

STRATEGIES FOR IMPROVING MINOR IRRIGATION SYSTEMS IN SRI LANKA

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STRATEGIES FOR IMPROVING MINOR IRRIGATION SYSTEMS IN SRI LANKA*

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BACKGROUND

The great extent of minor irrigation in Sri Lanka (roughly 40% of the total irrigated area) and the ongoing efforts to upgrade the performance of this sector through major assistance programs, point to the need for a thorough understanding of the dynamics of minor irrigation, and the identification of strategies by which assistance to this sector has been, or can be most effective. In spite of massive investments in programs such as The Village Irrigation Rehabilitation Program (VIRP), the Anuradhapura Dry Zone Agricultural Project (ADZAP), various district-level Integrated Rural Development Projects (IRDP), and the Freedom from Hunger Campaign (FFHC), very little information is available about the results and impact of these programs, and little experimentation is taking place to improve the process of assisting the minor irrigation sector.

In an effort to produce the kinds of information useful to the agencies that are implementing Minor Irrigation Systems (MIS) assistance programs (notably the Department of Agrarian Services and the Irrigation Department), and to the formulation of policies for better supporting the routine needs of the MIS sector, ARTI and IIMI have embarked upon a set of collaborative research activities over the next three years. The workshop on Strategies for Improving Minor Irrigation Systems was jointly sponsored by ARTI and IIMI, as the first step in this process. The workshop had three broad objectives: (1) to review past lessons and experience in MIS assistance programs; (2) to identify gaps in knowledge and research priorities; and (3) to create an informal working group of professionals working on MIS assistance, including representatives of implementing agencies, research institutes, and universities.

The workshop was divided into four sessions. In the first session, a background paper was presented by Jayantha Perera of ARTI, reviewing the main approaches currently being taken to assist the minor irrigation sector. In the second and third sessions, the various stages of assistance were considered: Selection, Planning, Design, Construction, and Water Management.

* The workshop was planned and organized by Joe Alwis, David Groenfeldt, Ed Martin, and Jayantha Perera. Grateful acknowledgement is made to Dr. Perera for preparing the background paper, "Research on Village Irrigation Systems in Sri Lanka: A Review," which is reproduced in these proceedings. The authors also wish to thank all the participants, whose names are given in Annex 3, and in particular K. Yoganathan, co-author of Annex 1, and Jaliya Medagama, author of Annex 2.

The approaches taken by the Agrarian Services Department (DAS) and the Irrigation Department (ID) were featured, with other approaches considered in relation to these. In the fourth session, a list of research issues was compiled, based on the knowledge gaps identified in the first three sessions.

INTRODUCTION AND OVERVIEW

The workshop opened with words of greeting from Roberto Lenton, Director-General of IIMI, who called attention to the importance of the minor irrigation sector, calling it a "national resource" developed by farmers over the centuries, with varying degrees of government assistance. Dr. Lenton also remarked on the broad **range** of participants, including the ID, DAS, FFHC, Plan Implementation, and several universities, in addition to ARTI and IIMI. In his opening remarks, Joe Alwis, Director of ARTI, observed that in spite of a great deal of work that has gone into implementing assistance to the MIS sector, there has yet been very little understanding in the way of real research that can be incorporated into ongoing assistance efforts.

In his presentation of his background paper, "Village Irrigation Systems in Sri Lanka: A Review" (reproduced below) Jayantha Perera provided a historical perspective on government assistance to the MIS sector, beginning with the British colonial period. He pointed out the use of "village" irrigation rather than "minor" irrigation. The former term reminds us that minor irrigation is village-based, which **has** important implications for the management of this type of irrigation. He then gave an overview of three main approaches currently being implemented in Sri Lanka: (1) VIRP (and IRDP which often has similar criteria), (2) ADZAP, which includes both irrigated and unirrigated lands as a package, and (3) FFHC, which emphasizes **community** participation and self-help. Appeals for reviving "traditional" customs such as **bethma** are on dangerous ground, he noted, as they may not have existed in the past, or they may have existed in significantly different form than we imagine. For example, in a study of 20 tanks, Seliha Begum documented **bethma** practices in only two of them, because the tank supplies were often too limited to support any Yala cultivation, and this itself **was** related to recent expansion of command area, thereby increasing the demand for water.

The current approaches, to assisting village irrigation make two important, and often wrong assumptions: (1) that water is treated as communal property in villages and (2) that villages are homogeneous, and more specifically, well-integrated systems. The growing politicization of villages since Independence has resulted in increasingly differentiated access to new benefits at the community level. Thus, assistance programs run the risk of being captured, in large part, by those who need help the least. In **summing up**, Jayantha Perera cited three main themes of research over the past decade: (1) the process of state intervention, (2) institutional structures at the village level, and (3) policy. The full text of his paper is given in the following section.

RESEARCH ON VILLAGE IRRIGATION SYSTEMS IN SRI LANKA: A REVIEW*

The title of this paper should be "Research on Minor Irrigation Systems in Sri Lanka: A Review" because it is the official phrase that is used to describe village irrigation systems in Sri Lanka. Another phrase that is frequently used is "small-scale irrigation systems". In this paper, I have used the term, "village irrigation systems" because it implies not only the size of the irrigation system but also a more important aspect of it, that is, the communal or societal side. By the term "Village Irrigation", I mean both village tanks (reservoirs) and anicuts (weirs).

A village irrigation system is typically characterized by its communal system of irrigation management. A useful definition of "village irrigation" was given in the Irrigation Ordinance of 1946. According to the Ordinance, a village (minor) irrigation system has two main characteristics: (1) it was constructed by the proprietors without government aid, and (2) it is maintained by the proprietors. The Agrarian Services Act of 1979 presented a definition which is broader and more precise than the 1946 one: A minor (village) irrigation system commands an irrigable land area which is less than 80 hectares (20 acres); the Irrigation Department is responsible for its refurbishment, while its operation and maintenance are done by Department of Agrarian Services with the help of the system beneficiaries, i.e., the village community. The changes in the definition of "village irrigation system" clearly indicate the increased State of intervention in such systems during last several decades.

Until the late 1970s, very little research had been done in the sphere of village irrigation in Sri Lanka¹. The well-known Pul Eliya: A Village in Ceylon (1961) by E.R. Leach is perhaps the only study carried out in the 1950s which demonstrated the importance of the village tank and its water in the Dry Zone village economy and society². Leach carefully explained various kinds of social organizational responses that had arisen to ensure both continuous production and an equitable distribution of water.

From the 1970s, both Government and NGO investments in village irrigation systems have increased rapidly. For example, annual investment in village irrigation systems increased from Rs. 16.4 million in 1950-54 to Rs. 197 million in 1975-79 and to Rs. 285 million in 1980-82. Even when the relative buying power of the rupee is taken into account, these figures indicate a more than four-fold increase in real investment on minor irrigation between 1950-54 and 1980-82. This interest in the improvement of village irrigation systems sprang from several factors:

- >> Village irrigation systems account for about 54% of the 450,000 hectares under irrigation, cover 35% of the paddy extent and contribute 22% of total paddy production (Gunadasa et. al. 1980).

* Text of the background paper written by Jayantha Perera, Research Associate, Agrarian Research and Training Institute, Colombo.

- >> It is estimated that about 50,000 ha. of new lands can be irrigated by refurbishing existing village irrigation systems. This means that 50,000 to 75,000 farmer households **can** be provided with adequate irrigation facilities without resettling them. Such a programme is cost-effective, as the average cost of village **tank** rehabilitation is estimated at Rs. 10,000/- per hectare which is only about **20%** of the cost of developing a hectare under a major irrigation settlement scheme, e.g., the Mahaweli Development Project (Economic Review, 1986).
- >> Low yields and minute holdings characterize irrigated lands under village irrigation systems. Therefore from a welfare perspective there is an urgent need to rehabilitate these irrigated systems and introduce land reforms, so that the majority of rural house-holds can be provided with opportunities to earn more from their **paddy** holdings.
- >> Room for the expansion of new **paddy** lands is now faced with natural limits and as a result, the Government has to evolve a strategy which is based on the intensification of agricultural production on existing cultivated land. Improved village irrigation works would facilitate this strategy.
- >> The symbiotic relationship between chena and **paddy** cultivation **has** recently been disturbed as the land available for chena cultivation **has** become limited as a result of increased demand and the Government's prohibition on chena cultivation. This imbalance could be corrected by assuring irrigation water for two cultivation seasons a year through improved irrigation facilities at the village level.

Major Approaches to Village Irrigation Development

The increased interest and investment in village irrigation systems are evident in various Government and NGO programs for village irrigation system rehabilitation. The main Government programs are the Village Irrigation Rehabilitation Project (VIRP), the Integrated **Rural** Development Projects (IRDP), the Anuradhapura Dry Zone Agricultural Project (ADZAP), and the Village Community Rehabilitation Program of the National Freedom From Hunger **Campaign** Board (FFHC). There are also a few **NGO** programs for the rehabilitation of village irrigation systems in the Dry Zone, e.g., Village **Tank** Restoration by the National Heritage Movement and the Kalegama Project of the Marga Institute. Of these, the VIRP, ADZAP and FFHC comprise the dominant strategies of village irrigation rehabilitation and other programs more or less emulate the approaches of these three strategies in planning and implementing their activities. A brief overview of the main strategies at this stage is appropriate as that would help us in identifying the **main** research issues.

Village Irrigation Rehabilitation Project (VIRP). The Government of Sri Lanka with assistance from the World Bank seeks to refurbish **some** 1,200 village reservoirs and anicuts in 14 districts of the island. Rehabilitation of these village irrigation systems, it is believed, would offer several advantages: (1) short-gestation periods compared to rehabilitation of **major** irrigation systems, (2) more equitable distribution of Government funds **among**

the rural poor, and (3) the possibility of creating conditions for efficient use and control of water and by increasing irrigated land acreage and their cropping intensity (Abeyratne 1986, 127).

The VIRP has several objectives, including (1) rehabilitating village irrigation works which had deteriorated due to lack of maintenance; (2) to increasing agricultural production and farm household incomes; and (3) introducing a systematic irrigation management program once rehabilitation is completed. It is expected that the rehabilitation work will minimize uncertainty related to irrigation water in about 75,000 acres of land, benefiting 20,000-25,000 farm households. The irrigation Department is responsible for the physical rehabilitation of the project which includes improvement of tank bunds and spillways, replacement of sluices, improvement of main channels; alignment of both main channels and field channels, and the provision of suitable drainage systems, control structures, turnouts and measuring devices. Village irrigation systems once rehabilitated are handed over to the Department of Agrarian Services (DAS). The latter is expected to plan and carry out a suitable water management program for each rehabilitated irrigation system in order to ensure optimum use of the available water. The project envisages that the DAS **would** develop each water management program in consultation with farmer beneficiaries. Finally the O&M functions of the system **become** the responsibility of the farmers with the support of the DAS.

The Anuradhapura Dry Zone Agriculture Project (ADZAP). The ADZAP is financed by the Asian Development Bank, International Fund for Agricultural Development and the Government of Sri Lanka. The Project started in 1981 and aims at providing an efficient farming system to increase agricultural production and enhance the living conditions of farm households. Another major objective is to establish a base for the stabilization of chena cultivation in the Dry Zone. The project includes several components, including rehabilitation of minor irrigation tanks, agricultural infrastructure, livestock development, rural roads, agricultural support facilities and project management.

The nucleus of the project is the rehabilitation of minor irrigation tank, including both upstream and downstream development. The upstream development is comprised of restoration of bund, sluices and spill. The downstream development includes the development of the command areas of the **tanks** restored under the Project. It is envisaged that the restoration of minor irrigation systems will provide a base for stabilizing the chena cultivation and increasing paddy production. This is to be ensured through the optimum utilization of tank water together with rain water.

An improved irrigation management program of proper scheduling and efficient water distribution is to be introduced, as well as a new cropping system suitable for existing social conditions, and climate. The improved water management could be ensured by adopting cropping system which suits existing social conditions, climate, crop calendar, proper scheduling of irrigation and efficient water distribution. The development of the command area including jungle clearing, uprooting of trees, land levelling, construction of main supply channels and field channels **is carried out** by the

project. The O&M functions are the responsibility of the project beneficiaries. One important characteristic of this project is the clear policy of involving farmers at the time of selecting a tank for rehabilitation. A Tank Committee, in which all beneficiaries are members, together with project officials, take all decisions relating to the development of the command area.

The FFHC Small Reservoir Village Community Rehabilitation Project. This project aims at restoring village reservoirs with the help of villagers to assure supply of irrigation water for paddy cultivation and other crops. The FFHC project expects to enhance the **socio-economic status** and the quality of life of the beneficiaries by providing them with **employment** in restoration works and by assisting them to get better incomes from agriculture and animal husbandry. The project also expects to bring about a balance between the ecology and human habitat in the Dry Zone by motivating villagers to abandon chena cultivation and by training farmers to use natural resources such as land, water and forests in a systematic manner. The project began in the latter part of the 1970s with the help of several international NGOs such as Community Aid Abroad Australia, Freedom From Hunger Campaign Australia, Swiss Inter-Cooperation and Deutsche Welthungerhilfe, ...

The FFHC's strategy is not to introduce pre-planned rehabilitation projects to villages, but to let the people of reservoir village communities take the initiative in both planning and implementing the rehabilitation program. The FFHC seeks to play the role of friend and partner, providing funds for what is beyond the means of the village communities. This clearly stresses the importance of farmers' (beneficiaries') participation in the whole exercise. The FFHC emphasizes that **farmer** participation in rehabilitation works, starting from the design stage, will contribute to the rehabilitation exercise whilst also persuading the local community that they are responsible for the future operations for, and upkeep of the irrigation systems. By the end of 1986, there were over 200 village rehabilitation projects scattered over the Dry Zone.

An important aspect of the Project is the decision to retain, or where necessary, to resuscitate traditional agricultural and water management practices. One such practice is **the three-field-system** of a paddy **yaya** (tract) which allows villagers to share irrigation water equitably when water in the tank **was** inadequate to irrigate the entire **yaya**. Planning of agricultural activities in each rehabilitated village is the responsibility of the Wew Sabhawa (Tank Council) **elected by** the villagers. The FFHC initially provided each Wew Sabhawa with **interest-free** loans to obtain agricultural inputs. In several villages, the project has attempted to consolidate and redistribute paddy holdings under the restored tanks with a view to resolving the major problems of **land** tenure: acute paddy land fragmentation and the proliferation of uneconomic-sized holdings which obstruct the efficient organization and management of paddy cultivation. However this attempt has failed except in a few places, as the big landlords declined to **hand** over their land for redistribution.

The above three programs of village irrigation rehabilitation show several common characteristics. Among them are (1) the recognition of the

need for external support in the development of village irrigation and (2) the emphasis on project beneficiaries' responsibilities for O&M activities and the role that they should play in the entire process of rehabilitation. Although **all** three programs emphasize the importance of beneficiaries' participation, the degree of such participation anticipated and allowed by each program varies significantly. It is possible to place the three rehabilitation programs in a continuum, of **FFHC-ADZAP-VIRP** in which FFHC ranks highest and the VIRP lowest. The VIRP and FFHC programs differ from the ADZAP as the former discourages chena cultivation while the latter seeks to stabilize it. Both the FFHC and ADZAP programs expect to introduce some kind of land reform which applies to both irrigated and non-irrigated land. The VIRP, on the other hand, is primarily an exercise which attempts to improve irrigation water supply for **paddy** cultivation without affecting the status quo of land tenure, except for introducing a bathma system in the dry season. Another difference is that both the FFHC and ADZAP concentrate exclusively on the Dry Zone village irrigation system while the VIRP takes both the Dry Zone and Wet Zone as its areas of operations and attends to both tanks and anicuts.

Research Themes for Village Irrigation Systems

Village irrigation rehabilitation programs have already produced several interesting monographs, papers and discussions. In the following pages, I will try to present some dominant themes that have emerged from these studies and to suggest some possible research issues or themes for the IIMI/ARTI future research agenda on village irrigation system.

Village irrigation development as a process of State activity.

Village irrigation systems are commonly known as "farmer-managed systems". Although these systems originated from villagers' collective effort and managed by them, it is possible to trace State intervention in village irrigation systems from at least, the **1850s**. British administrators believed that through the restoration of village irrigation works, the peasants could be organized to produce their **own** food and to look after their social welfare with little outside interference. This belief is embodied in the Paddy **Lands** Irrigation Ordinance of **1856**. The key principle of the Ordinance **was** that the State activity in irrigation and related arenas should be carried out in consultation with the peasants who were the beneficiaries of such systems. This policy **has** been amended from time to time, but these amendments in their totality have not changed its fundamental features.

During the latter part of the 19th century, government policy reflected a belief that villagers were entitled to receive State assistance, which was provided mainly through irrigation rehabilitation. This is also the basic policy of the VIRP and other current village irrigation development projects. Whenever the majority of villagers made a request through the Village Headman, the State did its best to repair the irrigation works. Sometimes even if villagers did not request, the State intervened to refurbish village irrigation systems. The present policies of village irrigation rehabilitation programs do not differ substantially from this policy.

Village irrigation system were selected mainly on the criteria of the number of cultivators and the size of command area of a given tank. These criteria are still used as the main criteria of selecting irrigation system for rehabilitation. The State expected that the beneficiaries would look after the rehabilitated irrigation system. At present, responsibility for O&M of village irrigation system continues to rest with the beneficiaries. However, there are several differences between village irrigation policies of the 19th century and the present-day irrigation policies. In the 19th century, the administrators thought that they could improve villagers' health by providing good food, and water if village irrigation systems were refurbished. This they thought would be the first step towards civilizing the "natives". At present, the main policy for village irrigation rehabilitation is, as discussed earlier, to increase food production and to improve incomes of the rural people.

The British irrigation policy had been that the beneficiaries should pay for irrigation works constructed for their welfare. At present, physical constructions are essentially done on the moral right of the peasants to subsist. British administrators carried out single-shot investments and withdrew from the irrigation system thereafter. This gave rise to the isolated inward-oriented village communities - "self-sustained village republics". In recent years, the increased number of public programs and the politicization of rural areas have linked remote village irrigation systems into the national arena.

Recent research (Abeyratne 1986, 1986a; Abeyratne and Perera 1984, 1986; Begum 1987; Perera 1985, 1986) has shown that the irrigation agencies have not fully understood the nature of State intervention into rural communities. This failure has caused many unanticipated problems for the implementors of various village irrigation development programs. In recently refurbished village irrigation systems, the majority of the villagers believe that, the Government owns the irrigation system and is responsible for ensuring system-operation and maintenance. In such an environment, it is difficult to expect farmers to act as if they were the owners of irrigation system and to look after these systems as a community. This difficulty is further aggravated by the gradual erosion of **many** of the characteristics of traditional village communities. Although policy makers believe that the village community is still a traditional and closed one, except for its manageable size and typically homogeneous character, it has changed radically.

A water management program premised on the expectations that farmers would act according to the traditional norms of community organization which emphasize communal property, and exclusiveness of the village, is destined to be unsuccessful as several rehabilitation programs have already shown in the recent past. Further research is necessary on the nature and type of State-community interaction in both diachronic and synchronic perspectives. Another important area for further probing is the changing property structure in village irrigation systems and its impact on institutional arrangements for water management.

Institutional Mechanisms for Irrigation Management. The role and functions of the Gamsabhawa (Village Council) and Vel Vidane (irrigation

Headman) in managing village irrigation systems have been well researched and documented by modern historians and anthropologists.

In the latter part of the 19th century, a new policy **was** initiated by which the Government Agent along with several villagers in a district decided whether ancient customs relating to irrigation and cultivation of **paddy** lands should be revived. Customs would then be defined by a Committee of Cultivators with the help of Government officials. The customs became rules only after they were accepted by at least, two-thirds of the general body of cultivators. Such rules were binding on all cultivators. A Vel Vidane was elected by the village community to supervise water distribution, maintenance of head works and channels according to the rules and to report wrong-doers to the Gamsabhawa. These institutional mechanisms brought many changes in water management practices: more regulation of flow of water; abandoning of wasteful practices of cutting bunds; more water in the tanks as a result of strengthened bunds; and the cultivation of entire **yaya** at least once a year.

Traditional irrigation leadership became less prominent when the Vel Vidane system was abolished and a Cultivation Committee (CC) system was introduced under the Paddy Lands Act of 1958. The importance of the village as an administrative unit had diminished gradually and the village now lost its identity as an organic whole. The election of the CC members contributed to a radical change in traditional village leadership. Numerical dominance and political power sometimes allowed traditionally low-status villagers to elect their representatives to the Cultivation Committees. This shift in leadership sometimes led to the total non-participation of **some** high-status and land-owing groups in the CC's affairs; sometimes they refused to pay the "acreage levy" or to take part in irrigation maintenance work.

The post-1970 era in rural Sri Lanka witnessed increased party political intervention in local (village) organizations. A clear indicator of this process **was** the move from election of office-bearers of the CC to their appointment by political leaders. This move led to the further deterioration of village-level irrigation leadership as the members were appointed by the politicians on the criteria of political popularity and the ability to deliver votes in an election. Property ownership, family status and social standing which constituted the traditional criteria of village leadership thus became less important, while the ability to be a good "vote bank" became more important in the appointment of CC members. The culmination of this process of politicization of rural leadership **can** be seen in the 1979 Agrarian Services Act: The Government expected that the villagers would select their **Yaya**-level Farmer Representatives on political links and identities rather than on their primordial relations. Research shows that this in fact has happened.

In this context, one of the important issues that needs further research is the villagers' capacity to handle village irrigation affairs. At present, although both State and community capacities are emphasized, the emphasis is on the former as seen in the VIRP. A historical survey starting from the mid-19th century would clarify the degree to which traditional water management mechanisms decayed over time or were intentionally abandoned as a

result of **changing** priorities in the development activity (e.g., from village tank rehabilitation to large-scale irrigation work) of the State. More importantly, such research will help identify factors that strengthen village capacity to handle irrigation works and water management activities.

Research has already shown that new institutional mechanisms introduced by various village irrigation rehabilitation programs, e.g., Tank Committees under the VIRP and FFHC are not really farmers' organizations, but organizations where the government officials and the village elite decide the majority of issues in their favor. In-depth case studies on how these institutional mechanisms work would be particularly timely; as many of the village irrigation rehabilitation programs are about to enter into their second phase of activity, replicating models developed in the first phase.

The Incongruence Between Policy and Research in Village Irrigation Rehabilitation Programs. A number of difficulties arise when policy prescriptions are premised on certain expectations of the socio-economic and cultural environment which may have no current empirical basis. These incongruencies between policy and practice can be illustrated by two components of water management programs of refurbished village irrigation systems.

a) Farmer Organizations for the O&M of village irrigation systems. As there are over **25,000** village irrigation systems scattered all over Sri Lanka, their proper management and operation are almost impossible without farmers' assistance and the modus operandi for the latter is considered to be through farmer organizations. Thus the establishment of farmer organizations has been incorporated as one of the main strategies of water management programs. Under the VIRP, for example, an attempt is made to organize farmers or at least, their representatives into the Tank Committees in order to develop **some** sense of proprietorship over the water source which would provide feedback on field performance to the irrigation officials. Farmer representatives come together with government officials under the chairmanship of the Vel Vidane to decide on the operations for the particular season such as organizing agricultural inputs, providing agricultural extension advice, and the resolution of conflicts. From the farmers' viewpoint, the Tank Committee (TC) is not a farmers' organization. It **was** introduced by the Government and its decisions are primarily taken by the Officials as they have the necessary legal **and** administrative backing to implement certain decisions and for remedial action (Abeyratne 1985:7). Such officials are not accountable to farmers, but to the Government. As a result, the TC derives its authority more from the State than from the farmer-community. These factors undermine the importance of farmers' participation in water management activities in village irrigation systems.

An important factor which discourages farmers' participation in water management is that traditional notion of property clash with present-day legal definitions of property. In the past, the farmers considered the tank and its products (e.g., fish) and paddy fields as village property; if one could show claim over village communal property, one **was** treated as a member of the village community. The rights over **communal** property derived from

membership in a kindred group called village variga which was decided by the village elders. However with the granting of land deeds for individual property and the sale of new lands under village tanks after their rehabilitation, there seems to be some ambiguity as to who owns the irrigation works. In already rehabilitated tank systems under the VIRP, for example, the majority of villagers said that the Government owns the irrigation systems. Therefore, it would seem difficult to expect farmers under the rehabilitated tanks to take part in operation and maintenance unless some compulsory rules are introduced. As a reading of history demonstrates, this was the case even in the 1970s. The Government then enacted rules directing every farmer to contribute free labor towards maintaining the tank. Each farmer had to work 60 days during the first year after the renovation of the tank and 30 days a year during subsequent years.

It appears that what is really needed in present-day village irrigation systems is strengthened capacity of existing farmer organizations by providing them with technical know-how and financial support. The Tank Committee or the Wew-Sabhawas may be capable of maintaining tanks as long as maintenance work involves only human labor. But if maintenance involves some technical know-how, then the farmer organization may be unable to perform the task. In such a situation, farmers need money and technical help from outside.

b) Cultivating Part of the Command Area in Periods of Water Shortage (Bethma). The present water management programs under village irrigation systems attempt to resuscitate the traditional practices of bethma to stop the wastage of water in the yala (dry) season. The main principle behind this practice is to cultivate a portion of the paddy field using the limited amount of water in the tank which is not sufficient to cultivate the entire tract. In many Dry Zone villages, bethma is no longer practiced in the yala season even when there is water in the tank to do so. An ADB (1980) study concluded that 87% of paddy lands was allowed to lie fallow in the yala season in Anuradhapura District. However, the water management programme of the ADZAP proposes to stop the wastage of water in the yala season due to non-cultivation by re-establishing the bethma practice through farmer organizations. One important factor that historical evidence shows with regard to bethma is that it had never been a regular practice in Sri Lanka. Farmers in the Dry Zone cultivated paddy only in maha season and concentrated on chena cultivation during the yala season.

One plausible reason for the disappearance of bethma would be the increase in the area irrigated by the tank which reduces water availability in the yala season even in rehabilitated tanks. Thus the decay of the bethma practice is more an outcome of the changing patterns of the production system than an outcome of social decay, Begum (1987) has shown that in 18 out of 20 village tanks studied in the North Central Province, the acreage of irrigated land under each tank has increased significantly during the last several decades from the original size of the purana-wela (old-field). In some villages, although the officials report the practice of bethma, the actual practice seems to be one of wealthy farmers buying the rights of other farmers. Thus some farmers sell their bethma right, mainly because of the lack of capital to cultivate even a small portion of land during the yala

season. They thus free themselves from **paddy** cultivation to concentrate on **chena** cultivation on a full-time basis.

These new practices reflect **some** of the radical changes that have taken place in villages during the last few decades. The main characteristics of the traditional village communities, such as subsistence ethics and social insurance are no longer visible in the production system. **Thus** any attempt to reinstitute traditional features of village economic organization will be unsuccessful if the policy makers fail to understand (a) the organizational set-up which existed in the past and the factors which contributed to their operation, (b) the factors that have caused structural changes in the village communal forms and (c) the emerging new forms of social organization and economic activity as a result of accelerated State intervention in rural wells.

DISCUSSION* (SESSION I)

Following Janatha Perera's presentation of the background paper, Kapila Wimaladharna, the chairman of Session I, opened the discussion by drawing attention to the politicization of village communities as an important issue to address. He then opened the floor for discussion either of the points made in the background paper, or of other concerns for consideration by the group.

Marcus Karunanayake: Although there is increasing development of minor irrigation, there is still a bias towards big projects (e.g., Mahaweli, major irrigation schemes). It would be useful to have comparative information on the amounts spent on large-scale vs. small-scale irrigation. On a different topic, rather than trying to establish the continuity between British times

* The discussion summaries that follow are based on notes taken during the workshop; they are not verbatim transcriptions, and **some** inaccuracies may have been introduced in the process.

and the present (in terms of state intervention in minor irrigation), we should treat major systems as a continuum with minor systems, and then examine points of departure. We know very little about institutional arrangements either then or now; e.g., was the vel vidane elected or selected? what **rewards** and sanctions were built into the vel vidane system? How authoritative or consultative was the vel vidane system? Was the vel vidane system different under different climatic/water supply conditions? There has been too much emphasis on the British period; instead **we** should **go back** to **our** roots. Certainly **bethma** cannot be adopted in its pristine form, but there **are** management elements of the bethma approach that **can** be extracted. There are also management suggestions in ancient texts that might have relevance today. For example, in ancient times water **was** distributed **at** night in order to reduce evaporation losses. Another avenue of research would be to **study** the "ethno-technology" of Dry Zone village irrigation, including a study of **the** various technical terms being used. The managerial practices assumed by these technologies would provide a clue to **past**

management systems. Bethma, for example, was not practiced in isolation, but was part of a broad institutional context, and there **were** probably many variants of bethma according to the social and environmental context. To summarize, we need to pursue both applied, "action-oriented" research, and also basic research on traditional **arrangements** for irrigation management.

K. Wimaladharna: Bethma was a crisis management system and not a normal management form.

R.B. Morapaya: We need to look also at the present and future; the environment has changed and there is **more** of a cash economy now. A devolution of power is needed from the Colombo-based concentration that now exists. Area-based field officers would be one possibility.

H. Ganage: Research is needed on cropping systems of minor systems. We have **good** data from the Walagambahuwa study which points to the hydrological and drainage complexity of small systems, but unfortunately this study ignored social aspects. **Also**, much of the research on **minor** systems has been done in the dry zone; it is not necessarily applicable to the wet and intermediate zones.

J. Alwis: Minor systems are dynamic, not static; they keep changing. Compared to **major** systems, **minor** systems suffer from lack of resources. They exist where there are no resources to **support a major system**. The need for institutional and social resources is particularly critical to ensure the productivity and equitable distribution of the little amount of water available. The Walagambahuwa study is one good study that has been done. It would be advisable to go back through this data **and see** if a multi-disciplinary approach might have led to different policy implications from the study. Finally, we need to develop a bibliography of minor irrigation **so** we can easily see what studies have been done and where to look for the results.

R.B. Morapaya: Village **tanks** should not be looked at in isolation and it is important to consider the regional and national context.

C. Panabokke: To *carry out* research on minor irrigation we need to develop a breakdown of different types of minor irrigation. For research you need some frame, and not just soil and **water**, but also organizational factors. The focus of Dry Zone tank development **has** been water **management** without considering the whole farm economy including chena cultivation.

S. Hettige: **Major** and minor irrigation systems do not exist in isolation. Large systems **may** be taking water from **small** ones, and vice versa.

K. Wimaladharna: At least three research topics seem to be emerging in this discussion namely: **(1)** Farmers' capacity to operate and **manage** minor irrigation and officers' capacity to transfer **power** and authority to the farmers, **(2)** How the unstable law and order situation affects farmer initiative, and **(3)** the interface between minor **and major systems**. As regards this last topic, Dr. Somasiri is conducting a study in Nacchaduwa

catchment which is looking at the link between minor and major schemes. Another type of relationship between the two classes of systems is seen in Huruluwewa, where allottees in that settlement scheme also **have** land in their old village **tanks** nearby, and carry out a dual irrigation strategy.

APPROACHES TO SELECTION, PLANNING, DESIGN, CONSTRUCTION, AND WATER MANAGEMENT (SESSION II)

Brief presentations were made of the approaches taken by the Irrigation Department (in implementing VIRP and IRDP) and by the Department of Agrarian Services (in implementing downstream work under VIRP and IRDP). Joe Alwis presented a **paper** co-authored with K. Yoganathan entitled, "Selection and Planning for Design and Construction of Minor Irrigation Systems by the Irrigation Department." The full text of this paper is given in **Annex 1**.

J. Alwis: After an interest list is assembled, a preliminary investigation is conducted, using a **standard** form. The data collected include socio-economic information as well as technical data (**see** full paper for details). Land alienation is a significant problem, since without this step, the handing over process (whereby ID turns over responsibility for the system to DAS) is delayed.

J. Medagama presented the approach of the Department of Agrarian Services (DAS) in downstream development under VIRP/IRDP. Since the role of DAS focusses on water management, Mr. **Medagama** distributed a paper outlining plans for water management under the next (proposed) phase of VIRP, "**Sane** Guidelines for Implementation of the Irrigation Water Management Programme under the Proposed Second Phase of the Village Irrigation Rehabilitation Project in Sri Lanka," the full text of this paper is given in **Annex 2**.

J. Medagama: In general, the Irrigation Department handles all construction at the headworks, and the DAS concentrates on downstream "modernization." An exception is Badulla District where DAS is handling both functions for IRDP systems. So far under VIRP, the DAS has modernized **325** of a planned 500 systems. Developing a water management plan will be the responsibility of an Agricultural Planning Team (AFT) from the relevant Agrarian Services Centers, (There are between 10 to 50 such centers in each district.) Implementation of the plan will be done by the Cultivation Officer.

J. Alwis: Are there individual approaches to improving MIS that have been taken and that appear to work well?

D.G. Dayaratne: The approach taken by FFHC is based on farmer requests to restore abandoned tanks. Each project constitutes several contiguous systems. As the start farmers are requested to pool their lands and then decide on a barrister re-allocation. Often the ancient system of **land** allocation is adopted with suitable modification. Allottees are then formed into Wesabha. During construction half the cost of earth work is absorbed by FHCC; the balance is considered the fanners' contribution. Subsequently allottees are given financial assistance at the rate Rs. 250 per acre, to

purchase deeds etc, and each farmer community is given a well for domestic use. In Thanthirimale, the FHCC have gone further and arranged short-term loans for allottees during the recent drought.

R.B. Morapaya: The approach taken by IRDP is more or less identical to that of VIRP for those districts where IRDP is funded by the World Bank. However, in districts where IRDP is funded by bi-lateral donors, there are some differences. For example, in Ratnapura, which is funded by the Netherlands, minor irrigation is being addressed on a catchment basis, and land use **maps** form the basis for planning. In Hambantota, where IRDP is financed by Norway, there is also more of a land-use approach, rather than basing selection on political boundaries such as electorates.

M. Karunanayake: What happens when a tank has only a few Owners so does not meet the VIRP minimum criteria, but has a real need for improvements (and perhaps *many* tenants who would benefit). Is there nothing that can be done for such a **tank**?

R.B. Morapaya: That depends on the criteria set by the donor. The district decentralized budget is more flexible, but even IRDP can make exceptions for special circumstances, as **has** been done in Hambantota.

N. Attudawe: In Kumunegala, a tank must be able to provide **3** feet of water to the entire command area in order to qualify for selection. This criterion leaves out *many* **tanks** that have less water than this, but we have never done research to test whether this is a desirable criterion for **this** area.

J. Perera: In considering different approaches taken to improving MIS, we need to make a distinction between working and abandoned tanks, particularly in terms of what happens to the community during reconstruction. In Monoragala there was a serious problem of community subsistence because farmers lost a cropping season, and the contractors doing the work brought in labor from outside rather than employing people from the community. **Fanners** were not consulted either by the contractors or by the agency. In **6** tanks, only 1% of the farmers were consulted by the engineers before construction, **and** even fewer said that they considered the **tank** to be "theirs" rather than the government's.

R.B. Morapaya: The approach has changed somewhat to include much more participation by fanners. It would be useful to do research to see whether this has caused a change in farmers' attitudes and perceptions.

D.P. Dayananda: In the eastern part of Hambantota District (in the **dry** zone) the **tanks** that have been improved under IRDP are mostly the abandoned tanks. However most of the **tanks** in the wet and intermediate zones that **have** been rehabilitated were the working tanks. The tanks improved in the dry zone **come** under **3** cluster settlements, each containing about **6** to **7** **tanks**. In improving these **tanks**, the fanners were not consulted as they were **not** working under these schemes at that time, When the fanners were settled in these schemes each of them were given Rs. **6000-7000** in kind and money for them to settle **down** and start cultivation. The new approach in

rehabilitating the tanks under IRDP is to involve the farmers in planning stage. This participatory approach by the beneficiaries in the Planning and Development process has given a tremendous boost to avoid mistakes.

S. Miranda: In abandoned tanks, are the reasons for abandonment looked into? How are such tanks selected when there are no farmers to provide information about their irrigation potential?

N. Attudawe: In Kurunegala we have developed a 2-year program for VTRP modernization which details each step to be taken, from site selection to planning, construction, and water management.

G.T. Jayawardene: Priorities for IRDP sites in Moneragala are set on the basis of a socio-economic survey [i.e., not only on the basis of internal rates of return or per acre costs]. Right onw all the tanks in Moneragala are full, but farmers are refusing to cultivate because dry rations are being issued (in response to the recent drought). They will begin cultivation after the dry rations stop in February.

R.B. Morapaya: We need to look very carefully at marketing and the profitability of what the farmer is being asked to cultivate.

S. Pinnaduwage: The selection of systems is not always correct. We need better data on the impact of these programs [to evaluate whether the selection of systems should have been done differently.]

K. Wimaladharna: This brings up the issue of monitoring and evaluation (M&E). We need evaluations after longer time spans. When, by whom, and how should evaluations be done? Often they are done by foreign agencies with short time horizons of five years or less, before the real impact is felt. We might try to influence project managers to include M&E as a part of their project design, and include it in their budgets.

R.B. Morapaya: This is basically true, that more M&E is needed, but some is already included in projects, e.g., in completion reports. What we need are independent evaluations that are not funded by the project.

J. Alwia: Have we ever thought of a hands-on approach where we really monitored step by step, as in Gal Oya? We haven't felt this was needed in minor irrigation because the farmers are already involved in irrigation management, but it is needed. The reason that the Ministry of Lands insisted on a ratification meeting with farmers (as part of the VTRP process) was that farmers were not being consulted. We need to see if the process of involvement can be carried through right up from planning and construction on up into the O&M of the rehabilitated system. There is a need to do a better job of explicitly enhancing farmer participation as is being attempted in major systems.

C. Panabokke: All the information gathered in the planning studies that go into these programs does not tap the experience of the farmers themselves. This should be the starting point of farmer involvement, at the fundamental level of getting farmers involved in making recommendations for

their **systems**. Farmers know the soils in the command area and their characteristics; they know the rainfall patterns and **how** often the tank spills. There are *many* areas where we can make this point of contact with farmers. Otherwise we're only paying lip service to farmer participation.

APPROACHES TO SELECTION, PLANNING, DESIGN, CONSTRUCTION, AND WATER MANAGEMENT (SESSION III)

The chairman for Session III was Marcus Karunanayake, who introduced the session by listing a number of points that arose out of the previous day's discussion, or that occurred to him as useful topics to consider. Next, Joe Alwis **and** David Groenfeldt added to the list. The points are summarized in the following:

- >> How is water management under minor systems the same as or different from major schemes?

- >> How is water management affected by:
 - different patterns used by different assistance strategies?
 - water management innovations (e.g., the APT)?
 - labor surplus or deficit situations?
 - changing property relations?
 - the peasant/bureaucratic interface?
 - different mechanisms for conflict resolution?
 - agronomic interventions

- >> Are the institutional innovations that are being introduced (e.g., by the APT) sustainable?
 - Legislative aspects. The constitution focusses on the right of the individual, but in irrigation it is the right of the group that is critical for both major and minor schemes.
 - What is the relevance of some traditional irrigation practices for modern irrigation management?
 - What approaches should be emphasized in interventions to improve **MIS**? How can the cost be reduced? through labor contributions?
 - The need for a bibliography, or a list of studies done on the assistance programs now underway.

J. Alwis: One difference between minor and major irrigation is that minor irrigation water is used not only for agriculture, but also for domestic purposes, more than in major systems.

M.N. Navaratne: In minor irrigation, farmers have to manage the water themselves. Over the past **6-7** years there have been *many* new downstream works, but it is still the farmers who manage these, and it is very

difficult. We can't punish farmers for breaking structures. It is easy to say this is the way we want the water to be managed, but it is very difficult to actually implement these plans.

D. Groenfeldt: An assumption behind intervention programs is that farmers are not managing their water well enough, and that their practices can be improved. But how much information is gathered about existing management practices in the **systems** that are slated for improvement to identify what practices, if any, need improvement?

G.T. Jayawardene: If farmers used weedicide instead of water to control their weeds, they would save a significant amount of water. Farmers need to be educated in this regard. Another aspect which needs to be studied is the amount of water needed to leach the soil of salinity.

R.B. Morapaya: Farmers would rather use free water **than** costly weedicide. **Communal** ownership of an irrigation system will not work; no one is responsible.

D.P. Dayananda: **Though** the village tanks are not meant for issuing water for Land Preparation, yet the farmers use tank water for Land Preparation (during Maha season) as they go for Chena cultivation when the rains start.

N. Attudawe: Downstream works are not considered important by the farmers. They would rather use the funds for other purposes, such as **roads**, a hospital, etc. In general, farmers do not feel that water management is a problem. However, bulldozing tank beds, done with DCB funds, has met with great enthusiasm, as farmers recognize its value.

E. Martin: Assistance programs appear to have an objective of local control for each system, which is consistent with the lessons from minor irrigation from several countries. **However**, the water management plan for farmers is imposed from outside. What information is collected on existing water management practices prior to intervening?

J. Perera: There is a standard "package" of water management used by **VIRP**, **IRDP**, **ADZAP**, and even **FFHC**, but no one knows how relevant it is to any given local situation. **The** basic parameters of this **package** are pre-determined.

H. Gamage: We are using borrowed information on minor irrigation, e.g., for establishing water duties. When paddy is grown next to **OFCs**, the irrigation frequency for both crops will change. We need to know **more** about how the water table is behaving in small systems in order to develop a good water management plan.

J. Medagama: We need to find **ways** to minimize government intervention in minor irrigation. One step in this direction is to treat water management and construction as a single **package**, and involve farmers in both parts of that package. The present separation of responsibility between ID and DAS

for the construction and water management phases of VIRP, is infortunate; Farmers lose their ownership.

C. Panabokke: The standard water duty for **major tanks** in the Dry Zone is 4 acre feet for Yala, while for minor **tanks** it is only 2.5 feet. presumably because of lower conveyance losses. However, we have no **measures** on actual **water** use under minor irrigation. It is extremely difficult to improve water management in minor schemes where the **year** to year fluctuation is **so** great.

S. Pinnaduwa: **Who** is controlling the water in minor tanks? We don't spend enough **time** with the farmers to **see** what is going on. We **need** to identify needs from a systems perspective, which **is** the **same** perspective farmers use, rather than in terms of water management alone. We **need** to look at the farmers' total economic picture and then try to develop a strategy.

S. Hettige: Farmers in **major schemes** in **Polonnaruwa** are not interested in a water-oriented farmer organization. They want a whole range of **services** and an organization that **can** help in all these services.

R.B. Morapaya: The amount invested in the agricultural sector, and particularly in irrigation over the past few years has been so great that the government **has** a responsibility to see that there are returns from this investment over the long term. We need **state** intervention to ensure that the investment is protected. A new area council (pradeshiya mandalay) is to be formed at the **AGA** level to help in this effort. We need to determine the best roles to be played by farmers, local bodies, and national government. Ensuring equity is a responsibility of the government.

J. Alwis: Two emerging points in the discussion **so** far seem to be that (a) minor irrigation systems should be **managed** by **farmers**, and (b) interventions to assist these systems may interfere with the process of self-management. We need to develop farmer capacity in a way that **makes** sense to the farmers.

S. Miranda: The model of water management presented by Mr. Medagama goes from the initial capturing of the water all the way to the drainage of that water from the fields. The objective of the water **management** plan is water balance over the season, and **maximum** crop production. Farmers have devised strategies for dealing with these problems over the centuries, and have a detailed knowledge of their particular system. Assistance to **those** farmers should aim at developing their capacity. Simple techniques **may** be more useful than complex ones, as in the case of **Kimbulwana**, where the **PA**, Mr. Gunadasa, is using measuring rods that are not calibrated, but give farmers a rough idea of how much water is flowing. We need to bear **in mind** the relative unreliability of water supply. Also, we need to test alternative cropping systems that might be adopted gradually, on a trial basis. Training may also be involved, but in terms of enhancing the capacity of farmers.

N. Attaduwa: Farmers need to be involved for the simple reason **that** officers cannot do it all. In one **AGA** division in Kurunegala there are 19

tanks being rehabilitated **under** IRDP. A lot of time is needed to meet the requirements of the project, and every officer has many other duties besides water management.

D.P. Dayananda: In Hambantota we are providing materials to local organizations (Gramodaya Mandaleyaya) but do not **pay** any labor costs. We **can** reduce total costs by about one third in this way. The requirement that farmers provide the labor is important for ensuring that they really want the project, and it also gives a sense of ownership.

D. Groenfeldt: This is an interesting example of a different approach to assistance within the framework of a standard package, in this case, IRDP. Why is this approach taken in Hambantota, and why is it not being taken elsewhere?

R.B. Morapaya: In this case, both Plan Implementation as well as the donor were willing to **go** along with a participatory approach. In Monoragala also, the work is done through local organizations, but not in the World Bank financed projects. However, participation is not necessarily in the interests of farmers; in some **cases** it can place a **real** burden on them. If it is a means to an end, then it is good, but participation should not be promoted just to get labor **from** the farmers.

J. Medagama: The original World Bank appraisal report required **26%** voluntary labor which was never carried out; it is simply not possible. Under the Agrarian Services modernization program, at least 10% of the costs **are** supposed to be provided by farmers through their labor, but even this is not happening in many cases, particularly where there are complex tenancy arrangements.

J. Perera: In the case of one FFHC system which I studied recently, the Chief Priest of the temple called people together and asked if they would be willing to provide labor for reconstructing the **tank**. Later the District Minister also called them together and asked for voluntary labor; **however**, it was paid labor, at 1/2 rates. This approach avoids the problem of exploitation, while preserving the beneficial effects of **community** participation in their own project.

D.G. Dayaratne: We cannot give up a scheme just because a few farmers do not want to contribute. The number who cannot afford to contribute is usually very small.

R.B. Morapaya: The manner in which labor is mobilized can also be significant [referring to Jayantha's example].

J. Medagama: Is it possible for **communities** to resolve their own problems? It would have been in the past, but is it now?

Hettige: One of the **major** sources of disputes in rural **communities** is illegal tapping. Without a farmer organization there is a **vacuum** in dealing with **such** issues.

J. Alwis: Getting officials to resolve conflicts in **minor** schemes is counterproductive. There is no choice but to have the farmers handle it themselves.

ISSUES FOR RESEARCH AND POLICY MANAGEMENT (SESSION IV)

At the start of this, the final session, Joe Alwis presented a list of "bullet statements" which captured **some** of the themes of the previous three sessions: He suggested that the issues that have surfaced be examined within the broad framework of growth and stability:

- >> There **has** been inadequate or no consultation with farmers in programs to assist MIS.
- >> We still do not have arrangements to understand the behavior of MIS before rehabilitation programs begin.
- >> Research already done is inadequate; there are more areas to probe into.
- >> Bureaucratic interventions made through various programs have had a negative impact in sustaining an effective management system.
- >> No conscious effort has been made to develop local capacity.
- >> There **has** been no close monitoring and evaluation of process in the different approaches to improve MIS.
- >> Rehabilitation programs have aimed at both growth and stability.
S. Hettige: Stability is very important. Is it possible to achieve this objective?

J. Alwis: We need more information on the factors that impinge on stability. In addition to the physical stability of the agricultural production system, stability in the management system is **also** important, particularly when farmers are the **managers**. The physical irrigation works **have** to be geared to that management system. For example, the irrigation designs used in Hambantota IRDP are somewhat different **from** the designs used in other districts, because the farmers perceptions were considered important and the design suitably modified.

C. Panabokke: When planning minor irrigation programs we need to give more emphasis to the rest of the agricultural system, including **chena** lands, or more often, what is called "settled chena." ADZAP has tried to combine these two aspects.

S. Hettige: In the past, villagers could move **from** one tank to another depending upon the availability of water, but this is not practicable anymore.

Research Themes

The suggestion was made to write **down** a list of research themes that would summarize many of the points made in discussions, and would provide ARTI and IIMI with some ideas to orient research on minor irrigation.

1. Legal aspects of land and water rights, and conflict resolution.
2. The role of minor irrigation within the overall socio-economic situation. Research on this topic would identify the questions that need to be asked before a project is developed. To some extent this issue has been addressed in the baseline studies done for VIRP, but those studies are too general and descriptive to provide an accurate picture of the total agricultural economy at the level of individual irrigation systems. Also, the issue of stability in the face of uncertain water supplies affects the way in which farmers use water, and this is **tied** to their other agricultural options, e.g., chena.
3. Criteria for selecting minor irrigation systems for rehabilitation. Are the right systems being selected? Are the optimal criteria being applied? These are basically "rules of thumb" that are not based on careful study of the actual situation.
4. Categorization of different types of minor irrigation systems, including both agro-ecological, physical, and organizational factors. We know there are differences between various types of systems, but we have never developed formal categories to describe what these differences are **and** what are their implications.
5. Interaction between minor and major irrigation systems. In **some** cases small tanks located in the catchment of large systems may withhold water from the larger system; in other cases large systems may prevent water from flowing into small systems. Both classes of irrigation need to be developed with an awareness of mutual effects. This topic could also include micro-irrigation systems too small to be included in the VIRP minimum size limit of 20 acres.
6. Analysis of different assistance strategies to identify lessons for more effective and sustainable management of minor irrigation systems. One case is that of the ADZAP which is intended, among other things, to stabilize settlement in new chena lands. However, farmers tend to stay in these new lands only as long as they receive dry rations from the project. Lessons could be drawn from comparing **minor** systems **that** have received project assistance with those that have not, as ARTI researchers did in Monragala.
7. Farmers' perceptions of rehabilitation needs. Understanding how farmers perceive their **needs** is an important **part** of developing workable assistance programs. How **are** they considered in planning and design?
8. Appropriate roles for farmers and officers in minor irrigation. What institutional arrangements are required? Field officers (e.g., Cultivation Officers) often become aligned with certain individuals or **groups** in this village, particularly **when** they are **living** and working in the same community.

Although there is no explicit policy that minor irrigation should be managed by farmers, this seems to be implicitly assumed by assistance programs such as VIRP. For example, farmers are expected to control the sluice on VIRP tanks, although the CO helps in planning a water schedule, and it is the CO who calls the kanna meeting. A confusion exists as to whether farmers are being asked only to participate in management, or whether they are to be the actual **managers** of minor irrigation systems. If farmer **management** is a policy objective, what is the process to be followed that can realize this objective? Does this require more research? A pilot project? Can we learn something from the work of the National Heritage Society and Sarvodaya? Both are working on village uplift that includes minor irrigation and hinges on farmer control of those systems. A Marga pilot project in Kurunegala in 1979-81 might also hold some useful lessons.

9. Monitoring and evaluation. Performance indicators are needed to monitor and evaluate the impact of projects. Evaluation studies need to be done at longer intervals after project completion, and by independent evaluators not tied to the project.

10. Appropriate technologies and physical parameters for farmer management of minor systems. What types of irrigation control devices are best suited to minor irrigation? What are the optimal water duties under different conditions?

11. Water balance and sediment transportation studies at the catchment level. What are the effects of activities in the watershed on water supply and tank sedimentation and the water table?

12. Irrigation management practices prior to rehabilitation. Aside from Leach's classic study of Pul Eliya, and two recent Ph.D. studies by IIMI research fellows, there is very little documentation of actual irrigation practices in minor irrigation systems. Under VIRP, the Agricultural Planning Teams gather some data from each system, but on a very superficial level. The role of the Vel Vidane and other leaders within the community needs to be well understood before rehabilitation is carried out. Historical research on each system is also needed to piece together past practices and to understand present land and water rights.

13. Strategies for dealing with water scarcity. Bethma and similar practices are part of Sri Lanka's irrigation heritage that can be adapted to new management systems. A better understanding of the underlying principles is needed.

14. Farmers' response to water saving techniques. Before attempting to introduce new cropping patterns, or cropping practices (e.g., planting with the Maha rains), an understanding is needed of farmers' perspectives of these practices.

CONCLUSION

In his summing up of the final session, Ed Martin noted that a central theme of the entire workshop had been how to promote and stimulate farmer

management participation in minor irrigation systems. At the same time, it is unclear to what extent farmer management is an objective of the assistance programs currently underway. David Groenfeldt called attention to the mix of participants from implementing agencies and the research community, citing this mix as a crucial part of conducting research that meets the needs of the implementing agencies. Joe Alwis reminded the participants that this meeting is intended to be the start of a working group comprising "most of the people sitting around this table" along with policy makers. The next meeting of the group will be in another 6 months, at which time ARTI and IIMI hope to have some research underway which will address some of the issues listed above. Moripaya added a further suggestion for how the group can be effective in influencing policy. The results of research need to be written down in very brief form and fed into the policy mechanisms. The topics cannot always be treated in the pure form researchers would like, because it has to go through a process. However, when it is successfully channelled through the bureaucracy it can have an effect.

It is hoped that these brief workshop proceedings will stimulate thought and discussion about minor irrigation assistance programs, leading to more effective policies and programs. This effort is an ongoing process which ARTI and IIMI are committed to pursuing, with the collaboration of the implementing agencies involved, and other members of the research community, as reflected in the working group. **Readers** are invited to offer their comments and suggestions on the issues raised in these proceedings. Please write to the authors at the addresses indicated on the title page.

NOTES

1. Of course as the archival files show, many a British administrator had studied the remote village irrigation systems both in the Dry Zone and Wet Zone at least from the 1850s. Such studies were mainly done to understand the social organizational features that facilitate irrigation administration at the village level and to find out the new possibilities of raising revenue. Early attempts at presenting scientific and policy relevant issues on village irrigation were done by Codrington, 1938; Kennedy 1981, Brohier, 1934.

2. Under the Bo Tree (1961) by Nur Yalman and a Ph.D dissertation research done in three villages in the Dry Zone by S.J. Thambiah (1955) are the other noteworthy research into village irrigation systems. However, the primary focus was not on irrigation systems per se, but on land tenure, kinship and property relations.

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ANNEXES

- ANNEX 1 "Selection and Planning for Design and Construction of Minor Irrigation Systems: The Approach of the Irrigation Department," by Joe Alwis and K. Yoganathan
- ANNEX 2 "Guidelines for Implementing the Water Management Program under the Proposed Second Phase of the Village Irrigation Rehabilitation Project," by Jaliya Medagama
- ANNEX 3 List of Participants

SELECTION AND PLANNING FOR DESIGN AND CONSTRUCTION OF MINOR IRRIGATION SYSTEMS BY THE IRRIGATION DEPARTMENT

J. Alwis and K. Yoganathan*

INTRODUCTION

In terms of the provisions of the Constitution, the subject of **water** resources planning is assigned to the Ministry of Lands and **Land Development (ML&LD)**. The Department of Irrigation (ID) is the principal executive agency of ML&LD, which assists in discharging this responsibility.

The Irrigation **Department** is responsible for construction/restoration of minor irrigation systems. It also engages its specialised technical services to deal with repairs in minor systems which will result in altering the technical parameters such as raising the spill and the bund to increase storage capacity. In Addition ID provides other technical inputs such as designing the spillway and sluice to ensure safety and operational efficiency. The Department of Agrarian Services (**DAS**) which is assigned with the responsibility to attend to repairs in minor irrigation systems **is** expected to consult ID in such instances to obtain the technical **know-how** to deal with specific situations.

SELECTION

Minor irrigation systems are selected **for** construction and restoration from the 'interest list' maintained by irrigation officials at the regional and divisional levels. This list contains items listed by local interest groups and members of Parliament for improving minor irrigation works.

The preliminary list prepared from items given in the interest list is initially submitted to the District Agricultural Committee (DAC) which **was** established under the Irrigation Ordinance of 1946. The approval of the DAC is considered necessary to initiate **work** in preliminary investigations **by** the ID. During the recent **past** certain districts **have** preferred to adopt a different procedure by directly resorting to preliminary investigations without DAC approval to expedite the preparation of the final **investigation** list.

PRELIMINARY INVESTIGATION

During preliminary investigations attempts are **made** to ascertain the response of the **farmers** and villagers benefitted by the proposals and also to collate information and **data** which are of a general **and** technical nature.

* Director, **ARTI** and Senior deputy Director, Department of Irrigation. General information includes attitude of shareholders, the nature of their requests, total number of persons resident in the neighbourhood and the degree of **dependency** on the **tank** for their livelihood, availability of construction material in close proximity, details of cultivation practices, adequacy of water to meet cultivation requirements, depth of water remaining in tank after sluice or bund cut ceases to function, approximate distance of fields from tank bed etc. Technical information collected deal with supply capacity, the catchment area and the nature of development that **has** taken **place** in the catchment, total capacity of catchment; approximate depth of tank and its capacity, rainfall figures, supply of water to tank from sources other than from catchment, potential command; spilling history, details of spillways, irrigable area under scheme, acreage cultivated, acreage abandoned, additional acreage available, acreage of fields in tank submerged at present full supply level, acreage of fields or private lands abutting or inundated on full supply level contour, details of area that will be submerged if tanks is restored, flood discharge history and its frequency, effect of **proposed** restoration on existing work and the degree to which it will limit future utilisation of the water resources of the basin of which the tank's own catchment is only a part, number of sluices with spill levels, useful storage and proposed cultivation pattern. This preliminary report will also attempt to approximate the construction cost to calculate the pro rata cost and ascertain whether the project details will measure up to selection criteria adopted by the ID.

Similar investigations are also carried out in respect of village anicut schemes which eventually result in collection of social, agricultural, tenurial, hydrological, technical and other economic data which will help in formulating proposals. In view of the fact that most anicut schemes consist of private lands benefitted by irrigation facilities and the source of water being shared by different groups of farmers at different locations, the nature of information sought after is somewhat different. For instance data requested in the standard form used for this purpose indicate the need to collect local information in respect of other existing anicuts, date of construction, number of times **washed** or **damaged** per year, annual labour required for repair, attitude of shareholders, number of people dependent on the anicut, dates of cultivation, cultivation results, adequacy of water, average cultivated and abandoned, catchment description, the nature of supplies and augmentations etc.

FULL INVESTIGATION

On completing the preliminary investigations by ID officials, a list of schemes which contains proposals for full investigation for the District is **prepared** by the Regional Irrigation Office for submission to the DAC for approval. This list contains a break-down of items into Irrigation Divisions and Electorates. After the Full Investigation List (FIL) is approved by the

DAC, the respective Divisional Irrigation Engineers prepare the survey estimate for the field investigation. Estimates for such work are sanctioned by the Deputy Director of Irrigation who is given financial allocation under various projects.

Technical Assistants (TA) of the ID are subsequently assigned with work related to full investigation surveys. Taking the Preliminary Investigation Report as the base information, the Technical Assistant carries out the field work which consists of the survey of the Tank Bund, longitudinal and cross-sections of the tank bund, tank bed contour survey, spill site surveys, breachsite **surveys**, irrigable area surveys and the channel trace surveys. On completing the field work the TA commences work on the plan and **prepares** proposal and designs under the guidance of the irrigation engineer. The TA and the draftsman then compute the bill of quantities to prepare the final estimates. These plans and estimates are submitted to the Divisional Irrigation Engineer who in turn inspects the site with the TA to scrutinise the proposals. On finalising the proposals, the plan and estimates are submitted to the Deputy Director who will get the proposals checked for their accuracy for approval. These items will constitute the construction **list** which is submitted to the DAC for approval. At each level of operation, priorities at least for Electorates are reflected in the list submitted.

INVOLVEMENT OF LOCAL INTEREST GROUPS IN PLANNING AND CONSTRUCTION

Farmers and local interest groups are not normally consulted at the preliminary investigation stages except for eliciting information relevant to the formulation of proposals. However during field investigations the beneficiaries are summoned by the Technical Assistant for a discussion on the nature of improvements expected to be implemented. Requests and proposals made by farmers and interest groups are being kept in focus during field work for investigations by the Technical Assistant.

The ratification meeting held before the commencement of construction work enables the villagers to discuss the proposals with officials from ID & DAS and understand the nature of work expected to be carried out. Officers dealing with land administration are expected to participate when land acquisition or land alienation is included in the proposals. **The** ratification meeting is held on a request made by ID officials to the ACAS or the AGA. In certain districts, the role played by the AGA in the ratification meeting is considered significantly important in view of his close association with the area included for improvement. Suggestions **made** by villagers during construction phase are sometimes accommodated after ascertaining the technical feasibility of the proposal and availability of funds. On completing the construction work the Irrigation Engineer prepares the completion report which is then submitted through the **Range** Deputy Director to the ACAS together with plans. A joint inspection is then fixed by the ACAS and ID for taking over the scheme for maintenance **by** DAS.

WATER MANAGEMENT

While the ID is principally concerned with the construction activities during implementation stages, water management activities do not often receive adequate attention. In order to overcome problems caused by this lack of attention to water management during the construction stage, the Agricultural Planning Team is kept informed of the selection of schemes for full investigations and construction so that an opportunity is afforded to DAS officials to initiate proposals for improving water management during construction stage itself. But this does not happen as expected. An improvement to this procedure can perhaps be affected by providing irrigable area survey plans and the plan of the channel system during the construction of the channels so that an opportunity is afforded to DAS officials to plan out water management activities. Furthermore, **meaningful** interaction **could** be arranged if ID convenes at least two additional meetings during constructions with farmers and DAS officials. This **will** provide an excellent opportunity to discuss the progress and quality of work undertaken and even the overall acceptance of proposals formulated by ID for implementation.

TIME FRAME

About two decades ago, the ID procedure in respect of minor irrigation systems taken up for construction envisaged a three year time frame to complete the works taken in hand. due to large scale availability of project **funds** to improve minor irrigation systems and increased staff-strength it **was** possible to cut-short this duration by one year and instruction have been issued by **ML&LD** in June 1985 to adopt the following time frame.

- i. Approval of the preliminary investigation List - **March** in each year.
- ii. Preliminary investigation completed by **April** in the same year.
- iii. Full investigation list approved by DAC in **May**.
- iv. Full investigations completed by **September**.
- v. DAC considers proposals for construction and **submits recommendations** to the National Committee **for** the Rehabilitation of Village Tanks (NCRVT) by **October** of the same year.
- vi. National Committee to take up construction lists from all districts **by** November for approval.

INSTITUTIONS

Improvement to minor irrigation systems have been programmed at least under 5 different separate plans of work, namely,

- i. Integrated Rural Development Project (IRDP)
- ii. Village, Irrigation Rehabilitation Project (VIRP)
- iii. Anuradhapura **Dry** Zone Agricultural Project (ADZAP)

- iv. Programme of Veva Sabha implemented by the Sri Lanka Freedom from Hunger Campaign
- v. Improvements financed separately under the Decentralised budget.
At the national level Central Steering Committees are held for IRDP and VIRP. Since IRDP includes *many* other components, the monitoring of irrigation improvements in the minor systems does not receive detailed attention as in VIRP. In addition it was considered necessary to set up a **separate** body which will monitor and provide policy guidelines especially in the allocation of investment resources to ensure equitable distribution among different regions to improve irrigation facilities. The National Committee for the Rehabilitation of Village Irrigation (NCRVI) was therefore set **up** in **1980** by the Hon. Minister of Lands and Land Development to provide national level coordination to programmes for improving irrigation in minor irrigation sector.

At the district level however, the DAC continued to monitor and coordinate the work carried out in the respective areas covered by district administration. Before long it was considered necessary to supplement and complement the work of the NCRVT by a parallel organisation at the district level in view of the large volume of work coming before the DAC for attention. It was also felt that certain policy decisions were required to be taken at the district level to expedite the process in minor irrigation development. Therefore the Hon. Minister of Lands and Land Development set up in **1985**, June a District Committee for the Rehabilitation of Village **Tanks** (DCVRT) to be chaired by the District Minister. The district committee was expected to meet quarterly and discuss among others the following agenda.

- a) Preparation of the Annual District Programme in relation to items included under different programmes for minor irrigation improvement.
- b) Monitor the preparation of interest lists and investigation lists.
- c) Preparation of **Full** Investigation list and construction lists, monitor and coordinate the investigation and construction activities.
- d) Tabling and obtaining approval for lists at the DAC,
- e) Monitor the holding of vilification meetings.
- f) Monitor the physical and financial progress.
- g)** Land alienation programme under minor irrigation works.

Experience during the last two years indicates that the District Committee meetings have not been regularly held in most districts and the monitoring and coordination work has been carried out with the DAC, meetings which had to meet more regularly to conduct its other business relating to agriculture development programmes. This can be **also** explained in the context of further strengthening of institutional mechanism during the implementation process as a result of which the District Committee **may** have proved to be superfluous for the limited work expected of it.

Below the district level, the attention given to improvement of minor irrigation systems appears to be inadequate. At present the meeting **held**

with farmers during investigation and construction phases were expected to help the development stages but not structured effort has been planned out to sustain the dialogue for the purpose of creating a participatory environment for effective operation, and maintenance activities. If no such effort is made, **assistance** provided by the Agricultural Planning Team may result in increasing the rate of dependence by beneficiaries on officials which will be counter-productive in promoting self-reliant strategies.

SOME GUIDELINES FOR IMPLEMENTATION OF THE IRRIGATION WATER MANAGEMENT PROGRAM UNDER THE PROPOSED SECOND PHASE OF THE VILLAGE IRRIGATION REHABILITATION PROJECT IN SRI LANKA

Jaliya Medagama*

INTRODUCTION

The main objective of the water management programme under **VIRP** is to make efficient use of rainfall and tank-stored water in order to maximize the productivity and cropping intensity in the command areas. The schemes that would be selected for the water management programme would be the schemes that were taken under rehabilitation and modernization by the Department of Irrigation and Agrarian Services respectively. The Department of Agrarian Services (DAS) would be responsible in formulating and implementing an improved water management programme in those village irrigation schemes that come under their purview.

The programme would consist of the following:

- i) Civil Works involving the construction of main and secondary field channels, control and measurement structures.
- ii) System Management consisting of:
 - a) Catchment development and protection
 - b) A rotational water supply scheduling
 - c) Supplementary irrigation based on current rainfall
 - d) Bethma cultivation
- iii) Agronomic Innovations involving extension to persuade the farmers to accept practices such as (a) land preparation with rain water (b) introduction of short term paddy varieties (c) timely cultivation (adhering to cultivation calendar (e) introduction of upland crops in suitable land classes in the YALA season (f) promotion of "DRY SOWING" wherever feasible (g) greater input use.

Department of Agrarian Services will be responsible for the implementation and operation of the water management programme. At the Head Quarter level Department of Agrarian Services, to have a separate water management division headed by a Deputy Commissioner under the Commissioner of Agrarian Services. He is to be supported by an Assistant Commissioner,

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Engineer and an Agronomist. It is envisaged that a senior level Agronomist post should be created or else it is essential to obtain the assistance of an agronomist from the Department of Agriculture on a secondment basis. The water management Engineer is from the existing *cadre*, and he should be responsible in co-ordinating all engineering aspects in the programme. The Division should have the assistance of the other supporting staff such as middle grade officers, in co-ordinating district activities at the Head Office level.

Formulation and implementation of the Water Management Programme at the district level should be the responsibility of the Assistant Commissioner of Department of Agrarian Services. He has a dual responsibility, to the Deputy Commissioner at the Head Quarter level and to the VIRP District Co-ordinating Committee. In VIRP districts, establishment of a Project Co-ordinating Committee is a prerequisite, before commencement of the activities under phase II. This VIRP District Co-ordinating Committee has to be headed by the District Minister/Government Agent and the Committee should consist of the following officers of the line agencies Deputy Director (Irrigation); Additional Government Agent (Lands); Assistant Director (Agriculture); Deputy Director Agriculture Development Authority; Regional Engineer (DAS), Assistant Commissioner of Lands and Assistant Commissioner of the Department of Agrarian Services should be the other ~~member~~ of this Committee. Assistant Commissioner, Department of Agrarian Services should function as the Secretary to the District Committee. **The** main functions of this District Committee should be the following;

- a) Scrutinising of the Annual Construction Programme in respect of Rehabilitation and Modernization programme before submitting it to the District Agricultural Committee.
- b) Overall supervision of the implementation of the water management programme.
- c) Land alienation **and** land acquisition matters. Monitoring and evaluation of the construction and water management programme.
- d) Attending to any matters that cannot be resolved at the divisional level. **Any** matters that cannot be resolved at the district level should be referred to VIRP steering committee.
- e) **Any** other matters pertaining to VIRP activities which the committee feels necessary to discuss too could be taken up at this committee.

It is expected that this District VIRP committee should meet at least once in three months to review the progress and other connected matters.

In formulation **and** implementation of an improved water management programme at the village level should be the responsibility of the

Agricultural Planning Team which has to be established at the Agrarian Service Centre level. The APT should consist of the following officers.

Technical Assistant **and** Divisional Officer of the Department of Agrarian Services and the Agricultural Instructor of the Department of Agriculture would be the members of the APT. As these three officers are presently attached to Agrarian Services Centres, it is expected that this interdisciplinary team should work together in formulation and implementation of the **water** management programme in their ASC areas. There are 530 ASC areas in the whole island and each District consists of 10-50 ASC **areas** depending on the size and potential of Agricultural Development Activities of the District. In addition to these officials of the APT, it is also expected that each APT should have two farmer representatives. As these Agrarian Services Committees are comprised of six farmer representatives, it is also envisaged that the same farmer representatives could be the members of the APT too. Two farmer representatives to each APT could be selected by their consensus of opinion and they could serve in the APT for a period of two years. The two farmer representatives are expected to **work** very closely with the other three officers of the APT at **ASC** level.

At the grass-root level a **tank** or an anicut committee should be established according to the needs of the local environment. The Tank/Anicut Committee should be headed by the Farmer Representative (VELVIDANE) of which the **water** management programme is to be introduced. Each Tank/Anicut Committee should comprise of a Group leaders who would be selected to meet with the new Farmer Grouping System of the rehabilitated or modernized schemes. In addition to these **Farmer** Group leaders, the local officers functioning at the village level too should be represented at these tank/anicut committee. The Cultivation Officer of the Department of Agrarian Services working at the village level should function as the Secretary to the Committee and the Krushi Viyapathi Sevaka (KVS) of the Department of Agriculture would be the other **member** of the committee.

It is very important to assure that these Tank/Anicut Committee is established once a scheme is being identified to promote under VTRP construction programme. It is the responsibility of the **APT** at the ASC level to **see** that these Tank/Anicut Committees are established well ahead of the construction programmes are commenced as these committees would be empowered with supervision of the physical construction programme under their tank/anicut scheme.

In addition to the APT at the ASC level **and** Tank/Anicut Committee at the village level, it is also envisaged to establish a District Agricultural Planning Team. The District Agricultural Planning Team should comprise of officers from the same disciplines as at the ASC level. District APT is expected to be overall in charge of guiding the Divisional APTT, it would be more appropriate to appoint Senior Technical Assistant; Head Quarter Divisional Officer of the Agrarian Services and Senior Agricultural Instructor from the Department of Agriculture. The Senior Agricultural

Officer could be the subject matter officer who would be in charge of Water Management Activities.

Their **main** responsibility would be to assist the Assistant Commissioner of Department of Agrarian Services in the district in guiding, formulation, implementation and operation of the water management **programme**. The District APT should collect information from the APTT working at the ASC level and review the progress and report it to the District Assistant Commissioner. Whatever information asked from the Head Quarters should be supplied by the District APT to enable the Assistant Commissioner to respond to the Deputy Commission in Colombo.

DATA COLLECTION AND **PROGRAMME PREPARATION BY THE APT**

After initial identification of a scheme for rehabilitation/-modernization, the APT working at the ASC level should convene a meeting of the beneficiaries in order to explain the rehabilitation/modernization **programme** and the intended irrigation water management programme that is going to be introduced in that particular scheme. It is very essential for the APT working at the ASC level to develop a dialogue between the Velvidane, beneficiaries and the officers of the construction agencies. At the first meeting with the beneficiaries, the importance of appointing a Tank/Anicut Committee should be emphasized and its role and functions should be explained to the beneficiaries. Although it is not expected to appoint a Tank Committee at the first meeting, the envisaged construction programme **and** water management programme should be explained to the farmers. The beneficiaries also should be briefed about the importance of establishment of a Tank/Anicut Committee and about its composition of the members. The concept of farmer Grouping and selection of Group leaders also should be explained at the first meeting so that farmers would have sufficient time to think over new proposals, and the farmer beneficiaries would be in a position to select their Tank/Anicut Committee within a fortnight. It is very important to establish Tank/Anicut Committees within two weeks of the first meeting and formation of these committee would facilitate to develop better two way communication system between the farmers and officials. Farmer's participation in design decisions, especially in locating Farmer Turn Outs, measuring devices and other down stream structures should be designed by the construction agencies with the consultation of the farmer beneficiaries and its committee. The above mentioned **system** management techniques; agronomic innovations should be made aware to the farmer beneficiaries through the Tank/Committee. The local APT should develop contact with the Tank Committee very frequently, **so** that during the construction period, the Tank Committee should be in a position to supervise the work, and develop a more practicable improved water management practices under their **scheme**. It is very important that the **APT** at the ASC level should pay visit to the Tank **Committee once** a fortnight and all the decisions taken at the committee stage should be minuted by its Secretary, the Cultivation Officer.

The local APTT would be given a thorough Orientation and on the job training of their expected duties in developing a water management programme. The local AFT should explore all the possibilities in getting farmers involved in the development of a water management plan for the Tank/Anicut to be rehabilitated or modernized. Water management plan should be in the form of a comprehensive report which the local AFT has to submit through the District AFT to the Assistant Commissioner of the District. The District AFT should make their observations and submit these reports for the AC's approval. Once the approval is obtained, it becomes the local APT's responsibility to see that it is being implementation of the programme, Velvidane the Chairman of the Tank Committee and the Cultivation Officer, the Secretary become the local point.

Data which is necessary to develop the water management programme should be collected by the local AFT, once a scheme is identified for rehabilitation or modernization. Data on topography, hydrology, soils, rainfall, existing cropping pattern, has to be collected by the AFT in order to understand the local conditions. It is expected that **data** relevant to the catchment area too should be collected in order to identify problems if there are any. Rainfall data should be obtained from the closest point and the APT should have a long term plan to collect rainfall data by ASC area or sub Agro-ecological regions. Soils of the catchment and command area have to be determined and land classification map has to be made available for each command area by its drainage classes. The texture of the soil in the command area also should be made available. In addition to technical **data**, the AFT also should concentrate on socio-economic aspects under each scheme and try to understand its implications on the implementation of the water management programme.

The role of the existing rural institutions and its leadership pattern has to be studied carefully in the process of developing a core leadership in the Tank Committee. Production constrains such as, non availability of required inputs, other support services, credit facilities, purchasing problems and others also should be taken into consideration in analysing and developing an improved water management programme. It is also important to collect **data** regarding the existing irrigation practices and analyse how best these indigenous irrigation practices could be encouraged if necessary or else how best the existing irrigation practices should be changed in order to meet the present day demand. APT also should concentrate in determining an appropriate cropping pattern taken into consideration of the hydrological and other **data**. For this purpose, the APT should develop an operation study for each of the scheme.

After preliminary analysis of all available data, when opportunities and constraints to increased productivity would have been identified and new proposals are given, the APT should arrange a meeting with the farmer beneficiaries to discuss the validity and feasibility of its proposals. Once the approval is given by the farmers with the concurrence of the Tank

Committee, the **same** proposals in the form of a report should be forwarded to the District Assistant Commissioners as mentioned earlier.

IMPLEMENTATION

In conjunction with the APT, Cultivation Officer (CO) will be responsible for implementation of the water management programme and its subsequent operation in his CO area. He will consolidate the organization of farmers' groups and assist the group leaders. A construction schedule will be provided by the DJ & DAS so that C/O can inform the tank committee regarding the approximate date of arrival of the construction team. It would be the responsibility of the Tank Committee to ascertain that field channels be constructed by the farmer beneficiaries. The Cultivation Officer with the assistance of the Technical Assistant should be responsible for the quality of work to be performed by the Farmers. If **any** conflicts arise in the implementation of the water management programme, the Cultivation Officer is expected to resolve them with the assistance of the Tank/Anicut Committee. Failing that, it **has** to be brought to the notice of the local APT.

The Velvidane would operate the sluice and supervise water delivery based on the predetermined rotation to groups; with the group leader responsible within groups, especially in the tank systems. Rotation water supply schedule will be drawn by the local APT once they prepare the plan for that particular scheme. These irrigation schedules would be **made** available for the farmers to know before hand.

The local APT should visit once a month to the tank/anicut schemes where programme is being implemented. The APT should ascertain that programme is being implemented smoothly, and if they experience any operational problems, corrective measures should be taken in order to rectify. The District APT should make sure that they attend the Tank/Anicut Committee meeting at least once in two months.

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