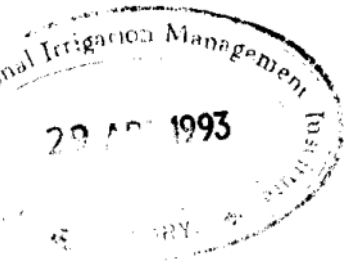
Technical Assistance Study
(T.A.1480 SRI)

irrigation Management and Crop Diversification
(Sri Lanka)

PHASE II



Seasonal Report

Uda Walawe

Maha 1991/92

October 1992

INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE

in association with the

MAIIAWELI ECONOMIC AGENCY

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Chapter 1

INTRODUCTION

This report describes progress and results of the Irrigation Management and Crop Diversification Project (Asian Development Bank TA 1480 SRI) in Uda Walawe for the 1991-92 Maha season. The report also outlines the work plan for Yala 1992. The report is organized by the three main components:

- Main System Operations Management
- Tertiary System Management
- Rehabilitation Process

During the season, the Main System Operations Management component continued preliminary work required to initiate the management improvements planned for the RBMC. Activities included calibration of flow measuring devices, computation of water requirements at main delivery outlets (branch channels), collection of flow data and analysis of deliveries made, analysis of the existing data collection program and transmission network, and training for O&M staff on operations. In addition, management changes made, specifically the appointment of a DRPM (Water Management) and the initiation of a Project Management Committee are also reported. This work will continue with the logical next steps during Yala 1992.

Under the Tertiary System Management Component almost all the activities identified in the Inception Report were implemented successfully in the selected channel, MK D7 in Embilipitiya Block. The main accomplishments were formation and strengthening farmer organizations, pre-seasonal and mid-seasonal maintenance work, improved operations during the land preparation period with improved input coordination, and improved operation during the crop growth period. The results are encouraging. During Yala, this work will be spread to nearby channels. .

The Rehabilitation Process implementation in Chandrikawewa Black did not show useful results. Work was accompanied by many difficulties. Although training on rehabilitation construction was given to farmers, performance was very poor because of many bottlenecks including lack of resources, delays in payments, and others. One problem was the relative weakness of the farmer organizations in the selected area. Therefore, it has been decided to discontinue this activity in Chandrikawewa Block and combine it with the Tertiary System Management Component activities in a larger area under Moraketiya Branch Channel in Embilipitiya Block. This will allow attention to be paid to rehabilitation construction work as part of the broader work of strengthening of farmer organizations.

Training activities were numerous. In December 1991, the staff of MEA and MECA went to Polonnaruwa and Kimbulwana Oya on a study tour that helped to change the attitude

of MEA staff towards institution building. According to the participants in a one day Training of Trainers program, and other training programs would help them in many ways. Computation of irrigation requirements was carried out in a series of workshops that concluded during the season. Although the objectives of the workshops were not fully realized, there is a positive impact on the quality of the work of the technical staff. Finally, computer training classes were held for the engineering staff at block and project levels. However, failure to carry out planned training of farmers on technical issues related to rehabilitation construction contributed to the difficulties faced under the Rehabilitation Process component.

All of the work was done jointly by MEA and IIMI staff. With more MEA staff contributions the effectiveness of research work can be greatly improved. The major changes in the organization of the research were the transfer of the RPM, the appointment of the DRPM (Water Management), and the appointment of the latter as chairman of the Main System Operations Management Substudy Committee.

Chapter **2**

MAIN SYSTEM OPERATION MANAGEMENT

2.1 **Introduction**

The Main System Operation Management component deals with the following two major activities.

* Development of a Seasonal Distribution Plan, and

* Improvement of Main Canal Operation.

This study has been implemented in the Right Bank Main Canal (RBMC) of the Uda Walawe Project focussing on the study of main outlets (Branch Canals or BCs) from the RBMC. During Maha 1991/92, the seasonal water distribution plan could not be completed due to delay in computing water requirements caused by inadequate participation of block operation staff. Without a seasonal distribution plan, only a partial implementation of the improvements to main canal operations could be done during this season.

For convenience of implementation, the above two main activities are divided into seven sub-activities as described herein:

1. Flow Gauging and computing Head-Discharge (H-D) Relationships
2. Computation of Irrigation Water Releases at Each BC Head
3. Rainfall Data Analysis
4. Planning and Implementation of a Seasonal Plan
5. Flow Monitoring and Communication
6. Main System Operation Management Process
7. Performance Evaluation

Of these 7 sub-activities, Rainfall Data Analysis (item 3) was completed during Yala 1991. Planning and Implementation of a Seasonal Plan (item **4)** could not be **started** since the Computation of Irrigation Water Releases at each BC Head could not be completed. Performance Evaluation (item **7)** was not taken up in Maha 91/92 work plan.

The sections that follow provide detailed reports of progress made during **the** Maha 91/92 on these activities. The work plan for Yala 1992 is also given.

2.2 Flow Gauging and Computing H-D Relationships

As reported in Yala 1991 seasonal report, most of the important locations of the RBMC had not been calibrated in the recent past; calibration was identified as a key entry point in improving the main system management. Irrespective of what the target deliveries are going to be it is required to have reasonably accurate measuring devices in order to assess the quantity of flow at every critical location of the main canal. Calibration of the offtakes (large BCs) from the RBMC and the important hydraulic locations along the main canal would provide sufficient information for the monitoring of the main system.

Calibration of gauge posts in the head of each BC and at selected points in the main channel (MC) commenced in Yala 1991. Gauge post locations had been determined in six places in the MC and at the head of seven BCs. Preparation of head-discharge (H-D) curves for five BC locations were completed during Yala 1991 and the program was to complete the balance by the middle of Maha 1991/92. At present, the expected gauge height (H) for the discharge (D) scheduled for delivery is computed from H-D curves for operating the main system. Similarly, flow data is being monitored by measuring gauge heights by field operation staff and conversion to discharges is done at the Project office.

2.2.1 Progress during Maha 91/92

Calibration of remaining gauge points and preparation of H-D curves were completed at the end of January 1992. The calibration of main canal points was laborious and progress could be achieved only under extremely difficult conditions. Four gauge posts (2 in MC and 2 in BCs) were broken by farmers after the calibration. Re-calibration has to be done in these four locations because the gauges were not fixed in relation to permanent reference points. In future, the utmost precautions have to be taken to protect gauge posts from different types of damages and gauges need to be fixed in relation to some bench mark.

2.3 Computation of Irrigation Water Releases at each BC Head

The procedure adopted for computing water requirements at the Project office was not sufficiently accurate. Also the computation of water requirements should be decentralized to Block level so as to make the block staff aware of the delivery targets and of the calculation of crop water requirements.

Implementation of this idea provides the opportunity to get feedback from the field level officers on the preparation of operation plans. The experiences of the field staff on operations is the most valuable knowledge in this calculation of water requirements, since they should be based on the needs and knowledge of the farmers. Therefore, an operation plan completed taking farmer demands into account will, once completed, be the most practical and acceptable operation plan possible. The awareness created among the

operational staff by adopting the decentralized procedure will also facilitate monitoring and evaluation of the operations and finally the institutionalizing of the operational procedure.

The Project office has adopted a norm of a 15 day stagger for downstream blocks under the RBMC. Embilipitiya, Chandrikawewa and Murawesihena blocks get water first while Binkama and Angunukolapelessa blocks get water 15 days later. During Maha 1991/92, the stagger period was 20 days. Accordingly, water issues started on 1 October 1991 to Moraketiya, Chandrikawewa and Mamadala BCs and 20 October to Gurugodella, Manamperigama, Bata-ata and Gajamangama BCs. There is a continuous water issue in MC and BCs during the land preparation period and in MC and some BCs during the crop growth period. Some DCs get a continuous water issue during the land preparation period but intermittent supply during the crop growth period.

The various steps involved in computing water requirements are as follows:

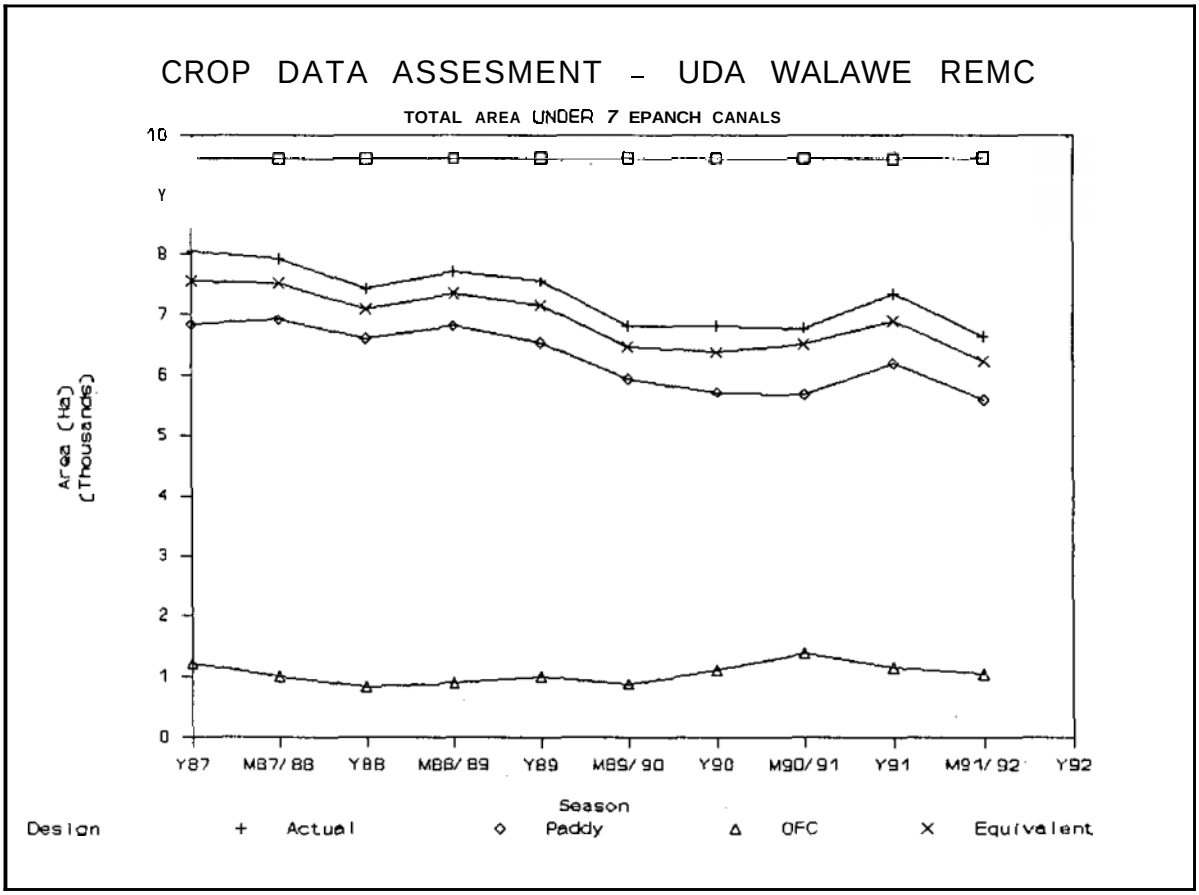
* Assessing crops and cropped areas,
* Determining a) evapotranspiration (ET) values for each crop, b) seepage and percolation (S&P) values, and c) application and on-farm conveyance efficiencies,
* Calculating crop water requirements,
* Estimating average conveyance efficiencies,
* Calculating the water requirements at Field Canal (FC), Distributory Canal (DC) and BC head gates.

Rainfall is not accounted directly; however, the previous week rainfall is accounted in the subsequent week.

2.3.1 **Progress** during Maha **91/92**

The progress of the activities are given below:

Assessing Crop Data Since the method used prior to initiation of this research was ineffective in providing crop area data in a timely fashion, a new method was introduced to collect crop data, **As** was reported in the Yala 1991 report, data for Maha 91/92 **was** collected according to this new method. During Maha, the crop planning summaries prepared by the Agriculture Division for the Yala 1992 season were collected and sent directly to all Blocks for their verification and re-arrangement of the crop areas canal wise. But due to severe drought conditions prevailing in the project area, the possibility of Yala cultivation is rather remote.



igure 2.1 Annual Cropped Areas

Cropping Trend Seasonal crop data from Yala 1987 **up** to Maha 91/92 was collected in order to determine the trend. A questionnaire format was used to collect crop data under each BC for different seasons. This format included potential area after rehabilitation **is** completed, actual area cultivated (sum of paddy and OFC area), paddy area, OFC area and equivalent area under each BC. The data for 10 different seasons were collected from the O&M Division and the Agriculture Division of the Project office and processed to determine the trends. The trends are shown in Figure 2.1. This analysis indicates that there is a decline in total cultivated area in the RB system and the cultivated area is less than the design area (design area is the area expected to be cultivated after rehabilitation construction is completed). Since there are many discrepancies in the data, the tabulated crop data were given to Block offices for clarification and updating. Most of the Blocks have reported that this data is not available with them. Therefore it has not been possible to get the exact picture of the crop trends in Uda Walawe Project. Further efforts will be made to identify a more accurate cropping trend after updating these values.

Water Demand at BC Outlets. **As** stated in the Inception Report, it is necessary to calculate the discharges at the heads of the BCs which consume more than 80% of the MC discharge. This exercise *can* be considered as the initial step in our monitoring program. The following

basic data used for computation of water releases at each BC head is shown in Table 2.1. It is necessary to start with average data and update it through field testing.

After assessing crop and climatic data, S&P values, application efficiencies, conveyance efficiencies, etc, calculation of water requirements at FC head gates for Maha 1991/92 was completed with the participation of all IEs and EAs in the Project.

Also, computation of water requirements at some DCs in each block was completed. A series of programs as outlined below were conducted to achieve this target:

Table 2.1 Basic Data for Computing Water Releases

Average Evapotranspiration (ETo) of Paddy in mm/day
(Source: IESL Journal September 1990)

Month	Week No	ETo(mm/day)
October	1-4	5 6
November	5-9	4 3
December	10-13	3 9
January	14-18	5 4
February	19-22	5.9
March	23-26	6 3
April	27-30	5 8
May	31-35	5 5
June	36-39	5 8
July	40-43	5.5
August	44-48	6 1
September	49-52	6 0

Crop factors (Kc)
Land prep in weeks 1-4
0.90 for week 5-7
1.10 for week 8-11
1.20 for week 12-15
0.90 for week 16-18

Seepage & Percolation
RBE soil = 10 mm/day
LHG soil = 6 mm/day

FC conveyance efficiency = .90
DC conveyance efficiency = .95
BC conveyance efficiency = .90
MC conveyance efficiency = .90

Soaking water requirement = 100 mm
Topping up water requirement = 100 mm
Average rate of flow = 5.5 l/s
through 3" pipe

* A number of working sessions with Project Irrigation Engineer (PIE) and other IEs were held to ascertain different parameters and to develop three formats for computing water requirements (one format each for FC, DC and BC requirements). Refer to Annexes 2.1 and 2.2 for sample formats.

* A sample calculation was prepared.

* A trial workshop was held with the participation of the Technical staff (IEs and EAs) of the Project office and Embilipitiya Block office.

* Discussions were held with Resident Project Manager (RPM) and all IEs in the Project.

* Three workshops were held with the participation of all the IEs & EAs in the Project.

Since this was the first attempt at computing crop water requirement, it was decided to take an average set of data (by using the experience of the project staff and also the experiences in similar projects) to start with. This initial set of data will be modified as experience is gained. When selecting the initial parameters, the technological level and the operational practices were taken into consideration. Variations of S&P values across the project are

large and dominate the computation of water requirements. Therefore, until S&P values are exact, close adjustment of other factors, such as ET, may not have much affect on the accuracy of the results. The procedure adopted will yield a rather approximate value which may be suitable as a starting target. Based on the monitoring and evaluation the calculated targets will need adjustments in the future.

Figures 2.2 and 2.3 show typical plots of water requirements at the heads of an FC and DC respectively. MK/DC7/FC2 (with an area of 9.5 ha and 80% of RBE soil) and MK/DC7 (with an area of 78 ha and 66% of RBE soil) respectively were used for these typical FC and DC plots. In these computations it can be seen that water requirements at the FC and DC heads (without rainfall adjustments) are 1.79 m/ha and 1.82 m/ha respectively for Maha season. It is important to mention that the S&P values assumed for RRE and LHG soils are 10 and 6 mm/day respectively in these computations.

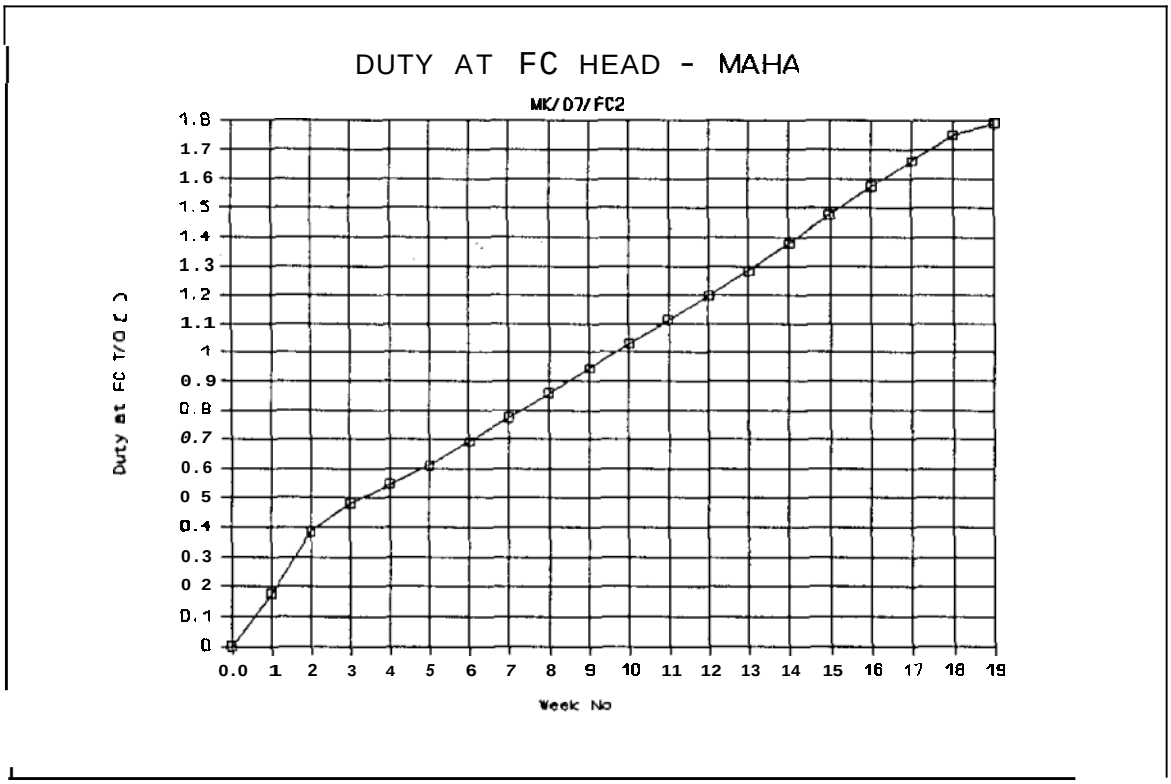
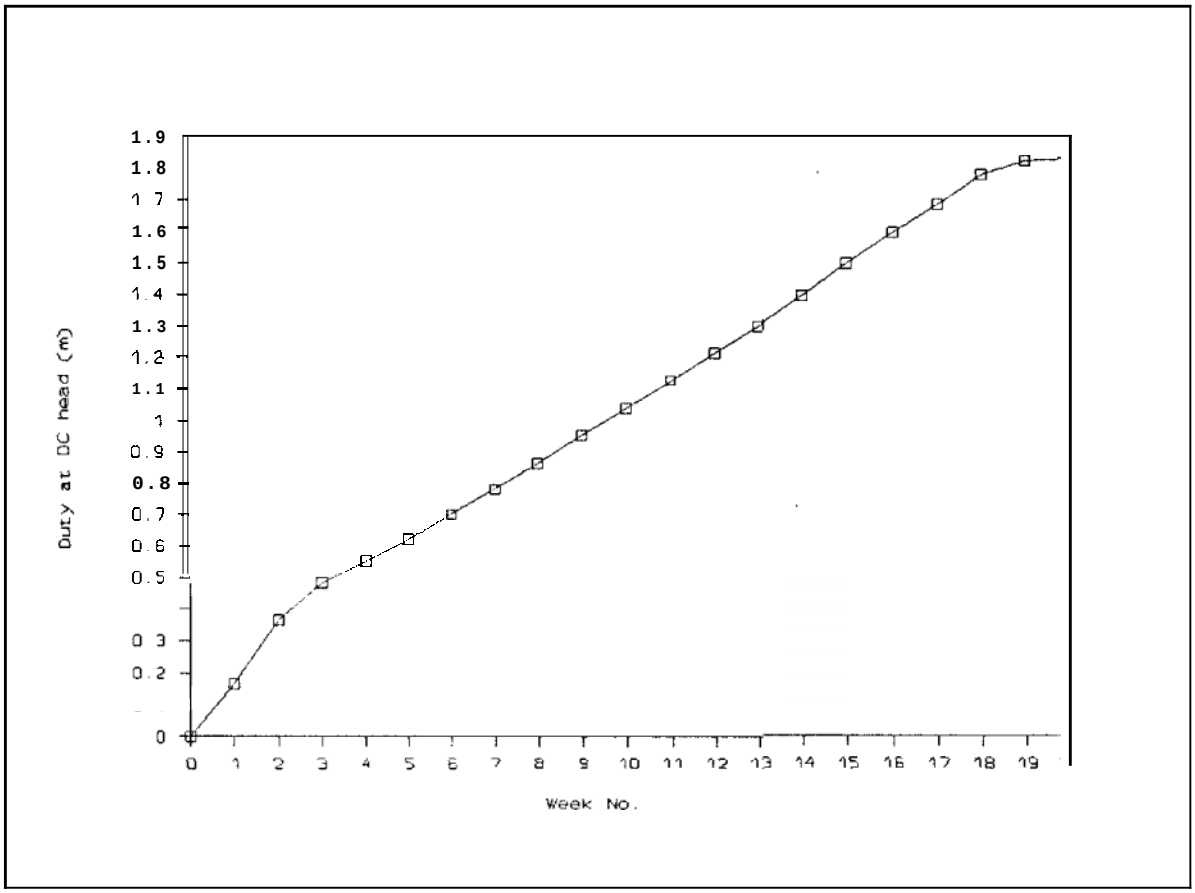


Figure 2.2 Duty at Head of MK/D7/FC2

Computer (Lotus 1-2-3) training classes for IEs and EAs were also conducted to train them in entering data to compute water requirements for Yala 1992. MEA and IIMI members of the Substudy Committee served as resource persons for these training activities.



igure 2.3 Duty **at** Head of MK *07*

The foregoing analysis shows that area irrigated for all the years analysed is less than the potential area. Also, the area irrigated seems to be decreasing. The annual duties indicate no improvements in water management. In 1983/84 the water duty was 1.6 m/ha and it has gradually increased more than 1 m/ha to 2.76 m/ha in 1989/90. This poor performance may be due to following reasons:

* Gradual deterioration of the system

* Inaccuracy of cropped area data

* Inaccuracy of flow data

* Inadequate supervision, water management, etc, by the operations staff.

2.4 Planning and Implementation **of a** Seasonal Plan

As mentioned in the Inception Report, water distribution among the MC offtakes is done with less accuracy than desired. Although the present physical infrastructure may not permit a more fine tuned operation plan until rehabilitation works are completed, it is necessary **to** develop a technically and managerially feasible operation plan using the available physical system. When rehabilitation is completed it may be possible to implement a more technically sound water scheduling plan.

Water distribution plans based on the crop water requirement calculations are needed for all four system levels -- FC, DC, BC, and MC -- to establish target discharges for each canal. Since the assumptions made during the water requirement calculation may not represent reality, it is necessary to update the targets based on current discharge analysis and arrive at a workable target discharge. Formats for preparing these plans at DC and BC levels are given Annexes ***2.3*** and **2.4.**

During Maha 91/92, no progress was made on this activity because computation of water releases at each BC head could not be completed.

Table 2.2 Present Water Scheduling System

Month	Wmk	Water depth at head of offtakes from MC (inches)
October	1	7
	2	5
	3	5
	4	5
November	5	2
	6	3
	7	3
	8	2
December	9	3
	10	3
	11	3
	12	5
January	13	5
	14	5
	15	5
	16	5
February	17	0
	18	0
		---
		66 = 5.5 feet
		= =

Water issue per day is calculated as follows:

Water issue (cusecs/day) = Area in Acres * weekly water depth at head of offtake from MC in feet/ 7 days/2 sc-ft

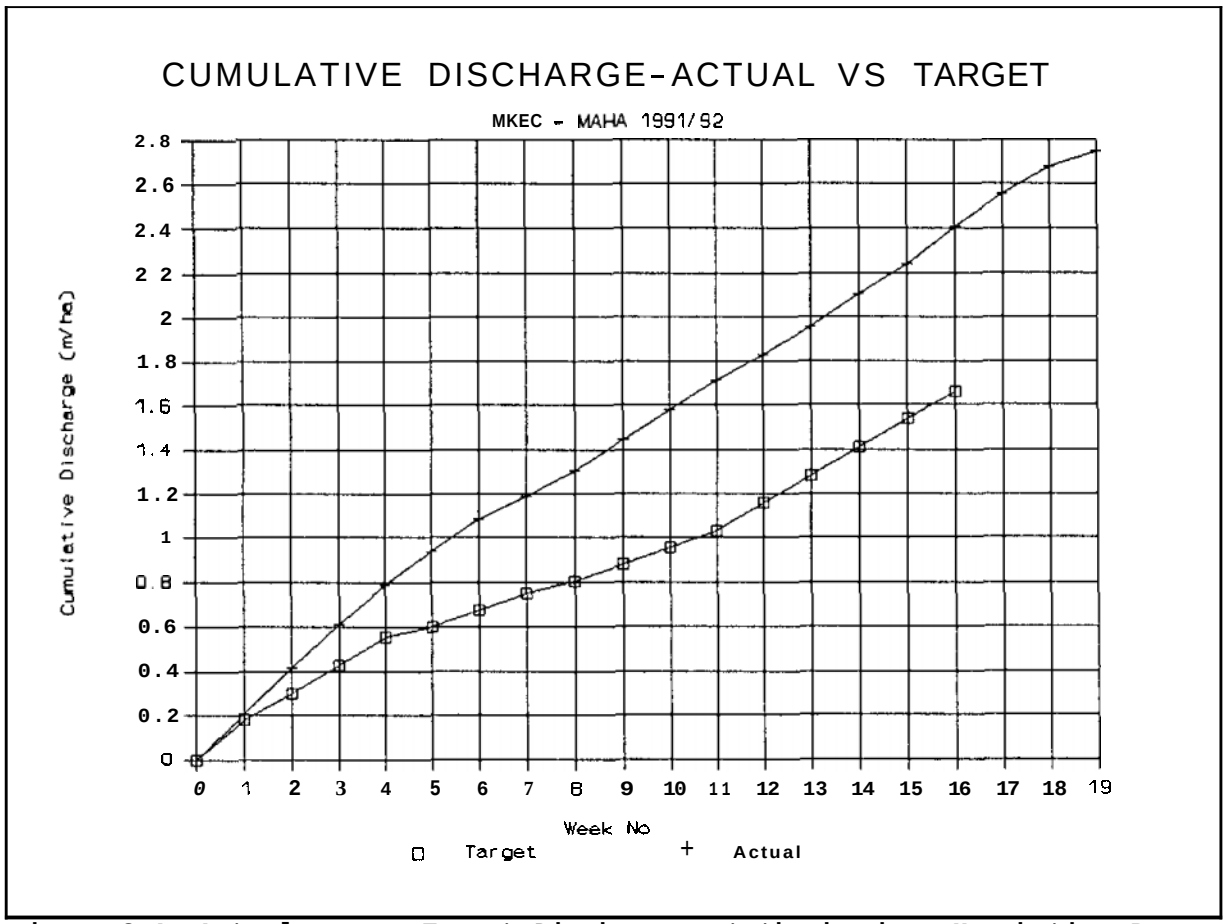
2.5 **Flow** Monitoring and Communication

This activity includes preparation of water issue targets for each BC based on existing system of water scheduling, monitoring of actual water deliveries in BCs, comparison of actual water deliveries in BCs against the targets, monitoring the flow data twice a day in RBMC in order to get better water distribution data, and improving communication among project operation staff and between Project and Block operation staff to create more effective working relationships.

The present system of water scheduling is shown in Table 2.2

2.5.1 **Progress during** Maha **91/92**

The actual water deliveries at each BC head were monitored daily. Cumulative discharges for the Maha 91/92 season were computed and compared with cumulative discharge targets for the season. Figure **2.4** shows a plot of this comparison in the Moraketiya BC (MKBC).



igure 2.4 Actual versus Target Discharges at the head of Moraketiya Branc

The Delivery Performance Ratio (DPR) is one way to compare actual and target discharges. The DPR is defined as the actual discharge divided by the target discharge. In MKBC, target and actual areas irrigated were 692 and 643 hectares respectively. Target and actual water deliveries at head of MKBC for the Maha 91/92 season were 1.66 and 2.74 m/ha respectively. This gives a Delivery Performance Ratio (DPR) of about 1.65.

In some BCs the DPR is more than 1.65. The reasons identified for high DPR values include:

* The target discharges have not yet been computed accurately because of the assumptions made.

* Areas assumed for crop planning and actual cultivation areas differ. The data is not accurate enough.

* Lack of monitoring, evaluation and feedback of water deliveries.

* Lack of supervision by the operation staff.

A system for monitoring flow data twice a day at the RBMC main outlets and transmitting the data to the Project office daily was introduced and is functioning satisfactorily. Data collection formats used include information on: Season, Date, Tract, Name of canal, Time of reading, Gauge height, and the signatures of Gate Operator and Technical Officer. From this system, it was possible to get more reliable data on daily water deliveries. Improving monitoring and supervision of daily water deliveries will allow achieving better operations and delivery performance.

Coordination between Project and Block operation staff was strengthened by holding workshops for all IEs and EAs, and by conducting awareness programs for all Technical Officers (TOs) and Gate Operators (GOs). According to the responses of the participants it is clear that they have not been given sufficient training in the past and they appreciated the new program. In fact they are very interested in their work if the management recognizes their efforts. GOs requested a change of their designation and accordingly it was agreed to change their title to Jala Palaka Sevaka. The awareness program was organized based on **a** survey of TOs and GOs concerning their responsibilities. At the program, the basic features of the project were explained to the participants and a discussion was held to stimulate recognition of the importance of their services. Also, the participants were given the opportunity to discuss their job problems. They insisted on the value of holding this type of program at least once a season.

Actions have also been taken to provide telephone facilities to Murawesihena and Binkama Blocks to improve communications.

2.6 **Main System Operation Management Process**

At the inception of this study it was recognized that the management of this project has not provided opportunities for participatory decision making. The entire main system management process needed to be streamlined and modified to facilitate the participation of the farmers in the decision process. Therefore a committee was appointed to suggest a new set of guidelines and procedures. The committee's recommendations were reported in the Yala 1991 Seasonal Report. Implementation of the recommendations commenced during Maha 91/92 and will be continued during Yala 1992 and later.

2.6.1 **Progress during Maha 91/92**

During the season, the Operation & Maintenance (O&M) Division was strengthened by appointing a Deputy Resident Project Manager - Water Management (DRPM-WM). The Flow Monitoring Unit (FMU) of the Project office was strengthened by appointing an EA and a TO, supplying flow measuring equipments, and providing a computer.

A committee consisting of senior officials of MEA and IIMI research staff has been appointed to study a proposal to form a system management structure whose apex body would be a Project Coordinating Committee (PCC) in which both MEA officers and Farmer Representatives (FRs) would participate in decision making. The proposed structure is shown in Table 2.3.

Table 2.3 Proposed Structure for Participatory System Management

Body	Membership
Project Coordinating Committee (PCC)	RPM (Chairman), DRPMs, BMs & FRs
Block Coordinating Committee (BCC)	BM (Chairman), Functional officers, Field level officers and DCO Chairmen
Distributary Channel Organization (DCO)	Elected DCO Chairman, FC FRs, Block and Unit field officers
Field Channel Group (FCG)	Farmer Representative, Unit level officers and farmers

This structure would pave the way for a more integrated approach to solving problems through discussions among the officers and the farmers. It would also strengthen coordination among MEA officials and would help the RPM. Both the farmers and officers representing the whole Project will meet at one forum for seasonal planning and decision making. They will have a better understanding of the water consumption disparities among the Blocks which will lead to decreases in these disparities.

Also, it is proposed to hold one Kanna meeting for the whole Project. This would have the following benefits:

* A cultivation calendar acceptable to the farmers in all Blocks can be determined.

* Through a meeting of farmers representing the whole system at a common forum, the farmers will get to know each other and understand some of their fellow farmers' problems and difficulties.

* The farmers of the head of the system will have a better understanding of the irrigation difficulties faced by the farmers of the tail of the system. It is hoped that the head end farmers will help to find ways and means to minimize the difficulties of the tail.

It has not been possible to convene the committees because the responsible MEA officials have been busy with other activities.

Bi-weekly meetings with main system operation staff, including GOs, to discuss operational problems and remedial measures were started and have had a positive impact on operations. Duty lists for TOs and GOs were distributed at the first meeting. Forwarding minutes of the meetings to respective officers for action was also started. Guidelines prepared for these meetings consist of following items:

* Participants: operation staff including GOs, etc
* Periodicity of meetings: dates, time, etc
* Meeting chairmen: the IE-Operation will chair the meeting; during his absence the senior EA will chair the meeting
* Reporting procedures: prepare minutes and direct them to the respective persons for necessary actions
* What is to be discussed: operation problems, how to overcome problems, problems faced by staff, etc
* What actions can be taken to improve the performances of operation activities and operation staff etc.

A representative from the flow monitoring unit **(FMU)** also attends these meetings. No representative from Headworks attends. To overcome difficulties in head sluice operations, a representative from Headworks should attend these meetings. An alternative would be to allow MEA to operate the headworks. Instructions have been given by DRPM-WM to all Blocks to start similar bi-weekly meetings for Block operation staff.

Block operation staff needs to know the water requirements to deal effectively with Block level operations. Their participation in computing water requirements, as detailed in Section **2.3** above, can lead to a marked improvement in operations.

A board displaying daily water issues at main locations is now kept in the DRPM-WM's office. **A** format was developed for this (see Annex 2.5). Similar boards will be fixed in the Block Managers' offices too. Seasonal water requirements, target discharges, important reservoir data (water availability, etc) too will be included to these boards in future. Also, instructions have been given to fix notice boards at field offices of the main system operations staff.

As per a suggestion made at a bi-weekly meeting, the main system GOs and TOs were taken on a field trip to Murawesihena Block, a water short **area** in the tail, to show them the water problems faced by farmers.

2.7 **Yala 1992 Work Plan**

During yala 1992, the following activities will be undertaken:

2.7.1 **Flow** Gauging **and** Computing **H-D** Relationships

* Calibration of gauge posts and preparation of H-D curves for the four gauge locations where gauge posts were broken.

* Periodical checking of calibration in all 13 locations. This exercise should be continued for a longer period since rehabilitation construction will change the flow profile. Periods for re-calibration will be selected considering the likely changes.

* Fixing permanent reference points (bench marks) for all 13 gauge posts ***so*** that re-calibration can be avoided after damages.

2.7.2 Computation **of** Irrigation **Water** Releases **at** Each **BC** Head

* Computation of water requirements at FC, DC and BC head gates for Yala 1992 will be completed with the participation of both Project and Block operation staff.

* Computer formats will be developed for FC, DC and BC water requirement computations. The computation of water requirements was done manually for Maha 1991/92; it is expected that computer formats using Lotus 1-2-3 will be used for Yala 1992.

* Lotus 1-2-3 training classes will be held for Block level operation staff to enter data and compute water requirements with the help of computers.

* Target discharges for the head of each BC will be fixed.

2.7.3 **Planning and** Implementation **of a Seasonal Plan**

* A seasonal plan for Yala 1992 will be prepared and implemented.

* Awareness programs to educate the operation staff on the seasonal plan will be held.

2.7.4 **Flow** Monitoring **and** Communication

* Monitoring of flow data at each BC head will be carried out.

* A day to day monitoring system by using display boards at each administrative level will be established.

* Twice daily flow monitoring for Block level as in the case of MC. A similar format can be used for this.

* A mechanism to make main system GOs and subsystem GOs daily meet to coordinate their operations will be developed. Under the proposed system it is expected to have more interaction among GOs. Possibilities will be studied to introduce adjustments (to decrease discharges depending on the adequacy of water supplies) to daily water deliveries by the BC/DC GOs themselves based on daily feedback.

* Communication in operation activities will be improved by strengthening links between officers, GOs and Farmer Representatives (FRs).

* Data collection (including checking of accuracy of data), recording, analyzing and feedback efforts will be systematized.

* Water levels in the main system will be monitored. Two automatic water level recorders will be supplied to MEA by IIMI to monitor water levels in the main system. The water level recorders will be installed to monitor water levels at the head of Moraketiya BC and in the MC close to Moraketiya BC.

2.7.5 **Main** System **Operation** Management **Process**

* The following meetings will be held: a) bi-weekly meetings of Block operation staff to discuss operation difficulties and remedial measures; b) monthly meetings with all IEs and the DRPM-WM, c) seasonal meetings with all DRPMs, BMs, IEs and the RPM. Also, kanna meetings will be held without overlapping so that the DRPM-WM or his representative can attend all of them. Once the proposed project kanna meeting is implemented, the overlapping problem will not exist.

* Regular inspection along MC by IE-Operation will be introduced in order to have close monitoring of the operation activities and give **quick** solutions to operational problems.

* A format to monitor cultivation area during land preparation will be developed. The Agriculture Division and the O & M Division should use the same format so that present differences in crop data can be minimized.

* Awareness (training) programs to all IEs, EAs, TOs & GOs will be held. These awareness programs will cover seasonal planning and improvements to MC operations.

* Display boards will be fixed in Block offices showing daily water issues from the main outlets.

* Special seminars for senior staff of the Project on main system operation management will be held.

* Proposal to form the Project Coordinating Committee and lower level bodies in which **MEA** officials and Farmer Representatives sit to solve problems and make seasonal plan will be finalized.

2.7.6 **Performance Evaluation**

* Indicators to evaluate the performance of operation activities will be developed.

Annex 2.1

FORMAT FOR COMPUTING WATER REQUIREMENTS

Turn out No: Total command area(ha) :-
Season : Wk(O&M) of 1st water issue:- SoilP'TAGE(%):- S&P(mm/d):-
Block : T.O.Application efficiency:- SoilP'TAGE(%):- S&P(mm/d):-

LAND SOAKING W.R.(1ST WEEK)	LAND PREPARATION W.R.	CROPPING	
Additional W.R./wk (mm)	Week No:	2 3 4	Crop1-Paddy Area(ha)
Topping up W.R./wk (mm)	Crop2-O.F.C Area(ha)		
Weighted S&P losses/wk (mm)	Weighted S&P losses/wk (mm)	Crop3-Sugger	Area(ha)
Evaporationlosses/wk (mm)	Evaporation losses/wk (mm)	Equivalent	Area(ha)
Total field W.R./wk (mm)	Total field W.R./wk (mm)	Group (a)	Area(ha)
Turn Out W.R./ha (m^3)	Turn out W.R./ha (m^3)	Group (b)	Area(ha)
D'ch/ha(7Day Issue) (l/s)	Dischar(l/s)	Group (c)	Area(ha)

O&M week Na :

Maha	12	3	4	5	6	7	8	9	10	11	12	13	14	IS	16	17	18	
Yala	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44

Crop week No:
Potential Evapo- Maha
transpiration (mm/day) Yala
Crop factor (Kc)
Weighted S&P losses (mm/day)
Total field W.R./wk (mm)
Turnout W.R./ha (m^3)
Discharge/ha(Day Issue) (l/s)

Land Soak. Wk I Group No.
Discharge(l/s) Wilh |:-
7 Days Duration

Land Prepa. Wk2 Group No.
Discharge(l/s) Wilh |:-
7 Days Duration
Wk3 Group No.
Discharge(l/s) Wilh |:-
7 Days Duration
wL4 Group No.
Discharge(l/s) With |:-
7 Days Duration

Crop Estab. Wk 5 Group No.
& Develop. Discharge(l/s) Wilh |:-
7 Days Duration |

Total Discharge at Turn Out(l/s) Wiul |:
7 Days Duration
Adjusted Duration (days)
Adjusted Total Disch. at TO(l/s)

TOTAL CALCULATED DUTY AT TURN OUT HEAD(m):-.

Prepared by.....Date..... Approved by ..... Date.....

Annex 2.2

SAMPLE COMPLETED FORMAT FOR COMPUTING WATER REQUIREMENTS

Turn out No: MK/D7/FC2
Total command area(ha):- 9.5
Season : Maha 92/93
Wk(O&M) of 1st water issue:- 1
Soil(RBE):- P'TAGE(%):- 80.0 S&P(mm/d):- 10.0
Block : Embilipitiya
T.O.Application efficiency:- 0.9
Soil(LHG):- P'TAGE(%):- 20.0 S&P(mm/d):- 6.0

LAND SOAKING W.R.(1ST WEEK)		LAND PREPARATION W.R.				CROPPING	
Additional W.R./wk (mm)	100.0	Week No:	2	3	4	Crop1-Paddy Area(ha)	8.5
Topping up W.R./wk (mm)	100.0					Crop2-O.F.C Area(ha)	0.9
Weighted S&P losses/wk (mm)	64.4	Weighted S&P losses (mm)	54.7	45.1	6.4	Crop3-Sugger Area(ha)	0.0
Evaporation losses/wk (mm)	35.5	Evaporation losses/wk (mm)	35.5	35.5	35.5	Equivalent Area(ha)	9.0
Total field W.R./wk (mm)	299.9	Total field W.R./wk (mm)	90.2	80.5	41.9	Group (a) Area(ha)	5.0
Turn Out W.R./ha (m^3)	3331.9	Turn out W.R./ha (m^3)	1002.3	895.0	465.7	Group (b) Area(ha)	4.4
D'ch/ha(7Day Issue) (l/s)	5.5	Discharge/ha (l/s)	1.7	1.5	0.8	Group (c) Area(ha)	0.0

O&M week No : Maha

I	2	3	4	5	6	7	8	9	10	11	12	13	14	IS	16	17	18	19	20	21	22	23	24
Crop week No:																							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	IS	16	17	18	19	20	21	22	23	24
Potential Evapo-transpiration (mm/day) Maha																							
5.6	5.6	5.6	5.6	4.3	4.3	4.3	4.3	4.3	3.9	3.9	3.9	3.9	5.4	5.4	5.4	5.4	5.9	5.9	5.9	5.9	6.3	6.3	
Crop factor (Kc)																							
0.00	0.00	0.00	0.00	0.90	0.90	0.90	1.10	1.10	1.10	1.10	1.20	1.20	1.20	1.20	0.90	0.90	0.90						
Weighted S&P losses (mm/day)																							
9.2	7.8	6.4	0.9	6.4	6.4	6.4	6.4	6.4	6 4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4						
Total field W.R./wk (mm)																							
299.9	90.2	80.5	41.9	72.4	72.4	72.4	78.5	78.5	75.0	75.0	n.8	77.8	90.6	90.6	79.2	79.2	79.2						
Turnout W.R./ha (m^3)																							
3331.9	1002.3	895.0	465.7	804.7	804.7	804.7	872.2	872.2	833.7	833.7	864.0	8M.0	1006.8	1006.8	880.3	880.3	880.3						
Discharge/ha(Day Issue) (l/s)																							
5.5	1.7	1.5	0.8	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.7	1.7	1.5	1.5	1.5						

Land Soak.	Wk 1 Group No.		a	b	c
	Discharge(l/s) With 7 Days Duration	:-	27.5	24.2	0.0
Land Prepa.	Wk 2 Group No.		a	b	c
	Discharge(l/s) With 7 Days Duration	:	8.3	7.3	0.0
	Wk 3 Group No.		a	b	c
	Discharge(l/s) With 7 Days Duration	:	7.4	6.5	0.0
	Wk 4 Group No.		a	b	c
	Discharge(l/s) With 7 Days Duration	:-	3.8	3.4	0.0

Crop Estab. & Develop.	Wk 5 Group No.	a	ab	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	be	c
	Discharge(l/s) With 7 Days Duration	:-6.7	12.5	12.5	13.1	13.6	13.2	13.0	13.2	13.4	14.6	15.6	14.6	13.7	13.7	6.4	0.0	
Total Discharge at		27.5	32.5	14.7	10.4	10.0	12.5	12.5	13.1	13.6	13.2	13.0	13.2	13.4	14.6	15.6	14.6	13.7	13.7	6.4
		0.0																		
Turn Out(l/s) With 7 Days Duration	:-																			
Adjusted Duration (days)		7.0	7.0	3.5	2.5	2.5	3.0	3.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	1.5	0.0
Adjusted Total Disch.		26.5	31.3	28.3	27.9	27.0	28.1	28.1	25.1	26.1	25.5	24.9	25.4	25.8	28.1	30.1	28.1	26.3	26.3	28.7
ERR at TO(l/s)																				

TOTALCALCULATED DUTY AT TURN OUT HEAD(m):- 1.79

Prepared by...CW Date...4.6.92 Approved by..... Dale

Annex 2.3

DC OPERATION PLAN FORMAT

Block:..... Tract:..... Season:. . . .

BC:..... DC & Area: ha Crop & O&M Week No:

FC No.	Sta. m	WI st/end hours	Type of WI C/I	Water issuing(WI) - l/s Monday	Tuesday	Wednesda	Thursday	Friday	Saturday	Sunday	Upto Pre.Wk. Duty(m)
											Wk.No.
DC Efficiency											0 Duty(m)
DC Water Requirement l/s											

Prepared By: ..... Approved By: .....

Date: Date:

Total Duty(m)

Annex 2.4

BC OPERATION PLAN FORMAT

Block: ..... Tract: ..... Season:.. ....
BC: ..... Area no Crop & O&M Week NO

DC No.	WI Sta. (m	st/end hours	Type of WI C/I	Water Issuing(WI) - l/s Monday	Tuesday	Wednesda	Thursday	Friday	Saturday	Sunday	
											Upto Pre.Wk. Duty(m)
											Wk.No.
BC Efficiency											
BC Water Requirement l/s											
											Total Duty(m)

Prepared By: ..... Approved By: .....
Date: Date:

Annex 2.5

FORMAT FOR DAILY WATER ISSUE DISPLAY

UDA WALAWE PROJECT - RBMC DAILY WATER ISSUES - ACTUAL Vs TARGETS (CUSECS)

Season:.....Month:.....Week No:...

	MC at Sluice	MC at 4.4 Km	MC at Udagama	MKBC	CWBC	MMBC	MC at K'gala	GGBC	MPBC	MC at MP	MC at Jandura	BABC	GMBC
Com.Area-ha													
Cul.Area-ha													
Monday													
Tuesday													
Wednesday													
Thrusday													
Friday													
Saturday													
Sunday													

Chapter 3

TERTIARY SYSTEM MANAGEMENT

3.1 Introduction

The objective of the Tertiary System Management research component is to develop and field test a model for turning over system management responsibilities at the tertiary level to the farmers in order to improve the performance of tertiary system operation and maintenance. This process involves institution building for joint management by the Mahaweli Economic Agency and the farmers. It is expected that at the end of the implementation of this component the farmers will take over the full management responsibility for the tertiary level. Four activities are included in this research component:

* Institution building through the formation and strengthening of farmers' organizations;
* Pre-seasonal maintenance program;
* Operational planning for the land preparation period and coordination of inputs; and
* Operational planning for the crop growth period.

As described in the Inception Report, the D7 channel on Moraketiya Branch in Embilipitiya Block was chosen as the pilot area in which to undertake this activity. Yala 1991 was the planning stage for this research component; the remaining seasons are the implementation stage. Maha 91/92 was the first season to implement pre-seasonal maintenance, operation planning for the land preparation period and coordination of inputs and operation planning for the crop growth period. Formation and strengthening of the farmers organization is a continuing process that began in Yala 1991.

3.2 Formation and Strengthening of the Farmers' Organizations

3.2.1 Work plan for Maha 91/92

The work plan for Maha included the following activities:

1. Training for farmer representatives on:

   a. Leadership qualities.
   b. Group leading.

c. Decision making, problem solving and maintaining close relations with officers.
d. Conducting meetings, writing reports and keeping records.
e. Financial control.

2. Training for officers on

a. **MEA** management system, expected objectives and effectiveness in achieving them and alternate solutions.
b. Necessity of farmers' organizations.
c. Experience of farmers' organizations in other projects.
d. Working with farmers.

3. Social and Cultural Revival: Organizing cultural events relevant to farming activities.

In addition, the process of formation and strengthening the farmers' organizations included:

4. Identifying problems, taking corrective actions and providing guidance to farmers and officers.

5. Gradually turning over tertiary system management to the farmers.

3.2.2 **Progress during Maha 91/92**

Training for Farmer Representatives The details of the training for farmer representatives were given in the Yala 1991 Seasonal Report. Financial control was not included in this training as it was felt that a separate session on financial control should be conducted later.

The initial awareness training provided to the farmers and their representatives was very effective in strengthening farmers' organizations and implementing the tertiary system management component successfully as described below. Immediate consequences of the training program included:

1. Farmers understood the importance of the farmers' organization, its objectives, its structure, and their roles and responsibilities.
2. Improved leadership qualities of the Farmer Representatives could be observed in group leading, conflict resolution, taking decisions, and working with officers.
3. Group consciousness increased among the farmers.
4. Meetings were systematically conducted and proper record keeping and documentation developed.
5. **A** high level of discipline was maintained at the farmer meetings.
6. Very good farmer-officer relations were built **up.**

Table 3.1 Results of Farmer Survey on Impact of Training

Statement	No. Agreeing	%
1. Farmers' organization is necessary for the farmers	20	100
2. Farmers' organization is necessary because:		
* To have cooperation among the farmers	18	90
* To solve farmer problems through discussions	19	95
* To have equitable and fair distribution of water:	20	100
* To maintain and protect the irrigation structures:	17	85
* To facilitate input supplies:	12	60
* To get better prices for farmer products:	6	30
* To achieve better coordination between farmers and officers:	8	40
* To assist each other when in difficulties:	8	40
* For the betterment of farmers:	13	65
3. The responsibilities of farmers toward the farmers' organization are:		
* To attend every farmer meeting:	20	100
* Active participation in discussions:	20	100
* To resolve conflicts through discussion:	19	95
* Participate in decision making:	4	20
4. The leadership qualities necessary for a Farmer Representative include:		
* Should be a good farmer:	18	90
* Can devote time and energy to work for the farmers:	16	80
* Should be active:	18	90
* Should be friendly with other farmers:	10	50
* Should be patient:	10	50
* Should make appropriate decisions:	16	80
* Can maintain good relations with officers:	4	20
5. Understanding of the MEA farmers' organization structure:		
* Field channel groups:	20	100
* Distributary channel group:	20	100
* Unit Committee:	3	15
* Block Committee:	0	0
* Project Committee:	0	0
6. Understanding of the organizational structure of the Uda Walawe Project:		
* Project level		
Resident Project Manager:	14	70
Water Management section:	16	80
Agriculture section:	16	80
Community Development section:	6	30
Land section:	13	65
Marketing section:	0	0
* Block level		
Block Manager:	20	100
Water Management section:	20	100
Agriculture section:	16	80
Community Development section:	5	25
Land section:	15	75
* Unit level		
Unit Manager:	20	100
Field Assistant:	20	100

In February, a survey was conducted to evaluate the long term impact of this training program. Twenty farmers were selected for this survey under simple random selection

procedure. These farmers were interviewed using a structured questionnaire (see Annex 3.1) on the subjects covered in the training. The results are shown in Table 3.1.

These results indicate that the farmers retain a good understanding and knowledge of the subjects where they have direct involvement, particularly areas that they brought to the training themselves. Though the farmers expressed theirsatisfaction with the training, especially on the MEA organizational structure, they have now forgotten many details of it because they have no direct contact with these persons. On the farmers' organization structure, many farmers remember only up to the distributary channel committee level as the higher levels do not yet exist.

Training for Officers Most of the planned officer training was not conducted as the Irrigation Management Division (IMD) was conducting a extensive training program for all the MEA officials during this time. However, no impact of the IMD training is visible at the field level as yet; the actions of the officers remained the same after the training.

IIMI arranged two programs for officers to facilitate the implementation of the study:

1. Study tour to Irrigation Systems Management projects in Polonnaruwa and to Kimbulwana Oya project The officers directly involved in the Phase II study were taken on a three day trip to learn about the farmers' organizations in these two projects. The officers were highly impressed with the progress of some of these farmers' organizations and the involvement of the relevant officers. A clear attitudinal change could be seen in them after the trip. Officers expressed keen interest in active involvement in building farmers' organizations. Close relations among the officers of the different sections of the project could also be seen.

2. Trainine Skills A one day program on adult training skills was conducted for the officers who are involved in the study to develop skills necessary for working with farmers. The officers who attended the training expressed satisfaction over the knowledge they gained; they expected it would be useful in working with the farmers.

Social and Cultural Revival No activity was organized under social and cultural revival. The officers did not pay much attention to this activity while the farmers were busy in implementing the activities relevant to farmers' organizations. Other activities to build group consciousness and a sense of responsibility among the farmers compensated for this lack. Most of the activities, including social work such as building a community hall, were implemented through shramadanas.

Take Over of the Tertiary System Manaeement Implementation of tertiary management activities by the farmers' organization as described below has also strengthened the farmers' organization. In particular, implementing maintenance work through group activities and distributing water fairly have generated a high level of group consciousness and a sense of

responsibility among the farmers. Farmers gradually have taken responsibility for maintaining and protecting the canal system.

Better Participation in Farmer Meetines **As** shown in Table 3.2, farmer participation in the FC group meetings remained at a high level throughout the period. The FC1 meeting scheduled to be held at the last date of the month could not be held in October due to rain. The December meeting of MKFC1 was not held as the farmers gathered earlier on the same day for mid-seasonal maintenance of the FC.

Imurovement in the Decision

With the strengthening of the farmers' organization, improvements in decision making could also be seen; the organization was able to solve some long standing problems (see Table 3.3). Some of the decisions taken were:

Table 3.2 Participation of Farmers in FC Group Meetings during Maha 1991/92

FC No.	Total No. of Farmers	Farmer Attendance									
		Sept.	%	Oct.	%	Nov.	%	Dec.	%	Jan.	%
FC1	9	9	100	-	-	8	89	9	1t09		100
FC2	9	8	89	8	89	8	89	8	89	8	89
FC3	1	7	100	6	~~	1	100	1	100	7	100
FC4	11	11	100	8	73	8	73	8	73	9	82
FC5	13	11	8511		85	1	54	11	8510		77
S1FC1	10	9	90	8	8 0	9	4	8	809		4
S1FC2	12	8	67	9	75	12	100	12	100	12	100
S1FC3	8	8	100	8	100	6	75	7	88	8	100
MKFC1	10	9	90	8	80	10	100	-	-	10	100
	89	80	90	66	74	75	84	70	79	82	92

1. Solving the stray cattle problem. The farmers' organization decided to ban cattle within the DC command area and to impose a fine of Rs 100 per animal on offenders, including damage to irrigation structures and crops. Four farmers were appointed to catch stray cattle.

2. Solving long standing boundary problems. Such boundary problems were solved in FC2, FC3, FC4 and FC5 amicably through discussions among the farmers, mostly at the FC group level.

3. Solving the seed paddy shortage by starting a seed paddy farm in 1 each FC from Yala 1992.

4. Graveling many of the FC roads to make them passable and less subject to be damaged during rain.

5. Solving tail-end irrigation problems by providing irrigation to the tail-end farmers first. .

6. Building a community hall for the DCO.

The farmers were able to solve problems, such as the stray cattle problem and boundary problems, that officers were not able to solve. Land and structure problems that were forwarded to block level officers were not solved, to the disappointment of the farmers.

These last problems have been repeatedly discussed at DCO committee meetings. However, no solutions can be found to some of them.

Involvement of the Officers More interest and involvement of the officers in the study could also be seen. Almost all the officers undertook their assigned roles in the activities without delay. The Block Manager has shown special interest in implementing the study successfully. Particularly, he has taken following actions for the strengthening the farmers' organizations:

Table 3.3 Problem Solving from September to January.

Total number of problems Brought to FC groups		Solved DC level	%	Brought by DCO	Solved	%	Not Solved	%
Irrigation	13	12	92	1	1	8		
Structure	14*	5	36	9	4	29	5	36
Land	11	5	45	6	1	9	5	45
Clearing of canals	7	7	100					
Stray cattle problem	1	1	100					
Social & welfare	3	1	33	2	1	33	1	33

* Structure problems includes graveling of FC roads. Solutions to some of other structure problems were given at the DC committee meeting by the relevant officers.

1. Provision of storage facilities for the farmers' organization to facilitate the input supply program.

2. Formation of a Women's Organization affiliated to the farmers' organization through the Community Development Officer. Arrangements have also been made to provide loan facilities for the members for self employment projects.

3. It has been planned to provide office space at the block office for the better coordination of the officers involved in the Tertiary System Management component.

4. Introduction of the farmers' organization to the Rural Development Bank to get loan facilities for input supplies and for the arrangement of marketing facilities from the next season.

The Technical Officer has been directly involved with strengthening farmer organizations at the field level. **He** provides assistance to the farmers in implementing tertiary level

activities and helps the farmers to solve their problems. His involvement may decrease as he is gradually being given additional responsibilities in other areas. The involvement of the Field Assistant and the Unit Manager has been limited to attending farmer meetings.

Strengthening of the farmers' organization and the gradual turning over of the tertiary level management responsibilities to farmers requires the full time engagement of a field officer to act as an Institutional Organizer. In the absence of such an officer in the MEA and because of the limited involvement of the Unit Manager and Field Assistant, the IIMI Research Officer's close involvement in strengthening of the farmers' organization as described in the Yala 1991 report has had to be continued. Some of the actions taken by the IIMI RO, with the assistance of the Technical Officer and the IIMI Field Assistant, were:

1. Providing on the job training and guidance to farmers in tertiary management, especially in pre-seasonal maintenance and on farm water management. This guidance was important to fill gaps in the formal training programs and to provide special training to the farmers. The irrigation laborer *too* benefitted in this exercise.

2. Maintaining the motivation and morale of the farmers. The farmers needed encouragement to undertake pre-seasonal DC repairs by themselves. Farmer interest has had to be maintained to avoid disappointment especially when officers have not been able to solve their problems as expected. Maintaining morale requires keeping close contacts with them so that they do not feel that their efforts have no meaning.

3. Assist in decision making, problem solving and conflict resolution. The farmers had to be guided at times in taking appropriate decisions, and solutions to their problems.

4. Assist in organizing group works.

5. Assist in maintaining records.

6. Coordinate between the farmers and the agencies, to facilitate the implementation of tertiary system activities and help solve farmer problems.

7. Identify problems and suggest corrective actions. Problems arose during this period such as conflicts among the FRs and attempts at political infiltration of the organization. These had to be pointed out to farmers and actions suggested.

Influence on Neighboring Channels Progress made in MKD7 has had a big influence on the neighboring distributary channels, especially in regard to solving irrigation problems and the stray cattle problem. In particular, many farmers now understand the value of farmers' organizations. The Unit Manager and the Field Assistant, who have been given the responsibility for building farmers' organizations, say it is now easy to motivate the farmers to form the organizations.

3.2.3 Findings

From the progress in the formation and strengthening of the farmers' organization in MKD7, it is clear that building of farmers' organizations should be a gradual process. It should be started from the grassroots level by strengthening the field channel groups. The process followed was:

- initial awareness meetings
- setting up field channel groups and the distributary channel organization
- gradual strengthening programs starting from awareness training.

The handing over of management responsibilities should also be a gradual process. The two processes of strengthening the farmers' organization and handing over are intertwined. We suggest the MEA should implement both of these simultaneously.

Training is of paramount importance in this process. The role played by the Training Manager in initial awareness meetings, developing a training model and providing training contributed a lot in the initial stage. However much of the training programmed under this component could not be conducted, primarily because the Training Manager was fully occupied with other activities. The IIMI RO had to partially fill the gap. Since the strengthening of the farmers' organization and the turning over of management responsibilities is a gradual process, continuous training is necessary. Training should not be limited to initial awareness classes.

These experiences mentioned above also indicate that there should be personnel to act as ***full time Institutional Organizers*** to build strong farmers' organizations. The Unrt Managers and the Field Assistants have been assigned by the MEA to organize the farmers. However, they cannot effectively play this role because 1) their work load keeps them from being fully involved, 2) they have little understanding of or training for this work, and 3) there is no incentive for them to be devoted to this activity. If the MEA expects them to be actively involved in this activity, it is imperative to train them to act as institutional organizers, to provide them the necessary time and facilities, and to judge their performance in part on the basis of their success in organizing farmers.

3.3 Pre-Seasonal Maintenance Program

3.3.1 Work Plan for Maha 91/92

The Maha work plan included the following activites:

1. Identify needed maintenance work and setting priorities

2. Preparation of estimates

3. Discuss the maintenance program at a Distributary Channel Committee Meeting and come to agreement

4. Implementation of the Program

5. Implementation of field channel pre-seasonal maintenance by the farmers' organization before the last date decided at the kanna meeting

3.3.2 **Progress during** Maha **91/92**

Identifying Maintenance **Work** and Setting Priorities The Technical Officer walked along the distributary channel on the 12th and 13th of August, together with the DCO Chairman and Secretary, to identify the pre-seasonal maintenance work needed and **set** priorities. Since the canal was recently rehabilitated there was not much maintenance work needed and all the work identified was included on the work program.

The pre-seasonal maintenance work identified was as shown in Table 3.4. The estimate prepared by the Engineering Assistant was discussed with the Farmer Representatives at the DCO Committee meeting held on 1 September. The discussion touched on how the work could be done by the farmers themselves. It was explained that the farmers' organization could raise an initial fund by undertaking this work on contract. After the discussions, the DCO Committee decided to do both jungle clearing and de-silting through shramadana with all farmers participating, and to do the cement work through a contractor, retaining 5 per cent of the cost for the farmers' organization.

Table 3 4 Pre-Seasonal Maintenance Work

Item	Quantity	Cost
De-silting	20.33 c.ft.	Rs 2556.50
Jungle Clearing	591.71 s.mts.	1863.38
Rubble Pitching	3.76 s mts	8751.36
Rubble Masonry Work	52.00 c.ft.	1763.48
Plastering	.24 s.mts.	120.88
Total		15087.60

Clearing and Desilting of the Distributary Channel At the general farmer meeting of the DCO held on 8 September, all the farmers agreed to do the jungle clearing and desilting of the distributary channel. At a special DCO Committee meeting held on 14 September, it was decided to do the desilting and weed clearing of the distributary channel through a shramadana on 27 September with the participation of all the farmers. The Farmer Representatives unanimously agreed to remit the payments for that work to the DCO fund. It was further decided to complete pre-seasonal maintenance of the field channels before 25th September and the responsibility was given to respective Farmer Representatives.

The shramadana for pre-seasonal weeding and desilting of the distributary channel was held on 27 September as decided. A total of 66 farmers (77% of the membership)

participated in this activity. They started the work at **7.30** am and completed it within two hours. It could be seen that the group spirit of the farmers was high.

The Technical Officer played a key role in organizing the activity, motivating the farmers and providing technical assistance whenever necessary.

Repairs to Structures The DCO Committee meeting held on 1 November discussed structure repair work on the distributary channel. With advice from the IIMI Research Officer and the Technical Officer, it was decided unanimously to implement this work by the DCO itself to raise funds. The Technical Officer agreed to provide technical guidance. Funds required to purchase materials would come from the payments for pre-seasonal desilting and weeding done by the farmers' organization. The DCO Committee further decided to do this work after the land preparation period when the canal would be closed for rotational water issues.

However, the work was delayed till 21 December for two reasons. First, they had to wait till the payments were made by MEA for pre-seasonal de-silting and weeding to buy necessary material. There was a considerable delay in making these payments. Finally, the DCO took an informal loan. Second, there was a delay in preparing and signing the contract.

Before the repair work was begun, an Engineering Assistant met the office bearers of the DCO on 12 December at the request of the Technical Officer to explain the quantity of the work and the materials requirements.

The work was organized by the Technical Officer, the Secretary of the DCO, and the Chairman of the DCO, by assigning responsibilities to the Farmer Representatives and skilled farmers. The work was done under the close supervision and guidance of the Technical Officer. Only one mason was hired for a repair that needed his skills. All the rest of the work was done by the farmers themselves. Machinery and equipment, such as water pumps, two-wheel tractors etc, were provided by the farmers. The Technical Officer worked alongside the farmers to encourage them. Also, the Technical Officer's guidance in the supply of material at the minimum requirements helped the farmers to reduce the cost.

The repair work was done under the close supervision of the Technical Officer and found to be of good quality according to the technical staff who came to inspect the work to approve the payments. In addition, the farmers had done more work (rubble pitching) than the contract called for as they felt it was necessary for long term sustainability. Payments were also made for this additional work as an incentive for the farmers' organization. Profits made by the farmers' organization is given in Table 3.5.

Clearing of Field Channels The kanna meeting decided that pre-seasonal maintenance of the field channels was to be completed by 25 September. The planning of this work in each field channel was done at the respective field channel group meetings. The progress of field channel pre-seasonal maintenance is given in Table 3.6 below.

Table 3.5 Profits from Pre-Seasonal Maintenance Work

Total payment received*		Rs. 19944.09
Expenses		
Cement	Rs. 1312.50	
Metal	1375.00	
Sand	300.00	
Labour	400.00	
Refreshment	113.25	
	Rs. 3500.75	(Rs. 3500.75)
Profit		Rs. 16443.34

* The total payment includes payment for pre-seasonal desilting and clearing of weeds.

Table 3.6 Field Channel Pre-Seasonal Maintenance

Field Channel	Date Completed	% Completed on Time	Method
FC1	25/09/91	100	Individual
FC2	15/09/91	100	Shramadana
FC3	01/10/91	87	Individual
FC4	19/09/91	100	Individual
FC5	28/09/91	85	Individual
S1FC1	25/09/91	100	Individual
S1FC2	25/09/91	100	Individual
S1FC3	21/09/91	100	Individual
MKFC1	20/09/91	100	Individual

Six out of the eight field channels completed their field channel clearing by the date decided by the kanna meeting. Three farmers of FC3 and two farmers of FC5 failed to clear their quota by 25 September. However, they completed the work before water issues started.

Mid Seasonal Maintenance The farmers' organization did mid seasonal maintenance of the field channels and the distributary channel on their own initiative. The farmers started mid-seasonal maintenance of their field channels after the formation of the farmers' organizations during the preceding season. It seems that this practice is being now institutionalized. Mid-seasonal clearing is a new phenomenon as there was no such practice among the farmers prior to this program.

The Distributary Channel Committee meeting on 1 December decided to do mid seasonal maintenance of both the field channels and the distributary channel together. The target dates were set. However, in some field channels mid-seasonal clearing had already begun. The target dates decided for mid-seasonal clearing were as shown in Table 3.7.

The distributary channel mid-seasonal maintenance was done by shramadana as decided by the DCO Committee with the participation of **73** farmers (85% of the membership). The Technical Officer together with the DCO office bearers organized the shramadana. It was conducted in a festive mood with national flags hoisted and with the provision of refreshment by the farmers. Afterwards a general gathering was held. The several project and block level officers who attended the occasion were highly impressed by the farmers' enthusiasm and high level of group consciousness. This was a highly successful group activity.

Table 3.8 shows the progress of mid-seasonal maintenance on the field channels. In the field channels where the mid-seasonal clearing was not completed by the target dates, the respective farmers were engaged in other income generating activities, mainly gem mining. However, they too cleared their portions later. Where the work was done in a shramadana

the total field channel was cleared whether all the farmers attended or not.

Usually the quality of the work was judged by all when maintenance work is done by shramadana. The quality of the FC maintenance done by individuals is evaluated at the FC group meetings. There were instances where the farmers whose work was not satisfactory were asked to do it again.

Table 3.7 Target Dates for Mid-Seasonal Clearing

Channel	Target Date
D-Channel	14/12/91
FC1	07/12/91
FC2	14/12/91
FC3	10/12/91
FC4	10/12/91
FC5	05/12/91
S1FC1	07/12/91
S1FC2	14/12/91
S1FC3	14/12/91

Table 3.8 Field Channel Mid-Seasonal Maintenance

Field Channel	Last Date	Date Completed	% Completed on Last Date	Method
FC1	07/12/91	07/12/91	100	Shramadana
FC2	14/12/91	08/12/91	100	Shramadana
FC3	10/12/91	09/12/91	100	Individual
FC4	10/12/91	--	82	Individual
FC5	05/12/91	07/01/92	93	Individual
S1FC1	07/12/91	07/12/91	100	Shramadana
S1FC2	14/12/91	--	92	Individual
S1FC3	14/12/91	06/12/91	100	Individual
MKFC1	20/12/91	14/12/91	100	Shramadana

3.3.3 Conclusions

In Yala 1991 none of the farmers had even started the pre-seasonal maintenance of the field channels by the scheduled completion date and only twenty per cent had completed pre-seasonal maintenance by the date of first water issues. The progress made in the pre-seasonal maintenance after the formation of the farmers' organization is remarkable. The farmers undertook mid-seasonal maintenance as well on their own initiative.

Farmers did pre-seasonal structure repairs using their own skills. The experience showed that it was necessary to build their confidence and provide encouragement and close guidance.

Farmers appear to be taking responsibility for the maintenance of their channels. The process followed to hand over maintenance responsibilities to the farmers is a successful one. However, it is extremely important to avoid delays in making payments to farmers for maintenance work. Such delays result in disappointments and discouragement and may prevent work being done since the funds are often needed for additional work.

3.4 Operational Planning for the Land Preparation Period and Coordination of Inputs

3.4.1 Operational Planning

An operation plan was discussed with the DCO office bearers but it was decided not to use the new plan for the following reasons:

* For various reasons, training for the farmers could not be arranged prior to the start of water issues.
* According to a survey, most of the farmers desired to continue the methods they had been practicing.
* Construction of the regulator in the Moraketiya branch canal near MKD7 was not completed.

Such a change should not be thrust upon the farmers. Any change should come from the farmers themselves, after providing the necessary training.

Though it was decided to apply the existing practices, the weaknesses in the present practices were identified and the following activities were planned for better control of water distribution and for preparing a better schedule:

* Building better communication between the farmers and the agency.
* Close field level monitoring.
* Identifying problems during land preparation.

3.4.2 **Progress of Land** Preparation

Irrigation Practices Though water issues started on October 1 as decided at the kanna meeting, the water release to the distributary channel was only 37 cm while the required quantity was 50 cm. A lesser amount was received because the required regulator was not yet built in the branch canal near MKD7. On the 2nd of October, a temporary wooden cross regulator was built in the branch canal but still the water flow was only 41 cm. According to the Technical Officer the expected discharge could not be maintained in the distributary channel as the branch canal flow was also low. On 3rd October, the branch canal flow was increased but still the required water level of the distributary channel could not be maintained. By raising the height of the regulator again it was possible to increase the water supplies to the distributary channel to the required level with an increase of the branch canal flow.

With the agreement of the Block Irrigation Engineer, the work schedule of the Irrigation Laborer was changed to spare extra time for him to have better coordination with the farmers. He was expected to spend time in MKD7 meeting the Farmer Representatives before visiting the block office with flow data. He was also expected to coordinate with the Technical Officer if there was any problem. Later he was given the responsibility of adjusting field channel gates depending on field conditions.

Though the water flow was increased to the distributary channel, there was acute dry weather and land soaking was very slow. In some field channels the water flow vanished half way down during the first few days. Farmers had to wait to start their first ploughing till their allotments were fully irrigated which took several days. To overcome these

problems more water had to be released to the distributary channel. The figures are given in Table **3.9.**

Due to the dry weather, land preparation was slow from the very beginning. The problem was aggravated because the farmers could not plan the supply of other inputs, such as farm power, in time. The irrigation distribution practice during land preparation was simultaneous irrigation on alternate days. However, at a special meeting of the **FC4** farmer group, the farmers proposed a 2 day continuous flow as **a** solution to the irrigation difficulties during land soaking. However, they could not test this option as the response of the technical staff was not encouraging.

Table 3.9 The time taken for land soaking from the 1st date of water issue till the allotments received full irrigation.

No. of days.	No. of allotments.	Cumulative no.
3	01	01
4	02	03
5	04	07
6	06	13
7	08	21
8	10	31
9	09	40
10	17	57
11	15	72
12	03	75
13	03	78
14	01	79*

* There are altogether 79 farmers in this distributary channel. During the Yala 1991 only 76 allotments were taken for our data collections as the remaining

We identified the following weaknesses in the then current practices:

1. Since the farmers were practicing simultaneous irrigation, the canals had to be overloaded to meet the requirements.

2. Simultaneous irrigation created irrigation difficulties for tail end farmers. Tail end farmers had to wait till head end farmers received their full supply. In the past, tail-end farmers closed head end pipes at night to irrigate, but this practice had been totally stopped with the formation of the farmers' organization.

3. It was observed that a lot of water was wasted as there was no proper control at the field level.

4. Good coordination could not be maintained between the Farmer Representatives and the Irrigation Laborer as Farmer Representatives had no role to play in simultaneous irrigation.

The farmers' views changed gradually as they underwent severe irrigation difficulties. They also began to realize that the canal system was not adapted to the practice. After two weeks, when the acute problems eased, we tried to gradually change farmer practices, and monitored the change closely. It was observed that the water flow could be reduced, depending on farming activities after the first ploughing was over. Initially some reductions were made with farmer consent. First we closely monitored the water distribution. In the process, farmers themselves asked to reduce the supply to them. When the farmers were

receptive to such reductions, continuous irrigation was changed with farmer consent to a demand based distribution. The objectives were:

1. To change the existing simultaneous irrigation practice of the farmers through experience.
2. To motivate the farmers to share.
3. To solve farmers' irrigation difficulties.
4. To stop overloading the field channels and to reduce irrigation losses.
5. To provide training to the Irrigation Laborer in better water distribution and field level monitoring.
6. To build a close relation and better communication between the Irrigation Laborer and the farmers.

The basic principles followed were:

* Only the needy farmers were provided irrigation.
* Field channel level drainage losses were minimized.

In applying these basic principles,

* Intensive field level monitoring was maintained. Monitoring started from the drainage canal and then from each allotment. Monitoring was done in the morning and in the afternoon and accordingly two adjustments were made in the flow on the field channels and the distributary channel. The Irrigation Laborer, assisted by the IIMI Field Assistant and guided by the IIMI Research Officer, did the monitoring and subsequent operations. Technical guidance was provided by the Technical Officer to the Irrigation Laborer; he was given all necessary operational authority.
* Effective communication and close relations between the Farmer Representatives and the Irrigation Laborer were maintained.
* The confidence in the IIMI Research Officer felt by the farmers and the Irrigation Laborer facilitated this practice.

The following results were achieved:

* The daily discharge under demand based distribution was approximately 50 per cent of of the daily discharge into the DC in the preceding three weeks. (Annex 3.2).
* Simultaneous irrigation was changed to demand based sharing. Further, the farmers themselves asked to reduce the water supplies to them when sufficient irrigation was received. They even asked to reduce the supplies to the field channels and the distributary channel. A new operations plan can be applied easily with these changes.
* None of the farmers had any irrigation difficulties during this period.
* Surface drainage losses were minimized; drainage losses from the field channels were totally stopped.

* Very good relations were built up between the Irrigation Laborer and the farmers. Earlier the Irrigation Laborer was criticized severely by the farmers.
* The Irrigation Laborer received on-the-job training and developed a sense of responsibility. Monitoring of demand based water distribution was stopped by the end of the month but the Irrigation Laborer continued to practice it.

Land Preparation As shown in Table 3.10, by the last date specified for land preparation in the kanna meeting - 31st October - 100 per cent of the first and second ploughing was done and 83 per cent of puddling was finished.

The following norms for each land preparation activity were determined in consultation with the farmers.

Table 3.10 Progress In Land Preparation.

Week	1st ploughing		2nd ploughing		Puddling		Sowing	
	No of allot.	%	No of allot.	%	No.of allot.	%	No.of allot.	%
1 01 October 07 October	07	8.9	-	-	-	-	-	-
2. 08 October 14 October	67	84.8	02	2.1	-			
3 15 October 21 October	79	100	52	65%	03	18	-	
4 22 October 28 October			79	10	45	17	30	17
5 28 October 04 November					74	536	69	87.3
6. 05 November 11 November					79	100	79	100

Land soaking	= 03 days
First ploughing	= 02 days
From 1st ploughing to 2nd ploughing (included clearing bunds)	= 06 days
2nd ploughing	= 02 days
2nd ploughing to puddling (included plastering)	= 06 days
Puddling	= 01 days
Sowing	= 01 day

The actual time taken in Maha 91/92 is shown in Table 3.10.

Table 3.10 clearly shows that many farmers took more time than they should have taken according to their own standards. The delays were unusually high. For example, during the preceding Yala, 65 farmers (85 per cent) were able to complete first ploughing in two days, whereas during Maha only 29 (37 percent) were able to do so. If these delays can be reduced, water can be saved.

Table 3.11 shows the reasons for the delays. There are several comments to be made in interpreting this table:

* Personal problems that caused delays included construction of a new house, the death of a relative, and a dispute with relatives.

* Some of the reported farm power problems were linked to irrigation problems. In particular, some farmers could not get tractors when neededbecause irrigation problems prevented them from using the tractors when scheduled.

* The leased-in farmers clearly stated that they had no commitment to complete work on the schedule given above.

Table 3.11 Reasons for Delay in Land Preparation

Reasons for delays	Land Soaking		First Plough		1st-2nd Plough		Second Plough		2nd Pl.- Puddle		Puddle		Sowing	
	No.	%	No.	%	No	%	No.	%	No.	%	No.	%	No	%
Irrigation difficult.	48	61	35		44	03	04	15	19					
Irrigat. & farm power problems			09		12									
Farm power problem	12	15	05		06	05	06	04	05					
Labor Shortage			19		24					2	8	4	8	
Labor. & farm power			08		10									
Financial Difficult.										02	03			
Personal problems	01	01	01		01	02	03	01	01	03	04	01	01	
Leased out	01	01					02	03	01	01				
Not considered delay	14	18			04	05				11	14			
Completed in time	03	04	29		37	24	30	57	72	07	09	78	99	79	100
Total	79	100	79		100	79	100	79	100	79	100	79	100	79	100

Almost all of the delays caused by irrigation difficulties occurred before the demand based distribution system was introduced from 21st October; after demand based distribution started there was no delay due solely to irrigation difficulties. Thus irrigation difficulties alone did not affect puddling or later operations.

3.4.3 Conclusions and Recommendations

In Maha 91/92, as in Yala 1991, the main reason for delays in land preparation was not receiving sufficient irrigation water in time. Difficulties in Maha were aggravated by the acute dry weather. Initial land soaking had been considerably delayed as the farmers did not receive sufficient irrigation water for up to fourteen days. This in turn worsened other difficulties, particularly the farm power problem because the farmers could not coordinate farm power with land soaking. Particular attention should be paid to the land soaking period with close monitoring and control of water distribution.

Despite these difficulties, 80 per cent of the farmers completed land preparations by the last date, The farmers who took six weeks to complete land preparations did so in part because of personal problems.

The farmer cooperation received and the results achieved in the demand based water distribution show that any change introduced should be gradual and with farmer consent and as much as possible through experiential learning. A new operational plan imposed at the beginning of the season against the wishes of the farmers likely would have failed, in part because of the initial irrigation difficulties. It appears that these difficulties explain the failure of the MMP operation plan in Yala 1991.

Water savings during the demand based water supply shows that water can be saved with better planning, monitoring and control. Drains should be used for monitoring. Further, farmers did not overuse water as is often alleged. The problems were due to lack of a proper control system.

Finally this experience showed that Irrigation Laborers, the lowest persons in the technical staff hierarchy, can play a vital role if due recognition, training and responsibilities are given.

3.4.4 Coordination of Inputs

In Yala 1991 the main problems identified during the land preparation period were irrigation and labor problems. Since there was no significant input problems, it was proposed that fertilizer be provided through the farmers' organization as an incentive for the farmers because: 1) they could have a ready supply, 2) it could be supplied at a low price, and 3) there would be no transport cost.

In talking with the Block Manager and the Marketing Officer, (MO) we learned that there were two ways to supply fertilizer through the farmers' organization: 1) from the allocation made for fertilizer from agriculture credit and, 2) by the farmers establishing a fund. No initial fund is required to provide fertilizer to credit holders. At the recommendation of MEA, arrangements could be made by the bank to release the allocation for fertilizer to the farmers' organization. There is also a possibility of supplying fertilizer to other farmers with these allocations.

These two methods were discussed with the DCO office bearers. At the Distributary Channel Committee meeting held on 1 September it was decided to provide fertilizer through both these methods. It was further decided to get the consensus of the farmers at the general meeting.

At the general farmer meeting of the DCO held on September 8, these plans were explained by the DCO leader and the MO. The credit holders agreed to get the fertilizer

through the farmers' organization because: 1) supply by the cooperatives was not reliable, 2) prices marked by the cooperatives were higher than the market price and, 3) they could save on transport cost. Other farmers agreed to join this program by making advance payments as they also can save transport costs.

However, supplying fertilizer through the DCO could not be implemented till the end of the season for the following reasons:

* As the first step, preliminary arrangements were made to get a dealership from the Fertilizer Corporation through MEA. To do so, a recommendation to the Fertilizer Corporation has to come from the Project Marketing Section. The Project Marketing Section did not pay attention to the request.

* The farmers' organization had no funds to venture into this activity quickly. Therefore they had to depend on the allocations made by the bank for credit holders.

* The farmers' organization had difficulty in finding storage facilities for the fertilizer.

Towards the end of the season, the Block Manager and MO were able to get the dealership with some direct personnel contacts rather than through the Project Marketing Section. In addition, the Block Manager introduced the farmers' organization to the Rural Development Bank who agreed to provide credit facilities for the farmers' organization for fertilizer. The farmers' organization accordingly applied for credit facilities and expected to supply fertilizer from the next season. In discussions, the Rural Development Bank agreed to make marketing arrangements for paddy together with the farmers' organization. In addition, the Block Manager provided storage facilities to the farmers' organization; this was a big incentive for them.

As a trial the farmers' organization began to supply fertilizer on a small scale for banana cultivation and the Block office started to provide seed material for OFC cultivation through the farmers' organization.

3.4.5 Conclusion and Recommendations

Since inputs are not a major problem, this activity is limited to supply of fertilizer and seed materials by the farmers' organization as an incentive for the farmers.

Much effort was made by the Block Manager in this activity; he provided necessary assistance and services. However, it appears that attitudinal change is necessary in some of the officers.

3.5 Operational Planning **for** the Crop Growth Period

3.5.1 **Work** Plan **for** Maha **91/92**

The work plan for Maha 91/92 included the following activities:

1. Discuss the distribution plan with the field channel groups.

2. Preparation of water distribution plan.

3. Discussion with the farmers' organization and coming to agreement.

3.5.2 Progress during Maha

Continuous flow given during land preparation was continued until the end of November when the project office had completed calculation of water requirements for all distributaries and the block office had prepared a revised rotational distribution system for the branch canal. Therefore, the operational plan was implemented one month late.

The previous practice among the farmers during the crop growth period was a:; follows:

* Five days water supply was given to the distributary channel during the crop growth period; the distributary channel was closed on Saturday and Sunday.
* Farmers practiced an internal rotation among the field channels; during the first 2.5 days the FC 1, FC 2, FC **4,** and FC 5 were provided water; during the next 2.5 days FC 3, Sub 1/FC 1, Sub 1/FC 2, and Sub 1/FC 3 were provided water.
* Within the field channels the farmers organized simultaneous sharing among all the allotments.

During November 1991, the Technical Officer explained the planned rotational supply to the farmers. He explained very convincingly the need for a rotational irrigation supply in order to provide equal and adequate supply to each farmer. He assured the farmers that there will be no irrigation difficulty for the farmers during this practice.

Three candidate schedules were prepared by the IIMI RO together with the Block IE. **A** special DCO Commitee meeting was held on 27 November and the Farmer Representatives agreed to use the third schedule with a five day water issue. This schedule appeared most appropriate since the farmers were told that a five day water issue would be given. **It** was agreed to apply the new operation plan from 2 December. The Farmer Representatives expressed their full cooperation to applying this rotation plan. The Technical Officer said that he would be fully involved in applying this plan so that the farmers would not face any difficulty.

The Farmer Representatives of five field channels called immediate FC group meetings before 2 December to explain the new schedule to the farmers. The Farmer Representatives were highly convinced of the need for this rotational operation and were able to get the full farmer agreement to it.

The new operation plan was applied from 2 December as decided and very close monitoring was maintained from the beginning to avoid negative reactions from the farmers. In the first two weeks the Technical Officer spent his full time in the field. the Irrigation Laborer spent most of his time in MKD7 during the whole period. The Technical Officer's presence was necessary to provide advice and give the farmers confidence in the rotational practice. Further, very close coordination was maintained between the Farmer Representatives and the Irrigation Laborer. The Technical Officer maintained direct contact with the block office throughout this operation in order to quickly solve difficulties.

Prompt remedial actions were taken, if possible, whenever there was an irrigation difficulty. Difficulties occurred mainly due to frequent fluctuations in the BC flow. Many times such problems were solved by adjustments within the DC with farmer consent.

The Farmer Representatives provided their fullest cooperation and gradually took the full responsibility for internal operations within the DC. The experience the farmers received during the demand based distribution also helped to make it possible to apply the operation plan without much difficulty.

3.5.3 Problems Faced

There were some difficulties at the beginning as the farmers were not knowledgeable about the proposed new practice. The main problem was that they did not know how to plan activities, such as applying agro-chemicals, to match the rotational supply of water.

At the beginning the Technical Officer was intensely involved in managing the distribution. He had to be guided to withdraw gradually. His close involvement was necessary at the beginning to demonstrate how to manage the rotational supply. Later it was necessary to transfer the responsibility to the Farmer Representatives.

It was difficult to maintain the distributary channel flow as required because of fluctuations and lack of control of the flow in the branch channel. According to the Technical Officer, there should be at least 49 cm of water in the BC to maintain the required discharge into the distributary channel. Without the planned regulator in the BC, BC flow varied and was less than the required depth much of the time. The Technical Officer had to keep constant contacts with the Block office and sometimes directly with the Project office to keep the water level close to the required height. Drops in the water flow were regular occurrences. Also, sometimes there was a delay in opening the BC after the rotational closure which further aggravated the problems.

3.5.4 **Results** Achieved

1. The quantity used by the farmers was less than proposed by the operation plan which was based on MMP recommendations (Annex **3.2).** An overall analysis of water management was done by computing the Delivery Performance Ratio (DPR) and Relative Water Supply (RWS) for the land preparation period (LP) and for the crop growth period (CGP) and for whole season and compared with similar set of values for Yala 1991. **A** big improvement could be seen in Maha 1991/1992. **(See** also Annex **3.3).**

2. **A** survey of 30 randomly sampled farmers was conducted to get their responses to the new operation plan. The results showed:

* **All** the farmers said that they used simultaneous irrigation earlier.

* During simultaneous irrigation:
  * **12** farmers **(40** per cent) received a continuous supply
  * 16 farmers **(53** per cent) received water for a limited period
  * 2 farmers (7 per cent) irrigated with drainage water.

* Under simultaneous irrigation, 22 farmers **(73** per cent) had irrigation difficulties. Of them:
  * 8 **(27** per cent) had difficulty in achieving timely irrigation
  * 10 **(33** per cent) had water shortages
  * 2 **(7** per cent) had not received water at all and had irrigated with drainage water
  * 2 **(7** per cent) had structure problems.

* The reasons given by the farmers for these difficulties were:
  * In adequate supply and water thefts = 11 farmers **(37** per cent)
  * Water thefts and poor canal maintenance = ***6*** farmers (20 per cent)
  * Water thefts = 2 farmers **(7** per cent)
  * In adequate supply and poor canal maintenance = 1 farmer **(3** per cent)
* Water thefts, no sharing, and poor canal maintenance = 2 farmers **(7** per cent)

* Farmers solved these problems by:
  * Night irrigation and illegal closure of the head end pipes = **13** farmers **(43** per cent) including 8 farmers who also mentioned solutions through the officers and 7 farmers who also mentioned solution by force
  * Through the officers = **4** farmers **(13** per cent)
  * By force = 1 farmer **(3** per cent)
  * Not solved = **4** farmers **(13** per cent)

* The farmer response to the new rotational operation plan was:
  * All farmers were satisfied with the new operation plan
  * All farmers said they did not have irrigation problems during the season
  * All farmers said that this system was successful.

It is noteworthy that no irrigation problem was brought to any of the FC groups from December till the cultivation was over.

3.5.5 Conclusions

According to the survey of 30 farmers conducted at the end of the season, the 'law of the jungle' reigned in the distribution of water prior to Maha 91/92. The operations plan introduced in Maha 199111992 improved the situation markedly. The process followed to achieve these results can be applied elsewhere within Uda Walawe.

3.6 **Work Plan for Yala 1992**

The following is the work plan to be implemented in the Yala 1992. However, it may not be possible to start the Yala cultivation season due to the serious drought weather conditions prevailing at the time this report was being written. The drought has resulted in a drastic lowering of the water level in the Uda Walawe reservoir. Therefore, the work plan may have to be altered depending on changes in the cultivation plans made by MEA.

3.6.1 Strengthening **of** Farmers Organization

1. Setting up sub-committees headed by the Farmer Representatives with assigned responsibilities for carrying out each activity. (Responsibility: IIMI RO, Technical officer, Unit Manager, officers of the DCO)
2. **A** study tour for farmer representatives to Kimbulwana Oya. (Responsibility: Block Manager, Training Manager)
3. Training for Farmer Representatives on financial control. (Responsibility: Training Manager)
4. **Self** evaluation of the progress of the farmers' organization. (Responsibility: DCO, IIMI)
5. Building a community hall for the farmers' organization. (Responsibility: DCO, Technical officer)
6. Monitoring and Evaluating. (Responsibility: IIMI)

3.6.2 Pre-seasonal Maintenance

1. Identification and prioritization of maintenance work. (Responsibility: DCO officers, Technical Officer)
2. Preparation of estimates. (Responsibility: Irrigation Engineer, Engineering Assistant)
3. Discussion with the farmers' organization and coming to agreement. (Responsibility: Irrigation Engineer, Engineering Assistant, Technical Officer, Farmer Representatives)
4. Implementation by the farmers' organization. (Responsibility: DCO)
5. Organizing pre-seasonal maintenance of the field channels. (Responsibility: Farmers' organizations)
6. Organizing and implementation of mid-seasonal maintenance (if desired by the farmers' organization). (Responsibility: DCO)
7. Monitoring and evaluating. (Responsibility: IIMI)

3.6.3 Input Coordination

1. Training farmers for seasonal planning. (Responsibility: Training Manager, Block Manager)
2. Identifying fertilizer requirements. (Responsibility: DCO, Marketing Manager, Unit Manager, Field Assistant)
3. Obtaining credit facilities from the bank. (Responsibility: Block Manager, Marketing Officer, DCO)
4. Making arrangements to provide fertilizer, seed, and agro-chemicals through the DCO. (Responsibility: DCO, Marketing Officer)
5. Making marketing arrangements for paddy together with the development bank. (Responsibility: Block Manager, Marketing Manager, DCO)
6. Monitoring and evaluation: (Responsibility: IIMI)

3.6.4 Operational Planning for the Land Preparation Period

1. Prepare the operation plan according to the cultivation plan. (Responsibility: IIMI, Engineering Assistant, Technical Officer, Farmer Representatives)
2. Prepare the water distribution plan. (Responsibility: IIMI, Irrigation Engineer, Engineering Assistant, Technical officer)
3. Discussion with the farmers' organization and coming into agreement. (Responsibility: IIMI, Irrigation Engineer, Engineering Assistant, Technical Officer, Unit Manager, Field Assistant, Farmer Representatives)
4. Implementation of the plan. (Responsibility: DCO, Technical officer, Unit Manager, Field Assistant)
5. Monitoring and Evaluation. (Responsibility: IIMI)

3.6.5. Operation Planning **for** the Crop Growth Period

1. Development of an appropriate operations plan with the experience gained during Maha 1991/92. (Responsibility: Irrigation Eengineer, IIMI)
2. Discussion with the farmers and coming to agreement. (Responsibility: Irrigation Engineer, Engineering Assistant, Technical Officer, Unit Manager, Field Assistant, Farmer Representatives, IIMI)
3. Implementation of the operations plan. (Responsibility: Farmer Representatives, Technical Officer, Field Assistant, IIMI)
4. Monitoring and evaluation. (Responsibility: IIMI)

3.6.6 Extension **of** Activities to **D6** and D8

It has been decided to replicate the study conducted in MKD7 to the two neighboring canals, MKD6 and MKD8. MKD6 is a small distributary channel with a command area of *30* hectares and *30* allotments under three field channels. Only two field channels exist; the third is to be constructed under the rehabilitation program. Rehabilitation in one of the other two field channels is completed.

MKD8 comprises 9 field channels with a command area of 92.5 is in dilapidated condition. Rehabilitation construction of some field channels has already been started by the farmers. It seemed that there was a wide disparity in the availability of water between the head and tail ends. Some farmers receive water directly from the distributary channel.

These channels were selected for the following reasons:

1. The farmers of these two canals are aware and very much interested of the progress made in the MKD7 under the present study, and therefore replicating is likely to be easier than it would be elsewhere.

2. The progress made in the three canals may make a big impact on the institution building program of the Engineering Assistant.

3. As described under the component of Institution Building through Rehabilitation the two components of tertiary system management and the rehabilitation process can be combined together.

In replicating the MKD7 experience to MKD6 and MKD8 the same process of institution building and handing over tertiary responsibilities will be followed, but different strategies may have to be applied depending on the social and physical conditions. In addition, this replication will allow a comparison of impact under different physical canal conditions: rehabilitated canals in MKD7 against a normal conditions in MKD6 and MKD8.

The following activities will be undertaken:

1. Strengthening the farmers' organizations.
   - Conducting a house hold survey in MKD6 and MKD8.
   - Awareness training for the farmers and re-organizing the field channel groups.
   - Awareness training for the Farmer Representatives.

2. Preseasonal maintenance.
   - Field channel maintenance by the farmers as a group activity.
   - Distributary channel maintenance by the farmers as a group activity.

3. Operational plan for the land preparation period.
   - Farmers present practices will not be changed; current practices will be monitored and the sharing will be promoted through a demonstrative exercise.

4. Operational plan for the crop growth period.
   - On the experience gained in the land preparation period by promoting share practice a suitable plan will be developed and tested with farmer consultation and agreement.

5. No input coordination activity will be carried out

Annex 3.1

QUESTIONAIRE TO EVALUATE THE IMPACT OF AWARENESS TRAINING FOR FARMERS

1. Whether the farmers' organization is necessary : Yes/No
2. If yes why the farmers' organization is necessary
   1. To have cooperation among the farmers.
   2. To solve farmer problems through discussions.
   3. To have equitable and fair distribution of water.
   4. To maintain and protect the irrigation structure.
   5. To facilitate input supplies.
   6. To get better prices for farmer products.
   7. To achieve better coordination between the farmers and the officers.
   8. To assist each other when in difficulties.
   9. To have timely cultivation.
   10. For the betterment of the farmers.
3. What should be the responsibilities of farmers towards the farmers' organization?
   1. To attend every farmer meeting.
   2. Active participation in discussions.
   3. To resolve conflicts and problems through discussions.
   4. To Participate in decision making.
   5. To abide by the decisions taken.
   6. To make new proposals.
4. What should be the leadership qualities of a farmer representative.
   1. Should be a good farmer.
   2. Can devote time and energy to work for the farmers.
   3. Should be active.
   4. Should be friendly with the farmers.
   5. Should not be reluctant to take responsibilities.
   6. Should be patient.
   7. Should make appropriate decisions.
   8. Can maintain good relations with officers.
5. Understanding of the MEA farmers' organization structure.
   1. How the FC group is formed?
   2. How the DCO is formed?
   3. How the Unit Committee is formed?
   4. How the Block Committee is formed?
   5. How the Project Committee is formed?
6. Understanding of the Management Structure of the Uda Walawe Project.

Project Level 1. Who is the head of the project.

2. What are the project level sections functional heads under them.

* Water Management * Marketing
* Agriculture * Land
* Community Development

Block Level 1. Who is the head of the Block.

2. What are the block level sections and functional heads under them.

* Water Management * Community Development
* Agriculture * Marketing * Land

Unit level. 1. Who is the head of the unit?

2. Who are the officers under him?

DISCHARGE *INTO* FCs DURING LAND PREPARATION

Water schedule for MK/D7 - MAHA 1991192

Weeks 1.3 Land Preparation

Canal	Area (Ha)	No.of Lots	days/week l/sec	Discharge (cm)	Gaugc Ht
FC1	9	9	7	32.8	16.7
FC2	10	9	7	36.4	17.9
FC3	7	7	7	25.5	14.1
FC4	11	11	7	40.0	19.0
FC5	13	13	7	47.3	21.3
S1/FC1	8	10	7	29.1	15.4
S1/FC2	12	12	7	43.7	20.2
S1/FC3	8	8	7	29.1	15.4
D7	69	70	7	251.1	55.0
D7 with 5% losses				263.7	55.5

Canal	Weeks 4-17 Growth Period Area (Ha)	No.of Lots	days/week l/sec cm	Discharge l/s cm	Gaugc Hl l/s cm	Adjusted days/week	Discharge	Gaugc Ht	Adjusted days/week	Discharge	Gauge Hl
FC1	9	9	4	28.3	15.1	5	22.6	13.0	3.5	32.3	16.5
FC2	10	9	4.5	28.3	15.1	5	25.5	14.1	5	25.5	14.1
FC3	7	1	3	28.3	15 1	5	17.0	10.7	2.5	34.0	17.1
FC4	11	11	5	28.3	15 1	5	28.3	15.1	5	28.3	15.1
FC5	13	13	6	28.3	15.1	5	34.0	17.1	5	34.0	17.1
S1/FC1	8	10	3.5	28.3	15.1	5	19.8	11.9	2.5	39.6	18.9
S1/FC2	12	12	5.5	28.3	15 1	5	31.1	16.1	5	31.1	16.1
S1/FC3	8	8	3.5	28.3	15 1	5	19.8	11.9	2.5	39.6	18.9
D7	69	70	5	198.1	500	5	175.5	48 0	5	232.1	53.0
D7 with 5% losses	5	2080	51.0	5	184.2	48 5	5	243.7	54.0		

Canal	Weeks 18 Area (Ha)	No.of Lots	days/week l/sec	Discharge (cm)	Gauge HI
FC1	9	9	1.5	28.3	15.1
FC2	10	9	2	28.3	15.1
FC3	7	7	1.5	28.3	15.1
FC4	11	11	2	28.3	15.1
FC5	13	13	2.5	28.3	15.1
S1/FC1	8	10	1.5	28 3	15.1
S1/FC2	12	12	2	28.3	15.1
S1/FC3	8	8	1.5	28.3	15.1
D7	69	70	2.5	198.1	50.0
D7 with 5% losses				208.0	51.0

Reference: MMP Draft report - April 1991 -page 11 (table 2-5)

Note: D7 Discharge and Gaugc Height values are maximum values when all the canals are open

Annex 3.3

WATER DISTRIBUTION ANALYSIS (DPR & RWS) FOR TERTIARY SYSTEM MANAGEMENT - MK/DC7

DELIVERY PERFORMANCE RATIO = DPR = ACTUAL DISCHARGE / TARGET DISCHARGE
DPR(LP) = DPR during Land Preparation = Actual Discharge during LP / Target Discharge for LP
DPR(CGP) = DPR during Crop Growth Period = Actual Discharge during CGP / Target Discharge far CGP
DPR(TOTAL) = DPR during Season = Actual Discharge during Season / Target Discharge for the Season
RELATIVE WATER SUPPLY = RWS = WATER SUPPLY / WATER REQUIREMENT

RWS(LP) = (IW + Re) during LP / (E t S&P t Land Soaking and ponded water) during LP
RWS(CGP) = (IW + Re) during CGP / (ET + S&P) during CGP
RWS(TOTAL)= (IW + Re) during the season / [(E+Land Soak.& Ponded water)during LP t ET during CGP + S&P during the season]

where IW = Irrigation water delivery (mm)
Re = Effective rainfall in mm (rainfall is assumed as effective reinfall)
ET = Evapotranspiration (mm)
E = Evaporation (mm)
S&P= Seepage& Percolation in mm (weighted value based on % of RBE & LHG sail)

Actual Discharge during LP mm/ha =	916.6	633.2	In both seasons. target was to complete LP within 3 weeks.
Target Discharge during LP mm/ha =	660.3	660.3	But in both seasons. 100% LP was completed within 6 weeks.
DPR(LP) =	1.39	0.96	

In both seasons, discharge upto end of 5th week taken as water used for LP since 90% of LP was completed at the end of 5th wk.

Actual Disc. during CGP mmiha =	1786.8	1244.1	(Total actual discharge - Actual discharge during 1st 5 weeks)
Target Disc. during CGP mm/ha =	1649.7	1479.7	(Total *target* discharge - Target discharge during 1st 3 weeks)

DPR(CGP) =	1.08	0.84	
Actual Disc. during Season mm/ha =	2703.4	1877.3	
Target Disc. during Season mm/ha =	2310	2140	
DPR(TOTAL) =	1.17	0.88	
Re(TOTAL) mm =	3 19.3	644.9	
Re(LP) mm =	72.1	178.5	1st 5 weeks
Re(CGP) mm =	241.2	466.4	Total - 1st 5 wks
E(LP) mm =	177	168	1st 5 weeks @ 35.5 mm/wk for Y & M
S&P(LP) mm =	210	210	1st 5 weeks with 66% of RBE soil
Land Soaking mm =	100	100	
Ponding mm =	100	100	
S&P(CGP) mm =	588	588	6th-19th wk (@ 6mm/day and this is for 66% of RBE soil)
ET(CGP) mm =	550	460	6th-19th wk Including both weeks for both seasons
	5th-19th wk	5th-19th wk	

RWS(LP)	= 1.68	1.40
RWS(CGP)	= 1.79	1.63
RWS(TOTAL)	= 1.75	1.55

LP **PROGRESS** - % COMPLETED UNDER EACH ACTIVITY

Week	1	2	3	4	5	6
Yala 91						
Soaking	*	100				
1st Plo.	33	97	100			
2nd Plo.	0	20	91	97	100	
Puddling	0	0	16	79	96	100
Sawing	0	0	4	57	92	100
Maha 91192						
Soaking	50	100				
1st Plo.	9	85	100			
2nd Plo.	0	3	66	100		
Puddling	0	0	4	57	94	100
Sowing	0	0	0	37	87	100

* No dale available

	DPR		RWS	
	Y91	M 91/92	Y91	M 91/92
LP	1.39	0.96	1.68	1.40
CGP	1.08	0.84	1.79	1.63
TOTAL	1.17	0.88	1.75	1.55

Chapter **4**

THE REHABILITATION PROCESS

The main objective of this research component is to identify how the rehabilitation process can best be utilized as a vehicle for the strengthening of farmer organizations. Prior to 1990, construction for rehabilitation within Uda Walawe was a straight forward process in which contracts were let solely to private firms. In April 1990, construction contracting was changed to accommodate farmer involvement. The following four activities are included under this research component:

* Analysis of the current rehabilitation construction process.
* Programing, planning, budgeting and resource mobilization.
* Training needs for agency staff and farmers.
* Institution-building through the rehabilitation process.

4.1 **Work Plan for** Maha **91/92**

The work plan prepared for this research component is described in the Yala 1991 report. It was found difficult to implement this research component in the canal selected as the farmers were reluctant to take over construction activity. It was found that the fanners have lost faith in the MEA and the experience of the rehabilitation pilot canal of DC10 had made other farmers reluctant to take the responsibility. In particular, it was found that the farmer organizations in the Chandrikawewa Block needed strengthening even before taking on construction activities.

The Rehabilitation Substudy Committee decided to implement this research component in six FCs of DC22 in the Chandrikawewa Block during Maha 1991/1992 as the farmers were said to be willing to undertake the construction. The estimates too had been prepared. A general farmer meeting of these six FCs was held and the farmers expressed their willingness to undertake the rehabilitation construction.

The following activities for these six FCs were planned by the Substudy Committee at a meeting held on 16 November 1991:

* Awareness training for the farmers from 18 to **21** November to be carried out by the Training Manager.

* Discussion of the estimates and designs with the farmers before 25 November by the RE(MECA) and SIE(C).
* Contracting with the farmers' organization before 30 November.

* Conducting field level training to provide technical know-how before 5 December by the Training Manager, RE(MECA), and SIE(C).

* Training the FRs in financial management, labor control and site management before 5 December by the Training Manager, RE(MECA), and SIE(C).

* Identifying problems and taking corrective actions during implementation.

4.2 **Progress during Maha 91/92**

Awareness Training for the Farmers Four one day training classes were conducted as planned from 18 to 21 November for all farmers of the six FCs of DC22 in Chandrikawewa. The training module prepared by the Training Manager (TM) covered five areas: **1)** the importance/usefulness of farmer organizations and the MEA farmer organization model, 2) MEA management structure, **3)** the necessity of farmer participation in rehabilitation, 4) information necessary for doing construction for rehabilitation, and *5)* a field visit to explain the design and estimates to the farmers.

The training was designed to strengthen the farmer organizations, motivate the farmers for rehabilitation construction and provide the basic understanding required to undertake the construction. The session on MEA management structure was included as it was identified under the Tertiary System Management component that such understanding is necessary for the farmer organizations.

The first session on the need for farmers' organization commenced with a highly emotional and motivational address by the TM. The necessity of farmer participation in rehabilitation was described briefly by the TM. Information necessary for the farmers in doing rehabilitation constructions was provided in the afternoon by an EA of the Chandrikawewa Block. This session was found to be highly effective and the EA was identified as a resource person for conducting future training. In his presentation he included the following information:

* the irrigation system of the project from the reservoir to the FC,

* the steps to be followed in earthwork construction,

* the benefits of doing construction through the farmer organizations,

* design criteria at the DC and FC levels,

* areas where the farmers should pay special attention in doing construction such as compaction,

* resources required, rates, contract agreement, payment procedure, and the agencies involved.

The estimates were explained to the farmers. Farmers were told that the planned work was rather small which they could easily implement. The farmers were also told that every assistance and cooperation would be provided by the MEA for the successful implementation of the rehabilitation construction.

During the last session of the training program, the MECA engineers with the **SIE** (C), the block IE, EA and TO visited the field together with the participants and explained to them the designs and the estimates. The farmers had the opportunity to get **a** clear understanding of the construction work.

This was found to be very effective training program as the farmers were highly motivated *to* do the FC construction work.

Other Training The planned field level training on technical subjects, financial management, labor control and site management could not be provided. It was MEA policy to conduct all training through the Training Unit and the Training Manager was too busy on other activities at the planned time. It was also not possible to organize this training at a later date as the annual allocation for training was used up. However, it was decided to introduce two forms proposed in the Yala 1991 Report to record work done and machine usage for better record keeping, but there was a considerable delay in preparing them at the Project office.

Implementation of the Work The work commenced from 6 December. Difficulties caused by lack of training were evident from the beginning. The farmers held different views on implementing every bit of work and needed frequent instructions. They had to depend heavily on the officers but, at the beginning, there was no one to provide technical instructions except a TO of MEA. No field supervisor was appointed and there was no one from MECA available for the first two weeks. However, this delay occured as the RE (MECA) **was** waiting for the planned training for field level. Later **a** permanent supervisor was appointed by MECA.

Some of the FRs admitted openly that they could not implement this work successfully as they had no understanding of how to mange it. Construction work was totally new to them; they worried that they would end up in debt. The farmers worked on a daily pay basis and it was observed that much of the time they were idling; on some days the work done was less than the wages to be paid.

Employing Wage Laborers Wage laborers were employed, rather than getting labor through shramadana, because:

* Some farmers sent laborers as they were engaged in other activities,

* The FRs hired wage laborers to fill the vacancies of non-participating farmers,

* The FRs wanted to complete the work as soon as possible,

* Some of the farmers had to be replaced with hired laborers as they were too old to do such hard work,

* The FRs could have better control over hired laborers and believed the performance of the hired laborers was better than that of the farmers.

Employing wage laborers created many problems for the FRs:

a) The wage laborers had to be paid a living wage and the farmers also began to expect equal wages. Gradually, making money became the main objective of the farmers in participating in this work.

b) The hired laborers had to be paid weekly and on time. This created many problems for the FRs. The FRs began to hire wage laborers on the assumption that there wouldn't be any delay in payments from the **MEA.** When there were payment delay:;, the FRs had to face serious consequences, including threats of work stoppage. The farmers, too, came to expect payment on time, making the situation worse.

Inadequate Resources of the **MEA** Except for basic requirements of mammoties and crowbars no resources were available with the farmers. They expected the **MEA** to provide the other implements such as a bulldozer, wheelbarrows, pans, compacting equipment, etc. Their expectations arose from the guarantee given to them that the **MEA** would provide every assistance. But the **MEA** was not in a position to provide these tools. The smaller tools were not available. Only one bulldozer was available for the whole Uda Walawe Project and it was out of the Project much of the time to fulfill other requirements.

Coordination among Officers and Farmers **As** decided by agreement between the agencies, **MECA** and **MEA** officers have the following responsibilities with regard to rehabilitation construction undertaken by farmers:

* Joint inspections for planning and design should be done by **MECA** and **MEA** officers together with farmers.

* Both REs from **MECA** and IEs from **MEA** can take measurements for planning. The work will be carried out as decided by the REs and IEs at the site and can be done jointly or separately. However, some percentage of measurements carried out solely by **MEA** officers must be checked by **MECA** officers for accuracy.

* MEA officers plot existing channel cross sections.

* MECA officers prepare design cross sections, design structures, and prepare bills of quantities for estimates.

* MECA must give lists of works, cutting sheets, and designs for longitudinal sections of canals to MEA officers before commencement of the work.

* MECA officers are responsible for technical instructions, construction supervision, and quality control during construction.

* MEA officers are responsible are responsible for setting out, setting levels and for assisting the farmer organization with supplies, machinery, etc.

* MECA officers are responsible for checking levels and setting out prior to concrete work.

* The MEA Block Manager is responsible for forwarding a request for an advance payment with the IE's recommendations to the Contract units.

* Measurements for payments are made by MEA and MECA officers jointly.

* MECA should hand over as-constructed drawings to MEA when the canals are handed over.

As this list shows, coordination between MECA and MEA officers is problematic because of the overlapping responsibilities.

In addition, the Substudy Committee recommended that someone from the Block office should be appointed to facilitate the institution building **by** identifying problems, taking corrective actions, and maintaining the motivation of the farmers. No one was appointed with the result that the farmer organizations faced extra difficulties.

The Technical Officer for the area took it upon himself to coordinate between the farmers and officers and to assist the farmers. His involvement was helpful for the farmers in several ways:

* He provided technical instructions to the farmers to overcome the difficulties caused by the farmers' initial lack of knowledge.

* He identified the problems and helped farmers to solve them. Whenever there were problems he called emergency meetings to arrive at solutions through discussions.

* He helped farmers maintain records on machine usage and daily work; this helped avoid conflicts among the farmers and between the farmers and the officers.

* He helped the farmers with financial control. Financial records were maintained and payments were made on the decisions taken at the farmer meetings under the guidance of the TO. This minimized conflicts over financial matters.

However, some matters required the intervention of MEA Block officers. In such matters, the TO was helpless because the Block officers took no action. Further, the TO's time was limited as he was engaged in other activities such as water management for the whole block. Later he was loaded with other work related to the Mahaweli Week celebrations.

The farmers were highly disappointed with the MEA Block officers. The TO was the only regular visitor and apart from occasional visits from the Unit Manager, no one visited from the block office to provide moral support to the farmers or for any other reason.

On the other hand, MECA officers played their part. Though there were some initial delays in providing technical instructions by the MECA these were later rectified and their responsibilities were taken care of with no delays afterwards.

Delay in Payments There was a considerable delay in making advance payments resulting in serious problems. The farmers made the request for advance payment on 12 December and were guaranteed payment within one week. The payment requisition forms remained in the Block office till 21 December before moving on. The farmers finally received payment on 14 January. This payment delay resulted in many problems:

* Farmers lost confidence in the MEA. The farmers started the work with full confidence in the MEA. The payment delay not only disappointed them but even led to suspicions of the genuineness of the MEA effort to implement this work. Relations with the officers deteriorated and many suspected that the officers wanted to discourage the farmers from undertaking construction contracts.

* Farmers could not buy basic equipment necessary for the work. Since the farmers' organization did not have funds, they had to depend on the advance payments lo buy some basic equipment. The DCO leader had to use money out of his own pocket to buy them.

* FRs faced serious difficulties in making payments in time to hired labors and to the farmers. They could not make any payment to the those who worked; this demoralized many and hampered the progress of the work.

* Conflicts arose between the farmers and the FRs. It was the FRs who were subjected to criticism when the payment delays were continued.

* Farmer participation gradually dropped.

* With the drop in the farmer participation the FRs had to depend more on the hired laborers. This aggravated the situation.

* With the farmers' gradual alienation from the work, the contracts became the responsibility solely of the FRs.

Progress of Construction in the Sample FCs It was expected that the farmers would be able to finish the work by the end of Maha season. However, due to the various problems, by the end of March 1992, the progress of the construction was only as shown in Table **4.1.**

Table 4 1 Progress of Construction in the Sample

Field Channel	Percent Complete
CW FC7	67 %
CW FC8	42 %
D21 FC1	56 %
D21 FC2	49 %
D21 FC3	32 %
D21 S1 FC1	61 %

Earthwork on CW FC7 and D21 S1 FC1 was completed by the end of May

4.3 Conclusions and Recommendations

According to the experience gained in these six FCs, the objective of institution building through rehabilitation cannot be achieved without major changes in the process. The pilot study carried out on DC10 specified prerequisites if rehabilitation is to be used as vehicle for institution building. Many of these prerequisites were not fulfilled in the rehabilitation of these **six** FCs.

One of the prerequisites is that the farmer organization should be strong when construction work is undertaken. It was learned that the farmers' organization of these six FCs were weak compared to the rest of the block. It was the DCO leader who had motivated the farmers to do the construction, otherwise not even FC group meetings could be held.

The initial awareness training provided to the farmers succeeded in motivating farmers to take over the construction as a group activity. However, without a parallel strengthening program during the process, the problems faced by the farmers gradually weakened the process, If a suitable officer had been appointed to assist the farmers, this weakening could have been prevented. Such an officer had also been identified as a prerequisite.

Training on technical matters, labor control, site management, and financial control had also been identified as a prerequisite. This training was not given.

The experience gained in this exercise shows that overconfidence should not be built in the farmers by the implementing agency. Instead, the actual situation and the constraints to be faced should be clearly explained to the farmers. There should be a general agreement on how to handle these constraints between both parties. This is particularly important if the level of support available to the farmer organization is low.

The experiences from the pilot study on DC10 strongly recommend that as far as possible payment delays should be avoided. The results of implementing the study in these six FCs may have been different if the payment delays were avoided, since the other problems could have been gradually remedied.

In the time remaining in the Uda Walawe Project, it is doubtful whether the changes can be made that are necessary to make successful use of rehabilitation as a vehicle for institution building.

4.4 Yala 1992 Work Plan

The study of rehabilitation process in the Chandrikawewa Block will be discontinued as the objective of using the rehabilitation as a vehicle for institution building cannot be achieved there without much more time and effort being provided than is presently available.

Instead, the study of rehabilitation will be combined with the tertiary system management study in two newly selected canals under Moraketiya Branch Canal where rehabilitation is currently underway.

Since the rehabilitation in these canals is already started the work will be limited to

- documenting the process,
- identifying the support services and training needs necessary to facilitate farmer involvement,
- studying the handing over process after rehabilitation.