DRAFT FINAL REPORT

on the

Technical Assistanct Studs

(TA 846 SRI)

Irrigation Management and Crop Diversification

(Sri Lanka)

Volume III

Uda Walawe Project

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International Irrigation Management Institute

P O Box 2075, Colombo, Sri Lanka

Please direct inquiries and comments to:

Dr R. Sakthivadivel
INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE
P. O. Box 2075, **Colombo,** Sri Lanka.

Tel: 546561-5; 544580-3 IDD: 94-1-546561-5; 94-1-544580-3
Tlx: 22318, 22907 IIMI HQ CE **Fax:** 94-1-544584

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CHAPTER I

INTRODUCTION

CONTEXT OF THE STUDY

This study of Irrigation Management and Crop Diversification is being carried out. under a Technical Assistance Agreement (T.A. No. 846 - SRI) dated 27 November 1987, between the Government of the Democratic Socialist. Republic of Sri Lanka (GOSL), the International Irrigation Management Institute (IIMI), and the Asian Development Bank (ADB). The study is being implemented by IIMI in the Iiirindi Oya and Uda Walawe projects in southern Sri Lanka in close collaboration with the agencies in charge of development and management of these projects. It addresses, through field-level research, priority issues of importance and relevance to the two projects in the processes of irrigation system management, with particular attention given to the requirements of crop diversification in Kirindi Oya and the rehabilitation project in Walawe.

PROGRESS OF THE STUDY

The study commenced on I February 1988 and is of 26 months duration; an additional trio months' estension was recently agreed to finalize the Final Report. The first season of field research in the Walawe project. was started in April 1988 which corresponded to the yala 1988 season. Due to the unsettled social and political situation that prevailed in the study area., the data collection and observations were interrupted. However, three seasons of research (yala 1988, maha 1987/1988 and yala 1989) could he captured during the period of study in addition to the present maha (1989/1990) season. This final draft report synthesizes the research results of the three seasons of completed study along with the preliminary results obtained during the ongoing maha 1989/1990.

REPORTING OF THE STUDY

An Inception Report (IIMI 1988a) was submitted in mid-March 1988 at. the end of stage 1 of the study. It contained 'the findings of the 1iterature review, and the research proposals and program, detailing data collection, field observations, analysis, and expected results, and other details of implementation for stage 2 of the study, covering four seasons of field research. The identification of the sub-system for research was also part of the research planning described in the report. A Progress Report (IIMI 1988b) and an Interim Report (IIMI 1989a) were submitted in October 1988 and Apri 1 1989 respectively during the on-going research. The Progress Report described the progress in the implementation of the first. season of field research, and preliminary findings. Based on the full season research of yala 1989, a Seasonal Summary Report (IIMI 1989b) was prepared which summarized the findings of that season.

This Draft Final Report analyses the results of all the previous seasons including a preliminary assessment of the work during the maha 1989/1990. 'This report will be reviewed at, a tripartite meeting (ADB, GOSL and IIMI) to he held sometime in March 1990. The Final Report, incorporating views and comments of the tripartit.e meeting and others will be submitted *to* ADR **and** GOSL by 31 May 1990. It will contain further analysis and recommendations for improvements and **any** follow-up studies which may he copsidered necessary.

The Appendix to Chapter I provides extracts from the Inception Report on the selection of the sub-system and Figures 1.01 to 1.04 for **easy** reference regarding field research locations.

IMPLEMENTATION

Field offices: A house was rented at Embilipitiya to serve as field office for research staff **and** also provide residential accommodation for the research officers.

Staffing -- International: The following senior staff of' IIMI worked on the study:

Dr R. Sakthivadivel, Engineer/Team Leader
Dr C.R. Panabokke, Agronomist/Senior Associate
Dr D.J. Merrey, Social Scientist
Dr M. Kikuchi, Agricultural Economist

Dr P. S. Rao, Team Leader associated with the project up to 22 August 1989, left IIMI and **Dr** R. Sakthivadivel succeeded him from that date.

Staffing -- National: Research Associate: Mr W.A.A.N. Fernando (Irrigation Engineer) was in charge of field research operations and coordination and supervision of research activities in bth Kirindi Oya and Walawe projects. He was based in Tissamaharama.

Research officers: The following research officers worked on the project..

Mr K. Jinapala, Sociologist
Mr L.R. Perera, Sociologist
Mr R. A. D. Kemachandra, Agricultural Engineer (until October 1989)
Mr A. F. Keerthipala, Agricultural Economist
(until mid- December 1989)

During the 1989/1990 maha, Mr. H.M. Hemakumara, Research Officer, temporarily replaced Mr Kemachandra; more recently, Ms Thilaka Samaratunge has been assigned to the research project full time by the Mahaweli Economic Agency.

COUNTERPART

Ms. P.M.C.C. Diyagama, irrigation engineer, was nominated by the Mahaweli Economic Agency as counterpart for the study. After her transfer from Mahaweli Economic Agency to Central Engineering. Consultancy Bureau, Ms G.W.P. Perera, her successor, was the counterpart for the study.

COMMITTEES

The first Study Advisory Committee (SAC) met in Colombo on 7 April 1988 at the office of the Director of the Irrigation Management Division. The first Study Coordinating Committee meeting has held on 11 May 1988 at the office of the Resident Project Manager in Embilipitiya to discuss the Inception Report prepared by IIMI. The meeting provided useful suggestions for implementing the research project. The second Study Coordinating Committee (SCC) meeting was on 8 March 1989 at the office of the Resident Project Manager in Embilipitiya; the second Study Advisory Committee meeting was (SAC) in Colombo on 16 March 1989 at. the office of the Director, Irrigation Management Division. Mr T.C. Patterson, Manager, Asia West Division 1 of the Asian Development Bank, participated in the SAC meeting and also visited the field research location on 14 March 1989. The Progress Report suhmitted in October 1988 was discussed in these two meetings and useful comments and suggestions regarding the research were made by the members of the Comnittees.

The third Study Coordinating Committee (SCC) meeting was held on 26 May 1989 at the office of the Resident Project Manager in Embilipitiya; the Interim Report submitted in April 1989 was discussed in the meeting. The issue of the rehabilitation management process received particular attention of the members at this meeting.

In response to the Interim Report suhmitted in April 1989 and some recommendations made by the IIMI team on the management of the rehabilitation process in Walawe, the Director Genera: of the Mahaweli Authority of Sri Lanka called a meeting on 15 June 1989 to discuss the Interim Report. After discussion, it was suggested that a workshop be organized jointly by Mahaweli Economic Agency, Central Engineering Consultant Bureau and IIMI on post-rehabilitation work and farmer participation in Walawe project.

The Interim Report was presented to the Asian Development Bank at Manila in the third week of June 1989. In response to the suggestion made i.n this report, Er Peter Smidt. of the Asian Development Bank visited Sri Lanka during the second week of July 1989. During his visit, a number of issues were discussed during the meeting held with Director General of Mahaweli Authority of Sri Lanka on 12 July 1989 of which following are the most important.

1. Two or three distributaries were to be rehabilitated in a1l respects before maha 1989/1990 in order to monitor the design management interactions and post-rehabilitation performance.

2. Program Review meetings were to he held monthly by the Project Director at. Embilipitiya and quarterly by the management in Colombo.

3. The Draft Operation and Maintenance Manual (MMP; July 1986) prepared by the consultants is to be reviewed by a committee headed by the Chief Irrigation Engineer of Mahaweli Economic Agency Colombo.

A Study Coordinating Committee meeting was held on 26 October 1983 at the office of the Resident Project Planager in Embilipitiya, to discuss the Seasonal Summary Report. The third Study Advisory Committee (SAC) meeting was held on 16 November 1989 in Colombo, with the participation of Mr Peter Smidt. The research results of yala 1989 season were presented and the importance of improving the water delivery performance and farmers' participation in the rehabilitation process were brought out.

PROBLEMS AND ISSUES

It was unfortunate that the period selected for the research was socially and politically so unstable that contemplated research could not be implemented. in full. Research staff had to be withdrawn often from the field for security reasons; the IIMI field vehicle allocated to the project was set on fire by an unknown group in July 1989. In spite of all these impediments, field research was carried out for three seasons and the credit for this must. go to the field research staff.

ACKNOWLEDGEMENTS

In spite of the sensitive security situation and difficult circumstances under which they were functioning, the agencv officials, field level staff, and farmers of the project area have offered excellent cooperation and assistance for the conduct of the field research which is gratefully acknowledged. Some of our observations have been critical and controversial, but this has not, affect.& the whole hearted coopration of officials. We are also grateful to the members of the Study Coordinating Committee and Study Advisory Committee for their comments and suggestions on previous reports, and to the Asian Development Bank for its continuing interest and strong support for the study.

Two sorrowful incidents that took place during the season were the sudden passing away of Col. Raja Wijesinghe, Resident Project Manager and Mr. Freddie Dias Abeysinghe, Chief Irrigation Engineer of Walawe Project. They were two key persons of the project, as well as in our research activities. If not for the excellent cooperation rendered by them to our staff, our research in Walawe would not have been successful. We take this opportunity to espress our deep gratitude to them.

Appendix

(Extract from inception report)

Selection of subsystem

The study envisages the selection of one sample subsystem in Uda Walawe project, for intensive data collection and analysis (the intensive sample), supplemented by extensive and intermittent monitoring at the next higher level subsystem (extensive sample). The sample subsystem should comprise the total command area of one distributary canal and its field canals and should also include both upland (well drained) and lowland (poorly drained) soils. The subsystem for Walawe should be relevant to addressing rehabilitation issues. Based on these considerations the following subsystems have been selected for the study.

The intensive subsystem consists of the command area served by Distributary Channel 8 (DC 8) of the Chandrikawewa Block (Figures 1.03 and 1.04). It has 107 allotments each of 1.2 ha (3 acres) and therefore an official area of 128 ha. the actual area served is estimated to be 10% more than this (about 140 ha total) because of encroachment. The Chandrikawewa Branch Canal has 18 distributaries serving nearly half of the Chandrikawewa Block, which has a total command area of over 2300 ha. This branch canal provides the basis for the extensive sample. DC 8 is one of the 18 distributaries. In addition to nine turnouts, there are a large number (nearly 50) of direct outlets from DC 8. Fanners have also built a number of bunds across DC 8 at various places to raise the water level. The rehabilitation will substantially change the shape of the water distribution system in DC 8.

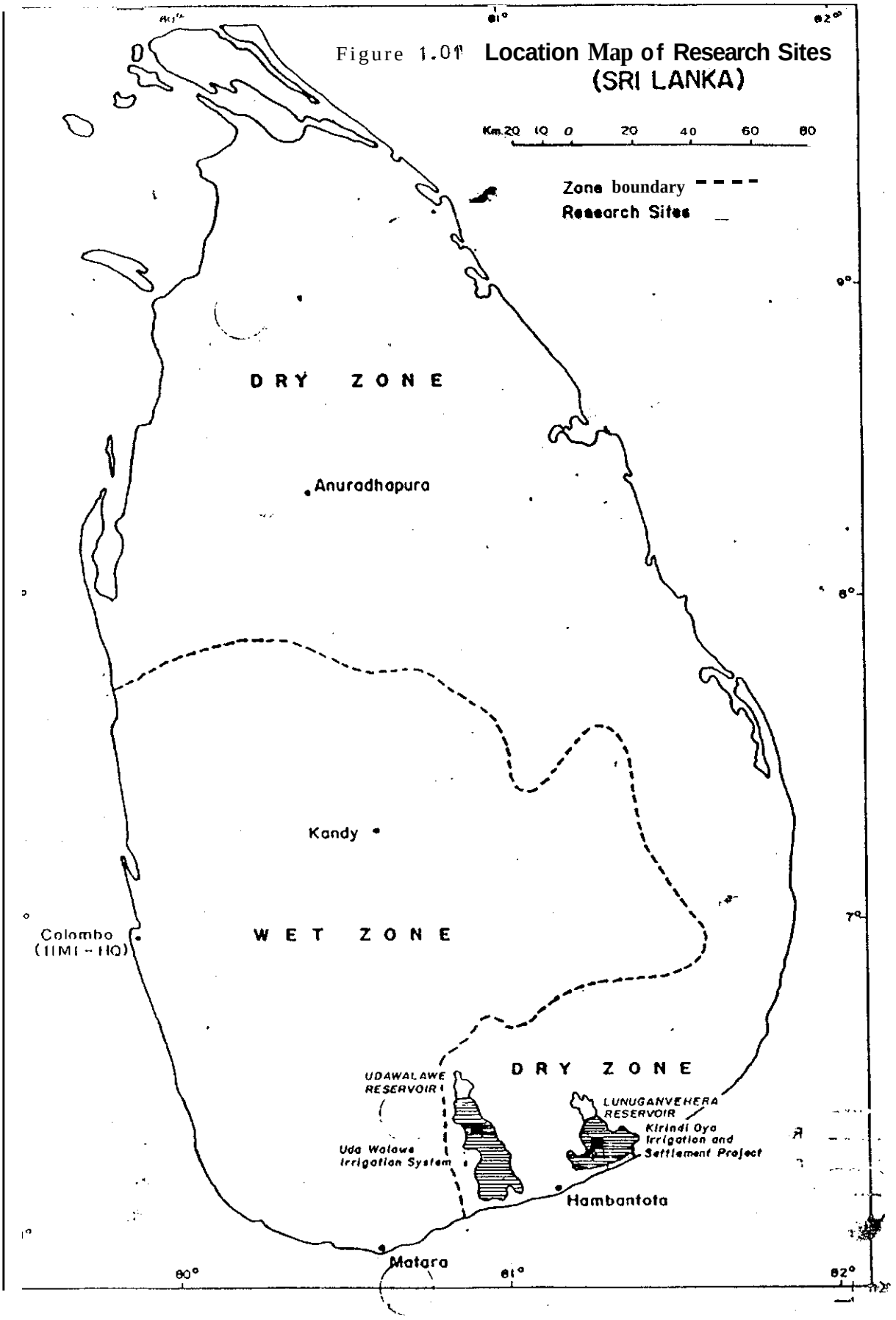


Figure 1.01 Location Map of Research Sites
(SRI LANKA)
Km 20 10 0 20 40 60 80
Zone boundary
Research Sites
DRY ZONE
Anuradhapura
Kandy
WET ZONE
Colombo
(IIMI - HQ)
DRY ZONE
UDAWALAWE
RESERVOIR
Uda Walawe
Irrigation System
LUNUGANVEHERA
RESERVOIR
Kirindi Oya
Irrigation and
Settlement Project
Hambantota
Matara
80°
81°
82°
9°
8°
7°

Figure 1.02 LOCATION MAP

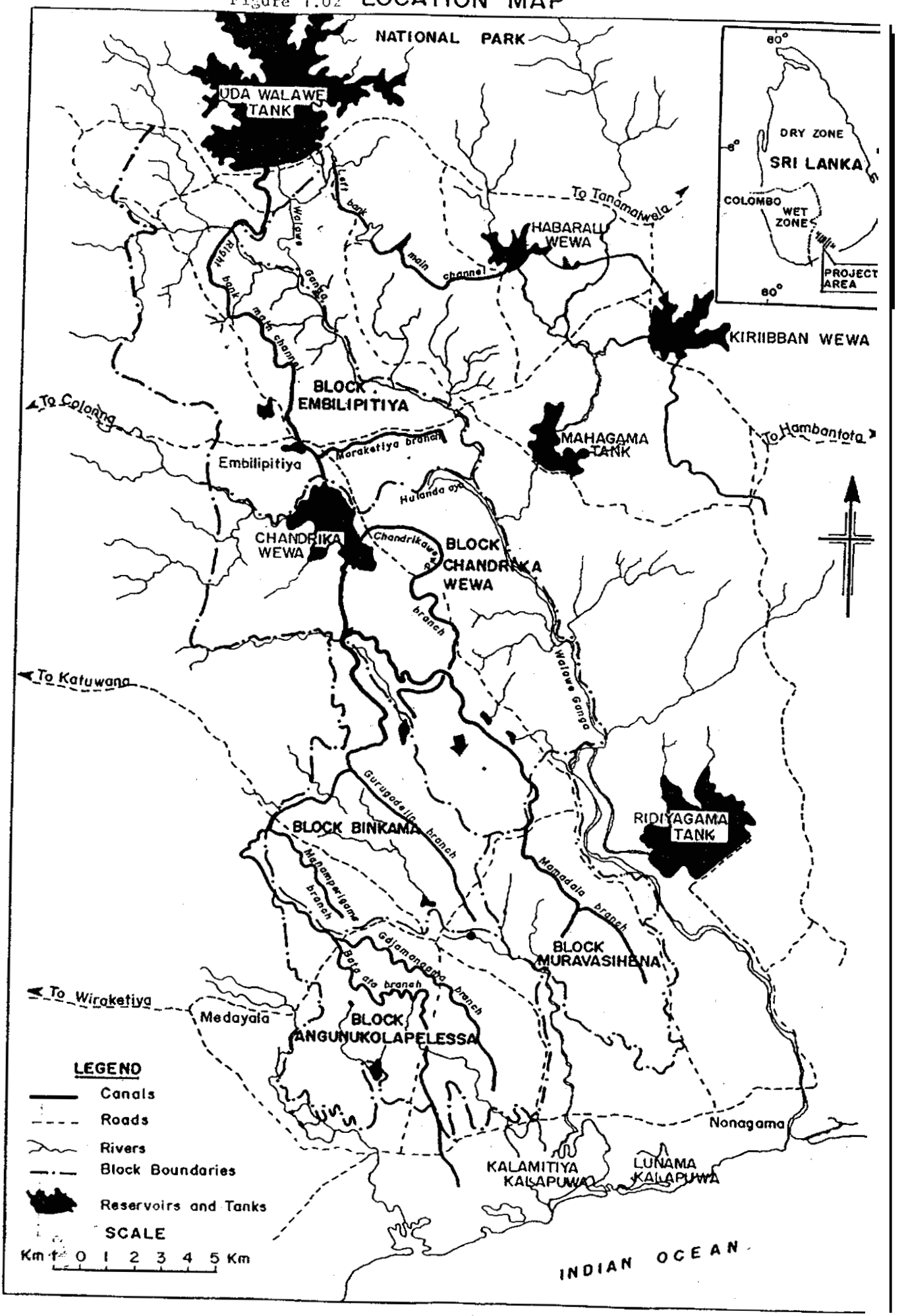


Figure 1.03

ISSUE TREE OF CHANDRIKAWEWA ,MAIN CANAL

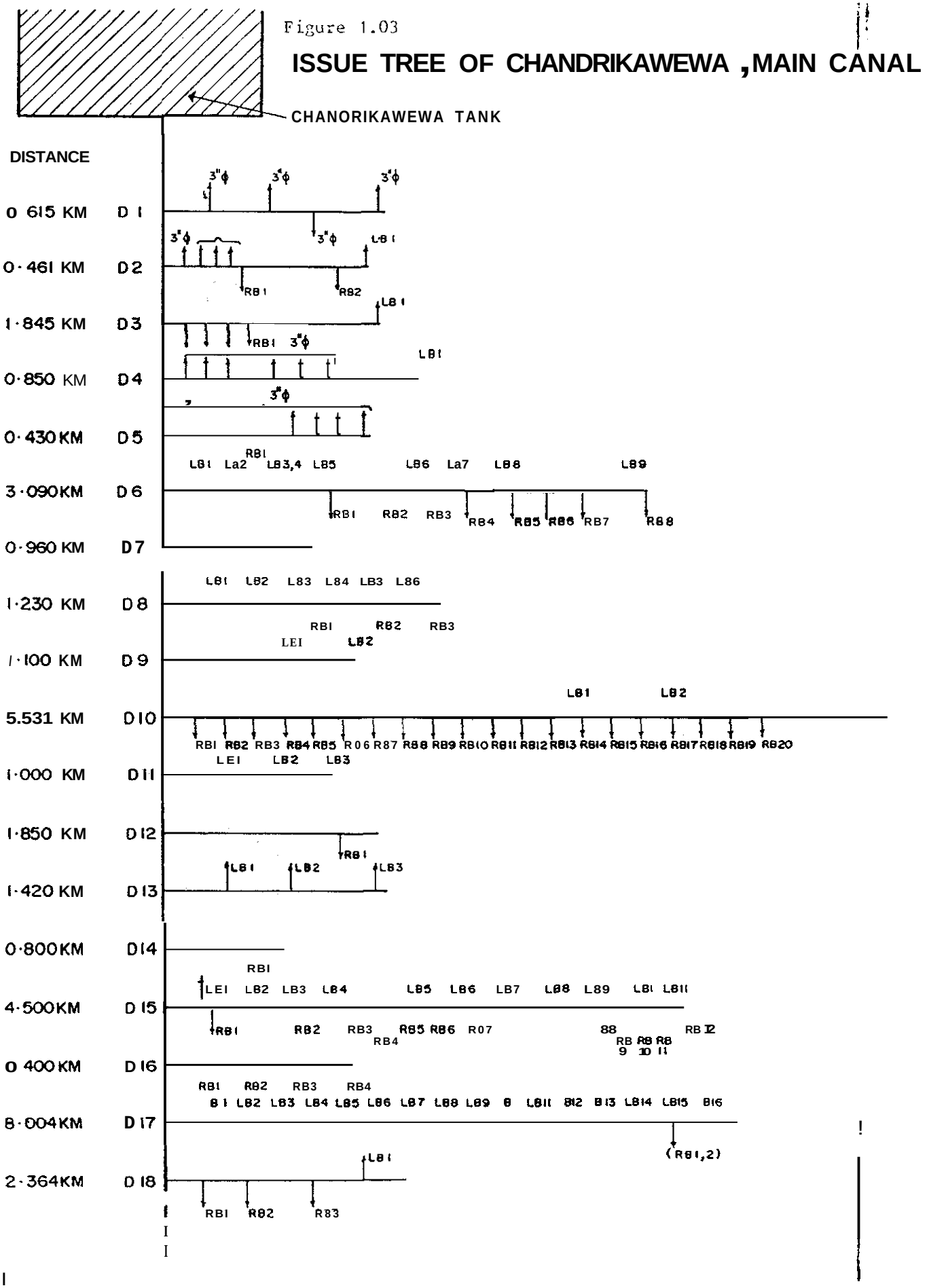
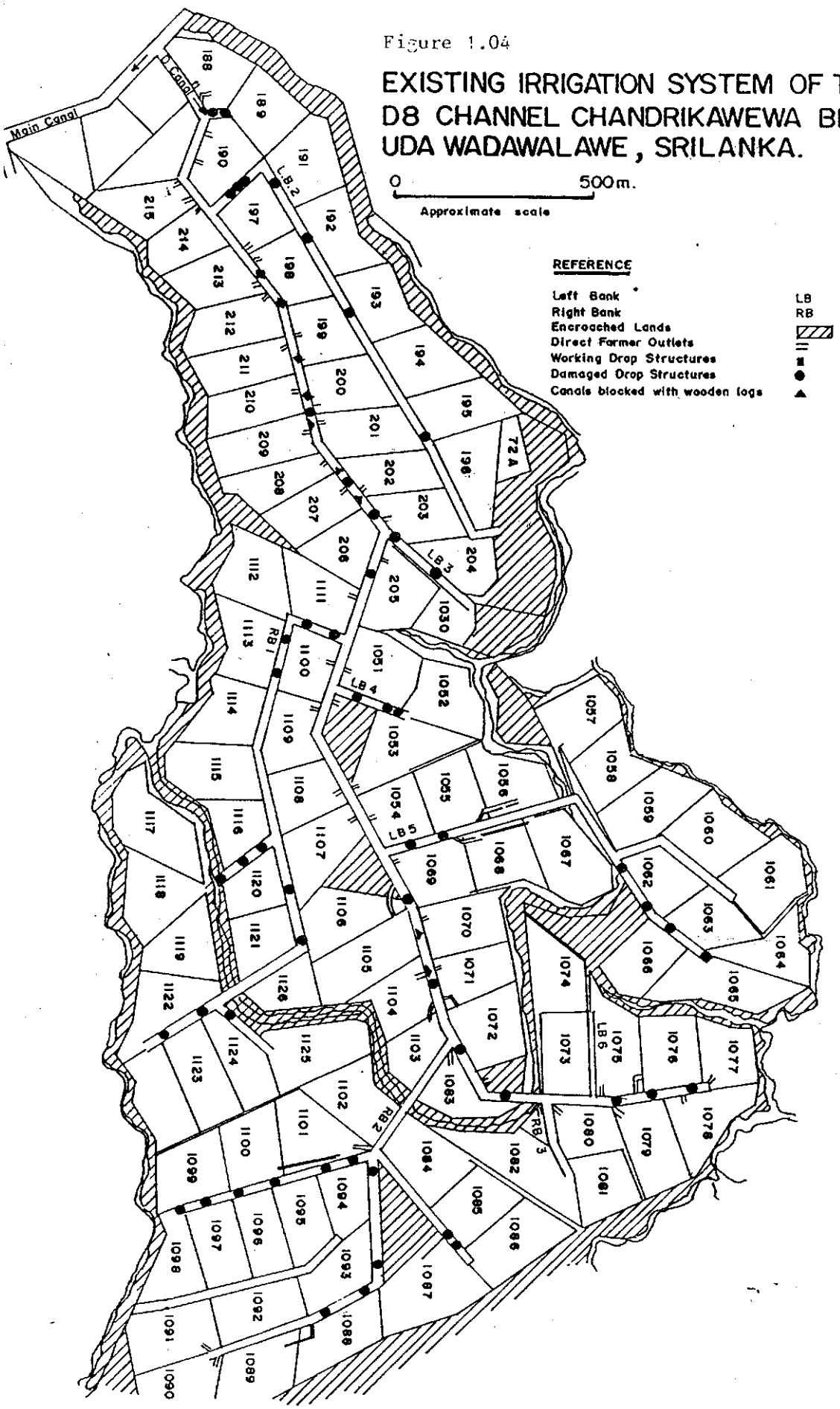


Figure 1.04

EXISTING IRRIGATION SYSTEM OF THE D8 CHANNEL CHANDRIKAWEWA BLOCK, UDA WADAWALAWE, SRILANKA.



CHAPTER II

IRRIGATION INSTITUTIONS

INTRODUCTION

Objectives and Research Questions

As outlined in the Inception Report (IIMI 1988a:17), this component has two broad objectives:

* to document and assess the present functioning, strengths, areas needing further strengthening, and impediments to improvement in the irrigation management institutions at the project and farmers' levels; and

* to propose structural and management innovations that could be adopted in the short run to improve project performance, and others that could be tested and adapted over a longer period that would strengthen efforts to achieve project goals.

With these two objectives in mind, the research on irrigation institutions at Walawe was guided by six research questions listed in the Inception Report (IIMI 1988a:17-18). We attempt to answer these questions based on our findings on three seasons (yala 1988, maha 1988/1989, and yala 1989) and recent developments at the beginning of the 1989/1990 maha season. There is some overlap with the research component on the management of the rehabilitation process (chapter VI), for example regarding farmers' organizations. For easy reference, the six research questions are summarized 'here:

1. What is the overall organizational structure of the agencies involved in irrigation management at the project/system level, and how has it evolved? Are there structural factors inhibitins management efficiency? How does the organizational structure affect the incentives far various agency personnel to provide efficient irrigation service and for farmers t.o cooperate in O&M on the system?

2. What are the formal and informal processes of decision-making and information flow both up and down and laterally, and of performance nionitoring and evaluation of personnel.? How effective are these processes, and where could improvements be proposed'?

3. What efforts are currently underway to establish water users' groups at. the field channel, and above? What methods are being used for organizing them, and hou effective are they? What are the task expectations of both the agency officials and the fanners in regard to fanners' groups? Is the level of resources invested in this area adequate to achieve the objectives? What could be done to further

strengthen the groups? What tasks and functions do farmers' groups carry out now, and what others could he contemplated'?

4. What are the patterns of communication, cooperation, and collaboration between the key irrigation management agency aid the farmers' groups? Are the agencies effective in encouraging self-reliant, effective farmers' organizations, and if they are not, what are the reasons for this? What could he done to further strengthen the cooperation between water user groups and the management agencies?

5. Are the present patterns of cooperation among farmers, or the potential for cooperation with no outside assistance, consistent with the technical requirements and technically feasible options for efficient. water distribution of the present turnout/field channel design? What level of effort would be required to match cooperative behavior with the technical design?

6. What are the relationships between the institutional factors addressed in this module, and the performance of the system as documented in the module on irrigation system performance'? To what extent,, if at all, can shortfalls in system performance be attributed to institutional factors? To what extent can irrigation system performance be improved through organizational and management innovations?

Methodology and Definitions

"Institutions" are defined by social scientists as "complexes of norms and behaviors that. persist over time by serving collectively valued purposes." They persist because they are valued as well as useful. "Organizations." are "structures of recognized and accepted roles." Organizations, thus, may be institutions, or not, depending on whether they have continuity because they are valued and useful' .

The term "irrigation institutions" is defined here as those institutions directly related t.o the operation and management of the water conveyance, i.e., irrigation, system. For the Walawe Project, the Mahaweli Economic Agency is responsible for the operation and maintenance of the irrigation system, so it. is the major "irrigation institution." iiithin the Agency, we focus primarily on the operation and maintenance (O&M) division, the agriculture division, and the block and unit levels of the organization which implement irrigation activities .in the field.

As indicated in the Inception Report (IIMI 1988a:19), the data on irrigation institutions has been collected using a comhination of participant observation and formal and informal interviews, as well as analysis of documents and files. Participant observation involves

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'. See Uphoff (1986:chapter 1) and our Interim Report (IIMI 1989a) for a more complete explanation of these terms and their uses.

attending meetings and other events and observing behavior. Interviews have been carried out with a wide variety of people, including officials at, various levels, farmer leaders, and ordinary farmers. These methods result in qualitative data on processes of decision making, on behavior patterns, and on peoples' explanations and rationalizations for what they do or see others do.

Ideally, these data should be supplemented with quantitative data based on sample surveys to get. a more precise picture of the distribution of variations. Unfortunately, for most of the period of study the security and political situation was extremely disturbed. At times it seemed unwise even to try to carry out sample survey interviews. At other times, we discovered that fanners and others were reluctant to respond in ways that would have provided reliable data. Given the extreme situation faced by farmers and officials, it is to their credit that they were able to assist and cooperate with the research at all.

We cannot offer precise data on the extent of variation, and cannot offer quantitative data to substantiate many of the observations. Nevertheless, we are confident that the observations and generalizations provided in this section, and the conclusions and recommendations derived from them, are valid and reflect social reality in the Walawe Project.

INSTITUTIONAL STRUCTURE OF THE UDA WALAWE PROJECT

Institutional Evolution and Structure

The Uda Walawe Project was constructed by the River Valleys Development Board and was managed by the Board until the end of 1981. In early 1982, it was handed over to the Mahaweli Authority of Sri Lanka to manage. Presently the Mahaweli Economic Agency, the system management agency within the Authority, manages the Walawe project. During the Board period, the management system of the project was hierarchical, with a regional general manager on the top and three deputy general managers under him for water management, agriculture,, and land, respectively. They had line authority to the field level.

After the Mahaweli Economic Agency took over, this hierarchical management system was replaced with a "unitary management system" in effect. in other areas managed by the Agency. Under this system, the project was divided into three management levels: project, block and unit. At the project level, the resident project manager is the head of the whole project.. He is assisted by specialize.? functional heads for irrigation, agriculture, land, community development, and marketing. The project is divided into seven blocks under block managers. They, too, are assisted by specialized functional officers for irrigation, agriculture, land, community development, and marketing. A block is in turn subdivided into units, each headed by a unit manager. lhere is also a field assistant for irrigation at this level. Figure 2.01 depicts the overall project structure.

The resident. project manager is responsible for overall activities of the project, and coordinates the functions of the sectional heads. The deputy project. manager (agriculture) is responsible for all agricultural activities of the project, including preparation and implementation of agriculture programs, arrangement for timely supply of seed material and other inputs, and provision of necessary agricultural knowledge to the farmers. He is assisted by sis project agricultural officers who are subject matter specialists in specific areas, such as rice, plant protection, or animal husbandry.

The duties of the chief irrigation engineer, who is the head of the O&M division, include preparation of water budgets and water allocation and supply for the project, and maintenance of the total irrigation system. He is assisted by four project irrigation engineers in these activities. The manager (lands) is responsible for land administration of the whole project; this includes solving fanners' land problems, issuing permits, protection of lands from encroachments, and collecting O&M fees. He too is assisted by three project land officers.

The responsibility of the deputy resident project manager for community development is mainly general welfare of the fanners. The duties include promoting farmer welfare societies, making arrangements to provi.de fanner training, conducting child care centers, making arrangements to provide housing loans to the farmers, and. developing youth societies and sports activities. He is assisted by a community development officer. The project marketing officer is responsible for marketing farmer products and supply of Some inputs, to the farmers. These sectional heads are expected t.o work in collaboration under the coordination of the resident. project manager in supplying their services to the farmers in achieving the ultimate objective of up-grading the living standard of the farmers.

The block management structure is a reflection of the project level structure. The block manager, as head of the block, is responsible for the overall activities of the block. Line officers, specifically the agricultural officer, irrigation engineer, land officer, community development officer, and the marketing assist-ant, represent the responsibilities of ths respective sectional heads on the block Level under the block manager. The block manager coordinates the key functions of agriculture, irrigation, land, community development, and marketing. He is responsible to the resident project manager in his activities. The line officers are expected t.o supply their services to the farmers through the unit level officers in a multi-disciplinary approach.

A block is divided into 10 to 15 units. Each unit is comprised of about 1.25 farmer families' under a unit manager. The unit manager is the interface between the farmers and the officers. His duties are multi-

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*. This i.s the official figure, based on the number of allottees. Through subdivision of growing families the actual number is undoubtedly larger.

disciplinary. He is responsible for supplying all. the services relevant to agriculture, land, community development, and marketing to the farmers. His includes implementing al.1 the programs of works, provision of services to the farmers, attending to farmer problems, preparing reports, and collecting data and other necessary information required by higher levels. However, the unit manager's main activity is in agriculture. The other field officer, the field assistant, is given the responsibility for water management under the block irrigation engineer.

The organizational structure.of the h'alawe Project is different from the prevailing administrative set up of the country with its more rigid hierarchial bureaucratic style, low inter-dependencyof functions, and its inability to respond rapidly to a changing environment. The unitary management system has been introduced to the h'alawe Project based on the experience in other Mahaweli projects such as System H. It is a matris type of system with, in principle at least, balanced, coordinated, specialized, but integrated functions. It has an integrated approach with a high level of coordination of those multiple functions to provide prompt specialized services to the farmers. In principle, it has the flexibility and adaptability for quickly responding to the changing environment. However, the reality does not match the potential.

Factors Inhibiting Management Effectiveness

Lack of Coordination. The coordination and integrated approach of the functional sections which is most essential in the present management system was hardly visible at any of three levels, project, block or unit. This has become a serious constraint. to the successful implementation of the programs organized by these sections. In practice, we observed that each section emphasizes the importance of its individual activities and operates as a separate functional unit to achieve its objectives.

For example, the activities of the O&M division are limited t.o a concern for seasonal water supply; there is no concern with the contribution of the water supply to crop production, or with overall productivity of the resource. The agriculture section is concerned about implementing its agricultural implementation and estension programs which primarily include conducting farmer and officer training, conducting demonstrations, and supply of inputs to the farmers. But it has little concern for water management problems. The community development section is involved in some farmer welfare activities; but it has had no role in organizing water users' groups. The main activity of the marketing section is supplying some inputs such as fertilizer to the farmers. The land section implements the program of legalizing encroached lands. All the sections operate as separate entities and there i.s no integrated approach to achieve the overall objectives of the Agency. Even during the season, the O&M and agriculture sections work separately and do not collaborate in any activities.

In principle, the resident project. manager's role is t.o insure that the various functions are integrated and coordinated. However, it was our

observation that until recent. personnel changes occurred, this integration was not achieved. We return to this problem again, below.

The same situation characterizes the block level where collaboration between the sectional heads is rare. Each section of the block works separately and tries to implement the narrowly-focused work program of the respective project-level section. Few collaborative efforts were observed either in planning or in solving problems such as irrigation difficulties that arise during a season. Until recently the block land officers were even stationed at the project office under the project manager for land.

At. the unit level there exists a structural factor that inhibits the coordination between the unit manager and field assistant. The field assistants are attached to the irrigation section and appointed on a distributary channel basis under engineering assistants. They are not responsible to the unit managers for their work. There is almost no coordination between these two unit level officers. Often, the unit managers are not aware of the activities of the field assistants assigned to their units. For example the unit managers are not well informed on the pre-seasonal irrigation maintenance work carried out hy the field assistants. There were some instances when the unit managers were pot. even aware when their field assistants were transferred from the unit'.

The lack of integration of functions has resulted in inadequate controls, and there:?;. a low level of services to the farmers as well as haphazard approaches to farmer problems.

Staff and block meetings. Staff and block meetings are an important management tool in the present management system. Staff meetings are held at the project level; all the sectional heads and block managers participate in them under the chairmanship of the resident project manager. Block meetings chaired by the block managers are held at block lei-el and all the block level sectional heads and the unit level officers participate. It is at·these meetings that the integrated approach is supposed to be activated, corporate actions planned, and performance evaluated. However, the full. potential of these meetings is not achieved. The project staff meeting is held once a month. Proceedings are limited to discussing the day-to-day activities of each section separately. At these meetings, the divisions and conflicts among the sections are expressed, rather than a team approach. Block meetings are held once a week and their proceedings as well are limited to discussing the day-to-day activities of each section; collaborative efforts at the meetings are rare.

Under the present unitary system what is required from the top mnnagement is a participatory leadership style. But until recently at least., this has not been the case according to our observations. The

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. This problem is not observed in System H, where the unit managers play an important role in irrigation management as well. as agriculture. See Raby and Merrey (1989).

staff meetings have been conducted under the one voice of the chairman. This has also inhibited the effectiveness of the meetings since the role of the top management should be that of a coordinator of the multiple functions. Many officers we interviewed from both the project and block levels suggested the need to change the present management to a more coordinated approach.

Delegation of authority. The logic of the' management structure suggests that substantial management authority should be delegated to the block and unit levels. Delegation of authority enables the manager to make decisions without seeking approval by higher management. At the block level the block manager is expected to have authority delegated by the resident project manager. But the block manager has very little decision-making power without the approval of the resident project. manager. Therefore he has become no more than a monitoring agent of the activities planned by the higher levels. As noted in a recent study of the Mahaweli Economic Agency's management of System H,

> At the block level, the absence of either direct or delegated authority weakens the hand of the block manager. Though devoid of real authority, the block manager continues to be the primary transmitter of information from above . . . team management at. the block level is very comples and ineffective (Raby and Merrey 1989:72).

The unit manager also has a very important place in the project in his rolr as the interface between the farmers and the Agency. Achievement of the organization's objectives ultimately depends on him. The unit. manager has a lot of responsibilities but he too lacks authority. Since the unit manager has neither decision-making power nor authority, he has virtually become a field officer in executing given functions. It. is also doubtful whether the remuneration is compatible with the workload and responsibility. The present salary structure places both the technical officers and unit managers at equal levels, which may be not fair when one compares their roles and responsibilities.

Since the main activity of the unit managers is agricultural, they cnncentrate on this aspect. The field assistants seem to be isolated in their irrigation activities due to the lack of coordination and integration with the unit manager.

Lack of, Unity of Command. The matrix management system combines vertical and horizontal coordination. In the division of the three management levels in the project, the block manager is supposed to combine project and field level coordination. If this coordination is weak, the unity of command is violated, a characteristic weakness of the matrix system. It is doubtful whether this vertical coordination can be maintained by the block manager successfully without. an effective link between the project and block levels in respective functions. There exists a gap in such instances. This gap between the project and block level is particularly clear in the O&M division where the coordination between project and block in field level water distribution is very low.

resulting in a low level of system performance. This is discussed below under "system operation."

Conclusions and Recommendations for Improving Management Efficiency

1. There is little integration of project. activities, which has resulted in poor control of the overall activities. The expected management efficiency is not achieved; there is a shortfall in system performance. Therefore, we propose a "systems approach" to achieve a higher level of integration among the functional sections. In a systems approach the organization is taken as a total system comprised of subsystems which are equally important and therefore should he integrated. One subsystem should not overlap the other, as one presently finds in Walawe.

   Since agriculture and irrigation are the main activities, these divisions have become prominent and competitive. Therefore, each functional section should consider the whole project as a total system within which each section is equally important. This can be achieved by clarifying the roles of the divisions, including formalization of the requirement for close coordination and joint responsibility for the success.of irrigated agriculture, and close monitoring of the performance of the divisions and their staff in this regard.

2. The lack of coordination between the functional sections is also due to the lack of understanding of tlie present management system. Some officers tend to think that the hierarchical set up as in the former River Valleys Development Board is more effective than the present system. This is partly because the loose integration has resulted i.n loose control over activities. Therefore, the officers have to be given a better understanding about the present system and the required integration between functional sections through in-service training.

3. The block manager's position, iiithout sufficient decision-making authority, now is that of a monitoring agent, or a "telephone exchange" to pass messages. Apart from being a coordinator of different functions he should he a manager in his block with real decision-making authority. As suggested i.n Raby and Merrey (1989:87-89), the block manager is managing the interface between tho higher-level administration and the farmers; a modern entrepreneurial or strategic management style, responsive to farmers' (clients') needs, is required at this level.

4. Some structural changes are required at. the unit level where the field assistants are under the engineering assistants and not responsible to the unit managers. There is no coordination of the activities of the unit manager and field assistant. We suggest. it would be better if the field assistants work under the unit managers and are responsible to them. Further, some redistribution of the work assignments of the unit managers and field assistants can be

recommended for better performance; the unit managers should have more responsibility for irrigation, and the field assistant for agricultura1 activities.

The unit manager who has nor- virtually become a field officer should also be given sufficient decision-ding powers within his unit. He is ideally a microcosm of the block manager, and should manage the farmer-agency interface. His performance should be evaluated in terms of results -- his ability to assist farmers to solve their problems (Raby and Merrey 1989:88-89).

5. The potentials of the present staff and block meetings should be fully utilized for the efficiency of system performance. This p i n t is developed further below.

IRRIGATION SYSTEM OPERATION

Project Level Structure

As Figure 2.02 show, there are four irrigation engineers under the chief irrigation engineer for system operation, construction, maintenance, and training field officers in O&M. Under the irrigation engineer for operation, there are two technical officers assigned, one each for the right and left. bank canals. The technical officer for the left. hank canal is assisted by one field assistant while the technical officer for the right bank canal has two field assistants, one for water deliveries to Chandrikawewa Block and the other to Binkama Block. The other blocks are managed with irrigation laborers

There are three other irrigation engineers assigned respectively for training, construction, and maintenance. However, due to the ongoing rehabilitation program the O&M division finds it difficult to assign specific duties systematically according to Figure 2.02. The O&M division expects to assign them with these specific duties after rehahilitation. At present the irrigation engineer (training) is assigned to train field level officers on the proposed O&M procedures. The engineers for maintenance and construction help the operation irrigation engineer in day-to-day operations since there is not much maintenance and construction work due to the ongoing rehabilitation work. The Mahaweli Economic Agency has made an arrangement to release one irrigation engineer each year to work with the consulting engineers in the rehabilitation project. Otherwise, there is no other direct involvement of the O&M division in the implementation of the rehabilitation work.

There are five irrigation laborers under the technical officer for the right bank canal for operating gates and collecting gauge readings. The responsibility of the O&M division in water distribution covers from below the headworks down to the block levels, including deliveries to direct offtakes from the right and left bank main canals.

Project Level Operational Pattern

Before a new season starts, the O&M division collects crop planning summaries which include the expected extent of land to he cultivated with different crops from each block. Based on these crop planning summaries the O&M division prepares the water budget for each block.

After the hater issue dates are decided at. the kanna (cultivation) meeting which is held to decide the cultivation calendar, the headworks engineer' is informed by the O&M division of the dates and the requirements. When the water issues begin, deliveries to the offtakes from DC 7 to DC 23 under Embilipitiya Block are made under the direct. supervision of the technical officer for the right bank canal. Water deliveries to Chandrikawewa and Binkama Blocks are made by the two field assistants under the super\-ision of this technical officer. After the initial month of issues for a season, water issues for land preparation rotations are introduced among the direct offtake distributaries.

Technical officers play the major role in distribution. However, the irrigation engineer for operations is kept. informed of the daily operations. Operations are closely monitored and gauge readings are taken daily and recorded. However, there is little evidence that this information is analyzed or used for management purposes. Any changes necessary in the deliveries to the blocks are requested by relevant block level irrigation officials directly from the project O&M division. Sometimes, minor adjustments are made informally through the technical officers or relevant field assistants.

At the end of each season, a project-level performance summary report is prepared h- the O&M division and is forwarded to the head office of the Mahaweli Economic Agency. This report includes a summary of bulk water releases from the reservoir and es-sluice duty of water.

The block level crop planning summaries which are used by the O&M division to prepare the water budget are prepared by the block irrigation .engineers, using information provided by the unit managers. We note that there is very littl.e difference between the two seasons of the year and therefore there is not, much difference in reported water allocations for each season. Usually the crop planning summaries sent. by the irrigation engineers serve little purpose in deciding the water allocations, due to delays i.n forwarding them. These are therefore based on past records. But this water budget is flexible.

Block Level Management Structure: Chandrikawewa Block

The irrigation engineer is responsible for water distribution within the block. Although nominally under the block manager, he actually reports to the chief irrigation engineer in charge of the O&M division.

'. The headworks are managed by a separate unit within the Mahaweli Authority of Sri Lanka, and are not under the resident project manager.

The operation at the block level is limited to the Chandrikawewa Branch Canal and its various offtakes, to the field channel level. As shown in Figure 2.33, the irrigation engineer is assisted by two engineering assistants; one is assigned to distributaries 1 t.o 16 and the other for the remaining distributaries including those under the Mamadala Branch Canal.. The responsibility for internal distribution on distributaries is entrusted to 13 field assistants under the supervision of engineering assistants. A technical officer is assigned the responsibility for deliveries to the distributaries from the branch canal. He is assisted by an irrigation laborer. Ten irrigation laborers are appointed for the distributaries where internal rotations are implemented under field assistants who operate field channel gates.

Block Level Operation Pattern

Water deliveries to the Chandrikawewa Branch Canal from Chandrikawewa reservoir are under the control of the project O&M division. Water deliveries to the distributaries are made on a pre-scheduled rotation system. During the rotational issues to the tail-end distributaries. on Sunday, Monday and Tuesday, the branch canal deliveries are increased in order to give adequate supply to the tail-end. In longer distributaries, water issues are rotated among the field channels. Field channel rotations are implemented in DCs 6, 8, 10, 15, 17, and 18. The rotations operated in DCs 8 and 18 are not significant since only one field channel gate is closed in each for one or two days to increase the volume of water to the tail-end of the particular channels. Rotational issues are started two weeks after the initial water issues and a separate rotation is operated during the land preparation period with more days of issues to all distributaries than in the normal rotation. Usually the distributary and field channel rotations are not flexible unless there are serious irrigation problems.

There are calculated quantities of water to be released from the branch canal to the distributaries but the actual release is more as the system is defective and irrigation efficiency is low. There are no gauges for some distributaries (DCs 1, 10, 12, and 13) -- most were removed by the farmers to get more hater. The gauge readings also do not indicate the correct figures as the canals are silted up and there has been no recent calibration of the structures. Readings are taken daily but they are not analyzed and utilized.

Control of water deliveries between the branch canal .and field channel levels rests with the branch canal technical officer, who is responsible for water deliveries from the branch canal to the distributaries. He is the key figure in system operation in Chandrikawewa Block. System operation to the distributary' level has become his responsibility by default given the lack of involvement of.other officers. His role is so important that there were some instances when system operation was disrupted when he was on leave. Block level officers are involved in operations only whenever there are serious irrigation difficulties.

Further, in this situation of lack of involvement of field officers, the irrigation laborers have become the main figures in system operation below the distributaries. Under this informal structure for irrigation management the branch card technical officer is actually the key figure in system operation and the irrigation laborers, working directly under him, play the main role below the distributary level.

Doth the distributary and field channel rotations are rigid but some flexibility is sometimes introduced to cater to the needs of tail-end fanners. Decisions on the amount of water to be delivered and the area to be given water are decided by the technical officer on information provided by the irrigation laborers.

Though the branch canal technical officer is in fact the key figure in the operation of the system at field level, he lacks official authority. His authority comes from the block irrigation. engineer and block manager. Therefore, he feeds them information and advice if an important decision is to be taken. Despite his key role, the technical officer has had no training in water management; he operates using his own skills and experience. Technical advise on operation and maintenance comes from the irrigation engineer and engineering assistants. Decisions at. the block management level such as getting the services of 'field assistants comes from the block manager. On the other hand the block manager receives feedback on field level operations through the branch canal technical officer.

Rotations at Distributary and Field Channel Levels

The rotations presently found on a few distributaries were devised by field assistants about five years ago to try to reduce irrigation difficulties on the tail-end of these distributaries. Whatever the weaknesses in preparing them, such a rotational distribution of water gives some control over the water consumption of the head-end farmers while providing some assurance of water issues to the tail-end fanners. In some of the distributaries, the rotation is planned in a way to give water to the tail-end when the water deliveries are high in the branch canal. Apart from the rotations among field channels, there are. some instances of applying rotations within field channels, arranged either by the farmers or by the officers.

The present. rotation system in some distributaries is the only workable solution available to the irrigation officers to solve irrigation problems on such a dilapidated system. If it were not for the rotations operated in longer distributaries, serious irrigation difficulties would have resulted in the block under the present defective and neglected system.

However, the objective of devising this rotation system was to ease irrigation problems in the tail-end and not necessarily to ensure equitable distribution. Therefore, there is a wide gap in water consumption between the head and tail ends and there remain many irrigation difficulties in the tail-end of some of these distributaries.

For example, it is doubtful whether in **planning** the rotational issues the actual service areas under field channels are taken into consideration.

Another reason for this difference in consumption is the damaged head-end field channel gates. Most of the head-end field channel gates on almost all the distributaries are damaged; equitable distribution is very difficult under these conditions.

Constraints to Efficient **Water** Management

At the block level, there is no doubt that the dilapidated condition of the irrigation structures is a major constraint to efficient water management. In the last few years, the agency has not allocates sufficient funds for routine desilting and jungle clearing, which has aggravated the situation. However, we find that this situation is often used by officials to rationalize their lack of effort to improve management of water. In fact there are **many** serious managerial and organizational constraints, ***some*** of which lie behind the deterioration of the distribution system.

In most **seasons** serious water distribution problems occur in the tail-end distributaries while the supply is abundant for the head-end distributaries. Farmers in some field channels of tail-end distributaries do not receive water in ***some*** rotational issues. They find there is no one to assist them with their problems, so they have to wait until the nest rotational issue. The lack of officers' involvement in the field to assist farmers in water distribution is a serious problem. Further, there is no monitoring of the water distribution; therefore it is not possible to have any control over the distribution. Fanners' behavior such as illegal **water** tapping by head-end farmers is yet another constraint to efficient water management -- but it is a behavior fanners are often driven to by their inability to obtain water legitimately. Illegal opening of head-end distributaries during the rotational closure has become a general practice of the farmers.

Water distribution below the field channel level is the responsibility of the .farmers. There is no rotation and **all** the field outlets,are kept open continuously during the water issues; Farmers keep them open even if the fields are adequately irrigated and water is drained off to the drainage canal. This is a common feature in-distributary head-end channels; such operational losses are compensated with additional issues. Sometimes, fanners adopt their own methods such as building bush weirs across distributaries to head up the canal water level to irrigate their fields. There is **a** wide gap **between** the head-end **and** the **tail-end** in water use and usually the tail-end fanners receive water only after head-end farmers feel that they had received **an adequate** supply.

WATER MANAGEMENT IN Dc8 IN CHANDRIKAWEWA BLOCK

Physical Layout of the Distributary

DC8 is tho intensive sample for this research. There are nine field channels on this distributary, six on the left bank and three on the right. For easy reference they are named as RB and LB. Compared to other distributaries on Chandrikawewa Branch Canal, DC8 is one of the most dilapidated. Most of the structures provided in the original design are badly damaged and none are functioning; as a result the canal is seriously eroded. The upper part of the distributary is deep. Except for RBI there are no field channel turnout gates among the nine field channels. on the distributary. In addition to the official turnouts there are two or more unofficial openings in five field channels (LB2, LB3, LB6, RB2, RB3) through which the water flows into fields from the distributary, by-passing the official turnout.

In many places both the distributary and field channel bunds are very weak and narrow due to severe erosion and poor maintenance. About 48 farmers have direct farm outlets; six of them do not have pipes for outlets, so they irrigate by cutting or tunnelling the distributary bund. Along the distributaries and field channels, approximately 20 farmers (20 percent of the total) have no pipes for their outlets. They also use the same method for irrigation, i.e., cutting bunds. The 48 farmers who have direct outlets use wooden logs to block the distributary in order to raise the water level. Eight such places have been identified, each serving 5-6 farmers.

Operational Procedure

The Dc8 turnout is closed every Thursday and Friday during the season after, the first two weeks of initial issues. As there are no field channel gates, operating a rotation within CC8 is not possible, with the exception of RB1. Rotational operation of RB1 to provide estra water to the tail-end had been started by the field assistant, following suggestions by the farmers of RB2 and about sis fanners at the extreme tail end of 'the distributary, with the consent of the fanners on the field channel. Usually, the rotation starts about three weeks after the initial water issues but sometimes if the farmers of RB1 have not received adequate water it is not possible to start the rotation so early- since the rotation is introduced with the farmers' consent. Therefore most often the rotation *starts* after the land preparation. Under this rotation the field. channel is closed for two days, Monday and Tuesday. There is no one to monitor the distribution within the distributary.

Distribution Problems

DC8 receives an adequate supply in comparison to the tail-end distributaries but there are many constraints to equal distribution within DC8 itself. Usually the tail-end farmers do not receive their first water supply until at least. two weeks from the commencement of issues, and they receive an adequate supply only after the head-end farmers receive water.

Undoubtedly a major constraint to equal water sharing is the dilapidated irrigation infrastructure. The dilapidated system is not conducive to equal distribution; instead it is indicative of a permissive environment where farmers *can* adopt arbitrary and ad hoc operational practices.

The presence of direct farm outlets is another constraint to equal distribution of water. Farmers tho have direct outlets build wooden structures in the distributary to raise the water level. This practice adversely affects tail-enders, especially on RB2 and the extreme tail-end of the distributary. The head-enders however, have no other choice. Because of this practice by the head-enders, the tail-enders in turn have to seek their own methods for irrigation. Therefore, they irrigate at night by destroying the wooden bush weirs. On the following day the head-enders again rebuild the structures.

Unequal distribution among field channels is also common in DC8. The reasons are the lack of turnout gates and the breaching of distributary bunds. As a result, some field channels get extra water. LB2 and 3 illustrate this. The official turnout for LB2 does not function properly so the field channel is issued extra water through a tunnel under the distributary bund. In addition, it has the opportunity to capture the DC8 flow through another distributary breach. The situation on LB3 was also serious though it feeds only two allotments. The DC8 bund near this field channel had a break in it which helped it to capture extra water.

But underlying all these physical problems is a more fundamental problem: the lack of any management system either on the agency side or among farmers. Officer involvement in the distributary is low; organized cooperative farmers' management is minimal. Farmers are on their own.

There is almost no monitoring of the field level distribution, an important contributor to the unequal distributisn of water in the distributary. At the project level the system operation is closely monitored under the direct supervision of the irrigation engineer for operations. At the block level, system operation is monitored only in terms of deliveries to distributaries by the branch canal technical officer: there is little effective involvement of the other officers.

At the field level there is hardly any monitoring of the distribution and farmers adopt their own methods even at the expense of the others. There is very little incentive and demand far active involvement of field level officers for improving distributary performance. In this situation the relatively effective monitoring system at the project level is not replicated at the field level. The question is, should the project officers limit their activities only to the main system level in a situation where there are serious field level distribution problems?

The desirable extent of involvement of the agency in field level water distribution is the other question. There are no viable farmer organizations and farmer behavior is individualistic. Therefore direct

officer involvement at the field level, to fill the vacuum, may be a necessity. But it does not happen at present.

Present Pattern of Cooperation among Fanners

As discussed above, there is very little cooperation among the farmers in sharing water, for example in DC8. The farmers adopt their own arbitrary irrigation practices, which the dilapidated system permits. The head-end farmers allow the tail-enders ,to irrigate only after they feel that they have received adequate water. The head-end farmers keep the field outlets opened even if the fields are adequately irrigated and water is flowing into the drainage canal. In the distributaries where internal rotations are operated, the rotation is prepared in a way to allocate more water to the head-end farmers to satisfy them before diverting water to the tail-end. A block irrigation official said that the head-end fanners have to be satisfied first if the rotations are to be implemented. Still, if there is an irrigation difficulty head-end farmers violate the rotational issues. In these distributaries most of the head-end field channel turnout gates have been damaged by the farmers. In DC10 the gates of the first eight field channel turnouts have been damaged by the farmers. We observed that water is drained off to the drainage canal from those field channels due to continuous supply.

The rotations along the branch canal are also violated by the farmers of the head-end distributaries. Our observations during yala 1989 disclosed that the head-end distributaries (numbers 1 to 5) were opened by the farmers almost everyday, immediately after they were closed at the end of rotation; the irrigation laborer for the branch canal had to close them subsequently every morning. No padlocks have been fised on distributary turnout gate except for tK8 because the farmers break them. Some officials think that the farmers' arbitrary practices such as damaging structures might be a precedent for the future (post-rehabilitation].

The lack of involvement of the officers in field level distribution is another reason for these practices among fanners. This gives the farmers a free hand for any arbitrary practice; on the other hand they are forced to come up with their own solutions to problems in the absence of officials' assistance. During maha 1988/1989, some tail-end DC8 farmer damaged the structure near RB2 since the water flow below the channel was blocked. This action affected the farmers of RB2 so they completely destroyed the turnout structure. This was repaired by the agency in yala 1989 but again the farmers damaged it when they experienced irrigation difficulties.

Conclusions and Recommendations

1. In the previous section we had noted that the actual performance of the Mahaweli management system is below the potential of this system. In this section, we have shown that in addition, the present dilapidated physical system is another major constraint to its efficiency. But the dilapidated state of the physical system

is to a considerable degree a function of the failures of the management system; that is, it is a symptom, or intermediate variable. and not the underlying cause of poor irrigation system performance.

2. The present operational pattern is a loose management system, with little effort. being expended. The morale of both *the* project and field level officers is low. The new O&M procedures proposed by the foreign consulting firm is more labor intensive, and requires a high level of management control (see chapters III and VI). For example, the proposed careful weekly monitoring system will require a drastic change in the officers' behavior. The present management patterns and constraints must be recognized and addressed 'in future. It will be very important to motivate the field level officers to adapt to the proposed system through training, close supervision, and providing incentives.

3. The project O&M division has limited its activities only to the main system level. In view of the serious distribution problems, and the likely delays in implementing the rehabilitation, we suggest that it should monitor and supervise the block level water distribution, and provide any other assistance necessary. Moreover, we recommend a regular meeting of the block irrigation engineers convened by the chief irrigation engineer to evaluate the field level water distribution in each block. Block engineers should be encouraged to get more actively involved in day-to-day water management.

4. Though arbitrary irrigation practices are not uncommon among the farmers, one *can* also observe some farmer cooperation. The present rotations on some distributaries would not be possible without some cooperation among farmers. The rotation applied within LK8 was started by the field officers on the consensus of the farmers of RB1. Therefore, there is a potential for farmer cooperation but. only with the assistance and guidance of the officers. Active involvement of the officers is necessary in the present situation as well as in future improvement of the management. Therefore, active farmer organizations, farmer education, and active officer involvement at the field level will be necessary and is feasible for operation and maintenance of the rehabilitated system.

THE PLANNING AND DECISION-MAKING PROCESS

At the initial stage of planning for a new season, a tentative seasonal program is prepared after formal discussions between the project O&M division and the agriculture division. This program is prepared considering the availability of water, *seed* paddy variety, and time required to finish pre-seasonal maintenance and to complete the delayed harvesting of the previous season. As a next step the O&M division decides the dates to hold kanna meetings to confirm the cultivation calendar based on its tentative program.

While preparing the tentative program at the project level, two main activities, pre-seasonal maintenance of the irrigation system and farmer and officer training, are taking place on the block level. Pre-seasonal maintenance of irrigation structures depends on the allocations provided. The Mahaweli Economic Agency in principle does the maintenance up to field channel level and the farmers are responsible for the maintenance of the field channels. But farmers do very little maintenance work on their field channels aid the Agency also has no developed plan, and perhaps as a result, few resources, to get. the work done. Lack of faimer unity is the main constraint at the field channel level. Only some individual farmers clean patches of field channels if they believe it will help to divert more rater to their fields. Pre-seasonal farmer and officer training is held under the agriculture extension program mainly to convey estension messages relevant to the initial stage of cultivation.

Kanna meetings are held at the block level to formalize the decisions of the tentative program. They are open farmer meetings and mainly held to fulfil a legal requirement. Both project and block level officers participate in them. The cultivation calendar based on the tentative program includes the dates for first and last water issues, on-farm activities, and supporting services. Farmers usually object to these dates, often just to demonstrate their objections to the manner in which the decisions are taken. Kanna meetings are sometimes very lively affairs, with angry exchanges and accusations. The Agency too faces constraints on its.flexibility in approving alternative dates suggested by the farmers, as they have to prepare a program for the whole project. In the absence of clear alternatives on which all can agree, the officers get the dates approved by the farmers. Based on the dates "decided" at the iianna meetings, the O&M division prepares the final calendar. The agriculture section thew prepares a separate calendar to be distributed among the field officers. It contains time periods for specific agricultural. activities. It is a guideline for field officers for the oncoming season.

The annual Agriculture Implementation Program prepared by the agriculture section as required by the Ministry of Agriculture to prepare their island-wide program, serves as the agriculture production plan for the project. It is a block-based program prepared based on the data given by the unit managers. Apart from this there is no seasonal program. Resides this plan, the agriculture section also prepares an annual extension program on the stress points of the estension messages to be given to the faimers.

Conclusions and Suggestions

1. We suggest the whole decision-making process in commencing the cultivation season is faulty. It is a top down process with no involvement from the field level officials or faimers. On other systems in Sri Lanka, there is a consultative process through "pre-kanna" meetings with farmer representatives and field level officials. This has rationalized the decision-making process on major irrigation systems to a large extent, avoiding the conflicts

and recriminations characteristic of previous kanna meetings (Murray-Rust and Moore 1983). No such pre-kanna consultations occur in Walawe -- indeed with whom would the Agency consult, given the lack of organized farmer groups?

Therefore, we recommend substantial farmer participation in the decision-making process though active farmer organizations. Our recommendations on fanners' organizations are given under the section on "farmer organizations" below. The decision-making process should move from the fanner level upwards to the project level -- a bottom to top process, including the pre-kanna meetings characteristic of other systems in Sri Lanka. Efforts should be made to train the farmers in the factors and logic behind the recommended cultivation calendar, so that it would seem less arbitrary than it does at present.

2. The coordination between the two divisions of O&M and agriculture in preparing the initial tentative program is limited to verbal communications. It is not even discussed at the staff meetings. In preparing the schedule to hold the kanna meeting for the approval of the resident project manager, the O&M division holds no preliminary discussions with the agriculture division though deciding the cultivation calendar is very much a concern of this division; in fact both are equally responsible. The resident project manager is the person who should coordinate these two divisions' collaboration with each other, and with the fanners.

IMPLEMENTATION OF THE AGRICULTURAL PLAN

The dates of the cultivation calendar are taken as the implementation targets for the seasonal cultivation. However, this calendar is usually difficult to follow, and the season normally continues about one month beyond the planned last date. This is mainly due to delays in land preparation which continues at least six to eight weeks.

Irrigation difficulties are the main reason for the slow progress in land preparation, particularly in the tail-end distributaries. The reasons for these irrigation difficulties are discussed above. It was observed that during the maha 1988/1989 and yala 1989 seasons some field channels of tail-end distributaries had still not received water four weeks after the initial. water issues that were made on 15th April. In the same season nearly 40 percent of the farmers in DC18 who are in the tail-end had not received water one month after this initial supply.

Though continuous issues are the normal expectation at the initial stage of land preparation, rotational issues usually have to be started after two weeks. In addition, additional water issue days are added for the head-end distributaries in the rotation schedule for land preparation, to insure they- do not disrupt deliveries to the tail. If the branch canal deliveries are not increased to compensate for this, more delays result in the tail.

Further, the farmers, particularly at the head-end, usually take estra days to finish land .preparation since they know the cultivation calendar is flexible. In fact, the delay in land preparation in the head-end distributaries can be attributed to some estent to the abundance of water. There is no reason to hurry. Most of the farmers who delay land preparation in DC8 are leased-in farmers who feel no obligation or commitment to follow Mahaweli Economic Agency decisions. Some other reasons for the delay include difficulty in obtaining hired tractors, lack of initial capital to pay for hired tractors, and personal problems such as death of relatives, or illness.

Conclusions and Suggestions

1. From the beginning of implementation of the cultivation plan both the agriculture and O&M sections **work** as separate units. Even in difficult situations, for example in relation to irrigation, there is no concerted effort to overcome them. This results in further delays. Timely cultivation is one of the objectives of the agriculture section, but no concerted effort is made to achieve this while the progress in cultivation is delayed mainly due to irrigation difficulties.

   We recommend a joint effort of these two sections to achieve the objective of timely cultivation. The agriculture section can prepare weekly progress reports and discuss them with the O&M section for adjustments in the water allocations. This *can* be done on both the block and project level. This would also enable improved monitoring of the progress of cultivation.

2. An important factor is the lack of farmer participation in the decision-making process at the initial planning stage of the cultivation season, as discussed above. The cultivation calendar is usually decided beforehand by the agency, and only the formal "agreement" of the farmers is obtained at the kanna meeting to ratify the agency decisions. As a result of their lack of participation, they feel no compulsion to adhere to the cultivation calendar.

3. Finally, the lack of discipline at all levels is inimicable to good water management on a major irrigation scheme. The Agency must begin with its own staff, and through farmers', organizations work with farmers as well to develop a more disciplined approach to irrigation management at Walawe. Within the Agency, another word for "discipline" is "performance control."

PERFORMANCE CONTROL

Given the lack of any alternative controlling mechanism to asses performance, the cultivation calendar has become the principal controlling tool to asses progress during the plan implementation. Completion of the cultivation season according to the dates of the *cultivation* calendar is

one objective during plan implementation; therefore the dates of the cultivation calendar are taken as the targets.

However, seasonal progress is not monitored regularly to achieve this. In the Mahaweli management system, the weekly block meeting is supposed to be used for this, but is not. There are no discussions of weekly progress at this meeting. At the project level, the monthly staff meeting is supposed to be the place to monitor and evaluate the progress at, block level, but this does 'not take place either.

While implementing the agriculture program, information is collected on the monthly progress in agriculture but it is not used to monitor and evaluate performance. Performance is evaluated based on the totals from these reports only at the *end* of the season. The performance of field level water distribution is also not monitored and evaluated, as noted above. It is therefore not possible to take corrective actions during the season; the only control is by exception. The overall system performance of the project is evaluated based on productivity (per ha) and the water duty.

For the personnel, there is also no clear performance standard to enable objective evaluation. Many staff members have not been given job descriptions. Performance cannot be assessed objectively without job descriptions. The performance of the field level officers attached to agriculture, block agriculture officers, and especially unit managers is evaluated at the end of the season based on whether extension targets were met. At the beginning of the season each unit manager is given extension targets, i.e., number of demonstrations, field days etc., and they are required to submit monthly progress reports. At the end of the season their performance is evaluated based on achievement of these targets. But this has no real impact; whether their performance is *found* to be unsatisfactory or exceptional is immaterial to their career prospects. This is true for other officers as well. There is a complete lack of performance evaluation of the field assistants and other block level officers of the O&M section. It is no wonder their performance level is generally low.

Conclusions and Recommendations

The level of performance of personnel is low as their performance is not monitored at any level. We believe that particularly the field level officers' performance *can* be improved if their activities are monitored by their respective supervisors. *For example, the performance* of field assistants can be improved if they are motivated and their performance is monitored by their respective supervisors. In turn the project level officers can monitor the performance of block level officers. What is lacking is motivation from senior officers to be more involved in their field work.

Therefore, we recommend that block level supervisors monitor the performance of the field level officers, and that the project level officers monitor the performance of the block level officers. The O&M

division should closely monitor the performance of the block level officers and not limit its activities to the main system level. Necessary operation procedures and clear job descriptians should be given to field level officers. In this way improved information as well can be collected for use by the management. This will facilitate adoption of improved O&M procedures during %he post-rehabilitation period.

COMMUNICATION AND INFORMATION FLOW PATTERNS

Communication is an interactive process to coordinate and integrate %he organization horizontally and vertically to achieve organizational objectives. The organizational structure of Walawe shows the vertical and horizontal paths of formal communication. The vertical communication path has three levels of management, project, block and unit. At these three levels organizational activities are, in principle, coordinated and integrated through horizontal communication.

Information Flow

The purpose of a management information system is to collect and interpret data for decision-making and control purposes. Information is used for both long term and short term planning. In the short term, timely information is necessary for quick decision making. Project managers basically use the formal field level information supplied by unit managers for these purposes. The unit managers submit monthly, seasonal, and annual reports as required by the functional heads.

For planning purposes, both the O&M and agriculture sections use the reports submitted by the unit managers on the expected crop plans, and past records. In principle, the O&M division decides water allocations based on the block-wise crop planning summary forwarded by block irrigation engineers. These are prepared based on the unit managers' reports. In fact, the hater allocations are usually based on historical data since these reports are not received in time.

The agriculture section prepares the annual implementation program based on the field level plans provided by the unit managers. Necessary instructions on preparing field level. plans, for example the extent of non-rice crops to be cultivated, are given by project management as decided by the agriculture section. Past records as well are used in preparing the project level plan. This plan is finalized at a meeting of block level agricultural officers convened by the deputy resident project manager for agriculture.

Information'pertaining to operations and distribution of hater is also necessary for decision-making and control purposes. However, the O&M division does not require any feedback of information on the field level distribution during the operational period. This is because in the present set-up it has no use for such information even if the information were collected. The O&M division collects only project level information. Any other necessary information is received informally through direct

contacts between the project and block level O&M divisions. Reports on daily issues and weekly progress reports during land preparation are maintained by the block O&M division but serve no purpose as these data are not analyzed. The project O&M division lacks such vital data as the correct estent of irrigated land. Even the block O&M section has no correct information on this. Without data field level control is not possible, and without control, no data comes or are needed.

The agriculture division collects monthly progress reports during the season, but again they are for recording purposes. Reports of the agriculture extension program are also collected and are used for controlling the performance of the extension program. The agriculture division has its informal information flow system within their ex-ension program and this information is used for decision-making and control.

To summarize, the following suggestions are offered.

1. The lack of feedback of information from the field level is the main weakness in the present information system; there is really no effective mechanism for information gathering; analysis, and use. The lack of feedback of information is a major constraint to efficient field level water distribution; at present it is not possible to evaluate the performance of the field level and to take any corrective measures.

2. In general, information is not exchanged regularly and effectively between sections for decision-making, except at some initial stages such as preparing the tentative seasonal program.

3. To have an effective information system, the data collected should be timely, accurate and relevant. The information collected from the field level most often is not timely *so* that it cannot be used for planning or controlling purposes. Further, the accuracy of the field data are not checked. Sometimes the field officers are not able to give correct figures due to practical problems such as not knowing the exact land extent.

Vertical Communication

Communication between the project level and the field level is expected to take place through the block manager. He represents the functions of the sections to the project level. And from the project level, communication goes through him to each block level officer.

Apart from memoranda and telephone conversations, meetings held in the three levels of the project serve as important communication media. At the project level, the monthly staff meeting is an important communication instrument between the project and block level. Project and block level information is expected to be interchanged at the meeting. Further, it is expected that messages and orders from head office will be passed down to the block level at the meeting; information from the block level is forwarded upward.

The weekly block meeting serves as the most important communication center between block and unit levels. Messages, information, instructions, and decisions from the project and unit. levels are expected to he interchanged at the block meeting.

Communication between the farmers and the agency takes place through the unit level. officers. Communication is through three media: personal contacts, notices, and farmer training classes. Of these, farmer training classes are the most important in the communication flow between the agency and fanners. Apart from being farmer training classes held under the agriculture extension program, these are forums for the faimers to present their problems to the officers and for the officers to convey messages and other information to the fanners.

Though the meetings do serve as important communication centers, they are not always effective. Sometimes decisions taken at the project level do not come to the field level. For example, a decision was taken at a staff meeting held during the yala 1989 land preparation period to grow three month rice varieties where land preparation was delayed, as a mean of saving hater. . But this decision did not come to the field level and none of the farmers whose land preparation was delayed in DC8 grew a three month variety. Sometimes block level decisions as well are not communicated to the farmers, as seen whenever rotational rater issues to distributaries are changed due to some irrigation difficulties. Farmers interrupt the new operation plan as they are not aware of the change. Finally an important reason for the poor communication between farmers arid the agency is the low level of contact between the farmers and officers.

Sometimes there is also very little upward communication through these meetings. There is no procedure to document topics discussed at the farmer meetings or issues that come up in personal contacts with the 'farmers, and to forward them to the block level. Only those remembered by the unit managers are discussed at the block meetings. The block meetings are also not well organized. There is no formal agenda, and discussions are mostly limited to the weekly activities of the block. No reports or minutes of the block meetings are forwarded to the project level. At the project level staff meeting, the discussions are limited to the monthly activities. Without proper recording the block managers are not. in a position to forward correct information on the field situation.

Though formal communication between the project and field levels is through the block manager, some communication also takes place within functional sections between project and block levels.. An agriculture meeting conducted by the deputy project manager for agriculture with the project. and block agricultural officers is one such medium of vertical communication flow. It is usually a monthly meeting, at which information and instructions are given by the deputy project manager (agriculture) to his subordinates, and some feedback of information occurs from the agricultural officers to the deputy resident project manager for agriculture. The officer training program is another area for

communication between these two levels. These two mechanisms fill some gaps in the vertical communication flow within the agriculture section.

There is direct communication within the project and block O&M division as well, whenever there are irrigation problems or technical matters requiring discussion. But there is a big communication gap between the farmers and officers. Changes in rotational issues are not. communicated to the farmers. Fanners' irrigation problems do not come to the block level unless they are very serious. Only on those distributaries where irrigation laborers have been appointed, are there regular contacts with the farmers on irrigation matters.

Horizontal Communication

Effective horizontal communication should promote integration and consistency among line functions. The functional heads use inter-office memoranda and informal contacts to communicate with each other. Again, staff meetings can be taken as potentially important for horizontal communication between the sectional heads. At the staff meeting all the sectional. heads are expected to discuss and agree on collaborative actions.

However, the expected integration does not take place at the project level as each section tries to achieve its own narrowly defined goals rather- than making a concerted effort to achieve larger organizational goals. Given this narrow focus, inter-section communication is minimal. Each section works as a separate unit detached fromthe others. Gne finds conflicts among them rather than collaboration. For example, in an exchange of articles in a national newspaper (The Island of 20 June and 2 July 1988) the deputy resident project manager and the late chief irrigation engineer expressed conflicting views on the key factors underlying the performance of the Walawe system (IIMI 1988b:22).

No other section cooperates with the present fanner training program conducted by the agricultural section. At the staff meetings, these divisions and conflicts become explicit. For example, at staff meetings the O&M and agriculture divisions blame each other for .irrigation difficulties or delays in cultivation though these are a collective responsibility.

At the block level, formal horizontal communication takes place principally at the block meetings: otherwise communication is informal and not always effective. There are occasional discussions on specific issues relevant to respective sections but collaborative action is only rarely taken. At the unit level, unit managers and field assistants are expected to meet to communicate with each other. But the field assistants work independently under the irrigation section and are not responsible to the unit manager for their work. Contact between them is minimal. The only place they meet each other regularly is at the weekly block meeting.

Conclusions and Recommendations

1. An effective comprehensive communication flow between the sections and up and dorm the management levels is required for the efficient functioning of the present matrix management system. Such a communication flow requires more collaboration and cooperation between the sections and management levels than one finds *at,* present.

2. At the field level, communication between the farmers and officers is very poor. At farmer meetings the attendance is low and the views of the majority are not represented. Officer-fanner relations have to be improved with more frequent contacts with the fanners. We recommend converting the farmer training classes into multi-disciplinary participatory training programs with the participation of block level sectional officers to improve communication at the field level. At present farmer attendance is low but *can* be improved with more involvement of the officers, and by consulting farmers on the topics they wish addressed at these meetings. The proceedings and matters discussed can be recorded for presentation at the block meetings. In the same manner the unit managers and field assistants could record problems encountered in the field level to be discussed at the block meeting. We discuss the faimer training program in more detail below.

3. The proceedings of the block meetings should be improved as a place where collaboration among sections is initiated and nurtured. We suggest that the field level problems and issues recorded by unit managers and field assistants be discussed at the block meetings. These proceedings should also be properly recorded in the form of minutes, and forwarded to the resident project manager. The block manager could also convene inter-sectional meetings with his subordinates more frequently to enhance communication. At these meetings each party can bring problems relevant to his section to the attention of the unit. managers and seek alternative solutions.

4. Problems not attended to by the sectional heads which are mentioned in block meeting reports *can* be discussed at project level staff meetings. These should be held more frequently. The resident project manager's deputies can recommend appropriate solutions. The horizontal communication pattern should also be enhanced at the staff meetings by building and encouraging a sense of teamwork. Further, some separate meetings of' the sectional heads chaired by the resident project manager would be very useful for improving horizontal communication flow.

5. The position of the block manager is weakened under the present management system if communications, for example on technical matters, takes place through the functional sections and bypasses the block manager. To improve the integration of the sections, we recommend that important information be communicated through the

block manager. This would contribute to strengthening his authority as a strategic manager, as recommended above.

FARMER ORGANIZATIONS

Attempts to Establish Water Users' Groups

Before the concept of farmer organizations was introduced under the rehabilitation program in 1985, there were no effective farmer organizations in Walawe[5]. The Mahaweli Economic Agency attempted to form about 21 fanner organizations in the 1986/1987 maha season. But this attempt was not successful. A major reason for this failure is the lack of well-defined specific objectives and attractive functions to convince the farmers of the necessity of having their own organizations. Although the main objective of forming groups was to turn over the O&M of field channels to the farmers after rehabilitation, no farmer involvement in the on-going planning stage of the rehabilitation was sought. The Mahaweli Economic Agency finally decided to suspend the activities until construction started.

In 1988, with the commencement of the implementation of construction activities, the Mahaweli Economic Agency decided to re-initiate the formation of water user groups. One agricultural officer with previous training in organizing farmers and in training methods was assigned the responsibility of foiming them. About three months later, three unit managers, two for Embilipitiya Block and one for Chandrikawewa, were assigned to assist him. Rehabilitation implementation activities were to be used as a vehicle to convince the farmers to form water users groups. Farmers were told that they could have a major role in implementing the rehabilitation project. This aspect is discussed in more detail in Chapter VI, below.

Methods of Organizing Groups

1. As the initial step in organizing farmers, group meetings of farmers under each distributary of Embilipitiya and DCs 1 to 10 in Chandrikawewa Blocks were convened, and farmer representatives were selected for each field channel. This was carried out as a rush program.

2. Next, the officials in charge of water users' groups organized training sessions for the farmer representatives. They were told that the success of about Rs 570/= million (about £16 million at the rates then) worth of rehabilitation would depend on farmer organizations. This helped to create pride among the farmers. The officials suggested the farmer representatives should do formal

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[5]. We do not know the basis for the statement in the Appraisal Report that such groups existed when the present project was being formulated; see chapter VI).

supervision of the rehabilitation construction activities. This helped to stimulate interest among the farmer representatives in the water users groups.

3. In addition to classroom training, the unit managers assigned to this work met the farmers informally and trained them. Farmers were taken to the headwords in Agency vehicles and introduced to the headworks officials, who explained the operation system of the reservoir. These steps helped to win the confidence of the farmers.

4. Farmer representatives were treated as invited guests at ceremonial functions organized by the Mahaweli Economic Agency, which further helped to create'pride among the farmer representatives and to build social contacts between them and the officials.

Effectiveness of the Water Users' Groups

There is no doubt that .theeffort to organize fanners' organizations was initially having some impact. For example, educating the farmers on the new design criteria resulted in better understanding and increased interest among the fanners in the work. Further, with the farmers' increased .interest in the rehabilitation process there was active involvement in the supervision of the work. Farmers brought numerous complaints regarding poor quality of the work, resulting in some changes in construction supervision (but also some unhappiness about fanners looking over the engineers' shoulders).

However, there were some serious weaknesses in this effort. 'These include the following.

1. Lack of an integrated approach towards the Later users' group program. The responsibility for organizing groups throughout this large project was given to one officer with no contribution from existing officers. Contributions of other sections for the development of'the groups were not sought or used. This is true for the block level as well. In our interviews with the block and project level sectional heads and their subordinates on farmer organizations, they spoke positively of the idea of forming farmer organizations, but none were informed on the position of the groups being formed. Some of them claimed they had no idea; what a water users' group is.

2. Related to the lack of involvement of other Agency staff was the lack of resources provided for the effort. In other projects in Sri Lanka, substantial efforts have been invested in providing personnel and proper supervision for promoting farmers' organizations (for example in Gal Oya, and the Irrigation Systems Management Project in Polonnaruwa). One man with a jeep is hardly sufficient for promoting substantial changes in attitudes and behavior of farmers and officials. The lack of resources perhaps was a signal to farmers and Agency staff that this program did not really have the priority that speeches suggested.

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