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Land Settlement Planning for Improved Irrigation Management

Land Settlement Planning for Improved Irrigation Management:

A Case Study of the Kirindi Oya Irrigation and Settlement Project

by

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Summary: This paper analyzes the impact of settlement policies on irrigation management in a new irrigated settlement scheme in southern Sri Lanka based on field research in 1988. It provides policy recommendations for improvements on this scheme and in future schemes.

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Executive Summary

RESEARCH WAS UNDERTAKEN to document the process of implementing a set of land-settlement activities designed to improve irrigation management in a new irrigated settlement scheme. The site selected for research was the Kirindi Oya Irrigation and Settlement Project (KOISP) in southern Sri Lanka. The overall objectives of the research were to examine the relationship between land settlement and irrigation management and, more specifically, to identify some conditions that may foster improved irrigation management by settlers themselves. As a result, the focus was on land-settlement activities, not on water management practices in a new scheme *per se*. The study of land settlement was considered important because irrigation schemes, particularly those in Sri Lanka, are so often characterized by significant irrigation management problems – inequitable water distribution, poor maintenance, and low rates of return on investment. A number of these problems result from deficiencies at the stage of settlement planning and the way the settlement process is implemented. In order to remedy this, successive planners have attempted to build appropriate settlement plans into project design. The implementation process and the effects of those plans, however, have remained unclear.

THE FIELD STUDY

Field research was carried out in KOISP from March to October 1988. The study was conducted during a period of transition in which construction work was nearing completion and greater demands were being placed on the settlers to solve their own problems and manage their own affairs. The period was also marked by serious political disturbances faced by settlers and project staff, as well as an extended slack period in which project beneficiaries could not cultivate due to construction work.

The field study was a modest one which was both short in its time frame (only lasting six months) and limited in scope to one hamlet within the study area for in-depth work. It was also limited to studying a small set of settlement activities, not the whole range of development activities for the project. We focused on the beneficiaries – the settlers themselves and the constraints they faced in the project-implementation phase. Based on our field observations, we were able to identify those areas in which the plans for KOISP have been innovative. We were also able to formulate some suggestions for improving the likelihood of settlers participating in irrigation management in the project over time.

Fostering cooperation and management of a common resource among a newly formed social group in a new environment is a difficult and complex task. In KOISP, a number of settlement activities were designed to increase the likelihood of farmer participation in irrigation-management activities and to reduce water wastage and inequitable water distribution. People were settled in homogeneous compact groups at not too great a distance from their irrigated land to ensure cooperation in sharing irrigation resources. They were settled prior to the first water issue to discourage encroachment and foster a sense of participation and were allocated land within turnouts to facilitate water sharing among groups. Farmer organizations for water management were also promoted in the early stage of project development.

RESEARCH FINDINGS

The study's findings highlight the problems inherent in the transition from a construction phase to an operations phase. Settlers were dependent on the agencies during the construction period but were expected to take on greater responsibilities for tertiary-level operations and maintenance as the construction phase ended. A series of steps were taken to ensure cooperation in sharing a common water resource – settlement in a clustered community, the turnout system, development of farmer organizations, and advanced alienation. But less attention was given to the process of building self-sufficiency among the new settlers and involving them in project development at the outset. Our major findings are summarized as follows:

* part-time settlement by settlers was retarding the community-development process and affecting cooperation among settlers;
* although efforts were being made to develop farmer organizations, they were not yet adequately tailored to fit the needs of new settlement in a new irrigation scheme;
* the irrigation turnout system was not yet functioning because the project was in an early stage; defects in scheme layout led to lack of correspondence between residential and irrigation units;
* settlers were not involved in the construction phase and were critical of the agencies for poor quality of construction work done by contractors; and

* communication between field-level staff and settlers was weak, especially when the transition from construction to operations took place.

RECOMMENDATIONS

Our recommendations are summarized as follows:

1. *Part-time residence.* Given the high incidence of part-time residence (and consequently part-time cultivation) at this early stage in the project, a major challenge is to encourage operators of irrigated land to participate in irrigation-management decisions and actions. It will be important to involve part-time cultivators in the farmer organizations. Institutional organizers, responsible for fostering the development of farmer organizations, will need to pay special attention to these settlers and try to draw them into the organizations. Financial gain from maintenance contracts granted to the organizations would also provide incentives for those part-time settlers to participate in project activities.

2. *Correspondence between turnout and residential group.* In new settlement areas such as Phase II of the Project, physical plans need to be coordinated to ensure that those who share irrigation water within a turnout also reside in the same hamlet area, and more so within the same neighborhoods. The allocation of land on the basis of the turnout group prior to the allocation of land within the hamlet would help curtail problems. It would require close collaboration between the settlement officials and irrigation officers concerned.

Although efforts were made to ensure a correspondence in the already completed first phase, defects were noted which will be difficult to correct. Given the defects, settlers who share water within a turnout but are not residing near one another may face special problems in developing farmer organizations. Field-level staff such as the institutional organizers could assist those turnout groups to solve related problems.

3. *Agency tasks for developing farmer organizations.* Clear terms of reference for the Irrigation Management Division and the Land Commissioner's Department *vis-à-vis* development of farmer organizations need to be established. This is particularly important as the project shifts from a construction phase to an operations phase. A workshop or a meeting on ways to improve the transition from construction to operations would bring together the various officers involved, increase cooperation and communication, define roles, and identify solutions to problems.

4. *Targeting farmer organization activities.* In future, institutional organizers to help develop farmer organizations should be appointed at the beginning of the project, rather than after the farmer leadership roles are established by higher-level project management. If budgetary constraints preclude this, a second option would be to allocate organizational responsibilities to the field instructors; they would require specialized training in irrigation management and farmer organizations. In either case,

field staff need to communicate with the settlers about farmer organizations as a first step, rather than as a last.

5. *Functions of farmer organizations.* Irrigation management at the tertiary level should be handled by farmer organizations and not by general-purpose hamlet-level organizations. At the present time, too many multipurpose demands are being placed on the farmer organizations. In the initial stages of project construction, expectations for irrigation management organizations cannot be high due to construction work which may preclude their effectiveness. A workshop on the transition period from construction work could also include attention to the role of farmer organizations at this critical time.

Separate hamlet-level organizations are needed in the early stage of the project to handle the wide variety of community development problems. A hamlet-level community development society could include elected hamlet leaders responsible for developing group work (*shramadana*), for distributing food aid, and other assistance. The development of such an organization could be promoted by the field instructor at the hamlet level.

6. *Employment of settlers.* Greater efforts are needed to ensure that settler communities are given the opportunity to do minor construction and maintenance work, particularly in the early stages of the project. Current policies need to be reviewed and possibly revised to allow settler groups to take small-scale work contracts. Under the current system, agencies resist the idea. A change would require a reorientation of project staff.

7. *Selection of settlers.* Project management needs to be actively involved in defining and possibly revising the selection criteria to ensure that settlers are selected who meet the objectives of the project. Furthermore, flexibility in adapting to changes in objectives and reassessing the criteria is needed.

Further, the system of selection by electorates does not give project management adequate knowledge about the background of the settlers who are selected. Thus, there is a tendency to blame the selection process when project activities go awry. Though the Project Manager, Settlement, would probably be too burdened with work if he were responsible for all selection, he could certainly play a more active role in selections made in the electoral divisions.

8. *Communication between field staff and settlers.* The position of field instructor should be restructured so that he/she plays a more direct role in promoting community-development activities, rather than merely being a provider of aid. We also recommend that field instructors who have training equivalent to other project field staff be selected to facilitate cooperation and coordination.

Although the results and recommendations are based largely on research with the project beneficiaries, many of the observations are pointed to the internal dynamics of planning and project implementation at the agency level. The suggestions for

improvements also imply corrective action on the part of project management. We hope that this study will shed light on one dimension of a highly complex system, and that our findings will assist project managers and irrigation experts in KOISP and other irrigation schemes to understand one set of factors that may enhance irrigation performance. Complementary studies of the technical and institutional components of the project are important to a more comprehensive set of realistic recommendations. We emphasize that this work is only one small part of a larger set of studies being carried out in the project.

Acknowledgements

THE KIRINDI OYA Irrigation and Settlement Project (KOISP) is an important new project that has brought about a rapid transformation from an area of forest jungle to intensive agriculture in southern Sri Lanka. Unfortunately, it is a project that has also experienced the full impact of the country's political and social unrest. Despite the many problems and frustrations faced, both project management and the new settlers took valuable time to help in these research efforts. I am grateful to them for their assistance during a period when problems of a much greater magnitude than irrigation management were being faced. I wish to acknowledge the assistance of project staff, particularly Mr. Chandra Ranasinghe (Project Manager, Lands), Mr. Sena Jayasuriya (Assistant Project Manager, Lands), Mr. Samarasinghe (Chief Resident Engineer) and Messrs. U.M. Liyanage and Gunawardana (Project Managers, Irrigation Management Division). I also wish to thank Mr. A.A. Wijetunga (then Land Commissioner) and Mr. Wimalabandu (Deputy Director, Major Construction) for providing the necessary support to carry out this study.

Useful comments on an earlier draft of this paper were provided by a number of project staff and government officers. In particular, I would like to thank Mr. M.S. Wickramarachchi (then Additional Land Commissioner), Mr. Wimalabandu, Mr. Ranjith Rathnayake (Deputy Director, Irrigation Management Division) and Mr. T. Hewage (Acting Director, Settlement Planning and Management Division) for their ideas and suggestions. Thanks are also due to Messrs. Liyanage, Samarasinghe, and Jayasuriya. As far as possible, I have tried to incorporate all comments into this version of the report.

I also want to thank the settlers in Hamlet 7 who took the time to talk with us. In particular, I am grateful to Mr. Sumathipala (Secretary of Distributary Channel Organization) who provided much information about the hamlet and the

farmer organizations.

This study would not have been possible without the assistance of Ms. Ranjanie Moragoda, Research Assistant at the International Irrigation Management Institute (IIMI), who carried out the fieldwork and conducted interviews with the settlers. Under conditions that were far from optimal, she won the confidence of the settlers and gathered the necessary data. She also played a valuable role in the writing of this report.

I also want to thank colleagues at IIMI who were working in KOISP and provided valuable insights into other components of the project. In particular, I want to thank Dr. Douglas Merrey (Head, Sri Lanka Field Operations, IIMI) who gave valuable ideas and guidance as the research progressed and to Drs. Merrey and Khin Maung Kyi (Senior Management Specialist, IIMI) who provided comments on drafts of the paper as it progressed.

I wish to take full responsibility for any errors and inadvertent misrepresentation found in the text of this paper.

Pamela Stanbury
March 1989

CHAPTER I

INTRODUCTION

DURING THE LAST five decades, the implementation of new irrigated settlement schemes has provided land, water, employment, and income to thousands of poor families in Sri Lanka. This particular type of agricultural development, also found in other parts of Asia, Africa, and Latin America, is typically characterized by severe constraints to effective irrigation management. Inequitable distribution, lack of attention to maintenance on the part of the project beneficiaries and lack of cost recovery on national investments are standard criticisms. While these criticisms are also common in older established systems, the mere fact that settlement schemes involve population relocation into formerly uncultivated or undercultivated land adds a new dimension to their management.

In this report we document the process of implementing land-settlement activities designed to improve settlers' irrigation management in a new scheme in southern Sri Lanka. We argue that without understanding the conditions surrounding irrigation management in a more holistic framework, it is difficult, if not impossible, to understand farmers' irrigation behavior and practices. In new irrigated settlement schemes, the ways in which settlers have been selected, allocated land, and provided with services – in short, the settlement process – are, we believe, key conditions affecting their long-term irrigation behavior. Underlying our project-specific report is a more basic argument – an hypothesis still – that there are certain unique characteristics of irrigated settlement schemes that are qualitatively different from other types of irrigation systems.

The overall objectives of the research project were to examine a *process* of irrigation project development in a new settlement scheme and specifically, to identify those settlement conditions in project implementation that could foster efficient irrigation management by new settlers, themselves. We were not concerned specifically with water-management practices which were in a state of flux because of the construction work still in progress.

To fulfill our objectives, a field study was carried out from March to October 1988

in the Kirindi Oya Irrigation and Settlement Project (KOISP) in Hambantota District, Sri Lanka. This was a period of calm between two storms of political violence in the region. Unfortunately, it was also a period straddling two cultivation seasons. At the time settlers were just beginning to adjust to a new physical and institutional environment which at best was tenuous since thus far their cultivation seasons in the project had produced poor yields due to drought, pests, and crop damage. It was also a period of transition from a construction to an operations phase in project development, which entailed new and changing demands on the settlers.

KOISP is a fascinating example of a scheme which in principle should reflect the "state-of-the-art" in planning. It is one of the last new irrigated settlement schemes to be developed since most of the island's major river systems have been tapped already. The plans for KOISP are based on over half a century of accumulated knowledge and experience gained in developing new major irrigation schemes[1] in the Dry Zone. We believe that KOISP offers some innovative ideas for use by planners and irrigation management specialists elsewhere. At the same time, however, it also reflects certain persistent problems that continue to arise.

This report is divided into six chapters. Following this brief introduction to management issues in Sri Lanka's settlement schemes, Chapter II provides background data on the KOISP. In Chapter III, we present our research methodology. Chapter IV is a description of the land settlement experience in one hamlet where an intensive study was undertaken, and Chapter V analyzes the effects of land settlement on farmers' irrigation behavior. Chapter VI provides some practical recommendations for the project.

CAUTIONARY NOTES

Before beginning, we would like to add some cautionary notes. First, the reader should note that we focus on a specific set of land-settlement variables that relate to settlers' irrigation management practices. When we refer to irrigation management, we refer to the settlers' organizational activities for dealing with the agencies and managing tertiary-level canal maintenance and water distribution (below the distributary channels). We have ignored numerous topics having to do with regional development in general

[1]Major irrigation schemes in Sri Lanka are defined as those larger than 80 hectares (ha).

– credit and marketing facilities, size of land holdings for specific types of agricultural enterprises, location of service centers, and many more topics. This is not a study of land-settlement planning in general; nor is it a study of irrigation management in general. Rather, we address a set of specific linkages between two otherwise broad topics of study.

Second, this research makes a fundamental assumption that participation and cooperation on the part of the water users is a critical component of effective water management. We believe there are enough arguments in the literature on the subject to support this. Our study is based on the premise that "There appear to be significant opportunities for improvement [in irrigation management] through working with water users in a more systematic way" (Uphoff, 1986).

Third, this study was limited in both time and scope. Because of the limitations, research was undertaken in one small area of the project and was not statistically representative of the project as a whole. It was not possible to obtain a detailed and wide spectrum of settlers' experiences. We hope, however, the study will stimulate thinking on unique problems of new scheme development in general and some ways to improve project performance in KOISP in particular.

Finally, our primary target readership is the body of irrigation management professionals in Sri Lanka and elsewhere. In order to be clear to a wider audience we have simplified some statements and expanded on others that will obviously be well known to those working in Sri Lanka.

IRRIGATED SETTLEMENT SCHEMES IN SRI LANKA

Sri Lanka occupies a prominent place in the literature on irrigated settlement schemes. The development of new schemes during the last 5 decades has brought over 263,636 ha under newly settled major irrigation schemes. Multipurpose irrigation-cum-hydropower projects more than double that area. Not surprisingly, irrigated land development has also consumed a large portion of the national investment. According to Moore (1985:95) new irrigated settlement schemes accounted for 22 percent of the government capital expenditure in 1977 and that was before the inception of the costly investment in the Mahaweli Program. The history of government-sponsored settlement in Sri Lanka has been well documented by Farmer (1957) and more recently by Ellman et al. (1976).

Management Problems in Settlement Schemes

Although one cannot deny that new settlement schemes have been a boon to many of Sri Lanka's poor, they have also been characterized by irrigation inefficiency resulting in low agricultural yields and poor rates of return on national investments, inequitable distribution of water, lack of cooperation among settlers, and inability or seldom to maintain their systems. These have become standard features of the Dry Zone settlements. At the agency level, lack of cooperation among departments has also contributed its share to the irrigation inefficiency problem (Economic Review, 1987:11).

These irrigation management problems have certainly not gone unnoticed and plans have continually been reshaped and revised. New schemes have become testing grounds for innovative techniques to develop conditions for improved irrigation management at both the settler level – selecting settlers and providing them with land and services – and the agency level – improved coordination between agencies responsible for implementation of settlement and irrigation development projects.

Drawing on this body of *experience*[2], the general consensus is that in order to foster cooperation among settlers and to ensure water sharing and involvement in maintenance activities, settlers should be chosen from homogeneous backgrounds, with irrigated agricultural experience. They should be settled in concentrated communities and should not be located at too great a distance from their irrigated land. Also, they should be settled as early as possible into the project to avoid encroachment and ensure rapid development of homesteads and irrigated allotments. Finally, they should be settled in groups on the basis of a turnout area to facilitate water distribution. The current framework for planning irrigated settlements is perhaps most accurately described by Ponrajah (1981).

Emphasis has increasingly been placed on developing local farmer organizations at the field channel (FC) turnout and distributary channel (DC) levels. The basic concept underlying settlers' involvement in water management is that, when organized, settlers will be more likely to allocate water and distribute it efficiently than any outside organization. Involving settlers marks an attempt to deal with criticisms such as Moore's (1985:97) that "part of the cause [of poor irrigation performance] appears to lie in the relationship between the cultivators and the government agencies responsible for water issues. . . . Some aspects of this relationship relating to poor water management include the lack of strong local farmers' organizations able to challenge the definition of problems and the behavior of the irrigation staff."

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[2]A range of settlement planning issues linked to irrigation management was reviewed and written by the author as a preliminary to the field study in Kirindi Oya (see Stanbury, 1988).

At the agency level, attempts also have been made to improve coordination between the technical-engineering activities and various community-development activities. In some large projects, independent boards have been established such as the Gal Oya Development Board or the Mahaweli Authority which include, under a single umbrella, sections which deal with the various project inputs. In major irrigation schemes, however, no autonomous boards have been set up. Rather, project implementation has been carried out by separate agencies often working independently of one another. KOISP, the subject of this study, is one exception whereby a dual project management structure was established to integrate settlement and irrigation work during the construction phase.

Replanning in older settlement schemes

Persistent irrigation problems in older schemes have also resulted in efforts to rehabilitate physical structures and replan the social and institutional environment in those schemes. Recent efforts have focused on developing active farmer organizations. Beginning in 1982 efforts were formalized under the Water Management Program, whereby 25 major schemes were selected for development of farmer organizations. More recently, the newly created Irrigation Management Division (IMD) provides coordination of services and support for the development of farmer organizations in 35 major irrigation schemes (see IMD/MLLD Booklet No. 2). Even more recently, a new Settlement Planning and Management Division (SPMD) has been established to provide training and management assistance for the major irrigation schemes.

SUMMARY

New irrigation development in formerly uncultivated areas involves a set of management issues that appear to differ from those found in old established schemes. Settlement schemes are often typically characterized by persistent water-management problems resulting from defects in settlement planning. In Sri Lanka, irrigation-management problems have been particularly acute. Attempts have recently been made to establish conditions for improved management, both at the project level and at the farm level. KOISP is one of the latest examples. We now turn to this example and a description of its successes and shortcomings at its early stage of project development.

CHAPTER II

BACKGROUND TO THE KIRINDI OYA IRRIGATION AND SETTLEMENT PROJECT

THE KIRINDI OYA Irrigation and Settlement Project (KOISP) is one of the most recent efforts to bring new land under irrigated cultivation in Sri Lanka. The project is situated in southern Hambantota District, approximately 260 kilometers (km) from the capital city of Colombo along the coastal road (see Figure 1). It involves the development of water resources of the Kirindi Oya[3] and adjacent land area. Upon completion, the project is to provide irrigation facilities, social services, and infrastructure to a newly settled population of approximately 8,000 families. In addition, the project involves the augmentation of the water supply to 6 old tanks and rehabilitation of irrigation structures in an adjoining settled area of 4,585 ha.

KOISP lies in the Dry Zone, with a mean temperature of 26°C – 28°C and annual rainfall of less than 1,230 millimeters. Seventy-five percent of it falls during a limited rainy season from October to March, known as *maha*. Rainfall in the area is so seasonal and erratic that cultivation of rice is untenable without irrigation. Thus irrigation makes permanent agriculture possible, and if enough water is available in the reservoir, irrigated crops may be cultivated during the dry season known as *yala* (from April to August).

DEVELOPMENT OF THE SCHEME

Initial planning for the KOISP began in the 1950s as part of a more comprehensive

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[3]*Oya* is a sinhalese word for 'river'.

scheme to develop the water resources of eight major river basins, including the Kirindi Oya. A political insurrection in 1971 which had its roots in the south also provided a strong impetus for the government to undertake a development project that would provide employment opportunities and benefits to the area (Mendis, 1988). In 1976, an agreement was made with the Asian Development Bank (ADB) to assist in the financing of the Kirindi Oya Scheme. Additional assistance was provided by the International Fund for Agricultural Development (IFAD) and the German *Kreditanstalt fur Wiederaufbau* (KFW).

A variety of factors, including high inflation and delays in contracts, resulted in large cost overruns. The dramatic overrun of about 105 percent of the original total estimated cost prompted the Sri Lankan Government to request a project reappraisal and supplementary financing for the project in 1981. This resulted in a reformulated plan in which the project was divided into two phases, each financed separately.

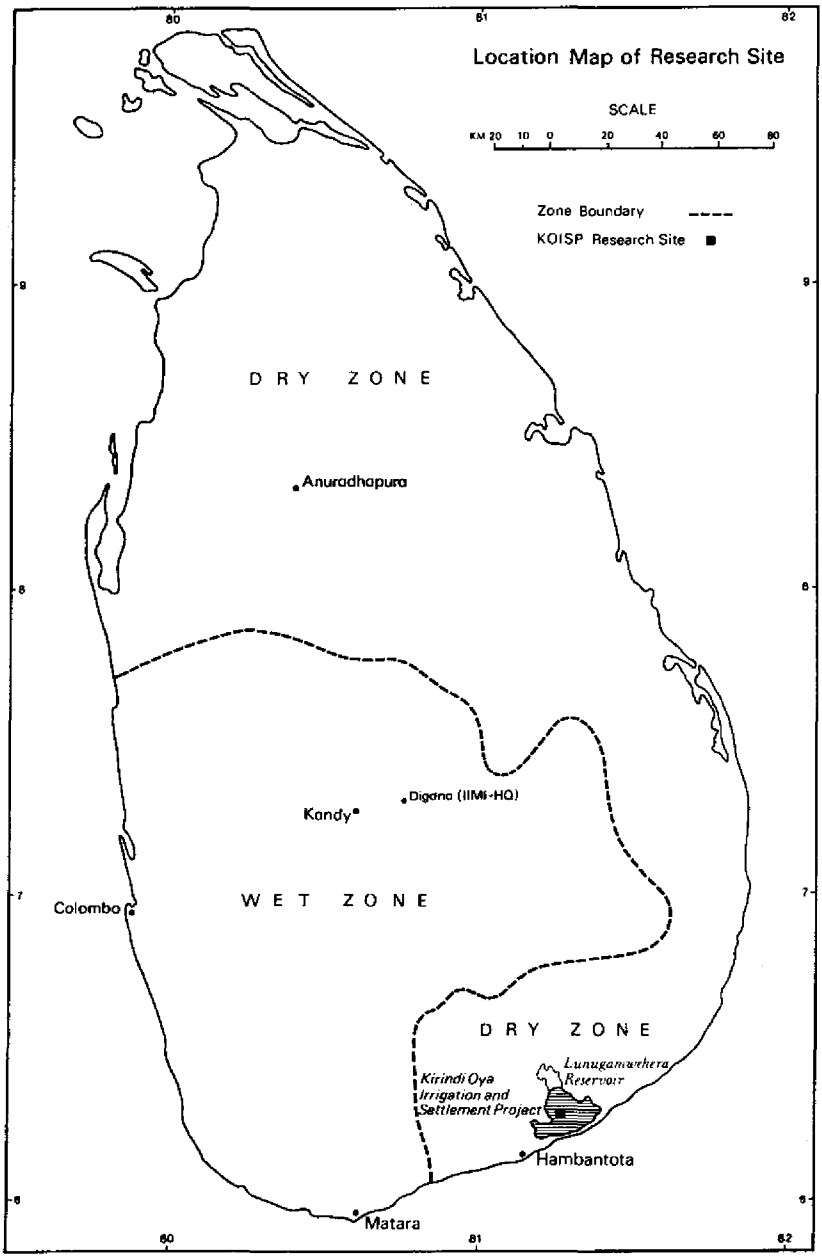
Under the reformulated project, Phase I was completed in 1988 at an estimated cost of US$79.9 million. It included construction of the main reservoir, Lunugamwehera, which was completed in 1985. The reservoir has an active storage capacity of 210 million cubic meters. Phase I also included 4,000 new settlers along the left and right banks of the newly constructed irrigation system. Settlers received their first irrigation water for rice in 1986. In addition, rehabilitation of 4,600 ha of existing systems was completed under Phase I.

Phase II, which has only recently begun, constitutes an extension of the irrigation and settlement facilities on approximately 4,000 ha of additional land. Work is expected to be completed by 1992. Plans for Phase II include additional forestry, livestock, and dairy components based on the concept of a farming system.

In addition to the provision of irrigation facilities and irrigable land, 28 hamlets (the term used for small villages, comprising approximately 250 families) and five village centers are to be built by the time Phase II is completed. Eighteen hamlets have already been completed under Phase I.

Along the right bank canal system, three separate irrigation tracts were constructed under Phase I. The main canal which serves these tracts is 20 km long. Each tract includes approximately 4 residential hamlets and 12 distributary channels. The right bank also includes a 4 km branch canal (BC2). The left bank serves a smaller new area than the right and only consists of seven new hamlets. The main canal is only 14 km long. Figure 2 shows the irrigation system, command area, and layout of residential areas in the project.

Figure 1. Map of Sri Lanka showing the location of the Kirindi Oya Irrigation and Settlement Project.



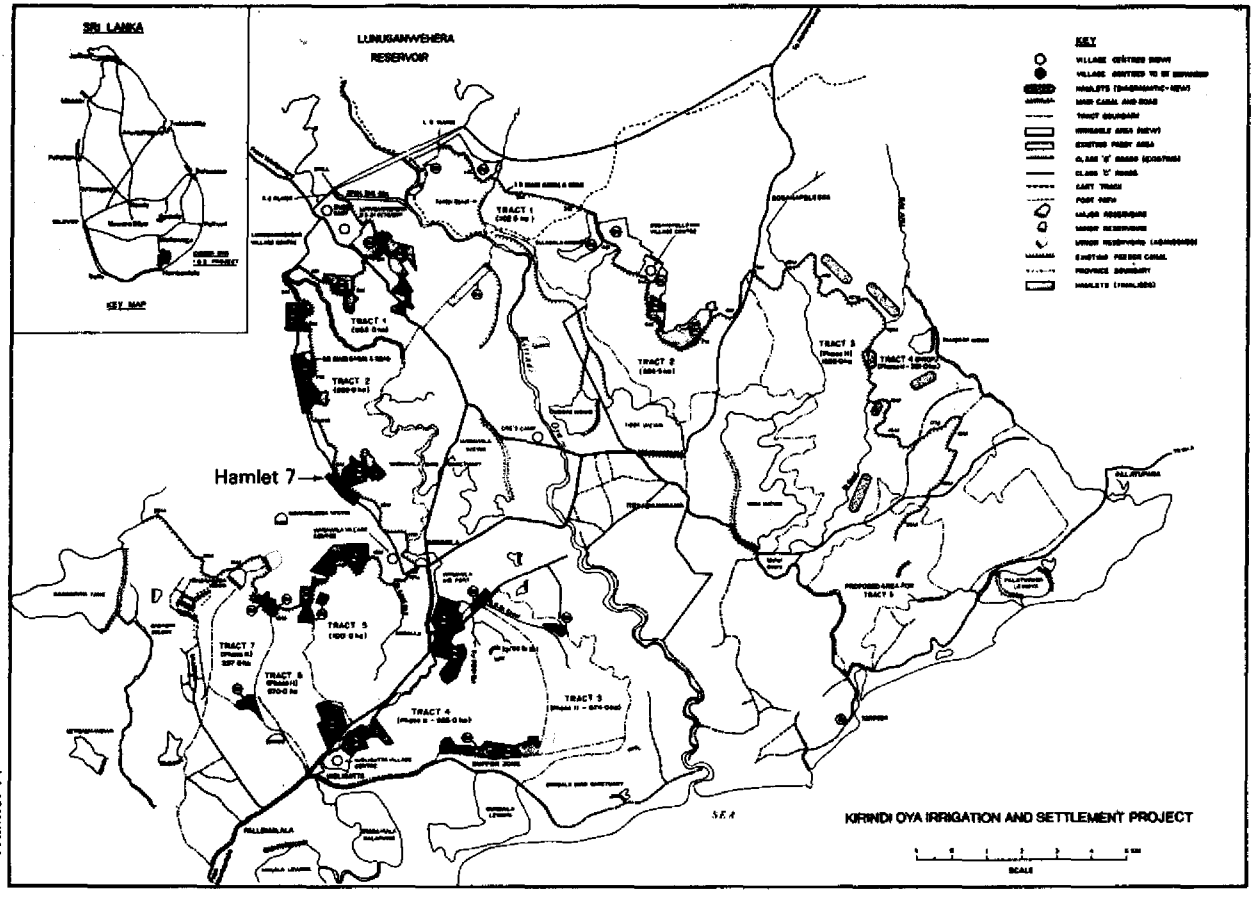


Figure 2. Map of the Kirindi Oya Irrigation and Settlement Project showing the location of Hamlet 7.

LAND USE BEFORE THE PROJECT

The project has brought land under permanent cultivation in the low lands of the Kirindi Oya Basin. Historically, the area formed part of the Ruhuna Rata, an area rich in archaeological sites dating back as far as 200 BC. In recent centuries, however, the area was abandoned and in 1881 a chronicler noted that it was a "desolate wilderness" (Farmer, 1957:13). Several of the ancient tanks were restored under the British in the late 19th century and a diversion scheme was developed to tap water from the Kirindi Oya. Under the KOISP, water for these tanks is being augmented by the project, and structures are being rehabilitated.

When in 1980 a preproject socioeconomic survey was taken, a population of 2,897 families was found living in the catchment, command, and tank bed area of the proposed project. They undertook *chena* (slash and burn) and permanent highland cultivation primarily during *maha* (Wanasinghe et al.,1983). Since the project began, however, the number of encroachers has continued to rise as speculative settlers have moved to the area hoping to gain legal access to land. In 1988, the Additional Land Commissioner had received a total of 4,490 applicants for land under Phase II, all of whom claimed to be living in the project area (personal communication).

OBJECTIVES OF THE PROJECT

The stated aims of Phase I of the project are "increased agricultural production, particularly of paddy; employment generation; foreign exchange savings; and land settlement" (Asian Development Bank, 1982:19). Under Phase II, the overall objectives are reiterated but they are to be achieved through, in addition to irrigation and settlement, forestry and livestock development, and crop diversification (Asian Development Bank, 1986:13). The goals of KOISP are consistent with the government's long- and medium-term policy objectives for the agricultural sector (Gamage et al., 1988).

DESCRIPTION OF PROJECT COMPONENTS, PHASE I[4]

Under Phase I, the project beneficiaries began settling in the new area as early as 1983 under the policy of "advanced alienation" but irrigation water was not provided until June 1986. Advanced alienation involves settling beneficiaries before the construction is completed but irrigation services are to be provided within one year. Although a rather controversial policy, it was implemented in KOISP as a means of curtailing encroachment and providing employment to settlers. By the end of 1988, most beneficiary families under Phase I had witnessed three cultivation seasons, though they had also faced some difficulties partly due to drought and pest diseases.

Organization of the Project

The organizational framework for KOISP has been described elsewhere in detail (see Merrey and Somaratne, 1989). Briefly, the coordination of settlement activities was carried out under a Project Manager, Settlement, appointed from the Land Commissioner's Department. His office was responsible for bringing settlers to the project and providing them with the initial facilities. Irrigation development work was carried out by a complementary Project Manager, Construction, from the Irrigation Department. Overall project coordination, project accounting, and project reporting were carried out by the Deputy Director, Major Construction, within the Head Office of the Irrigation Department.

Settlers were assisted initially by a field instructor who resided in each hamlet. He was under the authority of a colonization officer at the tract level. Other field officers included an agricultural extension officer (*krushi vyapti sevaka* or KVS) and a technical assistant from the Irrigation Department.

Following the construction phase, coordination responsibilities were to be taken over by a new third project manager, appointed by the Irrigation Management Division (IMD). His functions were to assist settlers in developing organizations to solve

[4]Our description of project componenets is based on various appraisal reports written under the terms and conditions of the loan agreement with the Asian Development Bank and our discussions with project officials.

problems and liaise with project staff[5].

Selection of Settlers

Priority in the selection of settlers was to be given to families who lost land owing to construction work in the reservoir catchment and downstream areas. Applicants were required to submit applications to the Project Manager, Settlement. A copy of the application form is found in Appendix A. Proof of residence within the project prior to 1980 was required. The Project Manager, Settlement, reviewed each case and held a land *kachcheri* (hearing) to allow others to contest the claim. Settlers who were selected, known as "alternative selectees," were then shown their allotments and requested to begin cultivation at a given time.

The remaining irrigated land was allocated to landless families from neighboring electorates. These "open selectees" were granted land based on the total number of points scored. Appendix B gives the points system. Preference was given to landless cultivators who were young, married, and had agricultural education and experience. Land kachcheris were also held for open selectees in the respective electorates based on applications received by the Assistant Government Agents' offices. The final selection was made by the government agents in the respective districts. The lists of the final selectees were given to the Project Manager, Settlement, who was responsible thereafter.

Provision of Homestead Land to Settlers

Both open and alternative selectees were to be allocated 0.2 ha of unirrigable highland for homesteads. The highland was to be allocated in a residential hamlet area having a total of approximately 250 households (Asian Development Bank, 1982:101). The concept of a clustered hamlet was proposed to foster social cohesion and facilitate more economical provision of services (see Weitz et al., 1971).

An official total of 2,030 open and 1,979 alternative settler families had been

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[5]A formal meeting to announce the turnover of coordination responsibilities to the Project Manager, Irrigation Management Division, was planned but had not been held yet at the time of our field study.

granted land in Phase I at the time of our field study. Thus, not all the 2,897 families identified as living in the area prior to the project were included in Phase I. Open and alternative settlers were to be settled in separate hamlets where possible since planners envisaged that there might be friction between the two groups of different types of beneficiaries. The distribution of open and alternative settlers by hamlets in Phase I is shownin Table 1. The Table shows that segregation was not complete, though most hamlets clearly have a majority of one or the other.

Table 1. Number of open and alternative selectees by hamlets, Kirindi Oya Irrigation and Settlement Project – Phase I, 1988.

	Number	Percent	Number	Percent
	Open		Alternative	
Right Bank				
Hamlet 1	208	92	18	8
2	0	0	236	100
3	1	1	190	99
4	6	4	146	96
5	25	12	184	88
6	146	44	185	66
7	276	98	5	2
8	192	98	3	2
9	153	100	0	0
10	253	96	11	4
11	272	96	11	4
18	76 (still settling)			
Left Bank				
1,2	372	93	35	7
3	8	4	215	96
4	7	3	264	97
5	103	53	90	47
6	152	99	1	1
7	0	0	165	100
Total	1979	–	2030	–

Source: Project Files – Land Commissioner's Department, Tissamaharama.

Provision of Irrigated Land to Settlers

In addition to the 0.2 ha highland, each settler was to be allocated 1 ha of irrigated land.[6] Consistent with the Land Development Ordinance of 1935, land is not to be legally sold, leased, or transferred to more than one heir. Settlers were to be allocated irrigated land within turnouts, designed so that, in principle, 10 – 14 farmers receive water from 1 field channel in pairs. KOISP settlers were to be settled so they live near others with whom they share water in an irrigation turnout. Planners envisaged that a correspondence between the hamlet and the irrigated allotment would help develop a shared interest and sense of cooperation in managing their common water resource.

The distance between the farmer's homestead and irrigated allotment, commonly referred to as the agro-distance, was also designed to be less than 0.8 km. This was intended to foster intensive land development (Asian Development Bank, 1982), following the example of the Mahaweli settlement plans. It was anticipated that problems associated with travel for night irrigations would be minimized by the proximity of settlers to their fields.

Provision of Materials and Infrastructure

Settlers were provided with materials and services to help them get established in the project. Included were some agricultural implements such as mammoty, crowbar, and axe, housing materials for a very crude building, a latrine plate, and money for irrigated land development. The World Food Programme also provided assistance in the form of food supplies during the first 18 months of settlement. The field instructor was responsible for assisting settlers during the initial period.

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[6]The appropriate size of individual allotments has been a subject of much debate. In earlier settlement schemes, they were as large as 5 ha. With the intention of providing as much land as possible to the most number of landless, the size of individual allotments has decreased to 1 ha in Mahaweli and other recent settlement schemes. One hectare is generally considered adequate for cultivation using family labor.

Institutional Development

When settlers first arrived in the project, they were formed into groups of about 50. Each group elected a leader, known as a *kattinayake*, who was to liaise between settlers and project authorities. In June 1986, a project manager from the IMD was appointed to develop a farmer organization program. Farmer organizations were to be developed on the basis of hydrology, not hamlet residential group, though a correspondence between the two was expected.

SUMMARY

In KOISP a large number of project activities were planned to achieve the goals of increased agricultural production and provision of land to the poor. Specifically an attempt was made to establish appropriate conditions for improved irrigation performance. Among those conditions were a set of settlement plans to increase the likelihood of farmer participation in water-management activities and to reduce water wastage and inequitable water distribution. Based on a review of the project, these conditions may be summarized as follows:

* the design of clustered settlements of settlers from homogeneous backgrounds, rather than homesteads strung out along a new irrigation canal system;
* assistance in the development of farmer organizations to manage water at the tertiary level;
* the design of turnout groups in which groups of 10 – 14 homogeneous settlers share water from a field channel rather than taking water individually from main or distributary channels;
* agro-distance of less than 0.8 km between the irrigated land and homestead to maximize settlers' involvement in irrigated land development;
* alienation of land to settlers prior to their receiving irrigation water for cultivation to reduce encroachment and involve settlers in the project at the start;
* selection of settlers with irrigated agricultural experience; and
* coordination of technical and social components of the project, resulting in the appointment of two project managers during the construction phase and later, the appointment of a project manager from the IMD.

CHAPTER III

RESEARCH METHODOLOGY

FIELD RESEARCH WAS carried out in one small area of the Kirindi Oya Irrigation and Settlement Project (KOISP) during a six-month period between March and October 1988. The focus was on the settlers themselves – their characteristics, how they were allocated land and water resources, and what sorts of problems they faced in the initial period of settlement. Then we tried to understand how the settlement process affected the initial attempts to begin organizing settlers for water-management purposes and the likelihood of future cooperation among settlers in managing their common water resource.

LOCATION OF RESEARCH

We selected Hamlet 7[7]of Right Bank Tract 2 as our field site (see Figure 2). The location was selected because of its proximity to Tract 5 where other research activities of the International Irrigation Management Institute (IIMI) were carried out (IIMI Inception Report, 1988). We felt that the proximity would permit cross-fertilization of research on the various topics under study in KOISP and would also widen the geographic area of IIMI's work. Hamlet 7 was thus selected deliberately, rather than randomly. We specifically chose not to work in Tract 5 because of the presence of other IIMI social science researchers and the potentially disruptive effects of inundating a single group of settlers with research questions.

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[7]Hamlets were given sequential numbers instead of names.

SAMPLING STRATEGY

As mentioned earlier, owing to time constraints and the political environment in the South, we were unable to take a statistically valid sample from the project as a whole. Instead, we focused on a case study – not a cross-section of the total population in the project and not a large sample. Rather, we chose one hamlet and within it, systematically selected every sixth from the project list of 270 settler families and arrived at a total of 45 for intensive interviews. In this sample of 45, 11 families were found to be nonresident in the hamlet. We then selected the next adjacent number on the list. In two cases, however, the settlers listed under the adjacent numbers were not resident either. As a result, we reduced the sample to 43.

Because of the large number of nonresident households, our sample is biased towards those who remained in the hamlet. We regret that we were unable to meet those who had not yet settled. An understanding of their behavior would have helped explain the low rates of permanent settlement at the time of our study. Through discussions with their neighbours, however, we were able to gather some information about these families.

FIELD METHODS

Social science field methods were employed in the field research. Participant observation and both formal questionnaires and informal interviews with sample farmers were conducted by a research assistant, who was well trained in sociological field methods and irrigation management research. The research assistant resided in nearby Tissamaharama for the duration of the field study; residence in the hamlet itself was difficult because of inadequate accommodation.

We proceeded slowly and first tried to establish rapport with hamlet residents and field-level officers because of the political unrest in the area. The research assistant began with informal discussions with hamlet leaders and local field staff. After a few weeks, she then began more structured questionnaires through which data were collected on the settler households, their settlement experience, their current irrigation and agricultural activities, and their problems as they began to settle. Informal discussions were also held with sample settlers to ascertain their views and perceptions about the project in a qualitative, rather than quantitative framework.

Although we focused primarily on the 43 sample households, informal discussions

were also held with farmer leaders, settlers, and local field-level officers wherever possible. Additionally, the research assistant attended both hamlet and project meetings in order to understand settlers' relations with field-level staff, particularly within the Irrigation Management Division (IMD) and Land Commissioner' Department.

We had planned to observe one full cultivation season. Again, owing to political instability both the beginning and the end of our field study were hampered. In particular, the last maha season which began in September 1988 would have been an excellent period for study. By October, however, the situation in the area had deteriorated so drastically that all field research had to be suspended. As a result, our field study covered a period including the end of the 1987 – 1988 maha[8] and the beginning of the 1988 – 1989 maha. It was a period of stress for the settlers because the months were characterized by lack of rain, lack of employment during the noncultivation period, limited services from the departments, and the threat of politically motivated violence.

[8]This was a very late maha due to delays resulting from construction work.

CHAPTER IV

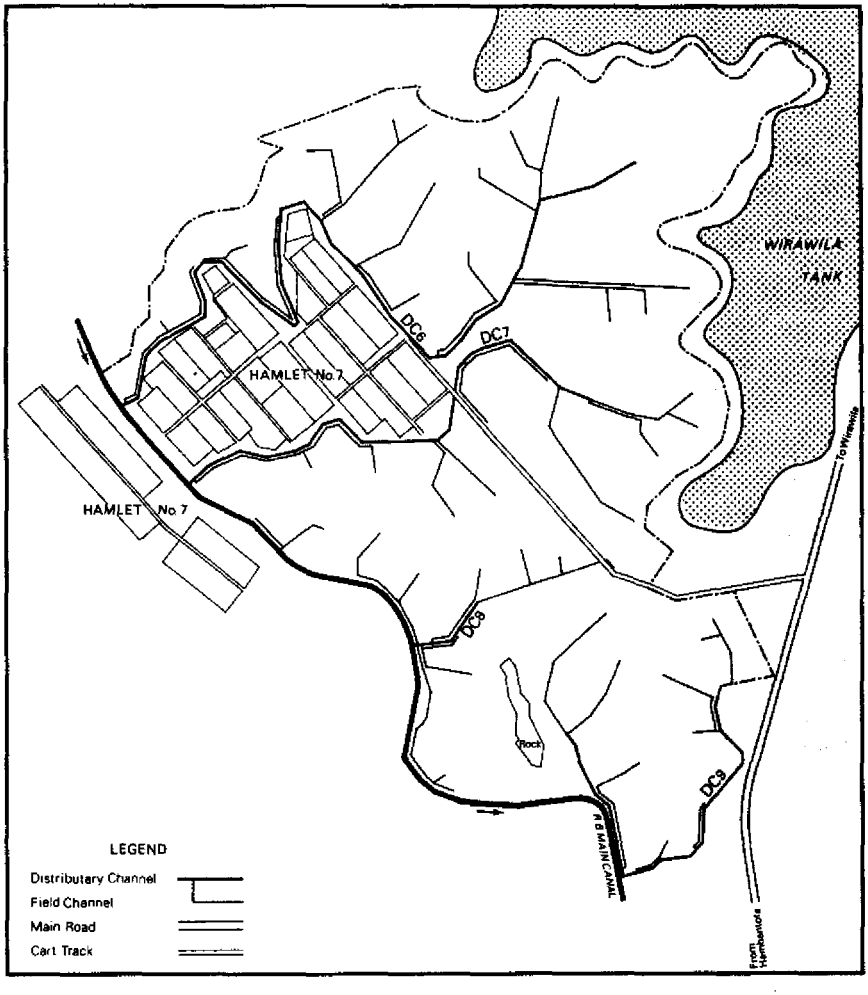
DESCRIPTION OF THE SETTLEMENT PROCESS IN HAMLET 7

HAMLET 7 WAS in the throes of rapid change during the period of field study. Settlers were establishing themselves and still trying to develop their irrigated and homestead allotments. In this chapter, we give a general overview of the status of the hamlet and the neighboring irrigated area as we observed them during 1988. Then we describe the process of settlement – the characteristics of settlers and how they were allocated land and water in the project – and their irrigation behavior as new settlers, specifically their participation in the development of organizations for water distribution and water-course maintenance. Our observations of actual irrigation practices in the field were limited due to the time frame of the study.

GENERAL OVERVIEW

Hamlet 7 is approximately 5 km from Wirawila town, along the Tissamaharama-Hambantota road. At the time of our study, it was accessible only by a dirt road running along the main canal from the Wirawila Training Center. It consisted of 286 homestead lots but 270 families had been allocated land, leaving a balance of 16 unallocated lots. During the study some of those remaining were given out to new settlers. Settlers were also allocated irrigated land along four distributary channels (DC 6 to DC 9) adjacent to the hamlet, as shown in Figure 3.

Figure 3. Blocking-out plan of Hamlet 7 and distributary channels.



The first group of settlers began settling in the hamlet in 1985 and gradually, more settlers moved in. Among our sample of 43 settler families, 20 settled in 1985, 21 in 1986, and 2 in 1987. By the end of 1988, settlement, irrigation facilities, and infrastructure development in Hamlet 7 were nearly complete.

Hamlet 7 was in a period of transition from construction to operation and maintenance at the time of our study. The construction phase had been marked by a high degree of settler dependence on the Land Commissioner's Department as the source of many benefits such as food aid, shelter, infrastructure, housing loans, and planting materials. The conduit for all these benefits was the field instructor who resided in the hamlet. During the study period, many of these benefits were being withdrawn and settlers were required to become more self-sufficient and play a greater role in system development.

Status of Homestead Development

After three years, the hamlet still looked like a frontier area. About 11 percent of the homesteads remained completely vacant and uncleared. Settlers built houses to lay legal claim to land but then did not reside there permanently. The houses that had been built were largely made of rough wattle and daub with coconut frond roofs. Only five settler families out of our sample had built brick houses with tiled roofs. Homestead gardens had not been developed to any significant degree. The Land Commissioner's Department was to arrange a housing-loan program, but it had not achieved any success.

The most difficult problems settlers faced were domestic water and transport services. Twenty three sample settlers indicated that domestic water was the major problem they faced. Sixteen mentioned domestic water and transport. Settlers were told that domestic water would be supplied by the project and initially it was, but after a period of time, the service had become unpredictable.[9]

Public transport facilities to the hamlet were not available. Settlers had to walk about five kilometers to a very basic urban center. Thus, all activities, ranging from marketing agricultural produce and transporting seed and fertilizer to visiting the

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[9]The initial plan was to supply domestic water by local wells. The presence of brackish water, however, required a reformulated plan to bring piped water from the Lunugamwehera Reservoir. Contracts had been given to build the pipe system but very little work had been done at the time of our study.

medical clinic became major undertakings.

Other problems that were identified by settlers included schooling and housing. Settlers, particularly those who were educated, wanted to send their children to secondary school but the only hamlet school was a primary school. Therefore, wives and school-going children often stayed in their home villages.

Settlers had not begun to reap any benefits from highland cultivation largely because of water shortages. They were given saplings of trees such as cashew, lime, orange, and coconut by the project but lack of water and lack of permanent residence all contributed to slow homestead development.

Status of Residence

Nonpermanent residence was common in Hamlet 7, as shown in Table 2. We observed that only 58 percent of the lots were occupied by full-time residents at the time of our field study. The remaining lots were either vacant, completely undeveloped, or encroached.

Table 2. Status of homestead development, 1988, Hamlet 7.

		Number	Percent
1.	Owners living in their own house	165	58.0
2.	Owner-built house but vacant	83	29.0
3.	Owners' house lived in by encroachers	2	1.0
4.	Encroachers living on allotment in own house	4	1.0
5.	Undeveloped allotment	16	5.5
6.	Vacant land still unallocated	16	5.5
Total		286	100.0

The settlers in our original sample who were omitted from our study because they were nonresident included eight from the nearby Tissamaharama electorate and three from other electorates. Among those who had not yet come to the project, some built temporary houses to lay claim to the property and subsequently returned to their native villages while others had not yet even cleared their highlands.

Status of Infrastructure Development

At the time of our study, government facilities in the hamlet included a primary school, cooperative shop, mailbox, meeting hall, and a nursery school. Land was also allocated for a Buddhist Temple which was constructed in July 1988. There was also a cemetery and a forest nursery. The school was functioning and teachers were in residence until all schools in the country were closed because of the political situation. There were five privately owned small shops but we were told that residents were fearful of theft, which had already caused some entrepreneurs to lose their investments.

Status of Irrigated Agriculture Development

By the end of 1988, most of the settlers in Hamlet 7 had been cultivating their irrigated allotments for the last two seasons. A time chart showing the major events in Hamlet 7 reveals the sequence of cropping seasons (Figure 4). Settlers were off the normal maha/yala schedule because of canal construction work still in progress but by September 1988 they had begun a first normal maha. Settlers were eager to get on schedule because the 1987/1988 season had been plagued by insect pests which they attributed to the staggered cultivation in the project. Reported rice yields averaged 3,385 kilograms/ *hectare*.[10]

Although many settlers were still not permanent residents in Hamlet 7, we did not observe any fallow fields during the 1987/1988 irrigation season. Settlers often took up temporary residence or sent a relative or friend to undertake cultivation and visit the fields as needed. Some fields were still fallow at the beginning of the 1988/1989 maha but we were uncertain whether they were prepared later.

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[10]The figure was slightly lower than that obtained by IIMI colleagues in Tract V crop cuts. According to their progress report, average rice yields were 3,699 kg/ha (see IIMI Progress Report, 1988:59).

Figure 4. Time chart showing events between 1985 and 1988.

		June 1985	FIRST SETTLERS SETTLED
Y	X	June 1986	YALA SEASON BEGINS; FIRST WATER ISSUE;
A	X		IRRIGATION MANAGEMENT DIVISION PROJECT
L	X		MANAGER APPOINTED TO PROJECT
A	X	September 1986	
M	*		MAHA SEASON BEGINS
A	*		
H	*	January 1987	DROUGHT; COMPLETE CROP FAILURE
A	*		
	*		
			NO CULTIVATION; CONSTRUCTION WORK IN PROGRESS
M	*	January 1988	SECOND MAHA SEASON BEGINS; INSTITUTIONAL
A	*		ORGANIZER APPOINTED TO HAMLET 7
H	*		
A	*		
	*	May 1988	FIELD INSTRUCTOR TRANSFERRED OUT OF HAMLET
			CONSTRUCTION AND REPAIR WORK ON CANALS
		August 1988	FIRST INSTITUTIONAL ORGANIZER LEAVES;
M	*	September 1988	SECOND INSTITUTIONAL ORGANIZER APPOINTED.
A	*		20 SEPTEMBER WATER TO BE ISSUED ACCORDING
H			TO PLAN; ISSUED ON 25 SEPTEMBER FOR MAHA
A			

Status of Settler-Field Staff Linkages

Sample settlers sought help of the field instructor for nearly all their problems during the construction period. By the end of our field study, however, the field instructor was transferred to another location and was not replaced. Agency officials claimed the project lacked funding to keep a field instructor in each hamlet so one person would have to be responsible for two hamlets.[11] Other field-level staff such as the Technical Assistant from the Irrigation Department and the agricultural extension officer (KVS) had infrequent contact with the settlers.

Settlers' Perceptions about the Quality of Life

Sample settlers were asked to compare their lives before and after coming to the project. Answers were varied and generally qualified. Out of the sample of 43 settlers, 19 (44%) thought their lives were better here, despite the difficulties; 16 (38%) thought their lives were better before coming; 2 (4%) thought there was no difference, and 6 (14%) did not respond.

Whether they gave a positive or negative response, all settlers felt troubled by the lack of homestead facilities, particularly domestic water and transport. Owning rice land – not just irrigated land – was their primary motive in staying in the project and was a key factor in their initial decision to move. In order to give the flavor of the settlers' views and show how they qualified their statements, some translated quotations are as follows:

> "Life before was good. We didn't have any difficulties with water. We had an income from the highland. But, we didn't have any rice land. We came here because of the rice."
>
> "My life before was better. Then I did not have water difficulties. But I did not have rice land. My brother helped me get land here."
>
> "This life is better because now we have rice land. Earlier I was an *ande* (tenant sharecropper) farmer. My son, however, does not like to stay here."
>
> "I came here because of the land. This life is better than before. I did palm reading and had an income but no land. Now, I go back to Debarawewa (nearby village) during the day for my work but come to the hamlet at night."

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[11]During a subsequent field visit, we learned that a new field instructor had been appointed to Hamlet 7, contrary to expectations.

"Life before was better than this. We came here because of the rice land though. My husband has been working for 15 years under the Land Commissioners' and Irrigation Departments as a government registered contractor. No one contested our application."

CHARACTERISTICS OF HAMLET 7 SETTLERS

Our sample consisted of 35 male and 8 female household heads. Their average age was 44 years. While 39 were married, 4 were single and lived in the hamlet with relatives (parents and/or siblings). There was a tendency for male settlers to come for the cultivation work and leave their wives and children in their original villages. The households were characterized by a very fluid composition in which members came and went from their original villages on a daily or weekly basis. Selectees were supposed to be married as a criterion for selection. Those selectees who were unmarried tended to be absent, leaving their parents or relatives to look after the cultivation work.

Place of Origin

When Hamlet 7 was settled, priority was given to applicants from the nearby Tissamaharama electorate. While the majority of the settlers from Tissamaharama were settled in Hamlet 6, the remainder were given land in Hamlet 7. As a result, the balance of settlers in Hamlet 7 were from other electorates in Hambantota and adjacent electorates. Table 3 shows the number of settlers and percentage from each electorate.

Table 3. Number and percentage of settlers by electorates, Hamlet 7.

Electorate	Number of families	Percent
Tissamaharama	172	64
Mulkirigala	58	22
Tangalle	23	8
Weligama	9	3
Dewinuwara	6	2
Special orders[12]	2	1
Total	270	100

Source: Project Files.

The households in our sample included 42 open selectees and 1 alternative selectee. They came from 4 electorates: Tissamaharama (30), Mulkirigala (5), Tangalle (5), and Weligama (2). (Two in our sample gave no response.)

Criteria for Selection

Nearly all (99 percent) the beneficiaries in Hamlet 7 were open selectees who were selected in their respective electorates. Only five settler households were alternative settlers who had been displaced by the project. Prior to the project, a few old tanks were located within the proposed command area but the indigenous farmers cultivating there were resettled in neighboring Hamlet 6.

Political affiliation was clearly one of the most significant criteria for selection, more so than agricultural ability or landlessness. All sample open selectees (99% of total sample) claimed they were selected because of their political activities or because they had relations who were sufficiently connected to the political party. Many worked for the Members of Parliament (MPs) as office bearers of the village-level party organizations. Though each situation varied and could not be fully quantified, some translated quotations from settlers as to why they were selected highlight the types of responses:

[12]Special order selectees comprise a rather mysterious category of settlers. In Hamlet 7, neither of the two families ever came to the project and they were not known to the residents. Rumors were that both these families came from Colombo.

"My family has two acres of highland and one acre of rice but there are six brothers. I knew the MP in my electorate and even worked for him so I was given land."

"Earlier I had no rice land. I was president of the rural development society and asked my MP for rice land."

We also observed cases where young people were given land instead of government jobs. For example, our sample included one young girl who was a graduate. She wanted employment in government service but instead she found herself the recipient of land in the Kirindi Oya Irrigation and Settlement Project (KOISP). She told us, "I am not really living here. I did not even ask for this land. I wanted a government job but suddenly I got a letter telling me I had land instead. We have a good house and land in Tissamaharama."

Differences between Open and Alternative Selectees

In our discussions with project staff and residents of other hamlets we noted differences in behavior and agricultural strategies between open and alternative settlers. In general, the open selectees were characterized as educated, urbanized, and wealthier than their counterparts. Alternative settlers on the other hand were characterized as having more experience in farming under local conditions.

The one alternative selectee in our sample reinforced the above characterization. He remarked that his neighbors on both sides of his highland allotment – both open selectees – had not settled permanently because of their lack of experience and knowledge about the value of the land. During a field visit, we witnessed a case of a settler coming to pick up his fertilizer receipts from the field instructor. The sample alternative settler pointed to the man, who was well dressed and looked urbanized, and remarked that he was typical of the level of the open selectees.

Education Level

Despite characterizations of open selectees as educated, the education level of the selectees in our sample was not exceptionally high. The majority of sample household heads had primary school education (Table 4). The one alternative settler in our sample also had a primary school education.

Table 4. Education level of sample household heads.

Level	Number	Percent
No education	2	5
Primary School	30	70
Secondary School	9	21
Higher Education	1	2
No response	1	2
Total	43	100

Economic Status of Settlers

It was difficult to gauge the economic status of settlers in Hamlet 7. Often settlers had access to highland plots, partial ownership of land, or encroached land elsewhere, but the terms and conditions of ownership were loosely defined. Additionally, many had part-time businesses in trading, palm reading, medicine, masonry, and small shops which gave them some income.

As a rough gauge, we inventoried items owned by settlers in sample households. Households were minimally equipped; only 24 had chairs, 30 had bicycles, 2 had bullock carts and 2 had sewing machines. No other major possessions were owned by any of the settlers. We doubt the validity of this gauge, however, since we learned that many settlers had possessions in their previous homes or with relatives.

The credit position was another possible gauge of settlers' economic status. We were told that just prior to the 1988/1989 maha cultivation season, only 43 hamlet residents had paid back outstanding bank loans from the previous season and were thus eligible for new cultivation loans. Many who had loans could not pay them back or paid the bank and took private loans. Indebtedness reached an average of approximately Rs 4,000, based on information gathered on a subsample of 20 settlers.

We believe that although there clearly were cases of settlers who had income, property, and businesses elsewhere, the majority of those who had settled fit the project objective of providing land to the poorer segments of society. We also speculate, however, that wealthier settlers were among those who had not yet settled.

Prior Occupation and Irrigated Agricultural Experience

Despite claims that open selectees lack irrigated agricultural experience, we observed that 34 household heads (80 percent) in our sample did have experience in irrigated agriculture as tenant farmers before coming to the project. We suspect that our sample was biased towards those who had greater knowledge of irrigated agricultural practices. Lack of experience may have been one reason for not settling.

We also questioned settlers about their previous occupations. Fewer settlers indicated that their major occupation was as irrigated cultivators, as shown on Table 5.

Table 5. Previous occupation of sample household heads.

Occupation	Number	Percent
No occupation	8	19
Irrigated cultivator	20	46
Chena cultivator	2	5
Daily laborer	8	19
Watcher	1	2
Cattle Owner	1	2
Masonry	2	5
Driver	1	2
Total	43	100

Female Selectees

Of the total 43 sample settler families, 8 (18 percent) of the legally registered land holders were female. In general, females received title only when a male, either a brother or a husband, was ineligible. For example, one female selectee was from Mulkirigala electorate. Unmarried, she had a secondary school education and a brother who was an institutional organizer under the Irrigation Management Division (IMD) in a nearby hamlet. He was a strong supporter of the Member of Parliament for Mulkirigala and wanted a job but instead got land. As he was employed by the government, he was ineligible for land himself. His sister was thus given the land but she was not interested in farming and therefore requested her father to look after the land.

A second case involves the wife of a contractor who worked for the Land

Commissioner's and Irrigation Departments in KOISP. She applied for the land because he was not eligible because of his position of wealth. Yet he had the connections required to get land. By granting it in her name, he circumvented the rules.

THE PROCESS OF ALLOCATING LAND TO SETTLERS

Homestead Land Allocation

When settlers first came to the hamlet beginning in 1985, the field instructor was responsible for allocating homestead land according to the blocking-out plans designed by the Irrigation Department. He did not follow the plans, however, resulting in a lack of correspondence between the plans and reality. Only 26 homestead lots in the entire hamlet were found to correspond to the location in the plans.

The field instructor was also to provide the supplies and materials to settlers, but we learned that in Hamlet 7 only the first group of settlers received any compensation. At the time of our study, many settlers were still awaiting their money and materials.

Figure 5 shows the layout of Hamlet 7 and the place of origin of the different settlers at the time of our study. The first settlers to be settled were those from Tissamaharama. Settlement proceeded from east to west.

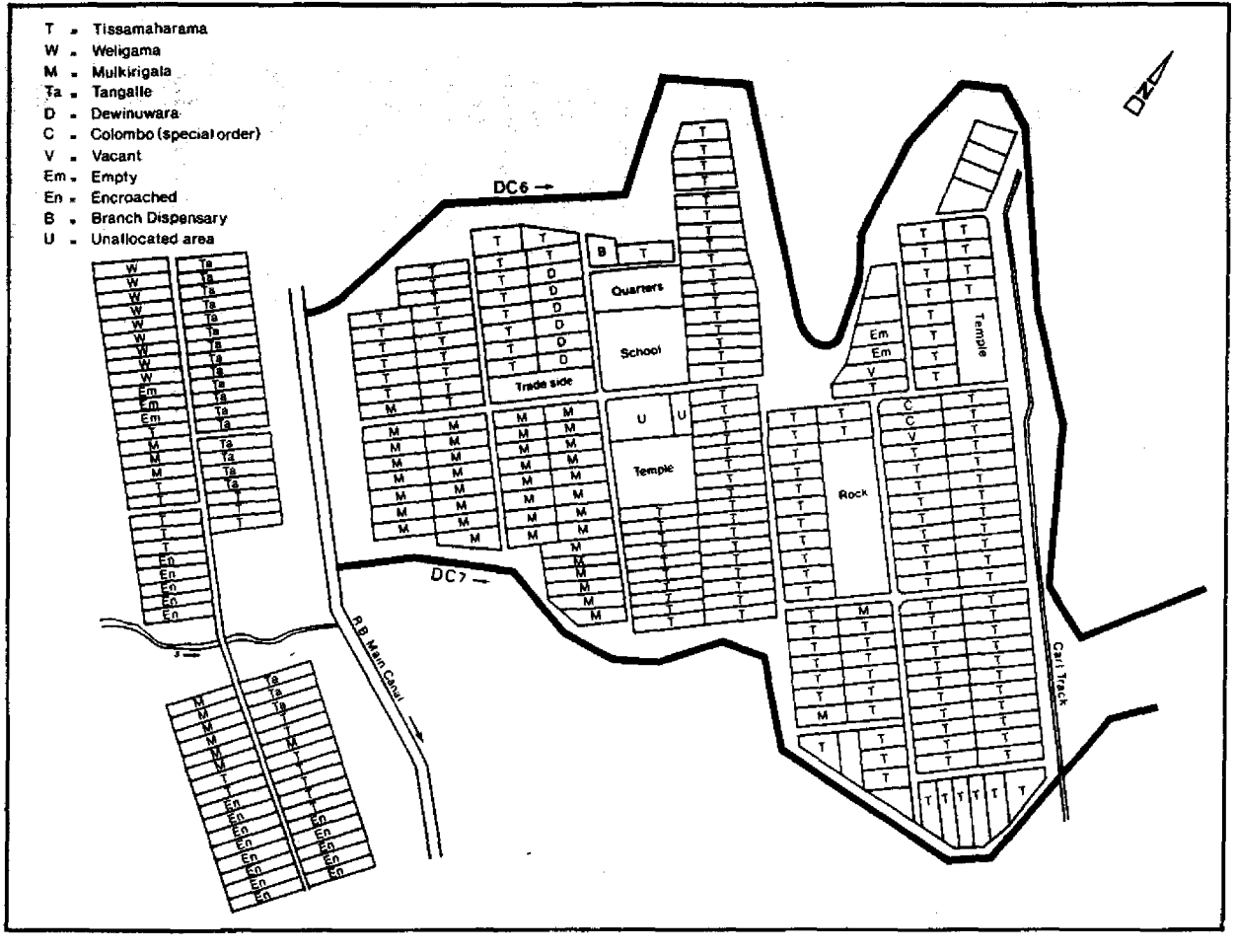


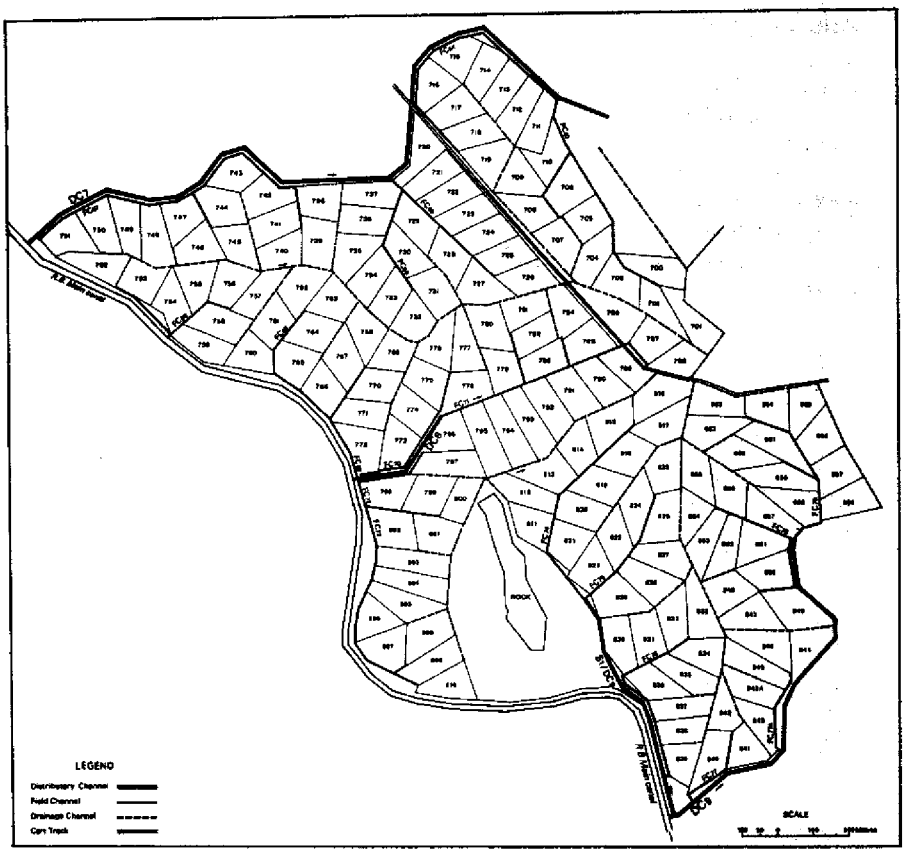
Figure 5. Schematic layout of residential area showing place of origin, Hamlet 7.

Encroaching had begun on homestead lots within the hamlet and adjacent forest areas, as is also shown on the homestead map. They were relatives of legitimate settlers who hoped to get legal title to land. They had even begun entering the hamlet and living in nonresident settlers' houses. Notably, they only encroached on those houses belonging to settlers from electorates other than Tissamaharama. Settlers became fearful to leave their houses and some who had temporarily gone to their native villages returned merely to protect their property.

Allocation of Irrigated Land

Irrigated land was allocated along four distributary channels (DC 6 through 9). Each distributary channel was divided into field channel (FC) turnouts and allocated to 5 – 17 members. The blocking-out plans for these distributary channels are given in Figure 6. In principle, all settlers farming on the four distributary channels were to own homestead allotments in Hamlet 7 with a corresponding number. Our study revealed that members of four turnouts – and indeed, their turnout leaders on DC 6 were allocated homesteads in Hamlet 6 instead of Hamlet 7. Yet, irrigation meetings were held in Hamlet 7, where the majority of settlers resided.

Figure 6. Kirindi Oya Irrigation and Settlement Project – Blocking-out plan of Right Bank area – DC7, DC8, and DC9.



Settlers' responsibility for land preparation.

The Irrigation Department undertook the jungle clearing, basic leveling and ridging on upland soils only. The settlers themselves did their own minor leveling, bunding, and clearing. They had to spend a considerable amount of their own time and money in this regard. We asked 20 sample farmers about their costs over the past 3 years. The expenses for land preparation during the first season were as high as Rs 12,000.[13] During the second season, the expenses were reduced to approximately Rs 6,000. The major expenses were for hired labor.

To meet their expenses, settlers had to borrow considerable sums from private money lenders or relatives because the government loans of approximately Rs 5,000 were not enough. The sequence of events in which settlers experienced severe drought during the first season and pest disease in the second led many settlers into debt. They could not pay back their previous government loans and thus faced difficulties with land preparation.

Survey of irrigated land.

Although the irrigated allotments were surveyed in the early stages of the project, some allotments proved difficult to irrigate. Eight of the sample settlers changed their rice allotments because the land was rocky, unirrigable, or too saline. These settlers complained to the Project Manager, Settlement, who then issued new land. In two of the eight cases, the unsuitable land was reallocated to another later settler family. In the remaining six cases, the land was subsequently encroached upon for nonirrigated crops.

Problems owing to inadequate surveying were commonly noted. Because the boundary markers were put up early in the project, by the time the settlers were allocated their land these markers were missing and they were not sure of the extent. Not surprisingly, there were no cases where settlers felt they had too much land, but there were many cases where settlers felt they had been cheated. The Survey Department was on strike during the period of our study, which also contributed to these survey problems.

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[13]The mid-1988 currency equivalent was US$1.00 = rupees (Rs) 32.00.

Irrigation construction problems.

Settlers also faced a number of difficulties because of construction problems. In a list of irrigation-related complaints made by farmers to project officials, there were 89 complaints which settlers felt they could not remedy themselves, though often the problems affected only a portion of the land. Land leveling was the most frequently cited, followed by others relating to field channels, drainage, bunds, and roads (see Table 6).

Table 6. Maintenance requests by settlers belonging to Hamlet 7.

Activity	Number of responses
1. Need to level plots	48
2. Need drainage channel	6
3. Need to reform bunds	7
4. Need outlet	6
5. Need to repair access roads	6
6. Need to repair turnout gates	5
7. Need to repair outlets	4
8. Need to repair drainage channel	6
9. Need separate channel	1
Total	89

Source: Project files.

SETTLERS' IRRIGATION MANAGEMENT ACTIVITIES

Since our study was carried out during the beginning stages of project development, irrigation management was still in a state of flux. Our observations of settlers' irrigation practices in the field were further limited by the prevailing political situation in the area. We were able to observe the end of the 1987/1988 maha season, which was late, and the land-preparation period of the 1988/1989 maha season and were able to discuss practices with settlers. Recognizing that this was the early stage of irrigation development, we describe three related topics: settlers' nascent organizations for water

management at the tertiary level, settlers' initial behavior in distributing water, and their role in canal-construction activities during the initial stages of the project.

Farmer Organizations

The *kattinayake* (see page 13) system of farmer organizations, fostered initially by the Project Manager, Settlement, was no longer active by the time of our study. In the 1986 yala season a second farmer organization program was implemented under the IMD Project Manager. Beginning in January 1988, he was assisted by institutional organizers appointed to each hamlet. The objective of the program was specifically to provide a better water management system for the farmers through farmer participation for water distribution and channel maintenance. Additionally, by forming a consolidated group, it was anticipated that the water users could liaise more effectively with the agencies.

The farmer organizations under the IMD are based, in principle, on the concept of irrigation units – the field channel turnouts and the distributary channels. The organizational structure is shown in Figure 7. At the time of our study, however, the distributary channel organization was still a hamlet organization in which each of the four distributary channel leaders had leading roles in a single organization. None of the other societies typically found in Sri Lankan communities (death donation society or community development society) were functioning in Hamlet 7.

Figure 7. Organizational structure of farmer organizations, Hamlet 7.

Distributary Channel Organization

DC 6 (DC leader) (Secretary)	DC 7 (DC leader) (Treasurer)	DC 8 (DC leader)	DC 9 (DC leader) (Chairman)
Field channel – Number of farmers			
51–9	61–16	69–11	74–11
52–7	63–14	70–7	75–8
53–14	64–09	71–17	76–11
54–7	65–09	72–14	77–06
55–15	66–09		78–9
57–10	67–14		79–11
58–10	68–07[a]		
59–10			
60–11			
Also[b]			
46			
47			
49			
50			

[a]FC 68 has 7 farmers. This is a direct field channel off the main canal. This farmer leader is not a member of any distributary channel organization.
[b]These field channels have farmer leaders who live in Hamlet 6 although some of the distributary channel members live in Hamlet 7.

When the farmer organization program under the IMD began, the IMD Project Manager initially assisted settlers to appoint farmer leaders (*kathelanayakes*) for each of the 30 field channels. At the time of our study, only 24 of the kathelanayakes were living in Hamlet 7. Two had been killed during the political violence and 4 were residing in Hamlet 6. Two field channel leaders were former kattinayakes.

The secretary of the distributary channel organization at the time of our study was an unusual personality who was responsible for many of the activities of the farmer organizations. He was a young bachelor from the local Tissamaharama area and lived in the hamlet with his brother and mother. He worked well with agency staff and sacrificed his time and even his own money for the farmers in Hamlet 7. His efforts to

bring a Buddhist monk and build a temple in the hamlet indicate his role as a general community development catalyst.

Settlers' opinions about the organizations.

The sample settlers knew about the organizations and had some idea about IMD activities. Only three of the sample household heads did not have any idea who their field channel leader was. Two were female selectees who were not involved in cultivation and one was a man whose field channel leader resided in Hamlet 6. Twenty eight (65 percent) of the sample households had a positive view of field channel leaders' effectiveness. Those who were dissatisfied indicated that the leader could not solve their particular land-development problems or were not residing permanently in the hamlet.

All farmers knew the secretary of the distributary channel and understood his function to liaise between settlers and the agency staff. The secretary was viewed as a successful leader by all those we talked with – the consensus was remarkable. Settlers, however, did not know about the distributary channel organization *per se*. It was the leadership provided by the secretary that was important to them.

Settlers generally viewed the leaders as a conduit for presenting problems – including those not relating to irrigation – to the various agencies. As a result, in the settlers' eyes, the leaders became responsible for solving all the farmers' problems and the distributary channel organization came to be seen as a community development society – a forum for voicing various problems such as domestic water, credit, and marketing. They had no other mechanism for solving these varied problems.

Farmer meetings.

The field channel and distributary channel leaders were supposed to meet monthly in the hamlet. The secretary and chairman were then to represent the farmers at a Project Committee meeting also held monthly. At the time of our study, however, to our knowledge the turnout groups never held meetings and all information that settlers received was on an individual basis through the field channel leaders or the secretary of the distributary channel organization. Only six farmer leaders were present at the most recent distributary channel meeting we observed in September (the beginning of the land-preparation period). The IMD Project Manager cancelled it due to lack of a quorum. According to him, the poor attendance was due to settlers being busy preparing their fields.

Water Distribution

In the initial stage of the project, water management in a strict sense was not being practiced and was certainly not an objective of the settlers themselves. Settlers took water as they needed it and did not rotate turns to *save* water. Only 14 sample settlers on 10 field channels indicated that their turnout group practiced some form of water rotation to *distribute* water. We should add, however, that our observations were made during a period of water surplus so that we are not in a good position to draw conclusions about the turnout system and water distribution.

The turnout leaders, elected by the turnout members, were asked to operate rotations by the Irrigation Department during the 1987/1988 maha. However, rotations were not strictly enforced and settlers were not given any special instructions. The rotation system thus became ad hoc with some turnouts practicing it and others not. Settlers who did practice rotations claimed that no meeting was ever held to discuss the practice. Rather, the field channel leaders informed individuals as to what they should do.

Those settlers who claimed to practice rotations had difficulty explaining how they did so. Their explanations were nearly as varied and numerous as the turnouts who practiced rotations:

* "We rotate four hours per one person. The days of water issuing are divided among the number of settlers."
* "One allotment gets water once in two days."
* "Two settlers get water at a time. The time is scheduled according to the number of settlers."
* "We each get four hours of water once in three days."
* "Three settlers get water for six hours twice a week."
* "Two settlers get water at a time."
* "One settler gets water at a time."
* "One settler gets water for four hours once every three days."
* "Two settlers get water at a time from 0700 h to 1400 h."
* "One settler gets water two days a week."

According to turnout leaders, they operated rotations when they felt it was difficult to distribute water among all the allotments within the given water issue. The variation in water rotation practices may have been due to varying lengths of channels so that the longer channels required more cooperation to ensure water at the tail end. It may also have been due to the varying leadership roles, the composition of the members with respect to their place of origin, or other factors. Further investigation into these factors would provide more insight into the settlement conditions affecting irrigation management behavior.

Exceptionally long channels faced serious problems despite attempts to distribute water and tail enders complained that they did not get enough water. For example, FC

67 on DC 7 runs parallel to the distributary channel, but is quite long. Tail-end settlers were prepared to make a cut in the distributary channel bank and take water directly because of shortages in spite of rotational practices.

Settlers' Involvement in Irrigation Construction

Settlement preceded the commencement of irrigation water under the program of advanced alienation. Settlers were expected to participate in construction work, thereby earning some income before commencing cultivation. In our sample only one settler participated in the construction work before first irrigation season.

Sample settlers complained about the lack of off-farm employment, not only before the arrival of irrigation water but throughout the last few years. There was some hope that settlers would be employed at the beginning of the 1988/1989 maha season when they prepared lists of various management activities which needed attention. Initially, the Irrigation Department promised to grant work contracts to the distributary channel organization for canal cleaning but because of time pressures, they later rescinded and hired settlers as daily paid laborers.

The settlers were beginning to take responsibility for both watercourse maintenance and construction and maintenance of their drainage channels. We observed that, prior to the September 1988 land-preparation period, they did get organized for watercourse cleaning. The field channel leaders marked the length of channel each settler was required to desilt. Settlers felt responsible for seasonal cleaning but otherwise felt no other obligations towards the system.

SUMMARY

Hamlet 7 had not yet emerged as a thriving self-sustaining community at the time of our study and agricultural production had not achieved its full potential. Many settlers were still not willing to make a full investment in settling on a permanent basis. Ties to places of origin remained strong. Despite the problems faced, the land was being developed and settlers were willing to put up with difficulties for rice land.

The hamlet was in a unique period of transition out of the construction phase in which a great number of services were provided, most notably food aid. The settlers' dependency on the Land Commissioner's Department had been strong but they were entering a new phase where they were required to solve problems themselves.

CHAPTER V

SETTLEMENT CONDITIONS FOR IMPROVED IRRIGATION MANAGEMENT

IN THE DESCRIPTION of Hamlet 7, we have shown that during the construction phase a number of intended activities were not yet implemented. To understand the reasons for the discrepancy between the objective plans and the reality requires looking at the management by the agencies – their function, decision making, and means of achievement of targets. Such an exercise lies outside the scope of this research; studies are, however, being undertaken by colleagues at IIMI (Nijman, C., n.d.; Merrey and Somaratne, 1989).

New irrigated settlement schemes such as Kirindi Oya Irrigation and Settlement Project (KOISP) require highly complex coordination of inputs. Plans can go awry due to a wide range of factors ranging from credit and marketing systems to the technical designs for the canal system and the agency structure. We focus on *one* set of factors in new irrigated settlement schemes – the process of settling people, allocating land to them, and developing a new institutional framework for them. Clearly, however, irrigation performance can be limited by other factors that have nothing to do with settlement or are common also in older established schemes. This paper has not addressed those issues but rather has focused on constraints due to new scheme development with new settlers.

In this chapter, we look at the outcome of specific settlement activities designed to improve water management. We focus on six activities and how they influence settlers' ability to take part in the management of the irrigation system: 1) clustered settlement, 2) farmer organizations, 3) turnout system, 4) agro-distance, 5) advanced alienation, and 6) selection of settlers. We also look briefly at the lines of communication between settlers and agency staff.

CLUSTERED SETTLEMENT AND IRRIGATION MANAGEMENT

Irrigation systems require cooperation to manage a common resource. The logic behind the concept of clustered hamlets is that settlers from homogeneous backgrounds are more likely to foster community development and cooperation than linear or ribbon settlements, where houses are strung out along irrigation channels. This latter type of settlement pattern is found in many of Sri Lanka's older schemes such as Dewahuwa and Minneriya. It has become clear (see Farmer, 1957 or Ellman and Ratnaweera, 1976) that factors such as caste differences, different places of origin, and differences in ethnicity can severely hinder attempts at cooperation in activities such as irrigation management.

Hamlet 7 conforms to the picture of a clustered settlement. Additionally, the majority of the settlers in Hamlet 7 were open selectees from the Tissamaharama electorate (63.7%). Although community-development activities were still limited, one expression of "community" was the construction of a new temple during the period of fieldwork and various *shramadana* (group work parties).

Despite the appearance of clustered homogeneity, Hamlet 7 was still characterized by part-time settlement which created problems in developing the community. Settlers who were residing felt that it was difficult to live in a place where there were so many vacant lots. They expressed fears about wild animals, theft, and encroachment, and some were considering leaving if the situation did not improve. Nonresidence was specifically a problem in developing farmer organizations since part-time settlers came to the hamlet for land-preparation work or harvesting but did not attend the cultivation meetings or meet with their field channel leaders. Although they were developing their irrigated land, they were less likely to participate in routine activities and decision making.

We were told that when they first settled, the Tissamaharama settlers created problems for settlers from other electorates because they felt that they had an inherent right to the land. They were from the area and resented the fact that their relatives and friends did not get land while those from outside the area did.

The problems had diminished by the time of our field study. Encroachers from the Tissamaharama area, however, were continuing to encroach on homesteads belonging to settlers from other electorates. Problems may be anticipated in the future as farmer organizations take on more cooperative activities.

We suspect that the numerical dominance of the Tissamaharama settlers reduced potential friction in Hamlet 7. Our colleagues working in Hamlet 11, Tract 5 observed that factionalism was strong and led to poor attendance at farmer meetings and water disputes. Merrey and Somaratne (1989) attribute the conflicts to the fact that settlers

came from various southern electorates but no one electorate was noticeably dominant, as was the case in Hamlet 7. We believe that the fact that most settlers in Hamlet 7 came from the Tissamaharama area *and* were open selectees resulted in less friction.

We anticipated that settlers from outside electorates would be less likely to set up permanent residence because of the distance from their native homes and lack of knowledge about the local area. Table 7 shows a breakdown by electorates and residential status in the hamlet. The data contradicted our expectations; 108 out of 172 Tissamaharama settlers (63 percent) and 57 out of 98 settlers from other electorates (58.1 percent) were permanently living in their own houses.

Table 7. Status of homestead by settlers' electorate of origin.

Status of homestead	Tissa-maharama	Mulki-rigala	Tangalle	Weligama	Devi-nuwara	Special orders[a]	Total
House not lived in	55	18	7	1	2	0	83
House occupied by owner	108	31	16	6	4	0	165
House occupied by encroacher	0	2	0	0	0	0	2
Developed homestead	9	7	0	2	0	2	20
Total	172	58	23	9	6	2	270

[a]"Special orders" were settlers who were selected by the Land Commissioner or the Minister under Section 20 of the Land Development Ordinance. In Hamlet 7 the two special orders had not settled and there were rumors that they were from Colombo.

DEVELOPMENT OF FARMER ORGANIZATIONS FOR IRRIGATION MANAGEMENT

In KOISP, local organizations were formed for irrigation management at the beginning of the project rather than after problems had emerged. This is an important innovation. But, a number of problems were observed. First, because there was no mechanism for solving a whole range of community development problems, the farmer organizations implemented through the Irrigation Management Division (IMD) for water management purposes became community development societies; the settlers expected the distributary channel leaders to solve all the community problems as well as all irrigation-related problems. The leaders expressed frustration at being caught between the settlers and the agency staff because they could not solve all the problems that cropped up.

Second, towards the end of the construction phase, the Land Commissioner's Department (LCD) was still the provider of food and supplies, but to *individual* settlers. The farmer organizations (under the kattinayakes) were no longer functioning. At this time, settlers were not required to act collectively to solve problems. It is clear that a high degree of dependency on the LCD, both materially and psychologically, resulted. The efforts of the IMD to organize settlers were undermined by the relationship settlers had with the LCD. IMD staff felt that as soon as the construction phase handouts were finished, they would be in a better position to help the settlers. They felt the settlers were not willing to come to them as long as the LCD was in control.

Third, on top of the dependency relationship settlers had with the LCD, a great deal of confusion surrounded the IMD and LCD's roles in developing farmer organizations. The original kattinayake leaders appointed through the LCD were expected to help settlers during the construction phase. But the IMD farmer organizations were also to be implemented in the early stages of the project. This seemed to create problems because staff did not know their expected roles and felt that others were doing their jobs.

Fourth, in an effort to implement farmer organizations quickly, project management could not pay much attention to the process and the timing of inputs to foster those organizations. The program was implemented initially during the construction phase by the IMD Project Manager himself without the assistance of institutional organizers or an institutional development officer. The institutional organizer in Hamlet 7 was not brought to the project until two years later. Because of the timing and shortage of manpower, the initial focus was on developing leadership at the hamlet level, but less attention was given to explaining the purpose to the settlers. In our view, this is analogous to putting the icing on the cake before it has been baked.

Part of the problem with the strategy of trying to win support of the settlers after

building the distributary channel leadership roles was that already many settlers were becoming disillusioned with what they knew about the program. Although they felt there was some potential benefit in having the organizations, they did not pay much attention to them. Their experience thus far had not been very encouraging because construction work was still underway when the organizations were formed. Settlers had irrigation problems but they could not be solved because of the time pressures to complete construction work.

ALLOCATION OF IRRIGATED LAND WITHIN TURNOUTS

A number of problems were observed regarding the allocation of land according to the turnout system. First, Hamlet 7 settlers were allocated land along field channels –having 5 – 17 water users, rather than the 10-14 which is considered the optimal size (Ponrajah, 1981). Although an even number permits allocation of water in pairs, only 9 out of the 30 field channels were planned for an even number of outlets.

A second problem is that planners envisaged that settlers who cultivated on the same turnout would live near one another in the hamlet as a means of fostering greater participation and cooperation in irrigation activities. However, when settlers arrived in Hamlet 7, the field instructor allocated land within the hamlet first, with little attention to the irrigated land or the blocking-out plans. Only 26 allotments out of the total 279 in the hamlet were allocated according to the planned numbering system, as shown in Figures 8 and 9. The result was that settlers cultivating on one field channel were not necessarily living close to one another in the hamlet. In some cases, turnout group members lived on opposite sides of the hamlet, resulting in difficulties in convening meetings and conveying messages to group members. Settlers in our sample clearly were more supportive of field channel leaders whom they knew and who lived in the neighborhood.

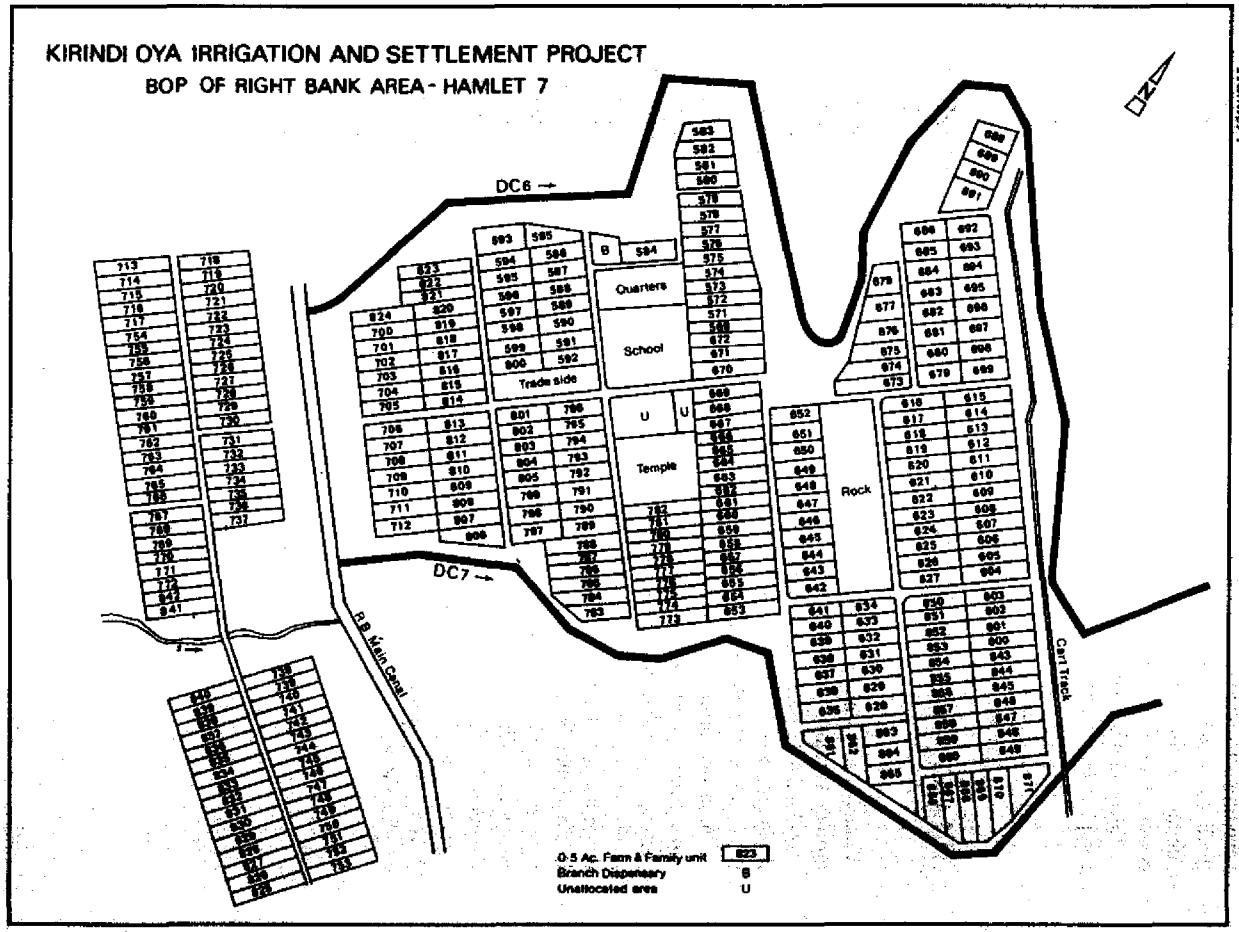

Figure 8. Kirindi Oya Irrigation and Settlement Project – Block-out plan of Right Bank Area – Hamlet 7

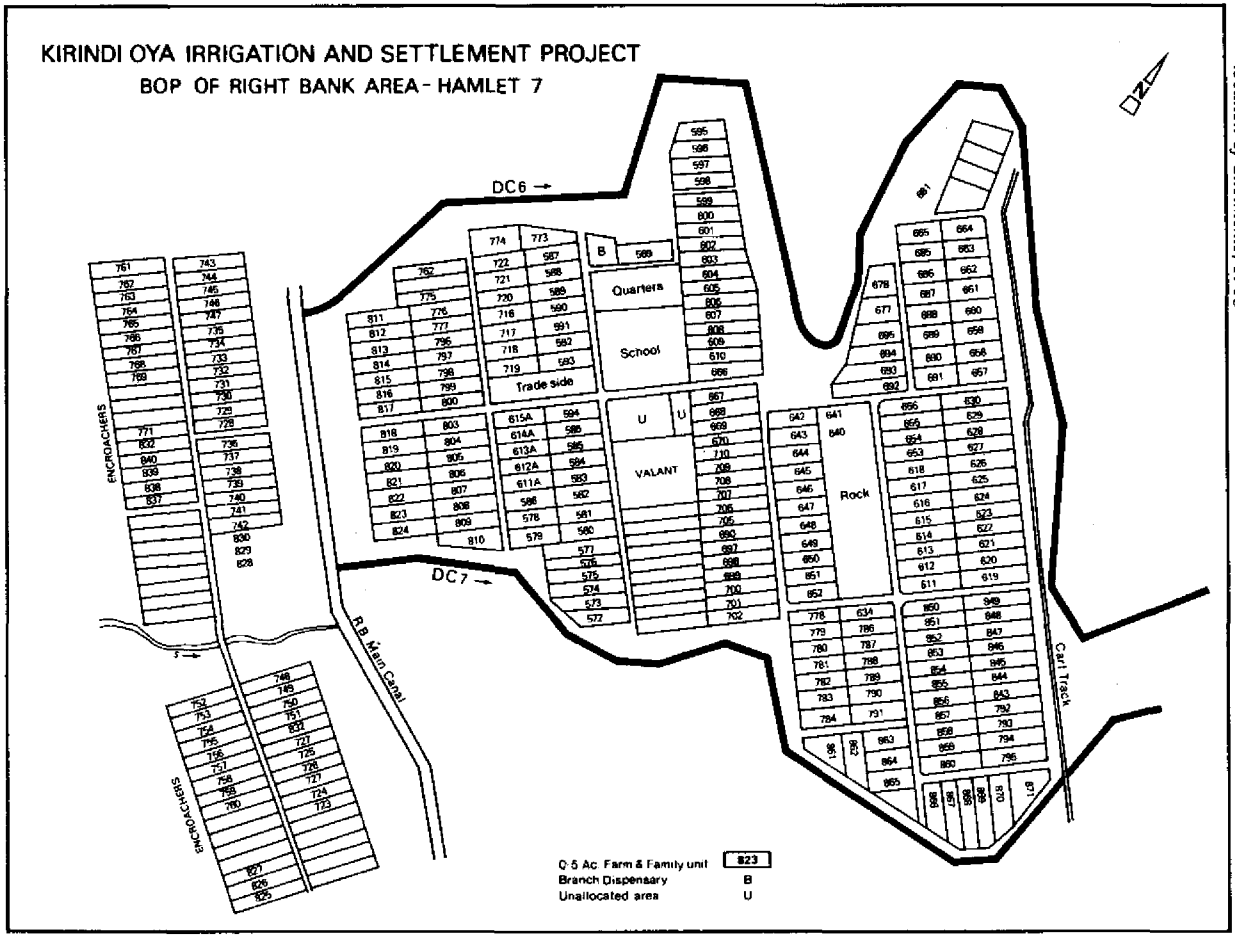

Figure 9. Kirindi Oya Irrigation and Settlement Project – Right Bank Area – Hamlet 7 – Actual location of allotments, 1988

In some extreme cases hamlet residence and distributary channel membership did not correspond at all. Those farmer leaders who were resident in Hamlet 6 came to the meetings held in Hamlet 7 during the period of field study but we may anticipate problems of coordination in the future as the project develops past the construction stage and the farmer organizations evolve. Such problems may be more acute, however, if the basis for coordination – that is, the activities that the settlers do – is not a strong one. In other words, if the settlers feel that coordination is important, they will be more likely to travel the distance to attend meetings and work with their fellow settlers.

Merrey and Somaratne (1989) also observed a lack of correspondence between hamlet and irrigated allotment in the Tract 5 area and felt this was a serious problem in the development of farmer cooperation. Although we did not observe such serious problems, we anticipate that as organizations become more functional, problems may emerge.

The planned correspondence between hamlet and turnout group membership was also undermined by nonresidence. The nonresident families frequently sent someone to the field during the season to do the cultivation work but their participation in community activities was limited. Furthermore, encroachers and lessees were also cultivating irrigated allotments on turnouts but were not residents in the hamlet. In the future, as farmer organizations develop further, these unsanctioned cultivation practices may have negative effects. There has already been one case where an encroacher cultivating on highland in the middle of DC 8 disrupted water flows to settlers' fields. He was in the process of trying to level the land to obtain irrigation water.

We anticipated problems or conflicts within turnout groups whose members were from different places of origin and had different backgrounds. Merrey and Somaratne (1989) had observed correlations between place or origin and cooperation in water sharing elsewhere in the project. In Hamlet 7, however, we did not observe or hear about any serious problems to date, perhaps because there had been no water shortages yet and perhaps because settlers from the same electorates tended to be located on the same watercourses. Figure 10 shows the field channels within one distributary channel and the distribution of settlers by electorates. One can see that settlers along FC 67 were mostly from Tangalle while settlers along the others were mostly from Tissamaharama. In the locale where our IIMI colleagues worked, settlers were from scattered electorates with less domination by one group.

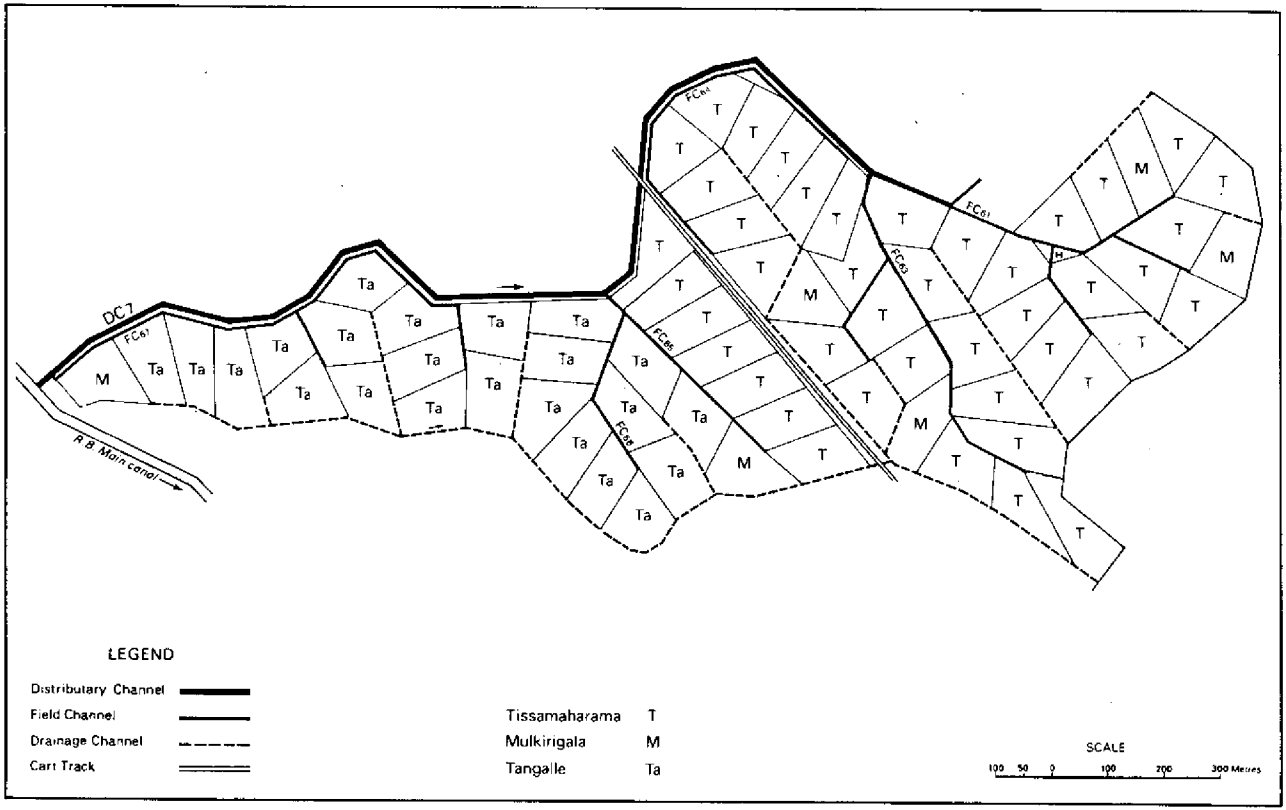

Figure 10. DC 7 showing electorate of origin of settlers along field channels.

A final problem with implementing the turnout system was that a number of irrigated allotments were later found to be too high or too rocky to irrigate. As a result, the allottees were granted land elsewhere by the Project Manager, Settlement. The change in allotment numbers due to cancellations had various effects. First, it disrupted any attempts at planned correspondence between hamlet and turnout group membership. Second, the change left uncultivated lots in some turnout areas and disrupted the composition of turnout group membership. Finally, some cancelled allotments were encroached upon by outsiders who had no legal right to the land or water. In our sample, 7 (17%) of the settlers had taken land in other areas because of difficulties with access to irrigation water.

AGRO-DISTANCE AND IRRIGATION MANAGEMENT

Efforts were made to minimize the distance settlers had to travel between their homesteads and irrigated lands. Settlers, however, maintained that they had difficulties getting to their fields because of the distance. Twenty seven of the sample settlers (62.6%) claimed they had to travel more than the stipulated 0.8 km and 5 said they had to walk more than 3 km. Settlers pointed out that lack of access roads for transporting supplies to and from the irrigated allotments was an even greater problem than the distance. Although blocking-out plans included access roads along field and distributary channels, they were often eroded by the excessive water flowing in the canals during water issues. Encroachment also led to erosion of access roads.

At the time of our study, agro-distance was not a serious irrigation management constraint, though some settlers did complain about it. They had not begun practicing rigorous water rotations or night irrigation but future attempts to impose them may be difficult. We also anticipate that settlers whose allotments are nearer the tail end of the distributary channels may move to highland areas that provide easier access to their fields. Already some farmers indicated that they wanted to move to the area around the Wirawila Tank but were told by the project authorities that they should not do so because they would disrupt the clustered settlement pattern.

We expected the early settlers from Tissamaharama to have fields at the head end because they would have selected the choice irrigated locations. In other words, we expected to find an association between village of origin and agro-distance. In fact the two were not closely related. Perhaps because so many settlers were from the Tissamaharama electorate, there was little chance of all of them getting head-end allotments.

ADVANCED ALIENATION AND SETTLER PARTICIPATION IN IRRIGATION DEVELOPMENT

Very few settlers in Hamlet 7 had the opportunity to participate in decisions about their new community or were employed to work in the early stages of the project, despite the policy of advanced alienation. We attribute their lack of participation to the fact that small- and medium-contractors were hired for construction work. The contractors were eager to use their own staff and the project managers had no authority to tell them whom to hire. One sample settler was a contractor and he had been hired by the Irrigation Department for KOISP. Other settlers from Hamlet 7, however, had not been hired.

Although we know little about labor relations during the initial settlement period we do know that settlers were frustrated by the lack of potential employment around the hamlet during the period of field study and that settlers were viewed as unreliable laborers. They were eager to earn income during noncultivation periods and wanted construction contracts where possible. Three settlers in our sample had masonry experience and others had experience in service and manual labor but they still had difficulties getting work.

Despite the fact that advanced alienation was intended to reduce encroachment, it was already taking place quickly in and around Hamlet 7. The selection of settlers from electorates outside Tissamaharama contributed greatly to the encroachment problem. Local people from Tissamaharama began encroaching because they felt they had a greater right to the land but were not granted it because of their political affinities, although they were landless and from the local area. Some were hostile towards the settlers from other electorates and even encroached on homestead allotments by breaking into the houses constructed by legitimate settlers.

The policy of advanced alienation did not have the anticipated outcome of bringing about settler participation or solving the encroachment problem. Settlers were not involved in building the system and earned little income from it during noncultivation periods. If the settlers had been involved at the start, they would have felt a greater sense of shared responsibility for system maintenance. At the time of our study, they were highly critical of the way the structures were constructed and attributed the problems to sloppy contractors who did not care about the quality of the work.

Involving settlers at the outset in a new scheme is a difficult undertaking but if it is not done, the adverse effects may be long-lasting. It was clear that no deliberate efforts were made to involve the settlers in any systematic way in KOISP. Yet, a planned policy which is monitored carefully could have a long-term positive impact.

SELECTION OF SETTLERS AND COOPERATION IN IRRIGATION MANAGEMENT

Although sample settlers generally were poor and did not have irrigated land, we knew numerous cases where settlers did not satisfy the criteria for selection. Some lacked irrigated agricultural experience. Some had houses and businesses elsewhere and some were unmarried. The reasons why they were selected are complex and involve the wider political framework in which the project is situated – a subject that lies outside the scope of this paper.

First, we believe that unplanned influence in the selection process had an important impact on the pace of settlement in Hamlet 7 and subsequently, on the development of farmer organizations. Although further research is needed, we suspect that settlers who owned land and businesses elsewhere were among the latecomers. While they participated in developing irrigated land, they participated less in the routine irrigation management activities required of the water users.

Second, some of the guidelines for selection appeared inappropriate. For example, preference was to be given to applicants with Practical Agricultural Certificates. Yet, staff felt those who were educated would be less likely to stay in the project. Our findings supported the idea that educated settlers are less likely to reside and graduates are the least likely to do so. Based on our interviews, we anticipate that 8 (19%) sample allottees will leave in the near future.

Additionally, the selection criteria favored small-scale irrigated rice farmers who are not likely to engage in diversified cropping or contribute to commercial farming. While the project objectives and goals have changed, the selection process remained inflexible.

Finally, open selectees were granted land by their Members of Parliament, not directly by the KOISP project management. The Project Manager, Settlement, was given a list of names and addresses but no information about the settlers' backgrounds and characteristics. He felt he could take no responsibility for the types of settlers and indeed, knew very little about them. We suspect that the lack of knowledge about the project beneficiaries made it difficult to target development activities.

SETTLER-AGENCY COMMUNICATION TO SOLVE IRRIGATION PROBLEMS

As a general rule, the first years of settlement require a good deal of settler contact with the various project officers and contact among the field officers themselves. There seemed to be limited coordination and communication, however, at the settler-agency interface. Settlers indicated that the field instructor was the officer they contacted most often when they had problems. His transfer to another hamlet during the period of our study (and the absence of a replacement) left a large gap in the communication system between settlers and agency staff.

One example of the weak communication system involved the dates of water issues for maha 1988/1989. Settlers were told they would receive irrigation water on 20 September and were prepared to begin the cultivation season at that time. But, on the 20th, the Irrigation Department was still in the midst of construction work and could not issue water. On the 20th, settlers tried to find out what the new schedule would be but no one knew and there was no contact person. The settlers could not plan on a fixed date to begin their work.

The scenario portrays a key issue settlers face in Hamlet 7 – the transition from a period of construction to one of operation and maintenance. While attempts have been made to coordinate activities at the construction phase and provide settlers with services, the transfer of responsibility has not been smooth.

SUMMARY

This chapter has examined the linkages between a set of settlement activities and settlers' ability to manage their part of the irrigation system over time. An attempt was made by the IMD to begin fostering cooperation in managing a common resource. We have shown that the early stages of settlement are generally a difficult time in which settlers must adjust to a new social and physical environment. In Hamlet 7, although some of the constraints were expected to diminish over time, our findings point out some areas for further attention.

Despite efforts to involve settlers in the development and management of part of the irrigation system, settlers faced difficulties in making the transition from a period of construction to one of operations. Settlers were dependent on the implementing agencies, particularly the Land Commissioner's Department, for many of their needs. We felt that the dependency on agency staff, lack of participation during the construction phase, and ambiguities in the transition phase could have long-term effects on the success of farmer organizations.

We summarize our specific findings as follows:

* The hamlet was characterized by part-time settlement which seemed to retard the community development proces and affect initial cooperation among water users; part-time settlement was caused by a variety of factors, including the choice of settlers and the lack of services. While we were unable to interview those who had not taken up residence in the project, we suspect that they do not satisfy the criteria for selection and may have businesses and property elsewhere.
* Although efforts were being made to develop farmer organizations, they were not yet adequately tailored to fit the needs of new settlement in a new irrigation system. In particular, ambiguities about the roles played by the IMD and the Land Commissioner's Department in developing farmer organizations led to confusion; the initial dependency on the Land Commissioner's Department resulted in difficulties in setting up irrigation organizations by the IMD.

  Because the project was new, settlers had many problems requiring attention, such as clearing land, building houses, and getting access to new credit. Yet, there was no medium for dealing with these kinds of community development problems. The nascent farmer organizations thus became the only forum for dealing with these wide ranging problems.
* The turnout system was not yet functioning due to the early stage of the project; some defects in layout were noted which led to lack of correspondence between residential and irrigation units which could have been solved by closer cooperation between the Irrigation Department responsible for layout, and the Land Commissioner's Department responsible for land allocation. Defects in the initial surveying were also seen to be a continual problem for settlers. Settlers continued to seek help individually from the Project Manager, Settlement, and his assistants, particularly to switch their land when it was found to be saline, rocky, or too high to irrigate. These changes all contributed to deviations in the planned turnout system which will most likely only be compounded over time.
* Settlers faced difficulties with access to fields because of the lack of farm roads. Distance did not appear to be as significant a problem.
* During the construction phase, the implementing agencies paid little attention to involving settlers in developing the system; settlers then became critical of the agencies for poor quality of construction work. Settlers were eager to have a source of income during the initial settlement period but opportunities were limited. As a result, many continued to spend part of their time elsewhere trying to earn some income, and thus became part-time settlers.
* Communication between field-level staff and settlers was weak during the transition period from the construction phase to an operations phase. In particular, a gap in communication was left when the field instructor was transferred out of the hamlet. The other field officers were hardly ever in the hamlet and settlers rarely sought their help.

CHAPTER VI

RECOMMENDATIONS

THIS REPORT HAS documented the process of implementing a set of settlement activities designed, in principle, to improve the capacity of settlers to take part in irrigation management. The subject is particularly important because settlement schemes are so often characterized by highly inefficient irrigation systems with inequitable water distribution and water wastage. New irrigated settlement schemes face unique management problems but also are potentially highly innovative because they involve new land development, new settlers selected according to certain criteria, and a high degree of horizontal coordination among project implementation staff.

We have drawn upon the example of the Kirindi Oya Irrigation and Settlement Project (KOISP) to test some hypotheses about new irrigated settlement schemes. KOISP is an excellent example of Sri Lanka's newest major irrigation schemes. Because it follows a long history of irrigated settlement schemes in Sri Lanka, it provides some insights into the successes and difficulties of developing irrigation management potential.

The development of KOISP included efforts to coordinate settlement and irrigation activities in the construction phase and to develop farmer organizations early in project development in order to establish appropriate conditions for more effective irrigation management. At the time of our study, settlers were not yet required to share water, did not have serious irrigation system maintenance problems, and were not confronted with the variety of water distribution problems that will most likely arise after Phase II is constructed or when there is a water-short season. A stage has been set which will affect the future course of the project and will condition the development of effective farmer participation in irrigation management activities.

Broadly, we feel that – as in many new projects – time and budget constraints have led to a product-oriented approach to developing KOISP. The result is that less attention has gone into the process. In principle, many of the conditions presumed important were recognized by the planners and some have been met (farmer organizations, turnout groups, and clustered homestead allotments). Yet, it is clear that it is not

the presence or absence of a set of conditions that determines the ability of settlers to share water and coordinate activities at the field level. Rather, it is the *process* by which those conditions are met.

Our observations in the field have led us to agree with the conditions that were identified as important for improving the performance of new schemes. But we propose taking the concept a step further – to the rather thorny problem of "how" (the process) rather than merely "what" settlement conditions (the product). In this last section, we make some recommendations to improve settlers' long-term irrigation management practices at the tertiary level. Some of our recommendations could be applied to Phase I of KOISP while others are limited to new settlement areas such as Phase II. In either case, we hope that they contribute to a more process-oriented approach. We do not provide all the answers; indeed doing so could be counter-productive. Rather, we provide general ideas for further thought and action by the agencies concerned and for those working elsewhere.

1. Nonresidence

We have shown that Hamlet 7 has a clustered settlement pattern, typical of the project in general; but we have also shown that, at the time of our field study, the hamlet was characterized by rather fluid residence patterns. Settler families pursued a strategy of temporary residence while keeping ties to their places of origin. Often the operator of the holding was not the legal allottee and furthermore, the operator changed from one season to the next.

The problem vis-à-vis irrigation management is – what means are there to foster participation and cooperation among cultivators, given the situation of part-time residence and cultivation? One action recently undertaken by the Irrigation Management Division (IMD) was the revision of the criteria for membership in farmer organizations to include the actual operators of holdings (lessees and encroachers), although this has not been implemented yet in KOISP. Given the fact that the project is new and it is important to encourage the settlers to settle, we anticipate that the revised plans would not yet work well in this context.

During our field study, part-time residence was more common than completely absent leasing of land. An important question is how to encourage these settlers to participate in the initiation of irrigation management activities. As a first step, the institutional organizers could meet with part-time settlers when they do come and work with them to develop a means of involving them more. This would have the dual advantage of increasing the profitability of irrigated agriculture and employment creation.

2. *Correspondence between Turnout and Residential Group*

We described some organizational problems associated with the poor correspondence between the residential and irrigation turnout group. Although we did not observe any serious conflicts during our field study, we recommend that efforts be made in Phase II to ensure a one-to-one correspondence to facilitate communication flows between settlers and field-level staff. The lack of correspondence in Hamlet 7 may have been partially due to inflexibility on the part of planners who understood that clustered settlements should be of a given size, regardless of the composition.

While it will probably be difficult to move those settlers who are now residing in Hamlet 6, it would be worthwhile discussing potential problems associated with the distance and seeking their advice on how to solve them. The deviation from planned correspondence clearly was not limited to Hamlet 7.

Within Hamlet 7 itself, lack of correspondence between residential allotment and irrigated allotment was also a potential problem. Settlers on single turnout sometimes lived on opposite sides of the hamlet. In Phase II steps could be taken to allocate irrigated land to turnout groups first and then settle the turnout group members in hamlet neighborhoods. The field instructor and the institutional organizer could coordinate activities to ensure a closer correspondence.

3. *Agency Responsibility for Farmer Organizations*

Relative to previous irrigated settlement schemes, greater efforts on the part of KOISP project management were made to develop farmer organizations so that settlers could participate in the development and management of the system. The division of responsibility within the agencies themselves, however, was unclear so that both the IMD and the Land Commissioner's Department felt they had the central role in developing farmer organizations.

Furthermore, there was no clear strategy for making the transition out of the construction phase. The efforts made to transfer responsibilities to the IMD in December 1988 appeared to be ad hoc. We recommend that, in Phase II of the project, efforts should be made to ensure that the roles of the agencies in fostering farmer organizations are clearly established as soon as possible. We also recommend that a transition strategy be planned, including a set of guidelines and terms of reference for the agencies responsible. Furthermore, field-level officers need to understand how the transition will be made, not only the project-level staff.

A workshop could be held on the problem of transition from construction to operations as a means of defining problems and identifying strategic solutions. Such a workshop could bring together officers from the different departments to discuss

means of achieving coordination and communication and help set clear targets. A workshop would not necessarily need to be project-specific but rather, could be a forum for more general discussions about the topic also relevant to officers working in schemes under rehabilitation.

4. *Targeting Farmer Organization Activities*

Largely because the IMD Project Manager had to do much of the initial work himself, the implementation of farmer organizations was – out of necessity – rather "top-down." The initial activities were directed to the distributary channel leaders on a hamlet basis, rather than to the settlers themselves. Institutional organizers were appointed to inform settlers about the benefits of those organizations *after* the distributary channel organizations had been formed.

We recommend that the institutional organizers begin their work with the settlers at the outset (i.e., the construction phase), rather than as a last step. Furthermore, in our experience, the institutional organizers lacked adequate knowledge about the local conditions and the irrigation needs of new settlers. Although they had received training at the Agrarian Research and Training Institute, they were not well-informed about irrigation management or the particular needs of a new settlement scheme. In Hamlet 7, the institutional organizer was left with little work and no clear terms of reference, particularly since the IMD Project Manager had already done the basic work and attended all the meetings himself.

A workshop on problems associated with the transition (mentioned above) could, at the same time, focus on the success of implementing farmer organizations for irrigation during this period. Particularly since construction work limits the activities such organizations can undertake, an assessment of the experiences would be useful.

We also recommend that the institutional organizers be provided with some of the amenities that other field-level staff have. In particular, housing is an important asset particularly since the hamlet is in such an early stage of development and settler families do not have the means or the space to house a guest. We recognize the budgetary constraints on the project and the difficulties of placing field staff. One alternative to putting an institutional organizer in each hamlet is to develop the skills of the field instructors, as has been recommended by Merrey and Somaratne (1989). This suggestion is, however, not without drawbacks since a major reorientation in job responsibilities would be required. Without a reorientation in the upper-level management structure, it is unlikely that the field instructors would be supportive of the institutional organizer concept.

5. *Functions of Farmer Organizations*

During the initial construction phase, new settlers were trying to solve a wide range of problems, from housing to domestic water and irrigated agriculture. There was a great deal of confusion about the functions of farmer organizations. Intended for water management purposes, they became forums for dealing with many other issues. Yet, the project authorities focused on irrigation organizations as the primary need.

In our view, settlers need two separate organizations – one for community development and one for irrigation management. Irrigation was only one of many issues confronting them and in fact, because of construction work, many of the irrigation problems faced by settlers could not be solved at the time of our study. We have a great deal of evidence to show that settlers were disillusioned because the organizations were not able to solve problems. Rather than try to attend to problems that may be very difficult to solve in the construction phase, they should focus on activities where they can be effective, such as small labor contracts.

A community development organization needs to be separate from an irrigation organization. We do *not* recommend that the old kattinayake system be used since it seemed too politicized to be effective and was oriented towards small groups of settlers, not the hamlet as a whole. A community development society could be promoted by the field instructor and could – from the outset – take on activities such as distribution of food aid, medicines, and shramadana campaigns. An assessment of experience in community development societies elsewhere in Sri Lanka would be instructive (particularly in the Mahaweli areas).

6. *Employment of Settlers*

We believe that unemployment during the initial stages of the project contributed to the settlers' critical attitude towards the agencies. Settlers complained about the lack of work and did not feel they had any opportunity to participate in the early stages of system development since all work was given to outside contractors or to local officials like the technical assistants who then got their contractors.

The implementing agencies need to encourage settlers to participate in the initiation of the project. Their current employment policies should be reviewed and amended as needed to make them an effective means of employing settlers and allowing them to participate in irrigation system development. A set of guidelines and specific policies is needed to ensure a *process* by which settlers are told about, and given, employment opportunities. Training sessions or workshops could help implementing agency staff to learn about farmer participation, and job performance could then be monitored.

7. *Selection of Settlers*

The settler selection process has been completed in Phase I but was clearly one of the most important elements in the development of Hamlet 7. The selection process will also be important in Phase II. We believe that project staff did not have sufficient information about the backgrounds and experience of open selectees because the selection process was electorate-wise. Furthermore, little was known about the differences between alternative and open selectees vis-à-vis their agricultural knowledge and practices. Greater knowledge about the settlers' skills and experience would assist project management in achieving their goals, in targeting their extension and training activities, in employing settlers to carry out maintenance work, and in developing effective farmer organizations.

We recommend that a short survey be undertaken to compare the open and alternative settlers' agricultural practices. Such a survey would assist in formulating alternative plans for Phase II. We suspect that alternative settlers are more promising agriculturalists for diversified crops but were unable to examine this, given the time frame of our study. A survey could be undertaken as part of the monitoring activities of the Land Commissioner's Department or as part of an external evaluation.

Project managers need to re-evaluate whether the selection criteria set forth are the best for Phase II. Our research has shown that in many cases, the criteria may not have been the best while in others, the criteria were not even met. The settlers who were selected for Hamlet 7 were rice farmers whose main interest was in rice cultivation (often using wage laborers) combined with a small business, not commercial farming or diversified cropping. There was also a certain amount of resentment towards those who came from neighboring electorates, which could have been avoided if more local settlers had been settled.

An important factor in settler selection criteria is flexibility. Flexibility is needed to ensure that the selection criteria are revised as problems are identified and objectives shift.

8. *Communication between Agency Staff and Settlers*

The dual project management structure (involving irrigation and settlement) is unique among new major settlement schemes and was designed to solve some of the problems associated with the frequent technical bias in new scheme construction. We understand that communication between irrigation and settlement staff was good. At the field level, however, there was less communication and coordination between the settlers and agency staff. Settlers sought the field instructor's help to sort out all their problems. When he was withdrawn from Hamlet 7 during the period of our study, his absence left

a large gap in communication with the agencies.

We suggest the position of the field instructor be restructured to provide more of an integrated link between settlers and the agencies. At the time of our study, he was merely a provider of benefits handed out by the Land Commissioner's Department and was considered dispensable once the benefits ended. We believe the position of field instructor could be phased out later once the local organizations for dealing with agency staff become more effective. The field instructor could assist in promoting community development activities, in providing some irrigation and agricultural guidance, and in channeling problems between settlers and others such as the technical assistant or the agricultural extension officer (KVS). The role we recommend is that of an animator – someone who assists the settlers rather than one who provides for them and discourages self-sufficient farmer groups.

Care would need to be taken to ensure that settlers do not develop too much dependency on the field instructor. One means of ensuring that settlers move towards greater self-sufficiency is giving the field instructors job training in how to assist in the implementation of community development societies (and possibly the irrigation organizations). The training would help them to understand the trajectory of their jobs and reduce their fears of putting themselves out of work by encouraging self-sufficiency.

We also suggest that field instructors be selected who are experienced in agriculture and rural development. They should have experience and training that is equivalent to other field staff. Some of the other field staff in Hamlet 7 such as the institutional organizer were graduates but the field instructor in Hamlet 7 was not. Equivalent experience and training would facilitate cooperation and coordination among field staff.

9. *Participation of Field-Level Officers*

At the time of our field study, the field-level officers such as the technical assistant and the agricultural extension officer (KVS) were hardly present in or around Hamlet 7. Settlers presented their problems at project-level meetings, bypassing those field officers. The field officers were not present at distributary channel level meetings. We believe that particularly during the initial settlement period, constant feedback and correction are required. We therefore recommend that the field officers be encouraged to attend hamlet meetings (such as the distributary channel meetings) to enhance the feedback process. The field-level officers would not be merely passive observers at these meetings, but rather would be answerable to the settlers and assist in solving particular problems.

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APPENDIX A

APPLICATION REQUIREMENTS FOR ALTERNATIVE SETTLERS

1. Name
2. Address
3. AGA[a] Division GA[b] Division
4. Household #
5. Age
6. Birthday
7. Occupation
8. Marital status
9. Education
10. Agricultural Experience
11. Annual Income
12. Dependents
13. Landownership – land owned by family members
    - own land
    - government land
    - ande
    - encroached
    - other
14. Residence for last 5 years
15. Experience with Agriculture
    - paddy
    - cotton
    - sugarcane

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[a]Assistant Government Agent.
[b]Government Agent.

other
chena

16. Membership in Organizations; membership by wife
17. Other qualifications
    carpentry
    machinery
    small works
18. Credit status
19. Punished for encroaching?
20. Applied for land Kachcheri for encroached land
21. Description of land which transferred to other family members.
22. Land given to the government (ex for construction)

Signature

APPENDIX B

POINT SYSTEM FOR THE SELECTION OF SETTLERS (100 POINTS MAXIMUM)

(1) Age (10 points maximum)

18 – 24	08
25 – 35	10
36 – 40	05
41 – 49	03
50 and above	00

(2) Civil Status (5 points maximum)

Married	05
Single	05
Divorced/Separated/Widowed	02

(3) Occupation (5 points maximum)

Cultivation	05
Self-employed (including trade)	03
Employed by government, corporation, local government, cooperative, etc.	00

(4) Education (10 points maximum)

General Certificate of Education (Advanced Level)	05
G.C.E. (Ordinary Level)	10

G.C.E. (Few subjects passed)	08
Grade 8 passed	06
Literate	03

(5) *Agricultural Education (10 points maximum)*

Practical Agricultural Certificate	10
G.C.E (Ordinary Level with Agriculture)	08
Young Farmers' Training	05

(6) *Annual Income (10 points maximum)*

Below Rs 3,600	05
Rs 3,600 – 6,000	10
Rs 6,000 – 9,000	08
Over Rs 9,000	00

(7) *Dependents (10 points maximum)*

Over 14 years:	
1	08
2	10
3	05
4 or more	01
Under 14 years:	
1	02
2	05
3	03
4 or more	1/2 each

(8) *Land ownership (10 points maximum)*

	Paddy	*Upland*
Landless	06	04
1/2 acre and below	05	03

1/2 acre – 1 acre	04	02
1 – 2 acres	02	01
Over 2 acres	00	00

(9) Practical Experience in Agriculture (5 points maximum)

Paddy cultivation over 5 years	1 point each year
Cotton/sugarcane cultivation over 5 years	1 point each year
Subsidiary crops cultivation over 5 years	1 point each year
Chena cultivation over 5 years	1/2 point each year (3 points maximum)

(10) Community Participation (5 points maximum)

Membership in village organizations	1 point each
Office bearer in village organizations	2 points each

(11) Spouse's Community Participation (5 points maximum)

Membership in village organizations	1 point each
Office bearer in village organizations	2 points each

(12) Additional Training (5 points maximum)

Traditional medical practitioners, masons, carpenters, mechanics, etc	1 point each trade

(13) Physical Fitness (5 points maximum)

(14) Period of Residence in the Area (5 points maximum)

Over 5 years	05
3-5 years	03
below 3 years	00

Source: ADB,1982