

2.4 Results of Participatory Management in Two Irrigation Systems in Sri Lanka

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INTRODUCTION

Similar to other countries in south Asia (Sampath, 1992), in Sri Lanka the cost of operation and maintenance of irrigation systems has been rapidly increasing (Aluwihare and Kikuchi, 1991). At the same time, however, new settlements and programs to rehabilitate physical infrastructure have not realized full productive potential (Gunatilleke, et al., 1992). These developments raise serious questions about state intervention to increase crop productivity and the crisis in financing recurrent costs involved in operation and maintenance. After an era of technological solutions in the 1970s and the early 1980s, the past decade has shown an increasing interest in participatory management strategies which claim to recognize the importance of local knowledge and give a greater role to local people in making decisions, (Bruns, 1993). In Sri Lankan irrigation systems, participatory management is seen as a strategy to develop irrigated agriculture jointly, between irrigation agencies and local farmer organizations. Local organizations take over a share of the responsibility to mobilize resources necessary to manage irrigation systems.

This chapter focuses on reforms in financing operations and maintenance (O&M) in two irrigation systems in Sri Lanka where responsibility for O&M at the field and distributary canal levels has been partially turned over to farmer organizations.

There are two reasons why we would like to focus on financing O&M:

1. The major reason for many participatory management and turnover policies is to reduce the cost of public expenditures for irrigation O&M. However, so far little evidence has been provided whether these policies actually enabled agencies to reduce their costs in the long run. We posit that the performance of O&M and financing farmer organizations in partially turned over irrigation systems will be largely determined by financial constraints in government agencies.
2. Most participatory or management turnover programs in South Asia emphasize the need for establishing *organizational arrangements* and concentrate on crafting institutions for collective action, such as selecting farmer leaders, organizing and training farmer groups and creating internal operating rules. A number of case studies shows that there is concern about the sustainability of newly established water users groups (Meinzen-Dick, et al., 1994). Few studies have addressed the problem of financial sustainability of local organizations in resource management. We posit that many *organizational* problems are linked to a lack of supportive *financial* arrangements. This lack is the result of poor accountability within organizations, as well as continuing political influence and government control over O&M financing. This leads to continuing O&M subsidies and resistance of agency staff to sharing financial control over irrigation.

The key element of participatory management in Sri Lanka is the turnover of O&M responsibility for distributary canals in reform for which farmers become exempt from paying water charges. Although the Sri Lankan government has assumed that these strategies would help to increase farmer willingness to invest in O&M, the two case studies presented in this chapter show that this strategy has led to farmer organizations turning away investments from O&M to non-O&M activities. As a result, some farmers now have better access to agricultural services, but the expected improvements in O&M performance have not materialized.

THE SETTING

This chapter is based on field research in two systems in the Dry Zone of North Central and East Sri Lanka in the period October 1993 to May 1995. The chapter focuses on two water users organizations, one in each system studied: Pubudu organization in Kaudulla Irrigation System and Diyawiddagama organization in Mahaweli System C.

Kaudulla Irrigation Scheme

Kaudulla irrigation scheme is a re-settlement project of more than 5,000 ha situated in the North Central province of Sri Lanka. The reservoir was restored in 1958 as part of nation wide resettlement and colonization policy, in which allottees from the densely populated wet zone in the South West of Sri Lanka were resettled. More than 4,700 allottees were given 0.8 to 1.2 ha of paddy land and 0.4 to 0.8 ha of highland to develop home garden cultivation. The infrastructure of Kaudulla was dramatically modernized and its command area was expanded in two phases. Both phases were completed in 1976. Aluwihare and Kikuchi (1991) report that the cost of construction of new works in the low level main canal area in Kaudulla was US\$ 1,686 per hectare¹ (in 1986 prices or US\$ 2,490 in 1994 prices²). Although this new system was originally designed to irrigate 4,225 ha, owing to encroachment the actual command area is now estimated to be more than 5,000 ha.

In 1986 a USAID-funded participatory management project was initiated to improve the Kaudulla system. The project included development of farmer organizations, system rehabilitation and improvement of O&M management. The responsibility to implement this program was vested with the newly-established Irrigation Management Division (IMD). In the early 1990s farmers were organized in 23 organizations. Farmers developed a system-level federation of farmer organizations, which mainly deals with supplying agricultural input to both farmer organizations and individual farmers. At the end of 1994 (when more than 90% of the work was completed) the cost of the rehabilitation and participatory management program was US\$ 323 per hectare.

Kaudulla receives most of its 1,500 mm annual rainfall during the *maha* season between October and March when most farmers grow paddy. Farmers receive much less rainfall during the *yala* season between April and September, which makes irrigation in this period totally dependent on water availability from the tank. Paddy is the most important crop in both seasons.

The command area is fed by two main canals and it is divided into 23 hydrological units which vary greatly in size from 80 to 260 ha. Each unit generally has one or two distributary canals (DC) which take water from the main canal by means of fully adjustable disc-gates with a screw. Most DC head-gates are operable and are in good condition. Most field channels take water from DCs, but some take it directly from main or branch canals. Screw controlled disc gates are the standard form of outlet from DCs into the FCs. Although some of these outlets have been improved during rehabilitation, the condition of many of these gates is still very poor, with many gates being inoperable. Each FC serves about 10 to 25 farmers, who take water by means of a pipe through the field channel bank.

Mahaweli System C

Mahaweli System C is one of the five major settlement schemes under the Accelerated Mahaweli Ganga Development Project. In 1979 the Mahaweli Authority of Sri Lanka was established under the new Ministry of Mahaweli Development. The accelerated plan covered 160,000 ha of irrigable land, of which approximately 20,000 ha. comes under Mahaweli System C in the eastern part of Sri Lanka.

The estimated total system development expenditure up to 1992 is nearly US\$ 2 billion, which is US\$ 12,500 per ha (Wickramasekera, 1985)³. Construction of Mahaweli System C started in 1981. The two major reservoirs, Ulhitiya and Ratkinda, were completed in 1982 and construction in the last six zones of the system was finished in 1994.

Most settlers arrived after 1984 and came from submerged reservoir areas. At present there are about 21,000 farmer families in System C. The Mahaweli Development program allocated 1 ha. of paddy land and 1-2 ha. for the home stead. Paddy is also the main crop in System C.

Mahaweli System C receives more rainfall than Kaudulla: about 1,750 mm per year (Nippon Koei, 1990). In addition to the two major reservoirs there are about thirty medium and small tanks within the system which are linked in cascades by main, branch and minor canals. These tanks create an enormous buffer capacity within the system and make water management at the level of distributary canals independent from short term changes in main system management. Each tank releases water to one or more distributary canals. Generally, the condition of these structures is much better than the ones in Kaudulla and can be operated as designed.

In the late 1980s Mahaweli System C started experimenting with so-called turnout groups and farmer leaders and in 1992, the Mahaweli Economic Authority (MEA) adopted a participatory management model in which farmer organizations are given O&M responsibilities at and below the level of distributary canals.

Two sample units

In each system one distributary canal unit was selected to study the organizational and financial involvement of farmers in local management of water and services. In Kaudulla "Pubudu" unit is situated along the high level main canal (Annex Figure 1). "Diyawiddagama" is the selected sample unit in Mahaweli System C. The unit has only one distributary canal, which takes water from the small Wewmedagama tank (Annex Figure 2). The general features of the two selected distributary canals are given in Annex Table 1.

PARTICIPATORY MANAGEMENT IN TWO SYSTEMS

The official objective of the participatory management program in Kaudulla is to "establish a harmonization of the various inputs and services necessary for increasing agricultural productivity, with special focus on the use of irrigation water, which has been identified as the most critical and limiting resource in agriculture" (IMD 1984). The emphasis under the program would be on the increase of agricultural production, improvement of water distribution, improved arrangements for inputs supply, establishing farmer organizations, recovery of O&M fees from water users, maintenance by water users and farmer education. In the long term, the program would focus "on handing over to farmer organizations some of the management and operational functions of these projects" (ibid.), which would help relieve pressure on the government budget (IIMI 1993).

The participatory management program launched by MEA explicitly focuses on expanding the role of farmers in water management and in guaranteeing the physical sustainability of the system. The Mahaweli Authority of Sri Lanka states that the main objectives of participatory management are to ensure optimization of the benefits of the massive investments of the Mahaweli project (MASL 1992).

When asked about the main objective of farmer organizations, 28% of water users in the Pubudu sample of farmers in Kaudulla see achieving equitable water distribution as the main objective of the farmer

organization⁴. Improving maintenance of the distributary canal and field channels is considered by 23% of the farmers to be the most important objective. Five percent of the farmers believe that the farmer organization should mainly do rehabilitation contract work, whereas 10% feels that the organization should primarily be involved in supply of inputs and paddy marketing. This means that 61% of the farmers mentioned that O&M and rehabilitation related objectives are most important roles of farmer organizations.

Survey answers by 40 farmers from Diyawiddagama in Mahaweli System C give an entirely different picture. Input supply (58%) and paddy marketing (13%) are considered to be the most important objectives. Only 13% believes that improving water distribution is most important and 10% feels that the main objective of the farmer organization is to improve maintenance. Five percent believes that the farmer organization should mainly deal with rehabilitation contracts. The majority of farmers feel that the only objective of the farmer organization is to provide better access to cheap inputs and better marketing facilities.

The agencies

Participatory management or "turnover" is 'executed' as top-down, planned intervention strategies, in which management-by-objectives, formalization and standardization are the *modus operandi*.

One of the major components of participatory management in both systems is the creation of joint management committees at different levels of the system, in which agency staff and representatives of the water user groups mutually take decisions on water allocation, rehabilitation works to be done and seasonal crop planning. The major point of discussion within these meetings tends to be the 'need' for more repairs and rehabilitation.

Pubudu farmer organization in Kaudulla

The Pubudu farmer organization was established on 17 March 1987. In the first year of its existence the organization hardly functioned, but this changed after new leaders were selected in 1988 and a constitution was drawn and approved in the annual general meeting, attended by the majority of farmers. The organization comprises 377 farmers. Although Pubudu farmers have always been involved in cleaning parts of the two distributary canals in the Pubudu area, maintenance responsibilities were officially turned over to them in March 1990. In 1991 Pubudu got officially registered with the Commissioner of Agrarian Services under the Agrarian Service Act 58 of 1979. Registration provides the organization with rights to formulate and implement agricultural programs, carry out construction works, market produce and distribute inputs. It also helps the organization to obtain access to institutional credit. In 1994 Pubudu also took over responsibility for water distribution at the level of the distributary canal. The president of Pubudu is a very committed man who spends more time on the farmer organization than any other member of the Executive Committee. The president also attends most of the project management meetings in which he mainly discusses problems with contract work and paddy marketing.

Federation of farmer organizations in Kaudulla

Kaudulla was one of the first schemes in Sri Lanka in which farmers attempted to federate the distributary canal (DC) farmer organizations into a system-level farmer organization (SLFO). In April 1991 a president, a secretary and a treasurer were selected from among the presidents of the farmer organizations and the presidents of other DC-level organizations were made executive members of the SLFO. To develop its own funds, the SLFO (or "Federation") required all farmer organizations to deposit one thousand rupees as a membership fee. The Federation mainly helps farmer organizations obtain access to cheap inputs like

fertilizers, agro-chemical and seed paddy. It is also actively involved in helping farmer organizations to develop their own channels for paddy marketing. It is very active in the Joint Management Committee. Already, after a few years, the Federation became so heavily involved in activities which serve the overall goals of the Joint Management Committee, that it was decided that the president of the Federation should take over the chair of the monthly Joint Management Committee meetings from IMD project management. Although many of the issues discussed in the Joint Management Committee are similar to ones dealt with in the meetings of the Federation, the Federation continues to have its own meetings, normally directly after the Joint Management Committee meeting.

The Federation has not officially been registered with the commissioner of the Department of Agrarian Services. As a result it has no access to institutional services like bank loans. The Federation tries to solve this by involving the farmer organizations, which are registered, to get bank loans (which are subsequently used for the federation). This makes the Federation financially dependent on the farmer organizations. Although the Federation tries to keep their independent status, its leaders admit that it must be registered in order to be able to continue its activities. According to the president of the federation the main goal of the SLFO is to improve farmer living standards by providing lower prices for inputs and getting higher prices for paddy.

Diyawiddagama farmer organization in Mahaweli System C

Similar to other units in Mahaweli System C, turnout groups in Diyawiddagama barely functioned at first. The first Diyawiddagama unit level farmer organization was created by MEA in May 1990. The main goal of the organization was to solve general problems related to irrigated agriculture. These unit level farmer organizations never became very active. This changed in 1993 when MEA redefined the purposes and boundaries of the farmer organizations. MEA decided that farmer organizations should follow the hydraulic boundaries of distributary canals. In order to reactivate the farmer organization, new leaders were elected from among the farmers who participated in the first Unit Coordinating Committee in March 1993.

Almost immediately the new organization became involved in supply of fertilizers and agro-chemicals to farmers. Compared to neighboring organizations, Diyawiddagama was actively involved in several rehabilitation projects, both inside and outside Diyawiddagama area. In the *maha* season of 1993-94, Diyawiddagama organization became an official agent of the government Paddy Marketing Board (PMB), which means that it could buy paddy from farmers and sell it for a guaranteed price to the PMB. The farmer organization was provided a room in the office of the unit manager.

In July 1993, the Diyawiddagama farmer organization officially became registered under section 56a of the Agrarian Service Act. This meant that they then had the same authority as Pubudu in Kaudulla. In 1994, i.e. one year after the implementation of its participatory management program, MEA selected a number of farmer organizations with whom they started to actively negotiate about the conditions for full turnover of O&M at the level of the distributary. These negotiations forced Diyawiddagama to organize a number of meetings in which they tried to formulate their own position regarding turnover. In July 1994 they decided to sign the first agreement with MEA and in December 1994 the second agreement was signed in which they officially took over the responsibility to manage the distributary canal. The agreements stipulate the responsibilities, rights and authority of both MEA and the farmer organization. As in Pubudu, the evolution of the farmer organization in Diyawiddagama has been heavily determined by its leaders, especially by the president and the secretary, both of whom have been in office since inception.

FINANCING O&M IN THE DISTRIBUTARY CANALS AFTER TURNOVER

There are four key financial aspects of the Sri Lanka turnover policy:

1. exempting farmers from paying water charges to the government,
2. having farmers pay fees to water user groups,
3. granting O&M contracts to farmers,
4. involving farmers in rehabilitation contracts.

Under these terms the government continues subsidizing O&M. But at what level and for how long have not yet been made clear.

Exempting farmers from paying water taxes

In Sri Lanka O&M cost recovery has been subject to rancorous political debate and propaganda (see Annex A). Efforts in the early 1980s to establish a user fee in Sri Lanka failed. Political unrest in the late 1980s made water tax collection all together impossible, with the result that even up to the date of exempting farmers from paying water fees very few farmers paid them. The highest recorded amount of water fees paid in Kaudulla was in 1987 when almost US\$ 5,500 was collected, which is an average of US\$1.1 per hectare (compared with the levied US\$ 5.2 per ha.). Since then the payment has declined dramatically to almost nil, after 1991. The collected amount of water fees in Mahaweli System C has always been negligible, mainly because Mahaweli staff never really tried to collect the fees. Exemption from paying water charges, therefore, provided little motivation for farmers to take over O&M.

Granting O&M contracts

The Irrigation Department in Kaudulla pays farmer organizations a small sum for operations and maintenance of the distributary channel. The government expected farmer organizations to carry out weeding, cleaning and desilting and that the contract money is used to buy materials and hire a ditch tender. The Mahaweli participatory management program has adopted this strategy as well.

Interviews with farmers and agency staff and observations of joint management meetings show that there are several difficulties with implementing this strategy. The main problem for both farmers and local agency staff is the lack of clarity about the level of payment, the number of seasons into the future for which this payment will be provided and the stringent eligibility requirements and procedures that must be followed to apply for contracts. The agency only pays a part of the estimated maintenance cost, assuming that the difference will be covered by farmers providing 'free' labor. However, the percentage that the Irrigation Department in Kaudulla provides differs from year to year. In 1992, 1993 and 1994, 20%, 33% and 30% of the regular maintenance budget was allocated to farmer organizations. The amount paid in 1994 is approximately US\$ 1.10 per hectare. In addition to payments for maintenance, in 1994 about 30% of the operational budget was allocated to the organizations (being approximately US\$ 0.65 per hectare). It is not clear how long the Irrigation Department can and will continue paying these allocations. At the time of this study, the Irrigation Department continued to pay irrespective of the fact that the distributary canal had not been cleaned for two years.

The situation in Mahaweli System C is even less clear. Mahaweli started paying some farmer organizations O&M allocations from the beginning of 1993 onwards. It was not made clear which organizations would be paid and which ones would be excluded. Generally, organizations are poorly informed about the level of

payment, but the Mahaweli Authority claims that they pay US\$ 8.30 per hectare per year for O&M, plus US\$ 6.30 per hectare per year for system improvement. This is far more than the amounts paid to the organizations which are reported in this study. Most farmer leaders complain about delays in payments.

There is no apparent relationship between receiving O&M grants and farmer activity to improve operation and maintenance of the main canal. In both cases it was observed that the allocations are used to build up a fund from which they finance the development of non-O&M related services, without compensating labor contributed by farmers for O&M. The idea behind the operational allocation provided to Kaudulla farmer organizations is that the organizations can hire their own ditch tender. Nevertheless organizations in Kaudulla decided to leave operation of the distributary canal to the leaders and use the allocation for non O&M purposes. Farmer leaders of the organization studied in Mahaweli System C likewise decided to organize water distribution among themselves (with a major role for the president) after Mahaweli had withdrawn its ditchtenders.

Involving farmers in rehabilitation works

In 1986, the USAID-funded Irrigation System Management Project was started in Kaudulla. This included rehabilitation and improvement of irrigation structures at the distributary and field channels. In this project farmer organizations were given priority contract offers to undertake rehabilitation work in their respective distributary areas. In both Kaudulla and Mahaweli System C, farmer organizations agreed to deposit 5% of the value of contracts into the farmer organization's fund to build up savings.

Many farmer organizations received contracts, but many problems have occurred in financial management. In some cases there is a broad gap between the time the technical assistant made the estimate and the moment that the final payment was made. With the rapid inflation of both wages and costs for materials farmer organization have found it difficult to complete the work within the estimated budget. Although the turnover program makes clear that contracts should be taken in the name of the farmer organization, it was observed that many contracts were taken by individual farmers, (especially leaders of the farmer organizations) without involving the farmer organization. This caused conflicts and loss of credibility between the president of the organization and the members, especially in System C.

A survey done among Kaudulla and Mahaweli farmers shows that the majority of farmers perceive that contracts are exclusively taken by leaders of the organizations. Seventy percent of farmers in Kaudulla and 88% of Mahaweli farmers had no idea of the value of contracts taken and how much of the contract payments had been deposited into the organizations' funds.

An important question is, Whether farmer involvement in rehabilitation contracts has created positive mechanisms that enable farmers to improve their future O&M? Many interviews and observations indicate that there is no relationship between the organization's involvement in rehabilitation contracts and its sense of responsibility for maintaining rehabilitated structures. Farmer leaders repeatedly stated that the only reason to take a contract is to be able to earn additional income. They showed little interest in improving the system. Rather than using the income from rehabilitation works for future repairs and O&M, farmer organizations use their revenue from contracts to develop other, non O&M related service activities, such as wholesale provision of inputs and marketing.

Paying fees to water user groups

Although farmers generally did not pay water charges, in both schemes in this study the policy is that members should pay fees to their farmer organizations, for which 100% can be used by the organizations

themselves. In Kaudulla farmers pay a one-time membership fee of US 5 cents and a seasonal fee of US\$ 2.00. However, our survey shows that on average farmers have paid these fees for only three seasons since 1985. Farmer leaders complain that they have no authority to collect seasonal fees and that they do not want to start conflicts with members over these fees.

In System C in addition to a US 10 cents membership fee, Mahaweli farmers can buy *shares*, which give them the right to buy inputs from farmer organizations. Farmers initially paid US\$ 2.00, but later on many increased their shares to US\$ 10.00 or even US\$ 20.00. The organization decided that some one with a higher share has the right to buy more inputs. When they realized that this share is still not sufficient to prefinance the purchase of inputs by the organization some farmers increased their shares to US\$ 40.00. Farmer leaders expect that other farmers will follow this example. However, everyone who paid more than US\$ 10.00 has equal access, which means that so far those who bought higher shares have not received any benefit from purchasing marginal amounts of additional shares.

The number of shareholders increased dramatically during the two years after the inception of the farmer organization. The clear link between paying a share fee and having access to the services provided by the organizations explains why 63% of sample farmers know that virtually all the organization's income is used to expand the provision of inputs. None of the farmers think that fees are used for O&M and system improvement, which corresponds with our observations.

HYDROLOGIC AND AGRICULTURAL PERFORMANCE

Before we turn to an analysis of the financial performance of the farmer organizations and agencies, it is important to briefly discuss the impact of participatory management on the hydrologic and agricultural performance of both systems. It is hypothesized that this level of performance will shape the willingness of farmers and the agencies to invest in improving O&M⁵.

Water delivery performance

Seasonal water supplies for Kaudulla show a slight declining trend between 1984 and 1994 (Annex Figure 3). The tank water delivery in Mahaweli System C has always remained to be high: between 4,000 and 5,000 per year (Annex Figure 4)⁶. The main reason for these high supplies is that Mahaweli System C farmers have access to water which eventually will be allocated to the not-yet-completed neighboring Mahaweli System B.

Relative water supply

The above mentioned improvement in system level water delivery performance in Kaudulla is also reflected in the improvement in the Relative Water Supply (RWS) measured at the sluices of the main canals⁷. With a tank supply of 1519 mm and an effective rainfall of 62 mm, the total supply for yala 1994 is 1554 mm. With an ET_{paddy} of 838 mm and an additional consumption of 329 mm for land preparation and percolation, the total consumptive use is 1167 mm. This gives us a RWS of 1.33⁸. The average RWS of the 1978-1993 yala seasons was 1.45. This is probably near to an optimum level if we assume conveyance losses of approximately 50 per cent.

Comparing RWS at the sluice level with RWS at levels at and within distributary canals gives us an indication of how equal water distribution was within the system. The measured water supply at the head of the distributary in Pubudu was 1,605 mm for yala 1994. The RWS at the level of the head intake of distributary is 1.40, which is higher than the system RWS of 1.33⁹. Water is distributed very inequitable

along the main canal. There are clear indications that Pubudu receives more water than some of its neighboring areas. As is shown below, the main reason for this is the way distributary canal operation (by the farmers) interacts with main system operation (by the Irrigation Department).

Comparing RWS at selected points within the distributary canal shows an even greater inequity in water distribution. Whereas the RWS at the head gate is 1.40, the RWS at the first field channel (FC23) was 2.17, at a middle reach field channel (FC30) it was 2.15, and at the last field channel (FC40) it was 0.98. This does not necessarily mean that fields in the upper and middle reaches receive more than twice their requirements and fields in the tail end reaches receive less than their requirements. Farmers of FC40 and other tail-end canals reported that they can heavily rely on drain water from fields in the middle and head end reaches of the distributary canal. Still, these farmers frequently reported problems with water shortages as this drainage supply is less reliable and predictable than direct supply from the distributary canal.

As Diyawiddagama in Mahaweli System C is fed by one of the many tanks that are relatively independent from main system management, we only consider the RWS at and within Diyawiddagama distributary canal. As reliable time series data on water supply at this level are not available, we cannot make a historical comparison. The ET_{paddy} requirement for yala 1994 was 723 mm. Owing to a high percolation rate of 6 mm/day, the total requirement for land preparation and percolation is 798 mm, giving a total consumptive use of 1,521 mm. With a total measured tank supply of 2,594 mm and an effective rainfall of 62 mm, the RWS is 1.75, which again is considerably higher than Kaudulla¹⁰. Also in Diyawiddagama there are great differences between the RWS at selected points in the distributary canal¹¹. Annex Figure 5 shows that the first field channel has an extremely high RWS of 3.2, while some other channels are lower than the average system RWS of 1.75. Still, the last channel along the distributary canal has a RWS of 1.89. Given the over all high RWS, none of the Diyawiddagama farmers reported difficulties with water shortages.

Water distribution practices

Although farmers frequently complained about inequitable water distribution and a failing rotation system, the leaders tried to convince both the water users and IIMI researchers that they were strictly following a rotation schedule in which all field channels would receive water for a certain number of days and would subsequently be closed to allow other field channels to take water. However our twice daily monitoring of water flows to all field channels show that there is no rotation pattern and that most field channels continuously receive some water. Observations and interviews show that the leaders mainly respond to farmers who come to visit them with complaints about irrigation turns.

Even after turning over O&M responsibilities to farmer organizations, the Irrigation Department remains responsible for controlling and operating the head gates of distributary canals. It was observed that farmers have some influence over these gate-keepers. They generally follow farmer requests to open or close head-gates. In some cases gate-keepers first consult the irrigation engineer and sometimes farmer organizations, but generally this does not result in refusing farmer requests. Also, officially the distributary canal only receives water for three days a week as the Irrigation Department tries to follow a rotation schedule at the main canal. However, only in a few occasions did the distributary canal not receive water at all.

An almost identical pattern can be found in Diyawiddagama. Our observations on gate settings and water flows show that during the entire yala season, all field channels continuously received water. The ditch tender mainly opened or closed the head gate of the distributary canal (for which he received instructions from the MEA irrigation engineer) and occasionally adjusted field channel turnout gates.

Impact of participatory management on O&M performance

Our observations of RWS and water distribution clearly show potential for improvement. Although in Kaudulla RWS is still high, the major problem seems to be unequal distribution of water. Also in Mahaweli System C there is a clear difference in the quantity of water in different sections along the distributary canal. But owing to the extremely high RWS numbers all along the canal, no farmer suffers from water shortage. This explains the relatively small interest Diyawiddagama farmers have in using the farmer organization to improve O&M. In Kaudulla there is clearly a need for O&M improvement, which explains why the majority of farmers feel that the organization should primarily work on O&M improvement.

From the above data it is hard to tell whether O&M performance at the level of the distributary canal has been improved as a result of participatory management. The O&M survey of 40 water users in each of the two systems shows that 49% of water users in Kaudulla did not see any change in O&M performance of the distributary canal after turnover, 16% saw a slight improvement, 8% reported a considerable improvement, and 23% felt that O&M performance deteriorated after the organization took over O&M responsibilities. Kaudulla farmers are especially critical about the organization's involvement in canal maintenance: 63% saw no improvement, 20% saw some improvement and 17% thought that canal maintenance had worsened. Data on actual maintenance done by Pubudu were incomplete, but the survey and interviews showed that very few farmers contribute 'free' labor for canal maintenance. At the time of the study, the distributary canal had not been cleaned for two years.

The responses in Diyawiddagama are more positive: 31% saw no improvement; 44% saw some improvement and 25% saw considerable improvement. None of the respondents perceived deterioration in O&M performance. 80% of the respondents said that canal maintenance had considerably improved owing to an increase in unpaid maintenance activities by farmers.

Agricultural performance

Normally, the Irrigation Department recommends that the farmers cultivate only 50% of the command area during the dry *yala* season. One of major achievements of farmers' involvement in deciding on the water delivery schedule was to encourage the Irrigation Department to shift away from the 50%, to cultivating the full command area. This resulted in an increase in annual cropping intensity in Kaudulla from 138% in 1989 to 200% in 1994 (Annex Figure 6).

This is a substantial improvement considering the fact that at the same time the total water supply (irrigation supply plus rainfall) of both the *maha* and the *yala* seasons declined slightly (Annex Figure 3). Annual crop intensities in Mahaweli System C have always been close to 200%.

Although in both systems attempts have been made to introduce a diversified crop system, more than 98% of the irrigated area remains planted with paddy. Our Kaudulla household surveys show an average yield of 3,660 kgs. per ha in the *maha* 1993-94 season and 4,360 kgs. per ha in the *yala* 1994 season. For Diyawiddagama these figures are 2,900 kgs. and 3,760 kgs. respectively¹². The gross value of output (GVO) was US\$ 1,136.00 per ha per year for Pubudu and US\$ 944.00 per ha per year for Diyawiddagama (with 200% crop intensities in both systems). As reliable water supply data for the *maha* season are not available, we can only compute the GVO per m³ for the *yala* 1994 season. In Pubudu the GVO was US\$ 38.00 per 1,000 m³ of tank water supply, whereas in Diyawiddagama it was US\$ 20.50¹³.

From the household surveys we also found that the costs of materials, fertilizers, chemicals, rental of equipment and draught animals and hired labor for paddy production were US\$ 695 per ha per year in

Kaudulla and US\$ 400 in Mahaweli System C. With an assumed opportunity cost for family labor of US\$ 188 per ha per year (Bhatia and Samad 1995), the computed Net Profit of Production was US\$ 253.00 and US\$ 356.00 per ha per year in Kaudulla and Mahaweli System C respectively.

FINANCIAL PERFORMANCE OF FARMER ORGANIZATIONS

Having explained the major financial strategies in two schemes undergoing participatory management and the impact of these strategies on system performance, we now examine the impacts of these financial strategies on financial performance, both for the farmer organizations and the agencies.

In addition to membership or shareholder fees, farmer organizations generate revenues from a number of other activities which they are involved in, including taking on rehabilitation contracts, providing agricultural inputs, paddy marketing and renting out two-wheel tractors. Taking over rehabilitation contracts used to be the main source of income for both farmer organizations, but as most rehabilitation has been finished this source of funds has been discontinued.

The farmer federation in Kaudulla supplies inputs to both individual farmers (through the shop they have in the Kaudulla Project office building) and farmer organizations. The federation depends on the contributions of farmer organizations to build up funds to purchase agricultural inputs. Since the federation is not officially registered, it cannot apply for loans from banks. It can only get bank loans through individual farmer organizations, which are registered. The federation requests farmer organizations to deposit an average amount of US\$ 208, to be repaid with 5% interest, from which they buy inputs for the organizations. This means that a considerable part of farmer organization funds goes through the federation.

Income from rehabilitation contracts

Until 1992 one of the most important sources of revenue of the farmer organizations in Kaudulla was rehabilitation contracts. The total cost of rehabilitation in Pubudu between 1990 and 1994 was US\$ 88,800 (US\$ 296 per ha), of which US\$ 14,900 (17%) has been contracted out to the Pubudu farmer organization (Annex Figure 7). In theory, Pubudu should have earned approximately US\$ 745 (i.e. 5%) from its involvement in contract work. However, the organization's record books shows an earning of US\$ 1,270.

The total amount spent by the government for system improvement in the Diyawiddagama unit between 1990 and 1994, was approximately US\$ 10,100 (or US\$ 51 per ha).¹⁴ Neither the block office nor the farmer organizations keep clear records on the number and value of contracts given out to Diyawiddagama organization. This is partly because of the farmer leader's personal involvement in receiving contracts. From interviews with farmer leaders and minutes taken at joint management meetings, it can be learned that the value of contracts taken by the organization and or its leaders is about US\$ 6,900, which is 68% of the estimated US\$ 10,100 of system improvement works done in Diyawiddagama area. In theory, this means that US\$ 344 should have been deposited in the organization's account, however we could not find evidence of this in the organization's books.

Fee collection

As mentioned earlier, Pubudu organization in Kaudulla has almost no income from fees. Between 1990 and 1991, only US\$ 630.00 was collected from the members, which is an average of only US\$ 0.20 per season per farmer,¹⁵ instead of the proposed US\$ 2.00 per season, an average collection rate of only 10%. However, the number of shareholders of Diyawiddagama in Mahaweli System C increased rapidly, from 5% of the

total farmers in 1993 to 81% in 1995. Within less than three years the organization collected US\$ 1,750 from its shareholders, which is almost US\$ 10.0 0 per farmer per hectare.

Both organizations mainly use these fees to invest in the provision of fertilizers and agro-chemicals and paddy marketing. Nevertheless, the survey among Kaudulla farmers shows that 63% of the farmers believe that these fees are mainly used to pre-finance rehabilitation works. Thirteen percent mentioned the supply of inputs and paddy marketing as being the prime use of the fees, while only 10% thought that the fees are collected to improve O&M. In contrast, 85% of the Mahaweli farmers knew that their shares are primarily used to buy and sell inputs at a discount. None of the farmers mentioned that these payments are used to cover the cost of O&M. Fifty-eight per cent of the Kaudulla farmers interviewed are willing to pay a higher fee if these fees are used to considerably improve input supply (39% of the group that is willing), 30% are willing for maintenance and system improvement or other services like giving out loans. Ninety percent of the farmers in Mahaweli mentioned that they are willing to increase their shares, primarily to further improve the provision of inputs and paddy marketing (89%). Only one farmer mentioned that the assets should be used to improve O&M.

In Kaudulla there is a clear divergence in what farmers want the organization to do with the collected fees (improve O&M) and what leaders actually do (use the fees for input supplies and marketing, from which they can receive personal gain). This explains why farmers stopped paying into the organization. On the other hand, in the case of Mahaweli System C there is a clear relationship between what the organization does with the collected fees and what the farmers want it to do.

Supply of fertilizers and agro-chemicals

One of the organizations' key activities is to supply fertilizers and agro-chemicals at discounted bulk rates. Farmer leaders take an active role in contacting fertilizer boards and private suppliers of agro-chemicals and negotiating bulk rates. Kaudulla started their sales in 1991 and had peak sales in 1993 (Figure 1). They have been able to receive several trade loans to buy agricultural inputs. Owing to high costs of transport as well as their objective to keep prices as low as possible for the farmers, the maximum net profit the organization made was 5% in the first season. This came down to less than 1% of the total sales in the wet season of 1993-94, which was the last season they were involved in this activity. The total net profit in this period is approximately US\$ 100. After its peak in 1993, sales dropped dramatically and ceased all together in 1994. The leaders questioned whether they will ever be able to start the sales again.

The Federation in Kaudulla started providing inputs in Maha 1991-92. For the first three seasons it was able to hold or increase its market position.¹⁶ However, its initial success in selling inputs gradually declined after Yala 1993, with no sales of fertilizers at all in Maha 1994-95 (Figure 2). The organization managed to maintain a 4% net profit level from its US\$ 200,000 turnover between Maha 1992-93 and Maha 1994-95, which constituted an approximate net income of US\$ 8,300¹⁷. The major reason for the decline in selling inputs is the Federation's dependence on funds and loans from farmer organizations and the growing reluctance among the organizations to financially support the Federation. It was observed during joint management meetings that leaders of several farmer organizations expressed their discontent with the way the Federation was handling sales of inputs.

Figure 1. *Sale of inputs and paddy marketing by Pubudu, Kaudulla, Maha 1991/92 to Yala 1994*

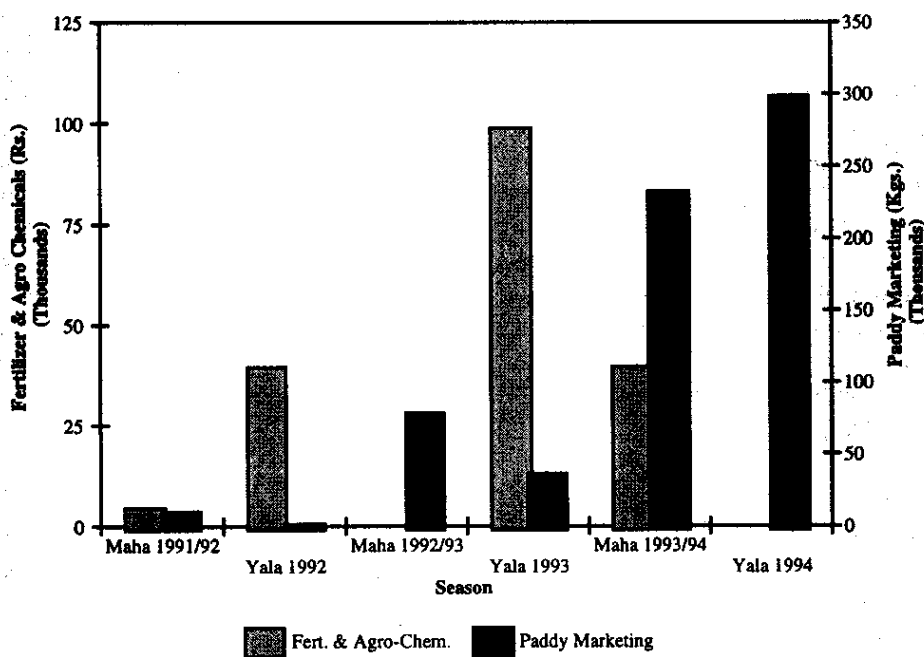
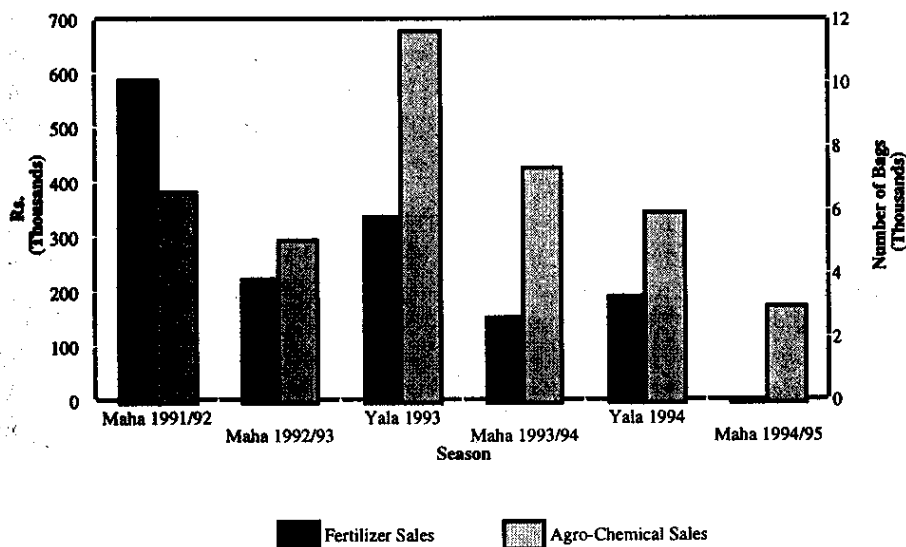


Figure 2 *Fertilizer and agro-chemical sales, Kaudulla Farmers' Federation, Maha 1991/92 to Maha 1994/95*



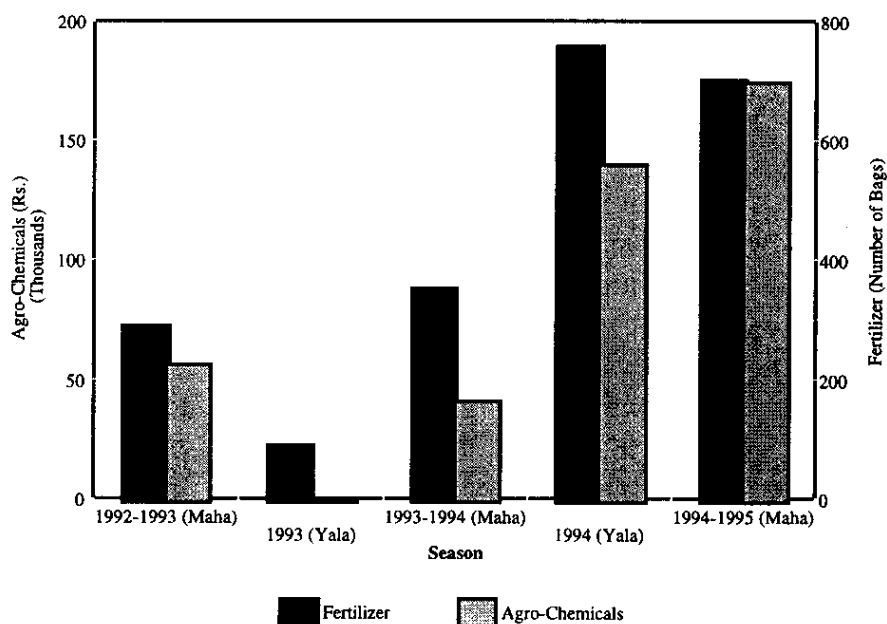
The complaints included:

- delays in delivery of inputs (so that in the end farmers had to go to local private traders),
- the marginal difference between the Federation's prices and those of private traders,
- the suspicion by some farmers that the president was using the Federation to profit personally from fertilizer sales and private companies, and
- the distorted relationship between the financial contribution of farmer organizations and the amount of inputs the Federation supplied to these organizations.

The Federation began providing inputs to farmer organizations that had not contributed to the Federation's funds, and even to farmers from outside Kaudulla. The last situation especially made several farmer organizations decide not to provide any funds to the Federation, which further aggravated the Federation's constraint of inadequate capital to purchase inputs in bulk.

Figure 3 shows that the farmer organization in Mahaweli performs well in terms of increasing sales of both fertilizers and agro-chemicals¹⁸. As the office of the organization is situated at the major road in Mahaweli System C, transport costs remain low. The organization obtained a steady profit of between 2.5% and 3% for fertilizer sales and around 2% for the sale of agro-chemicals. There is a proportional relationship between the shares they pay and the amount of inputs they can buy from the organization. Still, farmers feel that they cannot always buy as high an amount of inputs as they want because of the limited stock the organization can keep as a result of lack of sufficient capital. Similar to Kaudulla, because of this problem, shareholders started to question the practice of the organization of selling inputs to non-shareholders.

Figure 3. *Sales of fertilizers and agro-chemicals by Diyawiddagama farmer organization in Mahaweli System C, 1992-1995*



Paddy marketing

Farmer organizations in Kaudulla and Mahaweli have both been involved in paddy marketing. In 1994 the Government decided that registered farmer organizations can become agents of the government-controlled Paddy Marketing Board (PMB). This has advantages for both farmers and their organizations. For farmers, the price they receive from the PMB is generally Rs 0.5 to Rs 1.0 per kg higher than prices received from private traders and middlemen. Moreover, farmers do not have to deal with the PMB directly, which helps avoid problems with the quality of the paddy that is offered by individual farmers and the extra transaction costs involved in individual farmers dealing with the PMB¹⁹. Farmer organizations can generate extra income if they succeed in keeping the costs low for collecting, weighing and transporting paddy to the stores. There is a difference of about one cent (Sri Lankan) per kg between what the PMB pays the organizations and what the organizations pay the paddy producers.

In the dry season of 1994 the organization in Kaudulla marketed approximately 20% of the paddy produced in its area. It used its own two-wheel tractor plus trailer to transport the paddy to the stores. The net profit from paddy marketing remained around 1.5%.

The organization in Mahaweli also became heavily involved in paddy marketing. It expanded the marketed bulk from 172,000 kg in the wet season of 1993-94 (its first season) to 273,000 kg in 1995. Compared to Kaudulla, the organization in Mahaweli had lower transaction costs. The Mahaweli Authority provided the organization with a store and use of a truck, for which they only had to pay the cost of fuel. Additional costs are renting of a scale and hiring a number of laborers to weigh the paddy and load the truck. Because of the large number of laborers that were hired by the president in the first season, the net profit was only 1.5%. This increased to 3.3% in the wet season of 1994-95 after the president had been criticized by other farmers for spending so much on labor costs. As the Mahaweli farmer organization also bought paddy from neighboring units, it is not possible to assess the organization's share in marketing paddy from the Mahaweli area alone. In addition to the 172,000 kg bought directly from farmers, the president of the organization also made a deal with an employee of the Paddy Marketing Board and a private trader. With the unofficial permission of the PMB employee the president allowed the private trader to use the organization to sell 367,000 kg. to the Board, so that the private trader received a price higher than the current private market price.²⁰ As this was heavily criticized by other farmers, the president had to give up the practice.

O&M expenditures

In 1994, Pubudu organization received approximately US\$ 515 (or US\$ 1.70 per ha) from the Irrigation Department for O&M contracts. The ID estimated that the value of farmer involvement in maintenance in Pubudu would be approximately US\$ 1,000, which is US\$ 3.30 per hectare. This means that about two thirds of the total O&M cost was to be covered by the organization itself, in both labor and materials. However, in two years farmers contributed almost no labor to maintain the canal and spent only US\$ 45 on hired labor. The organization did not use its US\$ 200 grant for system operation to hire a ditchtender. The total amount spent on maintenance materials and fuel for maintenance equipment was US\$ 52, which is far below the anticipated amount. The rest was deposited in the organization's bank account and was not set aside to be used for O&M.

Financial investment in O&M by the Diyawiddagama organization in System C was negligible.

Non O&M expenditures

Expenditures made for input supply, paddy marketing and other operational costs are generally higher in Kaudulla than in Mahaweli System C. Both organizations have high labor and transport costs, which are associated with transporting inputs and paddy, and in the case of Mahaweli, hiring watchmen for the paddy store and people to load the truck. Pubudu spent a considerable amount on interest on bank loans and other banking costs. In 1994, the Kaudulla organization spent US\$ 4.50 per ha on administrative and support service expenses, without being heavily involved in providing inputs. Average expenses were US\$ 3.00 between 1990 and 1994. The organization in Mahaweli, which was heavily involved in both input supply and paddy marketing, spent US\$ 13 per ha.

Over the years both organizations managed to increase their assets. By the end of 1994, the Kaudulla organization had accumulated US\$ 3,000 (US\$ 10 per ha). The organization in Mahaweli had accumulated US\$ 2,800 (US\$ 14 per ha.). As the anticipated US\$ 3.30 per ha of own O&M contribution in Kaudulla was not spent in 1994, we conclude that the organization decided to build up reserve funds for non-O&M activities, thereby deferring maintenance.

Financial self-sufficiency

Farmer organizations do not collect fees for O&M, so that the financial self-sufficiency at the level of the distributary canals is zero.

One of our main questions is, Whether participatory management in Sri Lanka has helped farmers organizations to become self-sufficient financially? A comparison between internal revenue (fee collection and selling services) and external revenue (government financing) net income shows that the farmer organization in Mahaweli System C is more capable to raise its own funds than the organization in Kaudulla. Still, in both cases the organization heavily relies on O&M subsidies and income from rehabilitation contracts: 60% and 61% in Pubudu and Diyawiddagama, respectively. Especially in the case of Kaudulla, self-sufficiency has declined over the last few years owing to declining income from fee collection and provision of inputs (Table 1).

Table 1. Total net revenue of farmer organizations: internal versus government sources of income (in US\$)

		Pubudu Kaudulla 1990-1994	Kaudulla Federation 1992-1994	Diyawiddagama Mahaweli System C 1992-1994
Internal sources	*Seasonal fees	630		
	*Shareholder fees			1,750
	*Supply of fertilizers and agro-chemicals	100	8,300	770
	*Paddy marketing	700		
	*Providing seed paddy		1,040	3,300
	Sub Total	1,430	9,340	5,820
	Average per ha. per year	1.0	0.6	9.3
External sources	*5% from rehabilitation contracts	745		344
	*O&M grants	1,536		*2,920
	Sub total	2,281		3,264
	Average per ha. per year	1.5		14.6
	Total	3,711	9,340	9,084
	Total average per year	2.5	0.6	23.9
External as % of total net income		60%	0%	61%

**Note: This is the amount officially reported by the Mahaweli Economic Authority for 1994. (Farmer leaders report that MEA has not paid this amount.)*

FINANCIAL PERFORMANCE OF IRRIGATION AGENCIES

Reducing O&M staff

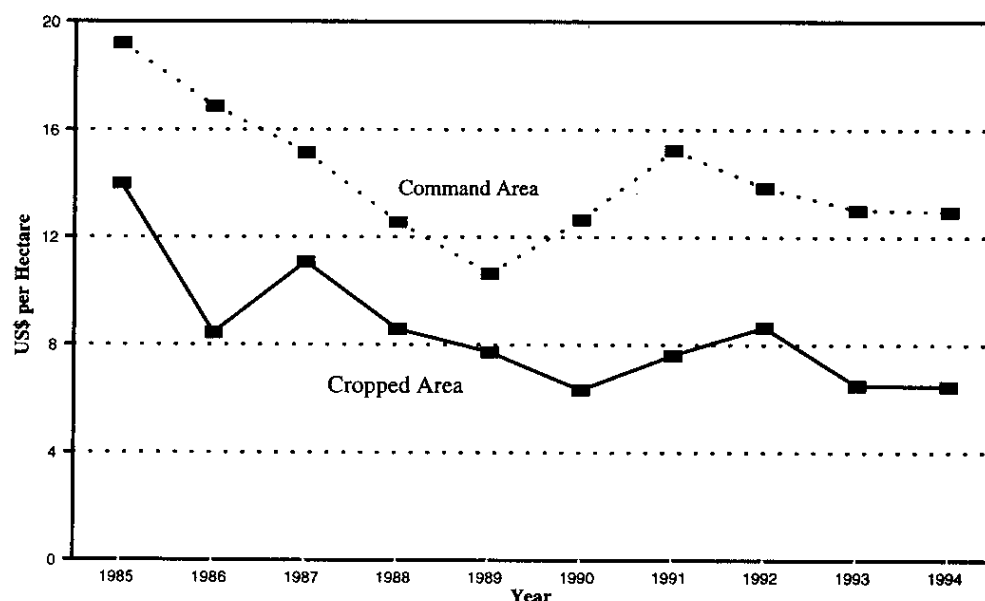
As pointed out earlier, the Sri Lankan government decided not to collect water charges in order for farmers to take over partial responsibility for financing of the cost of O&M. Another way to reduce public expenditures on O&M is to reduce staff. In the case of Kaudulla none of the regular staff have been made redundant as a result of the participatory management and the turnover process. Nor did the number of temporary employees decline.

In the case of Mahaweli System C, the anticipated reduction in the number local agency managers did not occur. The number of unit managers remains the same. At the end of 1994, Mahaweli stopped paying some of its ditchtenders and handed over operational contracts to the water users organizations who could then hire their own ditchtenders. At this time, however, it was not yet clear when the Mahaweli Economic Agency would phase out subsidizing both the remaining ditchtenders and the operation contracts to the organizations.

Reducing O&M expenditures

Annual government O&M expenditures in Kaudulla decreased since 1984 from US\$ 97,000 in 1985 to US\$ 65,500 in 1994 (constant 1994 prices), a reduction of 33%. Figure 4 shows that these figures correspond with US\$ 19.40 per ha of command area in 1985 and US\$ 13.10 per ha of command area in 1994²¹. As the annual cropping intensity increased from 138% in 1989 to 200% in 1994, the O&M expenditures per cropped area decreased more than the expenditures per command area. The decline in O&M expenses between 1985 and 1989 was the result of the fact that part of actual O&M expenses was charged to the rehabilitation project which started in 1994.²²

Figure 4. O&M expenditure per hectare, Kaudulla 1985-1994 (in constant 1994 US\$)

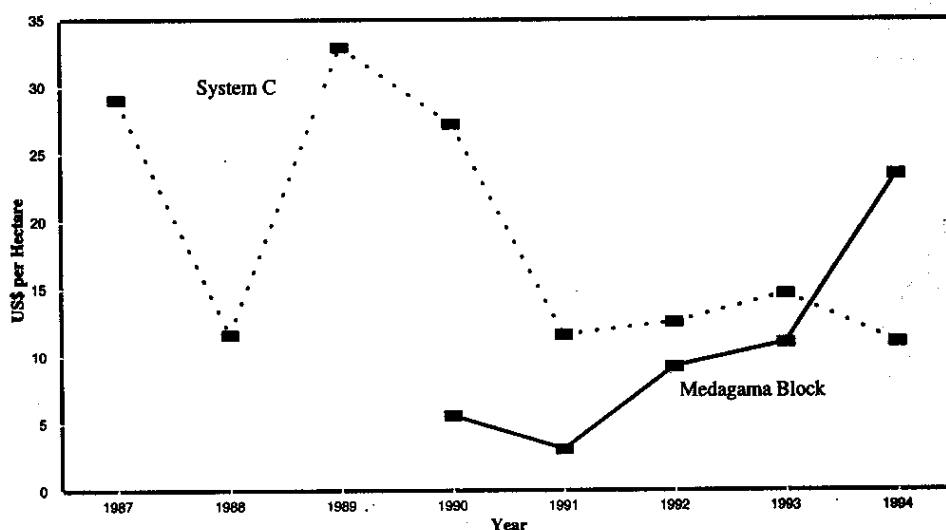


The decline in O&M expenditures per hectare can be explained by the fact that:

1. some of the regular O&M work is covered by funds under the rehabilitation program, and
2. the quality of O&M at the main system level been declined. (For example, desilting the main canal is changed from twice to only once per year).

Figure 5 shows the development in actual O&M expenses (in constant 1994 US\$) for both the entire Mahaweli System C and the area under the Diyawiddagama pilot organization in the Medagama Block. As far as the averages of the entire system are concerned, there has been a dramatic decline in O&M expenses per hectare: from almost US\$ 30 in 1987 to US\$ 11 in 1994. As the participatory management program only started in late 1992 it is not possible to attribute most of the reductions in O&M expenditures to this program. However, the trends are mutually supporting. At the level of the pilot organization we see a different picture arise, from almost US\$ 6 per ha in 1990 to US\$ 24 per ha in 1994, which is due to the extra attention (including an increase in O&M contracts) this area received, being a pilot area for system rehabilitation and participatory management under a Japanese aid program.

Figure 5. *Actual O&M expenditures per hectare for System C and Medagama, 1987-1994*



FINANCIAL PROBLEMS OF FARMER ORGANIZATIONS

The multi-functional farmer organizations in Kaudulla and Mahaweli System C performed well financially in the first few seasons of their involvement in new activities. However, the Pubudu organization has almost collapsed after four years of existence and the farmer federation in Kaudulla is facing severe difficulties. There are signs that the distributary organization in Mahaweli System C will follow the same pattern. There are at least seven reasons which explain this:

1. Lack of capital to bulk-purchase fertilizers and agro-chemicals from the fertilizer cooperation or private companies. Lack of access to credit facilities and the high 'transaction' costs of banking.
2. Increasing competition by other input supplying agents like the system level farmer federation in Kaudulla, other farmer cooperatives and private traders.
3. The inability of farmer organizations to supply inputs on time and on credit. Farmers prefer to pay for their inputs after completion of the harvest, even if they have to pay a high interest. The organizations neither have the resources to pre-finance these inputs, nor have the means to force farmers to pay their dues after they have sold their harvest.
4. The high cost involved in transporting inputs to the office of the farmer organization and the small savings farmers make by buying fertilizers from the farmer organization.
5. Mixed government support and resistance to water user groups being involved in the provision of non-O&M services.

6. Lack of interest of leaders to invest free labor in activities that are not remunerative to them and resistance from members to further deal with leaders that have tried to personally take profits from these activities. Rather than trying to replace influential leaders, farmers generally choose to drop out of the organization.
7. Lack of financial accountability and transparency within the organizations.

Organization members have little, if any, control over the leaders' involvement in financial transactions. The economic and political status of leaders as well as the lack of direct representation in the organization make it difficult to force leaders to become more accountable. Since leaders are not paid, members are further reluctant to dispose of them for poor performance or "rent seeking" behavior. With current levels of income generation and fee collection, hiring more professional leaders is not a feasible option.

FINANCIAL PROBLEMS OF IRRIGATION AGENCIES

Centralized financing

There has been more rhetoric than reality about implementing turnover and participatory management. Little has changed at higher levels of the irrigation bureaucracy. Although the government espouses farmer participation at the local level, they have not devolved financial control and authority over O&M. Operation and maintenance budgets are still centrally determined and allocated. Allocations are adjusted throughout the year. The government still largely finances O&M.

CONCLUSIONS

The four most important conclusions of this chapter are the following:

1. Owing to both political interference in irrigation fee policies and resistance from agency staff, participatory management in Sri Lanka has only involved turning over O&M responsibilities to farmers at the level of distributary canals. No financial responsibility or authority over the O&M budget was transferred. The government continues to be the primary source of finance for O&M.
2. The contradiction between farmers having partial responsibility for O&M versus government controlling the financing of O&M has resulted in disappointing O&M performance. The strategy has neither increased farmer financial contributions to O&M nor resulted in significant reductions in government expenditures in O&M.
3. However, participatory management in Sri Lanka created the environment for farmers to gain more control over surplus of inputs, marketing and some agrarian services. The Federation in Kaudulla and the Diyawiddagama organization in Mahaweli System C have the potential to raise their own funds by getting involved in providing these services to farmers. However, there are serious concerns about the financial sustainability of these organizations: about 60% of the capital of the farmer organizations comes directly from public O&M sources.
4. Instead of using public O&M funds to invest in O&M improvements, both organizations use the funds for non-O&M activities. In System C, farmers have no problem with access to water. Under these conditions farmers prefer to use their resources for agricultural support needs. Farmers have no control over leaders over how they use the organization's funds. The unconditional financial support for O&M from the agencies and government control over O&M financing do not create incentives for farmers to

invest in O&M. Also, the low level of net returns for paddy production prompted farmers to place priority on reducing input prices and increasing sale prices through the of government O&M grants.

Participatory management should include more than establishing farmer organizations and asking them to take over O&M responsibilities. Local reforms should be accompanied by reforms within the agencies as well. Organizational reforms can only be introduced if they are supported by financial reforms. This study supports the following recommendations, if the policy goal of local self reliance for irrigation is to be achieved:

1. O&M grants to farmer organizations should be reduced or eliminated;
2. Require local matching investments in order to obtain government subsidies;
3. Take measures to strengthen the legal status of farmer organizations and mechanisms for accountability of leaders to members;
4. Establish measurable water rights;
5. Require farmer payment for O&M services;
6. Reorient the gation agency to become service-providing authorities which are made accountable to the water users through dependence of the agency on service fees;
7. Declare clear policies about the separation of responsibilities between farmers organizations and government agencies.²³

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END NOTES

¹ These costs include irrigation infrastructure development expenditures, but exclude costs related to settlement, supervision and general administration and overhead.

² In 1986 US\$ 1 = Rs 28. In 1994 US\$ 1 = Rs 48. Unless mentioned otherwise, constant 1994 US\$ prices are used in the rest of this chapter.

³ Aluwihare and Kikuchi (1991) estimate the cost of construction of Mahaweli System C (i.e., excluding other settlement costs and general administration) at US\$ 7,200 per ha (1986 prices).

⁴ Sample sizes were 40 farmers each in Kaudulla and Mahaweli System C. Selections random, stratified by upper versus lower end locations.

⁵ Hydrologic time series data at the level of the main system were obtained from the government offices at the system level. At the levels of the selected distributary canals and field channels measurement devices were installed and calibrated at selected control points. Twice daily water readings were taken at these points, as well as the gate settings of all the gates in the distributary canals and field inlets of selected field channels. The readings were converted into daily and weekly supplies (in mm) and the observation of the gate settings were converted into actual rotation schedules. As the *maha* 1993-94 season was heavily distorted by floods, we only consider the *yala* 1994 measurements for this chapter. In order to be able to make a rough comparison of hydrologic performance before and after the participatory management program, our *yala* 1994 data are compared with averages of the *yala* 1978-1983 seasons, which were studied by Abernethy (Data for 1985). Agricultural production data were obtained from two household surveys of 40 farmers in Pubudu and 40 farmers in Diyawiddagama, respectively.

⁶ As reliable rainfall data were not available for all seasons, Annex Figure 3 only includes actual tank water supply. An average of 1,750 mm per year of rainfall can be added to these figures.

⁷ RWS is here defined as the ratio of Total Tank Water Supply plus Effective Rainfall to Consumptive Use. Consumptive Use is defined as the total water requirement for Et_{paddy} . Land preparation and daily percolation and have been calculated by using CROPWAT. Consumptive Use excludes conveyance losses and system runoff.

⁸ Considering only the ET requirement for paddy gives us Relative Water Supply of 1.85.

⁹ For the same distributary canal Abernethy reports an average RWS of 1.15 for the 1978-1983 *yala* seasons.

¹⁰ Considering only the ET requirement for paddy gives us a RWS of 3.70.

¹¹ Given the fact that the distributary canal and most field channels are lined, conveyance losses are assumed to be low.

¹² The relatively low *maha* figures are due to crop damage as a result of severe flooding.

¹³ These GVOs correspond with US\$ 52.00 and US\$ 35.00 per 1,000 m³ Water Consumed.

¹⁴ The total expenditure on system improvement in Medagama block (2,059 ha) is US\$ 104,069. The estimated expenditure in Diyawiddagama (200 ha) should at least be US\$ 1,010, but is probably higher knowing that Diyawiddagama organization received extra attention being 'a model unit'.

¹⁵ This equals about US\$ 2.00 per season per ha, as the average paddy landholding is 1 ha.

¹⁶ It is estimated that the Federation served approximately 30% of demand for fertilizer in the area in 1992 and 10% of demand in 1994.

¹⁷ 4% is actually an insignificant level of net profit given interest rates on credit in area of about 9% for government sponsored loans and much more in the private sector.

¹⁸ As the organization also sells to farmers outside Kaudulla it is hard to assess what percentage of the fertilizer market in Kaudulla the organization serves, but it is estimated for 1994 that this is more than 50%.

¹⁹ It is commonly known among farmers that for each load of paddy they deliver to the PMB farmers are expected to contribute one bag of paddy to the manager of the stores.

²⁰ Farmer organizations that are officially registered as agents of the PMB receive a guaranteed price, which unregistered private traders do not get.

²¹ These actual expenses are higher than the estimated average O&M expenditures of major schemes in Sri Lanka, which according to Fernando (1993) is approximately US\$ 8 per ha, but they are still much lower than the estimated required expenditures, which is estimated to be between US\$ 28 and US\$ 38.

²² As is shown earlier in this chapter, this change is a result of increased farmer involvement in seasonal planning and water allocation at the system level.

²³ The author would like to thank Anuruddha D.H.K. Kankanamage and Anura M. A. Ekanayake; Mr. Ivan Silva, Mr. M.G.S. Gunasekera, Mr. R.M. Punchibanda and their staff in Kaudulla; Mr. N. Bandara, Mr. D.A. Sarath Kumara, Mr. L.A.D. Karunaratne and Mr. Lakshman Fernando and staff at Mahaweli System C; as well as the leaders and the members of the farmer organizations in both systems for their hospitality and sharing their ideas and information so willingly with us.. Thanks are also given to Lionel Siriwardena (Peoples Bank HQ) and Jeffrey Brewer, K. Jinapala, Ann Abeyewardene and C.M. Wijayarathna at IIMI-SLFO for their support.

Annex A

In the first week of May 1994 the Sri Lankan Parliament discussed and passed Amendments to the Irrigation Bill in which farmers' organizations are given the opportunity to operate and maintain irrigation infrastructure below the distributary canal level in exchange for exemption from paying water taxes. The following is an excerpt from the discussion in parliament:

The Minister of Forestry, Irrigation and Mahaweli Development:

'The Amendments to the Irrigation Bill seek to transfer to farmer organizations more powers to see that farmers get a better service. The bill does not intend to levy taxes on the farmers, but farmer organizations will be responsible for the maintenance of irrigation works.'

An opposition MP:

'These amendments could cause burdens on the farmer organizations who will have to undertake the maintenance of the distributary systems which hitherto was done by the Department of Irrigation. If this is the case you must think about allocating a grant for each farmer organization.'

Another opposition MP:

'You propose (...) farmer organizations to levy a tax for the supply of water (...). You are only using these organizations to collect the money for you and make them bear all the responsibilities for this.'

A Minister:

'The opposition gave a wrong interpretation to this bill. These amendments are geared to bring about more participation by the farmers in conducting their affairs.'

An opposition MP:

'These amendments will not benefit the farmers. It is like changing pillows for a headache. You have empowered farmer organizations to impose levies and supervise the distributary systems. This should be the responsibility of the government.'

The Minister again:

'The bill seeks to get the participation of the Farmers Committees in the management and the maintenance of the irrigation systems. This work is now being done by technical officers. I personally know how inefficient some of them are. (...) farmers themselves would decide whether any taxes are to be levied or not. There is no compulsion on the part of the government. As far as the government is concerned the tax is being abolished.'

('The Island' daily newspaper, May 4 and 5, 1994)

This parliamentary debate not only reflects the political sensitivity of farmer involvement in operation and maintenance (O&M) activities, but also illustrates how the debate on sharing financial responsibility for O&M by levying water taxes or fees is mystified by opportunistic and populist political statements.

Although farmers hardly paid irrigation fees under the then ruling UNP government, People's Alliance Presidential candidate Prime Minister Mrs. Chandrika Bandaranaike Kumaratunge said during the presidential election campaign of 1994:

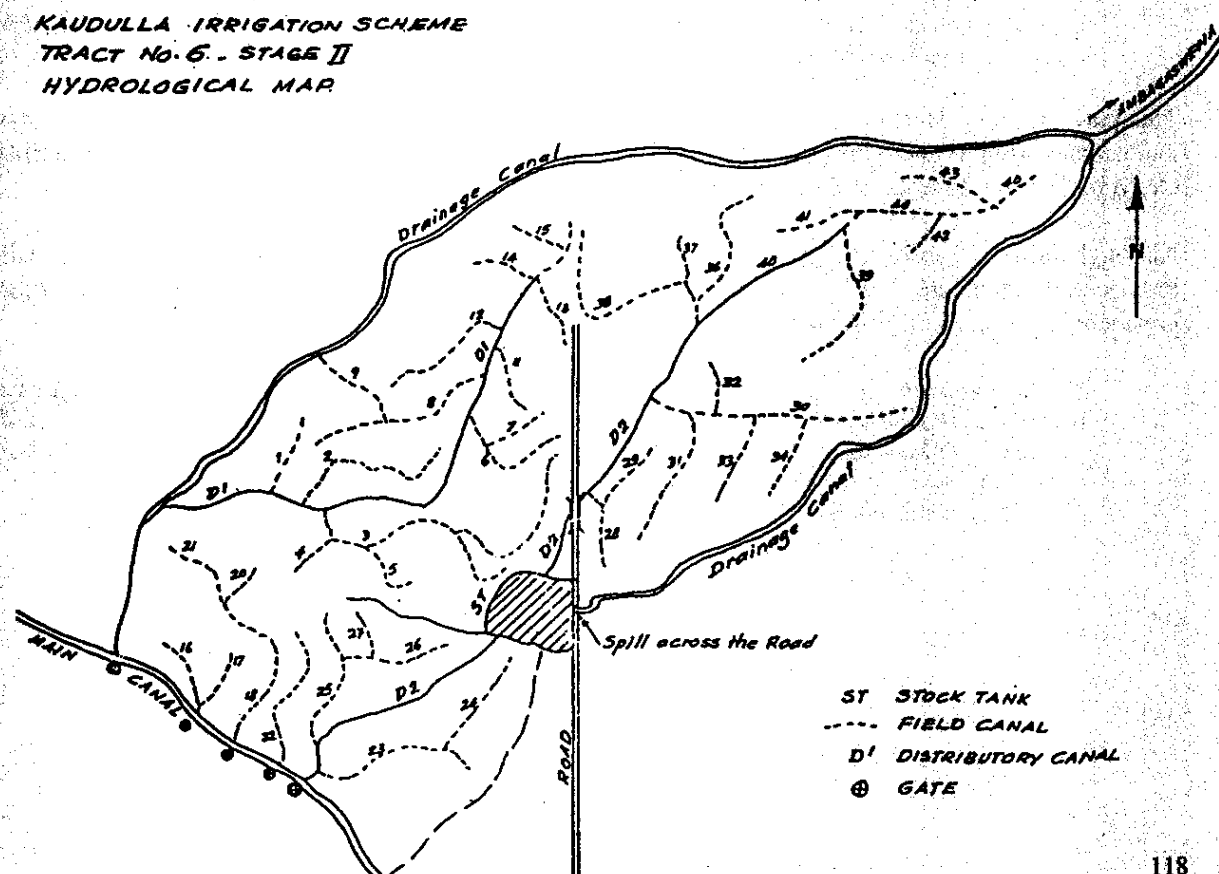
'farmers of this country who enjoyed free irrigation facilities down the ages had to pay a water tax for the first time when Mr. Gamini Dissanayake was Minister of Lands, Irrigation and Mahaweli Development. Added to that the UNP government abolished the fertilizers subsidy given to farmers. It is the People's Alliance who came to the rescue of the farmers'

('Daily News', October 18, 1994)

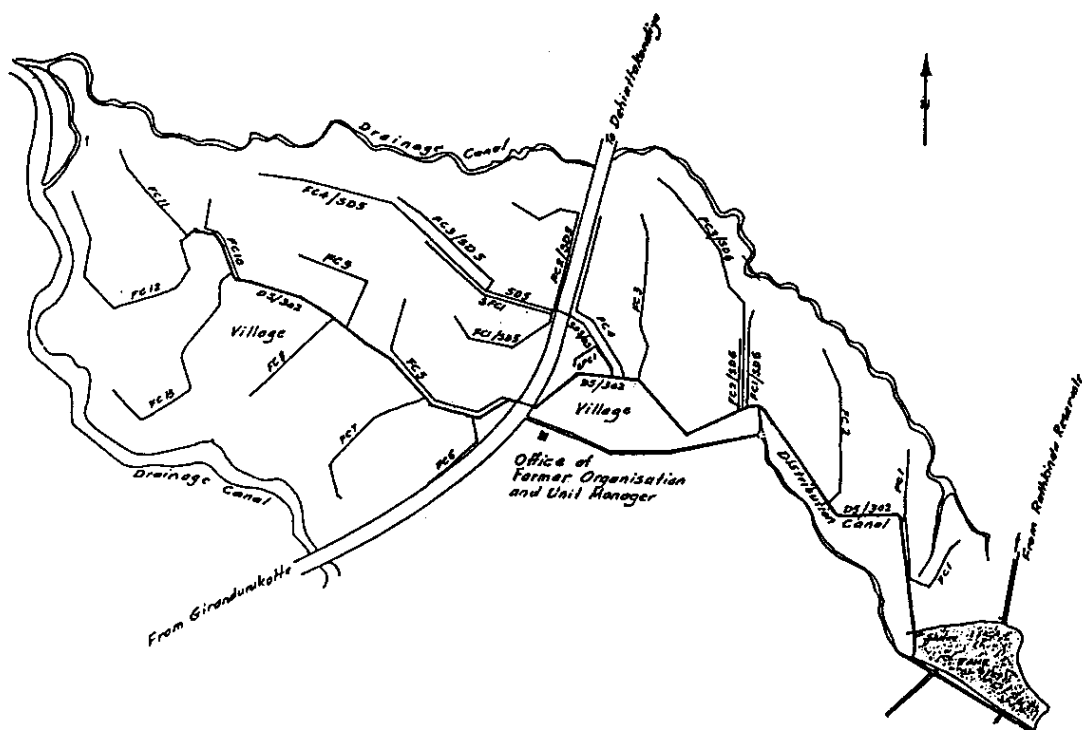
Annex Table 1. General features of the two selected distributary canals.

	Kaudulla Sample Canal	Mahaweli C Sample Canal
Name	Pubudu	Diyawiddagama
Command area (ha)	286	194
Average paddy land holding (ha)	0.8	1.0
DC takes water from	High level main canal	Minor tank
Length of DC	3.5 km	3.5 km
Number of FCs	20 from MC: 7	20
Average number of fields per FC	9	10
Maximum discharge and duty observed at head of the DC	0.37 m ³ /s 19.5 mm/day	0.54 m ³ /s 23.9 mm/day
Condition of DC	Poor; unlined, but some side walls; many bank cuts; siltation	Good; lined; few small cracks; well maintained
Condition of FCs	Fair; unlined, but some side walls; many cuts; siltation	Good; lined; few cuts; well maintained
Condition of control structures	50 % has no gates	5 % has not gate

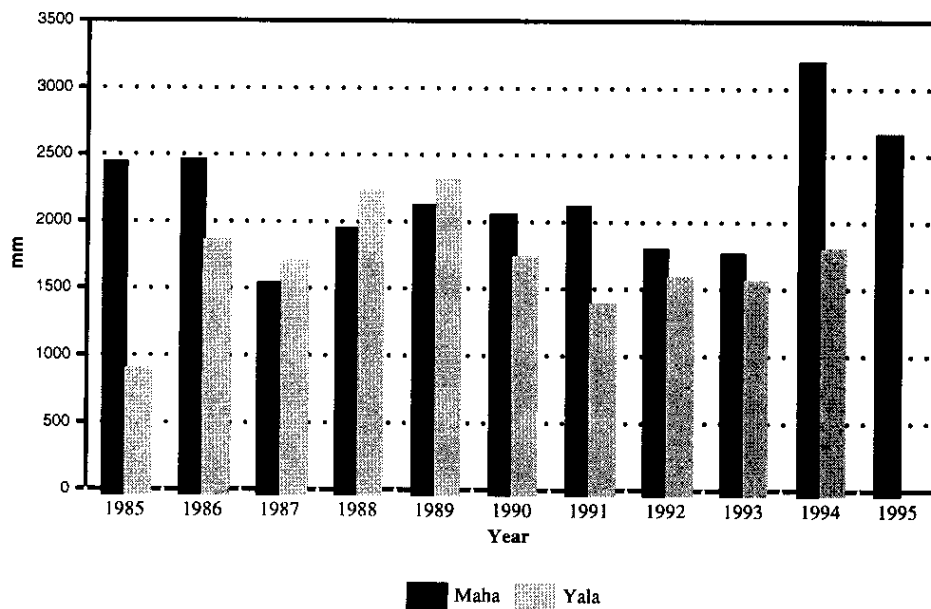
Annex Figure 1 . Pubudu unit in Kaudulla Irrigation Scheme



Annex Figure 2. Diyawiddagama unit in Mahaweli System C



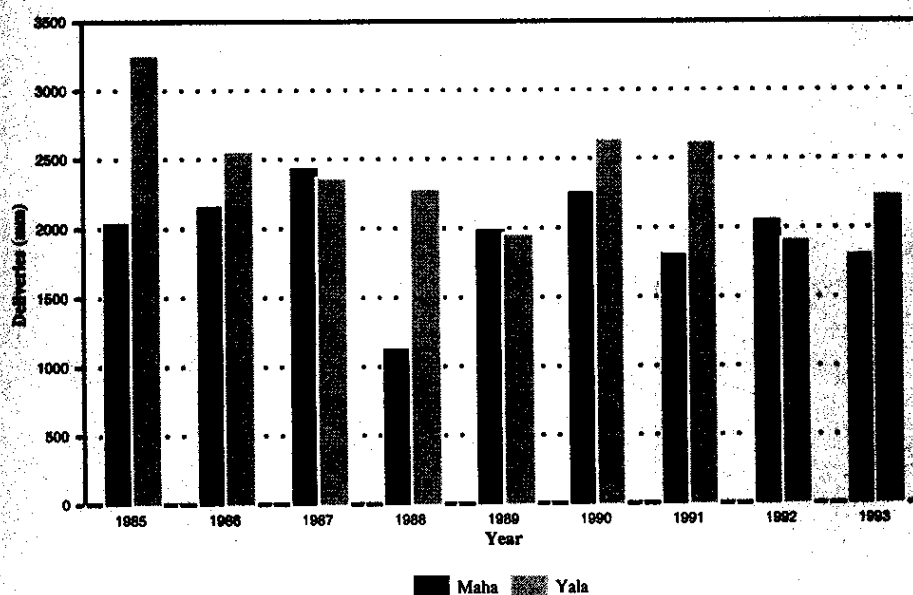
Annex Figure 3. Total seasonal water supply, Kaudulla Irrigation Scheme, Yala 1983 to Maha 1995



Source: Office of the Irrigation Engineer, Kaudulla

Annex Figure 4.

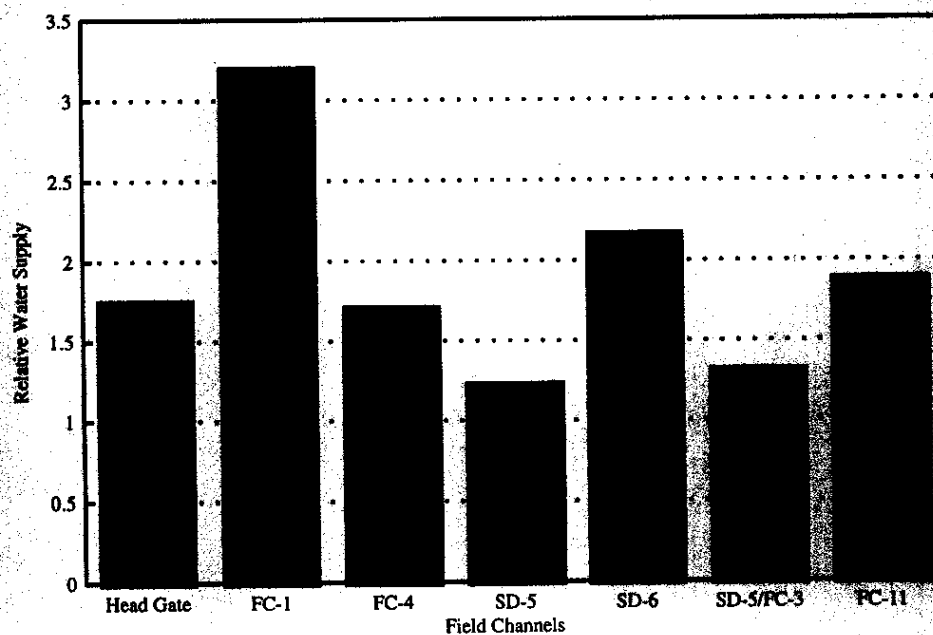
Seasonal tank water supply, System C, 1985-1993



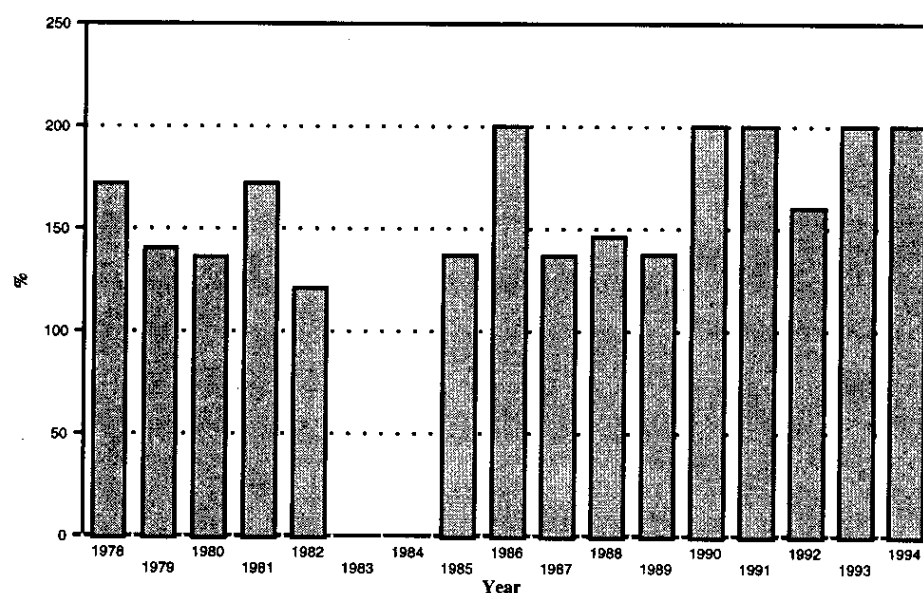
Source: MEA, System Project Office, Mahaweli System C

Annex Figure 5.

Relative water supply of selected field channels in Diyawiddagama, Mahaweli System C, Yala 1994



Annex Figure 6. *Annual cropping intensity, Kaudulla Irrigation System, 1978-1994*



Source: 1978-1982 data are computed from Abernethy, 1985; 1983 and 1984 data are not available; 1984-1994 data collected from the Office of the Irrigation Engineer

Annex Figure 7. *Rehabilitation work in Pubudu area, total value and value contracted out to Pubudu*

