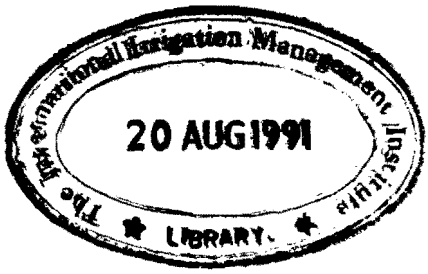
Assistance to Farmer-Managed Irrigation System: Experiences from Nepal

Papers presented in the seminar on "Improving Farmer Managed Irrigation Systems: Experiences of different Agencies and organizations" held on 27 June, 1990.

Edited by

N. Ansari and Prachanda Pradhan



MINISTRY OF WATER RESOURCE
DEPARTMENT OF IRRIGATION
PLANNING DESIGN AND RESEARCH DIVISION

1991

Table of contents

FOREWORD

Farmer-Managed Irrigation Systems in Nepal covers a major portion of irrigated agriculture and play an important role in the irrigation sector. Since the wake of the campaign to fulfill the basic needs program in which the attainment of self-sufficiency of food is a prime one, more attention is to be given to the improvement of these existing farmers managed irrigation schemes (FMIS's) which are not performing well or are operating below their potentialities or have become defunct due to some reason. This area has attracted attention of Government agencies as well as Non-Governmental Organizations (NGO's) as irrigation expansion or intensity can be attained in a shorter period cost effectively. In Nepal, since last decade many agencies are engaged in assisting these systems with the intention of making them more useful. Each of these agencies follow their own policies and modes of support or assistance with separate methodologies for implementations.

Some of these methodologies may be more productive and effective, while others may generate dependency on government or external resources. Other models of assistance may be more construction-oriented and not focussed towards the strengthening of farmers' management capability.

In this concept, IIMI collaborated with the Water and Energy Commission Secretariat (WECS) of Nepal in developing and testing a modality and procedure for improving and expanding FMIS's in a cost-effective manner through an action research program in the Indrawati River Basin of Sindhupalchowk district. The program was carried out from 1986 to 1990. Towards the end of this action research program the results obtained and lessons to be learnt enthused many professionals to discuss and dissiminate the findings with other agencies engaged in similar activities. This was achieved in the sponsoring of a seminar on "Assisting Farmer-Managed Irrigation Systems in Nepal: Experiences of different Agencies".

This volume has tried to compile and consolidate the papers and comments made during the deliberations of that seminar. It is an inventory of the several approaches of irrigation development activities undertaken in Nepal during last decade.

Although all the models differ in some respect or the other common focus has been, that the self-help nature of FMIS's should be strengthened and wherever weak farmers organizations exist they should be strengthened to carry out the operation & maintenance of their improved systems by themselves.

Shyam Prasad Adhikari
Secretary
Ministry of Water Resources

July 15, 1991

PREFACE

Remarkable performances of many farmer-operated and managed irrigation systems have aroused awareness in Government agencies to initiate irrigation programs for improving FMISs

Nepal is a country of mainly subsistence farmers farming in all types of ecological environment, some that are difficult for farming. In the world of irrigated agriculture, Nepal is now being known as "Land of Farmer Managed Irrigation Systems" This is because over 70% of the irrigated agriculture of the country is irrigated by FMIS. It is estimated that there are over 17,000 under surface irrigation systems, covering some 611, 000 ha. while there are over 16,000 farmer-owned shallow tube wells commanding 64,000 ha. as compared to 275,000 ha being operated and managed by the government through DOI. It is also estimated that about 45% of cereal crop requirements of the nation is met by the increased production from farmer-managed systems. This is attributed to Nepals peasant community efforts to prevent the influence of droughts and meeting the water requirements for increased cropping intensities. Since long ago Nepali peasants have been trying to increase agriculture production by creating and managing their own irrigation systems.

Nearly all arable land in Nepal has been brought under cultivation. It is therefore becomes inevitable that in order to realize full increase irrigation potential of existing arable land and water resources, irrigation development has to be intensified. Government agencies and non-governmental organizations working to increase irrigation facilities of the country have identified these FMISs as a potential area where irrigation intensitiy can be increased and also that irrigated area can be extended in little time cost-effectively. Several studies have shown that although many of these farmer systems are performing satisfactorily, there are still others that do not operate optimally. There may be several reasons for not performing satisfactorily related to financial, technical, environmental and organizational aspects. Therefore assistance and support from outside is desirable to be extended to them in order to rehabilitate them so as to improve their performance and utilization. Since last 10 years govt. agencies and NGOs have been trying to assist FMISs in their rehabilitation efforts. Each agency however followed their own pattern and policy. Some of them have improved the systems has by bearing the full cost from Govt. resources whereas others followed participatory approach in which certain portion of the capital cost of the improvement must be borne by the

beneficiaries group. The latter does not allow continued dependency on government.

In the earlier period of 1950s when the Department of Irrigation was created, this agency under-took several rehabilitation and extension program for FMISs where government funds were used to fully finance development works and now these systems are part and partial of the agency operated and managed systems. Examples these are Rajkulos of Kathmandu and Pokhara valleys. This way private systems were converted into public systems. Currently, again there is a move towards turning these systems over to the farmers' organizations, i.e., the agency policy is to privatize them.

Different agencies with programs for assisting FMISs claim the effectiveness of their own process. At the same time it is alleged that the agency's assistance approach is getting more costly and its creating dependancy. On the subject related to assistance to FMISs, it would be worth while to recapitulate that was an important seminar on "Water Management Issues" sponsored by APROSC and ADC that was held in Kathmandu (July 31 - Aug 2, 1983) that highlighted the existence of thousands of well-performing communal irrigation systems in Nepal and discussed inter-alia that the Government should provide technical and financial assistance to these communal irrigation schemes whenever needed, but should take strong measures in avoiding the creation of dependency syndrome and destroying the spirit of self help (APROSC/ADC-1983). It also recommended that Government policies should be consistent. Inconsistencies in policy and activities undermine the process of developing strong institutional linkages.

Another landmark event was the international conference on "Public Intervention in Farmer-Managed Irrigation Systems" organized by IIMI & WECS which was held in Kathmandu (3-6 Aug 1986). The forum discussed ongoing research issues related to agency interventions in FMISs. One of the alarming concern expressed was that public interventions in FMISs had induced more and more requests coming to the agencies asking assistance not only for rehabilitation but also to taking over of the system management by the agencies.

In many countries, research is used to modify and improve agencies assistance program to farmer-managed irrigation sector. In Philippines action research was used to test and modify the appropriateness of NIA intervention process. In Nepal, Water and Energy Commission Secretariat

(WECS) in collaboration with IIMI carried out an action-research (1986-89) to develop and test an innovative idea of assisting potential FMISs on watershed basis and not based on specific requests from the farmers. Indrawati river basin of Sindhupalchowk district was selected as the site. Inventory and rapid appraisal process was followed for studying the water use in the whole river basin. With the help of the study, the most potential systems where Government assistance could result in extension of command area or increased irrigation intensity, were selected for assistance. Minimal amount of fund was provided to each and self management and capable organizational capacity building was stressed. The experiences on the modality and its effectiveness was widely acclaimed. At the conclusion of the action research, it was perceived by with IIMI and DOI to share lessons learnt and the appropriateness of the process with all those involved in such irrigation developments works in Nepal. Experiences of other agencies and modelities of their assistance should also be exchanged. This prompted in arranging this seminar.

The objective of the seminar was to bring all the professionals together to discuss: How can farmer-managed irrigation systems be improved and expanded? How can they be made more beneficial? Should there be total rehabilitation or should there be minimal assistance? What are the experiences from past years of works on improving the FMISs in Nepal? What are the results? Should it be intervention or assistance?

The purpose of the seminar was to examine the experiences of different agencies and organization in such works, distill lessons drawn, and arrive at a suitable consensus for the use of national agencies to formulate appropriate assistance program.

It is a matter of satisfaction that all the discussion papers are brought together along with this proceedings which has been possible due to the insights provided by Dr. P. Pradhan. The dissemination of this production will surely be of interest to all those professionals and researchers interested in the improvement activities of FMISs.

N. ANSARI

ACKNOWLEDGEMENT

The Department of Irrigation (DOI) wishes to thank Dr. Robert Yoder, Head of IIMI's Field Operation Office (Nepal) for extending his valuable advice and support in sponsoring this seminar.

DOI also wishes to other staff member of IIMI's Kathmandu office who provided all official logistic support for the seminar. Dr. Yoder and Dr. Prachanda Pradhan assisted us in contacting all other agencies who are assisting the FMISs in Nepal to write papers on their experiences for presentations and discussion during the seminar.

In this regard we extend our sincere thanks to the following professionals for preparing papers for the seminar:

- Mr. Louis Rijk, UNDP Supported ISSP and World Bank executed T.A. Team member. He was advised by Mr. R.B. Reidinger, Senior Economist of World Bank, in the preparation of the paper.
- Mr. Sarda Pd. Sharma, Acting Project Director of Irrigation Sector Project (ISP). He was advised by Mr. N. Ansari in the preparation of the paper.
- Mr. M.M. Shrestha, DDG/Small Irrigation and Water Utilization Division of DOI. Mr. S.K. Hyjou, SDE, assisted in the preparation of SINKALAMA Hill Agriculture Development Project (SINKALAMA) paper.
- Mr. S. Lakhe & Mr. C.F. Baker from ILO/SPWP Team.
- Dr. Robert Yoder & Dr. P. Pradhan for presenting the results of Action Research in Indrawati River Basin.
- Mr. R.R.S. Neupane of IMC/IMP for presenting paper on the Results of Action-Research on "Improving Performance of Malebager FMIS."
- Mr. Arend Van Riessen from SNV Team for a paper on Mechi Hill Irrigation Development Program.
- Mr. G. Koirala and R. Koirala from ADB/N for their paper on the experience of ADB/N approach in irrigation development.
- Mr. Uttam Dhakhwa from Dhading District Development Project for his paper on Farmers-managed Community Irrigation Schemes.

Mr. B.B. Gurung from CARE-Nepal for his paper on improving FMIS in Rapti Zone.

The organisors also wished to thank the Acting Secretary of Ministry of Water Resources (MWR) and Dr. C.K. Sharma, Acting Executive Secretary of Water and Energy Commission Secretariat (WECS) for sparing their valuable time to chair the morning and afternoon sessions respectively. The comments and suggestions made by them reflect policy guidance for future programs.

Mr. R.R. Neupane, Mr. M. Dangol and Mr. Jitendra Rana worked as rapporteurs of the procceedings.

DOI appreciates the efforts made by all those who worked in organizing the seminar and bringing the publication of this volume.

DOI greatly appreciates the active participation of all the participants in giving their comments during discussions which brought into light the weaknesses and strengths of different programs of the different agencies. The organizors wishes to express its sincere gratitude to all participants who spared time from their busy schedule to participate in the seminar.

The text of this document is prepared and edited by Mr. N. Ansari, DDG/DOI and Dr. P. Pradhan, Irrigation Specialist of IIMI Field Operation Office Nepal.

Funding for printing and disseminating this publication was made possible from the budget of RTB/PDRD under the assistance of USAID-financed IMP.

OVERVIEW OF SEMINAR PAPERS

N. Ansari & Prachanda Pradhan

Introduction

Nepal has experimented different modes of public intervention to assist farmer-managed irrigation systems. A seminar was organized with the objective to record and share the experiences of different modes of interventions adopted by different agencies in Nepal. Ten papers were presented during the seminar. The experiences of World Bank Line of Credit Program, ADB Irrigation Support Program, SINKALAMA Program, WECS-FORD-IIMI Action-Research Program at Sindhupalchok, ILO special Public Works Program, Dhading District Development Project Irrigation Component, Mechi Irrigation Program, IMP's FMIS Research at Malebagar, CARE/Nepal and ADB/N Program, were shared in the discussion. This volume attempts to present the experiences of irrigation development programs in Nepal.

Role of Farmer-Managed Irrigation System

Nepalese farmers have recognized the importance of water resources for centuries and have been constructing irrigation systems at their own initiative to intensify their agriculture production. Irrigation development in the country remained in the hands of the people for many years. This tradition gave birth to the farmer-managed irrigation systems (FMIS) scattered all over the country. Historically, irrigation development has fallen under the domain of either a religious trust, individual initiatives or community effort. The legal tradition and local administrative structures over a period of time have permitted farmer-managed irrigation systems to operate without interference from an irrigation agency or other governmental administrative units. However, they have been assisted by the government from time to time when natural calamities required resources beyond the capacity of the farmers.

Though the role of FMIS is extremely important in Nepal's agriculture economy, it was only in 1981 that the government acknowledged their importance and began to consider ways to enhance and expand FMISs. The Irrigation Sector Policy for the fulfillment of Basic Needs clearly spelled out the distinction and made it clear that FMISs will be managed by the farmers themselves but that appropriate assistance both for physical and management improvements will be provided by the government.

Irrigation systems can be broadly categorized into two groups according to where the responsibility for their management lies: those that

are agency managed and farmer-managed systems. In the farmer-managed system, farmers are responsible for all management activities encompassing water acquisition from the very source up to its delivery to the plant in the field. In agency-managed systems, public officials are assigned many of the management tasks with varying levels of farmer participation. (P.Pradhan 1989.)

Seeing the potential of intensifying irrigated agriculture in a short time through rehabilitation and improvements of farmer-operated systems, the government irrigation agency launched such a program. During the last five years several small communal system have been renovated, rehabilitated, and even enlarged, through a participatory approach, where costs have been shared between the government and farmer's group at 75% and 25% respectively. Such completed projects have shown increasing performance and use. Hence, the government has adopted a new participatory approach and strategy for improving the existing communal schemes to extract benefits in a short while (Ansari, 1989.)

Issues and Programs

The following section is devided into two parts: one discusses the general highlights of the issues drawn from the papers presented in the seminar, the other part presents the features of each irrigation development program as described in the paper.

I. General issues highlighted in the papers

1. Selection Criterion

The basis of identifying irrigation systems for assistance has been the general issue brought out in discussion. Different programs have given importance to one of the following:

- area expansion
- intensification of agriculture
- increasing cropping intensity
- low cost, high return from investment made
- creation of employment for the local people.

Hence, it was clear that the selection criterion depended on the objective to be fulfilled.

2. Irrigation Development

Irrigation development was emphasized throughout the papers.

It was suggested that there was a need to encourage information sharing between the farmers and government officials during

- information collection,

- design,
- construction of the system
- contribution or cost sharing
- technical supervision

3. Adoption of Uniform Policy

It also pointed out that there was a need to adopt uniform policy for assisting the FMIS. At present, different procedures and cost-sharing basis were followed causing confusion to both the farmers as well as the implementators.

4. Orientation of Officials in Participatory Approach

It was highlighted that there was a need to orient the officials for working in the participatory approach while assisting in the improvement of the farmer managed irrigation systems. The participatory approach in irrigation improvement called for special skills that dealed with and recognized farmers' ability.

5. Need for Flexible Design

It was demonstrated from the experiences of different agencies and projects that it was advisable to have flexible design in order to adjust with local condition. There was a long time lag between design and implementation of the program. By the time of implementation, the features might have changed since the system was to be maintained and operated by the farmers, the farmers' need was to be well reflected. The farmers were able to understand the structures only when they saw them constructed. Farmers might have suggested amendment in design on the basis of their experience. Flexible design procedure can accommodated such need.

6. Accounting and Auditing Procedure

The existing government accounting procedure and auditing procedure did not encourage farmer participation in irrigation implementation. Hence, there was a need for introducing appropriate procedure which encompassed flexibility that encouraged farmer participation as well as transparency of expenditures.

7. Environment Preservation

It was pointed out that assistance programs should aim at preventing environmental degradation. Low cost of construction

alone should not be the only consideration. The environmental concern were prominent both in hill and tarai irrigation systems.

8. Combination of Physical and Non-physical Improvements

The assistance to FMIS were not to be only physical improvements. Physical and non-physical improvement were to go together. Lack of attention on managerial improvement and capacity development of the farmers resulted in difficulties in bearing responsibility by the beneficiaries for operation and maintenance of their systems in future.

9. Irrigation Structures and their Need-Identifications

It was suggested that the structure to be put up in the irrigation should be decided on the basis of need identification for water management. The type of structural requirement depended on the nature of operation and values followed in the irrigation system.

10. Criterion for Irrigation Development Costs

Different types of assistance program are in operation through different agencies in Nepal. It was also felt that it would be appropriate to fix criteria for reasonable cost/ha for irrigation development. On the other hand, it was suggested that a variety of development approaches coexist. It was not necessary to control the mode of assistance by insisting on one particular approach for the whole nation. The farmers were to make their own choices regarding the type of development assistance they preferred.

II. Specific issues of project Programs

WECS/FORD/IIMI Program:

The objective of the WECS/IIMI and Ford Program was to identify alternative assistance strategy to farmer-managed irrigation systems. In undertaking the activity, inventory of irrigation systems within Indrawati watershed basin was conducted. Reliable water at source and the potential for extension of command area were criteria for selecting the candidate systems for assistance.

Farmer-involvement during information collection, design and implementation was promoted. Management improvement and physical improvement were carried out jointly. Intensive technical supervision was provided by local consulting firms under the guidance of WECS.

SINKALAMA Project

Selection of the candidate sub-project was on the basis of farmers' demand. Farmers' participation was promoted through 25% contribution for construction cost. Participation in construction management was encouraged through "construction committees" which were converted into users committee for O&M phase later on. AOs were not provided for organizing the farmers. Management improvement in the system was not a priority.

Mechi Project

Inventory of irrigation systems within the project area was prepared. It was suggested that there was a need for formulating a uniform policy for assisting farmer-managed irrigation systems. It was also suggested that there should be only one type of irrigation program within a district.

Two major problems for implementation were pointed out. It would be helpful to have continuation of staff assigned to the project implementation, frequent transfer of the staff make the implementation difficult. Reorientation of the officials on the different aspects of farmer participation inadequate. Frequent turnover of staff assigned for the project made implementation difficult.

Irrigation Sector Project

It was suggested that there was a need for incorporating flexibility regarding farmers' contribution towards system management.

Assistance for system improvement was to be provided on farmers' request.

It was suggested that it would be useful to employ local consulting firms for construction supervision.

It was necessary to make clear demarcations of the division of responsibility in construction between farmers and the Department of Irrigation.

Association organizers (AOs) were employed to promote farmers' organizations, notably in enhancing farmers participation in different stages of irrigation development.

There were different options for the implementation of the Irrigation Sector Project. The DOI either took the full responsibility or it implemented jointly with the farmers. However, there was a need for a uniform policy. Realistic cost ceiling is to be established for system construction.

International Labor Organization: Special Public Works Program

Creation of Special Public works program was aimed at providing employment opportunities and promotion of people's participation in project implementation.

It was made quite clear that free and voluntary labor was to be discouraged. Agreement for their contributions was made before the project implementation.

Following criteria for project selection were followed;

- priority was given to food deficit area. Small farmers group were considered first.
- the other physical factors for project selection were sufficient water supply from the source, suitable soil, and the willingness of the farmers to participate.

The cost ceiling for the rehabilitation of the schemes was NRS 30,000 and NRS 60,000 for new construction. There was interactions between ILO and other agencies during construction. During construction, appropriate technology for the site and standardized simple design were followed.

Irrigation Line of Credit (ILC)

The project cycle for ILC consists of initial identification selection, input by the mobile team, farmers organization and registration, contribution of cash plus labor, construction through contractors and completion of the project.

However, the experience indicates that farmers participation has not been satisfactory. It is also pointed out that it has been difficult to DOI to distinguish among ESI, deferred maintenance and rehabilitation. There is need to have special care for rehabilitation.

There is need to have close interaction between cost estimates and farmers input. However, the cost sharing aspect is still quite abstract. It is necessary to negotiate with the farmers not on the basis of abstract percentage. Regular dialogue is to be maintained. Environmental consideration is to be given in designing the irrigation system. It is necessary to interface local technology with modern engineering knowledge.

It is felt that there is need to change the attitude of both the farmers and officials to make participation possible in principle and reality.

Irrigation Management Project Experience (IMP):

It was necessary to promote the sense of ownership of systems by the farmers while assisting for rehabilitation of their systems. There was to be a participatory approach to the intervention by the government. The objective of the intervention was to increase production.

The intervention consisted of identification of essential structural improvement, water requirement, and its use. It also was to organize training to the farmers in efficient water management.

Agricultural Development Bank (ADB/N)

The ADB/N had a distinctive feature in that it provided a package to the farmers consisting of three components. They were funding support, technical support and organizational support. The project identification was on farmers' demand. Implementation was carried out with farmers' participation.

CARE/Nepal - ADB Program

The cost for rehabilitation of FMIS was NRS 5000/ha. The cost for supervision in NRS 1200/ha. 50% of the total cost was be made available as subsidy. The farmers had to contribute 50% of the construction cost. The willingness of the farmers to participate in contribution of cost of the scheme will be the basis for selection.

Program on Irrigation in Dhading Project:

Community Supported Irrigation Project based on self-help organization of farmers is the basis for irrigation development under Dhading District Development Project.

Suitable projects will be provided technical support package on group basis. Contributions are to be made by the farmers. Flexible design is made the basis for the project implementation.

Farmer's organization capacity improvement is implemented through farmers to farmers training program.

Conclusion:

We have different experiences, we need to synthesize all these experiences. We need to come out common working procedure keeping in view of,

- design process in assisting FMIS.
- design outcome to make the farmers capable of managing the systems by themselves.

The above experiences indicate clearly that assistance to FMIS denotes to the capacity strengthening of the farmers. Resources will be channeled through the farmers organization. Rehabilitation of FMIS denotes that assistance is provided to the physical improvements only. Farmers organizational aspects are often ignored in rehabilitation schemes.

References:

Prachanda Pradhan. 1989. Patterns of Irrigation Organization in Nepal: A Comparative Study of 21 Farmer-Managed Irrigation Systems. Colombo, Sri Lanka.

Nasiruddin Ansari. 1989. Rehabilitation of Communal Irrigation Schemes in Nepal. ODI-IIMI Irrigation Management Network Paper 89/Ic.

Experiences from the Irrigation Line of Credit "Pilot" Project in Improving FMIS.

Louis Rijk

1. General. The Irrigation Line of Credit (ILC) is intended as the first stage in establishing a framework for irrigation sector lending program. It would eventually cover all proven irrigation investment options. The program could then be financed by various donors under a coordinated, unified program of irrigation investment. Specific subsector objectives of the ILC pilot project are to:

(a) establish a "subsector program" approach which would support national objectives instead of the "project-by-project" approach of the past, and enable donors to provide large scale, long term support to small schemes which are individually too small to justify involvement;

(b) make the program as "demand driven" as possible, based on locally felt needs in contrast to the traditional "supply driven" program;

(c) help develop, test, and establish effective subproject selection criteria and implementation procedures which are the basis for operating the subsector program; and

(d) reduce the burden of irrigation costs on (His Majesty's Government of Nepal) HMGN's budget, particularly for O&M of completed projects, through increased farmer participation to cover full O&M and a share of capital costs.

2. ILC finances irrigation subprojects for construction and rehabilitation and for specialized irrigation and agricultural support services. The latter requires close coordination between Department of Irrigation(DOI) and other agencies such as ADBN and especially the agricultural extension service of Department of Agriculture (DOA). The DOA is directly responsible for the implementation of agricultural support activities in ILC subproject area. DOA's involvement is particularly important, as its extension staff will be the primary agency source of day-to-day continuing contact and support to farmer water user groups after completion of each subproject.

Preparatory works for ILC implementation started during the 88/89 work season and the full-fledged implementation activities were taken up in the 89/90 work season. At present a total of 34 surface irrigation subprojects are under construction out of which 3 are new construction works while the rest are for rehabilitation. The total and average cost per

ha. of these subprojects are as follows:

	Total Ha	Total Cost	Cost/Ha
New Construction	1,700	92,000,000	54,000
Rehabilitation	1,800	37,000,000	20,000

3. Surface Rehabilitation Schemes. Rehabilitation of surface schemes ranges from selective minor improvements to complete reconstruction and expansion of irrigation systems. Two basic types of rehabilitation have been undertaken.

(a) Major rehabilitation of medium and small schemes

The main problem in many schemes is frequent interruption of main canal operation during the monsoon season because of the temporary nature of intakes and other main structures, high water losses, and waterlogging (in the Terai systems). Rehabilitation would comprise of: construction or improvement of (semi) permanent intake structure; permanent side drainage and landslide crossings; reexcavation; reshaping; lining of main canals; and improvement and extension of the distribution and drainage systems.

(b) Minor rehabilitation of medium and small schemes

In these schemes, works concentrate on the elimination of bottlenecks through the reconstruction of headworks and essential main canal structures.

EXPERIENCE

Subprojects for which intervention was requested can be broadly divided into three categories:

- Fully operational schemes.
- Assistance focused on improvement of water diversion and conveyance, generally through improvement of the headworks and canal lining. Principal reason for intervention: reduce maintenance and increase the quantity of water supplied at field level.
- Partly operational schemes.

  Intervention here involved the improvement of headworks, cross drainage structures, minor stability problems and canal lining. Principal reason for intervention: reduce maintenance and increase the reliability of water supply.

- Non operational schemes.

  This usually required the repair of canal sections damaged by major landslides. Principal reason for intervention: make the system operational.

  The first category represents mainly non-essential works and the intervention requested might, to a large extent, be motivated by opportunistic local leaders who see possibilities for additional income through petty contract work. The second category is a combination of essential and non-essential works that might also involve some level of opportunism. In the third category, the request for assistance is usually based on genuine need which is also reflected through the fact that the requested intervention is limited to the essential works only. The issue is how to prioritize between these three categories.

4. Selection and Implementation Procedures. Procedures for subproject selection and approval follow the "project cycle" comprising reconnaissance and identification, preparation and feasibility study, farmer agreement, appraisal and approval, implementation, development, commissioning, and evaluation. Direct participation of farmers, with appropriate institutional support, are built into all phases of the project cycle except appraisal and approval. DOI is responsible for overall operation of the project cycle (except approval), and it is establishing a management information system combined with monitoring and evaluation (M&E) for continuous feedback in parallel with the project cycle.

5. Establishment of Investment Ceilings. To determine the economic viability of subprojects - IRR of at least 10% - investment ceiling, in terms of cost per ha, have been established by HMG for the following subproject types:

	New Construction (NRs/Ha)	Rehabilitation (NRs/Ha)
Hills	60,000	30,000
Terai	30,000	20,000

EXPERIENCE

In many cases the present cost ceilings have been instrumental in focussing the interventions on the essential structural improvements. However the ceilings have also been a limitation for achieving sustainable irrigation facilities, especially with regard to rehabilitation of non-operational systems. Analysis have shown that

in such cases increasing the cost ceiling to NRs 60,000 and 40000 respectively for Hills and Terai could be justified.

The present low level of the cost ceilings has, in some cases, led to artificial increase of command areas to justify the intervention. This created problems later on when the farmers contribution had to be determined, and makes impact evaluation difficult.

6. Subproject Request Requirements. Requests for assistance in construction or rehabilitation of irrigation schemes are made by groups of farmers directly benefitting from these facilities. The request are signed by a minimum of 2/3 of the total number of beneficiaries in the subproject area (for STWs all beneficiaries) and would have to contain the following minimum information: (i) description of the type and condition of the present facilities, including exiting organizational arrangement, if any, and condition of irrigation source (e.g. year-round, monsoon only); (ii) type of works for which government assistance is required; (iii) intention and modalities for providing the required contribution to the capital cost specifying activities/type of works (e.g. cash, loan, voluntary labor contribution-linked to the works for which the contribution will be used); (iv) location and physical map of the command area (not necessarily to the scale); (v) possible command area and number of beneficiary house holds; and (vi) detailed reasons why the required works or facilities can not be constructed, completed, or maintained by the beneficiaries themselves.

EXPERIENCE

Requests for ILC assistance were generated by the (RID), (DIOs), project office establishments of larger irrigation projects (Rainastar, Bullingtar) and through the political system. Local political leaders came to know about the project at district meetings. Subsequent formal requests for assistance were signed by a large majority of the beneficiary-farmers, but they did not provide any of the requirements as mentioned above. It was therefore difficult to judge from a request form whether it was motivated by real needs for system improvement or marely an opportunity sought by potential local construction contractors. Farmer-leaders focussed their efforts on obtaining an understandable commitment in principle for assistance before determining the scope of the intervention. Requiring farmer groups to first determine in detail the required works and their possible contribution before entertaining any request will help them to better understand the principles of the program and their direct obligations.

7. Preparation of surface irrigation subprojects. This is carried out in two phases. The first phase consists of : (i) establishing the subproject

location on the 1:50,000 topographical maps; (ii) a detailed discussion with the farmer group, confirming and updating the information given in their subproject request; (iii) a "walk through" with representatives from the farmers group, to determine in detail, by chainage, the required works; (iv) collection of data on the command area, irrigation source, water rights, catchment condition, soils, land use, existing cropping pattern and yields, land tenure and holdings, number of households, farmers' attitude and commitment. Beneficiaries assist and facilitate the DIO/RID team in carrying out these activities by providing the required skilled and unskilled labor from their own community. For the technically simple district-level subprojects, the preparation report are completed with "good for construction drawings" and a detailed engineering estimate. Technically complicated central level subprojects are referred to the RID for preparation and completion report under a second phase. For preparation of these subprojects, the RID carries out a technical feasibility study following the requirements outlined in the PDSP field design manual. After completion of the subproject preparation reports, the regional director of the RID approves the engineers estimate.

EXPERIENCE

Because of staff constraints and lack of an adequate budget for project preparation, not all criteria as outlined above could be complied with during subproject preparation. This resulted in the need for frequent design and estimate changes after subproject approval. The level of farmer involvement in subproject preparation varied considerably between the individual subprojects, but in the majority of cases, subproject preparation was carried out in a "traditional" DOI fashion without much consultation with farmers on individual design and cost features of the proposed assistance.

8. Farmer Organization. After approval of a subproject, the farmer group would form a FIA, under the irrigation regulation 2045, appoint a subproject construction committee, and approve the bylaws of the association. For subprojects larger than 50 ha, or for groundwater subproject, water user groups are formed for 50 ha blocks, major branch canals or at each individual facility for STWs/MTWs. A representative of each water user group is a of the subproject construction committee. The FIA would then be registered at the office of the Chief District Officer. During the construction period the FIA would form a construction committee which meet at least once a month to inform the members of ongoing activities, resource mobilization and invite comments or suggestions from the members. Minutes of the proceedings are made by the committee's secretary on the supervision of the AO. After subproject approval, DIO/RID hire and/or field its staff to subproject sites, according to

the ongoing norms of DOI, for a period covering commissioning of the subproject. To begin with, these field staff will assume the responsibility to establish and strengthen FIA and slowly shift the emphasis to ensure smooth progress of construction works and then assist FIA during subproject. To begin with, these field staff will assume the responsibility of establishing and stregthening FIA and slowly shifting the emphasis to ensure smooth progress of construction works and then assist FIA during subproject commissioning with support from AO. As far as possible, the higher demand for field staff during subproject implementation should be met with skilled and unskilled labor available within the beneficiaries so that the knowledge and skill gained by them remains within the beneficiaries after the withdrawal of DOI assistance.

EXPERIENCE

All FIAs have registered their association with the CDO office under Irrigation Regulation 2045 and the Association Registration Act. A standard constitution and bylaws have been adopted by the associations. For associations in larger irrigation schemes with a high membership, registration and constitution will be an asset, but for small irrigation schemes with few beneficiaries the advantages of a formal association have not been very evident. In general the purpose of registration is not well understood by the farmers and associations have so far not familiarized themselves with the standard constitution and bylaws. If the farmer groups formulate the constitution and bylaws themselves, based on an agreed model, the level of interest would probably be higher.

9. Cost Sharing. The level of farmers' contribution to subproject construction should be sufficient to ensure their commitment to: (a) construction and ownership responsibility for their subproject; and (b) continue O&M of the subproject. Farmer contribution for small and medium irrigation developments has been determined in the "Working Policy for irrigation development" and consist of an "up front" cash contribution and an annual contribution of labor or its equivalent value in cash during the construction period. In isolated and extreme cases where beneficiaries fail to come up with required cash contribution prior to the signing of formal agreement with DOI and if RID is convinced of the depressed local economy as being the main cause, the RID may take one of the following measures: (i) provide up to 25 percent waiver to FIA in cases where total cash contribution required as per working policy of the government exceeds NRs 4,000 and (ii) sign an agreement with FIA when 50 per cent of the required cash contribution is deposited and provide a maximum of 6 months, not exceeding the construction period, from the date of signing the agreement, for FIA to come up with remaining 50 per

minimum data all subprojects the following data are necessary (i) signed subproject request' (ii) Location on 1:50,000 map; (iii) command area size, number of beneficiary households, land use, soils; (iv) details on water source flow and catchment area or test well result for groundwater development; (v) approved cost estimate, showing the government and farmers cost shares, and "good for construction" drawings; (vi) proposed division of works under the government and farmers contribution, and; a written endorsement of the preparation report by the farmers together with their commitment to form and register a FIA after approval of the `subporject (b) for medium surface irrigation subprojects the following are needed for: (i) aerial photographs and for groundwater subprojects a map showing the layout of the tubewells and supporting infrastructure; (ii) agro-economic data; (iii) socio-organizational profile; and (iv) proposed resource mobilization arrangements.

EXPERIENCE

Appraisal and approval have so far been largely a formality to fulfil donor approval requirements. However with regard to the issues concerning the justification of the assistance, degree of farmer-involvement in project preparation, acceptance of the proposed intervention by farmers, cost sharing arrangements, and construction arrangements, a more effective mechanism for appraisal seems to be required.

11. Farmers' Involvement. For all subproject, the degree of farmers involvement, details of government and farmers contribution and implementation modalities are spelled out in the subproject farmers' agreement. All detailed features of the farmers who would therefore be directly involved during project preparation and detailed design. For construction, there could be two alternative levels of direct farmer involvement: (a) construction under the direct responsibility of the FIA assisted by DOI staff, or; (b) Government implementation under direct responsibility of DOI, with farmers being responsibility to DOI, and this responsibility being limited to construction of works specified as their contribution under the WUO subproject agreement. The first alternative is suitable for rehabilitation of small projects, while the second alternative is preferred for implementation of larger surface subprojects and groundwater development.

EXPERIENCE

To avoid confusion about the implementation of DOI and farmer contribution, detailed work break downs have been prepared for some subprojects. Works under the DOI contribution only started after farmers had made considerable progress with their labor

contribution works. These procedures require a high level of commitment on the part of DOI to complete its share of the agreed works on time. This has not always been the case because of reasons outside DOIs control, e.g., late budget release. When a FIA was directly responsible for construction works sometimes individuals tended to monopolize awards of contracts. This reduced the overall farmer-participation, as these individuals, in return for the contract, also made the full cash and kind contribution themselves.

12. Subproject facilities should be designed for a useful life of at least 20 years with uniform annual maintenance requirements. The facilities should also be designed to be suitable for O&M by local farmers. The level of design requirements are determined by the nature and complexity of the individual subprojects and ranges from basic measurements and sketch designs for minor rehabilitation to detailed survey and design for construction of new subprojects or major hydraulic structures. Subprojects are designed to facilitate farmers' participation in both construction and O&M. Construction are based on optimal use of labor intensive methods to be carried out by small petty contractors or the farmers themselves, depending on complexity and division of responsibility for work specified in the subproject agreement with the farmers. Design standards and construction procedures are based on the PDSP design manuals and further developed during the project implementation period.

EXPERIENCE

Effective/appropriate intervention in FMIS which increases the sustainability of the systems for farmers at an acceptable level, has been one of the most problematic issues in the ILC since assistance has to be tailored to the priority needs in each system. To differentiate between essential and nonessential works proved to be very difficult for the majority of DOI engineers and technicians. In general too much emphasis was given to construction of nonessential items such as canal lining and high levels of concrete and masonry use in structural solutions, which are more within the standard civil engineering approach. It was further noted that the effect of environmental degradation on the sustainability of FMIS, especially in the hills, is far greater than originally assumed. Under ILC, about 80% of all rehabilitation works were required because of heavy erosion at intake sites, slope destabilization and gully erosion at cross drainage sites, all caused by either excessive deforestation in catchment areas, and along canal alignments and hill drainage streams or by excessive excavation works. Awareness among farmers about this problem and future consequences is still very limited.

13. Key Design and Engineering Problems. In surface irrigation development, the two most difficult and widespread problems in construction of small and medium irrigation schemes are: (a) variable headworks conditions, due to unstable river conditions and large differences betwen winter and monsoon flows; and (b) unstable main canal alignments, mainly in Hill projects. For construction of headworks, side intakes with gabion or rock-fill diversion weirs are preferred. Low cost standard designs for such structures need to be further developed in close collaboration with the Design Criteria Study under NEP/86/013. For main canals, construction are phased to reduce slope stability problems in new construction or major rehabilitation. For example, during the first construction season, only the canal bench are cut into the hill side and left to weather and stabilize during the monsoon. In addition, supervision would give special attention to avoid excessive hill cutting and hard rock blasting, which worsens stability problems.

EXPERIENCE

Engineering in ILC subprojects was biased towards the application of a limited set of "traditional" type design solutions for a limited range of field conditions. Construction options ar confined narrowly to masonry, PCC/RCC and gabion techniques and solutions. Effective intervention can only be achieved if a wider range of materials and construction solutions can be applied including both local technologies as well as newly developed techniques and materials. A well conceived and actively applied R&D program in DOI should be a high priority.

14. Conclusion. The above outlined issues with regard to the project cycle procedures in the ILC project only represents a rapid assessment of achievements and constraints. More detailed analysis will be required to arrive at final conclusions and recommendations. However some of the major areas for increased attention are as follows:

- For the successful implementation of farmer participation in irrigation development, there is an urgent need to develop suitable mechanisms for a more productive working relationship between the DOI and farmer groups.
- DOI's capability for selective intervention in FMIS needs to be further developed and strengthened.
- More attention should be given to control the environmental degradation in the vicinity of irrigation systems.

Experience of Irrigation Sector Project in Assisting Farmer Managed Irrigation System

Sharda Prasad Sharma

Introduction

Irrigation Sector Project proposes to rehabilitate and upgrade existing farmer-managed irrigation schemes to provide reliable irrigation in about 17,000 ha of land and construction of new gravity irrigation schemes to irrigate an area of about 8,000 ha. DOI is the implementing agency and the project area is within Eastern and Central regions as a whole in 35 districts. The project follows the participatory approach for the implementation of the subprojects. The other project activities include the strengthening of 22 District Irrigation Offices, and the procurement of equipment and vehicles.

The total project cost is US $ 47.41 million, of which HMGN is to contribute $ 4.7 million, farmer has to contribute US $ 4.4 million and the Asian Development Bank would provide a loan of US $ 36.3 million. A UNDP grant for US$ 2.01 million will be provided for consultancy and training (TA).

The project was started in 1989 and is scheduled to be completed in 1994. Up to now 5 schemes are under construction, 17 schemes have been approved and about 100 schemes are under investigation and assessment in the two regions.

To ensure a well-coordinated approach in the implementation of the project, there is a Project Implementation Unit at the Centra level. At the regional level, the Regional Irrigation Directors are acting a Project Managers. Mobile Irrigation teams (MIT) will support and supervise the District Irrigation Offices in subproject implementation.

1. Project formulation

The development of small and medium scale irrigation schemes have been included in the Irrigation Sector Program. In line with the Government's emphasis on quick yielding and short gestation projects, the following irrigation schemes have been given priority:

i) rehabilitation, extension and upgrading of existing farmer-managed irrigation schemes
ii) construction of new small and small medium-scale gravity irrigation schemes.

1.1 Resource Mobilization

On the basis of cost sharing principle, government has worked out the relative proportions of farmers' contribution modality for different categories of gravity subprojects as detailed in the table 1.

Table 1.

Unit cost of construction sub project (Rs/ha)	Govt. contribution (in %)	Total %	Farmers' Contribution			
			Cash %	Labor %	Max (Rs/ha)	Min
1. < than 10,000	75	25	5	20	2,500	--
2. 10,000-20,000	85	15	2.5	12.5	3,000	2,500
3. 20,000-40,000	91	9	1.75	7.5	3,600	3,000
4. 40,000-60,000	93	7	1.0	6.0	4,200	3,600

On the average, the farmers are expected to provide about 2.56% (max 5 & min 1.0 percent) of the total construction cost of the subprojects in the form of cash and about 11.44% (max 20% and Min 6%) in the form of labor contribution. The actual proportions of farmers contribution towards the capital costs of the subprojects would range from 7 to 25 percent depending on the unit cost per hectare of the subprojects.

2. System identification/acceptance

Farmers requesting assistance from the Project have to submit a demand form to the District Irrigation Office (DIO) supplying basic information about the scheme such as location, water resource, approximate canal length and command area and number of beneficiaries. On the basis of these informations, an engineer (an overseer if engineer unavailable) from the District Irrigation Office will visit the site and prepare a Site Identification Report.

Based on the Site Identification Report, a pre-selection is made by the MIT. Selected projects are visited by the MIT along with District Irrigation Officials and Assessment Report is prepared by MIT. In the next step, the report is appraised by Regional Appraisal committee and then finally it is approved by the Project Director. As the District Irrigation Offices in both regions were not fully established at the start of this fiscal year, help of local consulting firms were sought for the assessment of subprojects.

As a next step, the farmers are informed of the estimated cost. If they agree to go ahead with construction, they have to register the Water User's Association (WUA) and select the members of WUA, request District Administration Office for registration of WUA, collect the required contribution of project cost and open a bank account. At the same time, District Irrigation Office will carry out a detail survey and make the final

design estimates in consultation with the farmers of WUA. WUA has to decide the mode of construction and part of the labor contribution. WUA has to sign an agreement with the District Irrigation Office.

2.1 Prefeasibility, feasibility and selection criteria

During the preliminary survey, main emphasis should be given to the following characteristics:

i) water availability
ii) area to be benefitted
iii) accessibility
iv) firm commitment from beneficiaries regarding sharing of costs and participation in subproject implementation at all stages.

2.2 Data collection

The subproject request form filled in by the farmers should indicate subproject location, type, area, their contribution and participation in project implementation. In the feasibility assessment report, following main topics are covered:

A. SUBPROJECT AREA
Location, accessibility, climate, topography, soil, water resources etc.

B. STATUS OF EXISTING SOCIO-ECONOMIC AND ORGANIZATIONAL SITUATION
Population, irrigation, land tenure and farm size, food supply and market situation, existing water users organizations if any (formal, informal).

C. THE SUBPROJECT
Project type, command area, existing irrigation infrastructures, scope of work proposed.

D. AGRICULTURE
Existing and proposed land use, cropping pattern and yields, inputs and economic analysis.

E. IMPLEMENTATION
Implementation arrangements, schedules, cost estimates.

3. Design and cost estimation

Preparation of the feasibility assessment report is the final stage, leading to subproject appraisal. Its objectives are to review and improve the subproject plans and estimates, reach a tentative agreement with farmer beneficiaries on the plan of system development and finally submit to Regional Appraisal Committee for Project appraisal. The feasibility

assessment report is prepared by the Mobile Irrigation Team (MIT) with the assistance from DIO or by local consultants. Prior to the finalization of the report by MIT, the various aspects of the subproject is to be discussed with the farmer beneficiaries at a general meeting.

RAP is composed of RID, RAD, ADBN Regional/Zonal Manager and head of the Regional Planning Commission office. It is chaired by the Regional Irrigation Director (RID).

4. Implementation process

Upon approval of subproject, the WUA will form a construction committee which will decide the project activities in the following categories:

i) Government activities.
ii) WUA activities.
iii) Works under farmers' labor contribution.

District Irrigation Engineer and subproject overseer and construction committee will be jointly responsible for the implementation and quality control of the works. Also an association organizer (AO) will be fielded in the subproject area; the responsibility of the AO is to create a viable WUA for the subproject area. Thus he should build up a strong WUA so that they take part in all phases of project implementation. He will be under the administrative supervision of the chief of DIO and will receive technical supervision and guidance from Senior AO based in Regional Irrigation Directorate (RID).

4.1 Modality of Execution

Some options for the execution of the works are as follows:

i) Total work, executed by DIO (including government and farmers' contribution).
ii) Partly by DIO and partly by WUA (their respectives shares).
iii) Total work by WUA (both government and WUA).

Among the stated alternatives second and third variations are preferable. In all cases, the construction committee of the beneficiary farmers is entirely responsible for the timely implementation and quality control of the work. Material procurement is being done by DIO.

4.2 Supervision of Improvements

Supervision of the construction is done by the engineers of DIO and site overseer. During the construction, the sites are visited 1-2 times by MIT or whenever problems arise.

4.3 Control

Financial control is the responsibility of District Irrigation Officer following HMGN rules. Expenses of WUA share should be controlled by the chairman of WUA and Treasurer and are not bound to follow the HMGN financial rules.

Quality control is the joint responsibility of the DIO officer, site overseer and chairman of the construction committee. Time and place of construction are fully dictated or controlled by the beneficiary farmers.

5. Management Improvements

This project has given due consideration to the management aspects. For this, an AO has been deputed right from the beginning of the project. AO will assist in the organization of the farmers so that WUA is formed to participate in the planning and construction of the subproject. He will also assist to form construction committee. After the completion of the project, he will assist to form the rule and regulations of water distribution, yearly maintenance of the scheme. He will also act to provide for the establishment of WUAs' as legal bodies with specific rights and obligations, including the provision like entering into contracts, mobilization of resources and carrying out of the construction, operation and maintenance of irrigation schemes including the subproject.

Before completion of the subproject DIO/RID staff will identify the training needs for O&M. The trainings on the preparation and implementation of the following plans:

i) Developing a cropping calendar
ii) Water distribution during normal water supply
iii) Water distribution during short water supply
iv) Management of conflicts
v) Maintenance of facilities
vi) WUA financial management tailored to the level of the farmers
vii) Monitoring and evaluation of irrigation schemes performance; and
viii) Enforcing WUA rules and regulations and collection of charges as resources for O&M.

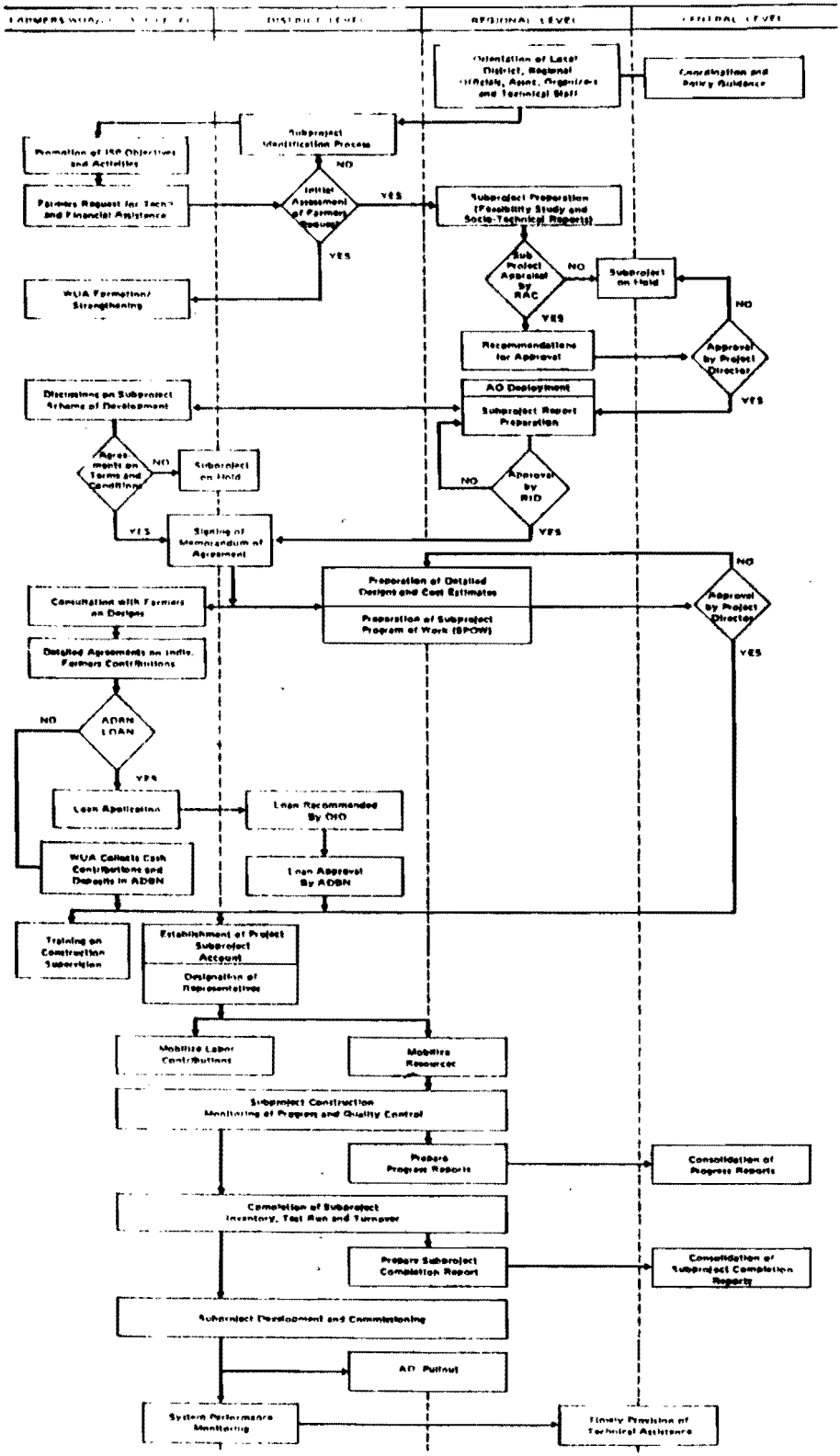
In addition to O&M, the WUA members are also trained on crop production and water management by the DOA staff.

6. Streng and Weakness of the Program

The Program's strength is that projects are farmer initiated and are executed with their participation. The beneficiaries never lose control over their irrigation schemes.

If we will go through the flow chart of the Project implementation, we notice that there are more complicated steps (backward and forward) before the construction of the project. Obviously, it will take more time than the construction period. In other countries like Philippines it takes 30-36 months for these pre-construction activities. Hence, it is recommended that strengthening activities of DIO, formation and strengthening of WUA and pre-construction requirements should get sufficient time and these activities should not be allowed to overlap with construction activities other wise this condition may lead to the situation where the cart is before the horse.

SUBPROJECT IMPLEMENTATION CYCLE



EXPERIENCE FROM THE SINKALAMA IRRIGATION PROGRAM

M.M. Shrestha

The SINKALAMA Irrigation Program is an irrigation component of the Hill Agriculture Development Project (HADP) which is financed by a loan from ADB. This program is executed by the Small Irrigation and Water Utilization Division (SIWUD) of the Department of Irrigation (DOI). Its objective is to assist farmers upgrading their irrigation schemes or construction of new schemes in the project area. The project area covers namely, Sindhupalchowk, Kavrepalanchok, Makwanpur and Lalitpur district. The Program adopts participatory approach for the implementation of the project.

The project started in October 1985. The project period is for 7 years. During this period, about 55 irrigation schemes covering approximately 2500 ha. was to be constructed or upgraded. Up to now 23 schemes with a total command area of 1178 ha. have been completed. They are 9 new and 14 farmer-managed systems. 10 new and 9 existing scheme with 995 ha command area are also under construction.

The average size of the irrigation systems supported by the Program is 51 ha. ranging from 8 to 125 ha. The length of the irrigation canals varies between 400 m to 5 km. Average construction cost per hectare for new schemes are Rs 12,278. However, there are variations from Rs 1,900 to Rs 26900 per ha. However, the range of expenditure is from Rs 3200 to Rs 19000. An average of Rs 9520 has been spent for upgrading existing systems. These cost include only construction, materials, labor and transport respectively. A temporary Program Office was established comprising of project engineer, 4 asst. ag. engineers, 9 overseers and 9 field assistants.

1. The Improvement Process of Farmer-Managed Systems.

The SINKALAMA Irrigation Program provides basically physical improvements of the irrigation systems and mainly of the main canal and its structures. Interventions therefore comprise of usually the upgrading of the structures like the construction of the diversion weir, excavation and eventual lining of the canals, cross drainage structures and falls and drop structures.

1.1 Resource mobilization

The farmers receive grant from the government for part of the construction costs. Technical assistance is provided by DOI.

1.2 Grant: provided by HMGN

1.3 Ceiling: 75% of estimated construction costs

1.4 Farmers' contribution:

Cash: 5% of estimated construction cost
Labor: 20% of estimated construction cost

This cost sharing system was applied in the past. The same cost sharing principle is incorporated in the "Working Policy on Irrigation Development for the Fulfillment of Basic Need" (HMG Ministry of Water Resources, 1988).

2. System identification/acceptance

Farmers requesting assistance from the Program have to submit a Demand Form to the Program Office. The Demand Form should include basic information about the scheme such as location, water source, approximate canal length and command area cropping pattern, present yields and number of beneficiaries. The program office has received more than 170 Demand Forms. On the basis of this information, a preselection of candidate systems is made. Selected schemes are visited by an engineer for a preliminary survey. Detailed survey is undertaken in the potential systems which includes the design and cost estimate of the scheme. A short feasibility report is prepared which has to be approved by SIWUD.

The next step will be to inform the farmer about the estimated cost. If the agreement is for construction, farmers have to form a construction committee. A contribution of 5% of the estimated cost will be deposited in a nearby Agricultural Development Bank's Account. Finally, an agreement is to be signed between the farmers' committee and SINKALAMA Irrigation Program Office.

2.1 Prefeasibility, feasibility and selection criteria.

During the preliminary survey (prefeasibility stage) the main consideration will be the availability of water and land with the possibility of extension or increasing cropping intensity. Motivation level of the farmers also will be judged because the schemes are to be implemented through the farmers active participation.

The selection is mainly based on the technical feasibility. Consideration will be made for simple solutions which should be within the capabilities of the farmers, technically as well as financially.

2.2 Data collection

For the preliminary survey a questionnaire is administered. Information is collected through interview with the beneficiaries. The

following main topics are covered by the questionnaire:

1. General Information
   location, access, labor availability,
   availability of construction materials.

2. Command Area
   size, ownership, soils and land use,
   slope and requirement for terracing.

3. Agriculture
   present and future cropping patterns, inputs,
   yields, prices, marketing facilities.

4. Source: River and Catchment
   name and type of source, vegetative cover of the catchment,
   water use and water-rights.

5. Intake site
   flow, water quality, bed materials.

6. Canal alignment
   length, cross drainages, landslides zones, seepage zones etc.

7. Village participation
   organization, finance and labor contribution,
   reasons for request for assistance.

The detailed survey is mainly an engineering survey. Few topographical surveys are made at the intake site, the sites of major structures. A longitudinal profile of the canal alignment is prepared. Farmers usually assist the engineers during the survey. Hence, necessary improvements can be discussed with the farmers at the site.

3. Design and cost estimation

System design is made by the engineers at the Program Office. Cost estimation is made using the norms established by the Ministry of Works and Transport. Farmers are not involved in this process.

4. Implementation process

Implementation of the schemes is carried through the construction committee of the beneficiaries. Construction is also supervised by the overseers and field assistants of the Programme Office. Supervisors spent about 50% of their time at each site supervising the construction especially when difficult works are carried out.

4.1 Modality of execution

The construction committee of the beneficiary farmers is entirely responsible for the procurement of construction materials and the organization of labor for construction activities.

4.2 Supervision by the engineers

Supervision of the irrigation system improvements is done by the engineers of the program office. During construction period the sites are visited by the engineer at least 1-2 times or whenever problems arise.

4.3 Control

Financial control is the responsibility of the Program Office. It follows HMGN Accounting and Auditing rules. A joint bank account with the Agricultural Development Bank is to be opened by the Program and all financial transactions are made through this account.

4.4 Officer and Construction Committee.

Quality control is the joint responsibility of the overseer and the chairman of the construction committee. Since all work is carried out by the construction committee, the farmers are directly in control of the works carried out for the scheme.

5. Management improvements

Physical improvements under this program are mostly limited to the main canal and its structures. Management improvements are not considered during design and construction.

6. Farmers capacity development

Farmers have to form a construction committee for the construction of the schemes. This committee will be transformed into a water users group. Farmers participating in the construction acquire skills too. Such skills are useful for the maintenance of the schemes. No formal training is organized. There is no provision of a social/association organizer in this program.

7. Strength & weakness of the Program

The Programs' strength is that projects are initiated by the farmers. These projects are executed with farmer's participation. The beneficiaries never lose control over their irrigation scheme. Their responsibility for organization and maintenance is always emphasized.

A weakness of the Program is that management improvements receive very little attention. However, it is considered essential that

interventions in management aspects should be made only when severe shortcomings are taken away of the schemes are corrected.

8. Recommendation

Assistance to improve the system performance must be given only to those systems which are actually performing below their capacity. Assistance program should not become a source for the farmers to finance "deferred maintenance". The responsibility of the farmers for maintenance and operation should not be undermined.

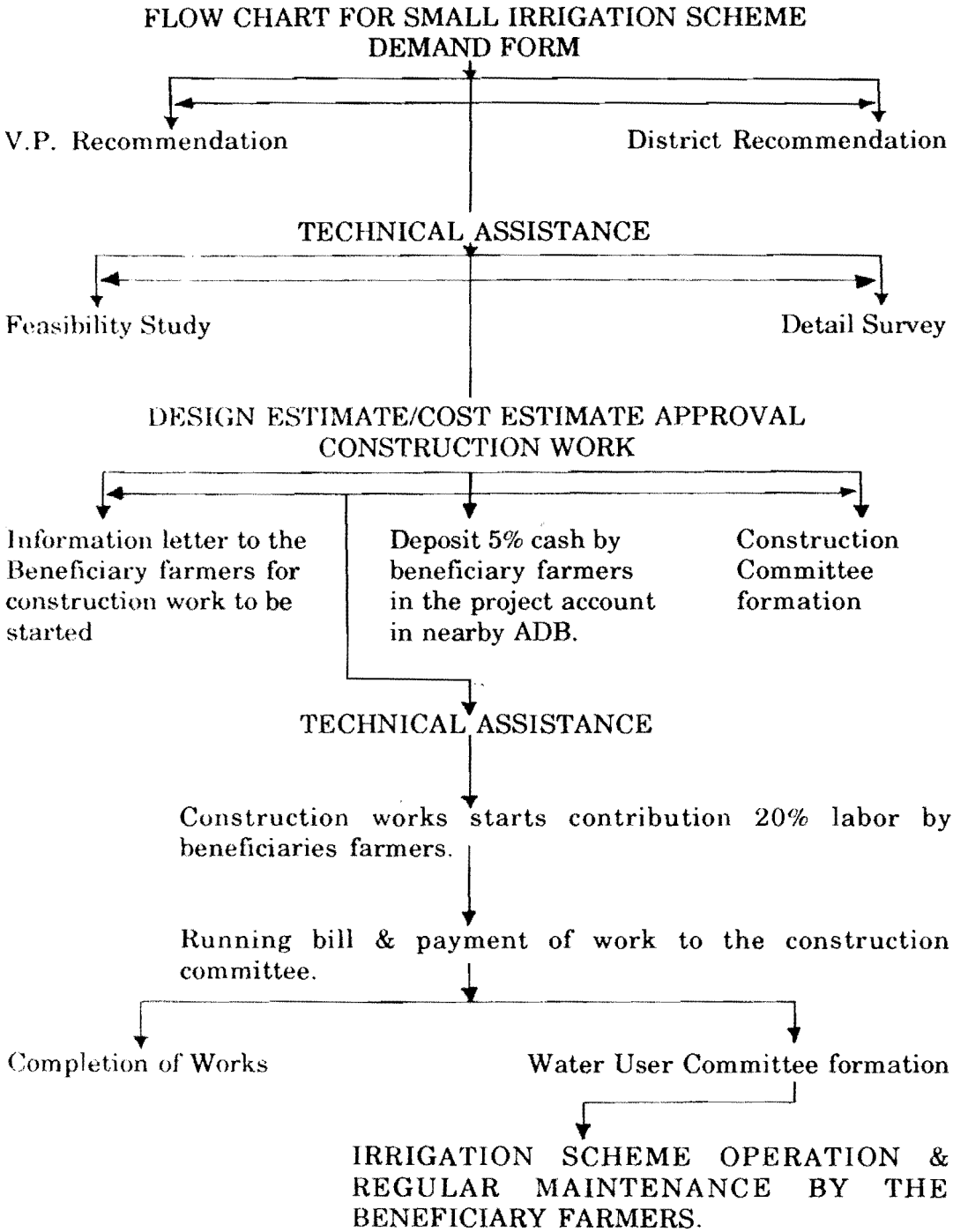

FLOW CHART FOR SMALL IRRIGATION SCHEME
DEMAND FORM
V.P. Recommendation
District Recommendation
TECHNICAL ASSISTANCE
Feasibility Study
Detail Survey
DESIGN ESTIMATE/COST ESTIMATE APPROVAL
CONSTRUCTION WORK
Information letter to the Beneficiary farmers for construction work to be started
Deposit 5% cash by beneficiary farmers in the project account in nearby ADB.
Construction Committee formation
TECHNICAL ASSISTANCE
Construction works starts contribution 20% labor by beneficiaries farmers.
Running bill & payment of work to the construction committee.
Completion of Works
Water User Committee formation
IRRIGATION SCHEME OPERATION & REGULAR MAINTENANCE BY THE BENEFICIARY FARMERS.

Table 1. RECAPITULATION OF SYSTEM WITHIN SINKALAMA IRRIGATION SYSTEM

No.	Village	Proj. type	Water Source	Area (ha)	Estimated cost (Rs.)	Actual cost (Rs.)	Proj. start date	Proj. complete date	Project completion status
1	Siauley (5)	R	Archale Khola	60	335875	314625	43/44	44/45	Completed
2	Pangtang (4,5)	N	Thamrang Khola	45	241996	-	44/45	-	"
3	Chautara (8)	R	Simdung Khola	8	37644	33926	44/45	44/45	"
4	Hagam (5)	N	Shahre Khola	60	121042	113983	44/45	45/46	"
5	Sikharpur (4,5)	N	Andheri Khola	60	671643	671643	44/45	45/46	"
6	Sangchowk (1)	R	Sindhu Khola	50	535980	534778	44/45	45/46	"
7	Sindhukot (6,7); I & II	N	Sera Khola	75	1123657	1123662	44/45	46/47	"
8	Bhotsipa (1,2,3)	N	Dadh Khola	50	520983	488164	44/45	46/47	Completed
9	Phataksila (8)	R	Khalay Khola	50	593545	-	45/46	-	90% "
10	Batasay (7,9)	R	Aanp Khola	35	307913	307913	45/46	46/47	Completed
11	Bhintar (4)	N	Gopay Khola	15	121255	-	45/46	-	60% "
12	Thokarpa (3,4,7,8)	N	Chhalappo Khola	100	1139349	-	45/46	-	20% "
13	Birta Golchay (6,7,8)	N	Khaharay Khola	100	949380	-	45/46	-	50% "
14	Sangachowk (8)	R	Gana Khola	100	1409935	-	46/47	-	10% "
15	Thakani (1,2,3)	R	Lapse Khola	60	761402	-	46/47	-	50% "
16	Pangtang (1,7,8)	N		60	724232	-	46/47	-	10% "
1	Taukhal Devisthan (7,8,9)	R	Basdole Khola	85	287862	275393	43/44	44/45	Completed
2	Deupur Gaorobosaime (1,3,5)	R	Dhad Khola	75	369655	3244050	43/44	44/45	"
3	Tuchuka Mala (1,2,3)	R	Punyamati Khola	40	274119	271216	44/45	44/45	"
4	Dapcha Daraune Pokhari (4)	R	Rosi Khola	30	355559	347002	44/45	45/46	"
5	Bhumlu Kalapani (1,2)	N	Jongsong (Rau)	40	228849	227057	44/45	45/46	"
6	Kanpur Kalapani (6)	R	Dharsing Rau	10	450504	158337	44/45	45/46	"
7	Mahadevsthan (9)	R	Cha Rau	75	621723	621723	44/45	45/46	"
8	Katunje Besi (1)	R	Rosi Rau	50	643621	603930	45/46	45/46	"
9	Panchkhal (7)	R	Jhiku Rau	50	216706	-	46/47	-	80% Completed
10	Pokhari Chauri (1,2)	N	Dano Dung Rau	75	910196	-	45/46	-	80% Completed
11	Jyamdi (5)	R	Chante Rau	20	169543	-	45/46	-	80% Completed
12	Chatrebas (3)	R	Ghatte Rau	60	813739	-	45/46	-	80% Completed
13	Bhumlutar (6)	N	Tar Rau	30	456787	-	45/46	-	70% Completed
14	Kharpachowk (1)	R	Narke Rau	30	569658	-	45/46	-	20% Completed
15	Sikhar Ambote (9)	N	Andheri Rau	25	673157	-	46/47	-	20% Completed
16	Sikhar Ambote (1,2,3)	R	Andheri Rau	50	704747	-	46/47	-	20% Completed
17	Khanalthok (9)	N	Hwarka Rau	25	633371	-	46/47	-	20% Completed
1	Thula Durlung (1,5)	R	Durlung Khola	30	190208	134162	44/45	45/46	Completed
2	Cimdi (5,6)	N	Khurmi Khola	25	257359	257385	45/46	46/47	"
1	Bajra Barahi (3)	R	Nande Khola	50	309797	213137	43/44	44/45	Completed
2	Handi Khola (6)	N	Mashine Khola	50	379459	366284	43/44	44/45	"
3	Mantar (4)	R	Manahari Khola	50	568353	-	44/45	-	"
4	Handi Khola (8); I & II	N	Rapti Khola	125	762718	726428	43/44	45/46	"
5	Daman (2,3,4)	R	Khaite Khola	100	945683	-	45/46	-	90% Completed
6	Mantar (8,9)	N	Dubo Khola	20	306605	-	44/45	-	90% Completed
7	Rai Gaun (8)	N	Cadhan Khola	25	994359	-	46/47	-	-
					2173				

SIN :SINDHUPALCHOWK KA: KABRE PALANCHOWK
LA :LALITPUR MA: MAKAWANPUR

N :New Scheme R: Rehabilitated Scheme

IMPROVING IRRIGATION SYSTEMS
EXPERIENCE OF THE ILO SPECIAL PUBLIC WORKS PROGRAM

The Nepal Public Works Program
(NEP/85/009)

1. BACKGROUND

Nepal's participation in the International Labor Organisation's (ILO) Special Public Works Programme (SPWP) dates back to 1975 when it joined the UNDP/ILO international programme "Planning and Administration of SPWPs". This became the initiator of Phase I of the Nepal SPWP which was operational from 1980 to 1987. During this time the Nepal SPWP was responsible for constructing/ rehabilitating 142 small and medium-scale hill irrigation schemes covering some 5,800 ha. Individual investment projects which included the Terrace Irrigation Project, Hill Irrigation Programme, Rehabilitation Project (Far Western Development Region) and Rehabilitation of Flood Damaged Infrastructures for Sindhuli District were implemented by the Department of Irrigation, Hydrology and Meteorology and the Ministry of Panchayat and Local Development (MPLD).

The philosophy of the ILO/SPWP is based on two basic principles: it uses labor intensive technologies to build infrastructures, and it is based on the participation of the beneficiaries.

In December 1987 HMGN restructured its Administration. The ILO/SPWP was transferred from the MPLD to the Department of Irrigation (DOI), so initiating a second phase in the Nepal SPWP. The objectives of the project were subsequently adjusted to meet the changes in the structure of the DOI's administration and the needs of HMGN's new working policy for the development of the irrigation sector. The Nepal SPWP's present role is therefore shaped by HMGN's Irrigation Sector Programme (ISP) of which it is now an integral part, through the progressive application of ILO/SPWP principles to irrigation development. The programme's activities have been revised with the aim of institutionalizing SPWP principles in all districts under the ISP and Second Hill Irrigation Project and similarly, demonstrating SPWP principles to the DOI through technical assistance to complementary irrigation projects namely Dhaulagiri, Khutiya and Marchwar.

The Nepal SPWP is responsible for emphasizing and demonstrating resource mobilization at local levels by motivating farmers to contribute cash and labor and take loans where feasible and assist in the design and implementation of small-scale

irrigation schemes financed by donors, development agencies and financial institutions on the basis of the ILO/SPWP's ten years of experience in Nepal. The ILO now provides advice to selected projects within the ISP on SPWP issues according to terms of reference agreed with DOI and the respective donor agencies, viz:

i) technical advisory services to the Irrigation Sector Project, Irrigation Line of Credit, Second Hill Irrigation Project, Dhaulagiri Irrigation Development Project, Khutiya Irrigation Project and Marchwar Lift Irrigation Project (total capital investment US$ 95 million) in subproject preparatory activities including the appropriate design of irrigation infrastructures, organisation and management of Farmers' Irrigation Associations and the training of petty contractors. The funds for capital investment are provided by the respective donor(s), while the ILO finances the costs of the in-service training and supervision facilities.

ii) management and administrative support services are also provided by the ILO for the Dhaulagiri Irrigation Development Project. Here capital investment is financed by DANIDA under a trust-fund arrangement with the ILO (US$ 3.5 million). Services include the channelling of labor funds and procurement of materials, tools and equipment. The Danish Volunteer Service is assisting with technical assistance at the field level through the provision of three civil engineers and two socio-economists. The Dhaulagiri Irrigation Development Project is therefore regarded as the Nepal SPWP's "model" project for demonstrating the labor-intensive SPWP approach.

2. PARTICIPATION

2.1. Formation of Water Users' Committees

In each of the 142 subprojects under Phase I of the Nepal SPWP, beneficiaries have formed Farmers' Irrigation Associations to assist in project execution and to ensure proper operation and maintenance of the irrigation schemes after their completion. Individual Farmers' Irrigation Associations are represented by a Water Users' Management Committee. In many subprojects beneficiaries also formed separate sub-committees to assist in construction works and to supervise operation and maintenance later on.

The formation of Water Users' Management Committees was prerequisite for ILO/SPWP assistance and committees were

formed at the written request of the Regional Directorate concerned. After he had received the initiation from the Regional Directorate the Pradhan Pancha (chairman) of the village panchayat where the subproject was located arranged a meeting among beneficiaries at which members for the committee were nominated. The engineer/overseer assigned by HMGN as Project-in-Charge assisted in this task and served as member-secretary of the committee.

The organisation of the Water Users' Management Committee varied a great deal. Most subprojects were small and the committees consisted of a dozen or so members. In rural Nepal, local political bodies comprise mainly the male heads of the social and economic leading families, and also respected men from less affluent households. Women, landless people and members of occupational castes were usually not included. However, the latter groups participated actively in construction activities.

Users' committees have been most effective where beneficiaries have felt an urgent need for the project and in villages with strong traditional political organisation.

2.2 Resource Mobilization

Agricultural in Nepal is characterized by small-scale rainfed subsistence farming, the use of traditional farming practices, and vulnerability to the weather because of unreliable and inadequate irrigation facilities. Where irrigation systems have been developed they generally lack permanent hydraulic structures. Maintenance requirements are therefore very high as schemes often need to be completely rehabilitated before the start of every irrigation cycle.

Resource mobilization for operation and maintenance work is therefore the main task of any Farmers' Irrigation Association. The strength and effectiveness of the Association tends to be directly related to the volume of resources needed to keep the system operational. In the past most of the voluntary contributions were in the form of free labor to which the small landholders and landless were the major contributors. In recent years however, mobilization of free labor has become increasingly difficult. The richer and larger landholders tend to refrain from providing voluntary labor and, so as the work is completed, the system organizers are satisfied by simply counting heads working in the field rather than their resources. Gradually the farmers, and

particularly the poor, have lost their faith in voluntary labor contributions and have taken up employment in other sectors during the agricultural slack seasons.

The problem is not only one of mobilizing the farmers' scarce resources but also reviving their confidence in order that their contributions can be used effectively. Keeping in view of unpleasant experiences in the past, the ILO is now assisting the Government to ensure that all beneficiaries, irrespective of their status contribute according to the proportionate size of their landholdings. The Nepal SPWP has recently developed a system of mobilizing farmers' resources (Lakhey, 1989) which is now being tested on pilot subprojects of the ILO/DANIDA financed Dhaulagiri Irrigation Project and the World Bank supported Irrigation Line of Credit. Initial responses have shown that farmers are agreeable and willing to pay their share of the contribution. Of course, the extension process of winning over the confidence and commitment of the farmers has required careful and drawn-out interactions between the Farmers' Irrigation Association, the DOI technical staff and the ILO advisers.

The Nepal SPWP is at present developing and demonstrating six different ways of mobilizing farmers' participation as an integral part of its technical assistance to the ISP and ILC viz;

a) **Registration Fee**

By virtue of cultivating a piece of land in the subproject's command area a farmer can be acknowledged as a member of the Farmers' Irrigation Association. Each farmer therefore has to register himself by paying a fee set by the Water Users' Management Committee.

b) **Cash Contribution by Landholding**

To ensure that social justice prevails throughout the irrigation scheme the Nepal SPWP is recommending that farmers make a cash contribution proportional to the size of their individual landholding(s). The amount payable per land unit is set by the Water Users' Management Committee.

c) **Voluntary Labor**

To avoid any confrontation between any rich and poorer members of the irrigation command area voluntary labor contributions are calculated in accordance with the proportionate size of farmers' landholding. This system also has the effect of creating employment for the poor and the

landless: the larger landholders tend to be less willing and/or unable to meet their higher contributions and are obliged to either, hire labor to work on their behalf, or pay cash to the Water Users' Management Committee. The cash payment is equivalent to their agreed commitment and at labor rates fixed by the district authorities.

d) **Voluntary Land Contribution**

According to the Irrigation Regulation (2045) farmers are entitled for compensation of land used in the construction of branch and main canals. Land lost in the construction of the tertiary canal and field channels is regarded as a donation to the project. Land used for branch and main canal is therefore accountable under the project costs and the farmers are permitted to claim compensation for its loss at the prevailing district rates. Farmers are compensated from funds collected under the "cash contribution by landholding (s)".

e) **Other Forms of Contribution**

Any other form of contribution peculiar to the irrigation project is clearly defined and agreed jointly by the Farmers' Irrigation Association and the DOI. During early trials the Nepal SPWP has identified two viable sources of project funds:

- the capitalization of organized voluntary work completed by a group of beneficiaries immediately prior to project implementation;

- grant aid received from either panchayats, financial institutions or individuals for the construction of part of the irrigation system; these contributions cannot be individualized and should be accounted as part of the farmers' gross contribution.

f) **Bank Loans**

It is estimated that the sources of farmers' contributions described above accounts for 50 to 60% of the matching contributions expected of the beneficiaries towards the project costs. The difference is still a very large amount, and in many cases the farmers have reached their saturation point and cannot provide any more of their scarce resources. The remaining and viable source of financing is from the banking institutions. The ADBN has been established with the mandate to promote development in the agricultural sector of Nepal, including irrigation. Following HMGN's endorsement of the working policy on irrigation development (2045) the

Government has entered into a separate agreement with the ADBN to provide irrigation loans to farmers by meeting their matching contribution to the project costs through their Farmers' Irrigation Association. The other commercial banks of the country also have mandates to extend irrigation loans but as yet are still inactive.

3. SYSTEM IDENTIFICATION/ACCEPTANCE

3.1 Selection Criteria and Target Groups

Under Phase I of the Nepal SPWP (1980-1987) subproject proposals were initially identified by beneficiaries with the approval of the District Panchayat, while the actual selection of individual subprojects was done by HMGN in consultation with the ILO. Water Users'Committees were formed only after subproject identification and selection.

Water Users' Committees usually played an active role in project formulation, especially in the design of the length, size and alignment of the main canal. Since beneficiaries did not bear the cost of the project for fixed percentage thereof, they usually insisted on an increase in the length and size of the main canal to ensure sufficient water for their fields and to include new areas under the command area. Further, beneficiaries insisted that the alignment follow non-cultivated areas and be as high as possible to cover a maximum command area. In the design of the size, length and alignment of the main canal, the project considered costs and benefits, and the design usually reflected the most cost-effective solution. In most subprojects, an extension of the length and size of the main canal beyond the original design was usually rejected as technically unfeasible, or too costly. Villagers at the tail end or just outside the command area failed to understand economical and technical considerations, and often developed a negative attitude to the project since they felt that it did not benefit them as much as they had hoped.

Under Phase II of the Nepal SPWP (1988-1990) the ILO has changed the procedures for system identification and acceptance and subprojects implemented now follow and adapt in principle the main selection criteria and target groups of DOI's sector lending programme. Accordingly, after the identification of possible schemes which will take place in dialogue with the beneficiaries, economic, technical and social selection criteria will be applied to ensure cost-

effectiveness and to facilitate that benefits go to the maximum number of poor people and to areas of small landholders and chronic food deficits area. Having firstly identified technically feasible subprojects, the main selection criteria will be inter alia: the population of the district, consideration of how to reach the poorest communities, willingness by beneficiaries to commit themselves to operation and maintenance through Farmers' Irrigation Associations, and selection of areas with higher unemployment. The specific criteria will, among this, give priority to:

- Rehabilitation of existing irrigation systems, preferably to enlarge the command area or increase the cropping intensity or a combination of both;
- Food deficit areas;
- Small farmers or small landholding with a minimum of 50% households owning less than 10 ropanis and their holdings making up at least 15% of the command area;
- Small and medium-scale irrigation systems preferably no larger than 200 ha;
- Good water source free from water right conflicts;
- Canal length preferably no longer than 7 km and avoiding areas prone to severe landslides and serious seepage losses;
- Soil suitability for surface irrigated agriculture;
- Demand driven request from beneficiaries;
- Availability of labor, preferably from/around the subproject area;
- Environmentally sound criteria e.g. stream-bank stability/river bank erosion at intake site, sheet/rill/gully/river bank erosion in command area, landslides along the canal alignment and above the command area and water quality.
- Construction costs should be less than NRs 30,000 per hectare for rehabilitation schemes and NRs 60,000 for new subprojects subject to review and revision from time to time due to changes in cost of construction materials and remoteness of subproject sites;

- Cost and benefit ratio as set by the National Planning Commission and taking into account the social benefits according to ILO/SPWP criteria.

Approval Process

Subproject proposals are identified by the beneficiaries and village panchayats and endorsed by the district panchayats in consultation with the District Irrigation Office (DIO). Applications are subsequently presented to the Regional Irrigation Directorates who submit them to a Regional Appraisal Committee. The applications are subject to strict survey and selection criteria established for ILO/SPWP projects. Design, cost estimates and simplified cost benefit analyses are prepared for feasible subprojects and forwarded for the formal approval by a central Approval and Co-ordination Committee. The full approval process is detailed as follows:

- Farmers groups collectively approach DIO and District Panchayat for financial and technical assistance.
- Requests from farmers' groups are screened and ranked by the District Agricultural and Irrigation Project Planning Committee (DAIPPC).
- District Assemblies approve and forward subprojects to the DIOs requesting ILO/SPWP assistance.
- The Nepal SPWP assists the DIOs to carry out preliminary investigations of all subprojects proposed by the DAIPPC through farmer questionnaire surveys and brief site visits. If all the social, agricultural, environmental and technical selection criteria listed in section 3, above are satisfied the subproject is listed as a possibility for implementation. In the past these investigations have either been carried out by local consultancy firms or Mobile Irrigation Teams (MITs) from the Regional Irrigation Directorates (RIDs).
- The Nepal SPWP assists the RIDs to rank the possible subprojects according to donor specific objectives.
- The DIOs carry out a full technical/economic feasibility study for all subprojects shortlisted by the RIDs. An exception is made for minor rehabilitation subprojects where the estimated costing is less than NRs 1 million; in such cases detailed designs, cost estimates, bills of quantity and work schedules are

sufficient. Farmers' groups are consulted for comment and ideas throughout the design process of the feasibility studies.

- Agreements with farmers' groups on participation, cost sharing and operation and maintenance responsibilities (see section 3.4. below).
- The DIOs evaluate the feasibility studies and farmers' participation and recommend subprojects to the RIDs with a copy of the detailed technical/economic feasibility study.
- The Regional Appraisal Committee reviews the subproject for construction costs and social and economic benefits and recommends it to the central Approval and Co-ordination Committee for approval. An exception is made for minor rehabilitation subprojects costing less than NRs 1 million where the designs, cost estimates, bills of quantity and work schedules are appraised by the DAIPPC and approved by the RID.
- The RIDs forward subprojects to the Nepal SPWP for approval of funding with detailed work schedules and supply of labor costs, equipment and materials required.
- The ILO and RIDs jointly declare subprojects formally sanctioned and draw up work plans for the fiscal year in question.

3.3 Participation Procedures

A key element in the success of this participatory approach is the direct involvement of the beneficiaries from the start until turnover, and that they are sufficiently informed about the project, costs and their commitments to make the decisions to participate. For this reason, the initial agreement only contains estimates of the total project costs, and not a statement of costs and monetary obligation of the farmers. This document is an agreement in principle between the farmers and the DOI to fully examine the project design, costs and time from start to completion. The agreement between the Farmers' Irrigation Association (FIA) and the DOI for participation, cost sharing and taking over the operation and maintenance proceeds through three stages. The first is the request from the FIA for the assistance. This

request may be from an organized group or an adhoc representative group to the DIO, and may be initiated in response to DIO's preliminary evaluation of the project potential. The second stage is the proposed agreements cited above, which is the commitment of both parties to further explore the feasibility of the project and their participation. The final stage comes after a detailed assessment of the extent of participation and contribution of both parties to the project, and the commitment to undertake these obligations. The initial agreement is then amended by an annex to the final written commitment, which is appended to the initial agreement and made a part thereof. The participation procedures of the Nepal SPWP can therefore be listed as follows:

- Farmers officially request the Village and District Panchayats for project assistance.
- Farmers organize a general meeting and form an Adhoc Committee to formalize a project assistance request to the DIO.
- Identify and mobilize farmers' participatory contributions, see section 2.2. above.
- Draft a constitution for registration of the FIA with the Chief District Officer's office.
- Register the FIA and form a Water Users' Management Committee (WUMC) under the Association.
- Constitute sub-committees and block committees as necessary.
- Draw up an agreement between the FIA and the DOI, defining works to be carried out by the WUMC.
- Draw up bylaws/regulations if necessary.

IMPLEMENTATION PROCESS

4.1 The Role of Beneficiaries in Construction Activities

In almost all subprojects completed under Phase I of the Nepal SPWP the Water Users' Committees assisted project personnel with the arrangement of rented storage facilities for construction materials, tools and equipment, and accommodation for project staff. In addition, the committees provided local construction materials, free of charge, such as sand, gravel, stone and timber. The project usually paid for the transportation of these material to the project site.

Construction work and transportation of materials were carried out mainly through petty contractors. While some outside labor mainly skilled was used, most construction work (and also transportation) was done by poor villagers from the project area and surrounding villages. The SPWP did not request beneficiaries to provide voluntary labor for the construction of main canals, except in a few cases. The construction of branch canals was not considered as a part of the subprojects and was left to beneficiaries to complete on a voluntary (unpaid) basis.

The involvement of the Water Users' Management Committee in project construction and supervision varied a great deal. In many subprojects, the Water Users' Management Committee was inactive, but in some cases they played an active role and provided much support. For example, beneficiaries assisted in engineering surveys and measurement of the volume of completed works, and the chairmen certified the progress of works and final bill of contracts before their submission to the regional directorates for payment.

Participation in the broadest sense was certainly forthcoming on a large scale in most of the Nepal SPWP subprojects. The villagers participated actively in decision making, both at the design and the implementation stages. They mobilized their labor resources for construction purposes. Construction labor for the main canal was usually paid for - as foreseen in the project documents signed by HMGN, the ILO, and donor agencies. Only the labor contributions for the field canals were assumed to be on a voluntary basis. It should be emphasized here that, in most cases, the beneficiaries fulfilled their obligations in this respect. Participation in labor mobilization has indeed been successful when measured by the standards laid down in the project document. The payment of SPWP workers however, created certain expectations among the beneficiaries which are, in the long run, incompatible with HMGN's maintenance policies. A lesson learnt from Phase I of the Nepal SPWP is that future capital investment projects planned under HMGN's new Irrigation Sector Programme will incorporate beneficiaries' voluntary contribution, and outside assistance will come forward only after beneficiaries have agreed to provide labor and cash as their matching contribution.

4.2 SPWP Implementation Methodology

The Nepal SPWP utilizes local skills and appropriate technologies. Subprojects are executed through local petty contracts who employ villagers from in or near the project area. Local materials are used wherever possible, and designs incorporate only essential outside materials such as cement and cratewire. The technology is simple and appropriate. Laborers use shovels, picks, etc. and portable rock drills are the largest items of equipment being used. All materials, tools and equipment are procured and supplied by the ILO/SPWP and supplied to the DIO's on request. The ILO holds custody of the equipment with HMGN until the end of the project or until the equipment has depreciated thoroghly that it has to be scrapped. The DIOs therefore take responsibility for their entry, storage and operation and maintenance. Simple hand tools are provided to petty contractors by the DIO's on loan.

The SPWP guidelines for implementation are as follows:

- DIO and WUMC jointly reach an understanding about the project implementation methods within the broad framework of HMGN financial regulations and the authority entrusted to the WUMC by the Association Registration Act (2034) through the FIA/DIO Agreement.
- Local labor is mobilized to maximize employment opportunities in the project area during construction.
- All non-technical jobs, such as earthworks (hill, bench and box cutting), simple construction works (e.g. drystone walls and canal lining) and transport of construction materials should preferably be awarded under the petty contract system with a ratio of 2/3 and 1/3 between local and outside bidders.
- Follow standard petty contract procedures developed by the ILO.
- Obtain approval of the WUMC for awarding petty contracts under the technical guidance of the project office/DIO.
- Encourage simple master pay role works under the direct supervision of the WUMC.

- Clearly defined works to be carried out by the WUMC as their participation, i.e., outline nature, volume, manpower required, cost involved, and the starting and finishing dates.
- All technically complicated construction works (primarily headworks, aqueducts, superpassages and tunnels) that need experienced and skilled contractors will be executed by the DIO through standard tendering procedures, keeping the WUMC informed at all times.
- the WUMC in agreement with the DIO will be empowered to remove any petty contractor from the construction site if the work is below the required standard and/or seriously behind schedule.

5. SYSTEM MANAGEMENT

5.1 The Role of Beneficiaries in Operation and Maintenance

The Government does not provide assistance to the operation of the irrigation systems constructed/upgraded under the Nepal SPWP, and the operation and maintenance is done entirely by the beneficiaries.

In order to ensure an equal distribution of water, distribution systems have to be planned and agreed to by the beneficiaries. But so far the Farmers' Irrigation Association have received little assistance for the development and implementation of efficient water distribution systems (which can sometimes be rather complex). Individual farmers (usually at the tail of the secondary canals) frequently complain that they receive insufficient water for their fields, and the stealing of water at night is a problem in some areas. Besides social sanctions, there is little the Water Users' Management Committee and other farmers can do to stop such violations.

Under Phase I of the Nepal SPWP, the government executing agencies took care of maintenance and repair work until the subproject was handed over to the Farmers' Irrigation Association, usually shortly after completion of the construction phase. From then onwards the Water Users' Management Committee was supposed to take care of recurrent maintenance as well as the repair of minor damages. For major damages, they continue to call on government for assistance. Beneficiaries however, have generally been unwilling to provide voluntary labor for

maintenance and repair works since they feel this is the responsibility of the Government. In the past this has often led to the ILO/SPWP paying for repairs, and even maintenance works after subproject turnover.

The Nepalese farmers know very well that foodgrain production increases with irrigation water, and it is in their interest to keep the irrigation systems well maintained. It is, however, also in their interest to have the Government bearing the cost of maintenance and repairs and, except for minor damage. Water Users' Management Committees usually request the Government for help when the main canal and structures are damaged by landslides. Although damage to an irrigation system may include parts which are beyond the technical or financial capability of beneficiaries, most work can be done by beneficiaries (such as the cleaning of the main canal, removal of landslides and minor repair to damaged structures), but the Regional Directorates and the ILO have seldom insisted on beneficiaries' voluntary contribution and, as hoped for by the beneficiaries, most repair work has been borne by the project. But if water is required in the immediate future and government assistance cannot be provided in time, farmers have tried on their own, and usually succeed in cleaning and repairing damaged canals and structures.

5.2 Operation and Water Management

Villagers with previous experience of (traditional) irrigation systems generally find it easier to adapt to the new/improved irrigation facilities. Rehabilitation/upgrading projects are often more successful than completely new ones because villagers already know about irrigation, cropping patterns, water distribution etc.

The improved systems usually have a higher water conveyance capacity and cover larger command areas. Initially, this poses problems for the system operators since they have to learn how to work with the increased capacity. For completely new projects, the water management problem may be somewhat overwhelming during the first few years. A proper design of the field canals system, with assistance from the DIO project staff, would facilitate the transitional phase.

Due to the lack of manpower, DIO technical staff in most subprojects leave the site after completion of construction

work and villagers are left on their own to sort out water management problems.

A lack of adequate provisions in the project documents (both in terms of funds and manpower) has been the root of the problem. During the initial years of an irrigation project, the Water Users' Management Committee should have received training and guidance in water management. This would have certainly improved the operational efficiency of most projects (which is sometimes very low). Furthermore, it would considerably step up the benefit/cost ratio because additional benefits during initial years have a larger impact than postponed benefits.

5.3 Recent Developments

The issue of system management has recently been addressed in revised project documents for the Nepal SPWP. Farmers' Irrigation Associations now have a clear role in achieving high operational efficiencies in the use of irrigation systems. Farmers' Irrigation Associations are structured in a hierarchy of block committees at secondary and tertiary canal levels all reporting to the Water Users' Management Committee at central level. HMGN has helped by making available suitable regulations and arrangements which give formal legal recognition to the Farmers' Irrigation Associations and provide specific rights and duties for the distribution of water, canal system maintenance, resource mobilization and water charge collection and payment. It is hoped that the majority of the farmers' cash contribution would be invested in command area development works so ensuring uniformity of water distribution on all subprojects completed under the Nepal SPWP in the future.

The above arrangements is meant to ensure that water is delivered in a timely and equitable manner to all farmers in the command area, provide a delivery flow rate as needed for efficient on-farm irrigation, match water delivery schedules to crop water requirements, create the institutional and financial basis for well managed, operated and maintained irrigation schemes. This is still a new field for the ILO and the Nepal SPWP will require a much needed assistance from ongoing research and development projects, such as International Irrigation Management Institute (IIMI) and Irrigation Management Project (IMP), in the future to ensure that some level of success is achieved in the area of system

management. As a first step the Nepal SPWP has been using expertise (technical advisers and resource farmers) from IIMI to carry out training programmes in "Post-Construction Aspects of Hill Irrigation Schemes" for core groups of progressive farmers (and WUMC members) from completed or nearly completed subprojects of the Second Hill Irrigation Project. During the 1990 monsoon season the Nepal SPWP will also be drawing up a working policy document for the operation and maintenance of irrigation systems constructed/rehabilitated under the Dhaulagiri Irrigation Development Project.

6. CONCLUSIONS

Phase I of the Nepal SPWP proved to be a successful instrument for rapid employment promotion through the creation of infrastructures which have had a positive impact on production and employment. The SPWP has two characteristics which distinguishes it from ordinary public works programmes. SPWPs use labor-intensive and appropriate technology to build irrigation infrastructures, and they are based on popular participation by the beneficiaries in all stages of the programme.

6.1 Strengths

The ILO/SPWP has proven to be very appropriate for the construction/upgrading/rehabilitation of community infrastructure works in Nepal. The SPWP has identified small-scale irrigation and land protection programmes as priority projects for increasing food production through:

- the creation of short-term employment in the construction sector;
- the promotion of local skills and appropriate technology;
- the development of guidelines and procedures for the execution of construction works by local petty contracts;
- the formation and management of FIAs, leading to the formulation of standardized Constitutions, Bylaws and Agreements and preparation of manuals for legislative and working procedures;
- standardization of simple designs for the construction of small-scale hill irrigation projects;
- preparation of working procedures for socio-economic base-line, evaluation and impact studies.

6.2 Weaknesses

While it is recognized that the Nepal SPWP has indeed been successful it has also faced many difficult challenges and many points have been overlooked:

- the effect of long-term employment creation and the sustainability of income-generating activities associated with communities involve in the development of irrigation systems;
- the environmental impact of labor-intensive irrigation development with special reference to deforestation, slope stability, and river bank erosion;
- lack of adequate provisions for operation and maintenance and water management to ensure the operational efficiency and long-term sustainability of the irrigation system.
- little or no consideration for the marketing and/or processing of surplus crops production associated with increased cropping intensities;
- no interaction with other relevant agencies in the agricultural sector to ensure the long-term sustainability of input supplies and credit.

7. RECOMMENDATIONS

The foregoing appraisal of the role of the ILO/SPWP's continued technical assistance to Nepal's Irrigation Sector Programme allows this paper to draw a number of general recommendations.

1. The Nepal SPWP should continue to improve both the construction management skills of petty contractors and the working environment in which they have to operate. Experience gained from training programmes for the Second Hill Irrigation Project should be replicated throughout the Irrigation Sector Programme.
2. The Nepal SPWP should continue to assist DOI to standardize the legal framework and management procedures for FIAs and draw up procedures for popular participation and resource mobilization in line with guidelines stated in the working policy on irrigation development. The Nepal SPWP has already made a significant contribution in the preparation of FIA Constitution, Bylaws and Agreements.
3. The Nepal SPWP should give stronger emphasis to co-ordination with existing institutions and development

programmes within project areas to ensure necessary follow up and support activities, such as credit, agricultural extension services and input supplies. Drawinging on the success of the Small Farmers' Development Programme the Agricultural Bank of Nepal (ADBN) is ideally suited for providing direct loan assistance to help meet the beneficiaries' matching contributions for the irrigation projects. Linkages with other relevant agencies in the agricultural sector and a wide experience in post-project support also make the ADBN an ideal second lead-agency. Further interaction between the ILO/SPWP and the ADBN is therefore essential if: (i) follow-up and support services are to be maintained; (ii) the concept of capitalizing popular participation is to be properly institutionalized; and (iii) the irrigation sector in Nepal is to be successfully privatized in accordance with Government guidelines.

4. The Nepal SPWP should investigate and develop linkages with other agencies regarding irrigation related income-generation activities, marketing infrastructures and environmental protection works, viz:

- creation of specific irrigation-related income generating activities for the poor, landless and unemployed to ensure the long-term sustainability of the project.(e.g. MPLD's Cottage Industry and Women's Development Sections and ADBN's Small Farmers' Development Programme). This should also include women's access to sustainable employment at all project phases.
- technical assistance to the Department of Roads/WFP Construction of Hill Trails and Jeep Tracks Project in subproject areas to ensure all weather access for the transportation of construction materials, operation and maintenance of irrigation systems and transport of excess production to adjoining markets. The earthworks requirements for a mule-trail are very similar to those of a main canal in a hill irrigation scheme.
- emphasis on environmental impact, i.e., soil erosion control and land stabilization works as an integral part of construction activities to minimize any negative ecological damage from heavy monsoon rains. This is done in collaboration with Department of Forest and

Soil Conservation, MPLD's Womens' Development Section, and various NGOs.

5. The Nepal SPWP should incorporate improved project planning and monitoring procedures to maximize the efficient use of limited technical manpower available, and to ensure that shortages of essential construction materials do not disrupt project progress.

6. The training of DOI technical staff in the more socio-political aspects of irrigation development is essential during the early stages of the popular participation approach. This could provide the ILO/SPWP with a new role in its continued technical assistance to the Irrigation Sector Programme of Nepal.

Assistance to Farmer Managed Irrigation Systems Experienced from WECS/IIMI/FORD Action Research Project in Indrawati Watershed Basin

Robert Yoder

INTRODUCTION

The importance of farmer-managed irrigation systems in Nepal can be viewed from several perspectives. At the household level, survival of many families in densely populated hill areas depends on the increased production made possible by their irrigation systems. At the national level, at least 45 percent of the population's subsistence cereal requirement is being met by the increase in food production made possible by irrigation from farmer-managed systems. This estimate assumes a conservative annual increase in production of 2,000 kilograms per hectare (kg/ha) with irrigation as compared to rainfed conditions.

Some farmer-managed irrigation systems are managed well, with intensive cultivation of three crops a year giving annual production in the range of 7,500 to 9,000 kg/ha (Yoder 1986). Other farmer-managed systems are operating far below the production level they could potentially achieve with their available water and land resources (Pant 1985; Tiwari 1986; Hydro Engineering Services 1987).

If minor improvements to already operating farmer systems can increase their irrigated area or improve irrigation reliability of the existing area so that an additional crop can be grown, a rapid increase in food production will result. If assistance to these systems increases the operation and maintenance capacity of the farmers, it will enhance system sustainability.

Though a given system may be performing poorly, the fact that farmers have already constructed a canal means they have identified land and water resources, have enough commitment to invest their own resources for irrigation development, and have formed at least the rudiments of a users' organization. These are the conditions that allow relatively low-cost assistance to existing farmer-managed systems to be effective.

Assume:

- Area irrigated by farmer-managed systems is 675,000 ha (HMGN, Ministry of Water Resources, Department of Irrigation 1988),
- Annual increase in production of cereal grain with irrigation is about 2 ton/hectare/year (t/ha/yr) as compared to rainfed conditions,

- Subsistence cereal requirement is 0.164 ton/person/year (t/person/yr),
- Nepal's approximate population is 18,000,000 persons.

Total increased annual cereal production from farmer systems

675,000 ha x 2 t/ha/yr = 1,350,000 t/yr

Total subsistence cereal requirement

0.164 t/person/yr x 18,000,000 persons = 2,952,000 t/yr

$$\text{Percent subsistence cereal production} = \frac{1350000\ \text{t/yr}}{2952000\ \text{t/yr}} \times 100\%$$

$$= 45.7\%$$

The Water and Energy Commission Secretariat (WECS), with assistance from the Ford Foundation and the International Irrigation Management Institute (IIMI), established a small action-research project in 1985 to investigate alternatives for providing assistance to farmer-managed irrigation systems that would expand irrigated agriculture. The WECS Executive Director for Water Resources had overall responsibility for implementing the project. Other senior WECS staff and the WECS accountant supported the field personnel.

GOAL AND OBJECTIVES OF THE ACTION-RESEARCH PROJECT

One objective of the action-research project was to establish low-cost procedures for identifying the relative needs of all systems in an area, allowing selection of systems for assistance where greatest impact on food production could be made. Another objective was to develop and test methods for delivering assistance that enhanced farmer management capability for operation and maintenance at the same time as the physical infrastructures were being improved.

The goal of expanding existing farmer-managed systems included ensuring that they remained farmer-managed. It was assumed that this required full participation of the farmers in identification of the available resources and the limitations they have in exploiting them. Furthermore, it was anticipated that farmer participation in carrying out all improvement activities under the guidance of competent technicians would give experience in physical system maintenance procedures and would teach management skills essential for mobilizing local resources.

This paper briefly outlines the main features of the action-research project and concentrates on the results and lessons learned. For further reading on this project see: Acharya 1989; Hydro-Engineering Services 1989; Acharya 1990; Bhattarai 1990; and Pradhan and Yoder 1989. The recommendations given are in the form of a set of procedures that could be

followed in developing an implementation program in an environment similar to the action-research project area.

PROJECT IMPLEMENTATION

The upper Indrawati River basin in Sindhupalchok District was selected for the project site (See Figure 1). Proximity to Kathmandu for supervision of the research was the primary consideration in site selection. This is a hilly area where the Indrawati River has cut deep into the valley making water from this large snow-fed river nearly inaccessible to farmers for irrigation. To develop irrigation, farmers have constructed diversions on the small high-gradient tributary streams to the Indrawati River. These streams have destructive floods in the monsoon but only a small spring-fed discharge in the dry season. Farmers have built contour canals, often across rock cliffs and through unstable slopes, to irrigate terraced hilly land.

At the lower end of the project area, where the elevation is about 1,000 meters, three irrigated crops are grown each year. At the higher elevations, low temperatures limit the growing season to two crops. Rice is the main irrigated crop in the rainy season and if the water supply is adequate, an irrigated rice crop is also grown in the hot, dry season preceding the monsoon. If water is limited, maize may be grown instead of rice before the monsoon. Wheat or potatoes are the predominant irrigated winter crops.

To allow systematic identification of existing systems, the river basin hydrologic boundaries were used to define the project area. This reduced travel time and simplified supervision since it is the basin's drainage pattern that determines the location of systems, not political boundaries.

PHASE I: SYSTEM IDENTIFICATION AND SELECTION

The objective of determining relative needs among systems and establishing criteria for selecting systems to assist required that all the systems in the project area be identified and some minimum level of information collected about each of them. An inventory activity was used to fulfill this objective.

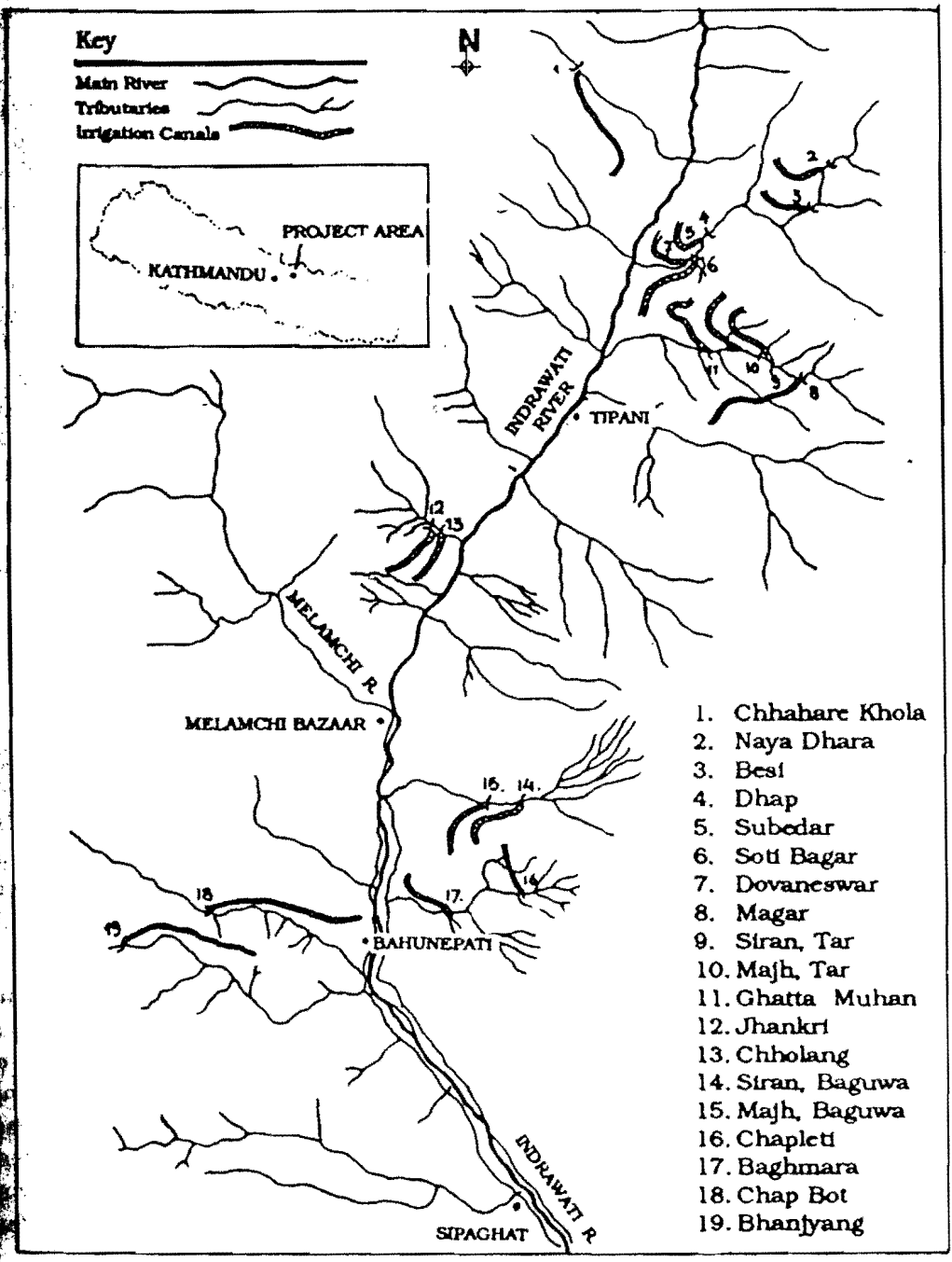
Inventory

Hydro-Engineering Services, a local consulting firm, was engaged to visit all tributary streams of the Indrawati River in the project area and identify each canal diversion point. Using farmer informants to describe the variation of discharge in the stream at the diversion in each season compared to that being observed, the water resource available throughout the year was assessed. The consultant was required to walk from the canal diversion to the command area of each canal with a group of water users and note difficulties that the farmers face in operating the system. A rough

estimate was made of the area irrigated for each crop by asking a group of farmers and then confirming by visual checking. identification of the extent and nature of unirrigated land that could be served by each canal and of the reasons why it was not presently receiving water was also accomplished with the help of the farmer group. It took a team of three persons 21 days in the field to complete the inventory.

As a result of the inventory, 119 irrigation systems were identified with canals longer than 0.5 km in the 200-square kilometer project area (Hydro-Engineering Services 1986). These systems irrigate about 2,100 ha owned by more than 5,000 households.

A major accomplishment of the inventory was a description of the potential for either intensifying the cropping pattern or expanding the area irrigated by each system. Out of the 25 tributary stream basins which farmers have tapped for irrigation, only 23 separate irrigation systems in 11 sub-basins were identified by the consultant as having both land and water resources with potential for expansion of the irrigated area.


Key
Main River
Tributaries
Irrigation Canals
PROJECT AREA
KATHMANDU
N
INDRAWATI RIVER
TIPANI
MELAMCHI R.
MELAMCHI BAZAAR
BAHUNEPATI
INDRAWATI R.
SIPAGHAT
1. Chhahare Khola
2. Naya Dhara
3. Besi
4. Dhap
5. Subedar
6. Soti Bagar
7. Dovaneswar
8. Magar
9. Siran, Tar
10. Majh, Tar
11. Ghatta Muhan
12. Jhankri
13. Chholang
14. Siran, Baguwa
15. Majh, Baguwa
16. Chapleti
17. Baghmara
18. Chap Bot
19. Bhanjyang

IMPLEMENTATION

System Selection Criteria

The main criterion established for selecting systems for assistance was water and land availability for irrigation expansion. Food production can also be increased by assisting systems where expansion of area is not possible but where an additional crop could be grown each year by making the water supply more reliable. Sustainability of some systems where the area irrigated and cropping intensity have already been maximized is threatened by high maintenance costs. Many systems would benefit from assistance to build permanent structures and reduce the maintenance burden.

However, because of limited resources, only systems where expansion of irrigated area was possible were selected because this would have a high impact on food production and benefit families not presently having access to irrigate their land. Of the 119 systems, only 23 systems, or 19 percent, met this criterion. Additional criteria for selection were that the existing users had to be willing to allow their system to be expanded and be willing to accept additional farmers as members of the water users' organization. After using the inventory information to identify systems that had potential for expansion and where existing users were willing to give water rights to new users in an expanded area, the selected systems were revisited and examined in greater detail using rapid-appraisal techniques developed by the project.

Rapid Appraisal

The same local consulting firm that had conducted the inventory also carried out the rapid appraisal study using the same field team. The team measured the discharge in the water source at the diversion and compiled a detailed description of all problems along the canal. They also developed a more complete profile of the existing agricultural and irrigation practices. The information from the inventory and rapid appraisal studies was used to make the final selection of 19 systems for assistance.

A major problem identified during rapid appraisal was that the water users of the systems selected for assistance did not function as organized bodies to manage the operation and maintenance activities of their canals. Labor mobilization for maintenance was not systematic, and in many cases it was unclear how many households actually received water for irrigation from the canal. Cash mobilization for making system improvements or paying someone to patrol the canal daily was unknown. Only one of the systems had any written records and that was for only a few days of labor mobilization.

This was in sharp contrast to well-managed farmer systems studied in many other districts of Nepal (Khatri-Chhetri et al. 1988; Martin and Yoder 1988; and Pradhan 1989). The systems selected for assistance by the action-research project had only recently begun development of their institutions, i.e., formulated rules, rights, and obligations, and organized themselves to make decisions and manage irrigation tasks. From the result of the action-research, it is clear that the primary reason these systems had not developed the full extent of their land and water resources was due to the lack of a strong users' organization rather than technical or economic difficulties. During the rapid-appraisal study, farmer training for irrigation management in each system was identified as a priority in implementation of the project.

PHASE II: IMPLEMENTATION OF IMPROVEMENTS

The rapid appraisal report identified far more work to be done than available project money could cover. One option was to reduce the number of systems to be assisted to allow full funding for a few. Another alternative was to only provide assistance for the most urgent needs in each system. Since it was noted that some work was essential for system expansion, while other improvements reduced maintenance or made the system easier to operate, it was decided to divide all improvements into three categories: 1) first priority was work essential for expansion but difficult for farmers to do without assistance, 2) second priority included work desirable for improved operation and maintenance, and 3) third priority work was identified as improvements farmers could accomplish with their own resources, skills, labor and materials.

The project assistance funds were allocated among the irrigation systems so that most first priority improvements were covered. Once the allocation of funds was made, a fixed amount of money was available to each system. As an incentive to the farmers, the project decided that if farmers could save money by working efficiently, or by paying themselves lower wages, or by donating labor, they would be able to use the savings for additional, second, or even third priority work within the system, i.e., all the funds allocated to a system would be used in that system rather than stopping work when the first priority work was complete.

In order to gain a perspective of different styles and modes to implement the assistance program, the 19 systems were divided into three clusters. Supervision of assistance for one cluster of four systems was handled by staff hired directly by WECS. Implementation in the other two clusters was supervised by local consulting firms. One of these was supervised by the firm which has already completed the inventory and rapid-appraisal studies. Actual field supervision was carried out by teams that consisted of engineers, overseers, agriculturalists, social scientists,

and persons with construction skills. The term field supervisor is used here to refer to any of the persons on the supervision teams responsible for directing the implementation work.

The terms of reference prepared by WECS for supervision of assistance emphasized building the capacity of the water users' organization to manage operation and maintenance. The construction activities were to be a training exercise for the users' organization in making decisions, establishing rules, managing conflicts, mobilizing labor, and keeping records. The project directives mandated that all activities be carried out by agreement of and assistance from the water users. This was to ensure that the "farmer-managed" character of each system be preserved, i.e., that all operation and maintenance activities remained the responsibility of the farmers after completion of the assistance.

Dialogues

The field supervisors initiated a series of dialogues with the water users of each system. These consisted of meetings to which all users of the irrigation system were invited. The first dialogue was used to communicate to the irrigators that their system had been selected for assistance under certain conditions. In the second dialogue, the water users were informed of the amount of money available to their system and the priority of the work to be done was examined jointly. In many cases the priorities were modified.

The terms and conditions discussed in the first dialogue included a requirement that the water users form a users' organization unless one already existed, and listed the activities that the users' organization was responsible for to fulfill their obligations. This list included: 1) identification of existing and future water users (from the expanded area) and the land area each irrigated, 2) preparation and acceptance by all water users of a plan for water allocation to the new area, 3) preparation of a plan, including rules for supervising the improvements to be made and for future management of operation and maintenance, and 4) setting requirements and rates for free and paid labor mobilization.

The terms and conditions also stated that the users' organization would assist the field supervisor in carrying out the site investigation and design work and that the users would provide all of the labor for transporting materials and making the physical improvements. All labor provided by the water users would be paid by the project at the rate set by the users of each system as long as the rate was within the government guidelines. The project would provide materials not locally available, including the cost of transportation.

All water users of the existing system and from the area to which the system was to be expanded automatically became members of the organization. The organization then had the authority to decide on the number of members required to form a quorum and to determine the basis for making binding decisions. In the first dialogue, the farmers were told that all activities would be carried out on the basis of the decisions made by their organization.

The users' organization was required to form a management committee to take care of day-to-day implementation activities and to continue as the manager of operation and maintenance after completion of the improvements. Each system determined the number of functionaries it wanted, described the responsibilities and accountability of each, and elected individuals to fill the positions. These persons were not to be paid from the project improvement fund.

Design

Between the first and second dialogues, the field supervisors worked with the farmers to collect design data and complete the design work. A field design book was opened for each system to record all measurements and sketches for each structure, including where appropriate, the alternative designs considered. The advice and suggestions of the beneficiaries were also noted. Emphasis was placed on maximizing the use of local materials and use of the existing canal alignment. The field supervisor provided the farmers with information about costs and relative labor requirements for alternative designs. On the basis of this information, in consultation with the field supervisor, the water users decided on the priorities for making physical improvements.

While it was specified that the design work should be field based with full participation of the beneficiaries, it was also necessary to comply with the rules and regulations of the government. This required design drawings of each structure and cost estimates based on the national norms published by the Ministry of Works and Transport. As a result, while design data were collected with farmers input, design drawings and cost estimates were done in a Kathmandu office away from the site without benefit of farmers input or reinspection of the site. Even though most structures were simple in nature, the drawings took a great deal of time, and in the end, required substantial changes to comply with the project objectives, i.e., meet farmer approval.

Physical Improvements

A construction book was established for each system. It was used to record meeting minutes and all decisions regarding the modification of designs and procedures. It was also used to record a summary of each

day's work, daily labor mobilization, quantities of local materials collected, costs for transportation of materials, and all transactions for cash and construction materials. The unique feature in this process was that the construction book was open for inspection by all farmers, the consultant, WECS, and IIMI staff.

Supervision of the physical improvements varied among the clusters but all received intensive supervision. In each case, a field supervisor was in charge at the site. Usually, this was a person without extensive experience or technical skills, but who could follow the directions given by the engineer and assist with record keeping. This field-level supervisor stayed full time at a site for the four to eight months when construction was underway. An engineer or overseer visited frequently to check and instruct the farmers, but the field supervisor was there each day to see that the instructions were understood and carried out. In many cases, the field supervisor lived with the farmers and learned to know them well, came to understand community problems, and became able to identify factions among farmers -- all of which were essential in the process of motivating and helping the farmers build a viable water users' organization.

The field supervisors' job was to oversee completion of the physical improvements, ensure the integrity of the design, and control quality. However, they found that the majority of their time and effort was spent motivating the farmers to work as an organization. The field supervisors also had to assist the farmers with the technical and administrative work. WECS purchased and delivered materials such as tools, cement, and steel to the field, but coordination of delivery and transport from the road head to each system was done by the field supervisors.

Management Improvements

The major input to improving farmer management was provided by the field supervisors through daily contact in helping the management committee organize and carry out its work. Assisting the committee members in making group decisions, keeping records, and mobilizing labor was a continuous process for the duration of the construction period.

In addition, WECS and IIMI initiated a series of farmer-to-farmer training tours. One to nine persons from each system were able to attend one of the five training tours. The objective was to expose farmers from the systems being assisted to a variety of organizational and management options that other farmers in well-managed systems have developed. On a typical tour, first an inspection was made of the intake and canal of the system visited. Then, a meeting was held where the host farmers described the ways they had devised to deal with issues such as labor mobilization for emergency maintenance, water allocation, water distribution, conflict management, and the structure of the organization. A facilitator listened

to the discussion and interjected questions periodically to ensure that all topics were adequately covered. Since the systems that farmers visited during the farmer-to-farmer training were difficult systems to build and maintain, they provided an example of what can be accomplished through the organized effort of farmers. This created a great deal of enthusiasm among the visiting farmers when they realized that most of their own systems faced fewer physical obstacles and that they could achieve the same level of intensive irrigated cropping.

To provide another mode for farmer-to-farmer input, the project hired farmers from well-managed systems as consultants to visit systems in the project area. The organizations of two well-managed systems chose four experienced irrigators as their representatives. In addition to experience, selection was based on ability to interpret observations and communicate authoritatively. The farmer-consultants inspected the canals and structures of nine systems and discussed their observations of similarities and differences to their own systems with the farmers in each system, and made suggestions for improvements.

The observations and input of the farmer-consultants at each system reflected their perception that it was not due to the lack of resources or difficult technical problems that these systems were not functioning well, but rather that the water users had not developed a strong organizational structure that enabled them to make and carry out decisions that benefited all users equitably. The farmer-consultants' report at the end of their ten days of work indicated some frustration that government assistance was being provided to irrigation systems where physical improvement was relatively easy. They identified the irrigators' unwillingness to sit down and work out personal differences and to work cooperatively as the main reason the systems had not been improved by the farmers themselves. In the farmer-consultants' own systems, they had overcome more difficult technical problems with much less outside assistance. When it was pointed out to them that they had been hired as farmer-consultants because they could communicate this self-help attitude so well, they accepted the rationale with great pride.

Problems Encountered during Implementation of Construction

Most government-assisted rural works in the project area have been carried out through local labor contracts in the past. The labor contractor often hired persons from outside the community if those from the community were not willing to work for the wages he dictated. In many communities, farmers told stories of being cheated out of their wages when they worked for a contractor. In most cases, they had only heard rumors regarding the amount of the contract, never a public declaration made by a government official. Because they felt that the contractors made a huge

profit at their expense, they were reluctant to participate. It was initially difficult to convince the farmers that this project would be different. Timely labor payments, accounts open for all to inspect, and the sincerity of WECS and consultant staff were the main factors in overcoming these fears. In several cases, local leaders who were initially enthusiastic about the prospect of a project lost interest when they realized they would not be able to win a lucrative contract.

Due to the isolated nature of the work site-- from the road, a full day of walking--there were periodic communication problems, delays in the flow of construction materials and sometimes payments did not reach the site on time, causing discontent. This placed a heavy burden on the site supervisor who was responsible for keeping the work moving. The WECS support staff overcame these problems by establishing good rapport with the farmers, flexible work schedules, and strong commitment to completion of the work.

The project objective stated that all activities had to be carried out with the agreement of the water users. Therefore, the designs had to be acceptable to the farmers. Since the farmers could not read design drawings nor easily understand a verbal description that involved terms and quantities that they were not familiar with, they often had agreed to designs that they later rejected when construction was to begin and the work actually laid out at the site. In part, this was because the farmers were reluctant to accept structures that they were not familiar with. In other cases, the farmers felt the structure might limit the discharge. In general, they wanted a type of structure that would allow continued increase in discharge beyond the design capacity in case water became available for further expansion of the command area or for other uses such as a water-powered mill.

Changing a design typically requires preparation of the new design and related drawings, a new cost estimate, and approval of both by higher authorities who are at a central office far from the work site. This must be understood in the context of an isolated work site where telephone and two-way radio communication are not available, and reaching the site requires considerable walking. Changes can cause long delays which are particularly annoying and expensive when a project has already mobilized labor and materials and is ready to build the structure.

Because farmers frequently demand time-consuming design changes when they actually see what is to be constructed, project staff in government projects often prefer to use a contractor who will carry out the work according to the design regardless of objections from the farmers.

To expedite construction in this project, the WECS Executive Director of Water Resources delegated authority to the two senior WECS engineers to

approve design changes in the field if the request was made by a majority of the water users. This allowed a great deal of flexibility during implementation and a substantial number of design changes were made. However, even with a rapid, flexible process for changing and approving designs, it always caused delays for those supervising the field work.

Of the 150 first priority structures designed for the 19 systems, 41 percent were redesigned as a result of farmer requests during construction, and seven percent were dropped in favor of using the money for modified priorities. Through farmer participation and intensive construction supervision, enough money was saved in implementation of the first priority work to allow an additional 140 structures and activities to be completed.

RESULTS

CONSTRUCTION AND COST

Table 1 shows that assistance to the 19 systems allowed expansion of the irrigated area commanded by the canals by over 50 percent. The cost based on the grant to each system was just under NRs 2,000/ha (about NRs 22/US$ at the time the grant was received). With supervision included, the cost of physical and management improvements was about NRs 3,300 (US$ 150) per hectare. This is in the same cost ranges as other agencies that have provided assistance to farmer systems in the hills using participatory methods such as the Farm Irrigation and Water Utilization Division averaging NRs 3,400/ha, and the Agricultural Development Bank of Nepal which costs about NRs 4,600/ha (HMGN Ministry of Water Resources, Department of Irrigation 1988).

More important than the low capital cost per hectare of the grant was the effect of intensive supervision and farmer training tours in motivating farmers to use the grant resource productively and to augment it with their own labor. This resulted in nearly all of the improvements identified by the farmers and consultant (including second and third priority work) being completed even though the budget was expected to cover only the improvements of first priority. Table 2 shows that farmer involvement in the construction resulted in a 38 percent savings over the estimated cost of the first priority work. Although the project was not based on a mandatory contribution from the farmers, about half of the systems managed substantial labor mobilization from their own resources. One system contributed 30 percent of the total investment.

Averaged over of all the systems, farmer participation can be credited with increasing the value of the grant by about 134 percent, where the volume of work completed is computed at the rates given in the national norms for rate analysis. Most of the increases in value of the work done can

be credited to the efficiency of work accomplished by farmer participation over what would have been required if contractors had been used.

Although a great deal of time and effort was required to bring about effective farmer participation and the project got off to a slow start with delays for design modifications, ultimately it resulted in an extraordinary farmer response during construction. Once farmers were convinced that they were getting what they needed from the project, they worked hard to get the most out of it.

MANAGEMENT CHANGES

In addition to effective construction output, the farmers gained confidence and pride in their own ability to organize and mobilize resources and gained skills in construction methods. This has improved their ability to continue management of operation and maintenance of the systems. While the savings in cost of physical improvements attributable to farmer participation is valuable, the real payoff is in the sustainability of those improvements and better water delivery from improved management.

Research has shown that the strength of farmer-managed irrigation systems is the ability of farmers to cooperate in the management of their systems. This allows them to overcome some of the limitations of temporary structures made with local resources in difficult terrain.

Table 1: Irrigable area and cost of improvements to 19 farmer-managed systems.

System	Existing command area (ha)	Command area expansion (ha)	Total irrigable area (ha)	Project grant (NRs)	Cost per irrigable area (NRs/ha)
Chhahare Khola	126	37	163	126,615	777
Soti Bagar	19	11	30	150,699	5023
Dovaneswar	2	10	12	74,807	6234
Magar	100	43	143	160,805	1125
Siran, Tar	18	6	24	136,789	5700
Majh, Tar	71	16	87	114,321	1314
Ghatta Muhan	23	10	33	124,321	3767
Jhankri	18	13	31	91,707	2958
Chholang	23	14	37	116,066	3137
Siran, Baguwa	18	19	37	57,488	1554
Majh, Baguwa	13	20	33	113,541	3441
Chapleti	8	15	23	78,065	3394
Baghmara	3	6	9	44,433	4937
Chap Bot	12	5	17	71,630	4214
Bhanjyang	21	14	35	65,178	1862
Dhap & Subedar	30	35	65	85,000	1308
Naya Dhara	55	55	110	139,720	1270
Besi	65	20	85	119,839	1410
Total	625	349	974	1,871,024	1921
Average cost per irrigable hectare					
Consultant and WECS supervision support				1,192,747	
Tools supplied				82,182	
Farmers training				55,000	
Total of supervision and suport				1,329,929	
Average cost of supervision per irrigable hectare					1365
Total cost of improvement per irrigable hectare					3286

Table 2: Savings in cost of improvements due to farmer participation.

System	(a) First priority work Grant (NRs '000)	(b) First priority work Actual expenditure (NRs '000)	(c) Saving (a-b)/a (%)	(d) Farmers' contribution (NRs '000)	(e) Work completed (NRs '000)	(f) Effective increase e/a (%)
Chhahare Khola	127	62	51	3	168	132
Soti Bagar	151	83	45	1	167	111
Dovaneswar	75	68	9	1	89	119
Magar	161	133	17	1	192	119
Siran, Tar	137	40	71	1	214	156
Majh, Tar	114	96	16	1	143	125
Ghatta Muhan	124	82	34	0	170	137
Jhankri	92	28	70	1	108	117
Chholang	116	41	65	1	136	117
Siran, Baguwa	57	42	26	25	81	142
Majh, Baguwa	114	85	25	42	170	149
Chapleti	78	60	5	19	109	140
Baghmara	44	30	32	12	73	166
Chap Bot	72	60	17	16	86	119
Bhanjyang	65	50	23	15	102	157
Dhap & Subedar	85	35	59	4	154	181
Naya Dhara	140	-	-	21	245	175
Besi	120	-	-	10	221	184
Total	1872	995	38[c]	174	2628	140

a) Grant amount allocated to the systems to complete most first priority work as estimated using national norms.

b) Grant money expenditure for completing first priority work money saved (a-b) was used for second and third priority work.

c) Naya Dhara and Besi Kulo systems are not included because information on the actual cost is not available.

d) Unpaid labor (calculated as the number of person-days of labor multiplied by the district wage rate) plus the difference between the

district rate and a lower labor rate as agreed to by farmers in some systems to reduce cost.

e) Value of work completed as computed using national norms. This is higher than (a+d) because: 1) estimates computed by norms are generally high, and 2) work efficiency due to farmer participation was very high.

f) Effectiveness of farmer participation in accomplishing more than estimated by the national norms.

Management of operation and maintenance activities in all 19 systems assisted was on an ad-hoc basis before improvements. There were few examples of cooperative efforts for maintenance and no evidence of rules, roles and sanctions that are common features in well-managed systems. There is evidence that the assistance to the project has brought some level of management change in all 19 systems.

A survey was made of the 19 systems after they had operated through one monsoon to determine if any of the management innovations introduced during the assistance program were being used. In all the systems there was a stronger feeling of ownership of their system by more of the farmers than before the assistance. In eleven systems the leadership has changed, but in all systems they were able to refer to an elected leader. In all systems there was evidence of more organized activity than previous to the assistance program, and a number of systems have become highly organized.

The system with the strongest organization reported that they are following all of the rules that they made collectively. In eight other systems, the farmers indicated that the rules they had made are operational. The other ten systems had nothing to report when asked about rules. In a number of systems, they have realized that some farmers have been able to irrigate without making a contribution to system improvement. Now that most have made a contribution, social pressure is increasing for equitable labor input for maintenance. In two systems, those who repaired the system refused to allow water to be used by families who did not fulfil their share of the labor requirements. The organization has made arrangements to allow delinquent farmers to do additional work on the canal to earn their place as members.

In nine systems, formal meetings with recorded minutes have continued after the project was completed. Seven other systems also held meetings but did not keep records. The other three systems have not held meetings. One system reported that over 90 percent of the water users had

attended their assembly meeting and two reported as low as 50 percent attendance. The rest indicated more than two-thirds of the users attended at least one meeting after completion of the construction. It was reported that the main purpose for meetings was to discuss labor mobilization for canal maintenance. There were also cases where a meeting was held to discuss water allocation, water distribution, and to resolve a conflict. In the two systems where they have continued to keep the accounts open for inspection by all users as was initiated during construction, meetings have been called to discuss the accounts.

In all systems there has been more cooperative effort to maintain the canal during the monsoon. In three systems, persons were hired and paid -- in two systems they are paid in kind and in one in cash -- by the organization to patrol the canal to take care of minor maintenance and report the need for emergency maintenance. All but a few systems with alternative sources for monsoon irrigation reported that there was effective labor mobilization for emergency maintenance.

There is need to be continued adjustment to the rules as each organization determines its needs and the mode in which it wants to operate, but there is an established mechanism now in place in each system for doing this. The real management test will be passed if this evolution continues until workable modes of operation and maintenance are institutionalized. The impact of better system operation on increasing agricultural production is providing an incentive for these changes.

AGRICULTURAL CHANGES

Farmers that were interviewed in each system after the first rice crop was harvested after assistance, were asked how much more water was now available as compared to before the improvements were completed. The system with the lowest report indicated a 40 percent increase in water delivery. Three other systems reported a 50 percent increase. All the rest said that the water available at the command area had at least doubled. When the same farmers were asked what impact the increased water supply had, the most frequent response was that it allowed timely rice transplanting. In the past, they had to wait for rain. Several reported that head end versus tail end irrigator conflicts over water distribution no longer existed. In several systems, the increase in water delivery allowed the installation of a water-powered grain processing mill.

Assistance for physical improvements was completed just before the monsoon rice season in 1989. No time was available for most farmers to convert their upland fields into level terraces for growing rice. Farmers in

one system reported that on the few hectares they were able to terrace, production shifted from an average of 1.7 tons per hectare (t/ha) of millet to nearly 3.0 t/ha of rice. Farmers indicated it will take them four or five years to complete the terrace building, but wide-scale work is underway.

Seventy-six of the farmers interviewed after the monsoon rice harvest indicated they had previously grown rainfed rice on land that they were able to irrigate for the first time after the system was improved. The total sample of 16 ha that shifted from rainfed to irrigated rice reported an average increase in yield of about 50 percent, from 1.5 to 2.2 t/ha. A sample of 106 farmers with over 44 ha of rice land that had intermittent access to irrigation in the past reported that on the average, their yields went from 1.2 to 2.3 t/ha, or an increase of about 90 percent. Many farmers indicated that their yields this year were reduced due to a severe hail storm and that they expect to get a much higher return in future years. In this first cropping season, farmer practices regarding fertilizer did not change. All the increase in production was due to improved irrigation. As reliability is proven, farmers will use fertilizer and other inputs resulting in even higher impact. Active agricultural extension could shorten the time required to achieve full production.

A survey of changes in winter crop production has been completed in 14 of the systems. Table 3 shows the increased area of various winter crops due to improved irrigation. The largest expansion of irrigated area is for wheat but the value of potatoes grown on the expanded area was highest. Table 4 shows the estimated value of production resulting from improved irrigation. It is assumed that the area growing potatoes was fallow before irrigation. The average national yields for wheat and oilseed in the hills in irrigated and unirrigated conditions and farmgate financial prices were used to estimate the value. Excluding the value of vegetables, the increased production of winter crops alone in the first year had a value of nearly one-third the cost of the improvements made in all 19 systems.

A more intensive evaluation is being undertaken by WECS in 1990 to determine the total impact on agricultural production. However, already there are clear indications that rapid change is taking place. If the trends indicated by the small sample of farmers reported here are correct and apply to the total project area, the value of increased production will be more than the cost of improvements within two or three years.

Table 3: Area growing irrigated crops in winter season immediately before and after assistance (ha).

System	Potato		Oilseed		Wheat		Vegetables	
	Before	After	Before	After	Before	After	Before	After
Chhahare Khola	0.2	2.5	n.a.*	n.a.	n.a.	n.a.	0.1	1.6
Soti Bagar	0	0.6	0.2	2.5	6.0	15.0	0.2	0.4
Dovaneswar	0	0.5	0	0	1.0	2.0	0	0.2
Magar	0.5	2.5	0	1.0	n.a.	n.a.	0.5	1.3
Siran, Tar	0.5	0.8	3.5	3.5	n.a.	n.a.	0.2	0.5
Majh, Tar	0.8	3.0	2.5	5.0	5.0	15.0	0.5	1.5
Ghatta Muhan	0.3	0.8	0.6	1.3	10.0	10.0	0.5	1.0
Jhankri	0.5	2.0	1.0	2.0	4.5	9.0	0.5	1.0
Chholang	0	4.6	2.0	3.5	63.0	63.0	0	1.5
Siran, Baguwa	2.5	5.5	3.5	8.5	10.0	15.0	0.5	1.5
Majh, Baguwa	0	5.0	0	7.5	0	20.0	0	2.0
Bhanjyang	0.4	0.4	0.5	1.5	3.0	6.0	0.5	0.6
Dhap & Subedar	0.2	0.4	3.0	12.0	6.0	15.0	0.2	0.4
Total	5.9	28.6	16.8	48.3	108.5	170.0	3.7	13.5
Increased area		22.7		31.5		61.5		9.8

*not available

Table 4: Value of winter crop production due to irrigation as estimated using yields and farmgate financial prices.

Crop	Increased area[a]	Estimated yield[b]		Value[c]	Value of production
		Unirrigated	Irrigated		
	(ha)	(kg/ha)	(kg/ha)	(NRs/kg)	(NRs)
Wheat	61.5	1000	2200	3.54	261,000
Potato	22.7	0	10,000	2.80	636,000
Oilseed	31.5	300	800	12.35	195,000
Vegetables	9.8	n.a.	n.a.		
Total					1,092,000

[a]From Table 3.

[b]HMGN Ministry of Water Resources, Dept. of Irrigation. 1990 Table B1-12

[c]HMGN Ministry of Water Resources, Dept. of Irrigation. 1990 Table B2-1.

Assisting Water Users Organization for Improving Performance of Malebagar FMIS: An Action Research Approach

R.R.S. Neupane

INTRODUCTION

The main purpose of irrigated agriculture is to increase crop production through crop intensification and yield increase. As irrigated area expands over time, attention should be diverted towards the performance of the irrigation systems. Are they performing at their the desired level? Should some development and modernization effort be introduced to irrigated agriculture managed by farmers or agency for it improvement? It is reported that more than 600,000 hectares of land have been constructed and managed by farmers. But how about the level of their performance? How about the existing production and potentials of such systems?

To answer these questions, Irrigation Management Center located at Pokhara undertook two FMIS for action-research. One was Malebagar Farmer Managed Irrigation System (FMIS) in Bhimad, Tanahu district and the other was Chabdi Bårahi Irrigation System (CBIS) also from the same district. The followings are the strategic concepts in assisting farmers managed irrigation systems under this study:

1. An integrated approach for increased crop production.
2. A participatory approach for system improvement through water user organization.

In order to understand the system's operation, detailed field observation and water flow measurements were taken during early paddy growing season. The prevailing meteorological data were processed to derive information on water adequacy and crop production planning. The major constraints were identified.

The information on the systems are presented in tabular and graphical forms. Evaluation of the project was left for the next season. It took five months to complete essential structural improvement works, institutional development and detailed field investigation.

INFORMATION ON PROJECT

NAME OF THE PROJECT : Malebagar farmer managed irrigation system

LOCATION : 8 km south from Khairenirar. Tanahu

Operation : farmer managed irrigation system

CONSTRUCTION : constructed around 1958 A.D.

SOURCE : Budhuwa khola (perrenial)

Objective

1. To apply system development approach on rehabilitation and modernization of irrigation schemes.
2. To document the effective processes that produce the changes on each sub-system.
3. To train IMC core staff on systematic procedure of understanding existing farmer managed irrigation system.

	HEAD	MIDDLE	TAIL	TOTAL
Number of Households:	14	25	25	59
Land holding (ha)	5	10	8	23

A. AGRICULTURAL SYSTEM	HEAD	MIDDLE	TAIL	OVERALL AVERAGE
Monsoon (Summer)	100	100	100	100
Wheat (early)	30	29	13	24
Pre-Monsoon Paddy	83	79	45	68
Maize	05	07	28	14

	HEAD	MIDDLE	TAILA	VERAGE
(a) Cropping intensity:	218	215	186	206

(b) Cropping pattern: SUMMER PADDY - WHEAT - EARLY PADDY
SUMMER PADDY - FALLOW - EARLY PADDY
SUMMER PADDY - WHEAT - EARLY PADDY/MAIZE
SUMMER PADDY - FALLOW - EARLY PADDY/MAIZE

	HEAD	MIDDLE	TAILA	VERAGE
(c) Yield -				
(kg/ha) EARLY PADDY	2481	2389	2128	2355
SUMMER PADDY	3340	3023	2379	2229
WHEAT	1678	1290	1120	1364

(d) Production: Average for cereals (rice, wheat, maize) - nearly 4 t/h/yr

1.APPRAISAL OF THE SYSTEM

Research Method - Case Study
Research Objective - To determine main problem areas of the system.

Information Collection on:

1. Physical System
   - Canals and maps
   - Capacity, Capability
   - Extent, method and degree of water control
2. Water Control System
   - Average yield of major crops
   - Cropping intensity
   - Cropping pattern
3. Water Control System
   - Equity (head, middle, tail)
   - Adequacy (head, middle, tail)
   - Reliability (head, middle, tail)
4. Institutional System
   1. Existing Organization
      - Matched to level of water control
      - Registered or unregistered
      - Authority, responsibility and accountability of each tyre
   2. Norms and rules
      - Written/unwritten
      - Religious or ethnic group
   3. Knowledge and skill
      - Water user activity
      - Productivity raising activity

B. Technical and Managerial Capability
   - Canal operation and maintenance procedures
   - Resource mobilization works
   - Transparency of income and expenditure
   - Conflict management works.

2.APPARENT PROBLEMS

1. Excessive moisture during winter season in 84% of the command area due to uncontrolled irrigation.
2. Inadequate judgement of water adequacy & equity
3. Upstream diversion of river caused unreliable supply in the system
4. Inadequate information and knowledge on improved agriculture
5. Insufficient tyres of organization and inadequate technical and managerial knowledge.

3.AREAS OF IMPROVEMENT

Water Control Aspect: Water Control, cross drainage crossings, and canal lining

1. Construction of essential structures
2. Repair and maintenance of field channel and canal banks.
3. Develop operation and maintenance schedule

Institutional Aspect:

1. Develop water users organization based on level of water control
2. Train WUO for technical and managerial processes

Agricultural Aspect:

1. Establish linkage with district agricultural office, local/TA and local Sajha for possible support.
2. Conduct demonstration (minikit) works in the site through contacted agencies and toli.

4. TARGETS OF ACHIEVEMENTS

Water Control:

1. Proportional allocation during monsoon paddy. Rotational allocation during wheat and late paddy season. Equity and adequacy through each canal gate (when flow is not disturbed).

Agricultural:

1. Increase annual grain yield from 4t/ha/yr to 7t/ha/yr
2. Increase cropping intensity from 200% to 265%

Institutional

1. Develop effective WUO that can sustain the process of system management.

Potential for Changes

Area - 24 ha

Crops	Existing Yield Average	Existing Intensity	Planned Yield/Average	Planned Intensity
1. Summer paddy	2.25 t/ha	100%	3.35 t/ha	100%
2. Wheat	1.36 t/ha	25%	2.5 t/ha	75%
3. Early paddy	1.35 t/ha	48%	3 t/ha	42%
4. Maize	1 t/ha	28%	2 t/ha	48%
Total	annual grain t/ha/yr	201%	annual grain 7t/ha/yr	265%

Types of Activities undertaken

1. Design, Supervise and Monitor Overall Action Research Package.
2. Assign Field Co-ordinator, Executing and Supervising Physical System Development Work.
3. Implementation of Institutional Development Works.
4. Implementation of Water Management Program (flow measurement, monitoring)
5. Data collection on flow measurement, cropping intensity, and agriculture practices.
6. Undertake survey works and construction works.
7. Institutional Development works in the field.

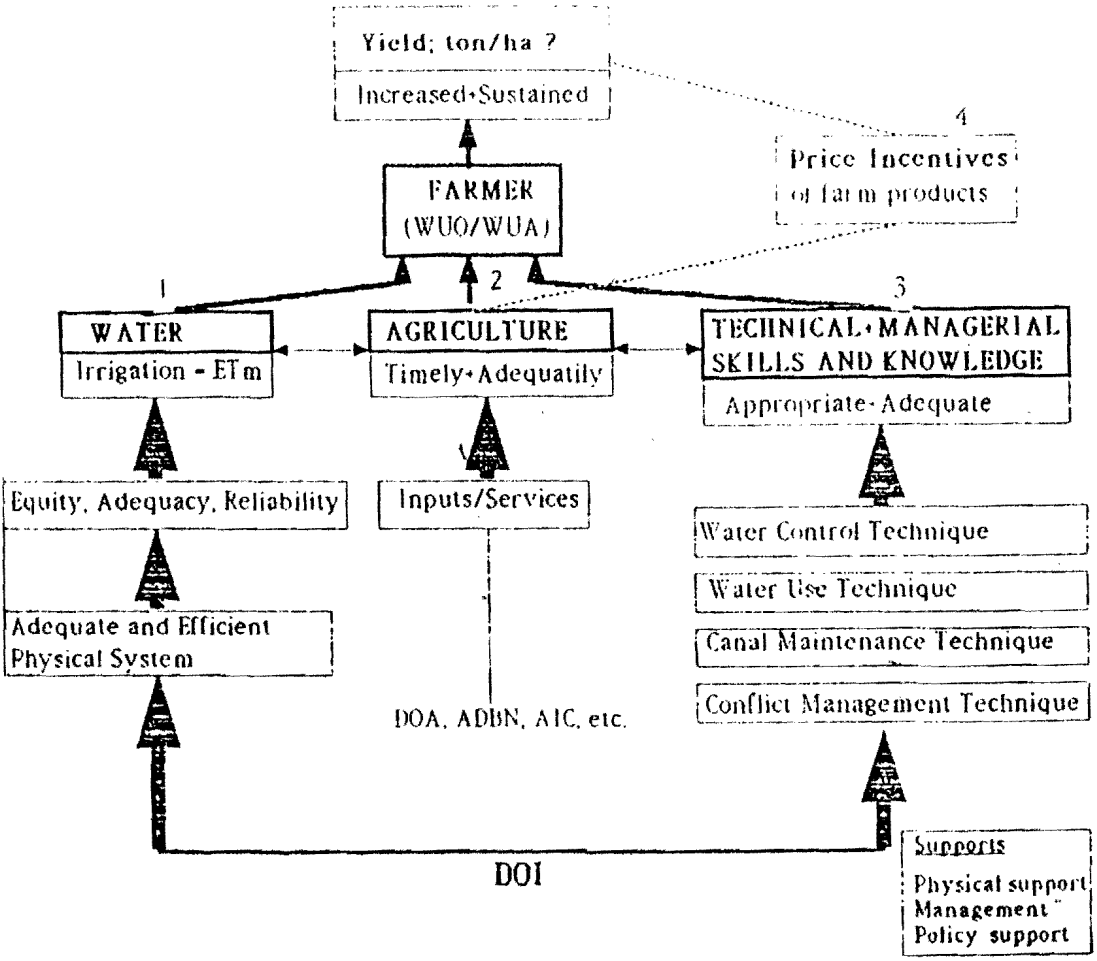
CONCLUSIONS

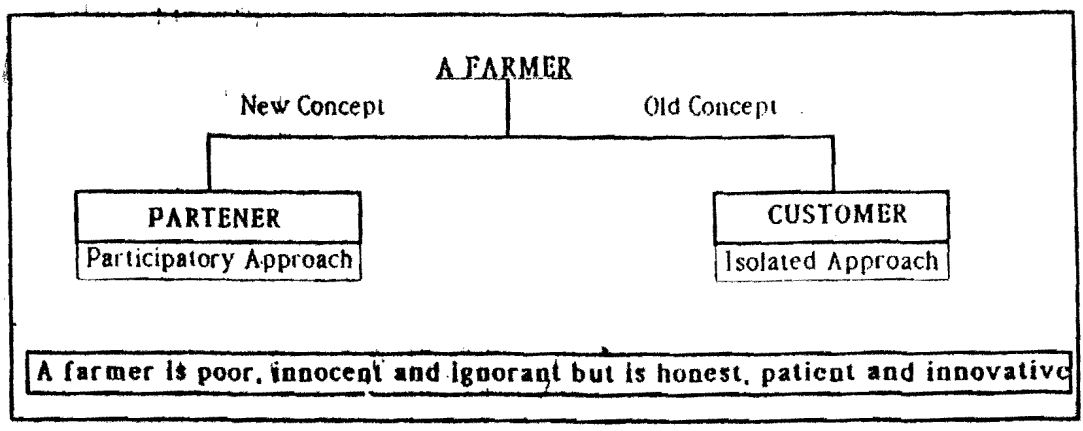
1. During wheat season, average flow of water needed is 3 l/sec. This flow is sufficient to irrigate 18 ha of wheat crop. The present cropping intensity of 25% in this season has potential for increasing to 75%. The flow greater than 3 l/sec should be controlled in order to reduce the excesses moisture in the field.
2. Twenty four hectares of land can be irrigated for early paddy. Flow greater than 50 l/sec is not needed as rainfall is sufficient to supplement during this season.
3. For raising seedlings, flow greater than 71/sec is wasteful.
4. For early paddy a critical period of two weeks exists during transplanting.

To solve this problem, cropping intensity of early paddy was deducted and that of maize was increased from the existing pattern.

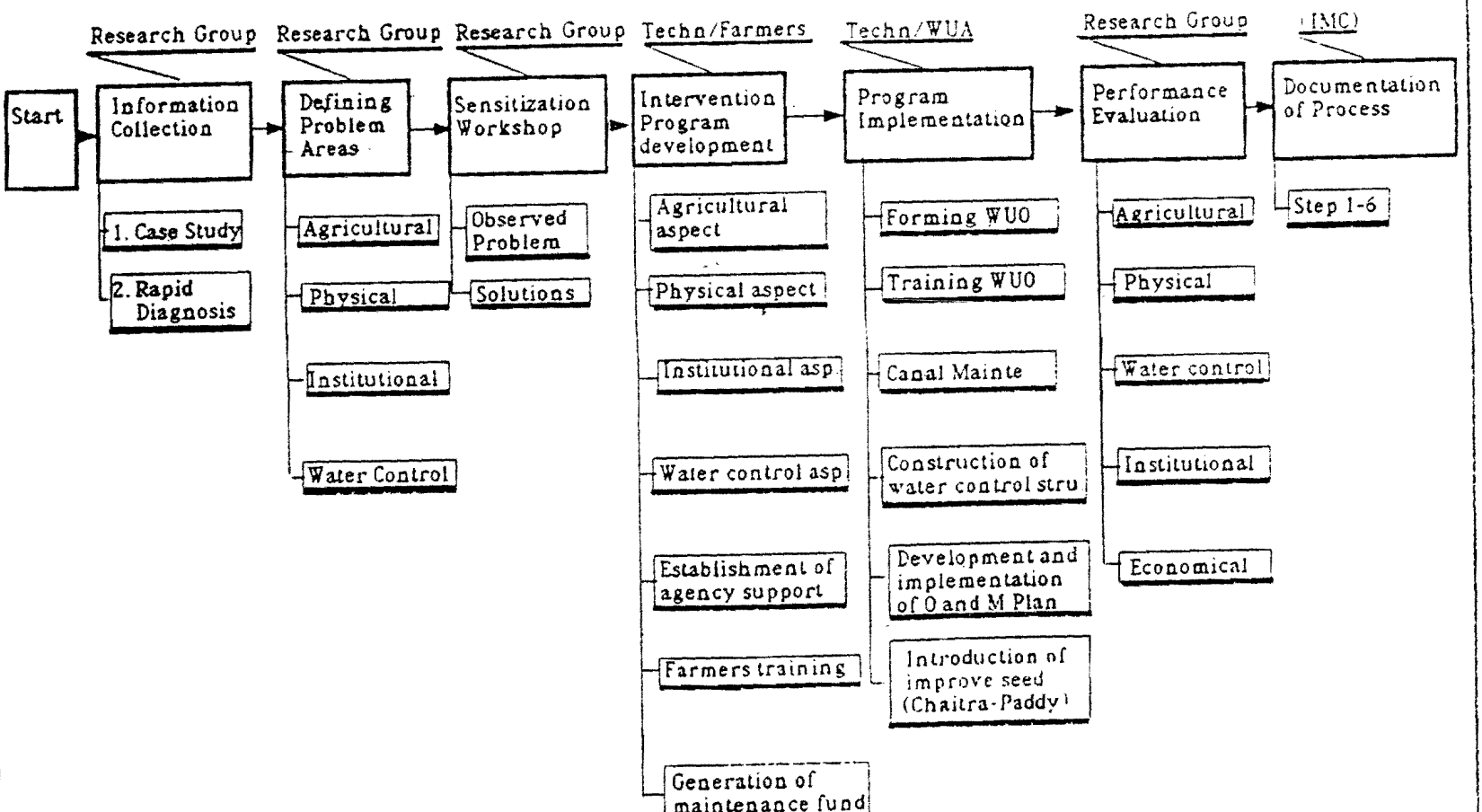
- A depth of 3 cm water should be supplied to all transplanted areas for 15 days.
- The early paddy transplantation is completed during ten days by rotational distribution of available flow.
- A part of the available stream is used for transplantation and the other part is used for meeting seepage, percolation, and evapotranspiration loss in the transplanted field.

ASSISTING FARMER MANAGED IRRIGATION SYSTEM FOR DEFINED GOAL: A CONCEPT STRUCTURE

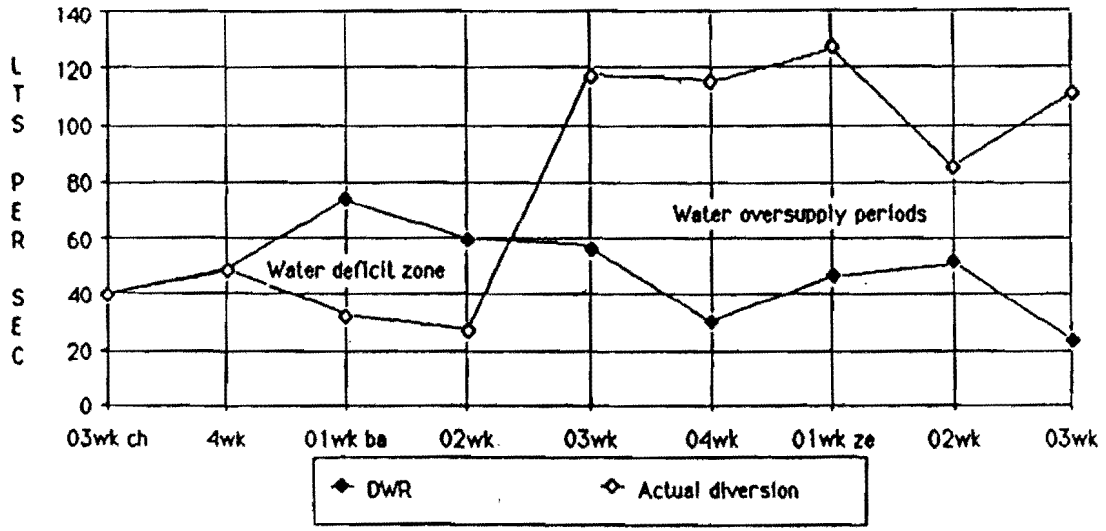




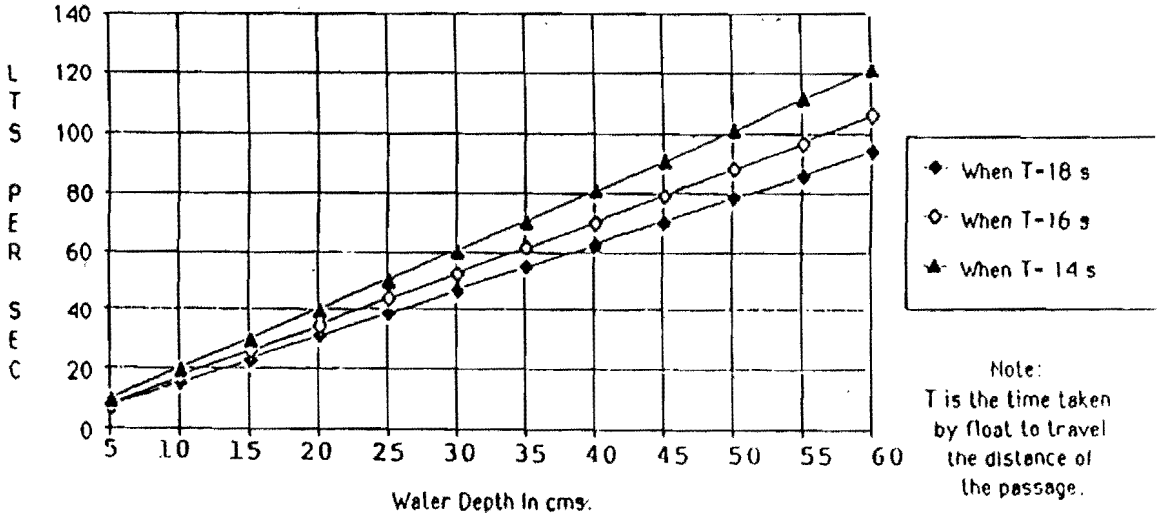
Strategic Package for Intervention



Water Supply versus demand during spring rice cultivation at MIS in 1990



Rating Curve for Head regulator (MIS)



Improving
Farmer Managed Irrigation Systems
Experiences from Mechi Hill Irrigation Development

Arend van Riessen

1.1 Resource Mobilization

The Program implementation is through the District Irrigation Office (DIO). The DIO is in charge of the site and works with the User's Committee (UC). HMG-assistance is through a grant partly in cash and partly in kind (materials, supervision). The DIO arranges construction materials and supervision through it own budget or via PCO or SNV-Nepal. Labor costs are paid from UC Account, managed by UC and DIO. The UC is responsible for resource mobilization among users.

1.2 Grant and Ceiling

In the beginning the ceiling for project cost was NRs 1,000,000 (one million). The ceiling includes users' contribution. However the ceiling has been reduced to NRs 500,000 for the initial estimate for several reasons:

- Experience shows that one HMG overseer can make per Fiscal Year an expenditure of NRs. 500,000 in a justified and efficient way. More expensive projects therefore will take more years resulting in decreased motivation among users, field officers and bureaucrats. The Water supply component has a ceiling of NRs 350,000 per project. From this project, we learned that the faster the individual projects are completed, the faster the program as a whole seems to go.
- NRs one million appears often too much for UCs to cope with efficiently.
- Real costs tend to double the original estimate, especially in new and complete rebuild-project. If you start with a NRs one million estimate, you might end up at NRs 2 million cost.
- Even if an investment of NRs one million seems justified, start-up funds of NRs 0.5 million can work as a test. In the agreement it can be mentioned that a second phase of NRs 0.5 million can be added if the first 0.5 million of work is completed in a satisfactory way.

1.3 Farmers Contribution

The Users can decide themselves whether to contribute in cash or labor. In the estimate and agreement the parts to be done by labor are specified. Some richer communities give this work to a contractor.

In the Mechi Programme, the new DOI Policy is followed, though with slightly modified amount for farmers' contribution. Farmers' contribution is about NRs 2500 per hectare, i.e. 25% of the Grand Total Estimate for projects up to NRs 10,000/ha and 15% of the Grand Total Estimate for projects of NRs. 10,000-20,000/ha. In the Mechi Programme, NRs 20,000 per hectare is the upper investment limit so far. The remaining 75%-85% is the form of a grant via the DIO office.

2.0.1. Request Procedure and Identification:

The main sources of project proposals to be studied are:

- Ilaka Seminars held by the Programme one or two years before implementation started. Panchas often down to Ward Chairman level are asked to come forward with an initial set of proposals.

2.0.2. Selection

The consultant is asked to prioritize the projects on technical, social and economical feasibility. The first priority projects as listed by the Consultant are visited by the DIO-staff for a check and a semi-detailed estimate.

Political feasibility is tested initially at the Ilaka Seminar and finally when it has to pass the District Assembly. Funding feasibility is screened by the DIO's and the Coordinators' Office, which actually decides on the level of investment in the concerned Ilaka/Panchayat/Ward and the final list of projects to be included in the programme. Both DIO, PCO and SNV approve Design/Estimate.

2.1.1 Pre-feasibility and feasibility

- Prefeasibility Study by the Consultant and Feasibility Study by DIO-engineer and overseer.

2.1.2 Selection Criteria

A Summary

Small scale projects with a net increase of command area are considered, especially those benefitting the poorer and food-deficit areas. Projects benefitting richer communities or areas with very unequal land distribution will be avoided. Preference is given to extension/improvement of existing farmer managed irrigation systems.

Only those projects are considered where permanent systems can be made, defining permanent as "longer than 10 years" life.

Criteria:

Command Area	:minimum 10 hectare
Command Area for New Canals	:maximum 50 hectare
Length	- Repair/Rehabilitation
:maximum 7 km	
- New/Extension	:maximum 4 km
Construction Period	:preferably 1 year
Cost (excl.labor, maintenance, tools) per	:maximum NRs 5,00,000 village/system
Maximum Cost per hectare:	
-Repair (discharge doubling)	:NRs 5,000 per hectare
-Rehabilitation/Extension	:NRs 10,000 per hectare
-New Project	:NRs 15,000 per hectare

These amounts are tentatively taken for canals of 3 to 4 km in Panchthar/Ilam districts. This cost per hectare might be affected by differences in length or remoteness, the estimated permanency of the canal and the estimated socio-economic benefits.

2.2 Data Collection

See Village Irrigation Profile - Example (Annex 11)

Farmers are met by the Consultant and later on by the DIO staff. Farmers are asked to indicate the canal alignment, the places and kind of improvements on a priority basis. A draft agreement is made between the beneficiaries and the consultant. The beneficiaries have to fill in a request form specifying roles, contributions, types and sites of work. The same exercise is repeated with the DIO staff during feasibility study and /or detailed survey.

3.0 Design and Cost Estimating

On the basis of Users' requests (as above), consultant's report and feasibility study, a design is made by the DIO engineer with overseers. As described above the design is strongly influenced by the users' requests and prioritization.

4.0 Implementation Process

The officer in charge of the field site is a DIO overseer (MECHI/HMG) who is supervised by the DIO engineer (in most cases MECHI/SNV). The overseer is at the site at least 40% of the time. The rest of his time is used for a second project (in starting or ending phase) and administrative or procurement duties in the District Headquarters.

Most sites have a locally recruited (SLC-pass) Supervisor, paid from the 2.5 % supervision cost on a daily wage basis. Sometimes these Supervisors form a team with the Overseer moving from site to site, sometimes they remain at one site as Maintenance supervisor. Each of the district's 3 to 8 sites is visited at least once a month by an engineer.

4.1 Mode of execution

Implementation takes place through UC which pays for work from the User Committee Account. The expenditure is also countersigned by the DIO overseers. The overseers administrative burden is found to be too much shifting the place of payment to the DIO should be considered. Sometimes work is given to a contractor by the UC. Often the whole work is divided among all UC members on a petty contract basis. Sometimes it is undivided.

4.2 Control

Accounting is done according to HMG-rules, payments made by UC are countersigned by DIO staff. The UC arranges work through petty contracts or daily wages. The experience is that DIO overseers do not always keep all UC members informed on financial details. However, by UC agreement users are entitled to control the financial matters.

The quality of work done is monitored by the overseer and engineer. Users by way of UC training for maintenance or on site experience are encouraged to co-supervise. Some become supervisors. In general this supervision by users is not sufficiently developed as yet.

5.0 Management

Management considerations are often not deliberately incorporated in design decisions. Since last year, the Mechi Program is shifting towards repair and rehabilitation of FMIS. The canals/structures are at spots designed for maximum flow. Whether the users want to enlarge the rest of the canal section up to a size sufficient for the maximum desired flow is left up to them.

6.0 Farmers Capacity Development

1. User Committee Member Training and Maintenance Supervisor Training So far most UC members received a standard UC training. One maintenance supervisor per project received a Maintenance Training organized by the Panchayat Development Training Centre (Jhapa) in either the District Headquarters or Ilam. These trainings are presently too

theoretical in content. The PDTC training are improved through Trainers' Workshops and feedback from user and project staff.

2. User Committee Tour to successful projects (Palpa, Sindhupalchowk): This year the first UC tours were organized for well-performing UC members as a reward and a learning process.

3. Recently DIO appointed Association Organizers at DIO's, some of whom are also involved in the Mechi Program. The recent Mid-Term Evaluation resulted in recommending its own Association Organizers at District level and local Group Organizers at village level. These recommendations still have to be worked out.

4. Policy and Procedure Development has been confused since the start of the project. Most of the MPLD-officers did not enough have experience. They were busy achieving overambitious targets. Therefore there has been variation in modes of execution and dealings with UC's. The project developed a standard UC agreement and an elaborate policy on farmers' contribution.

7.0 Strength and weaknesses of the programme

Weakness:

- The lack of staff time for (1) procedure development, (2) data collection on FMIS, (3) experiments in appropriate technology.
- Confusing organization. Until last Fiscal Year, there were strong PCO and weak LDO's, both under MPLD. This has resulted in low technical standards. Now a PCO under MPLD and DIO's under DOI has resulted in weak coordination and integration.
- Engineering supervision is done either by foreigner or by inexperienced HMG engineers.
- Incentives for technical staff are too low.

Strengths:

- Possibilities of integration of DOA/MPLD programmes under the Mechi Programme.
- Clustering of projects/panchayats, enabling a catchment area-approach for irrigation development.

8.0 Some Conclusions and Recommendations

The Mechi Program has been only IRDP up to last year. This has now entered into the irrigation sector. It has tried to accommodate some policies of DOA/FIWUD and ADB/N but DOI and ADB/N irrigation policy

are differently organized/oriented. We welcome very much the fact the DOI has now taken the lead in policy development for small scale hill irrigation development. We feel that policy development after years of lethargy has taken huge leaps. Coordination in the irrigation sector is becoming a fact. We are ready to try out the new policies and ideas of an irrigation sector-approach.

Possibilities for improvements in the Mechi Programme:

- To appoint extra Association Organizers and/or Group Organizers and gain experience
- To improve the relevant trainings
- To further develop UC tour concept
- To do experiments with more appropriate technology
- To do more data collection on FMIS in the Mechi Hills, probably by use of consultants
- To make HMG offices amend quantity targets in order to better achieve the quality targets
- To consider new policy like inclusion of assistance through loans
- To seek cooperation with other FMIS-oriented projects on their procedures, policies, trainings, data collection, experiments, etc.

MECHI HILL IRRIGATION AND RELATED DEVELOPMENT PROGRAM (MECHI PROGRAM) A SHORT INTRODUCTION

August 1989

The Agreement for Mechi Program was signed on 23rd March, 1987 between His Majesty's Government of Nepal (HMG/N) and the Netherlands Development Organization (SNV). The Program which is scheduled for four years started in the Fiscal Year 2044/45 (1987/88) and has completed its second Project Year.

OBJECTIVES

The general objective of the Programme is to assist the target population in the three hill district of the Mechi zone by improving their living standards and raising their self-reliance within an ecologically sound environment.

The programme pursuing the above-mentioned objectives is carrying out the following activities:

1. Constructing and rehabilitating small scale irrigation systems (total 1200 ha).
2. Constructing 50 small scale infrastructure projects e.g., drinking water schemes, wooden bridges, trails, community buildings.
3. Providing Agriculture Extension of technology relevant to small farmers
4. Involving women as a special target group in the sectoral projects.
5. Supporting experiments (e.g., Pilot Project, Farmers Field Trails), Training and Seminars.
6. Strengthening Local and Government Institutions in the planning and implementation of rural development activities (e.g., Standardization Courses).

PROGRAMME BUDGET

The total budget allocated for the Programme for four years is Nepalese Rupees 4,58,75,790/- out of which NRs 3,74,77,790/- will be borne by SNV-Nepal and NRs 83,98.000/- will be borne by HMG/N.

PROGRAMME AREA

The programme activities cover the three Eastern hill districts of the Mechi Zone (Ilam, Panchthar and Taplejung). The Women in Development and Agricultural Activities started on a trial basis only in Panchthar, but now it has expanded to other districts. In four years' time, half of the total panchayats within each district will be covered by this program.

COORDINATION

Because of its multi-sectoral character this programme is listed as an Integrated Rural Development Program (IRDP). The activities are to be coordinated by the Coordinator's Office (PCO) in Ilam. The Coordinator's Office develops policies, coordinates planning, budgeting and monitoring of the programme, arranges procurement and transport of equipment and materials, the organizes trainings and seminars in support of the district activities. The PCO also maintains coordination and communication with HMG-offices at the district, regional and central level and with SNV.

IMPLEMENTATION AT DISTRICT LEVEL

All projects under this program are implemented in accordance with Decentralization Policy of HMG/N. The activities are implemented through the District's line agencies for agriculture irrigation and watersupply, and coordinated at district level by the District Panchayat Secretariats' Local Development Officers under whom the Women Development Officers work on WID-Program. For successful implementation the program emphasizes on three aspects.

a. Clustering

The projects are not to be seattered around within each district but clustered in particular areas based on this facilitates proper supervision and integration of the projects. [Administrative criteria (Ilaka, Agricultural Service Centers), technical criteria (irrigation possibilities, climatological variety) and socio-economic criteria (accessibility, standard of living)].

In Ilam, the first two chosen Ilakas were No 6 (Laxmipur to Siddithumka) and No 3 (Jitpur to Shantidanda). Likewise in Panchthar, Ilaka No 1 (Phidim) and No 6 (Yangnam) were chosen. In Taplejung works started in Ilaka No 7 (Thechambu) and will shift this year to No 7 (Hangpang).

b. Popular Participation

The beneficiaries are involved from the were of the project start during identification they are mobilized during Ilaka level seminar. Project formulation is ahieved through meetings and project surveys assisted by technical administrative staff and also with the input from women. Project Users Committees play an important role in construction, operation and maintenance of the systems. UC-members and maintenance supervisor receive training for these management activities.

c. Technology

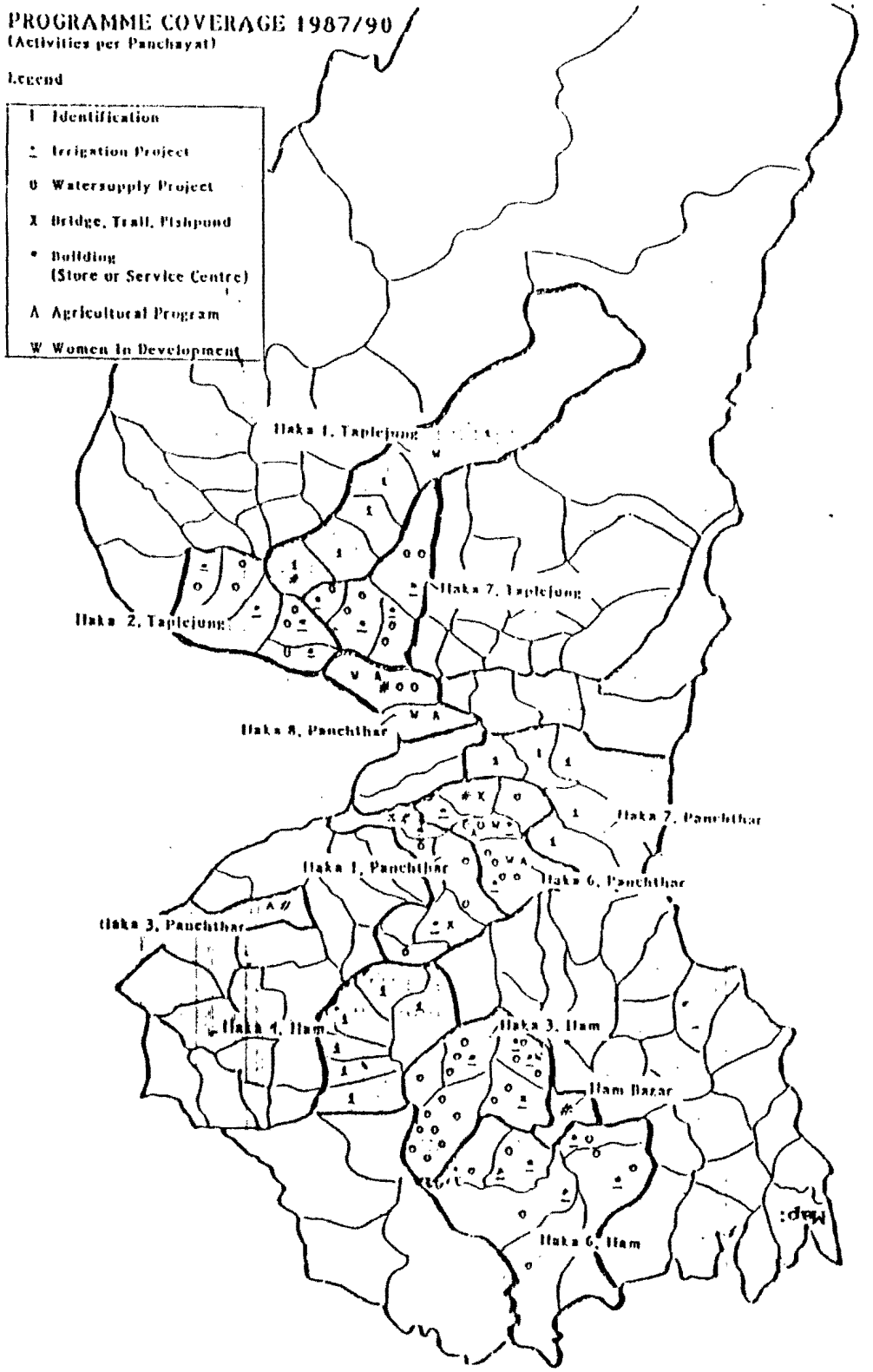
The program tries to apply technologically sound solutions to local problems with emphasis on simplicity, duplicability, local availability, self-reliance. Because these types of technologies are not readily available, experiments (agriculture and irrigation pilot project) are carried out. But the program does evade from trying out new high-tech solutions, if expected to be durable, cheap or ecologically sound.

PROGRESS

The Construction Programme has completed 2 irrigation projects, 20 watersupply projects and one bridge. Within this Project Year, another 20 irrigation, 30 watersupply and 1 trail project are planned for completion. In total an area of 1200 hectares will be irrigated with 1600 families as beneficiaries. The small watersupply projects will serve another 1500 families. District stores are also constructed in each district.

Agricultural trails, minikit distribution, and extension activities (demonstrations, tours, exhibitions) were carried out only in three sub-districts of Panchthar under the Agricultural Programme. The component works closely with WID-staff and will aim at firm integration with the irrigation programme in coming years.

Women Development in 15 wards in five Panchayats (4 in Panchthar 1 in Ilam) were selected and surveyed. In these wards some 20 Leader Women were trained. 5 Women Users Committee trainings were held giving several sanitation and nutrition trainings. The WID-staff also involved other line agencies in their project area.


PROGRAMME COVERAGE 1987/90
(Activities per Panchayat)
Legend
I Identification
± Irrigation Project
0 Watersupply Project
X Bridge, Trail, Fishpond
* Building
(Store or Service Centre)
A Agricultural Program
W Women In Development
Ilaka 1, Taplejung
Ilaka 2, Taplejung
Ilaka 7, Taplejung
Ilaka 8, Panchthar
Ilaka 7, Panchthar
Ilaka 1, Panchthar
Ilaka 6, Panchthar
Ilaka 3, Panchthar
Ilaka 1, Ilam
Ilaka 3, Ilam
Ilam Bazar
Ilaka 6, Ilam

MECHI HILL IRRIGATION AND RELATED DEVELOPMENT PROGRAM

VILLAGE IRRIGATION PROFILE
Outline

1. Objective

Collection of data base of Farmer Managed Irrigation Systems with potential for expanding or intensifying irrigation for use of office for planning or evaluating irrigation or related development in the concerned Ilaka in the future.

2. Methodology

a. Field-Inventory of all existing irrigation systems in one Ilaka: All canals longer than 500 m and bigger than 5 ha, shall be inventorized.

b. Field-Inventory (prefeasibility check) of requests for new irrigation systems, as submitted to Mechi Program.

c. Only rehabilitation of structures will be done. All enlarging/earthwork is to be done by villagers themselves. Projects will be small, manageable/maintainable by farmers and will take short construction period.

d. The whole watershed will be planned integratedly so that water rights problems will be more easily avoided.

3. Workplan for Field Workers (Engineers, Overseers)

a. Make a Question Guide and the Standard Project Information Format.

b) Prepare a Simple Request form in Nepali which the farmers should use in case they want to request assistance from the Mechi Program. These forms should contain detailed information on improvements, the size of the improvement, the way in which the farmers wish to participate in the work (cash, labor, transportation of materials etc).

c) Provide the district authorities request forms for new irrigation projects.

d) Before starting the field trip send an explanatory message to each village panchayat's Pradhan Pancha and Ward Adhyakshas with an approximate meeting date.

e) Before carrying out inventory in a new village panchayat call a meeting with the Pradhan Pancha and all Ward Adhyakshas.

Explain the purpose of the visit and the method of inventory. Make arrangements when and where to meet each group of Users for the walk through along their system.

f) Start at the top of each watershed and systematically walk downward, seeing all canals longer than 500 m. Walk through each system (along the canal alignment), together with farmers of head- and tail-end of the system, who will be interviewed. Maps will be drawn on the spot.

i) Compiled sets of data with clustering of systems per watershed will be submitted to District Irrigation Office/District Panchayat Secretariat.

j) District Irrigation Officer selects clusters of projects.

Blaka & SNo	TAPLEJUNG Village/Panchayat	Ward No	H.H. (No)	Type	Source (Season)	L (km)	C.A (ha)	Source Alt. (m)	Total Estimate (NRs)	Free Labour (NRs)	Materials &Trucking (NRs)	Labour& Local cost (NRs)	Cost per hectare (NRs)	Cost per HH (NRs)	Progress (%)
7:01	Nangkholyang**	6, 8	70	N	Monsoon	4	35	1300	719,033				20,544	10,273	40%
7:02	Thechambu-I	6, 8	100	R/E	Monsoon	6	40	1600	200,000				5,000	2,000	80%
7:03	Thechambu-II	7	100	R	Monsoon	5	40	1450	100,000				2,500	1,000	15%
7:04	Tiringe	1, 2,3,4	180	N	Monsoon	5	45	1600	806,229	121,000	161,155	450,779	17,916	4,479	70%
7:05	Dokhu	3	35	R/E	Monsoon	17	21	1400	291,977	58,395	61,422	172,160	13,904	8,342	100%
2:01	Nigurezin*	3	36	R	All Year	2.2	25	2000	40,000	8,000			1,600	1,111	20%
2:02	Nigurezin/Phurib	1,2/5		R/E		8.9	50	1500							20%
2:03	Hangpang	6, 8, 9	80	R	All Year	3	50	1200	554,095	82,000	173,654	298,441	11,082	6,925	50%
2:04	Dhungesangbu	7, 8, 9	100	N	All Year	3.5	150	1300	706,685	176,700	151,903	378,082	4,711		30%
	TOTAL TAPLEJ		701			36	455	1E+04	3,418,019	446,095	549,135	1,299,462	8,419	4,875	
	AVERAGE TAPLEJUNG		87.5			4	51	1,493	427,252	89,219	137,034	324,866	8,433	4,875	

Blaka & SNo	PANCHTHAR Village/Panchayat	Ward No	H.H. (No)	Type	Source	L (Km)	C.A (ha)	Source Alt. (m)	Total Estimate (NRs)	Free Labour (NRs)	Materials &Trucking (NRs)	Labour& Local cost	Cost per hectare	Cost per HH	Progress (%)
1:01	Pauwa Sartep	1, 3	100	N	All Year	3.5	45	1800	606,113	90,917	219,251	295,945	13,469	6,061	95%
1:02	Phidim	1, 5,6	55	R	All Year	4	80	1200	385,049	57,757			4,813	7,001	75%
6:01	Lungrupa 5,6	5, 6	100	N	All Year	3	40	2000	610,210	91,532			15,255	6,102	80%
6:02	Nagin	6, 7,6	30	N	Monsoon	2	30	1600	533,436	80,015	212,582	240,739	17,781	17,781	35%
6:03	Sallen	5, 6,7	100	R/E	All Year	6.3	97	1000	481,393	96,278	273,083	112,032	4,963	4,814	35%
	TOTAL P'THAR		385			19	292	7600	2,616,201	416,499			8,960	6,795	
	AVERAGE P'THAR		77			3.8	58.4	1520	523240.2	83299.77	235005.3	216238.7	8,960	6,795	

Blaka & SNo	ILAM Village/Panchayat	Ward No	H.H. (No)	Type	Source	L (km)	C.A (ha)	Source Alt. (m)	Total Estimate (NRs)	Free Labour (NRs)	Materials &Trucking (NRs)	Labour& Local cost (NRs)	Cost per hectare (NRs)	Cost per HH (NRs)	Progress (%)
6:01	Godak	1, 2,3	75	N/R	All Year	3.5	80	800	937,313				11,716	12,498	100%
6:02	Laxmipur	6	60	R/E	Monsoon	5	35	1100	964,350	192,875	318,934	452,541	27,553	16,073	100%
6:03	Siddhithumka*	2	15	N	All Year	3	25	400	294,372				11,775	19,625	65%
6:04	Sayek*	3	15	N	All Year		50	550	178,086				3,562	11,872	50%
6:05	Chisapani	5, 6,7	100	R/E	Monsoon	5	25	1000	598,533				23,941	5,985	50%
3:01	Shantidanda*	9	92	R	All Year	5	80	1500	228,342				2,854	2,482	70%
3:02	Shantidanda	3		R	All Year	5	75	1300							15%
3:03	Sangrumba	5, 6		R	All Year		55	1000							15%
3:04	Mangalbare	1, 9		R	Monsoon	7.5	100	1200							15%
	TOTAL ILAM		357			34	509	8,850	3,200,996	192,875	318,934	452,541	10,851	8,966	
	AVERAGE ILAM		59.5			4.9	58	983	533,499	192,875	318,934	452,541	9,146	8,966	

	TOTAL MECHI		1443			89	1273	3E+04	9,035,215	1,055,469	867,069	1,752,003	7,255		
	AVERAGE MECHI		75.9			4.2	55.3	1096	486,064				8,782	6,400	

IRRIGATION DEVELOPMENT APPROACH OF AGRICULTURAL DEVELOPMENT BANK OF NEPAL (ADB/N)

G. Koirala and R. Koirala

1. Background

Irrigation development in Nepal has A long history. Some of the farmer- constructed systems have been performing satisfactorily for centuries. Department of Irrigation (DOI) is fully responsible for the implementation of all types of irrigation projects. However, Agricultural Development Bank of Nepal (ADB/N) is promoting irrigation facilities through the provision of technical/ financial/ organization package based on farmers' demand or request.

2. Efforts and Involvement of ADBN

It is very difficult for an individual farmer to construct and manage an irrigation enterprise. It has to be a collective endeavor of all the potential beneficiaries. Such collective action requires joint agreements and undertaking to tie them together. ADBN's role in irrigation development has mainly been the creation of such kind of institution at the grass root level in the form of small farmers groups. With the advent of such group formation and interaction within and between them, several community enterprises including irrigation development have emerged. Small irrigation projects hold brighter prospects in Nepal. ADBN has considered those projects which are less than 100 ha in Hills and 500 ha in Terai. In the case of gravity irrigation schemes, improvement of existing farmers' systems have been given top priority. In such projects, low investment can yield high returns. At present (ADB/N, has managed to provide surface irrigation in 4068 ha, covering about 3577 beneficiaries. 20 projects are under construction which would cover about 1608 ha. of irrigable land.

3. Irrigation Technology

The bank is constantly looking for appropriate technologies so that the benefits of irrigation are extended to the poor and marginal farmers. The Bank believes that the productivity increase in many small farms can bring about the same aggregate result as if it increased in few large farms but with greater distributional equity. Rower pumps, treadle pumps, solar pumps, water turbine pumps and sprinklers are the technologies propagated by the Bank to

achieve these ends. The Bank can thus bridge the gap between the capital and technological constraints of the farmers. The scale advantage of larger scale operation and efficiency advantage of smaller farmers can therefore be harnessed simultaneously.

4. Project Implementation Procedure

Implementation of irrigation projects is based on farmers' demand. Beneficiaries are involved in every stage of project development such as identification, implementation, water management, operation, and maintenance. Increasingly, the bank is playing the role of a facilitator.

Project implementation sequence adopted by ADBN in irrigation schemes are summarized below:

(a) Beneficiaries identify the potential irrigation scheme and request the nearest ADBN office for technical and financial help. Group organizers in the SFDP areas serve as intermediaries in the process.

(b) Once the local office receives the request, an expert team visits the proposed site to collect basic information. Based on recommendation of the team, the local office requests the concerned Zonal office or the Head office directly for feasibility surveys.

Enquiries relevant to the project such as the following is collected by the team through measurements or enquiries with key informants:

- Maximum and minimum water level observed in the stream;
- Instability situation along the proposed canal alignment;
- Suitable location for intake structure;
- Water rights (if any) in the vicinity within 1 Km upstream and downstream from the proposed intake;
- Severeness of the flood;
- Condition of vegetation and slope instability in the catchment area of the stream.

(c) After receiving request for feasibility study, a technical team from Zonal/Head office visits the proposed site and conducts surveys and submits the details to the relevant office.

(d) If the proposed scheme is feasible, the local bank staff informs to the potential beneficiary groups.

(e) When potential beneficiaries become ready to participate in project activities, technical team will start detailed survey. Maximum

interaction with the beneficiaries is done at this stage of detailed feasibility studies.

(f) After receiving the total estimated cost of the project, the local ADB/N office will organize a beneficiary farmers meeting to explain the size of loan, subsidy, group's equity participation requirements and other aspects related to the project.

(g) Once necessary drawings, designs and detailed cost estimates are available, the local office staff will help to form a construction committee. Rules, regulations and responsibilities of the newly constructed committees are defined. Detailed work plan is prepared before starting the construction work. In consultation with committee members, ADBN Zonal or Head office assigns a technician. The type of technician for deputation will be based on the nature of the hydraulic structures and size of the project.

(h) ADB/N administers the government subsidy available for the project. The loan component is divided among beneficiaries based on their land holdings. The repayments schedules is prepared in consultation with the beneficiaries.

(i) When the official procedures are finalized, overseers/sub-overseers and engineers will visit the site and discuss with beneficiaries for the collection of local construction materials as required in the estimation. Work schedule and plan for the use of the labor is usually decided by the assigned technicians. Construction committee members will be responsible for the procurement and transportation of imported construction material and tools. Beneficiaries will be employed for the transportation of materials and in other construction activities.

(j) Records of the construction materials and tools are kept by the construction committee members. Technicians check regularly the quantity of construction materials and tools in stock.

(k) Problems encountered during the construction period is resolved jointly by the construction committee members, local ADBN staffs and technicians. Regular supervision and monitoring is done by the Head office engineers. During such supervision, the engineer instructs overseer/sub-overseers on technical questions of construction. It is also assessed the progress of the work during the supervision time.

(l) After the completion of the head works and canal networks as designed water is released in to the main canal. A joint written notification from the site technician and construction committee is forwarded to the Zonal/Head office declaring the satisfactory completion of the project. Technical personnel from the Zonal/Head office will then visit the project site for the final inspection and verification. Upon satisfactory result after inspection, the project is handed over to the beneficiaries. Loan part of the total cost is divided among beneficiaries based on their land holdings size to be irrigated by the scheme.

(m) Once the completed project is handed over to the beneficiaries, sub-committees are formed to look after operation, maintenance, and other project related activities. This committee prepares time tables for water distribution.

In some systems, cash or kind contributions from the beneficiaries on the basis of land holding are collected to pay for watchmen, gate operators, water distributors etc. These people can be recruited from the beneficiaries. However, they have performed extra activities so they are to be paid.

(n) The local ADBN office also seeks the help of the District Agricultural Development Office to organize training and technical assistance program to the beneficiary groups for the improved irrigated farming.

In the case of rehabilitated projects, activities of existing sub-committees involved in water distribution, system operation, regular maintenance are studied first before forming construction committee.

5. Constraints in Irrigation Development

Irrigation projects implemented by ADBN have faced more technical problems than management problems. In the following paragraphs few selected problems are briefed:

5.1 Technical Manpower

Agricultural Development Bank is basically a lending agency. Although the number of technical man-power has increased considerably and gone to 150. There is still lack of experienced technical manpower in the bank. Due to lack of condusive environment, technicians have considered the bank as a waiting platform. Hence, turn-over rate of the technical staff is high. The bank should therefore investigate this phenomenon and provide

adequate incentives to retain experienced technicians. The technical capability of the bank should not be ambitiously expanded to make it a liability in the future. Collaboration with DOI and the use of local consulting firms may be viable alternatives.

5.2 Physical Constraints

Most of the Hill irrigation schemes are facing slope failure problems. Importance of geotechnical problems is not seriously taken into consideration at the time of detailed survey. Later on, results into slope failure problems mainly due to heavy seepage. Such problems can be minimized providing biotechnical preventive measures, conducting geotechnical investigation at critical sections. Such preventive measures are cheaper and can be constructed by the beneficiaries themselves on technical guidance of experienced overseer/engineer.

In the hills, old landslide areas are mostly terraced for agricultural purposes. Sandy soils are frequently available in these areas, which result in heavy seepage and ultimately encourages soil erosion, soil slip, and debris-flow. Appropriate technology is to be used to address these problems.

In Nepalese streams, difference of water level between the driest and the peak floods is more than two meters. During dry period, farmers obstruct the main flow of the stream constructing boulder and brushwood weir to allow water into the main canal. Due to imported construction materials use and high cost intake structures are not preferred by the majority of the farmers. Due to lack of control structures floods enter into the main canal during monsoon damaging the canal system severely. Hence, there is need to have appropriate control structures at several points.

6.1 The Bank propagated rower pumps have been very popular and is in high demand, but the supply has been a problem. Only proven technologies and those whose supply can be maintained at sustained level should be encouraged.

6.2 Under IFAD irrigation program, ADBN will support to irrigate about 60,000 ha in the coming seven years. This needs substantial increase in the technical staffs of the Bank. To attract maximum technical staffs, ADBN should provide proper incentives and working atmosphere.

6.3 In general, cost for new projects is relatively higher than improvement projects. ADBN should focus on the improvement projects only while leaving new projects for DOI so that there is a clear delineation of work areas between them.

6.4 Farmers are well familiar that those projects implemented by DOI involve negligible contribution to the beneficiaries actually at the field level. Despite the contribution to be made by the beneficiaries in case of bank assisted projects, farmers have continued to request the bank for more projects to be implemented. This clearly indicates that the farmers are interested to share project cost. They are also involved in the project activities. This is important for reducing government expenses and should therefore be encouraged.

6.5 Appropriate technical standard is to be followed in designing the irrigation systems under SFDP.

6.6 In order to implement minor irrigation projects located in small farmers area, ADBN can be considered as the best institution. It has already set up Small Farmers Development Program through which it can directly interact with the poor farmers in various project related activities. Group organizers are available to motivate poor farmers, so management problems can be addressed at the beginning of project implementation. Writing manuals and guidelines alone can not ensure effective project operation. The sense of ownership is to be generated. Active participation of the beneficiaries is to be promoted. Bank has largely focussed on these aspects. The community assets like irrigation infrastructure is to be created at low cost through the provision of sense of ownership and participation of beneficiary farmers.

FARMER-MANAGED IRRIGATION SUPPORT PROGRAM IN DHADING

Uttam Dhakhwa

During the second phase (1989-1993) of Dhading District Development Project, a programme to support farmer managed community irrigation systems in the district has undertaken. The objectives of the programme are as follows:

A) Promotion of farmers self help organizations through creation/strengthening of irrigation organizations.

B) Improvement of food supply situation through irrigated agricultural development.

The support program is designed to be demand-oriented and group-oriented. This support is open for new systems as well as improving existing systems. It is also applicable to any kind of irrigation systems such as surface irrigation, lift irrigation, ponding, sprinkler irrigation, pipe irrigation etc.

1. The improvement process for farmer systems

1.1 Resource mobilization:
Farmers are provided with grant subsidy through Agricultural Development Bank (ADBN) branches or through Small Farmers Development Project (SFDP) office wherever it exists.

1.2 Grant
A grant amounting to 60% of the total cost is provided.

1.3 Ceiling
Grant ceiling is not fixed. Within yearly budget, grants are provided on priority basis. Small farmers systems are given priority over others.

1.4 Farmer contribution
Farmers are to contribute 40% of the cost. They have to contribute at least 10% of the cost by providing labor. The rest 30% will be contributed through a long term loan from the bank.

2. System identification and acceptance.

Since the support package is demand-driven and group-oriented, the bank branches and the SFDP Group Organizers appraise the

farmers of their respective areas about the package and the conditions attached to the program. They motivate the farmers to form groups and get benefit out of the support packages. Interested farmers then apply for support.

2.1 Prefeasibility/feasibility

Once applications are collected, the concerned bank officer checks the authenticity of the information in the demand by talking with them and by visiting the field site by himself. The information are then duly filled in prescribed format and forwarded to the higher office for commissioning a technical/economic feasibility survey.

2.2 Data collection

Survey and data collection are done together with the beneficiary group. Relevant information about present cropping pattern, potential future cropping pattern after irrigation, intended use of water, availability of water at various times of year, the command area, length of canal, number and types of necessary structure, number of potential beneficiary families, holdings of each beneficiary family, etc. are collected.

3.0 Design and cost estimate

The design process is governed by need of the farmers in terms of their own investment flexibility, their management capability and their future maintenance system. Since the schemes are often small, elaborate drawings are not considered necessary. Often free hand simple sketches are sufficient. Changes in the design are often expected. Cost estimates are made on the basis of norms, but often it is broken down to quantity and type of local materials, e.g., sand, boulders, imported materials such as cement, steel rods, wires, and skilled and unskilled labor man/days.

4.0 Implementation process

The beneficiary farmers form a construction committee to implement the scheme. The committee members divide the work among themselves. This process facilitates the committee members to learn from other farmers who have already implemented such schemes. Every year training programmes are organized for farmers to learn from fellow farmers from other areas of the district. The bank official and the bank technician support the committee by occasional site supervision.

4.1 Modality of execution.

The farmers execute the scheme themselves.

4.2 Supervision

The bank official and the bank technician provide occasional supervision.

4.3 Control (financial and quality)

Since the whole work is done by the beneficiaries themselves. Work is usually done using village wisdom and skills. Work is done phasewise. First an earth canal is dug out, temporary structures erected, and the irrigation system tested for its stability during the monsoon. The weak points are carefully noted and in the next season improvement work is carried out using cement and steel in only those places where they are essential. The work is usually monitored carefully by the villagers themselves and the quality of structures are checked by the bank technicians. The financial record keeping is done by the committee and it is checked by the committee members as well as the bank officials.

5.0 Management improvement.

Since promotion of farmers's self-help organization is one of the primary objectives of the irrigation support programme, the management considerations are built in to the process.

6.0 Farmers' capacity development

The irrigation users' group, after completing the scheme, transforms itself into irrigation maintenance group. The small farmers from among them are organized to form SF groups. (DDP is promoting SF groups throughout the district). The group members are then provided with opportunities for learning in various fields such as leadership development, agricultural skill development etc.

7.0 Strength and weaknesses of the program

The strength of the programme lies in the flexibility of the scheme to fit in with the reality faced by the farmers. The programme is demand and group-oriented. The initiative therefore should come from the farmers. Others are there to help. The assistance is channelled through the bank and thus does not face strict budgetary and financial rules like those of HMG.

Main weakness of the programme is in the technical support process. The problem of non-availability of the technicians in due time and the inappropriateness of the standards often followed by the technicians are the main shortcomings.

8.0 Recommendation:

Farmer-managed systems are farmers' affairs. If outsiders are interested in helping them, it should be done in a way that is convenient to the farmers.

Assistance to the farmers should be channelled as longer term credit on easier terms rather than as a grant.

Dependence on outside specialist for small systems must be reduced by training local people in simple techniques of irrigation survey and design.

Improving FMIS in Rapti zone: ADB/N-CARE/Nepal Experiences

B.B. Gurung
CARE/Nepal

CARE/N has been working in developing farmer managed irrigation systems in the rural areas of Nepal to help increase agriculture production. In Rapti zone activities have been carried out in Dang, Pyuthan, Salyan and Rolpa districts since 1985. CARE/Nepal's assistance is directed towards the rehabilitation of farmer-managed irrigation systems. They include building diversion weirs, canal lining and cross-drainage structures. Construction of systems are also included in the program of CARE/Nepal.

CARE/N in collaboration with ADB/N in SFCP/Rapti has implemented 14 such community irrigation projects since 1985 Nine out of fourteen have been handed over to the Water Users' Committee (WUC). Five are still under construction. The total command area of these projects is 1300 ha., ranging from 10 ha. to 253 ha., with a local of 1300 beneficiaries families. Average cost per hectare is Rs.5400 excluding supervision cost which is about 1200 rupees per hectare. Thus total cost amounts to Rs. 6600 per hectare.

Availability of water source and potential land for agriculture are the basic criteria for site selection, however, willingness of the farmers to contribute labor is a vital social-factor for undertaking a project. The idea behind this is to strengthen their self-help attitude. On account of this, CARE/N and ADB/N have formulated a working policy under which farmers have to bear 50%, untill the rest is received as ADB/N loan. CARE/N, in turn contributes the rest 50% in the form of construction materials like cement, reinforcement bars, steels, gabion wires, etc. Experiences of many projects have shown that CARE contribution has not always been only limited to 50% of the project cost but often exceeds. In such cases, farmers have to repay to CARE either by collecting money from among themselves or by taking loan from ADB/N. It was rather complex to evaluate their labor contribution. Adult males, children and women also participate to fulfil their labor quotas. Because of these problems now, it is 20% labor contribution and a maximum of 20% ADB/N loan and the remaining 60% being CARE's contribution. In addition CARE provides technical support in surveying, designing, estimating and implementing the project.

SMALL FARMERS' IRRIGATION PROJECT STATUS
(AS OF JUNE 7, 1990)

SR#	NAME OF PROJECT	SFDP	DISTRICT	DATE OF REQUEST	DATE OF PRELIMINARY	DATE OF DETAIL	COMMAND AREA ha	BENEFICIARIES HH	COST (NRs) ESTIMATED	COST (NRs) ACTUAL	DATE STARTED	DATE COMPLETED	DATE HANDED OVER	SOURCE (KHOLA)
1	KAMRAI	KAMRA	SALLYAN	02-Aug-85	21-Oct-85	03-Oct-85	25	51	227,998	123,079	Jan-86	Jun-86	29-Jul-88	PHOWE & CHHAPARE
2	RAMPUR	LAXMIPUR	DANG	17-Mar-85	11-Apr-85	11-Apr-85	253	225	881,819	874,316	Dec-85	Jun-88	27-Jan-88	BALUM
3	JAMALGADHI	DHANAURI	DANG	19-May-85	07-Jan-86	22-Jan-86	53	57	419,457	285,516	Feb-86	Jun-88	15-Jul-88	HILEDHALI
4	BHITORIYA	DURUWA	DANG	12-Apr-86	25-Oct-86	25-Nov-86	80	70	658,218	630,603	Jan-87	Jun-88	04-Aug-88	GUWAR
5	BULBULE	DURUWA	DANG	12-Apr-86	25-Oct-86	25-Nov-86	90	94	639,127	534,283	Jan-87	Jun-88	08-Aug-88	GUWAR
6	KANJURWAR	DURUWA	DANG	12-Apr-86	24-Oct-86	26-Nov-86	80	85	401,823	533,837	Apr-87	Jun-88	16-Aug-88	PATHICHAULI SOTA
7	BHINGRI	BHINGRI	PYUTHAN	17-Feb-87	13-Apr-87	13-Apr-87	100	130	455,071	460,000	Nov-87	Jun-89	08-Mar-90	JARI
8	JHILLIBANG*	BANGESAL	PYUTHAN	NA	05-Nov-87	05-Nov-87	10	25	13,513	15,791	Dec-88	Feb-90		DHARMA
9	BURADABAR*	DHANAURI	DANG	19-May-85	30-Oct-85	31-Aug-88	130	105	432,192	430,000	Jan-89	Jun-90		BARAUN & GADWA
10	KASHIPUR	DHANAURI	DANG	07-Nov-86	02-Oct-87	21-Jan-89	140	174	760,825		Mar-89	80%		BAULA
11	DARBHAN	BANGESAL	PYUTHAN	01-Jun-85	02-Nov-85	01-Nov-87	80	114	1,071,737		Feb-89	60%		DARBHAN
12	SUPARLA	GOBERDIHA	DANG	19-Dec-85	29-Jan-89	29-Jan-89	150	123	776,701		Dec-89	40%		SUPARLA
13	BAURAHA	GOBERDIHA	DANG	19-Dec-88	29-Jan-89	29-Jan-89	46	53	545,485		Dec-89	75%		BAURAHA
14	CHHEMETA	SAIBANG	ROLPA	27-May-85	16-Jan-86	07-Dec-88	60	56	70,257		Jun-90	0%		JAMBOO & JIBANG
						TOTAL	1259	1302	7,539,914	3,860,724				

*: In the process of handingover

CARE/N's involvement in the improvement of the farmer-managed systems in Rapti Zone have generated the following experiences:

1. **Participatory approach: a boon to success**

   Farmers should be involved in all stages of development activities like survey, design, planning and monitoring of a project rather than isolating them from it for construction phase only. This is the only opportunity for them to learn some skills and knowledge and train themselves in management, planning, monitoring which will enable them to maintain the system themselves afterwards. Our experiences have shown that this participatory approach is superior to the overused blue-print approach. In the latter case, farmers are deprived of these opportunities. It has been observed that the more farmers are involved, the less the problems are.

2. **Farmers' ideas and knowledge should be incorporated**

   A much ignored fact in designing & planning a system is the local farmers indigenous knowledge about the flows pattern of rivers, environmental changes, socio-economic structures of the society and so on. Their past experiences are more accurate than any engineering estimations, particularly in the flow pattern of the rivers. Therefore, their ideas and knowledge should not be ignored but need to be incorporated in the designs and estimates. Such incorporation helps in designing and planning a successful system.

3. **Feeling of ownership**

   Right from the initiation of a project, every endeavour should be made towards generating the feeling of ownership about the system by the farmers. A system cannot be sustainable even if it is well equipped with technically sound structures until and unless they feel that this is their system.

4. **Structures should be simple and easy to handle**

   The designer should try to devise most simple structures requiring minimal operation and maintenance and incorporating farmers indigenous technologies. The philosophy of "The more sophisticated the structures the better the system" is not always true, since complicated structures require complex and careful handling which in rural background proves to be a drawback.

5. **Contractors make profit at farmers' expenses**

Farmers have a deeply rooted impression that contractors make profit at their expenses with poor quality of work. Furthermore, farmers complain of many contract related problems regarding late and short payments of their wages when they work for contractors and the hiring of labors from outside depriving them of an opportunity to work even in their own projects. All these leave behind a negative attitude towards contractors. Farmers are of the opinion that their involvement is significantly reduced. Therefore it is felt that farmers participation should be as maximum as possible.

6. **Equip farmers with minimum working skill**

Usually skilled labors are not available in the project area and they are hired from outside. If local farmers are not trained in this line, they have to hire skilled labors from outside even for minor repair works such as plaster, stone/boulder works, replacing gabion boxes etc. But it is equally difficult to get skilled labors for repairing a few hours of work. Consequently it leads to the delay in repairing and maintenance resulting serious problems. It is therefore deemed essential to train some local worker during the construction period.

7. **The more we give, the more they want**

In many cases, especially at the end of the construction phase, farmers often say, "This work is very small, this is not long, it does not need much cement so please do this, do that." and so on. These may be of course, very small job in comparison to the already built structures, however, it is noteworthy that the more we give the more they want. Such attitude discourage self-help attitude and they become more dependent on outside resource. Any outside intervention does not and should not mean to erode their self-help attitude, rather it should aim at strengthening their self-help capabilities. It is, therefore, essential to formulate a working policy prior to undertaking any project under which farmers are required to share certain percentage of project cost which works as a device to control their ever-increasing demands.

8. **Influential farmers take undue advantages**

Influential farmers, specially Pradhan Panch or Chairman of a ward or other landlords normally take undue advantages though they are the members of Water Users' Committee. Even in the meetings, suppressed farmers are reluctant to express throughts

about injustice. They know that they have to have a good relation with those people to survive in the village. This is the most crucial problem in the farmer-managed systems which should be dealt with more seriously and cautiously. All farmers cannot be benefitted equally from the project. It may cause great hindrance and solidarity in maintaining the system.

9. **Improvement of system also means improvement in management**

Many designers or implementors have a feeling that once physical facilities are provided in a system, there should not be any problems at all. However, it is necessary to note that irrigation management is not merely a technical aspect, it is a socio-technical process. Any improvement in physical facilities may ensure increased efficiency of the system but does not ensure effectiveness of the management. Therefore, it is imperative to all that improvement in management of a system is equally important and should be given due weight in management improvement while doing physical improvements.

10. **Agricultural production is the final goal of an irrigation project**

Experiences have shown that agricultural activities are ignored in undertaking a project. An irrigation project is not economically successful and viable, if it doesn't contribute to increase crop production. Therefore extensive agricultural activities should be emphasized while undertaking a project.

11. **The more efficient the WUC, the more effective the system**

Water Users' Committee always plays a vital role in managing timely water allocation, water distribution, and maintenance of the system. Experience has shown that where there is active and efficient water users committee, the system is in excellent condition even though there are no permanent structure as such. So the water users' committee should be formed from among the most leading social workers who can afford time to volunteer for the sake of the fellow farmers.

12. **More water does not always mean more yield**

Farmers do have a concept that the more water they can divert to their field the more will be the yield. This is not always true, since irrigation water requirement is directly dependent on the type of crop grown and soil-moisture conditions. This is mainly due to the lack of knowledge about the crop water requirement. Therefore, to some extent, they must be provided some ideas of water requirement for

the major crops. They should be made aware that diverting more water into the canal is always expensive and troublesome.

13. **Farmers to farmers training**

It has been observed that farmers learn much better from other farmers than they do from instructors' lessons alone. If a problem arises in a project then a farmers' tour to another similar projects where the problem has been solved, would give them the real solution and motivation to solve the problem in their own project. This would make them clear and confident that they too can solve the problem as others have done. Furthermore, farmers can learn more by exchanging ideas and experiences from such cross-visits. Such a timely exchanges is an important element of farmers' training and therefore should be emphasized.

14. **Increase benefit is an incentive for greater responsibility**

If a system is improved, farmers get more water and are able to increase yield. This increase in benefits encourages farmers to take more and more responsibility over the system and consequently the system becomes sustainable.

APPENDIX

Welcome address by Mr. N. Ansari
Deputy Director General, Department of Irrigation.

Hon'ble Minister of Water Resources and Local Development, Respected Secretary, learned professionals and distinguished guests.

On behalf of Department of Irrigation (DOI) and International Irrigation Management Institute (IIMI), I would like to welcome you all here in the inaugural ceremony to this one-day seminar on "IMPROVING FARMER-MANAGED IRRIGATION SYSTEMS IN NEPAL". The objective of the seminar is to deliberate on the experiences of different agencies and organizations in search of suitable and sustainable process and modality in assisting FMIS improvement in Nepal.

We are indebted to the hon'ble Minister of Water Resources who has kindly agreed to inaugurate the seminar this morning despite his busy schedule. It has enhanced the importance of this seminar.

I would like to express my gratitude to the paper and report writers from ILO, SNV (Mechi Hill Project), Dhading District Development Project, ADB/N, SINKALAMA, ILC,ISP, IMP and CARE-Nepal. Attempt will be made to share the experiences of the different agencies that are involved in assisting FMIS. Their assistance has resulted in expansion of irrigated area assured delivery of water thereby uplifting the poor farmer's economic condition.

It is mentioned in several reports that there are over 17000 FMIS irrigating about 6,75,000 ha. in Nepal. It is also equally important to recognize that all of them are not operating satisfactorily. Their performance is below the potential. There are some factors which are beyond the capacity and means of the farmers. The non-physical factor like the irrigators' organization can be strengthened to help develop their indigenous skills for adopting better management practices which would surely improve their performance.

This seminar has been possible due to initiative taken by Dr. R Yoder, Head, Nepal Field Operations of IIMI. The inspiration through the action research project carried jointly by WECS and IIMI in identifying alternative strategies in assisting FMIS in the Indrawati river basin of Sindhupalchok district has been quite useful in devising the FMIS assistance program. We are grateful to IIMI for the support in arranging this seminar.

Once again, I would like to welcome you all most heartily on this occasion.

27 June 1990.

Improving Farmer Managed Irrigation System in Nepal
Seminar Objective
by
B.K. Pradhan

In Nepal, irrigation development has been underway for many centuries. However, government input for planning, funding, and implementing irrigation development is a recent phenomenon. The pool of trained engineers has grown from almost none in 1950 to a situation at present where skilled and experienced technical expertise is readily available.

For the past three decades, there has been emphasis on building capital- intensive infrastructure that differ strickingly from what farmers have developed and practiced. However, it is important to recognize that capital intensive infrastructure construction is only a step toward development of irrigated agriculture in Nepal. The relevance of capital intensive irrigation systems development cannot be undermined if one takes a long term view of food need of Nepal.

The purpose of this seminar is to examine different dimensions of irrigation development of the past three decades. One issue that is extremely important is the fulfillment of short-term food production needs. We are gathered here today to look into the experiences of different agencies and non-governmental organizations who have been assisting to improve and expand irrigation systems managed by the farmers.

Since the inception of Department of Irrigation some decades ago it has, in addition to designing and building new irrigation systems, also invested resources in rehabilitating farmer-managed irrigation systems. Hence, there are lessons to be learned from DOI's past experience.

The former Farm Irrigation and Water Utilization Division (FIWUD) of the Department of Agriculture developed procedures to assist farmers in improving this irrigation systems. Valuable experiences are now available in the Department of Irrigation. The Agriculture Development Bank of Nepal (ADB/N) has initiated irrigation development through their Small Farmer Development Program and is expanding its activities beyond these groups. There was an important experience of irrigation development under the Ministry of Panchayat and Local Development that we know very little about that experience. All of these experiences relate directly to assistance accorded to the farmer-managed irrigation systems of Nepal.

I wish all success in the deliberations of the seminar.

27 June 1990

Inaugural address by Hon'ble Minister of Water Resource Mr. Mahendra Narayan Nidhi

Distinguished guests
Fellow Participation of this Seminar
Ladies & Gentlemen,

First of all, I would like to thank the organizers for inviting me to inaugurate this important one day seminar on improving farmer managed irrigation system in Nepal. This issue is very vital because it poses a fundamental question: should government agencies rehabilitate the systems or showed the water users' themselves make the necessary improvements with assistance from the government agencies? One critical issues that should be borne in mind while rehabilitating. FMIS is that the existing unity of the irrigation organization and its self-help motives are not encroached upon or weakened. We should strengthen their organizations whereever they are weak and enhance their capabilities so that they can manage their system better.

The importance of farmer-managed irrigation systems should be understood from the fact that these schemes serve almost 70% of the total irrigated land of Nepal. These systems are contributing a lot in producing additional cereal crops for the nation. Most of the FMISs perform better than government-operated and managed systems. However, there are examples of FMIS which do not perform well. Hence rehabilitation and upgrading is required to increase their utility to the extent of their potential.

Action research on establishing procedure for low-cost improvements and extensions of FMIS has indicated that even minimal input and assistance from outside the community can generate local resource mobilization for carrying out the necessary physical improvements. Such assistance for physical improvement can act as catalyst for farmers to acquire experience in managing several other activities for effective and sustainable O&M of their systems. This can ultimately bring about major increases in agricultural production.

I wish you success in the deliberations of the seminar.

27 June 1990

LIST OF PARTICIPANTS

DOI

1.	Mr. M.D. Karki	Director General	DOI	Panipokhari.
2.	Mr. N. Ansari	Deputy Director General	DOI	Panipokhari.
3.	Mr. M.M. Shrestha	Deputy Director General	DOI	Panipokhari.
4.	Mr. S.R. Pant	Deputy Director General	DOI	Panipokhari.
5.	Mr. R.K. Thakur	Deputy Director General	DOI	Panipokhari.
6.	Mr. Y. L. Vaidya	Deputy Director General	DOI	Panipokhari.

REGIONAL DIRECTORS

7.	Mr. Somnath Poudyal	Director	Central Regional Irrigation Directorate, Kathmandu
8.	Mr. Kuber Kumar Shrestha	Director	Eastern Regional Irrigation Directorate Biratnagar.
9.	Mr. Lav Raj Bhattarai	Director	Western Regional Irrigation Directorate, Pokhara.
10.	Mr. Kailash Bhakta Shrestha	Director	Mid Western Regional Irrigation Directorate Birendra Nagar.
11.	Mr. Indra Bahadur Shrestha	Director	Far Western Regional Irrigation Directorate Dhangadi.

DOI OTHER

12.	Mr. Ram Pd. Satyal	Small Irrigation and Water Utilization Division, DOI.
13.	Mr. Laxman P. Agrawal	PDRD
14.	Mr. Komal P. Timilsina	HSDR, PDRD
15.	Mr. Prajwal P. Pradhan	DE, PDRD
16.	Gulmi District Engineer	
17.	Kapilbastu District Engineer	

IMP/IMC EAST/USAID

18.	Mr. Binod Aryal	Director	IMP
19.	Mr. R.R.S. Neupane	Director	IMC
20.	Mr. Laxman Ghimire		
21.	Mr. Prayog Pradhan		ARD/USAID
22.	Mr. Rob Thurston		ARD/USAID

WECS

23.	Dr. C.K. Sharma	Executive Secretary
24.	Dr. H.M. Shrestha	Executive Director
25.	Mr. D.R. Tuladhar	Senior Hydrologist
26.	Mr. K.P. Rijal	Engineer
27.	Mr. S. Joshi	Engineer
28.	Mr. D. Adhikari	

MOWR

29. Mr. Bhupendra Aryal

IIMI

30. Dr. Robert Yoder
31. Dr. Prachanda Pradhan
32. Mr. Jitendra Rana
33. Mr. Durga K.C.
34. Mr. Naresh C. Pradhan
35. Mr. Matrika Bhattarai

SECTOR PROGRAM

36. Mr. S.R. Sharma
37. Mr. Manik Lal Pradhan

WB-ILC

38. Mr. Samama
49. Mr. Louis Rijk
40. Dr. Upendra Gautam

ADB-ISP

Mr. Palteng
Dr. Kiran Koirala

ILO

Mr. Chris Baker
Mr. S.C. Lakhe
Mr. P. Kulatunga

ADBN

47.	Dr. Gobinda Koirala		

CARE

48.	Mr. Bill Buffum	Program Co-ordinator	CARE/Nepal
49.	Mr. Lex Kassenberg		CARE/Nepal

SNV/MECHI

50.	Mr. Arend Van Reissen	Technical Advisor	Mechi Program

DHADING PROJECT

51.	Mr. Uttam Dhakhwa		

OTHERS

52.	Mr. B.N. Acharya		
53.	Mr. Lila Bhattarai	WECS.	
54.	Mr. Jyoti Lohani		Consultant Ministry of Finance.
55.	Mr. Bijaya Shanker Mishra	Engineer	Banganga Irrigation Project Kapilbastu.
56.	Mr. S.K. Hyoj	SINKALAMA	Lagankhel.
57.	Mr. T.M.S. Pradhan	PDRD	Panipokhari.
58.	Mr. D.S. Sharma	MIT Team Leader	Central Regional Irrigation Directorate Chabahil.
59.	Mr. Duman Thapa		UMN
60.	Mr. D.S. Sharma	MIT Team Leader	CRID
61.	Mr. G.H. Shrestha	BPC Consult	

Date : 27 June 1990

Venue : Blue Star Hotel

Tentative Program

8:30	Opening ceremonies	
9:30	Tea and snacks	
10:00	Presentation: Discussion	WECS/IIMI Action-Research Report
10:00	Presentation: Presentation: Discussion	FIWUD Approach Dhading Project
12:00	Lunch	
1:30	Presentation: Presentation: Discussion	ILC ILO
2:30	Presentation: Presentation: Presentation: Discussion	IMP ADBN CARE
3:30	Tea	
4:00	Conclusions and recommendations	

Hosted by the Department of Irrigation and the International Irrigation Management Institute