:

To discuss the seasonal plan developed by the core farmers trainers together with the user farmers of the respective command area;

To provide training and guidelines to the core resource farmers on the procedures for the implementation of seasonal plan and Farmer to Farmer training at the sub-study plots in the field channel command area;

To upgrade the technical know-how of farmers trainers on the various aspects of irrigation and crop cultivation practices of the selected seasonal crops intended to be grown during the season in the identified command area;

To upgrade technical know-how of the farmers trainers on O&M and water distribution technique relevant to the season.

Facilitators: DTT Members.
Participants: Selected core FFS resource farmers (5 each from upper & lower reach of each irrigation scheme) and WUA Officials (4 from each scheme) responsible to supervise the F-F extension activities.
Venue: ASC of DADO.
Duration: Two days jointly for two schemes.
Annex 4

Check List for Seasonal Data Collection

(To be prepared separately for each irrigation scheme in each season)

<table>
<thead>
<tr>
<th>District:</th>
<th>Irrigation Scheme:</th>
</tr>
</thead>
</table>

1. General Information on Irrigation Scheme:
Location:

VDC: Ward No.: Source of water:

Total Command Area: No. of Beneficiary Households:

Average land holding size:

Irrigated command area (before OFWM):

Irrigated command area (at present):

WUA Established on (Date): WUA Registered at:

Structure of Executive Committee & Members (Main Committee):

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.

Soil Type: Head

Middle

Tail

Climatic Conditions:

Cropping Pattern (before launching of the programme):

1.
2.
3.
Cropping intensity (before launching of the programme)

Productivity of major crops (before launching of the programme):
Rice:  Wheat:  Maize:  Potato:  Vegetables:  Others:

Major problems identified (at the time of project initiation) in relation to:

Agriculture:

Irrigation:

2. Details of Seasonal Activities implemented:

Season:  Year:

Activities implemented as per seasonal workplan:

A. Agriculture Production and Productivity Improvements

i. Introduction of Improved Crop Production Technology through Study Plot

- Crop(s) selected for study plots & FFS:
  1
  2
  3
  4

- Major problems identified in relation to selected crop(s) to be addressed in the FFS and study plots:

  1. Crop cultivation practices:

  2. Irrigation method and practices:

Details of Study Plot:

<table>
<thead>
<tr>
<th>Location</th>
<th>Crop:</th>
<th>Total Area:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area under:</td>
<td>Crop 1:</td>
<td>Crop 2:</td>
</tr>
<tr>
<td>Varieties:</td>
<td>Crop 1:</td>
<td>Crop 2:</td>
</tr>
</tbody>
</table>

Technologies (Treatments) Compared in the Main Study Plot

<table>
<thead>
<tr>
<th>Crop 1</th>
<th>Area per treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment 1.</td>
<td>1</td>
</tr>
<tr>
<td>Treatment 2.</td>
<td>2</td>
</tr>
<tr>
<td>Treatment 3.</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Crop 2</th>
<th>Area per treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment 1.</td>
<td>1</td>
</tr>
</tbody>
</table>
Details of Production Technologies/Cultural Practices (Treatments) Compared in the Study & Observation Plots (To be indicted separately for main and other observation plots)

<table>
<thead>
<tr>
<th>Cultural Practices</th>
<th>Treatment -1</th>
<th>Treatment -2</th>
<th>Treatment -3</th>
<th>Treatment -4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed Source</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land and Soil Preparation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manuring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical Fertilizer (Rate)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Basal dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Top dressings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st : when ?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd when ?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed Planting/Transplanting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Spacing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigation Method</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time of Irrigation (Growth Stage)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2nd</td>
<td></td>
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<tr>
<td>3rd</td>
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<tr>
<td>4th</td>
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</tr>
<tr>
<td>5th</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weeding, hoeing and earthing up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(when &amp; how ?)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insects/diseases observed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant protection measures carried out to control the insect/pests</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvest date and procedures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Harvest &amp; Procedures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other elements (if any)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Details of Other observation plot such as varietal display, IPM trial etc. (if any):

Crop:    Total Area:    Varieties:
Treatments:                        Area per treatment
1            1
2            2
3            3
Assessment of Crop Yield:
Crop cut methods and procedures applied:

Crop cut area taken under each sample:
1
2
3
4

Yield under each sample (Kg)
1
2
3
4

Moisture percent based on which yield assessed (for cereals):

Crop Yield (Main Study Plot):

<table>
<thead>
<tr>
<th>S. No</th>
<th>Treatments (Practices)</th>
<th>Plant Measurements (if any)</th>
<th>Average Yield, mt/ha</th>
<th>% Increase Over Farmer Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Plant Height, cm</td>
<td>No. of Main Stem/Tillers</td>
<td>No. of Cob/ Plant</td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Yield under Other Observation Plot (Variatel Display, IPM Trails etc.): Indicate separately for each observation plot/trails

<table>
<thead>
<tr>
<th>S. No</th>
<th>Treatments</th>
<th>Yield, mt/ha.</th>
<th>% Increase Over Local Variety</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<td>3</td>
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<td>4</td>
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<td>5</td>
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<td>6</td>
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<td>7</td>
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<td></td>
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<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall reaction of farmers on introduced technologies:
**ii. Participatory Training of Farmers on Improved Crop Production Practices through OFWM-FFS**

Crop: 
Number of Session Planned: 
Major Topics Covered: 

Training Procedures: 

Number of Participants: 
Male: 
Female: 

Overall reaction of farmers on FFS training: 

**iii. Crop Production Enhancement through F-to-F Training/Extension activities**

Crop: 
Quality seed distributed arranged to 25+ farmers: 
(Except main study and sub-study plots) 
Seed Source: 
Seed Grade: 
Quantity: 
No. of farmers received seed: 

Number of Sub-Study Plots under F-to-F training/Extension Activities: 

Area under each sub-plot: 

<table>
<thead>
<tr>
<th>Treatments:</th>
<th>Area under each treatment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

**Crop Yield in the F-to-F Training/Extension Plots:**

<table>
<thead>
<tr>
<th>No.</th>
<th>Treatments</th>
<th>Yield, mt/ha.</th>
<th>% increase over farmers practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plot 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plot 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plot 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**B. Irrigation System Management Improvements**

**i. On-Farm Water Management Improvements through FFS**

Irrigation Method applied for cultivation of selected crop(s) in the study plots:
### Frequency of Irrigation (as per growth stages):

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

### Depth of Irrigation (if measured):

Training activities carried out to create awareness on irrigation methods and water application technique under selected crop(s) in the FFS:

Other activities carried out related to OFWM improvements:

Provision of irrigation & Drainage Channel:

Land levelling:

Others:

Overall reaction of farmers’ on introduced irrigation technologies:

**ii. System Management Improvements through WUA Training O & M:**

Number of Sessions:

Number of Participants:

Major Topics Covered:

WUA institutional strengthening:

Number of Sessions:

Number of Participants:

Major topics covered:

### C. Field Day:

**Date:**

**No. of Participants:**

Proceedings:

Reaction of farmers and local leaders on the introduced/displayed technologies:

### D. Details of any other activities undertaken during the season and outcome (observation tour, etc.)

### E. Details of deficient structure improvements (if carried out in the scheme in the season):
Annex 5

**OFWM-FFS, F to F and WUA Training Session Reporting Format**
(Add additional sheet if required)

Individual Session: Expenses of each FFS/F-to-F Training/WUA Training Sessions including the allowances of trainers will be settled down upon receipt of reports. Receipt of allowances received and necessary bills and log book of motorcycle if used should be included. A register should be maintained as main copy and be kept with WUA.

List of activities completed in each session:

- **Session Number**: ............................................
- **Season**: ............................................**Session Topic**: ............................................................
- **Venue**: ............................................**Date**: ............................................
- **No. of Participants**: Male:............................Female: .....................Total: .....................
- **Facilitators Name**: ...................................

Objectives of the Session (mention in bullet points):

- ............................................ ............................................ ............................................
- ............................................ ............................................ ............................................

Session Proceeding and Main Activities with time spent:

- ............................................ ............................................ ............................................
- ............................................ ............................................ ............................................

- **Technical subject matters discussed in the session and problems faced (put down in bullets):**

- ............................................ ............................................ ............................................
- ............................................ ............................................ ............................................

- **Participants’ Opinion:**

  - **Positive:**
  - **Negative:**

- **Conclusion and Recommendation from DTT:**

- ............................................ ............................................ ............................................
- ............................................ ............................................ ............................................

- **Name of the Facilitator**  **Designation**  **Signature**

  1. ............................................ ............................................ ............................................
  2. ............................................ ............................................ ............................................
  3. ............................................ ............................................ ............................................

Endorsed by [Chief of DIO/GWRDP or DADO]

- **Name**: ......................  **Designation**: ......................  **Signature**: ......................  **Date**: ..............
Annex 6

Suggested Outline for Seasonal Completion Report

Expenses will be settled down upon receiving the Seasonal Completion Report of each completed season. The report should have data and information as per the checklist for seasonal data collection. Following are the points to be included in the report:

- Background

- Seasonal Objective

- Brief Proceeding of the Season Long Activities Undertaken in the Site

- Results of each Activities Undertaken

- Analysis and Discussion on the Seasonal Outcome (to be prepared incorporating all activities implemented and also reflecting the comments/suggestions of the participants, DTT Members and Supervisors):

- WUA/Farmers Reaction

- Conclusions and Recommendations:

- Report Prepared by:
  
  Name: 
  Designation: 
  Signature:

  Date:
Annex 7

Suggested Reporting Outline for Monitoring Visits by the Chief of IDDO/IDSDO/GWRDP and DADO to OFWM Site

(Add additional sheet if required)

Date of Visit: .................................................................

Specific Purpose of the Visit: ...........................................

Specifically Observed /Monitored Activities:

1.
2.
3.
4.

Comments/Remarks on the Observed/Monitored Activities:

1.
2.
3.
4.

Recommendations/Suggestions/Instructions given to the (Farmers’ Group/WUA/DTT) [Note: Recommendation/suggestions/instructions made should also be entered into the register maintained at the field]


Recommendation (to the National Execution Team):


Supervisor:
Name .......................... Designation: Signature: Date
Annex 8

*Suggested Outline for Reporting on Monitoring Visits of Regional Directors of DŌl and DOA to OFWM Sites*

(To be prepared separately for each visited district/scheme and sent to National Execution Team with cc to respective departments)

Date of Visit:   District:   Irrigation Scheme:

Accompanying DTTs member:
1. 
2. 
3. 

Persons/WUA official met/interacted during the visit:

Specific Objective of the Visit:

Specifically Observed/Monitored Activities on:

☐ Irrigation System Management and WUA Functioning
☐ On-Farm Water Management
☐ Agricultural Production Enhancement
☐ Technical Backstopping to the Farmers by DTTs
☐ Any other activities:

Comments/Remarks on the Observed/Monitored Activities:

Recommendations / Suggestions / Instructions made to the:

☐ Farmers/WUA
☐ DTT’s Members
☐ DIO/DADO Chief

(Note: Recommendation / Suggestions / Instruction/comments made during the visit should also be entered into the register book maintained by WUA).

☐ Recommendation/Suggestion to the National Execution Team:
☐ Any Other Comments/Remarks

Reporting Person’s: Name   Designation:   Signature:   Date
Annex 9

Baseline Data on Irrigation Schemes

Name of the Irrigation Scheme:

Location: District: VDC/Municipality: Ward No.:

Date of Data Collection:
Name of DTT Members involved in data collection:

Guidelines to District Technical Team Members

On-Farm Water Management Programme (OFWM) seeks "Base Line" data from two levels of the pilot irrigation scheme: (i) System Level Data, and (ii) Household Level Data. Part – I of this format has been developed to collect irrigation system level data. The information are to be collected through group interview of WUA functionaries and key informants. DTT members are requested to review all relevant documents pertaining to the scheme including the appraisal report prepared upon the completion of rehabilitation and improvement in irrigation schemes. The information to be collected be based on immediately preceding year.

Part – II of this format has been developed to collect household level data. These data are to be collected from the 25 households (it could be more than 25 in some schemes) participating in the OFWM program. Separate formats need to be filled out for each household. The crop sheets attached at the end of the format for household level data collection are to be filled out for each variety of different crops grown by the household in the immediately preceding year.

Irrigation System-level Data

A. Physical and Structural Details

1. Source and Supply Characteristics:
   Name of the source:
   Nature of the source (seasonal/perennial)
   Flow characteristics (if available): High Flow...... m³/s, perennial.....
   Low Flow ...... m³/s, perennial.....
   Design Flow of Irrigation Scheme: .................... m³/s

If any kind of observation has been made by the users over time eg. catchment degradation, depletion in available water supply, frequency of flash flood etc give a brief explanation here.

Are their other irrigation schemes deriving irrigation supply from the same source ? If yes,

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Distance of intake form the costing intake of pilot scheme</th>
<th>Area Irrigated in</th>
<th>Location of command area (VDC and Ward Nos.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name(s) of upstream schemes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name(s) of downstream schemes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Any other pertinent information about the upstream and downstream irrigation schemes and flow characteristics of the source:

2. History of Development

<table>
<thead>
<tr>
<th>Event</th>
<th>When</th>
<th>Who initiated /supported</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Original Construction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Events of rehabilitation and improvement prior to intervention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) intervention made by</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Existing Physical Layout and structural details (Please attach a system map with canal network and use additional sheets if available space be inadequate to explain the physical layout and structure details of the system)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>No</th>
<th>Nature of Construction</th>
<th>Length</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main Canal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary Canals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary Canals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution Structures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross Drainage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landslide protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>River training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any other Specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Area under Irrigation
   i. Scheme Area

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Area in…….</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeted Irrigable Area upon completion of previous rehabilitation support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual Area Under Irrigation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential Irrigable Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unirrigable Area: of which</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultivable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncultivable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Area</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   ii. Area under Irrigation by Season

<table>
<thead>
<tr>
<th>Season</th>
<th>Targeted Irrigable Area in ..........</th>
<th>Actual Irrigated Area in ....</th>
<th>Unirrigated Area in ......</th>
<th>Potential Irrigable Area in ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monsoon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   iii. Spatial Coverage of Irrigation by Season

<table>
<thead>
<tr>
<th>Secondary/ Tertiary Canals</th>
<th>Area Under Irrigation in ............</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Monsoon (Jestha – Kartik)</td>
</tr>
<tr>
<td></td>
<td>Target</td>
</tr>
</tbody>
</table>
5. Existing infrastructural constraints as felt observed and perceived by the users (Please attach additional sheet if necessary).

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Type of Constraints</th>
<th>Effect on irrigation performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main Canals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary Canals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary Canals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution Structures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross Drainage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landslide Protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>River Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any other (Specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. Demography & Socioeconomic Information

Demographic Data

1. Distribution of Beneficiary Household by Caste/Ethnic Groups

<table>
<thead>
<tr>
<th>Caste/Ethnic Groups</th>
<th>No. of Hh.</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td>100.00</td>
</tr>
</tbody>
</table>

2. Distribution of Beneficiary Households by Family Size

<table>
<thead>
<tr>
<th>Family Size</th>
<th>No. of Hh.</th>
<th>Percent of Hh.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small (&lt;=4 members)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium (4-8 Members)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large (&gt;8 Members)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Distribution of Beneficiary Households by Educational Attainment.

<table>
<thead>
<tr>
<th>Level</th>
<th>No. of Hh.</th>
<th>Percent of Hh.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One or more member with primary Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One or more member below S.L.C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One of More member above S.L.C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Indicate whether most households are original settlers or migrants

<table>
<thead>
<tr>
<th>Particulars</th>
<th>No. of Hh</th>
<th>Percent of Hh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Settlers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Migrants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If most settlers are migrants, indicate where they come from

Socio-Economic Data

1. Resource Endowment

i. Landholding Size

<table>
<thead>
<tr>
<th>Size Category</th>
<th>No. of Hh.</th>
<th>Percent of Hh.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marginal &lt;0.25 ha &lt;0.33 ha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small 0.25-0.50 ha 0.33-0.67 ha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium 0.50-1.0 ha 0.67-3.33 ha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large &gt;1.0 ha &gt;3.33 ha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landless</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>
ii. Irrigation Access of Households

<table>
<thead>
<tr>
<th>Access Category</th>
<th>No. of Hh.</th>
<th>Percent of Hh.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households with year round irrigation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household with partial irrigation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household with no access to irrigation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

iii. Tenure Status of Households

<table>
<thead>
<tr>
<th>Tenure Category</th>
<th>No. of Hh.</th>
<th>Percent of Hh.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner Operation only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owner + Share cropper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share Cropper Only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any other ( Specify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

iv. Employment

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of Hh.</th>
<th>Percent of Hh.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent on farming only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent on daily wage earning of one or more family member and also farming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent only on daily wage earning of one or more farming members</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One or more members employed off-farm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One or more family member who migrate seasonally for jobs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any other (Pls. Specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Market Access (Please rank the markets by the order of preference of user Hhs i.e. where most households prefer to sell their farm produces and buy agricultural inputs to second, third and so on in the order of preference.)

<table>
<thead>
<tr>
<th>Market</th>
<th>Approx. Distance</th>
<th>Accessibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Means of Transport</td>
</tr>
</tbody>
</table>

3. Access to institutional services

<table>
<thead>
<tr>
<th>Institution</th>
<th>Where Located</th>
<th>Average Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed &amp; Fertilizer company Depot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sajha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADB/SFDP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agri. Service Center</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vet. Service Center</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Food Deficiency and supply Situation (Please indicate the number/frequency of households in each category)

<table>
<thead>
<tr>
<th>Category</th>
<th>No. Hh.</th>
<th>Percent of Hh.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households Producing Marketable Surplus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Self-Sufficient Households</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Deficit Households: of which;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deficit for 9-12 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deficit for 6-9 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deficit for 3-6 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deficit for &lt;3 months</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
C. Cropping System and Agricultural Production Information

1. Assessment of Soil Type and Fertility by canal reaches as perceived by the farmers

<table>
<thead>
<tr>
<th>Canal Reach</th>
<th>Soil Type</th>
<th>Fertility Status</th>
<th>Soil Related Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tail</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Use of Chemical fertilizer/FYM and the farmers perceived impact on crop productivity

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of households</th>
<th>Area in</th>
<th>Perceived effect on crop productivity over time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers using FYM only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmers using Chemical fertilizer only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmers using FYM + chemical Fertilizer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmers using no chemical fertilizer and no FYM</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Prevailing Cropping Patterns By Irrigation Regime (Information be based on immediately preceding year)

<table>
<thead>
<tr>
<th>Irrigated Area</th>
<th>Unirrigated Area</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop Rotation Pattern</td>
<td>Area</td>
<td>Percent of Total</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------</td>
<td>------------------</td>
</tr>
</tbody>
</table>
4. Area under Crops and Crop Calendar (This table also continues on the next page, information be based on immediately preceding year)

<table>
<thead>
<tr>
<th>Season/Crop 5.1</th>
<th>Area Occupied</th>
<th>Irrigated Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area in: ha./Ropani</td>
<td>% of Area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Early</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Planting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time</td>
</tr>
<tr>
<td>Monsoon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Specify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mustard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lentil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potato</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Specify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (Specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Cropping intensity**
5. Farmers opinion of optimum time of planting and harvest in view of planting time of the following /next crop.

<table>
<thead>
<tr>
<th>Season/Crop</th>
<th>Area Occupied</th>
<th>Crop Calendar (Pls. Specify Time of Seeding/Planting and Harvesting)</th>
<th>Unirrigated Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area in Ha./Ropani</td>
<td>% Of Area</td>
<td>Early</td>
</tr>
<tr>
<td>Monsoon</td>
<td></td>
<td></td>
<td>Planting Time</td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td></td>
<td>Planting Time</td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mustard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lentil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potato</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td></td>
<td>Planting Time</td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cropping intensity</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Farmers opinion of optimum time of planting and harvest in view of planting time of the following /next crop.
6. Area Distribution by Crop Cultivars and their Productivity Levels (Information be based on immediately preceding year)

<table>
<thead>
<tr>
<th>Season/ Crop</th>
<th>Variety</th>
<th>No. /% of Hh.</th>
<th>Area Occupied by Variety</th>
<th>Yield Levels</th>
<th>Variety</th>
<th>No. /% of Hh.</th>
<th>Area Occupied by Variety</th>
<th>Yield Levels</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Irrigated Area</td>
<td></td>
<td></td>
<td></td>
<td>Unirrigated Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Area in … % of Area</td>
<td>Low</td>
<td>High</td>
<td>Average</td>
<td>Area in … % of Area</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>

**Monsoon**
- Rice
- Maize
- Others (Specify)

**Winter**
- Wheat
- Maize
- Mustard
- Lentil
- Potato
- Vegetables
- Others (Specify)

**Spring**
- Rice
- Maize
- Other (Specify)
7. Important Crop Diseases/Pests including weeds and their Significance in Yield Loss

<table>
<thead>
<tr>
<th>Crop</th>
<th>Disease/Pest</th>
<th>Time of Occurrence</th>
<th>Frequency of Occurrence</th>
<th>Prevailing Practices for control</th>
</tr>
</thead>
</table>

8. Agricultural Input Supply Situation (Please put number/percentage of households in each category by their response)

<table>
<thead>
<tr>
<th>Input Supply Situation</th>
<th>No. percentage of Hhs. In each category for these inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Improved Seed</td>
</tr>
<tr>
<td>Available on time in adequate quantity</td>
<td></td>
</tr>
<tr>
<td>Available on time but not in adequate quantity</td>
<td></td>
</tr>
<tr>
<td>Neither Available on time nor in adequate quantity</td>
<td></td>
</tr>
<tr>
<td>Not available at all</td>
<td></td>
</tr>
<tr>
<td>Any other (Specify)</td>
<td></td>
</tr>
</tbody>
</table>

i. From Which Agency(s) Most Farmers in the System obtain the Agricultural Input Supply?

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Agency Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DADO/Service Centre</td>
</tr>
<tr>
<td>Improved Seed</td>
<td></td>
</tr>
<tr>
<td>Chemical Fertilizer</td>
<td></td>
</tr>
<tr>
<td>Insecticide/Pesticide</td>
<td></td>
</tr>
<tr>
<td>Technical Knowledge</td>
<td></td>
</tr>
</tbody>
</table>

ii. Please state the constraints that the farmers are facing pertaining to input supply

iii. Seed Supply Situation

<table>
<thead>
<tr>
<th>Crop</th>
<th>No. of households that depend on their own seed source</th>
<th>No of households who obtain the seed from other farmers</th>
<th>No. of households who obtain the seed form outside agencies.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring rice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potato</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. What is the frequency of visit of JTAs, JT sand Agricultural Officers to the Area for Advisory Support and Technical Information Dissemination:

<table>
<thead>
<tr>
<th>Agent</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>JTA</td>
<td></td>
</tr>
<tr>
<td>JT</td>
<td></td>
</tr>
<tr>
<td>Agricultural Officer</td>
<td></td>
</tr>
</tbody>
</table>
10. Has the DADO/Agricultural Research Center put (or has been doing so in the past) any kind of field demonstration in the Area? If yes, please state the Kinds of demonstration.

11. How many farmers, have received some kind of technical training in Agriculture or attended Farmers’ Field Day/Observation Tour

<table>
<thead>
<tr>
<th>Name of the Farmer</th>
<th>Training Received</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. Suggestion from the Farmers that would contribute to Agricultural Productivity Enhancement in the Scheme.

D. Irrigation Organization

1. Organization of Water Users’ Association (WUA)
   a. No. of tiers in WUA:
   b. No. of functionaries and appointees
   c. Tenure of executive committee functionaries:
   d. Please prepare a list of functionaries and appointees in the executive committee:

<table>
<thead>
<tr>
<th>Name</th>
<th>Designation</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Changes in the organization of WUA over time:
   a. Did Water Users’ Organization/WUA exist prior to ILC/NISP intervention? If yes, when and how was WUA initiated.
   b. When was WUA formally registered
   c. Changes in the WUA structure, the number of functionaries and appointees and their tenure over time.
   d. Changes in the election/selection of functionaries and appointees over time
   Changes in the gender concern in the WUA over time

3. Frequency of General Assembly and Regular/Emergency Meeting

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Frequency No/Year</th>
<th>When</th>
<th>Where</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Assembly</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Main Committee Meeting</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Regular</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. Emergency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Branch Committee Meeting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Regular</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. Emergency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Boundary rules for appropriation (please state the rules in use to obtain membership in WUA i.e. who can be included/excluded in WUA and to appropriate from the system)

5. Please state in the following table, kind(s) of training provided in the past for the capacity building of WUA, number of users participated in the training, when and where was the training conducted etc.

<table>
<thead>
<tr>
<th>Kind of the Training</th>
<th>When and Where Conducted</th>
<th>No. of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Record keeping of WUA (Please state in the following table kinds of records maintained by WUA and the status of records).

<table>
<thead>
<tr>
<th>Kinds of Records</th>
<th>Status of Records</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**E. Operation and Maintenance**

1. Please state the existing procedure of water allocation to the secondary and tertiary canals and the rules thereof, for:
   (a) Wet Season
   (b) Dry Season

2. Please state the existing procedure of water distribution to the farmers’ fields within the secondary/tertiary canals and the rules thereof for:
   (a) Wet Season
   (b) Dry Season

3. Please state the kinds of regular and emergency repair and maintenance in the system, their timing and assessment of kinds and volume of resource needs:
   (a) At the source and intake
   (b) At the main canal
   (c) At the secondary and tertiary canals

4. Please state the prevailing rules for resource mobilization (in cash or in kind) for regular and emergency repair and maintenance.

5. Pay-off rules (Please state the prevailing rules for fines, sanctions and rewards and the conditions for enactment of pay-off rules)
Base Line Data Part – II
Household Level Information

1. Personal Information
Name of the household head/participating farmer:
Age:
No. of family members:
Land holding size:
For how long the Hh/participating farmer has been living in the command area of the irrigation scheme and using water from the system:
Is the Hh/participating farmer is original inhabitant or migrant.

2. Resource Endowment
A. Family Size:

<table>
<thead>
<tr>
<th>Age</th>
<th>No. of Family Members</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

Educational Attainment:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>No. of Family Members</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Illiterate</td>
<td></td>
</tr>
<tr>
<td>Primary level</td>
<td></td>
</tr>
<tr>
<td>Below SLC</td>
<td></td>
</tr>
<tr>
<td>Above SLC</td>
<td></td>
</tr>
</tbody>
</table>

B. Land Holding Size
(a) Operational Land Holding:

<table>
<thead>
<tr>
<th>Type of Land</th>
<th>Area (Bigha/Ropani)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Irrigated</td>
</tr>
<tr>
<td>i. Agricultural Land</td>
<td></td>
</tr>
<tr>
<td>Khet Land</td>
<td></td>
</tr>
<tr>
<td>Bari Land</td>
<td></td>
</tr>
<tr>
<td>ii. Non-Agricultural Land</td>
<td></td>
</tr>
<tr>
<td>Homestead</td>
<td></td>
</tr>
<tr>
<td>Khar Bari/Parti</td>
<td></td>
</tr>
<tr>
<td>Forest Land</td>
<td></td>
</tr>
<tr>
<td>Hhs Own Land (i+ii)</td>
<td></td>
</tr>
<tr>
<td>iii. Leased-in land for share cropping/mortgage/contract farming</td>
<td></td>
</tr>
<tr>
<td>Khet Land</td>
<td></td>
</tr>
<tr>
<td>Bari Land</td>
<td></td>
</tr>
<tr>
<td>iv. Leased-out land for share cropping mortgage/contract farming</td>
<td></td>
</tr>
<tr>
<td>Khet Land</td>
<td></td>
</tr>
<tr>
<td>Bari Land</td>
<td></td>
</tr>
</tbody>
</table>
(b) Land holding within the command area of pilot irrigation scheme

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Area (Bigha/Ropani)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fully Irrigated</td>
</tr>
<tr>
<td>Khet Land</td>
<td></td>
</tr>
<tr>
<td>Bari Land</td>
<td></td>
</tr>
<tr>
<td>Other Land (Specify)</td>
<td></td>
</tr>
</tbody>
</table>

(c) Distribution of Land holding within the command area of irrigation scheme
Is the land holding consolidated at one place? Yes No
If No, how many farm parcels:
Indicate the distribution of farm parcels within the command area:

<table>
<thead>
<tr>
<th>Parcel No. (Kitta No.)</th>
<th>Size (Katha/Ropani)</th>
<th>Where Located*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Please indicate head/middle/tail in the system and the secondary/tertiary/outlet irrigating that parcel.

C. Livestock Holding

<table>
<thead>
<tr>
<th>Type of Livestock</th>
<th>Number</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Local</td>
<td>Improved</td>
</tr>
<tr>
<td>Cattle/Buffalo:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milking cow/buffalo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heifers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calf</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bullocks/male buffalo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheep and Goat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poultry</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

D. Off-Farm Employment and Income (Please indicate the number of family members involved and income earned under each category of jobs, where applicable).

1. Source of Income

<table>
<thead>
<tr>
<th>Type of Employment</th>
<th>No. of Members</th>
<th>Period of Employment (Months/year)</th>
<th>Income (Rs./Year)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent/Temporary Jobs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Within the country</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Outside the country</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily Wage Earning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Within the village</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Away from the village</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shops/Trade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remittance from Pension</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Specify):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Cropping Pattern of the household (For the land within the command area of the Irrigation Scheme)

<table>
<thead>
<tr>
<th>Crop Rotation Pattern</th>
<th>Irrigated Area (Bigha/Ropani)</th>
<th>Unirrigated Area (Bigha/Ropani)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area</td>
<td>Area</td>
<td></td>
</tr>
</tbody>
</table>

3. Area distribution by crop and crop varieties. This table also continues on the next page. Please fill out the information for the immediately preceding year for the landholding of the Hh within the command area of the irrigation scheme.

<table>
<thead>
<tr>
<th>Season/ Crop</th>
<th>Irrigated Area (Katha/Ropani)</th>
<th>Unirrigated Area (Katha/Ropani)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Variety</td>
<td>Area</td>
</tr>
<tr>
<td>Monsoon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (Specify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fallow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lentil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mustard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potato</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Pls. Specify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fallow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Season/Crop

<table>
<thead>
<tr>
<th>Variety</th>
<th>Area</th>
<th>Production (Kg/Muri)</th>
<th>Variety</th>
<th>Area</th>
<th>Production (Kg/Muri)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other (Pls. Specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fallow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. **Cost of production and income by crops and crop varieties** (Please fill out separate crop sheet attached at the end of the this format for each variety of different crops grown by the participating farmer in the immediately proceeding year)

5. **Participation in WUA**

(a) Is the participating farmer or any of his family member working as functionary (or had been a functionary) in the main or branch committee of WUA?

   Yes  No

If yes, please indicate when and for how long?

(b) How many times did the participating farmer or any of his family members attend the general assembly or meeting of WUA during the immediately proceeding year?

(c) How many of the WUA functionaries are personally known to the participating farmer?

(d) Are the WUA functionaries easily accessible to the participating farmer?

(e) Whom among the WUA functionaries does the participating farmer contact incase of irrigation related needs and problems?

(f) Do the WUA functionaries regularly inspect monitor the irrigation scheme to identify the irrigation related problems (Put 4mark)

<table>
<thead>
<tr>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
</table>

(g) Do the WUA functionaries make sincere effort to solve the users and/or irrigation related problems? (Put 4mark)

<table>
<thead>
<tr>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
</table>

(h) Does the participating farmer take initiative to perform small repair and maintenance in the canals/structures in cooperation with his neighbor (Put 4mark)

<table>
<thead>
<tr>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
</table>

6. **Participation in DOI Rehabilitation and Improved Process**

(a) From whom did the participating farmer came to know about DOI support for the rehabilitation and improvement of the irrigation scheme for the first time?

(b) What kind of involvement did the participating farmer have in the decision making pertaining to DOI rehabilitation and improvement?

(c) What contributions (in cash or labor) the participating farmer had to make during DOI rehabilitation and improvement?
7. Repair and Maintenance
How much contribution in terms of cash and labor the participating farmer had to make for annual repair and maintenance in the immediately proceeding year?

<table>
<thead>
<tr>
<th></th>
<th>Cash</th>
<th>Labour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Had there been any change in the resources contributed by the participating farmer in the annual repair and maintenance after DOI rehabilitation and improvement?

**Crop Sheet**
Please fill out the crop sheet for each of different varieties of crops grown by the participating farmer in the immediately preceding year.

**Cost benefit record of different crops** (to be completed for each crop and crop varieties after harvest and post harvest operations)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Particulars</th>
<th>Unit</th>
<th>Quantity</th>
<th>Rate Per Unit, Rs.</th>
<th>Total Amount, Rs.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Production input cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Seed</td>
<td>Kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>Nursery bed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Compost/FYM</td>
<td>Kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>Chemical fertilizer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- DAP</td>
<td>Kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Urea</td>
<td>Kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Muriate of potash</td>
<td>Kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>Micronutrient</td>
<td>gm/Kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>Fertilizer (main field)</td>
<td>Kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Compost/FYM</td>
<td>Kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>Chemical fertilizer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- DAP</td>
<td>Kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Urea</td>
<td>Kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Muriate of potash</td>
<td>Kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>Micronutrient</td>
<td>gm/Kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.4</td>
<td>Irrigation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre-planting</td>
<td>No.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>After-planting</td>
<td>No.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>Insecticides</td>
<td>gm/ml</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.6</td>
<td>Fungicides</td>
<td>gm/ml</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7</td>
<td>Any other inputs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total production input cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Labour input cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Nursery bed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Hired labour</td>
<td>Day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. No.</td>
<td>Particulars</td>
<td>Unit</td>
<td>Quantity</td>
<td>Rate Per Unit, Rs.</td>
<td>Total Amount, Rs.</td>
<td>Remarks</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------------------------------</td>
<td>---------------</td>
<td>----------</td>
<td>-------------------</td>
<td>-------------------</td>
<td>---------</td>
</tr>
<tr>
<td>b.</td>
<td>Family labour</td>
<td>Day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>Bullock (pairs)</td>
<td>Day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>Tractor</td>
<td>Hour/Day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.2 Land & soil preparation

| a. Hired labor | Male | Day |                   |                   |         |
|                | Female | |                   |                   |         |
| b. Family labour | Male | Day |                   |                   |         |
|                | Female | |                   |                   |         |
| c. Bullock (pairs) | Day | |                   |                   |         |
| d. Tractor | Hour/Day | |                   |                   |         |

2.3 Seeding/transplanting

| a. Hired labor | Male | Day |                   |                   |         |
|                | Female | |                   |                   |         |
| b. Family labor | Male | Day |                   |                   |         |
|                | Female | |                   |                   |         |

2.4 Compost/FYM application

| a. Hired labor | Male | Day |                   |                   |         |
|                | Female | |                   |                   |         |
| b. Family labor | Male | Day |                   |                   |         |
|                | Female | |                   |                   |         |

2.5 Chemical fertilizer application

| a. Hired labor | Male | Hour |                   |                   |         |
|                | Female | |                   |                   |         |
| b. Family labor | Male | Hour |                   |                   |         |
|                | Female | |                   |                   |         |

2.6 Intercultural operations (weeding, hoeing, earthing up, top dressing, etc.)

| a. Hired labor | Male | Hour |                   |                   |         |
|                | Female | |                   |                   |         |
| b. Family labor | Male | Hour |                   |                   |         |
|                | Female | |                   |                   |         |

2.7 Irrigation application

<p>| a. Hired labor | Male | Hour |                   |                   |         |
|                | Female | |                   |                   |         |</p>
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<tr>
<th>S. No.</th>
<th>Particulars</th>
<th>Unit</th>
<th>Quantity</th>
<th>Rate Per Unit, Rs.</th>
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<td>Threshing and winnowing</td>
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<td>Benefit: Cost ratio</td>
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ANNEX 10

Diagnostic Analysis and Improvement Plan for Farm Irrigation System

Some of the important aspects of water management, problems and issues related to farm water management are the followings.

1. Deficient Farm Water Management
A farm water management system concerns the water control system that is managed by a group of farmers or individual farmer. In the case of a larger irrigation system, it normally is a tertiary unit. It often includes a farmer managed or small scale irrigation system, where water intake, water supply and drainage is fully managed by farmers. In some cases, an individual farmer may manage the entire farm water management system.

Deficiencies in the farm water supply result either in shortages or in excess water in certain areas and in certain periods of the season. The water shortages and excesses can result in the potential of the system not being fully met in terms of area coverage and cropping intensity.

Verification Procedures

In Field Visits Observe
- Poor conditions of the irrigation and drainage system
- Cropped area affected by inadequate irrigation or waterlogging

With Farmers Evaluate
- General dissatisfaction with water control conditions
- Conflicts on water distribution and inadequacies in water supply in dry periods
- Waterlogging and flooding problems in wet periods

In Analysis Establish
- Low productivity and low cropping intensities as demonstrated in data from local agricultural statistics

Possible Causes
- Excess water in farm water management system.
- Water shortage In farm irrigation system

2. Excess Water in the Farm Water Management System
Excess water in the farm water management system occurs when rainfall or flood waters cannot by evacuated adequately and result in submerged and waterlogged conditions for shorter or longer periods effecting crop production. It also may occur by an excess of water supply for irrigation and water supply exceeds demand. Excess water needs to be removed from the system through adequate drainage. Waterlogging problems are particular
pronounced during the wet season. In arid and semi-arid regions with high groundwater tables waterlogging is often aggravated by salinity problems.

A drainage system consists of the natural drainage system of rivers and local streams complemented by manmade drainage canals and structures. In the case of flooding dikes and bunds may provide protection from floods.

**Verification Procedures**

**In Field Visits Observe**
- Depressions and lower areas submerged, waterlogged or flooded
- Conditions of the natural and artificial system

**With Farmers Evaluate**
- Areas that are affected by waterlogging or flooding
- Conditions and maintenance of drainage and water control structures

**In Analysis Establish**
- Design and lay-out of the drainage system with map or sketch map and size of low-lying areas affected by waterlogging and flooding.
- Crop water requirements and excess of water supply by irrigation.

3. **Water shortage in the farm irrigation system**

The farm irrigation system concerns the irrigation system that is managed by a group of farmers or an individual farmer. In the case of a larger irrigation system, it normally is a tertiary unit. It often includes a farmer managed or small scale irrigation system, where water intake and supply is fully managed by farmers. In some cases, an individual farmer manages the entire farm system. Water shortages in the farm irrigation system can both be shortages in certain areas of the farm unit or/and shortages in certain periods of the season. This water shortage may result in the potential of the system not being fully met in terms of area coverage and cropping intensity.

**Verification Procedures**

**In Field Visits Observe**
- Part of the command area is not cropped, in particular in the dry season;
- Crops show signs of stress

**With Farmers Evaluate**
- Only part of the command area can be effectively irrigated in particular in the dry season
- The water supply is irregular and/or water shortages occur regularly;
- Conflicts between farmers occur as a result of water shortages;
- Area that could be irrigated if more water would be available.
In Analysis Establish
- size of the cropped and irrigated areas from a sketch map of the farm system.
- crop water requirements and adequacy of water supply.
- crop yields and cropping intensities through data collection and local statistics

Possible Causes
- Hydrological shortage of water at the water source or intake
- Operational deficiencies within the farm irrigation
- Infrastructural deficiencies if the farm irrigation system

4. Hydrological shortage of water
Hydrological water shortage relates to a reduced amount of water available at the intake of the farm irrigation system. The source of water depends on the system and it can be a main irrigation system, a river, a dam/lake or groundwater. Shortages or an irregular water supply in the farm system can be caused by reduced water availability (droughts, seasonal water shortages), causing interruptions in the water supply.

Possible Causes
- Hydrological shortages in the main system
- Hydrological water shortage at river diversion
- Hydrological water shortage in dams/reservoir
- Hydrological water shortage of ground water

4.1 Main System Shortage
Hydrological shortage of water in the main system relates to a shortage of water in some or all of the supply canals of the main system and will result also in a reduced water supply at the intake to the farm irrigation system. The shortage in the main system can be due to a shortage or inadequate supply of water from the source (river diversion, reservoir, or ground water) for a certain time period, seasonally, temporarily, regularly or occasionally or due to excessive losses in the main canal by structural or operational deficiencies.

Verification Procedures
In Field Visits Observe
- Low and/or fluctuating water levels in the intake

With Farmers Evaluate
- The time duration of water shortages in water supply from the main system
- The arrangements and criteria used for water supply from the main system
- The occurrence of droughts and dry spells

With Agency Staff Evaluate
- The causes of shortage of water supply to the farm irrigation system
In Analysis Establish
- by flow measurements or discharge records, the volume of water flows to the farm irrigation system
- deficiencies in water flows into the farm system

Possible Causes
- Reduced water supply to the main System
- Deficiencies in main system operation

4.1.1 Reduced water supply from the Main System
The hydrological shortage of water in the main system can be caused by a reduced water availability at the water source of the main system. The reduced water availability can be due to reduced discharges in the river or reduced inflow to reservoirs, mainly due to drought, dry season etc. The reduced water availability can also be due to lower ground water levels in case of ground water supply.

Verification procedures

With Farmers Evaluate:
- The nature of the rainfall patterns and occurrence of droughts and dry periods.

With Irrigation Agency Evaluate

In Analysis Establish:
- A shortage of water at the source of the main system.

Possible Solutions
- Water deliveries

4.1.2 Deficiencies in main system operation
The poor operation of the main system can lead to a hydrological shortage of water in some or all of the supply canals in the main system. Deficiencies in the main system operation can lead to unequal water distribution and shortage of water in some canal section even though sufficient water is available in the main system.

Verification Procedures

With Farmers Evaluate
- The irregularities in main system supply
- The arrangements for farm water supply and communications with main system operators

With Irrigation System Operators Evaluate
- rules and criteria on water distribution to farm intake
• discrepancies in planned and actual delivered water
• shortcomings in the infra-structure for water distribution
• origin of reduced water supplies

In Analysis Establish
• timing and volume of water supplied to (the farm irrigation system, reliability and variability and planned versus actual delivered water.

Possible Solutions
• Improve communication with main system irrigation agency.
• Revise criteria for water supply to the farm irrigation system

4.1.3 Structural Deficiencies Main System
The operation of the main system is determined by the hydraulic system in combination with the operation system. Limitations in the infrastructural system will have a distinct impact on the availability of water in the right time and right amount.

Verification procedure

In Field Visits Observe
• general conditions of the canal system and the hydraulic; structures that regulate water supply to the farm systems

With Irrigation System Operators Evaluate
• functioning and constraints in the operation of the hydraulic system,
• shortcomings and conditions of the infra-structure for water distribution

Possible Solutions
• system rehabilitation and modernization

4.2 River Diversion Shortage
The water levels in the river and thereby the river discharge determines (the amount of water available at the river intake. A reduced supply in the river will result in less water being available at the intake. The reduced water supply can be seasonally (dry season), temporarily (short periods of droughts) or exceptionally (dry years)

Verification Procedures

With Farmers Evaluate
• The nature of the hydrological characteristics of the river

In Analysis Establish
• The hydrological characteristics of the river and catchment area and examine the variability and reliability of the river discharge
Possible Causes
- Reduced rainfall
- Deterioration of the Catchment area management

4.3 Reduced rainfall
Reduced rainfall will cause decrease in water levels and water intake and can be seasonally (dry season), temporarily (short periods of droughts) or exceptionally (dry years)

Verification Procedures

With Farmers Evaluate
- The nature of the rainfall patterns and occurrence of droughts and dry periods

In Analysis Establish
- The rainfall run-off relation from local hydrological service
- A statistical analysis of the rainfall pattern which reveals variability of rainfall and its effects on river discharge

5. Operational deficiencies
The operational deficiencies relate to inadequacies in the water acquisition and the distribution within the farm system. It deals with the actions taken by the farmers to control the flow of water through the farm system. Operational procedures are required at the intake of the farm system to control the volume of water entering the system. Operational procedures are also required to distribute the flow of water to the different parts of the farm command area according to requirements. Based on the flexibility of the hydraulic regulating structures, different operational systems can be established: rotation, proportional supply etc. Operational activities include planning the water distribution and implementing it which includes physical actions such as opening and closing or changing the settings of gates.

Verification Procedures

In Field Visits Observe
- Water regulating structures in place and operational:
- Variability of cropping intensities as a result of unequal water distribution

With Farmers Evaluate
- Rules and regulations concerning the distribution of water and regulation of distribution structures
- Equitable and reliability in water supply to different areas in the farm system
- Conflicts among farmers concerning supply and distribution of water

In Analysis Establish
- Equitability and reliability of water distribution to different areas based on discharge measurements.
**Possible Causes**
- Lack or inadequate rules on the operational of the intake (main system, river diversion, clam, groundwater)
- Lack of operational rules and criteria on distribution
- Inadequate organizational Structure
- Inadequate regulating structures
- Inadequate Operation Intake Device

**5.1 Inadequate Operation Intake Device**
The operation of the water supply at the intake relates to procedures governing the amount of water released in to the farm system and may give cause to a number of difficulties related to the type of intake and reponsibility of operation.

**Verification Procedures**

**In Field Visits Observe**
- The type of intake (main-system intake, pump, river intake, dam/reservoir, groundwater lift)
- Conditions and manner in which water is released into the system.

**With Farmers Evaluate**
- Operation of intake and reliability of supply, including duration (number of hours per day and interval Period)
- Criteria are used to determine the amount of water supplied to the farm system.
- Constraints and conflicts that exist between the farmers regarding the distribution of water.

**Possible Causes**
- Operational constraints at Main system intake
- Operational constraints at River intake
- Operational constraints at Dam/Reservoir/Lake intake
- Operational constraints at Well intake

**5.2 Inadequate Water distribution**
Operational rules on water distribution concern the arrangements among farmers that define the distribution of water among the different users and procedures to implement these. These includes the planning of the water distribution, preparation of a schedule according to certain criteria (area, crops, water availability) and timing of delivery, as well arrangements to impose the rules and penalties on uncontrolled and illegal water off-take.

**Verification Procedures**

**In Field Visits Observe**
- procedures and settings in the canal system to regulate water to different parts of the irrigation system.
With Farmers Evaluate
- Arrangements and agreements of the rotation of water along the blocks and within the blocks, the time allocated for each block and the time interval between irrigation turns
- Responsibility in regulating opening and closing of distribution structures
- Inequities in water supply among blocks (tail and head sections) and within blocks (evaluated at the hand of map)
- Dissatisfaction in adequacy and reliability of water supply
- Uncontrolled or illegal off-takes and conflicts among farmers in water distribution
- Penalties for unauthorised water off-take

In Analysis Establish
- At the hand of the irrigation map identify the different irrigation blocks served by the various canals and branches and the distribution structures in place;
- In calculations determine the water requirements for prevalent cropping pattern and supply for each canal section.
- In field measurements verify canal discharges and functionality structures to regulate water supply according to area and cropping pattern

Possible Causes
- Inadequate design and regulation of distributing structures
- Lack or inadequate operational rules and regulations

5.3 Lack or Inadequate Operational Rules and Regulations
Operational rules and regulations are necessary to effectively regulate distribution of water among the various users and crops. Arrangements must be put in place to supply water in the right quantity and at the right time. The water flow can be regulated through regulating the discharge of a continuous flow, by rotation full discharge among different canal units according to fixed and agreed timing, by indenting (on request) or by free off-take. The regulating structures in place play an important role in the rules and regulations for water distribution.

Verification Procedures

In Field Visits Observe
- Identify boards or physical indications of water distribution schedules
- Uncontrolled or illegal off-takes

With Farmers Evaluate
- Recognition of farmers of various irrigation blocks
- Arrangements and agreements on the rotation of water along the blocks and within the blocks, the time allocated. The time interval between irrigation turns for each block
- Inequities in water supply among blocks (tail and head sections) and within blocks (evaluated at the hand of map)
- Water shortages experienced and cropping pattern
**Possible Solutions**

- Based on cropping pattern and area establish water supply rates
- Establish simple rules for water distribution based on existing regulating structures
- Establish boards with water distribution schedules for each canal section

**5.4 Inadequate Organizational Structure**

The organizational framework deals with the manner in which farmers co-operate in the distribution of water. A basic organisational structure is required through which agreement is reached on the operation and maintenance of the system, on fees to be paid for services received and on penalties which can be imposed.

**Verification Procedures**

**With Farmers Evaluate**

- Responsibility for regulating opening and closing of distribution structures
- Agreement on a formal or informal water user association or Water users group and organisational structure
- Conductance of regular meetings to discuss operation and maintenance of the farm irrigation system
- Collection of water fees for operation and maintenance of the system and rate of payment
- Procedures to deal with conflicts amongst farmers
- Penalties for unauthorised water off-take
- Records kept on incentives, fees

**Possible Solutions**

- Review need and functions of the WUA and its organization structure
- Establish rules and regulations concerning:
  - Water supply to individual users
  - Contribution of individual users to operation and maintenance
  - Establish need for canal operator
  - Penalties on non-contributions and unauthorised water use
  - Training of farmers in book keeping and management functions

**6. Infrastructural deficiencies**

The infrastructure of the farm irrigation system relates to the physical infrastructure of the farm irrigation system and includes the intake, the canal conveyance system and the structures that regulate and convey the flow of water to the fields.

**Verification Procedures**

**In Field Visits Observe**

- General conditions of the intake, canal system and structures and conditions of maintenance
With Farmers Evaluate
- Difficulties in the conveyance and distribution of water
- Inadequacy of the canal system
- Functionality of the available structures and difficulties in water distribution and water conveyance
- Difficulties in handling water at intake or water source (main system, river, dam, groundwater.)
- Repair and maintenance activities

Possible Causes
- Deficiency of intake structure
- Deficiency canal conveyance system
- Deficiencies in the hydraulic structures
- Inadequate maintenance

6.1 Deficiency of intake structure
The intake structure at the source of supply to the farm system regulates the amount of water delivered to the farm system. Deficiencies of the intake structure can lead to water shortages, excess water or irregular water supply. The deficiency of the intake structure will depend on the type of source (main irrigation system, river diversion, dam or reservoir, and groundwater supply).

Verification Procedures

In Field Visits Observe
- Type and conditions of the intake (main system, river, dam, groundwater)

With Farmers Evaluate
- Difficulties in handling water at intake or water source (main system, river, dam, groundwater.)

Possible Causes
- Deficiency of intake structure main system
- Deficiency of river diversion
- Deficiency of dam outlet
- Deficiency of ground water outlet

6.2 Main System Intake Structure
The intake from the main system will regulate the supply and discharge of water to the farm irrigation system. The intake can be a simple canal breach or a sophisticated automatic device with water level cross regulators and constant discharge regulators.
Verification Procedures

In Field Visits Observe
- The conditions of the intake structure and its ability to regulate water (upstream and downstream water level control, measuring device)

With Farmers Evaluate
- Their ability to regulate and measure flow with the water intake structure
- Their level of satisfaction with the degree of low regulation with the intake structure

In Analysis Establish
- The hydraulic characteristics of the intake structure and the compatibility with the way it is operated

Possible Causes
- Reduced Intake Discharge
- Deficiencies Intake structure
- Poor Operation of Intake

6.3 Reduced Intake Discharge
Frequent changes in water level upstream of the intake structure causes insufficient and variable intake supplies

Verification Procedure

In Field Visits Observe
- The attempts of farmers to raise water level in main supply canal by construction of illegal cross check structures and thereby increase intake.

With Farmers Evaluate
- The regularity of the discharge through the intake.
- The regulation of the intake discharge

In Analysis Establish

Possible Causes
- Inadequate upstream water level control
- Siltation of intake or intake canal
- Wrong elevation of intake structure
- Adequate slope in intake canal

6.4 River Diversion Weir Deficiency
The river diversion structure or weir is inadequate to satisfactorily control water intake from the river. Deficiencies in the functioning of the structure may be due to shortcomings of design in relation to controlling fluctuating river levels, and adjusting river intake, silt loads and floods as well due to shortcomings in construction and maintenance.
Verification Procedures

In Field Visits Observe
- The type and the condition of the diversion structure
- The ability of the structure to handle excessive and low river flow
- The ability of the structure to handle silt loads
- The ability to regulate intake discharge

With Farmers Evaluate
- Tile shortcomings and constraints of the diversion structure

Possible Causes
- Simple traditional design
- Poor design intake structure
- Damaged and poorly maintained

6.5 Poor design of intake structure
The poor design of the intake structure shows weaknesses in relation to basic regulating functions in relation to flood protection, silt exclusion, and regulation of low water flow

7. Deficiency Canal Conveyance System
The canal conveyance system provides the transport and distribution of water from the intake of the farm system to the field. Deficiencies in the distribution system can be due to the infrastructure that does not allow the water supplied to the farm system to be distributed properly amongst the farmers. The management of the farm irrigation system plays a major role in the efficiency of the conveyance and distribution of the water. In more general terms, the deficiencies are related to the inadequate design, construction, operation or maintenance of the farm irrigation system.

Verification Procedures

In Field Visits Observe
- The canal layout and coverage of the command area
- number and location of structures, their adequacy and functionality of the general condition of canals and structures

With Farmers Evaluate
- The existence and nature of clear rules for water distribution and maintenance, and whether conflicts on water distribution exist
- Difficulties in conveyance and distribution of water to the different users

In Analysis Establish
- The layout of the supply canals by drawing a sketch map of the farm system indicating flow directions, tile irrigated areas, drain and roads
Possible Causes

- Deficiencies in the canal layout
- Poor canal conditions
- Lack of maintenance

7.1 Deficiencies in the canal layout

The canal layout concerns the network of canals that conveys and distributes water from the farmer managed intake to the field and includes the main or tertiary canal unit (minor canal) and the network of field canals and field ditches bringing the water to the field. Deficiencies can relate to insufficient canals to convey water to the various irrigation blocks or to a lack of fieldchannels to convey water adequately to the field.

Verification Procedures

In Field Visits Observe

- The method of field watering at field level and the field water control
- The potential for a further extension of the command area

With Farmers Evaluate

- The shortcomings and constraints with regard to the water reaching the various areas in the Command area

In Analysis Establish

- The layout of the farm irrigation system by drawing a sketch map including the irrigation command areas, the mains, laterals, water courses and field Channels and the irrigation areas served by each canal.
- The discrepancies in canal densities and areas out of command.

Possible Causes

- Canals don't reach full corninand area
- Lack of field channels

7.2 Canals don't mach full command area

The lack of supply canals results in the irrigation areas are not being adequately covered by the irrigation supply canals. Alternatively, an inadequate canal layout prevents the water to effectively reach certain sections or blocks in the command area.

Verification procedures

In Field Visits Observe

- The density of distribution canals and a number of branch canals
- The natural barriers, which prevent the extension of the irrigation area
- The topographical and elevation characteristics that limit the expansion of the command area.
With Farmers Evaluate
- The restrictions in allowing passage of canals through individual properties

In Analysis Establish
- The irrigation density per unit.

Possible Causes
- Very long distribution canals and a limited number of branch canals
- A complex topography prevents the passage of certain sections
- Natural barriers prevent extension of canal system
- Constraints in allowing passage of way

Possible Solutions
- Include additional Branch canals
- Identify technical solutions to extend canal system:
  - Facilitating passage through elevated areas
  - Siphons or aqueducts to overcome natural barriers
  - Pumps to lift to elevated areas
  - Review with farmers passage through cultivated areas.

7.3 Lack of Field Channels
Field channels regulate the water supply to the individual fields and plots. The absence of field channels prevents good control of the field applications (plot-to-plot irrigation)

Verification Procedures

In Field Visits Observe
- The layout and conditions of field channels
- The plot to plot irrigation
- The fields not connected to channels;

With Farmers Evaluate
- The difficulties in field water control and shortcomings in plot to plot irrigation and existing field Channels

Possible Causes
- Small size of plots and fields do not favour extensive field channels
- Topographical complexities
- Loss of cropland for field channels
- Farmers not familiar with lay-out of field Channels

Possible Solutions
- Construction of new field channels
- Improvement of existing field channels
7.4 Poor canal conditions
The conveyance of irrigation water through the canal system is hampered by poor conditions which cause water losses, reduced flows in the canal and frequent maintenance work to be carried out.

In Field Visits Observe
- Signs of eroding canals
- Collapsing canal banks
- Overtopping canal banks
- Siltation in canal
- Heavy vegetation
- Obstructions

With Farmers Evaluate
- The constraints and difficulties in the canal system

Possible Causes
- Too steep slope (steep terrain)
- Too little slope (flat terrain)
- Unstable and/or permeable soil
- Obstructions in canal
- Siltation
- Damage by animals or human traffic

7.5 Too Steep Slope (Steep Terrain)
A canal in steep terrain may cause water to flow with high velocities, resulting in an erosion of canal bottom and canal sides in particular in unstable soils or laid out along the contour of a steep hill-side is prone to frequent landslides, destroying whole sections of the canal.

Verification Procedures

In Field Visits Observe
- The general slope of the terrain and the direction of the canal
- The canal sections laid out along steep hillsides or slopes and unstable sections

With Farmers Evaluate
- The problems they encounter and their frequent maintenance attempts

In Analysis Establish
- On topographical map and canal-lay-out establish prevalent slopes

Possible Causes
- Steep slope of canal bed
- Canal on steep hillside
7.6 Steep slope of canal bed
A canal laid out along the slope may result in high water velocities, resulting in an erosion of canal bottom and canal sides in particular in unstable soils.

Verification Procedures

In Field Visits Observe
- The general slope of the terrain and the directions of the canals
- Through inspections of the canal system identify:
  - Canals dug into the terrain
  - Collapsing canal slopes
  - Farmer construction of improvised drops
  - High velocities in canal

With Farmers Evaluate
- The problems they encounter and their frequent maintenance attempts

In Analysis Establish
- A canal length profile through topographical survey

Possible Solutions
- Drop structures (examples of various simple structures)
- Canal lining
- Realignment direction of canal to avoid steep slopes

7.7 Canal on steep hillside
A canal laid out along the contour of a steep hill-side is prone to frequent landslides, destroying whole sections of the canal.

Verification Procedures

In Field Visits Observe
- The canal sections laid out along steep hill-sides or slopes
- The unstable sections in particular in areas with unstable soils and potential drainage problems

With Farmers Evaluate
- The problems and sections with frequent maintenance problems

Possible Solutions
- Realignment of canals to stabilise canal embankment and risk for canal slide
- Improvement of drainage along slope
- Canal lining or pipes
7.8 Too Little Slope (Flat Terrain)
A canal in flat terrain or a canal trace with too little slope or crossing a depression will have insufficient velocity and can only carry a limited amount of water requiring wide channel beds.

**Verification Procedures**

**In Field Visits Observe**
- The canal system and identify:
  - Canals with overtopping embankments
  - Wide deep canal section
  - Low water velocities in canal
  - Farmers attempt to heighten the banks

**With Farmers Evaluate**
- The problems and frequent maintenance attempts

**In Analysis Establish**
- A canal length profile through topographical survey

**Possible Solutions**
- Realignment of canals
- Reconstruction canal banks
- Construction of aqueducts

7.9 Unstable and/or Permeable Soil
Canals constructed in poorly structured soil will result in erosion, frequently collapsing banks, and high seepage losses.

**Verification procedures**

**In Field Visits Observe**
- The canal condition and identify:
  - Collapsing canal embankments and erosion
  - Waterlogging and drainage conditions of embankments
  - Soil texture, structure and stability

**With Farmers Evaluate**
- The problems and frequent maintenance attempts

**Possible Causes**
- sandy soils
- poorly drained and water logged soils
**Possible Solutions**
- Flatter side slopes
- Lining of canals in sandy soils
- Drainage provisions (Water logged soils)
- Realignment of canals

**7.10 Obstructions in canal**
Temporary or solid obstructions in the canal bed will restrict flow and reduce canal conveyance capacity. Obstructions may be in the form of rock outcrops, heavy vegetation or siltation as well as temporary structures in the canal.

**Verification Procedures**

In Field Visits Observe
- Any obstructions in the canal sections

With Farmers Evaluate
- The canal stretches where the flow of water is potentially restricted

**Possible Causes**
- Heavy vegetation
- Siltation
- Rock outcrops, trunks or other obstructions
- Temporary structures to raise water level

**7.11 Heavy Vegetation**
Vegetation in the canal will result in reduced flows

**Verification procedures**

In Field Visits Observe
- The type and density of vegetation

With Farmers Evaluate
- The constraints of weeds in canal
- Frequency of maintenance and canal cleaning

**Possible Solutions**
- Increased maintenance schedule
- Mechanical or biological means to reduce vegetation growth

**7.12 Siltation**
The silt in the irrigation water will be deposited in wider canal sections with reduced flow velocity, typical at the inlet and first canal section.
**Verification Procedures**

**In Field Visits Observe**
- The deposits of silts in canal bottom at typical canal sections (near intake canal, in wide canal sections (siltation can be recognized by the uniform texture or the deposit)

**With Farmers Evaluate**
- The problem areas and sections where silt deposits are accumulating

**In Analysis Establish**
- A length profile for survey and identify sections with typical siltation silts

**Possible Solutions**
- Increased maintenance schedule
- Canal realignment to increase slope and velocity at critical sections
- Include or improve silt excluder at intake structure

### 7.13 Rock Outcrops and Narrow Canal Beds
Rock outcrops, trunks or any other obstructions along the canal bed will cause reduction of canal capacity farmers may construct

**Verification procedures**

**In Field Visits Observe**
- Any obstructions in the canal sections

**With Farmers Evaluate**
- The canal stretches where the flow of the water is potentially restricted

**Possible Solutions**
- Remove obstructions
- Canal realignment around obstructions

### 7.14 Uncontrolled Structures
Farmers will try to regulate water flow and increase intake or reach high fields by constructing temporary or semi-permanent structures in the canal, mostly of local means (stones brush weirs). Such structures can reduce flow substantially.

**Verification Procedures**

**In Field Visits Observe**
- Any uncontrolled and irregular structures in the canal sections
With Farmers Evaluate
- The difficulties in water passages due to temporary structures to regulate water level

In Analysis Establish
- A canal study for improved water level control

Possible Solutions
- Canal realignment
- Cross regulators for improved water level control

7.15 Damage by Animals
Animal crossings, animal bathing and animals burrowing in the canal embankments (rats, crabs) can destroy or undermine canals resulting in water losses, overtopping and reduced flow capacities

In Field Visits Observe
- Collapsing or damaged canal bankments by cattle, rodents etc.

With Farmers Evaluate
- The difficulties and requirements for cattle crossing and bathing

Possible Solutions
- Construction of animal crossings/bath
- Regulations for cattle owners
- Canal lining
- Biological control of burrowing animals

7.16 Damage by Water Users
The interference of water users in canal crossing, and water off-takes can seriously undermine canal embankments and result in considerable water losses.

Verification Procedures

In Field Visits Observe
- Illegal off-takes and breaches in canal embankments

With Farmers Evaluate
- The awareness of difficulties and interference in canal flow

Possible Causes
- Illegal off-takes
- Uncontrolled crossing and bathing
7.17 Illegal Off-takes
Farmers breach the canal embankment or pump directly out of the resulting in uncontrolled and upsetting an equal water distribution.

**Verification Procedures**

**In Field Visits Observe**
- The number of illegal off-takes and assess water losses and extent of illegal and uncontrolled water use

**With Farmers Evaluate**
- The awareness of criteria for equal water distribution and the effects of uncontrolled water off-takes

**Possible Solutions**
- Agree with Water Users on concepts of water distribution
- Construct additional off-takes

7.18 Uncontrolled Crossings
Farmers will need to cross canals for access and transport of inputs and harvest to fields, which can in various ways damage the canals

**Verification Procedures**

**In Field Visits Observe**
- The damage to canal embankments due to uncontrolled canal off-takes

**With Farmers Evaluate**
- The difficulties in canal crossings

**Possible Solutions**
- Constructions of canal crossings
- Regulations for illegal crossings

8. Inadequate structures
A range of structures are required to regulate the flow of water to the different irrigation blocks to facilitate conveyance through certain canal sections. The number and type of structures will be determined by the specific requirements of the distribution and conveyance System.

**Verification Procedures**

**In Field Visits Observe**
With Farmers Evaluate
- The difficulties and inequities in the distribution of irrigation water to the various irrigation blocks and constraints in the conveyance of water
- The discrepancies in water distribution to certain areas by evaluating the cropping pattern and cropping intensity.

In Analysis Establish
- An inventory of the type, number and conditions of the various structures, including simple farmer made regulating structures

Possible Causes
- Inadequate regulation of water distribution
- Difficulties in water conveyance

8.1 Inadequate Regulation Structures for Water Distribution
The regulation of water distribution can be achieved by various structures which include division structures, offtakes and pipe inlets to lower canal units in combination with water-level control structures. Such structures ensure the stability of discharge and they are used to regulate and distribute the water to the various irrigation blocks according to size and water needs of the crops. In many farmer managed irrigation systems regulating structures may consist of simple canal breaches where with stones or brushwood temporarily regulation structures are formed.

Verification Procedures

In Field Visits Observe
- The type, number and condition of the regulating structures, paying particular attention to:
- the size of the gate opening in relation to the size of the irrigation block
- Control of water level
- Uncontrolled and illegal farmers off-take

With Farmers Evaluate
- The difficulties and inequities in the distribution of irrigation water to the various irrigation blocks
- The blocks which receive adequate water and which ones experience shortages

In Analysis Establish
- The water supply requirements for the various branch canals and off-takes serving the various irrigation blocks.

Possible Solutions
- No regulating sircutures
- Simple, traditional regulating structures
- Inadequate design and regulation of Existing Structures
- Inadequate water control regulating structures
- Poor operation of regulating structures
8.2 No Regulating Structures
The present canal lay-out does not contain any structures to regulate water distribution to
the various irrigation blocks and field sections

Verification Procedures

In Field Visits Observe
☐ The absence of structures or farmer’s improvised devices

With Farmers Evaluate
☐ The difficulties and inequities in the distribution of irrigation water to the various
irrigation blocks, as a result of the improvised structures.

Possible Solutions
☐ Design of regulating structure combined with adequate water level control

8.3 Simple Traditional Regulating Structures
The present structures mainly consist of simple devices made/improvised by farmers (often
made from stones and brushwood) to regulate and distribute the water to the various
irrigation blocks and field sections

Verification Procedures

In Field Visits Observe
☐ The type and number of farmer improvised device

With Farmers Evaluate
☐ The difficulties and inequities in the distribution of irrigation water to the various
irrigation blocks, as a result of the improvised structures.

Possible Solutions
☐ Design of improvised regulating structures (proportional), combined with adequate
water level control

8.4 Inadequate Design and Regulation of Existing Structures
The various structures which are used to regulate and distribute have not been designed
properly to ensure the adequate regulation of the water flow to the various irrigation blocks
according to size and water needs of the crop.

Verification Procedures

In Field Visits Observe
☐ The type of regulation structures, the way they are operated and their functioning in
regulating flow to the different irrigation blocks.
Guidelines for Institutional Arrangements, Training, Irrigation and Agriculture

Production Improvements under On-Farm Water Management Programme

With Farmers Evaluate

- The difficulties and inequalities in the distribution of irrigation water to the various irrigation blocks, assessing which blocks receive adequate water, which one experience shortages.

In Analysis Establish

- The required water flow to the irrigation blocks according to area and cropping plan and measure flow to the different areas.

Possible Solutions

- Rehabilitation of regulating structures (proportional), combined with adequate water level control.

8.5 Inadequate Water Level Control Structures

The flow of water to the various branch canals is strongly influenced by the height of the water table in the supply canal, various devices and structures are used to regulate the water level, proper cross-check structures may be constructed or farmers may use several uncontrolled and improvised means and devices to raise water level and increase inflow to their inlets.

Verification Procedures

In Field Visits Observe

- The way in which the water level control is arranged to regulate flow to the various branch canals and intakes.

With Farmers Evaluate

- The difficulties arising from water level fluctuations and interference by farmers in water level control effecting the distribution of irrigation water to the various irrigation blocks.

Possible Solutions

- Water level control structures, cross-check regulators, and arrangements for uncontrolled off-takes.

8.6 Poor Operation of Distribution Structures

The operation of the distribution structures will determine the flow to the various branches and be may for various reasons not adequately carried out, this may include poor functioning of the gates or complexities in setting the proper position.

Verification Procedures

In Field Visits Observe

- The opening and silting of the intake and distribution structures
- The condition of the structures with regard to leaking
With Farmers Evaluate
- The responsibility in operation of the regulating structures and difficulties arising in operation of the gates

Possible Solutions
- Upgrading the operation of the gates, and improving the organisational arrangements.

8.7 Inadequate Structures for Water Conveyance
The structures for water conveyance include structures which are used to facilitate or overcome difficult passages or crossings in the conveyance of water.

According to the function of the conveyance structure, we can distinguish:
- drop structures: to overcome steep canal slope
- siphons: to provide and underground canal passage for crossing roads drains and other obstacles
- aqueducts: to provide and underground canal passage for crossing roads drains and other obstacles
- Bridges: to cross the irrigation canal

Verification Procedures

In Field Visits Observe
- The type, number and conditions of the conveyance structures and note any improvised structures where farmers with traditional means have improvised to cross difficult passages.

With Farmers Evaluate
- The difficulties and constraints in the conveyance of irrigation water in the various canal sections, assessing constraint in:
  - Overcoming steep terrain sections
  - Canal crossing drains, rivers and streams
  - Road crossings and access to fields

Possible Causes
- Lack of conveyance structures
- Simple, traditional devices
- Inadequate conveyance structures

8.8 Lack of Conveyance Structure
No structures or devices at critical passages and crossing.
**Verification Procedures**

**In Field Visits Observe**
- The condition of the conveyance structures and identify:
  - Eroding canal sections
  - Interference of drains, stream and river crossings limiting expansion canals
  - Side drains or streams draining into canal, causing considerable situations
  - Interference of road to canal system
  - Canals restrict access to fields and roads

**With Farmers Evaluate**
- the need for better access and the interference of canal in the road and drainage system

**In Analysis Establish**
- The canal layout by drawing a sketch map and identify critical sections

**Possible Solution**
- Canal erosion
- No drain or stream crossings
- Road Crossings

**8.9 Canal erosion**
No structures to overcome steep canal sections resulting in canal erosion.

**Verification Procedures**

**In Field Visits Observe**
- The eroding canal sections

**With Farmers Evaluate**
- The difficulties farmers encounter with canal erosion

**In Analysis Establish**
- The terrain slope at the hand of the topographical map and identify potential sections with problems

**Possible Solution**
- Design and construction of drop structures
- Canal lining

**8.10 No Drain or Stream Crossings**
Drains and natural streams interfere with canal sections restricting a further extension of the canal or causing severe siltation in the canal.
Verification Procedures

In Field Visits Observe
- The canal layout and identify:
- Potential for canal expansion by crossing drains
- Drains discharging in canal sections

With Farmers Evaluate
- Potential for the expansion of canal system by crossing of drains or difficulties with siltation by discharge in canals

In Analysis Establish
- The interference of drains and streams at the hand of the map
- The terrain slope at the hand of a topographical map and identify potential section with problems

Possible Causes
- Design of Siphons (Underground) or Aqueducts (above ground) crossing of drains and rivers

8.11 No Road Crossings
- Lack of structure or bridge for easy access to field and road system
- Lack of structure to cross roads and expand canal system

Verification Procedures

In Field Visits Observe
- The potential for canal expansion by road crossing

With Farmers Evaluate
- In interviews with farmers identify difficulties in access and limitation set by road system

In Analysis Establish
- The interference of road and access to fields at the hand of the map

Possible Solution
- Design and construction of bridges and Siphons

8.12 Simple, Traditional Conveyance Structures
Conveyance structures made with simple means or improvised by farmers to overcome difficult canal sections, crossings of roads, drain or stream crossings structures may result in considerable water losses.
Verification Procedures

**In Field Visits Observe**
- The type and functionality of farmers devices and their effects on water control, water losses and maintenance requirements.

**With Farmers Evaluate**
- The constraints and difficulties with the structures made by farmers and the need to replace these.

**Possible Solution**
- Improved structures
- Drop Structures
- Drain and stream crossings
- Road crossings

### 8.13 Inadequate Design and Functioning Conveyance Structures
Existing conveyance structures inadequately designed or constructed and result in considerable water losses and heavy maintenance.

Verification Procedures

**In Field Visits Observe**
- The type and functionality of exiting structures

**With Farmers Evaluate**
- The constraints and difficulties with the existing structures and the need to repair or replace

**Possible Solution**
- Redesigned structures
- Drop Structures
- Drain and stream crossings
- Road crossings

### 9. Lack of maintenance procedures
The arrangements among farmers to contribute towards the maintenance of the irrigation system.

Verification Procedures

**In Field Visits Observe**
- The conditions of canals and structures with regard to the amount of maintenance work carried out.
With Farmers Evaluate
- The arrangements and agreements on contributions in kind and cash toward the maintenance of the system
- The responsibility in organising system maintenance
- The rate of participation towards maintenance and penalties for failing contributions.

Possible Solution
- Complexity and extent of maintenance and repair beyond farmers means
- Lack or inadequate maintenance procedures
- Inadequate organisational framework to impose maintenance rules and contributions in cash and kind.

9.1 Extent and Complexity of Maintenance
The deterioration of the system has gone beyond the means of farmers and requires a major rehabilitation and repair programme with appropriate technical assistance.

Verification Procedures

In Field Visits Observe
- The condition of the farm irrigation system have revealed serious deficiencies, requiring major repair, rehabilitation and modernization.

With Farmers Evaluate
- The capacity of farmers to operate and maintain the irrigation system.

Possible Solution
- Farm system rehabilitation.

9.2 Lack or inadequate maintenance procedures
Farmers have no effective maintenance procedures in place which will ensure a sustainable exploitation of the system

Verification Procedures

In Field Visits Observe
- The book keeping on payment and contributions from individual farmers

With Farmers Evaluate
- The seasonal maintenance works carried out
- The rates established for each farmer
- The adequacy of funds and contribution for maintenance works
- The frequency and arrangements for occasional break-downs and organisation of repair works
**Possible Solution**
- Establishment of maintenance schedules
- Arrangements for break-downs and emergency repairs
- Introduction of farmers fees and contributions

**9.3 Inadequate Organizational Framework**
Co-operation of farmers in the effective maintenance of the system, on fees to be paid for repair and maintenance works.

**Verification Procedures**

**With Farmers Evaluate**
- The responsibility in organising maintenance works
- The agreement on a formal or informal water users association or water users group and organizational structure and its responsibilities in organising maintenance repair and rehabilitation work.
- Collection of water fees for maintenance of the system and rate of payment
- The rate of participation by farmers
- The records kept on meetings, fees
  - Review need and functions of the WUA and its organization structure
  - Establish rules and regulations concerning.
  - Contribution of individual users to maintenance and repair works
  - Penalties on non-contributions and unauthorised water use
  - Training of farmers in book keeping and management functions.
## Problem Solving in Water Users Associations

### Problems and Solutions in the Water Users Group

<table>
<thead>
<tr>
<th>Problems</th>
<th>Causes</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| 1. No WUG Activities                          | □ Lack of information of WUG  
 □ Un willingness farmers to cooperate  
 □ Fear for extra costs and fees to be paid  
 □ Lack of leadership  
 □ Lack of competent support from district | □ Organize WUG meeting with OFWM Team  
 □ Inform farmers on purpose and advantages to cooperate  
 □ Through WUG better Water Supply and fair charge to everyone  
 □ Involve local village leaders  
 □ arrange training with OFWM Team |
| 2. No Leadership                              | □ Nobody interested to take lead  
 □ Low prestige linked to water users group  
 □ Social contrast in village/community  
 □ mistrust among villager  
 □ no support from village head  
 □ no good people available  
 □ farmers too busy with other activities | □ In consultation local leaders identify potential candidates  
 □ convince farmers of benefits WUG  
 □ analyse social contrasts and discuss with local leaders solution  
 □ Investigate reasons for mistrust  
 □ Discuss reasons, consider mediation from district head |
| 3. Low interest farmers in WUG                | □ Unfamiliar with the purpose of the water user Group  
 □ Irrigation low priority  
 □ Fear for enforcement of extra payments  
 □ mistrust among village  
 □ Lack of adequate information  
 □ Bad experiences with previous/other groups activities  
 □ Farmers too busy with other activities | □ Inform farmers on benefits WUG  
 □ Consider to abolish irrigation scheme  
 □ explain fairness of water fees  
 □ Investigate reasons for mistrust  
 □ arrange information meetings, use local leaders to disseminate information  
 □ Investigate reasons for previous failures  
 □ (Investigate other ways of participation 2 ) delegate authority of WUG to village head |
| 4. Poor Participation farmers                 | □ Not well informed on the purpose of the water users Group  
 □ Irrigation not considered high priority  
 □ Fear for enforcement of extra payments  
 □ Farmers too busy with other activities | □ Inform farmers on purpose and benefits  
 □ Organize training for farmers on the potential benefits of irrigation for rice production, horticultural crops etc.  
 □ Through WUG better Water Supply and fair charge to everyone  
 □ arrange meeting/training on convenient time and invite key farmers |
| 5. Low Payments of Fees                       | □ Farmers too poor  
 □ Low profitability  
 □ No or poorly supplied with water  
 □ Attitude "Other don’t pay, so why should I Pay’ Mistrust in fee calculation  
 □ no penalties for non-payment | □ water fees adapted to income from irrigated agriculture  
 □ In training explain potential benefits of irrigation and reliable water supply  
 □ Improved water supply through WUG  
 □ WUG need to impose fair payment by everyone  
 □ WUG to explain basis of fee calculation  
 □ WUG to establish rules and penalties for non-payment of fees or to facilitate payment |
<table>
<thead>
<tr>
<th>Problems</th>
<th>Causes</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Poor Participation in Maintenance</td>
<td>□ Farmers not motivated</td>
<td>□ WUG and local leaders to investigate reasons for low motivation and explain importance maintenance</td>
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<tr>
<td></td>
<td>□ Farmers don’t see benefits in maintenance works</td>
<td>□ WUG to arrange payment in cash for labour in maintenance in maintenance works</td>
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<td></td>
<td>□ Farmers have no time as employment else where attitude &quot;Other don’t participate so why should work&quot;</td>
<td>□ adequate control and penalties on non-participation</td>
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<tr>
<td></td>
<td>□ Conflict among farmers</td>
<td>□ Investigate reason for conflicts and ensure fair distribution of assigned tasks</td>
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<td></td>
<td>□ Lack of adequate penalties for non participation</td>
<td>□ WUG to agree on penalty system for non-participation</td>
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<td>7. Conflicts among members</td>
<td>□ Misuse of Water by Certain Farmers</td>
<td>□ WUG to impose proper control and penalties on misuse of water</td>
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<tr>
<td></td>
<td>□ Unequal water distribution among blocks</td>
<td>□ WUG to establish fair and equal water distribution system</td>
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<tr>
<td></td>
<td>□ Unequal distribution of maintenance tasks</td>
<td>□ WUG to establish fair assignment tasks, equality control and penalties</td>
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<tr>
<td></td>
<td>□ Social contrasts in village</td>
<td>□ Analyse social relationships and divide according social lines</td>
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<td></td>
<td>□ Misuse of entrusted funds</td>
<td>□ ensure an adequate control and complete transparency in WUG expenditures</td>
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<td>8. Lack of rules and regulations</td>
<td>□ Unclear about purpose of WUG</td>
<td>□ explain necessity of rules and regulation to ensure fair contribution and cooperation from all members</td>
</tr>
<tr>
<td></td>
<td>□ No need felt for rules and regulation</td>
<td>□ assist in drawing up regulations based on example else where</td>
</tr>
<tr>
<td></td>
<td>□ Unfamiliar in drawing up rules and relation</td>
<td>□ no enforcement, but gradual development of regulations</td>
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<td></td>
<td>□ Afraid of too heavy commitment</td>
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<tr>
<td>9. No book keeping and records</td>
<td>□ No need felt for keeping records</td>
<td>□ to ensure fair and adequate accounting of fees and expenditures, some basic book keeping is essential</td>
</tr>
<tr>
<td></td>
<td>□ Nobody capable or willing to keep records</td>
<td>□ discuss with village head possibilities for assistance village administration</td>
</tr>
<tr>
<td></td>
<td>□ require special training in book</td>
<td>□ arrange special training for WUG committee</td>
</tr>
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<tr>
<td>10. No WUG Meetings to explain or agree</td>
<td>□ no need felt to organize WUG meeting</td>
<td>□ evaluate reasons for low interest, identify issues for information</td>
</tr>
<tr>
<td></td>
<td>□ no leadership in WUG</td>
<td>□ identify in consultation local leaders potential WUG leaders</td>
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<tr>
<td></td>
<td>□ no WUG committee</td>
<td>□ Establish interest and willingness for WUG</td>
</tr>
<tr>
<td></td>
<td>□ farmers not interested to attend</td>
<td>□ arrange meeting/training on convenient time and invite key farmers</td>
</tr>
<tr>
<td></td>
<td>□ no confidence in benefits of WUG</td>
<td>□ inform and discuss with farmers benefits WUG</td>
</tr>
<tr>
<td></td>
<td>□ farmers insufficiently informed</td>
<td>□ in consultation local leaders arrange information meeting.</td>
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</tbody>
</table>
Annex 11

Check list/questions for discussion on Mapping Exercise

List of items which may be included in the irrigation and drainage map

General
- Roads
- Houses/villages
- Temples/Places of worship
- Rivers, streams, lakes
- North-south directions
- FFS meeting place
- Bridges
- Hills/mountains

Irrigation and drainage
- Water intake (weir, pumps, wells, reservoirs)
- Canal layout (primary, secondary, tertiary, field canals and drains)
- Irrigate command area
- Boundaries of subirrigation units
- Water flow directions in the field
- Small irrigation structures:
  - Drop structures
  - Cross regulators
  - Distributories
- Tertiary off-take
- Field canal off-take
- Siphons, aqueducts

Questions for discussions
- Does the map give a good representation of the irrigation and drainage situation in the area?
- Indicate areas inadequately irrigated or frequently flooded/water logged?
- Identify on the irrigation and drainage systems where you experience problems?
- Indicate areas with flooding or water logging on the map?
- Indicate areas that receive inadequate water?
- Where would you expect problems with poor canal conditions, lacking structures, etc?
Annex 12

**Guidelines for formulating ballot box questions**

Ballot box test is a field-based test without pen and paper. In developing ballot box questions it is essential that the questions be related to a situation in the field. The questions have to be formulated in such a way that they can be answer only after field observation has been made. A simple way of checking this is by trying to answer the questions at a place where no field observation can be made. If it is possible to answer the questions, they need to be re-formulated.

Ballot box questions are of a selection type (multiple choice, A. B or C). The questions should be in the dialect or vernacular and formulated in a simple way, understandable for everybody.

The field situation to which the question is referring to, should be visible from where the question is asked. The formulation of the question should contain a reference to the relevant situation in the field (for example: this canal etc.) or by connecting the question and the related situation in the field using a piece of thread, if it is helpful.

*Preparing the Ballot box exercise in the field*

Make as many ballot boxes as there are questions (20-25 pieces). A simple way would be to use a folder.

Mount the cardboard or folders on bamboo sticks with thumbtacks and set the ballot boxes up in the field. Prepare for each farmer also the pieces of paper with his or her assigned number on it.

*Questions for discussions*

- What has been learnt from the exercise in relation to on-farm water management?
- Did the questions cover most of the problems in the area?
- Where there questions that related to unfamiliar topics?
- If yes, which were these topics, and would you like to learn more about these topics?
- Are there other topics/problems which were not covered by the ballot box questions but are interesting to learn more about?
SAMPLE BALLOT-BOX QUESTIONS

**Canal design**

The size of this distribution canal is?
A) Too small
B) Just right
C) Too large

The construction bund is?
A) Too wide
B) Too low
C) Not sufficiently strong
D) Will require frequent maintenance
E) All right as it is

The discharge of canal is too small because?
A) Too narrow cross-section
B) Not deep enough
C) Intake weir insufficient

The problem in this canal section is?
A) Lack of maintenance
B) There is no problem
C) Soil erosion

This quartenary canal is needed for?
A) Irrigation
B) Drainage
C) To separate two fields
D) Is unnecessary and takes-up only space

The situation in this canal causes?
A) Erosion
B) Unequal water distribution
C) No problem at all

**Collapsing banks**

What is needed to repair/prevent landslide in this canal?
A) Slope needs to be flattened
B) Canal bank needs to be widened
C) Canal lining is required

To repair/prevent sliding of this part of the canal, it needs?
A) Canal bank should be constructed with a slope or have some supporting device
B) Canal bank should be vertical
C) Canal is to be widened

The collapsing sides?
A) Can be repaired by reshaping canal sides
B) Require canal lining
C) Does not matter
Unstable sides?  
A) Does not matter as water will carry away earth  
B) Can be repaired by putting soil in the sides  
C) Can be repaired by bamboo matting  

Is there a problem with this part of the dike or bund?  
A) Is good, satisfactory  
B) Will require regular maintenance  
C) Original = solution  
D) Will cause water leakage’s  
E) Will frequently block the canal  

This part of the canal often gets damaged, so that?  
A) It needs to be repaired  
B) Needs to be hardened or to be made permanent  
C) No matter  

Seeing this type of canal, it needs to?  
A) Be made permanent  
B) Be repaired and returned to its original form  
C) Be planted with grasses  

**Leaking of lining**  

Seepage through stonewall?  
A) No problem  
B) Causes seepage and water losses  
C) Inadequate design/construction stonewall  

**Structures - causes of broken structures**  

Collapse sidewall?  
A) Cement not string enough  
B) Design inadequate  
C) Broken on purpose by somebody  

**Steep canal section**  

Too steep slope erosion section?  
A) More water will pass, leave as it is  
B) Fill up with earth to higher water level  
C) Make drop structure  

The condition of this canal can be improved by?  
A) Building a division structure  
B) Construction of a drop and canal lining  
C) Lining of canal only
This part of the canal will cause?
A) Flooding
B) Canal erosion
C) More water flow

Erosion in canal will cause?
A) Reduce water flow downstream
B) Silt will be carried away by flow
C) Destroys canal

**Over-topping canal**

Over topping of this canal is caused by?
A) Too much grasses and weeds
B) Too low
C) Too much water

What is the problem at this location?
A) There is no problern
B) Water flows too fast
C) There is too much water in the canal

Over topping canal section?
A) Too much sand/vegetation in the canal
B) Canal too low
C) Too much water in the canal

**Damage by animals**

Damage in canal is caused by?
A) Too much water
B) No maintenance by farmer
C) Animals

Canal is damaged because of?
A) Rain
B) Bad construction
C) Washing of animals

Maintenance and repair should be done by?
A) The farmers of that block
B) Owner of the animal
C) A+B is right

**Crabs/Rats**

Crab holes leaks?
A) Few holes will not matter
B) May cause collapse of canal banks
C) Caused by rats
Crab holes seen here?
A) Cause severe water leakages
B) Are no problem
C) Damage bund

What problems do cause the holes on the other side of the canal?
A) Cause water losses
B) Cause undermining by water and erosion
C) Are not a problem

**Canal blockage – stones**

Will the stones form a bottleneck in this fast running water?
A) Much water will pass as water is flowing fast here
B) Does not matter, has no effect on water supply
C) Canal requires to be made deeper here

Stone in canal?
A) Cause water to flow faster
B) Block flow of water, reduces debit of canal
C) No problem at all or use full for washing

Such canal condition will result in?
A) Canal will be stronger
B) Water flow will be better
C) Water flow will be hampered

**Canal blockage – vegetation**

The grasses and weeds in this canal will cause?
A) Dirty water
B) Reduced water flow
C) No problem

The waste and leaves around this structure and in the canal?
A) Are not a problem
B) Hampers the water flow
C) Lowers the discharge

What is the effect of all this vegetation in the canal?
A) Plants restrict water flow
B) Plants keep the water in the canal
C) Does not effect water availability

What will be the influence of this heavy vegetation in the canal?
A) Plant restrict water flow
B) Plants keep water in the canal
C) Does not effect water availability
**Sedimentation**

The sedimentation in this canal is caused by?
- A) Water is not clear
- B) Need to have division gate
- C) Canal is too dirty, flow is hampered

**Low density of offtake structure**

Why are there only a few offtake structures?
- A) No. of offtakes sufficient
- B) More canals required to serve total plots and all blocks
- C) Not enough boxes

**Irregular offtakes**

What is needed in this canal section?
- A) A bamboo inlet is needed
- B) A gate of cement should be build
- C) No improvement is needed

What is the situation of this brushwood offtake?
- A) Require frequent repairs
- B) Allows accurate distribution of water
- C) Needs to be replaced with a concrete box

What needs to be done with this offtake to quartair?
- A) Need to be equipped with box
- B) Water intake need to be controlled
- C) It is acceptable as it is

What kind of irrigation structure is needed at this part of the canal?
- A) Drop structure
- B) Division box
- C) Intake structure

**Water management**

Which of the following irrigation structures would be needed here?
- A) Drop structure
- B) Diversion structure / quartenary canal
- C) Intake

**Illegal off takes**

Water theft on this canal can cause?
- A) Neighbouring plot will have shortage of water
B) Downstream plot will have shortage of water
C) Water distribution is in equity

What is the situation here in relation to illegal offtake?
A) Each farmer is allowed to take water as required
B) Causes water shortage with farmers downstream
C) Intake gate should be installed

**Drop structures**

Is there a problem with this drop structure?
A) There is no problem
B) Weir is needed
C) One is not enough

This drop structure is?
A) Okay
B) Needs maintenance
C) Is constructed wrong

What is needed at this part of the canal?
A) Permanent canal
B) Drop structure
C) Leave it like it is

**Functioning of a box**

If supply is continuous?
A) Gate B and A should have the same width
B) Gate A should be 2X larger than gate B
C) Gate B should be larger

What would happen if no box were constructed here?
A) Much problems in dividing water equally to the different blocks
B) Not needed here
C) More water would pass to block 1

Where are the gates used for in the box?
A) Gates are normally open and are closed only when water is too little
B) To regulate flow of water
C) Gates normally closed, only when water is needed to they are opened.

How does this box function?
A) It functions okay
B) It functions a bit
C) Must have higher embankments
How does this big diversion structure work?
A) Wider gates are needed  
B) A gate needed  
C) No problem at all

How does this big diversion structure gate work?
A) No problem  
B) Is leaking  
C) Too small

**Damaged structures**

Leakage of this big diversion structure is caused by?
A) Water flows too fast  
B) Damage by farmers  
C) Bad construction

Erosion behind this structure is caused by?
A) Too much water is passing  
B) Canal should be lined  
C) Stilling basin should be deepened

Damage of this structure is caused by?
A) Its time (age)  
B) Leakage/small damage that is repaired on time  
C) Using for bathing

Collapse of the wing or the wall of this structure is caused by?
A) Bad quality mixture of materials used  
B) Poor structure design/plan  
C) Flood is out of estimate

Gates are worn out due to?
A) Old  
B) Too much water flowing through  
C) Lack of maintenance

What should be done with this broken gate?
A) This gate is not needed  
B) Farmers should remove it in order to increase water supply  
C) A new gate is needed and it should be made stronger

**Distribution of water to the fields**

Water distribution to these fields should take place?
A) From quarternary canal to the (paddy) field  
B) From one (paddy) field to another  
C) Directly from the main canal to the (paddy) field
How is the flow of water from one field to the other?
   A) Its too much, the flow needs to be reduced
   B) Flow needs to be increased for better aeration
   C) It should be stopped in order to save water upstream
   D) Flows alright

Should this form of field to field irrigation be replaced?
   A) Better be replaced by canal with separate intakes to each field
   B) Always OK. Already old. Its a tradition
   C) Acceptable, but water flow need to be controlled, preferable by bamboo poles

The outlet for drainage of this field is?
   A) Just the way it should be
   B) Too high
   C) Too low

Seasonal Calendar

1) Introduce topic
2) Draw a line on a piece of paper and define the line in terms of number of months, put the month names under it. Explain what you have drawn to the farmers.
3) Ask each group to divide 50 beans over the months according to the rainfall intensity
4) Ask the groups to mark the height of the bean root in each month
5) Ask the groups to do the same with the temperature and available irrigation water in two separated diagram right under the first one.
6) Ask the groups to indicate in an other diagram the planting and harvesting dates of the different crops and crop seasons according to cropping pattern followed by farmers and estimate the area under each cropping pattern.
7) Ask each group to present and discuss the presentations.
8) Discuss the introduction of new crop(s’) varieties to optimise the use of available time and/or irrigation water.
9) Summarise the results of the discussions.
Guidelines for Institutional Arrangements, Training, Irrigation and Agriculture
Production Improvements under On-Farm Water Management Programme