

Community Management Model for Irrigation Management Transfer - Moraketiya DC7 in Embilipitiya Block of the Uda Walawe Project

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ABSTRACT

Irrigation Management Transfer is accepted worldwide today. Though many countries including Sri Lanka have various programs to transfer irrigation management to farmers more failures than successes are reported. One key characteristic of a successful Irrigation Management Transfer is an associated program for community management of irrigation systems. The International Irrigation Management Institute carried out an action research program in the Uda Walawe Project in order to field test a community management model for handing over system management responsibilities at the tertiary level. The model consisted of a 12 step process with three stages of building, strengthening and sustaining the farmer organizations and gradual empowerment of farmers. It was expected that farmer would take over system management responsibilities with this gradual empowerment.

The process followed satisfied the requirements of irrigation management transfer at the tertiary level and it proved to be effective. This paper describes the 12 step process followed and the lessons learned. The community management model tested for Irrigation Management Transfer would be worthwhile replicating in other irrigation schemes.

Introduction

Transfer of management responsibilities of publicly owned irrigation schemes to farmers is widely accepted worldwide today. Many countries implement various projects and programs aiming at improving performance, ensuring the sustainability and reducing government costs (Kloezen and Samad 1995). Both failures and successes are reported in these attempts (Vermillion, ed. 1996; Kloezen 1998). In Sri Lanka this has been tried through different modes of experiments since the 1980s. Irrigation Management Transfer (IMT) is currently accepted in Sri Lanka as a policy and is being implemented in many irrigation systems under special programs called Integrated Management of Agricultural Systems (INMAS), Management of Irrigation Systems (MANIS) and Mahaweli joint management systems. However, expected results have not been achieved from these programs (ARTI 1992; IIMI/ARTI 1995; Samad and Vermillion - Forthcoming).

The International Irrigation Management Institute (IIMI) carried out an action research program to improve system performance in the Uda Walawe Project during 1988 to 1994 with financial assistance from the Asian Development Bank (ADB) (IIMI 1995). One of the components of this research project was Tertiary System Management, the objective of which was to develop and field test a model for tertiary system management and a process for turning over tertiary system management responsibilities to farmers. This

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paper is based on the lessons learned from implementing the Tertiary System Management component which involved institution building for turning over management responsibilities at distributary and field channel levels to farmers.

Objective of the Paper

The objective of this paper is to analyze the process followed, strategies used, results achieved and impacts observable in implementing the research component of Tertiary System Management; and to suggest its relevance to policies of irrigation management transfer in Sri Lanka.

Tested Hypothesis:

The hypothesis tested was "*if farmers are mobilized through well designed and systematic institution building strategies and processes they are capable of taking over the full operation and maintenance responsibilities in a tertiary sub system of an irrigation system.*"

IIMI Research Program in Uda Walawe

In a diagnostic study carried out by IIMI prior to the action research it was found that system performance below the distributary level was poor because of the absence of an effective management system, either among farmers or on the agency side. Also, the organizational development activities in the project had not achieved the expected results. As a consequence it was found that the existing water user patterns would have serious implications in the achievement of project objectives and the long-term sustainability of the Uda Walawe Scheme which was being rehabilitated under ADB loan funds (IIMI 1990). The study recommended that the Mahaweli Economic Agency (MEA) should commit itself to a joint management approach based on the participatory management policies of the Government of Sri Lanka with the development of an appropriate handing over methodology and process.

The action research phase was designed to contribute to:

- Main System Management: working with MEA to improve its management of the main system.
- Tertiary System Management: working with farmers and MEA to improve the management of distributary channel and below.
- Rehabilitation Process: working with farmers and MEA to improve the ongoing system rehabilitation project (IIMI 1995).

The following four main activities were included in the Tertiary System Management Component:

- Institution building through the formation and strengthening of farmer organizations,
- Pre-seasonal maintenance program,
- Operation planning for the land preparation period, and
- Operation planning for the crop growth period.

The formation of strong and effective farmer organizations was the foremost activity since organizations are a prerequisite for turning over tertiary system management responsibilities to farmers. However, all four activities were implemented through a process of community management.

Location of the Study

The tertiary system management component was first implemented in one distributary canal – Distributary Channel 7 (DC7) under the Moraketiya Branch Canal in the Embilipitiya Block and later expanded to cover all nine distributary channels under Moraketiya Branch Canal.

Moraketiya Branch Canal is the headmost branch canal off the Right Bank Main Canal (Figure 1). DC7 is located at the tail-end of Moraketiya Branch Canal. DC7 was chosen because it was, at the time (1991), one of the few distributary channels where rehabilitation activities had been completed, and it was having many irrigation problems mainly due to poor system management at the DC level and below. DC 7 has 8 field channels (FCs) serving 79 farmers in the command area of 77 hectares (Figure 2).

The study commenced from late Yala 1991 (August 1991) and ended in Maha 1993/1994 (February 1994). Institution building started right from Yala 1991.

Mode of Implementation

The Study was a Participatory Action Research (PAR) program. PAR is a research process in which the community members actively collaborate in the identification of problems, collection of data and analysis of their own situation in order to improve it (Selener 1997). The farmers and the system management unit of the MEA become the implementors of the research program implemented in Uda Walawe (IIMI 1995). Particularly the Tertiary Management Component was a process continued from Yala 1991 with the involvement of farmers, field level MEA officials and IIMI researchers. Collecting information, planning, implementation and feed back of all the activities were done jointly by farmers, MEA officials and the IIMI researchers. The study was implemented by a sub-committee comprised of Block level and field level officers, FC farmer representatives (FRs) and IIMI researchers. The Study Coordinating Committee at the Project level had the responsibility of monitoring the total PAR. The IIMI researchers were expected to assist in collecting data, preparing work plans, providing necessary guidance in implementation and monitoring the work. Particularly one researcher (the first author) played the role of change agent both for field level officials and farmers.

The Community Management Model Tested

The total tertiary system management component was implemented through a twelve step process aimed at institution building and transfer of management responsibilities. These twelve steps can be divided into three stages.

- Building the farmer organization
- Strengthening the farmer organization
- Sustaining the farmer organizations by institutionalizing and stabilizing the activities.

The twelve steps followed under these three stages are shown in Table 1.

Table 1. Steps of the Community Management Model

Stage	Steps
1. Building the FO	<ol style="list-style-type: none"> 1. Evaluating the strengths and weaknesses of existing farmer organizations 2. Developing a model for farmer organization 3. Conducting awareness meetings 4. Forming farmer organizations
2. Strengthening the FO	<ol style="list-style-type: none"> 5. Identifying training needs of farmers, FRs and MEA officials and preparing training modules 6. Providing training for farmers 7. Providing training for FRs 8. Providing training for officers 9. Providing guidance on conducting meetings, systematically keeping records, solving problems and making decisions 10. Formulating rules and getting legal recognition
3. Sustaining the FO	<ol style="list-style-type: none"> 11. Implementing tertiary system management activities with joint management and gradual transfer 12. Implementing other FO activities

The total process was a collaborative and continuous one although given as separate steps as above, and some of them were undertaken out of sequence or simultaneously with others. On the other hand during each step the problems were identified and corrective actions were taken to adapt the process to the changing environment; that is, it was carried out as a learning process. The total process was aimed at gradual empowerment of farmers to take over the system management responsibilities.

The implementation of each step in the process in DC 7 is described below:

Stage 1: Building Farmer Organizations

Evaluating existing farmer organizations was necessary because of previous activities aimed at organizing farmers for irrigation management. However, even where such prior activities had not occurred it is important to undertake this step which will be useful in building new organizations. The survey indicated that the farmer organization built in DC7 in those previous attempts by the MEA was almost non-existing. Therefore, it was decided to build a new farmer organization.

The farmer organization model developed was derived from previous models used in Sri Lanka with several modifications by taking into account what was learned in the initial

survey as well as some ideas put forward by farmers. The model proposed two levels of organization, one for each field channel (FC) and one for the DC. At the FC level, a farmer group was to be formed for each FC. The FC group would be headed by a farmer representative (FR) selected by the common consensus of farmers and would be responsible for irrigation management on the FC. The DC level organization was to be comprised of all the farmers of the DC. To manage the DC organization, a DC committee of all the FRs was formed. As suggested by farmers an assistant for each FR was also included in the committee to ensure the representation of the FC committee in every committee meeting and to develop a future group of FRs. In addition to this it was proposed to form a Unit level coordinating committee covering the total Moraketiya BC comprised of all DC FRs and the field level officers and a Block Committee comprised of farmer representatives of the block and MEA officials at the block level.

Conducting awareness meetings was intended to get the farmers to begin discussions on the need of getting organized. These meetings focused primarily on motivating farmers to organize themselves. They were held at field canal level.

Formation of the farmer organization took place after farmers were fully convinced of the need for an organization and decided to create one with a model they thought would be effective. Accordingly, the formation of the organization took place with active farmer participation with over 85 per cent of the total number of farmers in three stages: formation of FC groups, formation of the DC committee, and formation of the general farmer organization.

Stage 2: Strengthening Farmer Organizations

Training for farmers and MEA officials was needed to make necessary behavioral and attitudinal changes and building their capacities to work with the organization. Training needs for farmers and FRs were identified during the initial survey. A separate survey was carried out to identify the training needs of MEA officers.

Training was provided for all the DC 7 farmers under the subjects of development of group consciousness, awareness and advantages of farmer organizations, proposed FO model and objectives, understanding of required leadership qualities, and how to undertake group problem solving and decision making.

The training provided for the FRs was intended to improve their leadership qualities, help them understand their roles and responsibilities, provide knowledge of techniques of leading groups including meeting management and proper record keeping.

MEA officials were not provided with formal training as another agency was given the responsibility to carry out training for all officers. IIMI, however, arranged two programs for officers to facilitate implementation of study:

- A study tour to other schemes in Sri Lanka where participatory management approaches were applied successfully.

- A one-day program on “training skills for training adults” for officers to develop skills needed for transferring irrigation technologies to farmers.

After the initial formation of the FO, farmers needed guidance and assistance in conducting meetings and systematic record keeping. In addition, farmers needed assistance and guidance in participatory decision making and in problem solving as it is a new approach for them. Providing guidance on conducting meetings, keeping records, solving problems and making decisions is very important as they are the key organizational management tasks.

Deciding the roles and responsibilities of farmers, FRs and the office bearers, formulating other rules and regulations, and preparation of a constitution took place as part of the training program prepared for FRs.

Arrangements were made for the farmer organization to fulfill the necessary requirements and obtain legal recognition under clauses 56a and 56b of the Agrarian Services Act.

Stage 3: Sustaining the Farmer Organization

After strengthening, the DC 7 FO gradually took up tertiary level management responsibilities. Gradually these activities were institutionalized. Tertiary system management activities included three categories of activities: pre-seasonal maintenance, operations planning for the land preparation period and operations planning for the crop growth period.

Pre-Seasonal Maintenance

The maintenance program was organized to get maximum farmer involvement in decision making; it included the following steps:

1. Identification and prioritization of DC maintenance work with farmers.
2. Preparation of estimates for DC maintenance.
3. Discussing the DC maintenance program and coming to agreement within the FO.
4. Implementing the DC program by the FO.
5. Planning and implementation of the field channel pre-seasonal maintenance by each FC group.
6. Participatory monitoring and feed back.

Operations

The operation planning was for both the land preparation period and the crop growth period. Operations planning involved six steps:

1. Initial discussion with farmers at FC group level concerning distribution problems and desired operations.
2. Preparation of alternative operations plans by IIMI personnel together with the block Irrigation Engineer.
3. Discussion of the alternative operations plans with the DC committee to devise a plan agreeable to farmers.

4. Discussing the selected plan with the farmers in the FC groups convened by the FRs; with the help of IIMI personnel and the Technical Officer, farmers prepared rotational schedules for each FC.
5. Implementation and preparation of an improved plan after identifying problem areas through experience.
6. Participatory monitoring and feed back.

Both these programs were repeated in the following seasons while farmers gradually took up the responsibilities for the operation and maintenance when they become capable of doing them by themselves.

As it was felt necessary to increase the benefits of the farmer organization by taking up other activities desired by farmers, the DC 7 farmer organization was assisted to organize several activities outside of irrigation management. These included provision of fertilizer and other inputs to farmers, building a community hall, forming a women's organization affiliated to the farmer organization, starting a carpentry school, forming a sports society, starting a library, and organizing religious and social activities for the benefit of the community.

The role played by the FRs, general farmers, MEA officers and IIMI researchers in the total process is given in the Table 2.

Results Achieved

Formation of a Strong and Effective Farmer Organization

The organizational strength was evaluated using specific indicators developed for Sri Lanka to assess farmer organizations (IIMI/ARTI 1995) (Table 3). The conceptual base, performance and outcome was rated as at a very high level.

This organization was able to withstand both the serious consequences of giving up the Yala 1992 cultivation due to lack of water while all other organizations built in the project were severely affected and declined, and some political pressures came from several local politicians to change the FO into a political organization. It became a model for the farmer organizations built in the rest of the 8 DCs in Moraketiya BC. This organization while involved in the DC level operation and maintenance activities gradually took over those responsibilities.

Increase in the Water Management Performance

Prior to the study the operation within the DC was the sole responsibility of the Agency. There was no rotational water distribution and farmers were used to simultaneous irrigation. There were severe irrigation difficulties in the tail-end and as well as frequent farmer disputes. The operation plans developed with farmers under the study were implemented initially with the Agency officials and later by farmers themselves after FRs took over these responsibilities. Rotational water issues were practiced both among and within the FCs with equal distribution of water between head and tail. The irrigation problems were solved and

the actual water use was below the target in consecutive seasons (Figure 3). The improvement in water management could be seen in the computation of Delivery Performance Ratio ($DPR = \text{actual water issues}/\text{target}$) (Figure 4). The operation plans prepared for the project under the existing rehabilitation and modernization project of the Uda Walawe Project were revised based on the actual water consumption of the DC7 which was lower than those plans (IIMI 1995).

Improvement in System Maintenance

The system maintenance of the DC prior to the study was entirely the responsibility of the MEA and implemented through hired labors. Under the study the maintenance plans were prepared by farmers and Agency officials together and implemented by farmers with part payment from the MEA. Farmers developed routine maintenance practices and implemented them without expecting MEA funds. The total system including roads was maintained at a better quality by farmers.

Creation of Strong Group Consciousness

After the formation of the farmer organization, civic and group consciousness of the farmers was heightened. In DC 7, the whole community including the women and youth were brought together in activities benefiting the entire community. This change of behavior made it possible to solve some long standing boundary disputes and even the contentious cattle grazing problem. Both the FC level and DC level routine maintenance and any repairs to structures were done through group work.

Building a Sense of Responsibility

An additional consequence was a heightened sense of responsibility among individual farmers to fulfill their obligations. This sense of responsibility could be seen in greater effort spent in cleaning the canals and taking measures to protect them including canal roads.

Building Better Farmer-Officer Relations

The usual strained and hostile relations between farmers and many MEA officers, particularly those responsible for irrigation services, were changed especially after the establishment of joint management committees and mutual respect and trust was developed.

Expansion of the Study to the Total Moraketiya BC

With the results achieved in DC7, the Tertiary System Management Study was expanded to the total Moraketiya BC with 9 DCs. The process followed in DC7 was applied in the other DCs and similar results were achieved in organizational development and in operation and maintenance. It was able to build strong and effective FOs in all the 9 DCs. The FOs in the whole BC worked together as one group and became involved in decision making, planning and implementation. A strong Unit Coordinating Committee (UCC) comprised of all the

FOs of the BC was formed and it became the planning and decision making body of the BC and the forum of joint management. The FOs took the responsibility of field level water distribution and implementing the pre-seasonal maintenance. Rotational water sharing was introduced at the field level on operation plans prepared together with farmers instead of simultaneous irrigation which was the existing practice. A sense of responsibility and group consciousness were built among the farmers within the whole BC. The impact of this exercise could be shown in the increase of the water use efficiency of the Moraketiya BC (Figure 5).

Impact of the Study

Gradual Taking over of O&M Responsibilities

Though there was no formal handing over, farmers gradually took over O&M responsibilities with the introduction of joint system management. First, the FRs took over the full responsibility of distributing water within FCs and later took the responsibility of FC head gate operation. The maintenance was done taking it as an obligatory responsibility of farmers. A new practice of mid-seasonal canal maintenance was also followed by farmers.

Impact on the Other DCs of the Branch Canal

The progress made in the DC7 had a positive impact on expanding similar practices to other DCs in the Moraketiya BC. The DC7 FO had become a model for replication. The operation plan tested in DC7 was taken for the development of operation plans for the total Right Bank Main Canal of the Uda Walawe project.

Cost-saving

The agency cost for operation and maintenance was reduced during the study period as the FO shared a part of it. Particularly the maintenance cost was reduced as farmers practiced routine maintenance on their own initiative. For example the total estimated pre-seasonal maintenance cost in Maha 91/92 for the DC was Rs 15,087 (\$359 @ \$1 = Rs 42 in 1992). In Yala 92 it was reduced to Rs 1576 (\$37.50) i.e., just 10 per cent of the previous year's cost (IIMI 1995). The practice followed by the MEA before the study had been to allocate funds according to the length of the DCs without considering the quantity of the work.

Increase in Yield

There was an equitable increase in the yield in both the head and the tail of the DC. The average yield of the DC7 according a crop survey carried out in Maha 92/93 with a sample of 15 farmers was 5.3 tons/ha while the yield distribution among the head middle and tail of the sample was 5.21, 5.47 and 5.26 tons/ha respectively (Table 4). Farmers attributed this to the equitable and reliable distribution of water within the DC (IIMI 1995).

Present Status in DC7 and other DCs in Moraketiya

Strength of the FOs

In a survey done in August 1998 using the same indicators developed to evaluate the performance of farmer organizations in Sri Lanka, it was found that the DC7 FO was functioning at the same high level as at the time it had been formed. All the aspects of membership, conducting meetings, leadership effectiveness and involvement in O&M have been sustained at the level achieved during the study period (Table 5). However, the funding sources of the FO at the time the survey carried out are limited to the membership fee since they receive no maintenance allocations from the MEA.

FOs built in the other DCs of the Moraketiya BC under the expansion of the study were also found to be functioning well in August 1998. The Unit Coordinating Committee formed representing the total 09 FOs is firmly established and functioning well. Meetings of the Unit Coordinating Committee are being held monthly with over 80% attendance. The seasonal planning for Moraketiya BC is taking place at the Unit committee together with FRs and Agency officials. These planning sessions have replaced the typical kana meeting.

Involvement in O&M

The total operation and maintenance within DC7 has been formally handed over based on an agreement signed between the MEA and the FO in 1995. IMT has been therefore completed. The responsibility for total internal water distribution, minor repairs and routine maintenance of the canal structure is with the FO. No O&M allocation has been made by the MEA to the DC7 FO since 1995.

The members of the DC7 FO do the maintenance of the DC, FCs and the roads on a share basis. The chairman of the FO does the distribution of water within the DC while the FRs are responsible for water distribution within the FCs. There no internal water distribution problems. Maintenance of the rehabilitated canal structure is good, there is no evident deterioration of since 1991 except for siltation in one FC.

Based on the precedent of DC7 the total responsibility for operation and maintenance within all the DCs on the branch canal has been formally handed over to the respective FOs. FOs are responsible for the internal water distribution and routine maintenance including minor repairs and earthwork. Maintenance allocations have not been made for these FOs since 1996. The number of MEA gate operated for the branch canal has been reduced from three to just one.

The Unit Coordinating Committee leader who is selected among member FRs is responsible to ensure equal water distribution among the DCs within the BC. He also supervises the water discharge to the BC and to the DCs. Flexible water operation is applied according to field requirements and the gate operator for the main canal makes necessary changes according to the instructions of the Unit Committee leader.

Change of Crop Pattern

The cropping pattern of DC7 has changed dramatically since 1991. About 80% of the total land area is devoted to banana in August 1998. In 1991 when the study commenced the total land area of the DC was cultivated with paddy. Banana was cultivated only in the home gardens but not as a significant commercial crop.

The farmers of the Moraketiya BC are now gradually changing their crop from paddy to banana. Moraketiya BC is gradually becoming the main banana growing area of the Uda Walawe Project. Earlier the tail-end of the Uda Walawe Scheme was regarded as the main banana growing area, mainly due to the water scarcity. Some MEA officials and farmers attributed the new change in the crop pattern in MKDC7 partly to the interventions of the crop diversification program implemented under the study.

Comparison of Changes Before and After Interventions

A summary of the major changes after intervention and at present in MK DC7 as well as in the total branch canal is given in the Table 6. The FOs that had been in name only were re-formed and strengthened under the study and they are still functioning well. The MEA had full responsibility for O&M before the study. Under the study, joint management was introduced. Now, the O&M responsibilities within the DCs have been formally handed over to the FOs. When the study was started the major crop cultivated in the area was paddy. Crop diversification was introduced under the study. The major crop in the Moraketiya BC has changed to banana leading to substantial increase in farmer income.

13. Lessons Learned

The community management model tested in the Uda Walawe Project for irrigation system management transfer offers the following lessons:

Need for a process for institution building over an extended period of time. Institution building and handing over should be a gradual and appropriate process. Each step should be followed with full farmer participation as a way of empowering them. On the other hand the process should be flexible to adapt to a changing environment and implemented as a learning process. Effective process provides four characteristics of formation of farmer organizations, strengthening, sustaining and taking over system responsibilities.

Need for a change agent. In large irrigation systems where government agencies control water source, spontaneous generation of farmer organizations and taking over system management responsibilities is unlikely. The initial leadership is taken by the change agent who induces the farmers to take on leadership tasks so that the catalyst role can be phased out with the gradual empowerment of farmers. In the study this role was played by the researchers which is often one of the roles of those involved in Participatory Action Research (Selener 1997). The study was a training ground for farmers and agency officials as the researchers assisted them in planning, implementing, monitoring and feed back and also in identifying an appropriate process, identifying problems and taking corrective

actions. Apart from that they acted in a way to achieve necessary attitudinal and behavioral changes of both farmers and particularly the agency officials.

Time needed for gradual development of organizations and taking over O&M responsibilities. Institution building is a process which needs time for gradual development, strengthening, sustaining and maturing to take over system management responsibilities. The time may vary for different organizations depending on the environment they are built in and the effectiveness of the institution building program and the change agent.

Need for engagement in multi-purpose activities. Depending on the magnitude of the irrigation management benefits to farmers the provision of non-irrigation benefits like a multi-purpose organization may also be necessary to get the initial farmer involvement and make the organizations useful and valuable to them.

Need for empowering farmers. Irrigation Management Transfer becomes effective only if the farmers are empowered to take their own decisions. While there are stories about failures of irrigation management transfer, Moraketiya DC7 and BC show a success story due to this empowerment rather than working on agency timetables.

The application of the community management model in MKDC7 was a complete learning and action process through which a model was applied in such a way that farmers were convinced that continuity and sustenance of the model would bring them benefits. The lessons learned from MKDC7 in Uda Walawe project indicate that the participatory irrigation management policy can be significant in managing major and medium irrigation schemes in the country.

More importantly the experiment discussed in this paper contributes to designing implementation strategies for introducing a participatory management model in irrigation schemes. The twelve steps followed as a continuous process would be worth replicating in other schemes for improving their management.

Reference

- ARTI. 1991. *The Integrated Management of Major Irrigation Schemes*. Agrarian Research and Training Institute. Colombo.
- Selener D. 1997. *Participatory Action Research and Social Change*. Cornell University. NY.
- IIMI. 1990. *Irrigation Management and Crop Diversification (Sri Lanka); Final Report*, 3 volumes. International Irrigation management Institute. Colombo.
- IIMI. 1995. *Irrigation Management and Crop Diversification Phase 11; Final Report*, 3 volumes. International Irrigation management Institute. Colombo.
- IIMI/ARTI. 1995. *Monitoring and Evaluation of the Participatory Irrigation System Management Policy; Final Report*, draft, 3 volumes. International Irrigation management Institute. Colombo.
- Kloezen, W.H., and Samad, M. 1995. *Synthesis of Issues Discussed at the International Conference on Irrigation Transfer*. International Irrigation management Institute. Colombo.
- Vermimillion, D.L. (Ed.). 1996. *The Privatization and Self-Management of Irrigation*. International Irrigation Management Institute. Colombo.
- Kloezen, W.H., and et al. 1998. *Impact Assessment of Irrigation Management Transfer in the Alto Rio Lerma Irrigation District. Mexico*; Abstract, Research Report 15. International Irrigation Management Institute. Colombo.

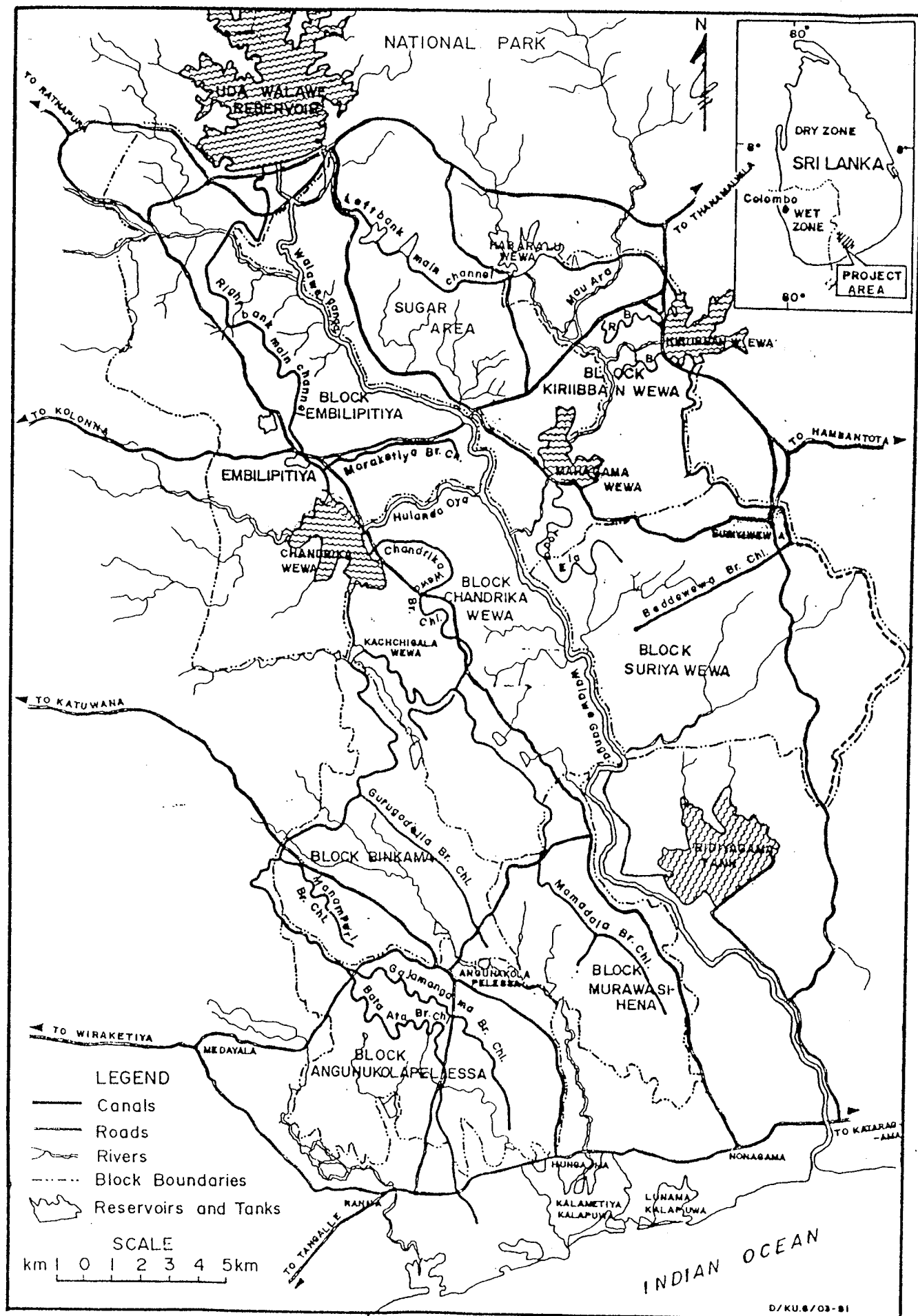


Figure 1. Map of Uda Walawe System

Figure 2

EMBILIPITIYA BLOCK

TRACT 06

MK/D7

LAY OUT PLAN

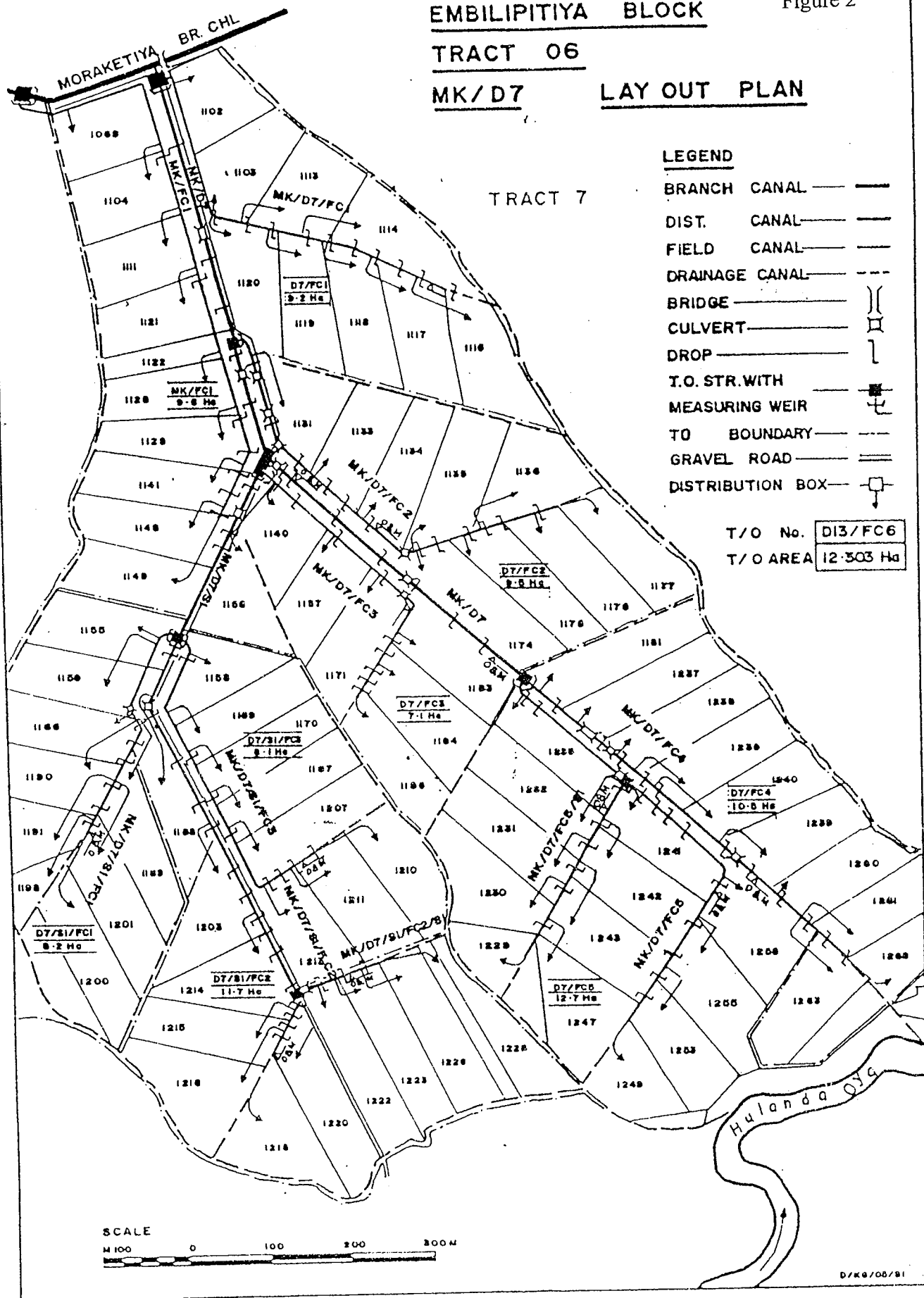
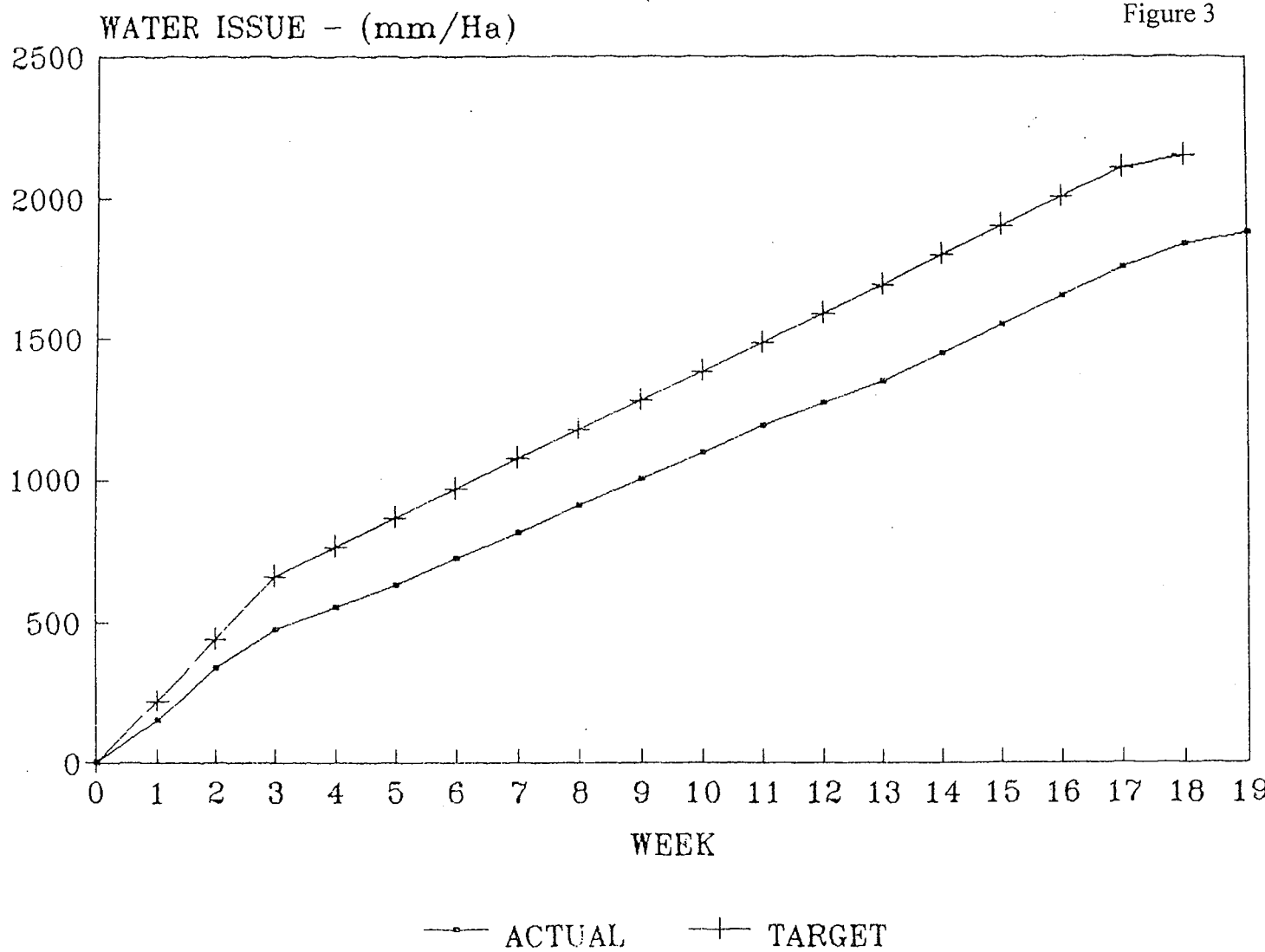


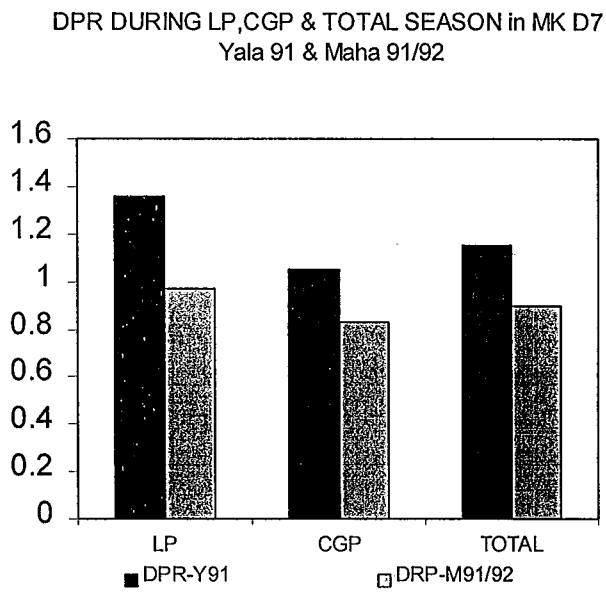
Figure 3



Cumulative Water Use in MK - D7, Maha 1991/92

(IIMI 1995)

Figure 4



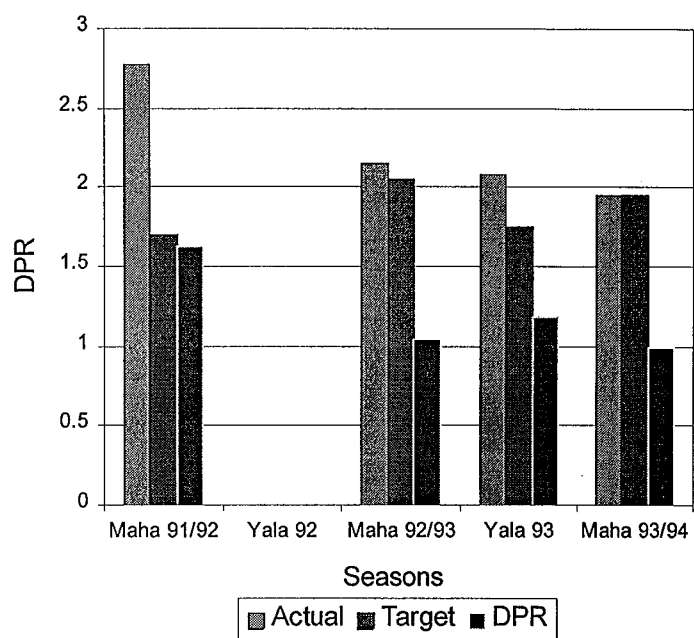
DPR: Delivery Performance Ratio (Actual water issue/Target)

LP: Land Preparation

CGP: Crop Growth Period

(IIMI 1995)

**Figure 5. Delivery Performance Ratio -
Moraketiya BC**



$DPR = \text{Actual water issues} / \text{Target}$

(IIMI 1995)

Table 2. Roles Played by Farmers, MEA officers and IIMI Researchers in the Process

Steps	FRs	Farmers	MEA officers	IIMI researchers
1. Evaluating the existing FOs	-	-	-	Conducting the survey
2. Developing the FO model	-	Involved in developing the model	Involved in developing the model	Developing the model
3. Conducting awareness meeting	-	-	Assist in organizing groups, conducting the sessions	Preparing and implementing the program with MEA officers
4. Formation of the FO	-	Involvement in the formation	Organizing the meetings, and implementing	Implement with MEA officers
5. Identifying training needs	-	-	Involved in preparing training modules	Identifying training needs and prepare modules with MEA officers
6. Provision of training	Assist in organizing the groups	-	Conducting training for farmers	Organize the training, assist in conducting training for farmers. Organizing training for officers.
7. Providing necessary guidance in organizational management	-	-	-	Providing of necessary guidance
8. Formulating rules and regulations	Formulated the rules	Assist in formulating rules	Provided necessary guidance	Provided necessary guidance
9. Getting legal recognition	Making preliminary arrangements and fulfilling requirements	-	Assist in getting legal recognition	Assist in fulfilling the requirements and getting legal recognition
10. Implementing tertiary system management activities	Involved in Planning. Implementation	Involved in field level planning Implementation	Involved in planning and implementation	Preparation programs, providing guidance in planning and implementations
11. Implementing social and cultural activities	Planning, Implementing	Assist in planning and implementing	Assist in planning and implementing	Providing guidance
12. Monitoring and evaluation	Provision of data. Monitoring the progress	Discussing the progress	Monitoring the progress	Collection of data. Monitoring and evaluation

Table 3. Evaluation of the Organizational Strength of DC7 FO in 1993

Feature	Conceptual Base (Max = 13)	Performance (Max = 8)	Outcome (Max = 15)
Structure	2	1	2
Membership	1	Na	2
Leadership	2	2	2
Funding	2	1	3
Financial Management	2	1	2
Use of Funds	1	1	1
Communication	2	2	2
	12 (92%)	8 (100%)	14 (93%)

(Values given in Table 3 are calculated using following indicators.)

Feature	Conceptual Base	Performance	Outcome
Structure	0=FO has no constitution or no clear structure 1=FO has a constitution or formal structure 2=FO has both constitution and formal structure	0=FO has no farmer approval for constitution 1=FO has farmer approval for constitution	0=Required characteristics of FO structure are not met 1=Required characteristics are partially met 2=Required characteristics are fully met
Membership	0=No clear definition for eligibility 1=There is a clear definition for membership		0=Less than 50% of potential farmers are active members 1=Between 50% - 75% are active members 2=More than 75% are active members
Leadership	0= No procedure or criteria for selecting leaders 1= There is a procedure but no criteria 2=There are both procedures and criteria	0=Neither procedure nor criteria followed 1= Only procedure is followed 2=Both procedure and criteria are followed	0=Leaders are not selected by farmers 1=Leaders are selected by farmers but not by majority of farmers 2=Leaders are selected by majority of farmers
Funding	0=No planned ways to raise funds 1=Funds are raised in an adhoc manner 2=Funds are raised mostly from agency allocations 3=Funds are raised through a sustainable procedure	0=FO has poor funding position 1=FO has a satisfactory funding position	0=No funds 1=Funds primarily obtained from agency O&M allocations and contributions 2=Funds primarily obtained from membership levies 3=Funds obtained from contracts and other FO business activities
Financial Management	0=FO has no financial reporting or disbursement procedures 1=FO has reporting procedures but no disbursement procedures 2=FO has all needed procedures	0=FO does not follow financial reporting and disbursement procedures 1=FO follows financial reporting and disbursement procedures	0=Funds management and disbursements not reported to membership 1=Funds management and disbursement acceptable to some farmers 2=Funds management and disbursements acceptable to most farmers
Use of Funds	0=No plans prepared to use funds 1=Plans are prepared to use funds	0=Funds are not used 1=Fund are used for FO activities	0=Use of funds brought no benefit to FO 1=FO activities are diversified with the use of funds 2=Stronger financial position through diversified activities
Internal Communication	0=No defined channel of communication 1=Information passed through informal channels 2=Regular channel is established through meetings	0=No FO meetings held 1=Meetings held irregularly 2=Regular meetings are held	0=No systematic information flow between farmers and FRs 1=Information is passed mainly between FRs and DC officers 2=Systematic information flow between farmers and FRs

Note:For purposes of judging membership, "potential members" will be defined as all farmers (including renters, squatters, etc) served by the distributary channel. The number of "active members" will be defined by asking the FO officers to identify the number of "active members" of their organizations.

(IIMI/ARTI 1995)

Table 4. Crop Survey Results DC7 – Maha 92/93

Location	Allotment	Yields tons/ha	Average
Head	1169	4.96	5.21
	1131	6.71	
	1239	4.23	
	1215	5.99	
	1156	4.18	
Middle	1258	7.43	5.47
	1174	5.11	
	1222	4.65	
	1243	5.58	
	1259	4.59	
Tail	1226	4.65	5.26
	1229	6.19	
	1247	5.58	
	1201	4.70	
	1176	5.16	
Total Average			5.31

(IIMI – 1995)

Table 5. Evaluation of the Organizational Strength of DC7 FO in 1998

Feature	Conceptual Base (Max = 13)	Performance (Max = 8)	Outcome (Max = 15)
Structure	2	1	2
Membership	1	Na	2
Leadership	2	2	2
Funding	2	0	2
Financial Management	2	1	2
Use of Funds	1	1	1
Communication	2	2	2
	12 (92%)	7 (88%)	13 (87%)

Table 6. The comparison of the changes before and after interventions in DC 7 and the Moraketiya BC

Activity	Before Intervention	After Intervention	Present Situation
Farmer Organizations	<ul style="list-style-type: none"> Namesake, almost non existing No leadership development Decision making by Agency Hostile relations between officers and farmers 	<ul style="list-style-type: none"> Building strong and effective FOs Identifying and development of leadership Joint decision making Introducing coordinating committees 	<ul style="list-style-type: none"> Strong and effective FO Leadership development Strong UCC UCC leadership risen up to project and national levels Empowerment of farmers
Water Management	<ul style="list-style-type: none"> Total Agency responsibility Simultaneous irrigation No rotational practices Conflicts with the Agency and among farmers Severe irrigation problems in the tail-ends 	<ul style="list-style-type: none"> Joint responsibility Rotational water distribution Equal water sharing FRs taking responsibility of internal distribution Irrigation problems solved 	<ul style="list-style-type: none"> Water management responsibility formally handed over to the FO FO leader is responsible for supply of water to FCs FRs responsible for internal distribution No internal irrigation problems Joint operation planning within BC
System Maintenance	<ul style="list-style-type: none"> Total Agency responsibility Agency personal implemented them Full cost by the Agency Farmers were not happy with the quality maintained 	<ul style="list-style-type: none"> Joint responsibility Planning together, implemented by the FOs Part of the cost paid by the Agency Quality of work maintained 	<ul style="list-style-type: none"> Responsibility of DC maintenance is formally handed over to the FOs FOs plan and implement the maintenance work Agency does not bear any maintenance cost Quality of work is maintained Rehabilitated canals are maintained at the same quality
Crop	<ul style="list-style-type: none"> Almost all paddy Yields of tail-end were reduced by irrigation problems 	<ul style="list-style-type: none"> Equal distribution of high yield Crop diversification started with growing banana 	<ul style="list-style-type: none"> 80% banana in DC7 Substantial increase of farmer income Moraketiya BC becoming major banana cultivation area
Cost	<ul style="list-style-type: none"> Total O&M cost by the Agency 	<ul style="list-style-type: none"> Part of the O&M cost by the Agency 	<ul style="list-style-type: none"> No O&M cost within DCs for the Agency
System management	<ul style="list-style-type: none"> Total by the Agency 	<ul style="list-style-type: none"> Joint management 	<ul style="list-style-type: none"> Formal IMT within the DCs

Table 2: Station Densities Compared with WMO Standards (WRS, 1998)

Organisation	Network Type	Number of Stations	Effective Area SqKm	Station Density SqKm/Station	Respective WMO Standard Density Km ² /Station	WMO Inforhydro 1991 Standard	Satisfactory by WMO standards	Remarks
Department of Irrigation	River Gauging (After 94/95 Water Year)	48	65531	1365	1875 For interior planes and hilly areas	1000	Yes	Very few stations at northern and eastern areas
	Daily rainfall(Non Recording)	350	65531	187	575 For hilly areas	200	Yes	Very few stations at northern and eastern areas
Meteorology Department	Automatic rainfall gauging stations (Recording)	22	65531	2979	5750 For interior planes and hilly areas		Yes	Very few stations at northern and eastern areas
	Evaporation (Agromet)	38	65531	1725	50000 For interior planes and hilly areas		Yes	Very few stations at northern and eastern areas

Table 1: Summary of Sri Lankan Hydrometric Network

ORGANISATION	TYPE OF HYDROMETRIC STATION	NUMBER OF STATIONS IN THE NETWORK	TYPE OF DATA COLLECTED	FREQUENCY OF DATA COLLECTION
Department of Meteorology	Principal Climatic Station	22	<ul style="list-style-type: none"> • Rainfall • Evaporation • Humidity • Pressure, temperature, • humidity, cloud cover etc. 	<ul style="list-style-type: none"> • Continuous Pluviographs • Other data every 3 hours
	Agro-Met Stations	38	<ul style="list-style-type: none"> • Rainfall • Sunshine hours • Evaporation • Humidity • Soil temperature, Pressure, temperature, humidity, cloud cover etc 	<ul style="list-style-type: none"> • Twice Daily
	Daily Rainfall Stations	350	<ul style="list-style-type: none"> • Rainfall 	<ul style="list-style-type: none"> • Once a day
Department of Irrigation	Streamflow & rainfall gauging stations	48	<ul style="list-style-type: none"> • Water levels • Flow velocity • Cross section of rivers • Reservoir water issues • Evaporation 	<ul style="list-style-type: none"> • Water Levels once in an hour where staff gauges are used, continuous where automatic water level recorders are used • Rainfall , once a day in non recording stations, continuous in recording stations • Evaporation etc. once in a day