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Effectiveness Of Nongovernment Organizations in Developing Local Irrigation Organizations

Effectiveness of Nongovernment Organizations in Developing Local Irrigation Organizations

A Case Study from Sri Lanka

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and

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IIMI

INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE

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Cover photograph by Douglas J. Merrey: Farmers desilting a field channel.

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Foreword

THIS BOOK IS an expansion of a study conducted as one of a series of studies commissioned by the International Irrigation Management Institute (IIMI) under its cooperative agreement with the United States Agency for International Development (USAID) (number 383-0080-A-PG-7040-00), to manage the research component of the Irrigation Systems Management Project in Sri Lanka.

This study is important not only because of the light it throws on nongovernment organizations (NGOs) working in the field of irrigation management in major schemes in Sri Lanka, but also because it analyzes this experience to show the policy implications for Sri Lanka and to point out that the implications are for NGO programs anywhere in the world.

Two of the authors of this book—Karunatissa Athukorale and Kusum Athukorale of Associated Development Research Consultants—carried out the original field research and wrote up the findings of the original study. The third author—Douglas J. Merrey—conceived the original study and contributed the theoretical underpinnings and analysis of the implications of the field study findings.

I expect that many persons, outside as well as in Sri Lanka, will find the discussion illuminating and useful.

Jeffrey D. Brewer
Social Scientist

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THIS PAPER IS the result of collaboration originally between the International Irrigation Management Institute (IIMI) and Associated Development Research Consultants (ADRC), whose principals are the first two authors. ADRC carried out the original study under a contract with IIMI, at the time when the third author was the Head of IIMI's Sri Lanka Field Operations. The three authors felt that the results of the original study, though controversial, were sufficiently important and useful to be presented to a wider audience interested in the role of nongovernment organizations in improving irrigation management institutions.

The study could never have been completed without the support, encouragement, and active assistance of a wide variety of people and institutions. The field research and this publication were made possible by the financial support of the United States Agency for International Development (USAID) through its cooperative agreement with IIMI, number 383-0080-A-PG-7040-00. This agreement enabled IIMI and its collaborators to manage the research component of the Irrigation Systems Management Project. This was a project in which USAID assisted the Government of Sri Lanka to further test cost-effective methodologies for rehabilitating irrigation systems, organizing farmers and developing a more effective participatory management system; strengthen the capacities of the Irrigation Department and Irrigation Management Division for irrigation management; and implement improvements in six major irrigation systems in Polonnaruwa, Kurunegala, and Ampara districts.

The research component of the study was guided and coordinated by the Project's Research Advisory Committee, whose members, drawn from IIMI, USAID, the Irrigation Department, the Irrigation Management Division and the consultants on the Project (Sheladia Associates Incorporated), were very supportive of the study and critically analyzed the findings. The Mahaweli Economic Agency, though not part of the Research Advisory Committee, was very cooperative and helpful in the study implementation. We are therefore grateful to all of these institutions for their support.

We are also grateful to the nongovernment organization, the Nation Builders Association, which was both subject and participant in the study. We were very impressed by the dedication and hard work of the Association and its staff. They remained very cooperative and helpful throughout, even when they realized that they might not agree with some of the findings. We should emphasize that the Nation Builders Association has commented critically and in detail on the early drafts of the original study report. We took its comments seriously, and responded to many of them. Nevertheless, the Nation Builders Association does not agree with all of the results presented here.

One individual needs special mention, Mr. N. G. R. de Silva. Mr. de Silva was the guiding hand of the Nation Builders Association's two projects that are analyzed in this study. He has played a key role for many years in furthering the development and implementation of participatory management of Sri Lanka's irrigation schemes. At the time of the study he was the State Secretary for Irrigation; before it was completed he took over as the Director of the Irrigation Management Policy Support Activity (IMPSA). He is currently the Managing Director of the Mahaweli Economic Agency, where he is trying to implement many of his ideas throughout the Mahaweli areas. Mr. de Silva was very supportive and helpful in the implementation of this study, though he too does not agree with all of the results.

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We also thank the participants who helped with valuable comments on the draft final report to IIMI at the workshop held at IIMI, Colombo on 15 June 1990. Finally, we thank the most important contributors—the farmers, farmer leaders and the key informants in Nagadeepa, Pimburettewa and Dewahuwa. But with all this help, we, the authors, remain solely responsible for the contents of this study.

Karunatissa Athukorale
Kusum Athukorale
Douglas J. Merrey

Executive Summary

THERE IS A widespread belief that nongovernment or voluntary organizations (NGOs) have the potential for playing an extremely important role in social and economic development. A number of such NGOs have been active in Sri Lanka as well as other countries in various sectors, including improvement of irrigation management. But there are very few detailed studies evaluating their effectiveness, or analyzing their relative strengths and weaknesses. This paper is intended to contribute to filling this gap by presenting a detailed case study of two programs to improve irrigation management through promoting participatory management of major irrigation schemes implemented by one NGO, the Nation Builders Association.

This paper reports on a detailed sociological study carried out as the NGO (or change agent) was completing three-year projects in two sites, Nagadeepa and Pimburettewa. The study describes the change agent's strategy, and analyzes its impact and the perceptions of farmers and government officials regarding its impact. The case study is placed in a wider context, in terms of both the participatory management policy of the Government of Sri Lanka, and the lessons learned that are relevant for NGOs working in other countries as well.

Overall, the study concludes that while the change agent did have an important impact in both irrigation schemes, it did not achieve all its objectives, and the changes introduced did not prove to be as sustainable as had been expected. In both systems, farmers clearly had an improved knowledge of irrigation management and a higher awareness of its potential importance, but the impact on the actual water delivery or agricultural performance was minimal. Similarly, while most farmers were supportive of the concept of farmers participating through their organizations in the joint management of the systems, the actual success and sustainability of the joint management systems introduced were less than anticipated. There is evidence that overall, the responsiveness of government officials to farmers' needs improved, but again this did not clearly translate into improved system performance.

The study attempts to explain the mixed success of the change agent in these two schemes. It documents a number of strategic choices made by the change agent which the authors believe were mistakes, particularly in terms of having had too great a hand in the choice of farmer representatives, and in terms of creating conflict between farmers and officials. It is also important to note that the programs were implemented in the context of political violence which characterized Sri Lankan rural areas in the late 1980s, and that three-year projects are not by themselves adequate for achieving long-term institutional change.

Notwithstanding the mixed success of the change agent in these two sites, the program did contribute to the overall evolution of the participatory management policy and strategies of the Government. Consistent with other studies of NGOs working in irrigation management in Sri Lanka, the study offers a number of suggestions if NGOs are to play a useful role in the future. These include the need to develop a higher degree of professional expertise not only in terms of the technical aspects of irrigation, but in terms of planning, implementing, and monitoring social change projects; the importance for an NGO to have a vision that is practical and achievable, rather than one based on romantic ideologies; and the importance of a long-term program approach, as opposed to contractors for time-bound projects.

Finally, NGOs must face the question of whether they wish to be involved in routine implementation of programs, with the dangers of their becoming less flexible and innovative; or whether they wish to focus on social experimentation, which may produce important innovations but has higher risks of failure and marginalization. The answer to this question has implications for another important question, the relationship between the NGO and the government: An NGO which works closely with the government faces the danger of becoming a "captive," and losing its innovative character, but may also have a greater opportunity to have a major influence on government policy. Ultimately, there is great potential for NGOs to make significant contributions to help people create a more just and viable society.

CHAPTER I

Introduction

SEVERAL YEARS BEFORE this study was done, a representative of Nation Builders Association took one of the authors on a field trip to Nagadeepa to observe the institutional change activities that had been initiated. The "change agent"[1] at that time extended an invitation to the International Irrigation Management Institute (IIMI) to carry out research on its program. The opportunity to do such a study became possible with the support of the Government of Sri Lanka and the United States Agency for International Development (USAID), through the research component of the Irrigation Systems Management Project. With the concurrence of the Project Research Advisory Committee and encouraged by the change agent, IIMI contracted with Associated Development Research Consultants (ADRC) to carry out a field study of the Nation Builders Association's two change programs, one located at Nagadeepa, the other at Pimburettewa, both in the dry zone of Sri Lanka. ADRC subsequently carried out the field study and submitted a final report (ADRC 1990).

The main focus of ADRC's original report is on understanding the nature of the changes that occurred at Nagadeepa and Pimburettewa, and the reasons for these, as a basis for recommendations for further institutional strengthening work in these two irrigation schemes. The present paper draws heavily upon this report for its data, but attempts to put the results into a broader context, and to draw conclusions more broadly relevant to understanding the potential contributions of nongovernment organizations in strengthening irrigation management institutions in Sri Lanka and elsewhere.

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1 For the remainder of this paper, we use the term "change agent" to refer to this organization. Our purpose is to avoid any impression that this is a critique of the particular organization involved; and the term also reflects the Nation Builders Association's own perception of itself.

It is important to note here that Nation Builders Association's objectives were different from the objectives of other nongovernment organizations working in irrigation schemes in Sri Lanka in one key respect: while the others emphasize as their objective the achievement of their targets in terms of number of systems renovated and people assisted, Nation Builders Association had a clear additional objective of demonstrating the benefits of participatory management, learning lessons on how to do it better, and influencing public policy. Thus, in the concluding chapter, we return to the question of the contribution of its efforts to achieving these broader objectives. In the main body of this paper, we analyze its program by the more mundane and immediate criteria of its achievements and impact in the two systems, Nagadeepa and Pimburettewa.

This chapter briefly describes the Sri Lankan policy context of the study, the objectives of the study and research methodologies used, and also briefly describes the two irrigation schemes, Nagadeepa and Pimburettewa, where Nation Builders Association worked.

PARTICIPATORY MANAGEMENT

Since the end of 1988, "participatory management of irrigation schemes" has been the official policy of the Government, set out in a Cabinet Memorandum dated 1 December 1988.[2] This policy was adopted after nearly a decade of experimentation with organizing farmers, involving farmers in irrigation system rehabilitation and operation and maintenance, training in water management for both farmers and officials, a large number of workshops, and considerable research on the issues involved.

One stream of experimentation involved long-term support from a donor, the United States Agency for International Development (USAID), and partnerships between Sri Lankan specialists and institutions and outsiders (Merrey 1991). From 1979 to 1985, USAID assisted the Government of Sri Lanka in developing innovative cost-effective ways of rehabilitating irrigation systems on the left bank of Gal Oya, then the largest system in Sri Lanka. A very important component was the program to organize farmer organizations using trained "catalysts" called "institutional organizers." This

2 See Appendix I of Jayawardena (1990) for the text.

began as an attempt to induce farmers to contribute free labor, but evolved into an ambitious effort to experiment with setting up strong farmer organizations at the base levels, and a joint farmer-government management system at higher levels. The Irrigation Systems Management Project, also supported by USAID, carried this work further in the four major schemes in the Polonnaruwa District, and on the right bank of Gal Oya.[3]

Another equally important if less visible stream of experiments has been purely indigenous, with no foreign involvement. These include the program on Kimbulwana Oya Scheme implemented primarily by a dedicated Technical Assistant of the Irrigation Department, with modest support from the Department (Gunadasa 1989), and another one at Minipe (de Silva 1985). At Minipe, the then Deputy Director of Irrigation for the Kandy range organized a joint management system based on farmer committees at lower levels, and joint committees at higher levels, to try to overcome serious operational problems faced by that system. At one point in the evolution of this effort, he used an indigenous nongovernment organization to assist in the process of mobilizing farmers.

The results of these and other experiments became more widely known as a result of a series of workshops and publications (for example, ARTI 1986; IIMI 1986; IIMI 1990a), and informal interactions (and friendships) among the people trying out these ideas. The Irrigation Management Division was established parallel to the Irrigation Department in 1984 specifically to promote integrated and participatory management on major settlement schemes. The Irrigation Management Division has played a key role in furthering the effort to develop more effective participatory management schemes.

More recently, the Government of Sri Lanka has completed a two-year effort to further refine and operationalize its participatory management policy, and create a broader consensus on this policy. This effort was called the Irrigation Management Policy Support Activity (IMPSA). With USAID support, a series of 10 policy papers, supported by over 50 working papers and refined through a large number of consultations and workshops at various

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3 The Gal Oya Project has produced a large number of publications; Uphoff (1992) provides a personalized overview of the program, while Murray-Rust and Merrey (1991) tries to evaluate the sustainability of the changes that occurred. The ISM Project, which supported this study, has produced a number of unpublished reports; its results are reported in Sheladia Associates Incorporated (1992).

levels, were produced (see Merrey, de Silva, and Sakthivadivel 1992; IMPSA 1992).

This paper reports on one of the important building blocks in this process of testing and developing strategies for participatory management in Sri Lanka. There are a number of nongovernment organizations (NGOs) working in small-scale irrigation in Sri Lanka, but Nation Builders Association is the only important organization that has worked on major schemes. The present study analyzes its experience in two systems, Pimburettewa and Nagadeepa.

IMPORTANCE AND ROLE OF NONGOVERNMENT ORGANIZATIONS

Nongovernment organizations, or "[private] voluntary organizations" as they are often called,[4] have been playing important relief and developmental roles in Sri Lanka and around the world for many years. In recent years, there has been a marked increase in their visibility, resources, and range of activities. No longer focusing primarily on relief, they are seen by many as complementary, and even as alternatives, to the "normal" or official development programs implemented by governments and international organizations. There are increasing numbers and types of NGOs both in the international arena (usually based in the richer countries), and in many developing countries; some of these NGOs are increasingly linked into a global network, and becoming more involved in policy issues, transcending their local roots (see Korten 1990; Clark 1990). Increasingly, international donors are also channeling resources through NGOs, on the assumption that they can promote local-level development and change more effectively than governments (Cernea 1988; Caroll 1992). Sri Lanka too has a large number of local and international NGOs working on a wide variety of issues (see ARTI 1991).

In the area of irrigation management, NGOs have played very important innovative roles in several countries, including Indonesia, Bangladesh and Nepal (Bruns and Soelaiman 1992; Wood and Palmer-Jones 1990; Pradhan et al. 1992), as well as Sri Lanka. A number of important Sri Lankan NGOs

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4 Various terms are used in the literature, including "private voluntary organizations" (PVO), "voluntary organizations," and "nongovernment organizations" (NGO). Some are not strictly speaking nongovernmental. Nevertheless, we use "NGO" which is the standard term used in international literature (Clark 1990; Korten 1990) and in Sri Lanka.

are working with communities in small dry zone irrigation "tank" (reservoir) systems, promoting grass-roots efforts to rehabilitate small irrigation tanks. These include Freedom from Hunger Campaign (FFHC) and the National Development Foundation (NDF). More recently other NGOs have entered this arena as well. IIMI's work has shown that while these NGOs are generally more effective than government departments at mobilizing community action for restoring irrigation tanks, they are often technically weak, leading to serious deficiencies in the rehabilitated systems; and more important, that the sustainability of both the physical and management systems is problematic (Dayaratne 1991; Jungeling 1989).

In principle, NGOs ought to be a powerful force for promoting local organizational development, and participatory management of local resources. They have many advantages, including flexibility in their operational mode, which should make them more effective at what Cernea (1988) calls "social capacity building" and also at learning from their experiences; their small scale and closeness to the communities with which they work should make them more responsive to local needs; and many NGOs are able to attract highly motivated and committed people to work for them.

Given the ambitious objectives implicit in the government's participatory management policies, there is a need to understand what are the strengths and weaknesses of NGOs compared to government, in strengthening farmer organizations for irrigation management. Are they inherently superior, as some literature would suggest (Korten 1990; Clark 1990), and therefore a viable alternative means to implement the program? What are the conditions that affect their performance? What should be the relationship between the NGO and the government? These are some of the broad questions to which this study contributes.

OBJECTIVES OF THE STUDY

The specific objectives of the present study are as follows:

1. To examine the strategies and methodologies adopted by the change agent in the project areas, including identifying related factors which affect the change agent's impact that were beyond its control, and factors which should be taken into consideration for future programs.
2. To assess the level of fulfillment of the primary aims of the projects and the real impact of the change agent in relation to institution

building, water management practices, water use efficiency and increased production.

3. To assess the degree of participation of farmer organizations in operation, maintenance and rehabilitation of the irrigation systems.
4. To assess the present level of functioning and likely sustainability of the systems through continued farmer participation in water management after the change agent's withdrawal from the project areas.
5. To assess the level of involvement of government agencies and their influence on project performance.
6. To highlight the level of acceptance by farmers of methods and strategies used by the change agent so that they can be incorporated into the further development of this model.
7. To draw broad conclusions on the potential future role of NGOs in institutional strengthening for irrigation management.

METHODOLOGY

A research design which includes both qualitative and quantitative data collection techniques was adopted in this study.

Selection of the Sample

Separate farmer and officer samples were drawn to collect quantitative data. In the farmer sample, the farmer leaders (representatives of field channels) were given priority; in the officer sample, the officers who were related to project implementation activities were given priority. If the study had adopted a simple random selection technique, very few farmer leaders would have been selected for the farmer sample. Therefore, the entire farmer population was stratified into four groups: ordinary farmers, field-channel representatives, distributary-canal organization chairmen and subproject committee chairmen.

All the subproject committee and distributary-canal committee chairmen, as well as at least two field-channel representatives and two to three ordinary farmers from each distributary-canal area, were selected for the administration of the questionnaire. The sample thus consisted of about 100 respondents from each location. Therefore, the sample is biased toward the

farmer organization leaders. The sample also had to reflect the variations between the head and tail ends of the irrigation systems. This was tackled by systematically selecting ordinary farmers and field-channel representatives from both head and tail.

Statistically speaking, other variables such as income, expenditure, and education of the farmer community should be automatically represented in the sample, since the ordinary farmers and the field-channel representatives were selected at random and the total population of subproject and distributary committee chairmen were included in the sample. The farmer sample size from both Nagadeepa and Pimburettewa is 206 (see Table 1.1). A sample totaling 44 government officers was selected from both study locations, because government officials were directly connected with the implementation of the project activities.

Table 1.1. The sample size of the questionnaire survey (numbers and percentages).

Category	Nagadeepa			Pimburettewa		
	Total	Sample	Percentage of total	Total	Sample	Percentage of total
SPC chairmen	5	5	100	5	5	100
DCC chairmen	17*	17	100	15	15**	100
FCC chairmen	91	40	44	74	30	40
Ordinary farmers	2,009	42	2	1,311	52	4
Total	2,122	104	5	1,405	102	7

* The total number should be 21, but four of the SPC chairmen are also holding the posts of DCC chairmen concurrently.

** The total number is 17 but one is an SPC chairman as well; the other died while the study was in progress and a replacement was not elected.

Notes: SPC = Subproject committee. DCC = Distributary-channel committee.
FCC = Field-channel committee (or group).

Data Collection Techniques

The following data collection techniques were adopted:

1. Indepth interviews and panel discussions with farmer representatives, community leaders and project and government officers. At the first

stage, these interviews were held to get basic information and at the latter stage, the interviews were geared towards clarifying and sorting out contradictory information provided by various groups.

2. Participant observation at field- and distributary-canal, subproject and project committee meetings and cultivation (*kanna*) meetings, and at some community activities.

3. Collection of data from secondary sources such as minutes of meetings, progress and evaluation reports, water issue charts, rainfall and land use records.

4. Two semistructured detailed questionnaires (one for the farmer sample and the other for the officer sample) which were developed in the field and after pre-testing were administered to collect quantitative data.[5]

5. The physical systems, especially the status of selected main and distributary canals and field channels prior to and after the cultivation season were systematically observed.

Data collection was carried out by four senior consultants and five research assistants. The latter were final-year undergraduates, three of whom were majoring in sociology.

Data Analysis

At the beginning of the field work, the data collected through secondary sources, interviews and participant observation were analyzed. Further steps of the study were directed and guided by these initial and ongoing analyses. The questionnaires were constructed in the field based on the initial data analysis. The data collected by both means were systematically analyzed after

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5 The questionnaire administered to the farmer sample asked for farmer identification and personal data; household information; savings and indebtedness and production data; income and expenditure patterns; awareness of, participation in and attitudes toward farmer organizations; leadership aspects; farmer training; perception of activities involving operation and maintenance of irrigation systems; opinion of the officers; knowledge of water management and agricultural practices; perceptions on crop water requirements; opinions on various aspects of the pre- and post-project status; and religiocultural ceremonies. A separate section was used to obtain data from field-channel representatives on the activities carried out by each field- and distributary-canal committee.

the field survey was completed. The major variables thus taken into consideration are of two types:

1. Qualitative information: the level of farmer-officer participation, motivation and efficiency, personality, leadership and attitudes.
2. Quantitative data: production, water use efficiency, land use, agriculture practices, rainfall, cultivation pattern, the number of farmer organization meetings held and participation in same and other related activities such as *shramadana*, income and expenditure patterns, and the opinions of farmers regarding the farmer organization system and other issues.

Study Limitations

The team experienced methodological problems as well as disruptions to work schedules caused by the prevailing unrest in the country.[6] It would have been better to have started the study at the beginning of one cultivation season and continued field work till the end of that or the next season. The study was planned to cover at least one *yala* (dry) season; but because of factors beyond our control, the field work commenced only during the second half of yala 1989. Therefore, it was not possible to cover even one complete cultivation season.

The disruptions to daily life and the continuous violence experienced during this period had an adverse effect on the field work. The investigators were under considerable strain especially since travel between the locations and the field base in Kandy was quite dangerous. At least four times during field work, the investigators had to be withdrawn from the field due to upsurges of violence in the locations. This slightly affected the continuity of field observations, mainly in Nagadeepa.

Finally, another important problem was that secondary information such as minutes of meetings, schedules, land use records, and production figures were often not systematically maintained by the relevant organizations.

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6 During this period there was youth unrest in the country. A revolutionary group called the *Janatha Vimukthi Peramuna* (JVP) had started destabilizing the economy and the political system of the country. Many dead bodies were seen in the study locations during the field work.

STUDY LOCATIONS

This section provides a brief description to familiarize the reader with the study locations. Each study location covers an extent ranging from 4,000 to 6,000 acres (1,620-2,428 ha). The number of farm families at each location was estimated to be about 2,000. There were four types of organizations set up in both systems, namely, field-canal groups, distributary-canal committees, subproject committees, and project committees.

Nagadeepa-Mahawewa

Nagadeepa-Mahawewa is located 8-10 miles from the Mahiyangana Township on the Bibile road, in the Badulla District. Climatologically, this area comes within the dry zone, where an irrigated water supply is needed for systematic cultivation (see Figure 1.1).

This irrigation scheme was set up in 1969 in the Mapakada Division of the Irrigation Department with about 2,000 settler families, within an area of approximately 4,354 acres (1,762 ha) of cultivable land (JICA 1986). After the raising of the tank bund during 1974-1975, the reservoir now has a capacity of about 27,000 acre-feet (3,331 ha-m). The distribution network consists of 14 miles (22.6 km) of main channel, 19 miles (30.6 km) of distributary channels, and 57 miles (92 km) of field channels. There are 24 distributaries and 303 field channels in the system. Formerly, the scheme consisted of 13 tracts but at present only 11 tracts come under the project.[7] Each farmer was given three acres of rice land and one acre of high land. According to data collected by the change agent, about 3,000 acres (1,214 ha) of rice land had been cultivated for maha (wet season) prior to the commencement of its intervention. During yala, the fields were usually left uncultivated due to the shortage of water. Nevertheless, whenever water was available and where there was waterlogging, rice plots were cultivated even during the yala season.

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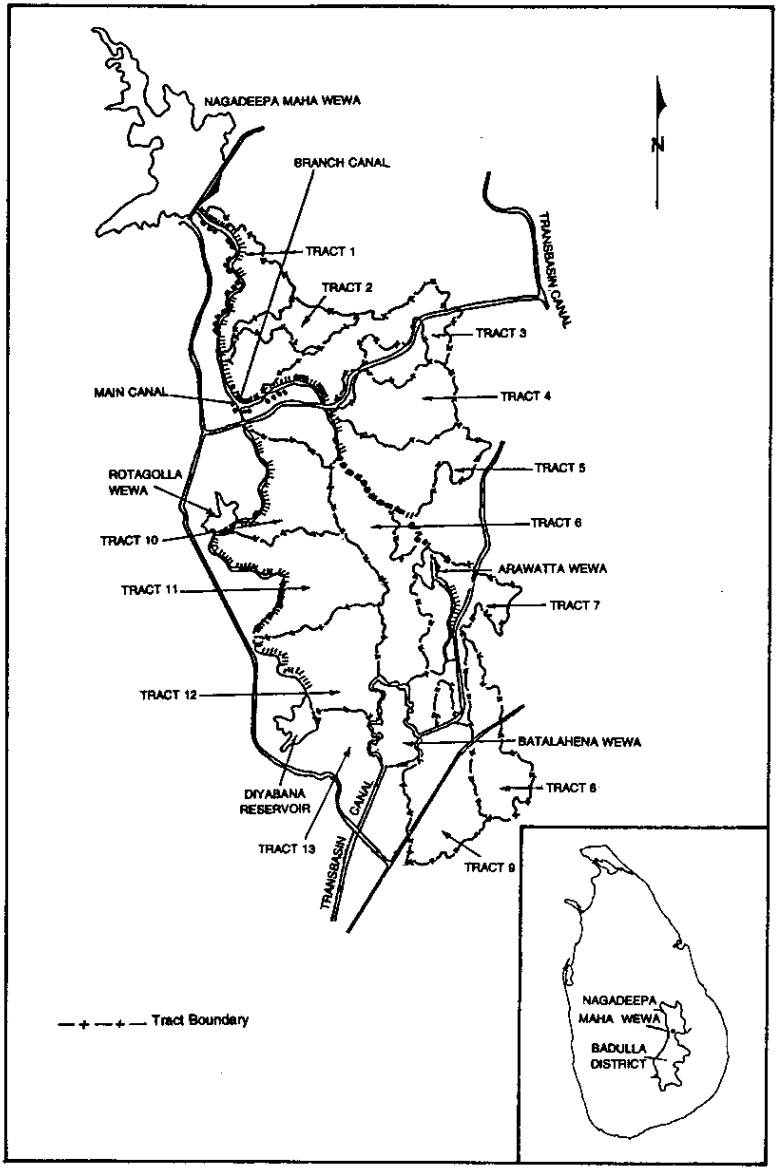
7 The settlers in tracts 7 and 13 were evacuated to the Mahaweli System when sections of these two tracts were used for the construction of the Mahaweli Transbasin Canal. However, it was observed that some farmers, notably the landless second-generation settlers are still occupying the abandoned tracts. The remaining 11 tracts have now come under the supervision of three colonization officers.

Figure 1.1. Location of Nagadeepa.



The majority of the farmers have migrated from outside the immediate locality (60 percent are from Badulla District); only about 18 percent are migrants from nearby locations. Though statements on the total number of families and the total population vary from source to source, at present about 2,000 families are living in the area.[8] As much as 72 percent are authorized settlers; the rest belong to various other categories. The estimated population of Nagadeepa based on the *gramasevaka niladhari's* data is 12,166 while the estimate based on distributary-canal committee members' information is 14,217 (see Table 1.2).

Table 1.2. Total number of families and total estimated population in Nagadeepa-Mahawewa area.

Farmer status	Number of families	Percentage of category	Total population
Present Survey Data			
Authorized settlers	1,521	71.7	10,191
Settlers of others' plots	293	13.8	1,963
Squatters on reservation	201	9.5	1,347
Temporary settlers	12	0.5	80
Other categories*	95	4.5	636
Total	2,122	100.0	14,217
GSN Data			
Authorized settlers	2,377	94.2	11,442
All other categories	144	5.8	724
Total	2,521	100.0	12,166

* Those who have built houses in the premises of the authorized settlers are usually the householders' immediate family members.

Note: GSN = *Gramasevaka niladhari*, a local-level multi-functional government officer.

In association with the Irrigation Department, the Irrigation Management Division has been implementing its integrated settlement management program in this system since 1984. The Irrigation Management Division has posted a project manager, who is responsible for developing a management framework including farmer organizations and for ensuring that the various

8 The change agent's survey indicates that the total number of families is about 1,660.

organizations involved in agriculture are well coordinated. Nagadeepa is one of four systems under this project manager, the others being Mapakada, Sorabora, and Dambarawa. Nagadeepa is regarded as the most problematic of these four systems because of chronic water shortages.

Pimburettewa

Pimburettewa is situated about 20 miles (32 km) from Polonnaruwa on the Mahiyangana road in Mahaweli System B. This area is now administered by the Vijayabapura Block Office of the Mahaweli Economic Agency (see Figure 1.2). Out of the total project area of 5,000 to 6,000 acres (2,023-2,428 ha), 4,400 acres (1,780 ha) are irrigable land located under the main tank. The entire land extent has been divided into nine tracts.[9] The farmers are provided with three acres (1.21 ha) of rice land and two acres (0.80 ha) of high land, except in Galtalawa Unit where farmers have only 2.50 acres (1 ha) of rice land and 0.50 acres (0.20 ha) of high land. The scheme was constructed in 1969 and maintained by the Irrigation Department up to the end of 1982. The scheme was then handed over to the Mahaweli Economic Agency, as Pimburettewa was incorporated into Mahaweli System B.

The storage capacity of the main reservoir is about 40,000 acre-feet (4,936 ha-m) at full capacity. The channel system of the scheme includes 14 miles (22.52 km) of main channel, 25 distributary channels totaling 16 miles (25.7 km), and 291 field channels totaling 65 miles (104.58 km).

The majority of the farm families are second-generation settlers from older irrigation schemes in Polonnaruwa. Our data show that only 64 percent of the farm families in the project area are authorized settlers, the rest being encroachers. The total population is about 8,000 and the total number of families in the project area is between 1,500 to 1,800. Here again, the information given by the unit manager is somewhat different from the present study estimates (see Table 1.3).[10]

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9 These 9 tracts now come under 5 units administered by unit managers; Pimburettewa (3 tracts), Aralaganwila (1 tract), Devagama (2 tracts), Madurutenna (2 tracts) and Galtalawa (1 tract).

10 As in Nagadeepa, we have used estimates based on data provided by distributary canal leaders.

Figure 1.2. Location of Pimburettewa.

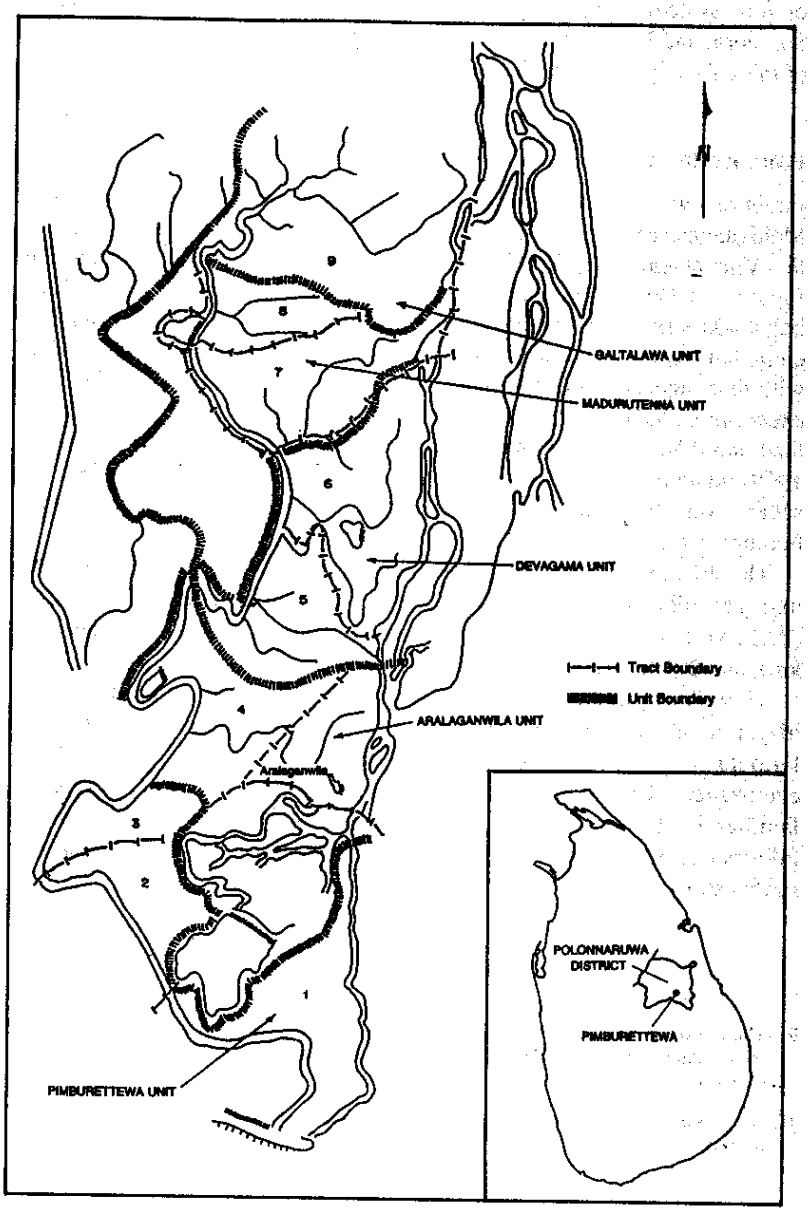

Table 1.3. Total number of families and total estimated population in Pimburettewa area.

Farmer status	Number of families	Percentage of category	Total population
Present Survey Data			
Authorized settlers	901	64.1	5,226
Settlers of others' plots	255	18.1	1,479
Squatters on reservation	159	11.3	922
Temporary settlers	65	4.6	377
Other categories	25	1.9	145
Total	1,405	100.0	8,149
Unit Managers' Data			
All categories	1,762	100.0	8,470
Total	1,762	100.0	8,470

CHAPTER 2

Objectives and Strategies of the Change Agent

ENTRY OF CHANGE AGENT TO THE STUDY LOCATIONS

THE CHANGE AGENT obtained separate small grants from USAID for its programs in Nagadeepa and Pimburettewa. According to the change agent's proposals, it was also to contribute some resources to the projects, which it did in the form of unpaid supervision by senior people. In both cases, it had the support and concurrence of the management agencies of the systems, though obtaining the support of the Mahaweli Authority for the activity in Pimburettewa took some time. A comparison of the change agent's strategies in these two systems with that of de Silva in Minipe (de Silva 1985) in the late 1970s shows they are quite similar.[11]

The change agent's staff made preliminary visits to Nagadeepa in preparation for commencing project activities in mid-1985; the work was done from the beginning of 1986 to the end of 1988 in Nagadeepa. While the Nagadeepa Project was ongoing, preliminary work on the Pimburettewa Project commenced in early 1986; actual implementation was carried out from mid-1986 till mid-1989. Each project was scheduled for a period of three years. The change agent set up a project office in each location for the duration

11 This is no accident, as Mr. de Silva was the director of the change agent's Water Management Division, and also wrote the proposals and provided overall guidance. By this time, Mr. de Silva had become chairman of the Mahaweli Agency in charge of downstream construction work. But he retained his strong interest in participatory management, and put a great effort into the change agent's programs on a voluntary basis. He was also an advisor to the Irrigation Management Division at that time; later (after the period of this study) he became Director of Irrigation, and afterwards, State Secretary for Irrigation. After retiring and directing the IMPSA Program (IMPSA 1992), in 1992 he was appointed Managing Director of the Mahaweli Economic Agency. Therefore, while our study has not highlighted his role in the two projects studied, clearly he has been an important leader in the effort to refine and implement a participatory approach to irrigation management.

of its stay to facilitate implementation of the program. At least two field officers were stationed in each location. The change agent planned to use the services of settler youths as community organizers to facilitate entry into the community. According to the change agent's progress reports, there were 12 community organizers in Nagadeepa and 6 in Pimburettewa.

OBJECTIVES OF THE CHANGE AGENT

The objectives, tasks and pre-project problems identified by the change agent in its proposals were the same for both project areas, though the irrigation systems have quite different social and administrative setups.

The major objectives of the projects as outlined in the change agent's proposals were as follows:

1. To devise and operate a system involving both farmers and officials to effect better coordination of all activities relating to the seasonal cultivation plan and to involve farmers in the decision-making process at all levels of management.
2. To motivate government officials working in the project and increase their efficiency.
3. To encourage farmers to increase the productivity of their lands and thus improve their standard of living.
4. To encourage farmers to revive traditional religiocultural practices associated with agriculture to create unity within the community.
5. To educate farmer leaders by organizing discussions, audio-visual instructions, seminars and other means.
6. To promote school children to form "School Water Conservation Committees" and participate in activities that would promote better water management.
7. To mobilize the support and participation of Buddhist priests, teachers and other community leaders in the area in encouraging better water management.
8. To organize shramadana (self-help) activities among farmers to foster self-reliance and unity within the community.

9. To effect the transfer of an appropriate technology for water management and improved cultivation practices to the farmers.
10. Ultimately to bring about management of the entire operation and maintenance of the system by the farmers themselves.

The proposed activities and strategies to achieve these objectives were as follows:

1. Training of farmers and officials.
2. Conducting educational and motivational programs and introducing new cultural practices.
3. Mobilizing local resources including priests, teachers and students for the program.
4. Directing and training community organizers.
5. Assisting the formation of farmer organizations.
6. Carrying out socioeconomic surveys.

Further, the change agent expected to coordinate government service bodies, revive traditional rituals and ceremonies related to agriculture, set up experimental water management blocks, and organize demonstration plots.

These responsibilities were divided among the organizations responsible for the implementation of the three-year project (see Table 2.1). USAID contributed the major part of the cost of the social change component, while the respective irrigation agencies were expected to contribute for maintenance and rehabilitation work. The change agent and the farmers were expected to contribute in cash and kind for the implementation of the two projects.[12]

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12 USAID contributed Sri Lanka Rs 1.556 million (US$57,000) for Nagadeepa in 1985 and Rs 1.805 million (US$64,000) for Pimburettewa in 1986. The Irrigation Department was to contribute Rs 2.5 million (US$90,000) for rehabilitation of Nagadeepa, but ultimately was not able to contribute this much; MASL contributed about Rs 14.8 million (US$0.52 million) for rehabilitation of Pimburettewa. The change agent was to contribute Rs 87,500 (US$3,222) for Nagadeepa and Rs 89,000 (US$3,176) for Pimburettewa; the farmers (who were not consulted) were to contribute the equivalent, in kind, of Rs 225,000 (US$8,284) at Nagadeepa, and Rs 370,000 (US$13,204) at Pimburettewa.

Table 2.1. Basic responsibilities of joint agencies.

Description	Related activities	Officer/Agency
Technical aspects of water management	Water control and measurement. Rehabilitation and maintenance of channels. Operation of experimental irrigation management blocks.	Irrigation Engineer (ID/MEA)
Management process and agricultural inputs	Building up appropriate management structure for decision making with effective farmer involvement. Training programs for field officers. Operation of demonstration plots.	Project Manager (IMD) Block Manager (MEA)
Social change program	Training of farmers. Educational motivational programs and introduction of cultural practices. Mobilizing local resources such as clergy, teachers, students, etc. Directing community organizers. Assisting in the formation of farmer organizations. Conducting socioeconomic surveys.	Water Management Division of Nation Builders Association (change agent)

Source: Change agent's reports.
Notes: ID = Irrigation Department. IMD = Irrigation Management Division.
MEA = Mahaweli Economic Agency.

STUDY TEAM'S ASSESSMENT OF PRE-INTERVENTION CONDITIONS

The pre-project situation was reviewed by the study team using three data collection methods: secondary information sources, indepth interviews and questionnaire surveys. The farmers were first asked to identify the problems they had encountered formerly; they were then prompted on specific problems which they had not mentioned earlier. The major problems thus identified at the two locations are discussed below. Most of them are common problems in Sri Lanka's dry zone irrigated settlement schemes. Unfortunately we were not able to obtain reliable quantitative data on these problems.

Inadequate Water Supply

Inadequate water supply was a major problem at Nagadeepa, especially during yala (dry season). The tail end was very badly affected even during maha (wet season). In Pimburettewa, there was cultivation during both maha and yala but some tail enders faced problems in obtaining their water supply. These problems were acute before the rehabilitation of the physical system and before Pimburettewa was incorporated into the Mahaweli System. This system now gets a sufficient water supply from the Mahaweli Transbasin Canal. The storage capacity in both locations is adequate if system losses are minimized and the available water distributed equitably. Nevertheless, at both locations, farmers believed that inadequacies in the physical infrastructure resulting in insufficient water was their major problem.

Inefficient Water Use

In addition to water losses caused by physical deficiencies in the systems, water was said by many farmers to be wasted because of human error: negligence of farmers in water management and lack of knowledge of modern agricultural practices. Most of the Pimburettewa farmers are second- and third-generation descendants of the earlier dry zone colonists, who are knowledgeable about rice but not the cultivation of other crops. Most of the Nagadeepa farmers are from Kandy and Badulla with no previous experience of dry zone agriculture. There were also settlers in Nagadeepa who had come from Mahiyangana, descendants of *veddah* families who were used to *chena* (shifting) cultivation. They are perceived by many people as lacking enthusiasm for learning new methods of cultivation. Both schemes have been in operation since 1969; therefore one would expect that most farmers are by now experienced and knowledgeable rice farmers.

Water was also being wasted because of non-adherence to the seasonal cultivation plan and failure to make good use of rainfall. This is due to a combination of factors: nonavailability of equipment, draught animals, fertilizer, seed rice, etc., at the appropriate time; and labor shortages. Illegal tapping of the channels by farmers, including encroaches, and head enders grabbing more water than actually needed has also resulted in inequitable water distribution as well as conflicts among the farmers.

Lack of an Efficient Farmer Organization System

There were a number of community organizations in both locations, some based on units and tracts, but there were no organizations specifically for solving agricultural and water-related problems. In the 1970s, *paladawardana committees* (productivity committees) had been set up but they were not successful. This system was later substituted by a *yaya niyojitha* (tract representative) system which functioned up to the inception of the project. The *vel vidane* system which had been functional before the others were introduced was another traditional form of leadership in both locations. The pre-seasonal cultivation meetings, the only common forums, were generally extremely stormy sessions with the farmers venting their pent up anger on officers and each other. These cultivation meetings were an equally frustrating experience for officers who were often held responsible for issues beyond their control. Coordination among line agencies was poor in Nagadeepa with eight different state institutions dealing with agricultural matters. The Nagadeepa farmers therefore frequently encountered problems in obtaining timely service. This is in contrast to the coordinated service provided in Pimburettewa under the Mahaweli System. But at both systems, the accumulated problems had created considerable disharmony between the officers and farmers. Farmers worked as individuals and officers carried out their work independent of farmer opinion.

Another major problem was the limitations of funds, manpower and equipment. This resulted in further frustration and demotivation of the officers since they were unable to meet the farmers' expectations. As a result of the disunity of the farmers, their limited ability to obtain benefits for themselves, and the lack of proper organizations to act as watchdogs for farmer rights, the funds allocated for system improvement may often not have been properly utilized.

Acute Poverty and Poor Health

Poverty was clearly a major problem, especially in Nagadeepa where most tail-end farmers did not receive sufficient water for yala cultivation, thereby compelling them to work as wage laborers in nearby schemes and in construction sites. When farmers need money, they mortgage their lands especially to traders and rich farmers. Unable to repay the loan, they forfeit the land and become tenant-farmers on their own land. They even obtain agricultural subsidies in their own name and hand them over to the landlord The tenant farmers, caught in a vicious circle of poverty, are rarely able to regain their lands.

Malaria, encephalitis and dysentery were especially serious problems in Nagadeepa. The contaminated supply of drinking water, mosquitoes breeding in waterlogged areas, and the lack of sanitary latrines have contributed to this situation. Farmers have to spend a considerable amount on health care while frequent illness hampers agricultural activities.

Other Problems

Other problems existing during the pre-project period were absentee landlordism, unauthorized settlers and encroaches on the reservations, unsuitable lands for cultivation (waterlogged and unlevelled fields) and crop damage due to wild animals (mostly in Pimburettewa).

The above presentation indicates that the identification of the problems by the change agent and farmers was different to a certain degree. The farmers emphasized the inadequacy of irrigation infrastructure as the major irrigation-related problem, while the change agent thought it was the wastage of water. These differences in perception undoubtedly affected the impact of the social change program.

ANALYSIS OF INTERVENTION STRATEGIES

The change agent used four basic intervention strategies. These were training of both farmers and officials, setting up farmer organizations and joint management committees, and organizing School Water Conservation Committees and leadership development programs.

Training

The Irrigation Management Division and the change agent with the support of other government agencies were responsible for farmer and officer training programs in Nagadeepa.[13] The Mahaweli Economic Agency together with the change agent were responsible for the same tasks in Pimburettewa.

13 The change agent's training programs and those of the Irrigation Management Division differ. The change agent introduced a single course for all categories of participants (officers, farmer leaders and ordinary farmers) while the contents of Irrigation Management Division modules vary for each group.

Training of farmers and officers was intended to support the efforts to establish a new organizational setup to maximize farmer involvement in the decision-making process for water management at all levels.

The objective of the change agent's farmer education program was to enlist the participation of farmers in the water management program by educating them about the need for water management, system operation, modern methods of cultivation to minimize water use and optimize yields, proper on-farm water management on their own plots and the importance of farmer-officer cooperation in the management of the whole system. The objective of the motivational seminars and workshops was to promote adequate interaction between officers and farmers. This was thought to be an essential aspect of the project because properly coordinated functioning of farmers and officers is considered necessary for the success of the water management program.[14]

A number of training programs were conducted by the change agent at its head office at Kundasale, near Kandy, and in Girandurukotte, a town near both systems. According to available information, the services of some officers from state institutions and two academics were utilized to train the farmers. It is difficult to compute how many farmers and officers were provided with training by the different agencies since data vary from source to source. The major part of the planned training component was carried out by the change agent. An analysis of secondary information[15] shows that

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14 The motivational seminars and work-camps proposed were: a) for farmer youths in project area, two one-week work-camps every year (expected number of youths was 60); and b) for farmer representatives and field officers, one-day motivational seminars every 6 months with an expected participation of about 100 farmer representatives and about 30 government officers in the project area.

15 According to Wijayaratna et al. (1988), 66 farmer seminars providing training to 4,614 farmers were reported in Nagadeepa for the period 1985-1988. Another 858 farmer representatives were trained at 23 seminars in the same location, 168 farmer organization office bearers were trained at 3 seminars and 825 distributary canal leaders at 8 seminars. Three motivational seminars were held to train a further 125 farmers.
The change agent's Progress Reports record that a total of 6,590 farmers have been trained during this period. The numbers contained in the Nagadeepa End of Project Review prepared by the change agent for USAID provides a slightly different picture, indicating that a total of 7,811 persons had received training.
In Pimburettewa, according to Senaka Arachchi et al. (1989), a large number of farmers were trained. During the project period of 3 years, 114 programs were held and 4,980 farmers, officers and farmer leaders were trained. The average number of persons per group is 44 and the maximum is 92.

Nagadeepa farmers participated in about 3 to 4 training camps or motivational seminars and that Pimburettewa farmers participated in 2 to 3 such programs.

In addition to the training programs conducted by the change agent, the Irrigation Management Division in Nagadeepa and the Mahaweli Economic Agency in Pimburettewa simultaneously carried out farmer-officer training programs. Data are not available as to how many farmers have been trained under these programs during the project period.

It was observed that the change agent's and government agencies' training programs in both locations were generally carried out as two separate programs. The Mahaweli officers had requested the change agent officers to keep them informed about participants sent for training programs and other related details, but the actual level of coordination was very low.

Since secondary data provide a contradictory picture of the number of participants in the training programs, the present study made an attempt to examine the number who participated through the information provided by each distributary committee chairman or secretary. By this method, we estimate that about 160 farmers in Nagadeepa and about 185 farmers in Pimburettewa were provided with training at Kundasale, Girandurukotte or other locations.[16] About 87 percent of the Nagadeepa farmers and 43 percent of the Pimburettewa farmers did not participate in any of the farmer training programs or motivational seminars conducted by the change agent (see Table 2.2).

Establishing Farmer Organizations

Most previous attempts at achieving improved water distribution were based on a "top down" extension strategy which did not take into account farmer feedback. The Minipe Project was one pioneering project carried out in Sri Lanka to develop a participatory water management system, involving both farmers and officers (de Silva 1985). The approach used by the change agent at Nagadeepa (located close to the Minipe System) and Pimburettewa was

16 The number of persons trained according to the secondary sources seems to be rather high, perhaps due to multiple counting of the number of farmers who participated repeatedly in training programs. It is also possible that participants in the local-level educational and motivational programs might have been counted as having participated in the training programs.

heavily influenced by the Minipe experience, as was the Irrigation Management Division's own model.

Table 2.2. Farmer training according to present study.

Status of respondent	Nagadeepa		Pimburettewa	
	Number of participants	Percentage	Number of participants	Percentage
Ordinary farmers				
Participated in training/ motivational seminars	7	13	24	57
Not participated	45	87	18	43
Total	52	100	42	100
FCC leaders				
Participated in training/motivational seminars	27	90	35	87
Not participated	3	10	5	13
Total	30	100	40	100
DCC and SPC leaders				
Participated in training/motivational seminars	20	100	22	100
Not participated	0	0	0	0
Total	20	100	22	100

Source: Present study data.
Notes: FCC = Field-channel committee.
DCC = Distributary-channel committee.
SPC = Subproject committee.

In Nagadeepa, the Irrigation Management Division first approached the introduction of a farmer organization system by appointing a project manager in March 1984 to undertake the responsibility. The change agent, assuming the role earlier played by the catalyst, National Heritage Programme at Minipe, entered the location in 1985 in order to work as a catalyst facilitating the functioning of the farmer organizations.

In Pimburettewa, the same program was introduced via the Mahaweli Economic Agency, again with the change agent as the catalyst, in mid-1986.

This was the first such social change program carried out by an external agency to be introduced in a pilot project in the Mahaweli System B. The same model was introduced in both systems; in Pimburettewa the block manager played a role similar to that of Nagadeepa's project manager.

It must not be assumed that the farmers did not have the potential for organizing themselves prior to the change agent's intervention. There were and are a number of self-help organizations in both locations. The difference is that those organizations did not have as their clearly defined objective, the solving of farmer problems through participatory irrigation management.

The present analysis is based on two types of information sources: secondary data such as the End of Project Reports,[17] the available change agent's Progress Reports[18] and the present study data. Project records were not maintained in a systematic, easily comprehensible manner. The manner in which they are presented makes the data open to varying interpretations even when the same source is being utilized.

The new organizational system set up by the change agent is a formal organization with a hierarchical order and a distinct mode of communication. Conceptually, it is organized on a "bottom up" approach. The system introduced in both locations is similar except for the involvement of different officers.

A steering committee was set up at the beginning to supervise implementation. It continued to function for as long as it was thought necessary.[19] The aim of the steering committee was to study the progress of the project and to take necessary action for its effective implementation. Higher-level officers of state agencies and the change agent participated in steering committee meetings. The same issues taken up in the project committee meetings were observed to be repeatedly discussed at steering

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17 Both the End of Project Review at Nagadeepa by Wijayaratna et al. (1988) and the End of Project Report at Pimburettewa by Senaka Arachchi et al. (1989) are based mostly on the change agent's data, supplemented by short field visits.

18 The study team was provided with three Quarterly Reports and the Annual Report for 1986, four Quarterly Reports for 1987 and the first Quarterly Report for 1988 for Nagadeepa; and the following reports for Pimburettewa—two Quarterly Reports for 1987, two Quarterly Reports and the Annual Report for 1988 and one Quarterly Report for 1989.

19 There was no particular time frame for the functioning of the steering committee. In Pimburettewa 12 meetings were held to monitor progress. There was no information on steering committee meetings in Nagadeepa.

committee meetings. The steering committee was established for the project period, and was not intended as a permanent institution.

The project committee is a permanent organization at the apex of the hierarchy. These two bodies, the project committee and the steering committee, are not primarily farmer bodies. According to Irrigation Management Division (IMD) guidelines (IMD 1985), farmers (distributary chairmen) should constitute a majority on the project committee. However, it was observed that at Nagadeepa and Pimburettewa the officers were in the majority.

Next in the hierarchy is the subproject committee, of which a farmer is the chairman and an officer is the secretary. The subproject committee has representation from both officers and farmers. However, we observed that the officers who control the resources and technology tend to be the decision makers. The actual farmer organizations are the distributary-channel committees and field-channel groups, mainly comprising of and directed by farmers (see Table 2.3 for the number of farmer organizations).

Table 2.3. Number of farmer organizations in the two study locations.

Type	Nagadeepa	Pimburettewa
Field channels	303	291
Field-channel committees	91	74
Distributary channels	24	25
Distributary-channel committees	21	17
Subproject committees	5	5
Project committees	1	1

Source: Project Managers' reports.

Field-Channel Groups. The informal field-channel groups are the lowest strata of the farmer organization system and the first to be set up in each location. The area under each field channel varies from 30 to 100 acres (12.1 to 40.5 ha), worked by 10 to 20 farmers. This group selects a chairman or representative at its initial meeting. The field-channel group is expected to meet monthly in a convenient place to discuss farmer problems.

The members of the field-channel group should be authorized settlers. A family member can participate at the meetings if the farmer is unable to attend.

An officer of line organizations can participate in these meetings only in an advisory capacity or as an observer. The representative should be a settler but it is not clearly indicated in the Irrigation Management Division document (IMD 1985) whether he must be an authorized settler. It is considered desirable to select the leaders by consensus rather than resort to voting. In addition, a secretary is also selected.

The duties and functions of field-channel groups according to Irrigation Management Division guidelines include identification of irrigation problems, implementing O&M activities, protecting irrigation structures, and resolving problems together with the officers.[20]

Only a few field-channel groups keep records of meetings. Therefore, it is difficult even for the project personnel to keep track of participation of farmers in these groups. Based on Wijayaratna et al. (1988), the annual average number of meetings per field-channel group in Nagadeepa was as follows: 0.5 in 1985, 3.1 in 1986, 3.6 in 1987 and 2.2 in 1988 (up to the second quarter). An estimate based on the change agent's progress report gives the following frequencies: 2.1 meetings in 1986 and 2.2 meetings in 1987. Though there seems to be a discrepancy between the data sources, what is most important here is to get an accurate picture of the functioning and the level of participation of farmers in their organizations. Regardless of which set of figures is more reliable, both suggest that the meetings were not being

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20 The duties are listed as follows (IMD 1985):

a) Collectively maintain/clear field-channel structures;
b) Protection of irrigation structures in the system;
c) Organize water saving activities
d) Motivate farmers for on-farm water management;
e) Collect information/data on all matters relating to agricultural development (number of acres, allotments, tenurial status, details of water management problems);
f) Identification of irrigation problems affecting the group, and explore possible solutions;
g) Resolve problems that could be solved with the assistance of officers
h) Present other problems to the higher levels to be resolved;
i) Conduct informal meetings of farmers regularly
j) Resolve conflicts among farmers;
k) Plan agricultural activities of the group;
l) Participate in activities of the distributary-canal committee and subproject committee through their representatives;
m) Inform authorities of offenses relating to the irrigation system and assist in checking such offenses;
n) Undertake community shramadana activities such as clearance of irrigation channels, construction and maintenance of project roads; and
o) Help in collection of O&M rates.

held monthly in Nagadeepa, as expected. The frequency appears to be in the range of 2 to 4 meetings per year, suggesting that the farmer organization system has either a very low overall level of functioning or else the different levels have unequal functions (see Table 2.4).

Table 2.4. Number of field-channel meetings held and number of farmer participants.

Location	Year	Number of meetings	Number of farmer participants	Number of farmer participants (%)	Average number of meetings per year, per FC group
Nagadeepa[a]	1985	ni	ni	ni	ni
	1986	189	2,632	14.9	2.1
	1987	202	3,568	17.7	2.2
	1988 (2Q)	ni	ni	ni	ni
Pimburettewa	1986	ni	ni	ni	ni
	1987	198	3,030	16.0	2.5
	1988	148	2,120	14.3	2.0
	1989 (2Q)	ni	ni	ni	ni
Nagadeepa[b]	1985	48	537	11.2	0.5
	1986	282	3,997	13.9	3.1
	1987	332	4,950	14.9	3.6
	1988 (2Q)	197	3,015	15.3	2.2
Pimburettewa[c]	1986	70	1,071	15.3	0.9
	1987	189	2,542	13.4	2.5
	1988	199	2,001	10.0	2.7
	1989 (2Q)	79	1,016	12.9	1.1

a Change agent did not have all the progress reports; the tables were prepared with available data.
b Wijayaratna et al. (1988).
c Senaka Arachchi et al. (1989).

Notes: 2Q = Second quarter. ni = No information.
FC = Field channel.
Average number of farmers expected to participate in FCC meeting = 20.

The average number of meetings held per year per field-channel group in Pimburettewa according to Senaka Arachchi et al. (1989) is as follows: 0.9 meetings in 1986, 2.5 meetings in 1987, 2.7 meetings in 1988, and 1.1 in 1989 up to second quarter. Our data show 2.5 in 1987 and 2 in 1988. Thus the frequency of meetings held in Pimburettewa is less than in Nagadeepa, ranging from 1 to 2.5 meetings per year.

Our survey of a sample of field-channel groups[21] shows more meetings per year overall than the above figures. The lowest incidence of meetings was in the tail end of Nagadeepa (3.7 meetings per year; see Table 2.5). This suggests that the tail-end farmer organizations in Nagadeepa may be practically nonfunctional. Since Pimburettewa does not show any difference between the head and tail, one can argue that to a considerable extent, farmer organization functioning is dependent upon the availability of water. The Nagadeepa tail-end water supply is so inadequate that farmers cannot do much to improve it, and participation is correspondingly poor (see Uphoff et al. 1990). The average expected number of participants at a meeting should be about 20 but actual participation was always lower in both systems.

Table 2.5. Field-channel information in the two project areas.

Information	Nagadeepa		Pimburettewa	
	Head end	Tail end	Head end	Tail end
Sample size of FC committees	16.0	24.0	17.0	131.0
Number of leaders working up to now	26.0	42.0	22.0	18.0
Number of leaders per FCC	1.6	1.7	1.3	1.4
Number of meetings held so far	243.0	415.0	302.0	235.0
Number of meetings held per year	6.0	3.7	5.5	5.2
Average number of participants per meeting	15.5	8.6	11.0	10.7
Number of farmers of the sample given training	36.0	33.0	20.0	21.0
Estimated number of farmers of the project given training	157		184	

Source: Present study data.
Notes: FCC = Field-channel committee. FC = Field channel.

21 The sample consisted of 16 head-end field-channel groups and 24 tail-end field-channel groups at Nagadeepa and 17 head-end and 13 tail-end field-channel groups from Pimburettewa.

The tail-end farmer organizations in Nagadeepa also have a higher turnover of leadership than in Pimburettewa. The tail-end farmer representatives in Nagadeepa have had to resign due to the continuance of the water problem (see Table 2.6).

Distributary-Channel Committees. The representatives from the informal field-channel groups form the distributary-channel committee. If there are 20 farmer groups under a distributary, then 20 representatives form its committee which is supposed to be the formal farmer organization. The area of authority of a distributary-channel committee is generally the area fed by one distributary canal. However, there are some exceptions; for example the amalgamation of several small distributaries under one committee.

The divisional field-level officers in the project operate as associate members, but the number of farmer representatives should always be more than the number of officers. There is a president and a secretary to the committee. The president is selected by the committee. He should be selected by consensus whenever possible and the Irrigation Management Division guidelines indicate that it is desirable to have a divisional field officer as the secretary (at the initial stage), and also a treasurer if necessary.

Table 2.6. Reasons given by respondents for the resignation of FC leaders (percentages).

Reason	Nagadeepa		Pimburettewa	
	Head end	Tail end	Head end	Tail end
Requested by farmers to resign	12	0	20	20
Too busy with work	25	25	0	40
Inability to solve problems	0	17	0	0
Accused of corruption	0	0	0	20
Problems with officers	0	0	20	0
Death/sickness/personal reasons	50	42	20	20
Inability to work with farmers	13	8	0	0
Reason unknown	0	8	40	0
Total	100	100	100	100
Number reported as resigned	81	2	5	5

Source: Present study data.

The distributary-channel committee has the power to fix and regulate its own procedures including the authority to determine the number of members necessary to form a quorum. The guidelines for its effective operation can be decided at the first two or three meetings. A simple constitution for the organization can then be adopted. The major functions of distributary-channel committees according to the Irrigation Management Division (1985) are as follows:

1. Water management.[22]
2. Maintenance of the system.[23]
3. Preparation and implementation of the agricultural program.[24]
4. Sociocultural activities.[25]

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22 Rotational water distribution within the distributary in collaboration with irrigation officials, and planning and implementation of programs to save water by preventing wastage by farmers.

23 Protection of the irrigation system within the area of authority, identification of critical problems and presenting them to the project committee, solving whatever problems are within their collective capacity with the help of the authorities, participating in the preparation and implementation of a program for repair and maintenance of the system, organizing shramadana activities to attend to earth-works in main channels and distributaries with due intimation to irrigation authorities, undertaking irrigation repair work on contract basis within the area of authority after the legal sanction is given, and assisting officials in the collection of operation and maintenance fees.

24 Participating in the preparation and implementation of the annual agricultural program at the project level through their representatives, collection of agricultural information through field-channel groups and resolving problems regarding supply of agricultural inputs and marketing with the help of the officers.

25 Organizing sociocultural activities such as *vap magul* and *aluth sahal mangalya* with the help of the field-channel groups, and participating in all other sociocultural activities in the scheme in order to promote cordial links with the nonfarming population and develop community cohesiveness.

In addition, some general functions are also expected from the distributary-channel committees.[26]

In Nagadeepa, there are 24 distributary channels, and 21 distributary committees were formed; in Pimburettewa there are 25 distributary channels and 17 committees. These committees were introduced in 1987-1988 in both locations. They are now registered with the respective agencies in both systems and have adopted constitutions, a pre-requisite to taking maintenance contracts. The field-channel groups, subproject committees and project committees were introduced first; distributary committees were later additions.

The distributary committees are expected to meet every month but this rarely happens. The annual average number of meetings at Nagadeepa was 1 in 1987 and 5.5 in 1988. Pimburettewa had an average of 11 meetings in 1988 and 9.4 meetings in 1989 according to Senaka Arachchi et al. (1989). However, the change agent's progress reports indicate just 3.1 in 1988 (see Table 2.7).

The number of participants too fluctuated. The average number of participants at a distributary committee meeting ranged from 8.7 to 34 at Pimburettewa and was about 10 in Nagadeepa. In both locations the distributary-committees seem to function better than field-channel groups. Nagadeepa is, however, not as satisfactory as Pimburettewa. The participation during yala was poor since many farmers could not cultivate due to the lack of water. Pimburettewa farmers get water for two cultivation seasons and, if the Mahaweli Economic Agency's checkroll (labor) records can be taken as an indicator, then the Pimburettewa distributary committees are functioning well. The data do not reveal any significant differences in the

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26 The general functions of the distributary-channel committee are as follows:
a) Establish close links with the field-channel groups;
b) Establish close cordial links with the officials;
c) Strengthen weak field-channel groups;
d) Organize training of farmer representatives and farmers in water management, agriculture and farmer organizations;
e) Resolve conflict within field channels and field-channel groups;
f) Plan and implement a program to check irrigation offenses within the area of authority;
g) Present problems which cannot be solved at their level to the project committee;
h) Maintain records of decisions of meetings, discussions, etc.; and
i) Coordinate with relevant government departments and agencies.

functioning of the tail- and head-end distributary committees. Changes of distributary-committee leaders are not as frequent as changes of field-channel group representatives.

As indicated by distributary-channel committee leaders, some community work was carried out in Nagadeepa. Thirty three percent of the distributary committee leaders said that they carry out operation and maintenance (O&M) work through shramadana (community labor); 19 percent said that they had organized cultural ceremonies; and 14 percent had organized welfare activities. The rest (34%) were of the opinion that the work is being carried out by the state agencies.

At Pimburettewa, by contrast, only checkroll work paid by the Mahaweli Economic Agency has been carried out according to 31 percent of the farmers. The rest, the majority, said that O&M work is done by the Mahaweli Economic Agency.

Table 2.7. Distributary-channel meetings held and number of farmer participants.

Location	Year	Number of meetings held	Number of farmer participants	Average number of participants per meeting	Average number of meetings per DCC
Nagadeepa[a]	1987	ni	ni	ni	ni
	1988	21	168	8.0	1.0
	1989	ni	ni	ni	ni
Pimburettewa[a]	1987	ni	ni	ni	ni
	1988	53	688	13.0	3.1
	1989 (2Q)	ni	ni	ni	ni
Nagadeepa[b]	1987	21	218	10.3	1.0
	1988	116	1,239	10.6	5.5
	1989	ni	ni	ni	ni
Pimburettewa[c]	1987	3	101	34.0	0.2
	1988	188	1,556	17.7	11.0
	1989 (2Q)	80	698	8.7	4.7

a Change agent did not have all the progress reports; the table was prepared with available data.

b Wijayaratna et al. (1988).

c Senaka Arachchi et al. (1989).

Notes: DCC = Distributary-channel committee. ni = No information. 2Q = Second quarter. Average expected number of farmer participants per DCC meeting = 12.

The distributary-channel committee accounts were also studied since these committees were carrying out contract work for repairs and other improvements in the systems. In Nagadeepa, it is clear that almost all the distributary committees have carried out some work but the value of contracts undertaken by each (if undertaken) was less than Sri Lanka Rs 5,000 (US$157.18 in 1988). The data were gathered from the distributary committee chairmen and some did not know about the accounts, indicating that they have, to some degree, lost interest in their work.

There is a significant difference between the two systems in terms of the mechanism for getting work done through farmers. In Nagadeepa, if distributary committees undertake small-scale earth works for which there is an allocation, the money is usually paid to the committee and then distributed among the farmers who participate in the work.

But in Pimburettewa, the distributary committee accounts are maintained just for the sake of appearance; practically no work has been undertaken by the committees. The farmer leaders prefer to undertake checkroll work rather than organize collective work. According to the officers, the farmers are not motivated to undertake shramadana through the distributary committees because there is no financial gain. Farmers always ask for checkroll work and the work is usually completed satisfactorily, on time. It is clear that the checkroll work which provides opportunities for personal financial benefits flourishes while the collective works which were supposed to be undertaken by the distributary committees according to the project objectives have declined. This issue is further addressed below.

Subproject Committees. No guidelines are provided for subproject committees by the Irrigation Management Division. The subproject committee is a joint farmer-officer committee. There are five subproject committees at each location. The chairmen of the subproject committees are farmers while the secretaries are technical assistants at Nagadeepa, and at Pimburettewa, unit managers. These meetings too are supposed to be held monthly in order to discuss the problems in the subproject committee areas. The change agent officers too were present at these meetings.

In the subproject committee meetings, generally, the farmers present requests to carry out some work in their locality related to maintenance, construction or rehabilitation. In addition, many relatively trivial matters which should be dealt with at the lower levels come up for discussion at the subproject committee meetings, which is indicative of the poor decision-making ability of the lower-level farmer organizations. At a meeting

in Nagadeepa, the project manager advised the farmers that they should refrain from referring minor issues to the subproject committee meetings since they have been provided with a mechanism through the farmer organization system to solve their problems at the lower levels.

Minutes of subproject committee meetings often do not mention the number of participants. As such, it is not clear how farmer participation was calculated for the End-of-Project Reviews. According to Wijayaratna et al. (1988), the average number of participants is 20. This report does not include the farmer-officer participation ratio. The same report shows an average of 12 meetings held in 1986, 10.8 in 1987 and 6.2 meetings in 1988 in Nagadeepa; a drastic decline. At the beginning of the project, 100 percent of the scheduled meetings were held, but by 1988 only about half were held. The main reason for poor participation in Nagadeepa is the lack of water for cultivation; the farmers feel there is no point in going for meetings if they lack water for cultivation.

At Pimburettewa, except one meeting, all the others were held in 1987; 9.8 meetings were held in 1988, and in 1989, 11.2 meetings. This shows a somewhat similar picture to that of the Pimburettewa distributary committee meetings and a better picture than at Nagadeepa (see Table 2.8).

Table 2.8. Subproject committee meetings held and farmer-officer participation.

Location	Year	Number of meetings	Number of partici-pants	Farmer partici-pation (%)	Officer partici-pation (%)	Number of partici-pants (% per meeting)
Nagadeepa[a]	1985	9	387	ni	ni	43.0
	1986	60	1,338	ni	ni	22.3
	1987	54	1,080	ni	ni	20.0
	1988	31	651	ni	ni	21.0
Pimburettewa[b]	1986	20	328	68	32	16.4
	1987	59	926	59	41	15.7
	1988	49	854	67	33	17.4
	1989(2Q)	28	527	72	28	18.8

a Wijayaratna et al. (1988).
b Senaka Arachchi et al. (1989).

Notes: 2Q = Second quarter. ni = No information.

The frequency of subproject committee meetings is high compared to the field-channel groups and distributary committees, and is perhaps due to the substantial officer participation. But we observed that the majority of meetings scheduled in Nagadeepa during the field survey were postponed or canceled due to the nonattendance of farmers.

Project Committees. The project committee is the highest body within the joint management system. It is chaired by the project manager at Nagadeepa and block manager at Pimburettewa. The duties and functions of the project committee, according to the Irrigation Management Division, are mainly related to policymaking, planning, implementing, and organizing and monitoring the activities of the farmer organization system.[27]

Table 2.9 shows that a fairly large number of persons were present at project committee meetings, ranging from 23 to 60 at Nagadeepa and 17 to 33 at Pimburettewa. The frequency of meetings does not show much decline since they are usually organized by the officers. Table 2.10 indicates that in some instances, the majority of the participants are officers, ranging from 8 to 15 per meeting. The number of meetings held at Pimburettewa according to Senaka Arachchi et al. (1989) is 3 in 1987, 4 in 1988 and 6 in 1989, a smaller number than in Nagadeepa.

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27 The duties and the functions of the project committees according to the Irrigation Management Division (1985) are as follows:

a) Decide on all matters of policy regarding irrigation and farmer organizations in the project area;
b) Plan, implement and monitor the irrigation operation and maintenance program in collaboration with the Irrigation Department;
c) Plan, implement and monitor the agricultural program for the project;
d) Assist in the collection and disbursement of irrigation rates and resolve all issues, problems, conflicts referred by the distributary committees;
e) Collect information on agriculture, irrigation and tenurial status through distributary committees and field-channel groups;
f) Assist in directing distributary committees in their activities;
g) Identify training requirements of farmers, farmer representatives and field-level officers; and plan, implement and monitor such training programs;
h) Effect necessary liaison and coordination with departments and agencies involved in irrigation and agricultural matters;
i) Plan and implement a program for the protection of the irrigation system and take suitable action against the irrigation offenders; and
j) Other related activities that would benefit the farming community.

Table 2.9. Project committee meetings held and farmer-officer participation.

Location	Year	Number of meetings	Number of partici-pants	Farmer participa-tion (%)	Officer participa-tion (%)	Number of participants (% per meeting)
Nagadeepa[a]	1985	1	60	ni	ni	60.0
	1986	60	252	ni	ni	28.0
	1987	10	234	ni	ni	23.4
	1988	5	160	ni	ni	32.0
Pimburettewa[b]	1986	3	99	38	62	33.0
	1987	3	52	40	60	17.3
	1988	4	101	42	58	25.2
	1989	6	128	60	40	21.3

a Wijayaratna et al. (1988).
b Senaka Arachchi et al. (1989).
Notes: ni = No information.

Table 2.10. Project committee meetings held and number of participants per meeting, Pimburettewa.

Year	Number of meetings	Average number of farmers	Average number of officers	Average number of change personnel	Total number of participants (%)
1985	2	14.5	13.5	1.5	29.5
1986	9	12.0	12.1	2.2	26.3
1987 *	11	11.2	7.9	1.9	21.0
1988	9	16.3	10.4	1.2	27.9
1989 **	6	14.0	8.8	nr	22.8

* There was a special meeting which was not taken into account.
** Only up to July.
Note: nr = Not relevant (because change agent had left the field).

Communications within the Joint Management System. Since the new management system is a complex organizational network, it is essential to hold meetings in order to communicate among different levels. The frequency of

meetings is very important in this regard. We observed that the frequency of meetings increases as the decision-making authority is enhanced and where there is high officer representation (see Table 2.11). If the project committee meetings are held as scheduled, then 12 meetings would be held every year. The meetings are arranged in such a way that the field-channel group, distributary committee and subproject committee meetings precede them. Therefore, theoretically, it would take less than a month for a problem to be referred from the bottom to top or vice versa. But in reality, meetings are held at 2 to 4 month intervals at the field-channel level. Therefore, it could take about 4 months for a communication to reach the project committee.

Table 2.11. Average frequency of meetings of various levels of farmer organizations.

Level	Frequency per year			
	Nagadeepa		Pimburettewa	
	Expected	Actual	Expected	Actual
Field-channel committee	12	2-4	12	2-3
Distributary-canal committee	12	5	12	9-11
Subproject committee	12	6-12	12	10-11
Project committee	12	9-12	12	6-11

Source: Present study data.

If the four-level system functions as intended, the subproject committee representatives have to attend meetings on four days a month, the distributary committee representatives three days a month, the field-channel representatives two days, and farmers one day a month.[28]

School Water Conservation Committees

This section analyzes the purpose of forming School Water Conservation Committees (SWCCs) and their functioning. Though some methodological

28 According to our calculations, 2,825 farmer-days in Nagadeepa (if the population is calculated at 2,500 farmers) and 2,219 farmer-days in Pimburettewa (with an estimated population of 2,000 farmers) will have to be spent at committee meetings, assuming a full day for each meeting.

problems[29] were faced in carrying out this task, the team collected all available documents, interviewed the SWCC office bearers, both teachers and students still resident in the locality, and farmers and farmer leaders, in addition to data gathered using a questionnaire.

A major objective of forming SWCCs was to educate the younger generation in effective water management. The strategy adopted by the change agent to achieve this was to introduce SWCCs at school level while coordinating this activity with the field-channel groups. This program was also expected to help ensure sustainability by utilizing the relatively better educated younger generation for the introduction of effective water management. The value of water management would be inculcated early in the children. The SWCCs were also to facilitate the provision of free labor to the farmers in the form of shramadana. The students in turn would acquire the knowledge and skills they would need later on to successfully cultivate their parents' landholdings.

The membership of the SWCC is drawn from among school children above grade six. The committee is comprised of the office bearers elected from the student population. The president, secretary, treasurer and committee members are selected from among the school children representing each class. The agriculture teacher is the patron or advisor of the committee. The SWCC is very similar in its structure to the *sahithya samithiya* (literary society) which is established in every school.

It was planned that the SWCC would meet once a month with some item related to water management being presented. Theoretically, this presents an opportunity to increase students' awareness of water related issues and their impact on the environment. The president of the SWCC was expected to participate in subproject committee meetings. Though the SWCC members were supposed to be observers at the field-channel groups in which their parents have membership, this was never achieved. A Joint School Water

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29 The methodological problems faced were as follows:

a) The team was unable to observe any activity on the part of these committees during field work;
b) Closure of schools during the earlier part of field work;
c) Nonavailability of systematically organized documentation regarding the work of the SWCCs;
d) Some of the teachers and students who had held office in the SWCCSs had left the area; and
e) In some cases, students who had held office in the SWCCs had been arrested for subversive activities.

Conservation Committee (JSWCC), which combines all the SWCCs in each area, was also established. This has the same structure of office bearers who are elected from among the school representatives, with one of the SWCC teacher-advisors as the advisor.

The change agent had formed seven SWCCs in all seven of the schools in Nagadeepa in 1985. The first Pimburettewa SWCC was formed at the end of 1987 and two other SWCCs were formed shortly afterwards. The total membership of these ten schools in both locations was roughly estimated to be 3,500 in a given year, with 2,500 in Nagadeepa and 1,000 in Pimburettewa.

Change agent reports indicate that the SWCCs played a vital role in both locations. More work seems to have been carried out in Nagadeepa which shows a steady rate of improvement since 1985. The number of students who participated in the SWCCs that year was 1,600. This was shown as having increased to 7,266 by 1988. The situation in Pimburettewa was not as satisfactory as Nagadeepa. The total student participation was 553 in 1987 and this reduced to 150 in 1989 (up to March; see Table 2.12).

Analysis of the minutes of meetings of two SWCCs in Nagadeepa shows that the meetings were not held monthly as scheduled. They were held very irregularly. The secretary of the JSWCC reports that the following number of meetings were held: 1986, one; 1987, one; and 1988, six (that is, once in two months). The secretary of the SWCC of the Abeypura Maha Vidyalaya (MV) at Nagadeepa said that no meetings were held after 15 June 1988. In Pimburettewa, two meetings were held in each school in 1987 and 1988; in addition two JSWCC meetings were held each year. It was observed that many of the meetings were not held as scheduled.

According to the president of the JSWCC, seven shramadanas were organized at the seven schools in Nagadeepa. Almost all the school children are reported to have taken part in these shramadanas which were carried out in a tract close to the school. Not many such activities took place in Pimburettewa. The SWCC of Leelaratna MV organized a shramadana where 50-60 students participated. In addition, the same committee organized another shramadana to help a teacher farmer who also happened to be a distributary committee chairman, with his harvest. Only about 25 took part in this. Perhaps the low attendance resulted from this being viewed as a form of exploitation by other farmers. Vilayaya MV also organized a shramadana to clear a field channel. The number of participants is not known. In addition, ten students took part in a shramadana camp organized by the SWCC.

Table 2.12. Activities of school water conservation committees.

Location/Year	Number of activities	Participation	
		Students	Teachers
Nagadeepa			
1985	6	1,600	22
1986	7	1,850	24
1987	16	2,480	26
1988	42	7,266	148
Pimburettewa*			
1987	6	553	ni
1988	4	150	ni
1989 (up to March)	4	150	ni

* Number of student participants in school cultural days were not added since the numbers are not indicated in reports.

Source: Progress Reports, NBA.

Note: ni = No information.

There is information to the effect that some school children took part in some shramadanas organized by other groups to clear salvinia and to build roads. But they did not participate as SWCC members, nor was the activity organized by the SWCC.

Three religious ceremonies were organized by the SWCCs in Nagadeepa during the period 1985-1989. One such activity was a *bodhi pooja* organized by the Abeypura MV. No such activity was recorded in Pimburettewa.

In Nagadeepa, 20 students from seven schools were trained for two days at Kundasale in 1987. This was repeated for another 21 children and seven teachers. In Pimburettewa, a total of 21 students from three schools were sent for training at Kundasale; 13 in this group were girls. This training included methods of interaction between the students and farmer organizations, in addition to other subjects.

A very successful cultural show was organized at Nagadeepa. In addition, students were given a demonstration on planting. Further, the top management of the change agent addressed the students on their contribution to effective water management. At least one such address was given at every school. One education conference was organized for GCE A/L students by the Tissapura MV of Nagadeepa. No such conference was held in Pimburettewa.

Our data show that only 27 percent of the respondents in Nagadeepa and 12 percent in Pimburettewa expressed a positive view of the SWCC. A further 35 percent in Nagadeepa and 17 percent in Pimburettewa had no idea what the functions of an SWCC should be; 28 percent in Nagadeepa and 62 percent in Pimburettewa claimed never to have heard of the SWCC (Table 2.13). This makes it obvious that the SWCCs did not function as expected, nor was there the expected coordination between SWCCs and farmer organizations.

Table 2.13. Farmer opinion regarding school water conservation committees.

Opinion	Nagadeepa (%)	Pimburettewa (%)
It provides students knowledge on water management and agricultural practices.	23	9
It is a good system in general.	4	3
It is only a nominal committee.	5	6
No knowledge of what has been done by SWCC.	35	17
Not heard of SWCC.	28	62
No information.	5	3
Total	100	100
(N)	(104)	(102)

Source: Present study data.

At the inception of the project in Nagadeepa some positive action is seen in the setting up of the SWCCs and the JSWCC. These groups flourished at the beginning but soon declined in vitality and effectiveness. Therefore, the change agent made an effort to revive the SWCCs in 1987. They were advised to observe the activities undertaken by the field-channel groups to which their parents belonged. An awareness campaign was launched with higher-level change agent officers and a university professor addressing the SWCCs. However, the impetus thus given did not last long. The SWCCs became more sluggish after 1987 and after the pullout of the change agent, they became inactive. While reorganizing of the SWCCs was going on in Nagadeepa, the same process was undertaken in Pimburettewa, but with less interest. The Pimburettewa SWCCs too became less active and ceased to function after 1987.

The school teachers interviewed said that the concept is ideal but there were many shortcomings in implementation. The present study confirms that by mid-1989 the SWCCs had collapsed completely. Though one of the main reasons for setting up the SWCC System was to ensure project sustainability, the SWCCs themselves did not long survive the change agent's withdrawal from the location.

Leadership Development

The most important part of a community-based social change program is building up a strong leadership network. The project has introduced a joint management system with multi-leadership on a hierarchical basis, mainly with one objective, water management, on the basis of hydrological boundaries and not social or administrative boundaries.

It is not clear how the change agent identified the existing leadership prior to deciding whether to use the prevailing network or to develop new leaders. The change agent seems to have made several preliminary visits and become familiar with the existing leadership. Some of the leaders thus identified were persons who facilitated the change agent's entry into the community. After the identification of the key leaders, an awareness campaign was launched and the network of leadership further developed. Farmers selected were then given training at Kundasale. This was the first step taken towards leadership development in both locations.

It was observed that the change agent had earmarked certain persons for positions of leadership and indirectly influenced the rest of the farmers to ensure their choice. In many cases farmers were not in a position to go against the change agent's request and were unable to select the persons of their own choice as leaders. The leaders that the change agent seems to have appreciated were those with strong communication skills rather than other leadership qualities. Further, it was the change agent who selected the farmers to be sent for training; this was not decided at the farmer organization meetings by the farmers themselves. Thus the change agent was able to select its clients as leaders and to send them for training. Later these leaders were used for the change agent's promotional activities, such as addressing farmers in other projects being carried out by the change agent, participating as orators at the change agent's official functions and ceremonies, and for the production of a video film.

If the selection of the leaders and the selection of farmers for training had been entirely in the hands of the farmers, and the change agent was able to develop leadership qualities of those who were chosen by the farmers, a larger proportion of the leaders might have been acceptable to the farmer community.

The leader has no constitutional powers to control community activities. What he has is authority devolved through a community consensus, where his leadership is acceptable to the majority. Many leaders in the project areas were seen as striving to gain constitutional powers but not to win greater community acceptance. This could partly be due to the fact that the leadership was developed on hydrological parameters only and the sole objective of the system was water management. The duties of the farmer leaders were primarily to undertake responsibilities in water distribution and the organization of channel maintenance activities, though the scope was wide enough to cover all agricultural matters according to project objectives. With hindsight, we suggest that if the farmer organizations had been in some way merged or had collaborated with other existing community organizations, the validity of the leadership may have been enhanced.

CHAPTER 3

Impact of the Change Agent

INTRODUCTION

THIS CHAPTER EXAMINES the impact of the change agent's program on the two irrigation systems, based on qualitative and quantitative data. In this analysis both positive and negative aspects are discussed in detail. To the extent possible we try to examine areas where the change agent anticipated having an impact. At the same time the views of the respondents are also considered, and compared with other data. Where it is relevant, we also note the limitations of the available data. The timing of the study and the violent context in which it is placed obviously do affect the findings to a considerable but indeterminable degree.

IMPACT ON KNOWLEDGE OF WATER MANAGEMENT

Concerning the farmers' views on the impact of the training component of the program, 17 percent of the Pimburettewa and 6 percent of the Nagadeepa farmers found the training (including motivational seminars) conducted by the project to be satisfactory. Only 3 percent in Nagadeepa felt that they were not satisfactory. The rest had mixed feelings about the program. However, the majority of the farmers were observed to be satisfied since they were exposed to new knowledge through training, and educational and motivational programs.

The farmers were asked to indicate who should make decisions on water use, distribution, maintenance of the canals, land use pattern, etc. If they had developed an opinion favoring farmer-officer cooperation from the training, as was intended, they would have replied that it should be a joint decision.[30] But in both locations a majority of the leaders (who have had greater exposure to training programs) consider that farmers alone must undertake water distribution while the majority of the ordinary farmers (who had less opportunity for training) consider it should be carried out jointly by both farmers and officers (see Table 3.1).

Table 3.1. Farmer opinion regarding decision making on water management, land use and extent of land cultivated.

Opinion	Nagadeepa		Pimburettewa	
	Ordinary farmer (%)	Farmer leader (%)	Ordinary farmer (%)	Farmer leader (%)
Decisions should be taken by:				
Farmer	10	47	27	44
Officer	0	21	31	16
Both together	90	32	42	40
Total	100	100	100	100
(N)	(42)	(62)	(52)	(50)

Source: Present study data.

The knowledge gained by participating in training programs and motivational seminars was evaluated by asking their opinion on the concept of water management. The knowledge thus gained is satisfactory. About 69 percent of the Nagadeepa and 80 percent of the Pimburettewa farmers have given the most relevant answer—water use without waste, get and distribute water on an equitable basis, and use available water in an efficient manner.

30 We do not say that the farmers cannot or should not be given full responsibility for all activities regarding water management and other agricultural aspects. In future the farmers will be able to undertake all the responsibilities by themselves. However, at present the systems are under government authorities and, further, the objective of the change agent was to develop a better farmer-officer relationship to solve existing problems.

The answers provided by the rest are not relevant to the specific subject of water management. It is clear that the majority of the farmers have adequate knowledge regarding proper water management, which we believe was to a large degree obtained through the project training component (see Table 3.2).

Though the majority feel that decision making on water management should be handed over to or at least shared with the farmers, the majority of the respondents do not feel that the best person to control water distribution is the farmer representative. The majority still think water must be distributed by the farmer representative together with the *jalapalaka*, or irrigation laborer (86% in Nagadeepa and 53% in Pimburettewa). This suggests there is considerable harmony between the farmers and jalapalakas; or it may indicate that the farmers do not wish to be totally dependent on the farmer representative. In any case, it can be concluded from the evidence that the farmers received sufficient knowledge on water management through the motivational, educational and training programs carried out by the change agent.

Table 3.2. Means suggested by farmers to control wastage of water.

Means	Nagadeepa (%)	Pimburettewa (%)
Proper maintenance of irrigation system	22	16
Issue/take the required volume	25	36
Distribution of water on *mura* basis	6	8
Awareness of the negative results of water waste	4	7
Cultivate according to *kanna* schedule	2	3
Strengthen the bunds of rice fields	4	14
Not use/issue water during rainfall	3	3
Make use of water from drainage channel	4	0
Various other means/several of the above means	20	6
No answer/answer not relevant	10	7
Total	100	100
(N)	(104)	(102)

Source: Present study data.

IMPACT ON WORKING RELATIONSHIPS OF FARMERS AND OFFICERS

One of the major pre-project problems in the study locations was the disunity among the farmers. About 89 percent and 70 percent of the farmers in Nagadeepa and Pimburettewa respectively, stated that there were many disputes among farmers during the pre-project period, but that the training had brought about some positive results by reducing the disputes which existed among the farmers.

But some unexpected events which occurred in both systems have also resulted in exacerbating the fragmentation among the farmers and given rise to misunderstanding between farmers and officers. One such event took place during the 1986 yala season at Nagadeepa. This yala was planned to be devoted to nonrice crops (this was the first cultivation season after the introduction of the change agent program). Since both the project manager of the Irrigation Management Division and the change agent were very eager to see quick results, they seem to have paid less attention to other possible socioeconomic factors affecting the introduction of the new system. The communication of the yala plan to the majority of the farmers was very poor and tardy. By the time the decision was taken at the project committee meeting, some farmers had already commenced the season with rice cultivation. Altogether, 483 farmers are said to have sown rice, and cases were filed in court against 60 of them for not adhering to the cultivation plan.

As a result of this issue, a large group of farmers united against the project manager and the change agent, seeing themselves as a persecuted group. This incident shows the evolution of two distinct groups among the farmers; thereafter, it was difficult to achieve coordination among the farmers.

We found a considerable gap between the farmers and farmer representatives in both locations. This was more predominant in Pimburettewa. The ordinary farmers tend to view the farmer representatives as quasi-officials, who extract the maximum benefit from the system. This signifies that while the project has brought about a positive result by providing a forum for farmers to unite, some of the incidents which took place during the project implementation period have also had negative results. These have exacerbated latent conflicts among farmers, brought into the open previously hidden fears of officers, and to an extent difficult to quantify, generated an unspoken dissatisfaction with the joint management system in the minds of some ordinary farmers and officials.

The erosion of the farmers' trust in the farmer organization and joint management system introduced by the change agent was one of the several factors which nearly led to the formation of a new farmer organization in Pimburettewa. The major reasons given by the farmers trying to form this organization are loss of faith of ordinary farmers in the leaders and the loss of faith in the change agent.[31]

By the time the new organization was formed, the change agent was about to leave the location. Since they knew that the project was ending and opposition from the dissident farmers was strong, the field officers of the change agent do not seem to have taken any action to bring about a settlement to this problem. Later the problem was solved through the intervention of the block manager who was able to bring about a reconciliation by absorbing the dissident organization into the main system. He was able to win the trust of the farmers, and because the main "opponent" as perceived by the dissident farmers—the change agent—had by then left the location and the controversial farmer organization leaders viewed as clients of the change agent were dismissed from office and new leaders selected, much of the

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31 Contradictory views and explanations were given of this effort to establish an alternative organization. Key informants gave the following examples of the loss of faith that had developed.

Loss of faith of the ordinary farmers in the farmer representatives:

a. They do not believe that the representatives adequately represent the farmers' problems at the farmer organization meetings;
b Ordinary farmers believe that the representatives have merely become the mouthpiece for decisions taken by officials at the committee meetings;
c. Representatives are believed to take undue advantage of the farmer organizations, mainly by using the checkroll contracts and exploiting the ordinary farmers as laborers;
d. Farmers believe that many of the leaders have become the clients of the change agent and have lost their usefulness as independent farmer representatives; and
e. Farmer leaders invariably are seen as skilled orators but are unable to follow up with appropriate action and there is general dissatisfaction due to personal weaknesses of some leaders.

Farmers' loss of faith in the change agent:

a. Some farmers believe that the change agent is responsible for pushing the selection of some unpopular and unsuitable representatives and then sustaining them in office;
b. The change agent was first believed to have supported the farmers in their refusal to pay O&M fees, and later was seen as having switched sides and pressurized the farmers to pay O&M fees; and
c. According to the farmers, the change agent did not always keep its promises.

friction was eliminated.[32]

Farmers in both locations indicated that the pre-project support they had received from the officers had been relatively poor. Only 15 percent said that they received adequate support. This situation was considered to be improved after the project. As many as 30 percent of the respondents in Nagadeepa and 49 percent in Pimburettewa think that the officer support has become satisfactory. However, this positive increase cannot be seen as sufficient since more than half the respondents still consider officer support in the post-project period to be unsatisfactory.

There is strong evidence to indicate that the change agent, especially in Nagadeepa, has antagonized a large section of the officers through a somewhat shortsighted use of a published article[33] on the Nagadeepa Project, which contained highly inflammatory writing about the workings of officers. The article was rather sensational and biased, and written without sufficient facts. It contained a strong indictment of state officers, especially officers of the Irrigation Department. While the views expressed may have had some justification, we feel that it was a shortsighted step to take in a project where one of the avowed goals is the improvement of farmer-officer relations by emphasizing areas of cooperation.

This article was given wide publicity by being distributed to all the farmers in Nagadeepa and even to the officers in Pimburettewa, thus creating a problem not only in Nagadeepa but in the entire area, and damaging the tenuous but gradually strengthening bond between officers and farmers. Among the officials at Nagadeepa, it served to increase the antipathy towards the change agent along with hostility towards the farmer organization system.

At the beginning of the Pimburettewa Project, many of the Mahaweli Economic Agency staff seem to have had some reservations, perhaps due to the friction over the Nagadeepa publication issue. Yet they claim they extended their support in operationalizing the farmer organization concept. However, many believe that the change agent had intervened to obtain the transfer of officers who were viewed as not being sufficiently

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32 At the time the field work of the present study concluded, this new farmer organization had been completely absorbed into the mainstream, with its officers and members being elected to office in the "official" farmer organization system.

33 This article was published in *Desathiya* (a government publication devoted to development issues—Vol 9, Oct. 1986).

supportive.[34] The change agent may have felt that given the short time period of its project, officers who did not cooperate should be moved out. What is significant is that this is the perception of both officers and farmer representatives. If these misgivings are well founded (we could not confirm the truth), it could be that officer cooperation during the project may have been elicited more through fear than a real sense of commitment. In any case, the perception that this happened has affected the build-up of the strong working relationship that was envisaged at the inception of the project.

This situation can be further observed by examining the minutes of a meeting held in May 1987 in Vijayabapura Block Office to discuss the problems arising from the project. The participants were only Mahaweli Economic Agency officers; the change agent officers were not invited. There were 23 participants; the main item on the agenda was a discussion of the difficulties of working with the change agent officers. The officers stated the following at the meeting:

1. The change agent had not been able to change the attitude of farmers or guide them.
2. Problems had been created between farmers and officers with the farmers being given a biased picture of the officers.
3. Farmers were neglecting maintenance of channels and the payment of O&M fees was declining at an alarming rate.
4. The decisions taken at the subproject committee meetings had not been conveyed to the general membership.
5. Farmers hindered the officers going about their normal duties.
6. The relationship between field officers and farmers had declined so badly that the farmers did not heed the officers' advice.
7. The scope of work and functions of the change agent officers were not clear to the officers.
8. The officers were not kept informed of the training given to the farmers by the change agent.

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34 At Pimburettewa, 6 out of 18 officer transfers between 1986 to 1988 were believed by the respondents to have been due to this reason.

9. The change agent officers had given advice contrary to the Mahaweli Agricultural Extension guidelines.
10. The change agent training program had resulted in the farmers getting confused since its contents contradicted the content of the Mahaweli Training Program.
11. The change agent officers had become a hindrance to the entire system by making it difficult for unit managers to control their assigned units.

The above highlights that there was no full understanding and cooperation between the change agent and government officials in carrying out the project activities. It is also evidence of the resistance to change among some of the officers, whose interests would be directly threatened if farmers became better organized. Our observation is not on whether the above comments are true or not true; but rather that the change agent may not have handled its relationships with government officials with sufficient sensitivity to minimize opposition.

We suggest that the change agent's use of short sighted strategies to boost the project activities, such as the threat of punishing the farmers and officers not fully supportive of the program, weakened rather than strengthened the long-term farmer-officer, farmer-farmer and officer-officer relationships.

IMPACT ON MOTIVATION OF FARMERS AND OFFICERS

The entire officer sample in both locations agrees that the officials' motivation and personal efficiency are important for the success of the efforts to improve system performance. Yet except for 11 percent of the officers in Nagadeepa, all the others stated that their motivation and efficiency have always been at the same level (pre- and post-intervention period) and did not improve merely due to the change agent's intervention.

Most farmers agreed that officer motivation was low before the inception of the change agent's project (92% in Nagadeepa and 68% in Pimburettewa). As a result of the project, 36 percent of the Nagadeepa farmers and 52 percent of the Pimburettewa farmers feel that the officers now are highly motivated. What is important here is that many farmers perceive that the officers are more motivated because of the project. There were no incentives made available by the project to motivate the officers. Their work for the project

has been assumed to be part of their normal duties, not needing further incentives.

The majority of the farmers (79% in Nagadeepa and 71% in Pimburettewa) agree that motivation of the farmers was low before the project started and has greatly increased (60% in both locations) as a result of the change agent's intervention. This feeling regarding the farmers' and officers' enhanced motivation is a healthy indication.

This reveals that the motivation of both farmers and officers and the officers' effectiveness had improved in both locations as a result of the project. At least, there is a common understanding on the part of the farmers that officer motivation has been enhanced and this is important in bridging the gap between the two groups.

OUTCOMES OF THE FARMER ORGANIZATION SYSTEM

The majority of the farmers in both locations favor the establishment of the farmer organizations. In Nagadeepa, 69 percent feel that the farmer organizations are a positive development, but 31 percent think that they leave room for "unhealthy complications." The percentages are almost similar in Pimburettewa (68% : 32%).

Nearly a quarter of the farmers (24% in Nagadeepa and 23% in Pimburettewa) said that the farmer organization system was an effective organizational network for promoting participatory management. Seventeen and eleven percent of farmers in Nagadeepa and Pimburettewa, respectively, said that it had created unity within the community. The other positive results indicated by the farmers are that they are a way of solving farmer problems; they give knowledge of water management and effective agricultural practices to the farmers; they have in some cases provided solutions to problems; and they have improved farmer-officer rapport. However, only 2 percent of the Nagadeepa and 12 percent of the Pimburettewa farmers mentioned that the farmer organizations were actually able to solve farmers' problems.

A fair percentage of farmers (14% in Nagadeepa and 19% in Pimburettewa) pointed out that the system is sound conceptually but has shown poor results in practice. A smaller percentage (9% in Nagadeepa and 1% in Pimburettewa) suggested that farmer organizations are not capable of solving farmers' problems. Other negative responses highlighted the following: the choice of inefficient leaders; the low level of participation by

ordinary farmers; and that although there were positive effects during the project period, these have declined after the change agent left the field.

The farmers in Nagadeepa believe that the subproject committee is where the majority of solutions can be found, followed by the project committee, field-channel groups and distributary committees. This implies that decisions are taken at the top rungs of the system where the farmer is a representative but not a decision maker. The farmer-level organizations are felt to be less important since their decision-making powers are limited. A very significant difference is seen in Pimburettewa where the majority (57%) feel that the field-channel group is the most important problem solving committee (see Table 3.3).

Table 3.3. Farmer opinion on the most important committee to solve farmer problems.

Type of committee	Nagadeepa (%)	Pimburettewa (%)
Field channel	16	57
Distributary	14	8
Subproject	30	14
Project	18	7
All or several of the above	13	1
Do not know/None	9	13
Total	100	100
(N)	(104)	(102)

Source: Present study data.

This situation can be further analyzed by considering the attitude of farmers towards the problems which have been solved through the new system. No farmer at Nagadeepa felt that his problems had been solved. A more positive picture is seen in Pimburettewa where 12 percent agreed that they have had solutions to their problems. Fifteen percent in Nagadeepa and 21 percent in Pimburettewa felt that the farmer organizations had been ineffective in solving their problems. The rest (85% Nagadeepa and 67% in Pimburettewa) were of the opinion that a limited number of issues had been resolved through the farmer organizations. A rather small percentage (5% in Nagadeepa and 9% in Pimburettewa) say the ineffectiveness is because the

farmer organizations do not have the authority to implement the decisions taken. Decisions taken in committees have very rarely been implemented according to 35 percent in Nagadeepa and 60 percent in Pimburettewa. Thirteen percent in Pimburettewa said that decisions are being implemented; none of the Nagadeepa sample were in agreement. Thus it can be said that the farmer organizations in Pimburettewa are perceived as having slightly more decision-making authority than those in Nagadeepa. However, overall, farmer organizations were not perceived as being as effective as expected by farmers, the NGO, or government officials.

The hierarchical nature of the joint management system requires good coordination among the various levels. Nagadeepa shows a very negative picture with only 7 percent agreeing that the lower-level farmer organizations receive the support of higher committees; 49 percent feel that the support received is not adequate, while 44 percent feel that there was no support at all, thereby indicating an inadequate level of coordination among the committees.

In comparison, there is much better coordination among the levels in Pimburettewa with 35 percent saying that the higher levels intervene to solve problems brought up by the lower level committees; 41 percent feel that though some support is received, it is not adequate; 16 percent feel that there is no support at all.

The majority of farmers feel that at least some decision-making authority for water distribution has now devolved on the farmers. Table 3.4 presents the opinions expressed on this issue. Two major differences can be observed here:

1. The lowest percentage of persons who felt that they had obtained the authority to distribute water is recorded in Nagadeepa, with Pimburettewa being more positive once again. Only 11 percent of Nagadeepa farmers and farmer leaders feel that water management is in their hands; the numbers are double in Pimburettewa (24%).

2. There is a significant difference of opinion between the farmers and farmer representatives. Only 2 percent and 19 percent of ordinary farmers in Nagadeepa and Pimburettewa, respectively, felt they had gained control of water management. In contrast, 17 percent and 36 percent of farmer representatives in the two locations believed that they had achieved control. This indicates that the average farmers do not perceive themselves as yet having gained full control of water distribution through their organizations. However, in general, a ma-

jority of the respondents (95% in Nagadeepa and 71% in Pimburettewa) are fully or to some degree satisfied on this issue.

Table 3.4. Farmer opinion on whether they have received water management power into their hands.

Location/Reason	Farmer (%)	FC Leader (%)	DC Leader (%)	Total
Nagadeepa				
Yes, fully	2	17	18	11
Yes, to some degree	93	77	77	83
No, not at all	5	6	5	6
Total	100	100	100	100
(N)	(42)	(40)	(22)	(104)
Pimburettewa				
Yes, fully	19	36	20	24
Yes, to some degree	52	57	75	58
No, not at all	29	7	5	18
Total	100	100	100	100
(N)	(52)	(30)	(20)	(102)

Source: Present study data.
Notes: FC = Field channel. DC = Distributary channel.

Field-channel groups in Nagadeepa have organized some shramadanas[35] for strengthening of field-channel banks, weeding, and desilting and road maintenance work. Secondary data reveal that there has been a reasonably high level of participation in shramadana work (Table 3.5). But it is difficult to conclude whether the improvement is the direct result of the project or because all activities which took place after the project were reported as outcomes of the project. When the man-days are calculated at the rate of Rs 40 (US$1.35 in 1987) per day (the average daily labor wage at the time), the estimated value of the work performed through shramadana is about Rs 140,000 (US$4,755). If the entire number of families is assumed to have been 2,500, then it has to be assumed that each farmer has contributed 1.4 days

35 A complication arises since some Progress Reports refer to "field-level shramadana" and others to "small-scale shramadana." In this analysis both have been taken into consideration.

labor for shramadana at the field-channel level during the period of the project—less than half a day per year.

Table 3.5. Number of shramadana held in Nagadeepa.

Year	Change Agent Progress Report		Wijayaratna Report*		
	Number of shramadana	Number of participants	Number of shramadana	Number of participants	Number of persons/shramadana
1985	–	–	18	924	462
1986	74	2,108	90	3,948	1,950
1987	107	2,760	81	2,287	1,100
1988	0	0	ni	ni	ni

* Wijayaratna et al. (1988).
Note: ni = No information.

In Pimburettewa, according to the change agent's Progress Reports, 72 field-channel level shramadanas were held during the two-year period from 1987 to 1988. The total number of participants is 1,085. If this is computed on the basis of a one-day shramadana (the earlier case was half a day), and if the total number of active farmers is 2,000, then only half a day was contributed per farmer for the two-year period.

Of the 40 field-channel group leaders in Nagadeepa, three (7.5%) said that they have not done anything so far but the rest indicated that they had carried out small-scale shramadanas in support of O&M work, welfare work, etc. None of the Pimburettewa respondents indicated that they had been totally inactive. Sixteen out of 30 (53%) of the field-channel group leaders indicated that they had carried out work under the "checkroll" system. There were very few shramadanas or cultural or welfare activities carried out.

IMPACT ON OPERATION AND MAINTENANCE

The maintenance work at the field-channel level is expected to be done through the farmer organizations. More farmer representatives than ordinary farmers feel that they should undertake irrigation maintenance work (see Table 3.6). About 18 percent of the Pimburettewa farmers feel that it should

not be their responsibility. The same table also indicates that even if the farmers accept these responsibilities regarding the system, 20 to 25 percent of the farmers and farmer representatives in Pimburettewa maintain that the farmers have not yet been entrusted with the really important maintenance work. More than 95 percent of the Nagadeepa farmers feel that they have been given responsibility for maintenance of the irrigation system only to a limited degree, indicating that maintenance has so far not come under farmer control.

The farmers' attitudes towards distributary-canal maintenance is also shown in Table 3.7. Some money is allocated for maintenance work on distributaries by the Irrigation Department at Nagadeepa. Sixty four percent of the farmers in Nagadeepa said that they carry out work on a shramadana basis and that if there is an allocation, they distribute the money among the participants. A further 27 percent in Nagadeepa said that the farmers maintain their own stretches of the channels. Though some construction work is carried on a contract basis by outside contractors, prior to water issues, the Nagadeepa farmers have to clear the channels. Here, each farmer is supposed to clear the portion of the channel demarcated as his own.

Table 3.6. Farmer opinion on the status of irrigation maintenance work.

Opinion	Nagadeepa		Pimburettewa	
	OF (%)	FR (%)	OF (%)	FR (%)
Maintenance work:				
Should be fully ours	41	48	40	75
Should to some degree be ours	57	52	42	20
Is not our responsibility	2	0	18	5
Total	100	100	100	100
Maintenance work:				
Has fully come under farmer control	2	0	25	22
To some degree come under farmer control	98	95	61	76
Has not at all come under farmer control	0	5	14	2
Total	100	100	100	100

Source: Present study data.
Notes: OF = Ordinary farmer. FR = Farmer representative.

Table 3.7. Farmer opinion on distribution canal maintenance.

Farmer opinion (on who should maintain DCs)	Nagadeepa (%)	Pimburettewa (%)
Distributary-canal committee (DCC)	7	0
DCC by shramadana and paid work using DC allocation	64	36
Farmers/leaders by checkroll system	0	60
Owner	0	4
Farmers individually maintain their section	27	0
There is no distributary channel	2	0
Total	100	100
(N)	(104)	(102)

Source: Present study data.
Notes: DC = Distributary channel. DCC = Distributary-canal committee.

The percentage who mentioned shramadana as the basis for maintenance work in Pimburettewa is much lower (36%). At Pimburettewa, the majority (60%) said that they carry out work on distributary canals on a checkroll basis and that farmers can earn money as daily paid laborers. The checkroll system for small-scale contracts for construction and rehabilitation seems to have become the normal practice in Pimburettewa. This has become a highly controversial issue. Prior to the change agent's intervention, such work was carried out by contractors through established community organizations. Later, this responsibility was handed over to the new farmer organizations.

Opinion on the quality of checkroll work differs among the officers, with the technical personnel especially professing to be dissatisfied (87%). Some ordinary farmers agree that only the farmer representatives benefit from the checkroll system. The farmer representatives, they allege, are interested in their posts only because it brings them monetary gain through the checkroll system. In many cases, though the farmer representative does no actual work but only supervises (according to the farmers, like an estate *kangany* or an overseer), he nevertheless claims the day's wage. Another complaint is that the farmer representatives pad the checkroll with the names of their relatives. Some officers claim that the only reason why the distributary committees continue to function is because the farmer representatives are able to profit through their office. The formation of the new farmer organization system by

the Pimburettewa farmers is partly due to the alleged corruption of farmer representatives whom, some farmers say, have become a separate bureaucracy.

On the other hand, the farmers seem to have lost their enthusiasm for carrying out maintenance work themselves. When work was being given to outside contractors, the farmer organizations fought hard to get it into their hands, arguing that the contracts were being carried out very shoddily. But when they won the right to carry out the contracts, they began to see it as an additional source of income, and not as a service to the community. There is evidence that one subproject committee chairman who had leased out his rice fields, made checkroll contracts his main source of income. Further, some subproject and project committee meeting minutes indicate that the farmers were not willing to work on the checkroll system when payment was low. Also, according to the minutes of these committee meetings, the farmers have to wait a long time to collect the money due on checkroll contracts, and this has become a problem.

The majority opinion, however, is that the system itself is suitable. Of these, 41 percent approve of it as a method of generating income; only 37 percent of the farmers feel that the users themselves can maintain their own system. The major problem for most farmers is that the funds are not being properly utilized due to the alleged corrupt activities of the farmer leaders who use the checkroll system to exploit their own membership. Nevertheless, the majority (87%) consider this to be better than the former system. The major advantage is that the farmers can do quality work since they are working for themselves while earning an extra income; the disadvantage is that the system lends itself to exploitation by the farmer representatives and helps build up a farmer bureaucracy. This also suggests that most farmers would support reforms that make farmer participation in maintenance more effective.

The positive results of introducing the checkroll system are that the farmers receive some financial returns which were formerly enjoyed by the contractors and the quality of work is obviously better than that of the contractors. Further, the farmer community is able to do the same work for less money than the contractors.

Impact on O&M Fee Collection

The payment of O&M fees too has become a very controversial issue. We suggest that even if farmers are given the responsibility and opportunity to carry out maintenance contracts, they will not start feeling that the system belongs to them until they spend their own resources to maintain their own system. The farmers in both systems are still very dependent and prone to expect everything from the state.

Because of the political problems prevalent during the project period, farmers were convinced by various groups that they need not pay O&M fees. In the project locations it appears that the change agent too has favored this move. If a social change program intends making farmers more self-reliant, then the farmers should be motivated to accept their responsibility to pay this levy (or contribute through some alternative mechanism) by emphasizing its value to the farmers as individuals and as a community. The change agent seems to have refrained from getting involved in what is a very sensitive area, instead of making a determined effort to tackle this difficult issue. The argument put forward has been that if the farmers are already carrying out O&M work, they need not pay the levy. This argument is correct if the farmers are donating free labor for maintenance work. But they have become wage laborers replacing the contractors and maintenance workers, especially in Pimburettewa. Thereby the farmers have become more dependent on the state. Since the financial allocations are not sufficient for the upkeep of the system, the physical structures will gradually deteriorate, creating more problems for farmers in the long run.

Table 3.8 shows that O&M payments have been low in the study locations. Especially after 1985, practically no one, not even the farmer representatives, have paid the levy. To be fair, it must be noted that this decline in payment of the O&M fees is a national phenomenon. Nevertheless, it appears to us that the change agent did not adequately tackle this highly controversial issue through its training and motivational programs.

Our data show that in Pimburettewa the change agent did not have an unvarying, clearcut policy on this issue. With the farmers, they had dismissed the payment of the O&M fee as unnecessary, thereby putting the responsibility for maintenance on the state. With the officers, they had seemed to advocate the collection of the levy. Finally, the more skeptical officers seem to have engineered a situation where the issue was put directly. The senior project officer of the change agent spoke favoring payment; this move antagonized a considerable section of the farmers and was one of the

immediate factors leading to the setting up of the alternative farmer organization discussed above.

The argument that farmers should not pay O&M fees since they carry out the maintenance work needs to be examined. According to the change agent's project proposal, the expected farmer contribution was Rs 374,000 in kind during the three-year project period. It is not clear how this estimate was arrived at and how the contribution would be made. We assume that this is computed as the money value of shramadana labor.

Senaka Arachchi et al. (1989) calculate the value of shramadanas organized by the farmer organizations in Pimburettewa during 1986 to 1989. Therefore, a comparison with original expectations can be made. Table 3.9 indicates that farmers have not contributed to O&M in Pimburettewa at the level anticipated. Neither the government's target for O&M fee collection (Rs 3.2 million) nor the change agent's target for labor contribution have been realized. A further 3,491 days of free labor would have to be provided by the Pimburettewa farmers to cover the farmers' contribution to the project promised by the change agent. In addition, the farmers need to provide 83,358 labor units if they are to contribute the O&M levy in kind. This analysis was not carried out for Nagadeepa due to the lack of data.

The government and the charge agent expected a total of Rs 3.35 million as the value of farmer contribution to O&M at Pimburettewa (Table 3.9). Even if half of this had been realized it would have made a significant level of resources available to the system.[36] The multiplier effect of the improvements to the system would profit the farmers who would have been motivated to attend to the farmer organization work since they would have been discussing how their own money was to be spent. Hence, they would have begun to shed their overdependency on the state. Had Rs 3.2 million in service fees been paid, the system would have benefitted from improvements worth about Rs 9.6 million, since the Mahaweli Authority would in principal have paid double the amount collected into the distributary committee accounts. Further, this would revert as additional income to the farmers through the maintenance contract system.

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36 This assumes that the funds would be promptly available to the system. Delays in making the funds collected from farmers available for work in their systems was one major reason why the good intentions of the Irrigation Management Division Program were not fulfilled.

Table 3.8. Recoveries of O&M payments in selected study locations.

Location	Year					
	1984	1985	1986	1987	1988	1989
Nagadeepa						
Total paid (Rs)	30,200	2,400	38,178	3,040	340	–
% paid	6.7	0.5	8.4	0.7	0.5	–
Balance [a] (Rs)	420,200	448,000	412,221	447,360	450,100	–
Mapakada						
Total paid (Rs)	64,337	45,227	16,148	17,262	1,030	–
% paid	100.0	70.3	25.1	26.8	1.6	–
Balance [a] (Rs)	0	19,072	48,152	47,035	63,274	–
Dambarawa						
Total paid (Rs)	51,262	26,987	3,710	14,250	925	–
% paid	439.8	21.0	2.9	11.1	0.7	–
Balance [a] (Rs)	77,512	101,787	125,065	114,525	127,850	–
Pimburettewa [b]						–
Total paid	–	–	–	–	0	0
% paid	73.3	49.9	12.3	3.0	0	0
Balance [a] (Rs)	ni	416,131	968,626	1,627,646	2,376,536	3,210,796
Dewahuwa [c]						
Total paid (Rs)	132,900	69,400	26,100	8,800	125,000 [d]	ni
% paid	55.9	29.2	13.7	5.4	ni	ni
Balance [a] (Rs)	104,600	168,100	164,000	152,700	ni	ni

a Accumulated balance.
b Estimate based on available limited data.
c Based on IIMI (1989).
d Data not available since the project office was burnt prior to data collection of the present study. The project manager claimed to recall this as the total amount paid for 1988, though it seems rather high.

Other sources: Project Manager (IMF), Nagadeepa Project.
Block Office, Vijayabapura, MEA.

Notes: ni = No information.
In 1984 US$1.00 = Rs 25.44, by 1989, US$1.00 = Rs.36.05.

Table 3.9. Monetary value of shramadana and farmer contributions to the O&M recovery fund at Pimburettewa.

Item	Rupees	Labor units
Contribution to be made by farmers according to change agent's financial proposal for the project (in kind).	374,000	9,350
Monetary value of shramadanas carried out by farmers at the Rs 40/day basis, according to Senaka Arachchi Report.	234,337	5,858
Arrears of O&M payment.	3,210,796	80,270
Arrears in shramadana work to meet change agent financial budget.	139,663	3,492
Total free labor units farmers owe, including arrears of change agent budget and O&M recoveries.	3,350,638	83,766

Sources: Change agent and project records.
Notes: Calculated at the rate of Rs 40/labor unit. US$1.00 = Rs 36.05 in 1989.

Is the Impact on O&M Sustainable?

The farmers were asked whether they are prepared to undertake future O&M work through the farmer organizations. In this regard, though the level of maintenance work at present is not satisfactory, the majority of the respondents indicated that they can continue O&M work on the field and distributary channels of the irrigation system in both locations. More than 65 percent of the farmers in both locations said that they can undertake the O&M work on the field channels. Regarding distributary canals, almost the same percentage of farmers in Nagadeepa were in agreement but less than half the sample farmers in Pimburettewa accepted this. The rest were of the opinion that it was not their responsibility.

In Nagadeepa, 97 percent of the farmers said that they could not undertake the O&M work of the branch and main canals. In Pimburettewa, 92 percent of the farmers answered that they cannot undertake the O&M work of the main channels (in Pimburettewa there is a very small branch canal, therefore, they were asked only about the main canal). All the farmers who are not prepared to undertake O&M work of the branch and main canals said that it is not their responsibility and that the authorities should see to it (see Table 3.10).

Table 3.10. Farmer attitudes towards O&M work.

Farmer attitudes towards carrying out O&M work	Operation		Maintenance	
	Nagadeepa (%)	Pimburettewa (%)	Nagadeepa (%)	Pimburettewa (%)
Field channel				
Yes, fully	71	64	70	68
Yes, to some degree	15	17	16	16
No, not at all	14	19	14	16
Should be done by the authority	4	4	3	3
No farmer cooperation	3	9	3	8
No knowledge/no equipment	3	4	3	3
Other reasons	4	2	5	2
Distributary channel				
Yes, fully	74	46	69	45
Yes, to some degree	16	17	18	20
No, not at all	54	37	13	35
Should be done by the authority	4	8	2	8
No farmer cooperation	3	17	3	16
No knowledge/no equipment	3	7	7	5
Other reasons	4	5	5	6
Branch channel				
Yes, fully	3	nr	3	nr
Yes, to some degree	5	nr	1	nr
No, not at all	7	nr	97	nr
Should be done by the authority	75	nr	75	nr
No farmer cooperation	16	nr	2	nr
No knowledge/no equipment	2	nr	2	nr
Other reasons	4	nr	5	nr
Main channel				
Yes, fully	3	9	3	8
Yes, to some degree	5	6	1	6
No, not at all	97	85	97	86
Should be done by the authority	75	28	75	28
No farmer cooperation	16	28	16	27
No knowledge/no equipment	42	18	2	17
Other reasons	7	11	7	14
(N)	(104)	(102)	(104)	(102)

Source: Present study data.
Notes: nr = No record.
Totals exceed 100 percent because farmers could give multiple responses.

IMPACT OF REHABILITATION WORK IN PIMBURETTEWA

This analysis is limited to Pimburettewa since Nagadeepa lacked a rehabilitation component. The majority (85%), said that they are satisfied to some degree with the rehabilitation work carried out by the Mahaweli Economic Agency. Further, 78 percent of the farmers said that their suggestions regarding rehabilitation work were considered to some degree. More than three fourths of the farmers participated in rehabilitation work through the check-roll system. Only 15 percent said they had participated through shramadana work.

More than half of the farmers of the sample said that their water distribution system was improved as a result of rehabilitation work. About 25 percent said the supply of water improved to a somewhat satisfactory level while 22 percent said their water supply was not at all improved due to rehabilitation work. This latter response was probably in the areas where adequate water had been previously available. Almost everybody (98%) has an adequate water supply in their fields and 2 percent said their problem was waterlogging. More than half (53%) of the sample farmers said they did not have adequate water prior to the rehabilitation project. These figures clearly indicate that there is a very positive improvement as a result of rehabilitation work.

IMPACT ON LAND USE AND AGRICULTURAL PRODUCTION

The farmers should be able to exploit their lands to the optimum level in order to improve their incomes. Proper water usage involves adopting an efficient water management system and good system maintenance. The limitations of water and land might be overcome to a certain extent by the introduction of nonrice crops (which need less water but are more labor intensive), by using short-aged rice varieties, and intensifying the input of locally available material, such as organic fertilizer. In this section, cultivation of rice versus nonrice crops and use of short-aged rice varieties versus long-aged varieties, both factors directly related to water management that were promoted by the change agent, are examined. Overall, our data show an increase in the extent of land under cultivation in Pimburettewa during 1985 to 1989, and a declining trend in Nagadeepa.

Rice versus Nonrice Crops

Though the data from different sources do not tally, it is possible to observe whether the farmers have put into practice the knowledge of agriculture received through the training. The change agent was particularly interested in the introduction of nonrice crops in order to increase farmer incomes and to optimize the use of available water. However, nonrice crops are labor intensive so that many farmers prefer to cultivate rice which is less troublesome and needs less attention. The introduction of crop diversification is in principle an excellent idea especially for Nagadeepa, where water is limited and the rice yields poor. Even in Pimburettewa the introduction of other crops can have a positive impact on the farmers' level of income.

In the Nagadeepa System maha cultivation is usually carried out, but yala cultivation is possible only when water is available. The percentages of land used for nonrice crops during yala in Nagadeepa are as follows: 59 percent in 1986, 100 percent in 1987, 50 percent in 1988, 89 percent in 1989 (Table 3.11). The fact that the farmers are ready to change their cropping pattern is a healthy sign but one cannot conclude whether this change has taken place due to the impact of the project, or the scarcity of water forcing farmers to cultivate other crops, or because farmers are becoming more commercialized. There is still a considerable number who stick to rice cultivation even in violation of the cultivation plan.

In Pimburettewa a small percentage of land, ranging from 7 to 12 percent, is being used for nonrice crops during both yala and maha. This suggests that the farmers prefer to cultivate rice since the water supply is adequate. If this is the case, it can be argued that the change agent has not succeeded in achieving an actual change in cultivation practices—but the importance of this change in Pimburettewa is far less than in Nagadeepa.

Table 3.11. Land use pattern, rice and nonrice crops.

Season	Nagadeepa						Pimburettewa					
	Rice		Nonrice		Total		Rice		Nonrice		Total	
	(acre)	(%)	(acre)	(%)	(acre)	(%)	(acre)	(%)	(acre)	(%)	(acre)	(%)
83/84 M	5,009	100	0	0	5,009	100	ni	ni	ni	ni	ni	ni
84 Y	0	0	787	100	787	100	ni	ni	ni	ni	ni	ni
84/85 M	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
85 Y	ni	ni	ni	ni	ni	ni	2,122	94	135	6	2,257	100
85/86 M	4,616	81	1,062	19	5,678	100	2,407	87	356	13	2,763	100
86 Y	1,641	41	2,359	59	4,000	100	3,870	90	446	10	4,316	100
86/87 M	4,616	78	1,280	22	5,896	100	4,211	93	317	7	4,528	100
87 Y	0	0	1,313	100	1,313	100	2,326	93	164	7	2,490	100
87/88 M	4,544	70	1,979	30	6,523	100	4,530	94	301	6	4,831	100
88 Y	1,520	50	1,540	50	3,060	100	4,611	90	492	10	5,103	100
88/89 M	4,468	84	848	16	5,316	100	4,666	88	652	12	5,318	100
89 Y	77	11	626	89	703	100	4,290	89	500	11	4,790	100

Notes: M = Maha. Y = Yala. ni = No information. 1.0 ha = 2.47 acres.
Sources: Agriculture Officer, Mapakada.
Block Office, Wijayabapura, MEA.

Short-Aged versus Long-Aged Rice Varieties

One important aspect of land usage is to find out whether farmers were motivated to cultivate short-aged rice varieties which need less water because of their shorter life span, thereby conserving water for the next yala season. Data on Nagadeepa are not available but data on Pimburettewa can be used to study this aspect. Prior to 1986, most farmers (95%) cultivated short-aged varieties. After 1986, only 60 percent of farmers cultivated short-aged varieties during yala. The pattern of cultivation for maha too shows that there has been no specific change. Table 3.12 indicates that Pimburettewa farmers have no desire to use short-aged varieties which is supposed to be one way of improving the efficiency of water management. Their water problem had been solved since the water supply improved after rehabilitation of the irrigation system. In other words, they have no real incentive to use short-aged varieties, and have good reason to shift to long-aged varieties.

Table 3.12. Varieties of rice used, Pimburettewa.

Season	Short-aged varieties		Long-aged varieties		Total	
	(acre)	(%)	(acre)	(%)	(number)	(%)
85 Y	1,920	99	8	1	1,928	100
85/86 M	499	20	2,046	80	2,545	100
86 Y	3,815	92	306	8	4,121	100
86/87 M	678	16	3,533	84	4,211	100
87 Y	1,754	42	570	58	2,324	100
87/88 M	908	20	3,546	80	4,454	100
88 Y	3,090	67	1,519	33	4,609	100
88/89 M	914	19	3,751	81	4,665	100
89 Y	2,807	71	1,124	29	3,931	100

Source: Block Office, Wijayabapura, MEA.
Notes: Short aged = Less than 3.5 months. Long aged = More than 3.5 months.
M = Maha. Y = Yala. 1.0 ha = 2.47 acres.

Rice Production

Since there were insufficient secondary data available, the present study gathered data on production from the farmers. They indicate a slight overall increase in production during the post-project period. But the data show that the production of the Nagadeepa tail-end farmers has decreased during this period while it has increased in Pimburettewa. This once again demonstrates how the rehabilitation component has resulted in a significant increase in the rice production of the Pimburettewa tail enders (see Table 3.13).

Crop Damage

One of the major objectives of the project was to use limited water efficiently and thereby prevent crop damage caused by lack of water or poor water management. However, Nagadeepa farmers (85% of sample) report crop damage after the introduction of the project: of this damage, 75 percent is caused by the lack of water or poor management according to the farmers. The rest (25%) indicated other reasons. In Pimburettewa, 35 percent of the farmers in the sample reported crop damage after the introduction of the project; of these 53 percent indicated it was due to poor water management and lack of water. The rest (47%), gave other reasons such as damage caused by wild animals and heavy rains.

Table 3.13. Rice production according to the present study.

Season	Head end (average bushels per acre)	Level of significance (%)	Tail end (average bushels per acre)	Level of significance (%)
Nagadeepa				
Pre-NBA (80-85)	38.5	65	51.0	90
All yala seasons	26.1	95	56.8	95
All maha seasons	50.9	95	45.2	95
Post-NBA (86-89)	45.1	95	49.8	90
All yala seasons	38.3	95	44.9	95
All maha seasons	54.3	95	56.4	90
Pimburettawa				
Pre-NBA (80-85)	64.7	95	68.9	95
All yala seasons	58.0	95	66.2	95
All maha seasons	71.4	95	73.3	90
Post-NBA (86-89)	70.3	65	71.3	95
All yala seasons	67.7	95	62.9	95
All maha seasons	73.7	95	82.3	95

Source: Present study data.
Note: 1.0 bushel/acre = 51.62 kg/ha.

Land Preparation

In Nagadeepa, 70 percent of the farmers use their own cattle or hire buffaloes or cattle as draught animals. In Pimburettewa, 57 percent of the farmers use their own animals. Family labor is most often used for agricultural work in Nagadeepa (62%). In Pimburettewa, the majority use hired labor (57%). *Attam* (exchange labor) is rarely used in either location even though shortage of labor is one of the major problems in both areas.

Only 18 percent and 3 percent, respectively, of farmers in Nagadeepa and Pimburettewa transplant rice; 39 percent and 31 percent in both locations broadcast the seed rice and the rest use both methods in combination. According to our observations the poorer farmers usually turn to broadcasting because they are unable to afford the labor charges for transplanting. If

collective work can be organized through the farmer organizations for transplanting, both the output and farmer incomes may increase.

Adherence to the Cultivation Schedule

Adherence to the cultivation schedule is regarded as important for several reasons. They are as follows:

1. To make optimum use of water through all farmers cultivating one particular crop or variety simultaneously.
2. To have sufficient time for carrying out repairs and maintenance.
3. To cultivate according to the seasonal weather pattern.

Prior to the project, many farmers deviated from the cultivation calendar for many reasons. According to both farmers and officers, the cultivation meetings were chaotic, with farmers indulging in severe, often unwarranted, criticism of the officers and their fellow farmers. Many farmers had problems with crop insurance because of nonadherence to the calendar.

The cultivation meetings held after the change agent's intervention were observed to be very disciplined in both systems, with all the participants being able to air their views. Further, a precultivation meeting, at which a tentative plan for the season is arrived at by the farmers and officers together, has now been introduced. The decisions are modified according to the first day of water issue which marks the commencement of the cultivation season. The progress made in this respect is remarkable though the schedule is violated in some instances by the farmers.[37] The Irrigation Management Division, Mahaweli Economic Agency, change agent and farmers are jointly responsible for this improvement.

Adherence to the calendar makes the officers' tasks easier. But the farmers should be the group which receives the maximum benefit. Farmers cannot be induced to work according to schedule only by the use of penalties. The

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37 Some farmers at Nagadeepa pointed out that the manner in which the decision is taken to cultivate nonrice crops instead of rice (with special reference to 1986 yala), is shortsighted. According to them, some of their lands are waterlogged (*halapath*) and unsuited for anything other than rice cultivation. The farmers suggested that the owners of such land should not be forced to undertake cultivation for which their lands are not suited. This issue had not been taken into consideration. If farmers can collectively agree on the lands unsuitable for nonrice crops, then the owners should be given the right to cultivate rice on such lands.

project manager and the change agent's staff in Nagadeepa seem to have believed that the farmers could be compelled through use of penalties, but this has only resulted in fracturing the unity among the farmers in Nagadeepa.

The most important decision taken at the cultivation meeting is a suitable date for the commencement of cultivation. Production as well as efficiency of water use can be optimized if this decision is consistent with the "theoretical" season.[38] There could be some deviations from this due to factors such as a change in the weather pattern.

An indepth analysis was carried out to see whether the systems under review have adjusted their seasons according to the theoretical seasons. Some practical problems are faced in trying to adhere to a theoretical season. The major problem is the lack of water to start the season. But this can be addressed by introducing short-aged rice varieties and starting the season with rainfall. The analysis uses a reservoir system located about 60 miles northwest of Nagadeepa, Dewahuwa, for comparison: our analysis shows that Dewahuwa has always cultivated within the theoretical season. In Nagadeepa, there have been deviations in all years between 1984 to 1989, excepting 1987. Pimburettewa also deviates from the theoretical season. The pattern there is to extend yala and maha cultivation throughout the year except for a brief interval in March-April.

It is generally accepted that the seasonal water requirement for rice cultivation at the reservoir sluice is about 5 to 6 acre-feet (0.62-0.74 ha-m) if there are no system losses and an efficient water management system is adopted. An analysis of the theoretical crop water requirement cannot be presented here because of the lack of reliable data on land use patterns. The season can be started on schedule with about 2 acre-feet (0.25 ha-m) according to the experience of Dewahuwa (this inference must be approached cautiously because Dewahuwa has a higher rainfall than the study locations). If this is not sufficient, the acreage can be reduced in keeping with the available water.

As shown in Table 3.14, until yala 1987/1988, the season in both study locations had been delayed until there was sufficient water stored for the entire season before commencing cultivation. In maha 1987/1988 and yala 1988, Nagadeepa farmers started the season with 2.2 to 2.3 acre-feet

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38 The theoretical maha season is from September to mid-March; yala starts in May and ends at the end of August.

(0.27-0.28 ha-m) of water. However, even at the theoretical starting date of yala 1988, there was 2.3 acre-feet (0.28 ha-m) in the tank. This means that except for maha 1987/1988 and maha 1986/1987 all the other seasons could have commenced on the theoretical starting date in both locations with available water, though admittedly with a slight risk in maha 1987/1988.

If cultivation can start according to the theoretical date of commencement of the season in Dewahuwa, the Nagadeepa farmers too can start cultivation with sufficient water. The season started on time in Dewahuwa even when there was only 1.7 acre-feet (0.21 ha-m) of water in the tank. Though there is a scarcity of water at Nagadeepa it is seen that the available water has not been used as carefully as possible. Since the season always starts late, the rainfall is not properly used for land preparation and therefore the farmers are always dependent on tank water.

At Dewahuwa, the tank's storage capacity to cultivate 3,000 acres (1,214 ha) is about 3.3. acre-feet per acre (0.41 ha-m per ha). In contrast the figure for the 4,000 acres (1,618 ha) at Nagadeepa is 7.0 acre-feet (0.86 ha-m); at Pimburettewa it is 8.0 acre-feet (0.99 ha-m) for the same extent of 4,000 acres (1,618 ha). But the Dewahuwa System with a much lower capacity manages to adhere to the theoretical seasonal plan. In addition, in some years, Dewahuwa farmers have even cultivated three seasons in a year. These positive changes were introduced to the system through state agencies without the involvement of a change agent. The seasonal plan is prepared and carried out by the Irrigation Management Division Project Manager and the Technical Assistant from the Irrigation Department along with the farmer representatives.

Water control solely by farmers, without adequate understanding of the technical aspect of water management and the impact of related factors, may not be workable and could lead to water waste and crop damage. Participatory water management must involve both farmers and officers; therefore, the decisions must be taken by a group who are able to maximize the use of rainfall, ensure adherence to the plan, and minimize crop damage due to water stress using their technical knowledge as well as their familiarity with local conditions. They must also be socially conscientious enough to ensure an equitable water distribution while avoiding water waste.

There is not much more to be added about Pimburettewa since farmers continue with two cultivation seasons (even though they may deviate from the theoretical season) because the system is adequately, even plentifully, supplied with Mahaweli water.

Table 3.14. Water available in reservoir on the first water issue day, the first day of the theoretical season, and on the last day of the season.

Location/Season	Day of first water issue (acre-feet/acre)	Theoretical starting day (acre-feet/acre)	Last day of season (acre-feet/acre)
84/85 M			
Nagadeepa	4.7	1.3	2.0
Pimburettewa	ni	ni	ni
Dewahuwa	2.5	ni	2.7
Sorabora	7.1	ni	8.4
85 Y			
Nagadeepa	ni	ni	ni
Pimburettewa	ni	ni	ni
Dewahuwa	9.2	9.2	6.4
Sorabora	8.5	8.3	2.6
85/86 M			
Nagadeepa	4.7	3.5	9.1
Pimburettewa	5.9	3.8	16.2
Dewahuwa	2.1	ni	3.1
Sorabora	4.0	2.6	6.5
86 Y			
Nagadeepa	6.4	6.4	
Pimburettewa	10.2	10.2	4.5
Dewahuwa	6.5	6.5	4.2
Sorabora	ni	ni	ni
86/87 M			
Nagadeepa	3.4	1.4	3.4
Pimburettewa	6.2	2.7	7.2
Dewahuwa	2.1	2.1	1.0
Sorabora	4.8	2.2	7.2
87 Y			
Nagadeepa	8.3	8.3	1.1
Pimburettewa	13.5	12.5	6.9
Dewahuwa	5.1	5.1	2.7
Sorabora	7.7	7.4	1.1
87/88 M			
Nagadeepa	2.2	0.8	0.8
Pimburettewa	2.7	2.4	4.6
Dewahuwa	5.7	0.4	0.1
Sorabora	8.1	1.1	7.4
88 Y			
Nagadeepa	2.3	2.3	0.6
Pimburettewa	4.5	4.5	1.5
Dewahuwa	7.7	7.7	5.1
Sorabora	7.7	7.5	0.9

Source: Irrigation Department data.
Notes: ni = No information. 1.0 ha-m = 8.10 acre-feet. 1.0 ha = 2.47 acres.
M = Maha. Y = Yala.

The number of days between the first and last days of seasonal water issues depends on the variety cultivated and its life span, and the adherence or nonadherence to the seasonal schedule. It is one useful measure of overall efficiency. The difference between the first and last issue of water has decreased slightly in the post-project period in Nagadeepa. Pre-project Nagadeepa farmers used an average of 131 cultivation days for maha; this was brought down to 125 days in the post-project period. The number of days for yala cultivation was reduced to 117 from 131 in the pre-project period (Table 3.15).

Table 3.15. Duration (average number of days) of season before and after project intervention, in the study locations and the control system.

Location	Yala		Maha	
	Pre-project	Post-project	Pre-project	Post-project
Nagadeepa	131	117	131	125
Pimburettewa	134	153	161	181
Dewahuwa	124		153	
Sorabora	150		128	

Source: Irrigation Department data.

Pimburettewa shows a completely different picture. Prior to rehabilitation, the average maha season lasted 161 days and yala 134 days. After rehabilitation, maha increased to 181 and yala to 153 days. There are two major reasons for this. One is the availability of water and the other is the trend among the Pimburettewa farmers to opt for long-aged rice varieties. The farmers also tend to deviate quite sharply from the seasonal plan. In maha 1989/1990 there were plots where land preparation had not commenced even 30 days after the water issue. When such dilatory farmers are ready to commence cultivation, the leaders open the gates once more for them. Participatory management has thus been interpreted as the farmers' right to obtain water whenever they want. The plots are given water at the end of the season too and, therefore, the two seasons continue throughout the year. It is clear that the Pimburettewa farmers have little interest in water management though their water supply, if properly utilized, is probably sufficient for three crops per year.

IMPACT ON WATER USE EFFICIENCY

In Nagadeepa, the average amount of water used per season has shown an increase during the project period (Table 3.16). Two factors seem relevant in this context:

1. The motivational and training program has had little impact regarding the improvement of water use despite the apparent impact on farmers' knowledge reported in Chapter 2.
2. During this period, rainfall had hit a ten-year peak and the tank was filled; therefore more water could be issued.

Table 3.16. Pattern of average water usage for cultivation, Nagadeepa.

Stage of cultivation	Through 1985 (acre-feet.)	After 1985 (acre-feet)
Initial stage	1.15	1.42
Development stage	1.04	1.91
Middle stage	1.43	1.49
Late stage	0.80	1.08
Total	4.42	5.90

Source: Irrigation Department data.
Note: 1.0 ha-m = 8.10 acre-feet.

Secondary data are not available to analyze pre- and post-project water use efficiency for Pimburettewa. Climatological data show that there had been a drastic change in the rainfall pattern in the Mapakada Irrigation Division.[39] The change agent did not experience the full impact of the water problem as stringent water control was not necessary during the project period. Therefore, it can be summarized that there has been no appreciable change for better or worse in water use.

39 The highest rainfall in 10 years was recorded in 1988 (2,158 mm) followed by 1986 (2,160 mm), and 1987 (1,175 mm). The rainfall during 1981-1983 was less than 1,000 mm. Therefore, the project period has coincided with the period of highest rainfall in recent times. Since there had been adequate rainfall, more water had been issued to the fields. Water use also increased with rainfall as was seen in the indepth interviews. The farmers say that "the [change agent] came with the rain."

There is considerable evidence that a very significant amount of water can be saved in the first month of the cultivation season (IIMI 1990b). The Nagadeepa farmers agree and say that everybody should be encouraged to start land preparation with rain water. Since there is a continuous month-long issue of water for land preparation, some farmers do not bother to close the gate even if their fields are sufficiently inundated. If wastage at this point can be minimized, crop damage in the middle stages could be controlled. However, this means that the farmers must not wait until the day of the water issues to start work. Since many of the poorer farmers work as agricultural laborers on a daily paid basis, they do not start land preparation of their own fields until the very last instance. As a result, more water than is strictly necessary has to be issued for land preparation.

As many as 90 percent of the farmers understand that water can be saved if the time spent on land preparation is shorter. But this is not realized in practice. Water is issued for land preparation for one month. Some farmers begin on the first day of issue, others in the middle of the month and others wait until the very end to start on land preparation. Very rarely does a farmer start the land preparation with the onset of the rains. This is due to the uncertainty regarding the date of water issues in Nagadeepa. The farmers also believe that if they start land preparation with rainfall and the water issue is somehow delayed, the fields will dry up and harden making ploughing difficult. Many also believe that retaining water for a long time in the fields would make weeding easier. This may be a cost-effective practice where there is excess water, but not where there is a water shortage.

ECONOMIC IMPACT: INCOME AND EXPENDITURE PATTERN

Income and Expenditure Pattern

According to farmers, their present incomes are relatively lower than their pre-project incomes; here Pimburettewa shows a marked decrease in income in spite of increased production. This may be because the increases in costs of agricultural inputs such as fertilizer and agricultural labor have not been matched by the increase in the price of rice. This type of project cannot solve problems that result from national trends and policies. However, if farmers

had cultivated more high value crops the level of income of the farmers would have increased.

Present study data on income and expenditure are primarily from one somewhat atypical season, supplemented by interviews and observation. Thus the findings reported here should be considered as indicative of trends. The levels of income of the two locations are different. The Nagadeepa farmer incomes are low; lower than their expenditure largely because of poor productivity during the sole season of cultivation. In Pimburettewa, income is always higher than expenditure, showing a small margin of profit (see Table 3.17).

In the present context the majority of farmers in Nagadeepa have a subsistence-oriented household economy. Spending more than three fourths of a family's budget on food is often taken as an indication of poverty. The figures in both locations do not show this level of poverty. But this does not mean that their actual expenditure on food is low because they do not have to purchase their staple food, rice. A rough estimate taking into account the rice consumed domestically reveals that more than 70 percent of their income is spent on food by both Nagadeepa and Pimburettewa farm families, indicating that they are on the verge of falling below the poverty line.[40]

As incomes decrease, farmers turn increasingly to rice for subsistence. This may be one reason why it is difficult to encourage them to change their agricultural practices. Many nonrice crops are cultivated for sale, not mainly for domestic consumption, and are generally difficult to store over a long period of time. Therefore, it can be observed that as incomes decrease, the tendency is to cultivate rice; as incomes improve and the financial uncertainty is less, they tend to go in for subsidiary crops.

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40 The Nagadeepa farmers' domestic rice consumption was 45 percent of production; Pimburettewa 33 percent. A bushel of rice was estimated at Rs 80 and calculated for one season in Nagadeepa and for two seasons in Pimburettewa. If Nagadeepa farmers' domestic consumption of nonrice crops were considered, the percentage would further increase, but this was not calculated due to nonavailability of production figures of nonrice crops and the uncertainty of yala cultivation in Nagadeepa.

Table 3.17. Present income and expenditure pattern of the farmers (average in rupees per month).

Location/Income/Expenditure	Ordinary farmer		FCC leader		DCC and SPC leaders	
	Pimb.	Naga.	Pimb.	Naga.	Pimb.	Naga.
Income from :						
Agriculture	945	3,101	1,116	3,745	1,235	3,466
Other employment	590	608	653	320	424	719
Renting vehicles, etc.	0	99	0	55	0	0
Other sources	199	165	50	98	336	673
Total	1,734	3,973	1,819	4,218	1,995	4,858
Expenditure for :						
Education	77	234	169	420	205	375
Agriculture	477	1,592	602	1,636	527	1,833
Food	1,024	1,183	1,144	1,255	1,232	1,179
Transport and fuel	121	156	110	187	112	223
Health	90	119	128	103	78	102
Recreation	30	102	49	82	55	99
Other needs	114	118	192	54	146	62
Total	1,933	3,504	2,394	3,737	2,355	3,873
Difference between income and expenditure :						
Amount	-199	469	-575	481	-360	985
Percentage [a]	111	112	132	111	118	120
Expenditure for food as % of total expenditure	53	34	48	34	48	30

[a] Difference between income and expenditure as a percentage of income.

Source: Present study data.
Notes: Naga. = Nagadeepa.
Pimb. = Pimburettewa.
FCC = Field-channel committee.
DCC = District-channel committee.
SPC = Subproject committee.
US$1.00 = Rs 36.05 in 1989.

Most farmers' incomes are based on agriculture. About 55 percent of the Nagadeepa farmers' and 75 percent of the Pimburettewa farmers' total income was derived from agriculture. In Nagadeepa, some farmers have

become agricultural laborers on their own lands or work for other farmers on their lands. Thus a significant part of their income derives from the provision of labor. We suggest this is not a very healthy sign since a farmer by definition should be able to meet his basic requirements through agriculture. It is undoubtedly linked to the broader issue of limited employment opportunities for the younger generation in both locations.

Table 3.17 shows that the level of income of the field-channel representatives is somewhat higher than the ordinary farmers'; and the incomes of the distributary and subproject committee members are higher than the field-channel representatives' incomes. This indicates that either the farmer representatives have been the major beneficiaries of the change agent's program, or that the wealthier farmers have been chosen as the leaders in the farmer organizations, or both.

Living Standards

It is difficult to estimate the improvements in the standard of living of the farmers immediately after the withdrawal of the change agent since this is a long-term target. The basic indicators used in this study are increase in income, building new houses, improvement and construction of latrines, and purchase of household goods. Income and expenditure patterns have already been discussed above.

Upgrading housing facilities or construction of new houses is often a priority investment in rural Sri Lanka when a seasonal profit is earned. Since the implementation of the water management projects, our data show a significant improvement in housing in both locations. About 50 percent of the Nagadeepa and 30 percent of the Pimburettewa respondents have built houses after 1986. The *Gam Udawa* 1989 held in Mahiyangana was a major contributing factor in Nagadeepa. Farmers of Nagadeepa had also earned well through the cultivation of nonrice crops in 1986 and used the profits for construction. In Pimburettewa, as a result of rehabilitation, farmers could cultivate their entire plot. The profit went into house building (see Table 3.18).

Other indicators also show positive trends. More than 35 percent of the Nagadeepa respondents and 44 percent of the Pimburettewa respondents have constructed latrines after 1986, a positive improvement in their standard of living. About 76 percent of Nagadeepa and 83 percent of Pimburettewa farmers have a bank account, either in his own name or in the name of one

of the family members. Of the total sample, 12 percent in Nagadeepa and about 19 percent in Pimburettewa have opened accounts after 1986.

Table 3.18. Improvements in the standard of living of farmers (i.e., building of house and latrine, and opening of a bank account by respondents).

Item/Period	Nagadeepa		Pimburettewa	
	Ordinary farmers (%)	Farmer leaders (%)	Ordinary farmers (%)	Farmer leaders (%)
New house built				
Pre-NBA	19	18	23	12
Post-NBA	52	35	30	28
Not newly built	29	47	47	60
Total	100	100	100	100
Latrine built				
Pre-NBA	10	36	20	30
Post-NBA	37	33	45	43
Not available	53	31	35	27
Total	100	100	100	100
Bank account opened				
Pre-NBA	62	76	66	72
Post-NBA	14	11	17	22
Not opened	24	13	17	6
Total	100	100	100	100

Source: Present study data.

More than 25 percent of the farmers have bought bicycles in both locations after 1986; 5 percent have bought motorbicycles; and about 2 percent of Pimburettewa farmers have bought two-wheel tractors. About 9 percent of the Nagadeepa and 13 percent of the Pimburettewa farmers have invested in furniture; 20 percent of Nagadeepa and about 25 percent of farmers in Pimburettewa have bought wall clocks; 4 percent of Nagadeepa and 10 percent of Pimburettewa farmers have bought sewing machines; water pumps were purchased by 4 percent of Pimburettewa farmers while 3 percent at the same location had obtained petromax lamps after 1986.

The above figures indicate that farmers in both locations have purchased some household items after the introduction of the project. The farmers have

also purchased equipment for entertainment: 15-18 percent of the farmers in both locations have bought radios; about 7 percent have bought television sets and 8 percent of Nagadeepa and 22 percent of Pimburettewa farmers have bought cassette recorder-cum-radios.

These data indicate a measurable improvement in living standards. They show a more positive trend than the data on incomes and expenditures. We do not have data on other "control" areas to distinguish broader Sri Lankan trends from the impact of the change program. It cannot be concluded that these changes are the direct impact of project activity alone. These data are useful only to indicate that there was change after the project. The improvements are seen among the ordinary farmers, as well as the farmer representatives. The data suggest that the farmer representatives were relatively better off before the project, but the ordinary farmers too have been able to acquire household goods and build houses.

IMPACT ON CULTURAL ACTIVITIES

Most agricultural societies have traditions of agriculture-related religious rituals and cultural events. Sri Lanka had a very rich tradition of such religiocultural ceremonies, now somewhat eroded for a multiplicity of reasons. In the colonization schemes, these traditions do not flourish to the same extent as in the traditional communities since the colonies often lack the homogeneous sociocultural life of the village. Modernization and political changes too have led to the gradual decline of such practices. However, these practices have not been completely forgotten by the settlers in the two locations. They are familiar with these rituals even though they are infrequently practiced. Often these activities, especially those which do not involve much expenditure, take place when the farmers have the time and are relatively unburdened economically.

The change agent's purposes in reintroducing these rituals were to:

1. Promote unity and trust among farmers.
2. Bring about uniformity in agricultural activities.
3. Instill the value of such ceremonies in the younger generation.

During the period of fieldwork, the only such ceremony to be held in either location was a *kirithiriweema* (harvest) ceremony in Pimburettewa.

Therefore, this analysis will be limited to secondary data (change agent and other reports) and the questionnaire data.

According to the change agent's reports, 36 such ceremonies were held with a total of 21,496 participants in Nagadeepa; in Pimburettewa, 27 programs drew 4,886 participants (Senaka Arachchi et al. 1989). Even though it is not easy to count the number of participants at such events the specific number of programs can be counted. The cultural ceremonies held are presented in Table 3.19.

Table 3.19. Cultural ceremonies held in the project areas and the number of participants.

Ceremony	Year	Nagadeepa		Pimburettewa	
		Number of programs	Number of participants	Number of programs	Number of participants
Vapmagul	1985	2	1,660	–	–
	1986	5	2,250	5	60
	1987	5	1,368	2	300
	1988	5	1,689	2	101
	1989	ni	ni	0	0
Rankaral	1985	0	0	–	–
	1986	1	485	0	0
	1987	5	1,689	3	76
	1988	5	1,297	0	0
	1989	ni	ni	3	342
Aluth sahal mangalya	1985	0	0	ni	ni
	1986	5	2,355	0	0
	1987	5	24,044	4	800
	1988	5	2,400	2	375
	1989	ni	ni	0	0
New year festival	1985	1	163	–	–
	1986	1	2,436	4	0
	1987	0	0	0	0
	1988	0	0	0	0
	1989	ni	ni	0	0

Source: Change agent's reports.
Note: ni = No information.

According to the change agent's data, two *vapmagul* ceremonies were held in 1985 at Nagadeepa; another such ceremony was held each year from 1986 to 1988. This is held at the onset of land preparation and serves to motivate the community to start the cultivation season at a given time. No such ceremony was observed during field work. This practice does not seem to have survived the change agent's pullout. In Pimburettewa, two vapmagul ceremonies were held in 1986 (Senaka Arachchi et al. 1989); two ceremonies were held again in 1987 and 1988 respectively. Yala and maha 1989 were not ushered in with similar ceremonies, indicating that the practice had lapsed even before the project had ended.

The *rankaral* ceremony which is connected with the harvest is still being practiced in many smaller dry zone communities. The change agent's reports indicate that this ceremony was held as follows in Nagadeepa: 1986, single ceremony; 1987, five ceremonies; 1988, five ceremonies. In Pimburettewa the number of rankaral ceremonies held are as follows: 1987, three ceremonies; 1989, three ceremonies (Senaka Arachchi et al. 1989). No such ceremony was held in Nagadeepa for yala 1989 since only a limited acreage was cultivated due to the lack of water. What was reported in Pimburettewa was really for the last maha season, with no ceremonies being held for yala 1989.

Aluth sahal mangalya—a ceremony usually practiced on an individual level rather than collectively—involves an offering of the newly harvested rice to a temple or a sacred bo tree. Five such ceremonies were held in 1987 and 1988, respectively, in Nagadeepa with the change agent's sponsorship. But such ceremonies organized by farmer organizations were seen to be declining in Pimburettewa since 1987.

Two pirith chanting (incantation) ceremonies were held in Nagadeepa and four more ceremonies in 1987. After 1987 no such ceremony was held in Pimburettewa.

Cultural ceremonies do not have an immediate, observable impact. The value of these ceremonies is that they enable the farmers to get together, and thereby community feeling may be enhanced. The relationship between the villagers and the temple is also strengthened. It is also a form of relaxation in a community where such opportunities are rare. However, this community activity can be put to practical use if it involves training people to work together for some matter which affects the entire community.

FARMER PERCEPTIONS ON THE OUTCOME OF THE PROGRAMS

The perceptions of the farmers on some aspects obviously differ from the concepts used in the above analysis. For instance, the adherence to seasonal schedules according to farmers is working according to the time table but the above analysis considered the combination of both the use of water in an efficient manner by starting at the theoretical time and using the technical knowledge of both the officers and the farmers. An efficient water supply according to farmer perception is the availability of water whenever they want it; but the above analysis is based on the optimum use of water. However, it is also important to examine the project outcome from the farmers' point of view even if some of the analytical findings and the farmer perceptions do not tally.

Table 3.20. Project outcome according to farmer perceptions (percentage of responses).

Perception	Level of improvement					
	Nagadeepa			Pimburettewa		
	Pre-project (%)	Post-project (%)	Level	Pre-project (%)	Post-project (%)	Level
Cultivated entire land during maha season	89	88	NI	75	81	LP
Cultivated entire land during yala season	3	4	NI	68	79	LP
Cultivated according to kanna schedule	9	19	LP	36	63	RP
Crop damages due to lack of water	93	69	LP	57	18	RP
Water supply sufficient for cultivation	6	22	LP	29	81	RP
Water supply efficient	1	50	RP	17	78	RP
Getting water by illegal means (breaking poles)	95	44	RP	76	30	RP
Getting water by illegal means (cutting bunds)	96	70	LP	82	42	LP

Source: Study survey.
Notes: RP = Remarkable positive improvement. LP = Little positive improvement.
NI = No improvement.

Table 3.20 shows that the extent of land cultivation has improved positively in Pimburettewa while Nagadeepa shows no such improvement. This means that the available water in Nagadeepa was not sufficient for farmers to increase cultivation. What the farmers perceive in cultivating according to the seasonal schedule, is as indicated earlier and this has improved. As a result of the rehabilitation component in Pimburettewa, water supply according to farmers has increased. By this they mean that they can obtain water as they wish. Illegal water tapping still continues in Nagadeepa but it has decreased remarkably in Pimburettewa (they do not have to do so since the water available is sufficient). However, overall, farmers in both schemes perceive the project results positively.

CONCLUSION

This chapter has shown that some aspects of the program have contributed positively to the farmer community, while some indicators show neutral or negative trends. At this point it is important to look at the project output from the economic point of view as well. We did not carry out a cost-benefit analysis but Aluwihare and Kikuchi (1991) have done so based on the data presented in the earlier report on this study (ADRC 1990). Their analysis shows that the costs incurred in Nagadeepa were not very different to the costs usually incurred during the pre-project period. It further indicates that based on the pre- and post-project extent of land cultivation, considering that no appreciable change can be observed before and after the project, it is difficult to detect any positive impact. They conclude that the project had realized no positive benefit, at least by 1989.

But in Pimburettewa, according to their analysis, a considerable cost was incurred in comparison to the pre-project period, yet it has resulted in a considerable amount of benefit. Cropping intensity increased from 1.25 in the pre-project period to 1.88 in the post-project period; this has resulted in a benefit-cost ratio of 7.4, with a 77 percent internal rate of return (Aluwihare and Kikuchi 1991: 39).

This cost-benefit analysis and the present findings are similar. The present study shows that Pimburettewa has shown more positive results than Nagadeepa. To a large extent, this is due to the rehabilitation component and not merely the social change component. Therefore, it can be concluded that a key variable in these two projects is the presence or absence of a system improvement component rather than the social change component *per se*.

Aluwihare and Kikuchi (1991) conclude that the projects with the highest returns are those that combine physical improvement with institution building. This seems a reasonable hypothesis, but further comparative analysis would be required to demonstrate whether it is correct.

The availability and certainty of the water supply compared to the demand is clearly a key variable. For instance, the Nagadeepa farmers tend to cultivate nonrice crops and short-aged varieties of rice and use relatively less water, while the Pimburettewa farmers tend to use more water, cultivate long-aged varieties of rice, and have not increased their nonrice crops. The increased water supply in Pimburettewa was not the result of improved water management but obtaining an increased water supply—which has enabled Pimburettewa farmers to use larger quantities. In Nagadeepa, which has a genuine shortage of water, there is little evidence that the change agent has assisted farmers to use their scarce supply more effectively.

CHAPTER 4

Conclusion

THIS CHAPTER RE-EXAMINES the achievements and results of the two social change programs analyzed in this book, primarily with reference to the change agent's own objectives. It then discusses the implications for the future implementation of Sri Lanka's participatory management program. These implications are relevant to other countries as well.

ACHIEVEMENTS

Specific Achievements in Nagadeepa and Pimburettewa

In its original proposals, the change agent outlined a set of specific objectives for the two irrigation schemes. These included developing a management system involving both farmers and officials to improve productivity and farmers' standard of living, motivating government officials to increase their own efficiency, educating farmers and officials, promoting school water conservation committees to influence the younger generation, and encouraging the revival of traditional religiocultural practices related to agriculture. Our research has shown that some but not all of these objectives were achieved.

In both irrigation schemes, a joint management system including farmer organizations at the base, and joint farmer-official committees at higher levels were established, and were functioning to some degree. In Pimburettewa the continued interest of local officials after the withdrawal of the change agent meant that this system continued to function for a while, but it has since been

incorporated into the System B Management System.[41] In Nagadeepa it has continued as well, but is not very effective, as government agencies did not build effectively on the foundation created.

In both systems, the rather confrontational strategy used by the change agent's field officers led to conflicts and confrontations between farmers and officials, among farmers, and between the change agent and both farmers and officials. This strategy had several dimensions: there was a tendency to suggest to farmers that officials were the cause of their problems. The change agent pressured the officials, most notably by its alleged involvement in getting some Mahaweli staff transferred. The change agent was also involved in pressuring farmers, for example through legal action against farmers who had not adhered to a cultivation plan at Nagadeepa; and the publication of an inflammatory article about officials at Nagadeepa led to considerable conflict and resistance. At least some of the farmer representatives were apparently selected by the change agent itself, and not by farmers through a democratic process, leading to some disaffection with the leadership. In Pimburettewa some farmers were sufficiently unhappy that they attempted to set up an alternative farmer organization. Some of these events are evidence of the resistance to change by people with vested interests, and thus not surprising since instigating conflict is a recognized methodology for promoting social change. Nevertheless, these incidents are also evidence of strategic mistakes that reduced the change agent's overall impact.

In both systems, farmers reported that officials were on the whole more efficient after the project, though officials claim they were equally motivated and efficient before. In both there is evidence that the farmers have gained some knowledge of water management from the training programs (but the impact on system performance is not obvious). There was a revival of community-based cultural and religious ceremonies—but these do not seem

41 According to a recent unpublished report (Ganewatte 1992), a completely new joint management organization has been developed in System B under a special USAID-funded project: Pimburettewa—or rather Vijayabapura Block—has been incorporated into this. The extent to which the previous setup has been made use of, adapted, or simply replaced is not clear. But according to a 1991 survey of Unit Managers, Vijayabapura's field-channel groups show the lowest percentage rated "excellent" among all the blocks; and this block had no unit-level farmer organizations—the equivalent of distributary organizations—rated "excellent" and had the highest percentage rated "functions poorly." All of this suggest that the long-term impact of the change agent's program was minimal.

to have been continued after the project. Similarly, school water conservation committees were established, but they proved to be unsustainable as well.

The impact of the change agent's program on agricultural production and farmers' incomes is not clear, but probably not substantial. In Nagadeepa, there was a declining trend in the area cultivated, as improved water management practices were not adopted to overcome the serious water supply problems in the system; and farmers' incomes appear to be at or even slightly below a subsistence break-even point. In Pimburettewa, the combination of receiving water from the larger Mahaweli System and the implementation of a rehabilitation program led to increasing the area cultivated, and an increase in the cultivation of long-aged varieties of rice. It would be difficult to attribute the improved cropping intensity and farmer incomes to the change agent's program, though it probably did help.

Thus overall, we conclude that the change agent's programs in Nagadeepa and Pimburettewa had modest, though real, impacts. Its programs were affected severely by external factors beyond its control. Nevertheless, the change agent also made some significant strategic mistakes that reduced its effectiveness and overall impact.

Broader Achievements

The change agent had broader objectives than simply organizing farmers and improving water management on two irrigation schemes. It was interested in demonstrating the benefits and possibilities of participatory management, influencing public policy, and learning lessons on how to carry out participatory management more effectively. Two of these three broad objectives were achieved.

In conjunction with other pilot activities testing and promoting participatory management of irrigation, these programs were instrumental in demonstrating what could be done. Higher government officials and policy makers maintained an interest in these schemes, and often visited them on special occasions. These projects were pioneers in testing what can now be referred to as the "Irrigation Management Division model," i.e., getting farmer organizations to take direct responsibility for field and distributary canal O&M, and to participate in the management of the schemes through joint committees. The present research questions the sustainability and effectiveness of some of the change agent's specific innovations with hindsight; but there is no question about the influence of these projects on the

perceptions and thinking of policymakers and higher-level management officials.[42]

We would contend that these projects were less successful as ways of learning practical lessons on methodologies and strategies for strengthening participatory management. Although involvement of academic staff of the university was envisioned in the change agent's proposals, and implemented in the early stages at Nagadeepa, this was not carried through. This opportunity for lesson learning was therefore not effectively used. Further, the End-of-Project Reviews commissioned by the change agent focused on analyzing the impact of the program on Nagadeepa and Pimburettewa, primarily using the change agent's own data; they were really used to justify the investment in the programs. But they did not attempt a broader analysis of the lessons learned which could be used in future. Hopefully, the earlier study by ADRC (1990) and the present paper make some contribution towards this objective.

IMPLICATIONS FOR THE FUTURE

The Government of Sri Lanka, like many others, is committed to devolving increasing levels of responsibility and authority for managing local resources and infrastructure to local-level peoples' organizations. In the irrigation sector, this policy is referred to as "participatory management of irrigation schemes." This process involves a combination of policy and legal changes, restructuring of public organizations, promoting and strengthening local organizations, and training and educating farmers, farmer leaders, and government officials. These kinds of changes require a long-term commitment, major changes in attitudes, incentives and behavior, and substantial skills in managing such a process. Even under ideal conditions, it would be difficult for any government to implement such changes by itself. Relatively weak government agencies are getting weaker, not stronger, as a result of pressures on the government's resources and other factors. It is therefore difficult to imagine how it could implement such an ambitious change process.

In principle, nongovernment organizations offer an attractive source of assistance. Korten (1990) and Clark (1990) have recently argued that NGOs

42 This statement is based on the third author's close involvement with a wide variety of government officials and policymakers over the past few years.

can and will play a key role in re-orienting development efforts to be more "people-centered" and are likely to be the only mechanism available for successful implementation of grass-roots community development aimed at sustainable management of natural resources and equitable access to these resources. However, this study and others raise questions about the effectiveness of NGOs working on irrigation management in Sri Lanka.

Previous studies by IIMI of NGOs assisting communities to develop and manage small irrigation tanks in Sri Lanka have raised questions about the technical adequacy and long-term sustainability of these efforts (Dayaratne 1991; Jungeling 1989). This study raises the same issues. To make an effective long-term contribution to irrigation management, it is suggested that NGOs need to develop a high degree of professional expertise, not only regarding technical irrigation issues, but also in terms of planning, implementing, guiding and monitoring their intervention programs. Idealistic young people can make a more useful contribution if trained and guided adequately.

In addition, NGOs with a specific ideology are likely to attempt both to impose their vision, and to interpret their work in terms of their own ideological assumptions. Certain NGOs working on small tanks in Sri Lanka are driven by a desire to achieve a specific vision of what rural society should look like; similarly, in its presentations to farmers and its training materials, the change agent tended to use appeals based on idealized versions of ancient traditions. Obviously, to be effective, NGOs need to be motivated by a set of values, and pursue clear objectives. But to the extent that an NGO's "vision" or "ideology" is instrumentally unrealistic or impractical, or is not shared by the beneficiaries, we suggest it is unlikely to be effective as a change agent in the long run.

Another serious limitation is the implementation of specific time-bound projects. A change process like that attempted at Pimburettewa and Nagadeepa requires a long-term perspective. Within three years, it is unlikely that a weak state-dominated management system with disunited farm communities can be transformed into a strong community-based management system with state agencies playing a facilitating and supportive role. But having a funded three-year project forces the implementor to be input-oriented, promising to carry out a certain number of training programs for example, and to focus on quantifiable short-term indicators of success, such as so many man-days of shramadana. If NGOs are to be effective, they

need to operate in a program mode, with a long-term perspective, as part of a broader long-term project.

The extent to which NGOs should engage in "routine" implementation of change programs, versus experimental programs is another important question (Wood and Palmer-Jones 1990). Just as some of the NGOs working in small tanks in Sri Lanka are implementing long-term programs to maximize the number of tanks rehabilitated, the present change agent has taken additional contracts to implement similar change programs to those analyzed here. We doubt there is a single answer to this dilemma, but suggest that the most valuable and successful NGOs are those that experiment with new social innovations, as Nation Builders Association has in fact tried to do. If they engage in routine implementation, for example through contracts with the government, they are likely to become more bureaucratic, less flexible and innovative, and ultimately less effective as change agents.

The question of routine implementation versus experimentation leads to the question of the relationship of NGOs and governments. Some observers see NGOs as an alternative to government dominance of development programs, (i.e., Korten 1990). Others see NGOs as valuable allies to official government and donor programs, (i.e., Cernea 1988). If an NGO plays a routine implementation role as part of a government program, it faces both dangers and opportunities. The danger is of becoming a "captive" of the government, doing its bidding; but the opportunity is to be able to have an important influence on the government's policies and strategies, as well as improving their effectiveness, and to obtain resources and participate in a larger program that would enable a far greater impact in the long run.

These issues need to be addressed by members of NGOs seriously. Korten (1990) provides a simple self-assessment guide that NGOs can use to assess what their role should be. Despite the critical nature of this paper, we believe that NGOs do have a very important potential role in social experimentation, in influencing and supporting positive government policies, and in helping people create a more just, equitable and viable society.

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