

# Management Turnover in A Major Irrigation Scheme of Sri Lanka

## A Study of Consequences and Constraints

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### INTRODUCTION

SRI LANKA HAS experienced a noteworthy increase in rice production since Independence. This achievement largely depended on a two-pronged strategy: expansion of the cultivated area and intensification of cultivation both of which were facilitated by the strengthening of irrigation infrastructure. A large proportion of public investment was devoted to irrigation, mainly to new construction since the 1950s. However, it was in the early 1980s that the expenditure on irrigation construction in Sri Lanka escalated to unprecedented heights. It reached an all time peak of Rs.3,034 million (US\$ 62 million) in 1982 from which time investments began to wane (Aluwihare and Kikuchi, 1991).

The period which followed is mainly characterized by a live interest in irrigation rehabilitation and improved management in major irrigation schemes (Abeysekera, 1993). Mounting operation and maintenance (O&M) expenditure and irrigation problems in these schemes compelled the authorities to adopt alternate strategies for irrigation management.

A shift of policy emphasis was evident to change the role of farmers from passive recipients of irrigation benefits to active partners in the management process sharing responsibilities with the agency staff (Abeywickrema, 1983). Organizations of farmers on pilot bases commenced with different water management experiments such as the Minipe Water Management Project and the Gal Oya Left Bank Water Management Project launched in 1979.

However, the concept of participatory management was applied on a wider scale in the mid-1980s under the Integrated Management of Major Irrigation Schemes (INMAS) Program of the Ministry of Lands and Land Development. System managers increasingly sought beneficiary involvement to ensure smooth functioning of the systems and to increase the efficiency of operation and maintenance tasks. Irrigation management transfer to farmers has been attempted in varying degrees by many developing countries. Few systems in the Philippines have moved to complete turnover while countries like Indonesia and Madagascar have phased out their activities towards this direction (Vermillion, 1991). There are still other countries where no explicit policy exists for management turnover, but have made some progress in increasing the farmer involvement in management functions. Sri Lanka also falls into this category. Changes initiated towards management turnover in Sri Lanka have made many strides during the last decade. The purpose of the present paper is to examine this process in detail and to study its impact with reference to Huruluwewa, a major irrigation scheme in the north central dry zone of Sri Lanka.

### PHYSICAL SETTING

Huruluwewa is located in the Anuradhapura District of the North Central Province (NCP) in the dry zone of Sri Lanka (Figure 1). It lies about 40 km southeast of Anuradhapura, the present capital of the NCP. The reservoir is constructed by damming Yan Oya, a stream which drains into the Indian Ocean in the northeastern shores of Sri Lanka. Yan Oya is marked for its seasonal flow which depends on the rainfall rhythm of the dry zone of Sri Lanka. As long-term climatological records are not available for Huruluwewa the salient features of the rainfall rhythm and variability characteristics have to be analyzed with reference to Anuradhapura, the closest climatological station.

The usual rainfall distribution in this part of the country shows a double maxima falling within the pre-southwest monsoon period in April and within the north-east monsoon period in October. Nearly three fourths of the rainfall in the area is received from October to January from the north-east monsoon and cyclonic activity. June is the driest month of the year (13 mm - average for 40 years) while October records the highest rainfall (255 mm - 40 year average). Long-term data clearly indicate an 'effective dry period' (which according to Domros, should contain at least 3 consecutive months with monthly rainfalls not exceeding 102 mm) with significant drought characteristics from May to August (see diagram for Anuradhapura climatological station in Figure 1). It is pertinent to note that moisture deficiency during this period does not permit any seasonal cropping without recourse to irrigation. The situation with cropping is further aggravated owing to the marked variability of precipitation particularly during the drier months.

Temperatures in the area are generally high, averaging between 25 °C (December / January) and 29 °C (May - September). The warmest period coincides with the southwest monsoon season when a warm dry wind - "*kachchan*" -

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blows over the dry zone. This wind is characterized by a drying effect, higher temperatures and low humidity (Domros, 1974).

On the whole, temperature poses no problem to agriculture in the Huruluwewa scheme. It is the water availability which determines the type of agriculture as well as the extent to be cultivated during each season. Water availability in the system in turn is the function of a combination of variables such as the water yield of the catchment, diversion from other sources (e.g., Mahaweli scheme), evaporation and conveyance losses through the irrigation system.

Owing to the limited inflow from the catchment water scarcity has become a consistent feature at Huruluwewa. With a view to ease this situation efforts were made to divert 150 cusecs (4.25 cumecs) of water from the Mahaweli scheme. However, this amount never reaches Huruluwewa as the 32 km-long feeder canal is tapped at numerous locations by illicit cultivators.

## **SETTLEMENT AND SYSTEM CHARACTERISTICS**

### **Historical Overview of Settlement**

Alienation of land in the Huruluwewa colonization scheme started in 1952 and by the end of 1953, 2,239 ha had been alienated among 1,051 allottees (Farmer, 1957). At the completion of settlement 2371 allottees received land in the Huruluwewa scheme. The earlier settlers at the left bank (from tract 1 to 5) received 2 ha of paddy land and 0.8 ha of highland while subsequent allotments in tract 6 of the left bank and in the right bank were reduced to 1.2 ha of paddy and 0.6 ha of highland. Although the total number of families at present approximates to 4,500 second and third generations of the original settlers were deprived of securing land in the scheme owing to the acute shortage of this resource. Hence, with the increasing population and resulting pressure on limited land, unabated illegal sub-division of the original allotments proceeded at an alarming rate. The situation also led to the encroachment of the reservations which invariably increased the area to be irrigated under the scheme approximately to 3,850 ha and the number of beneficiary farm families to 3,014.

### **Technical Characteristics of the Irrigation System**

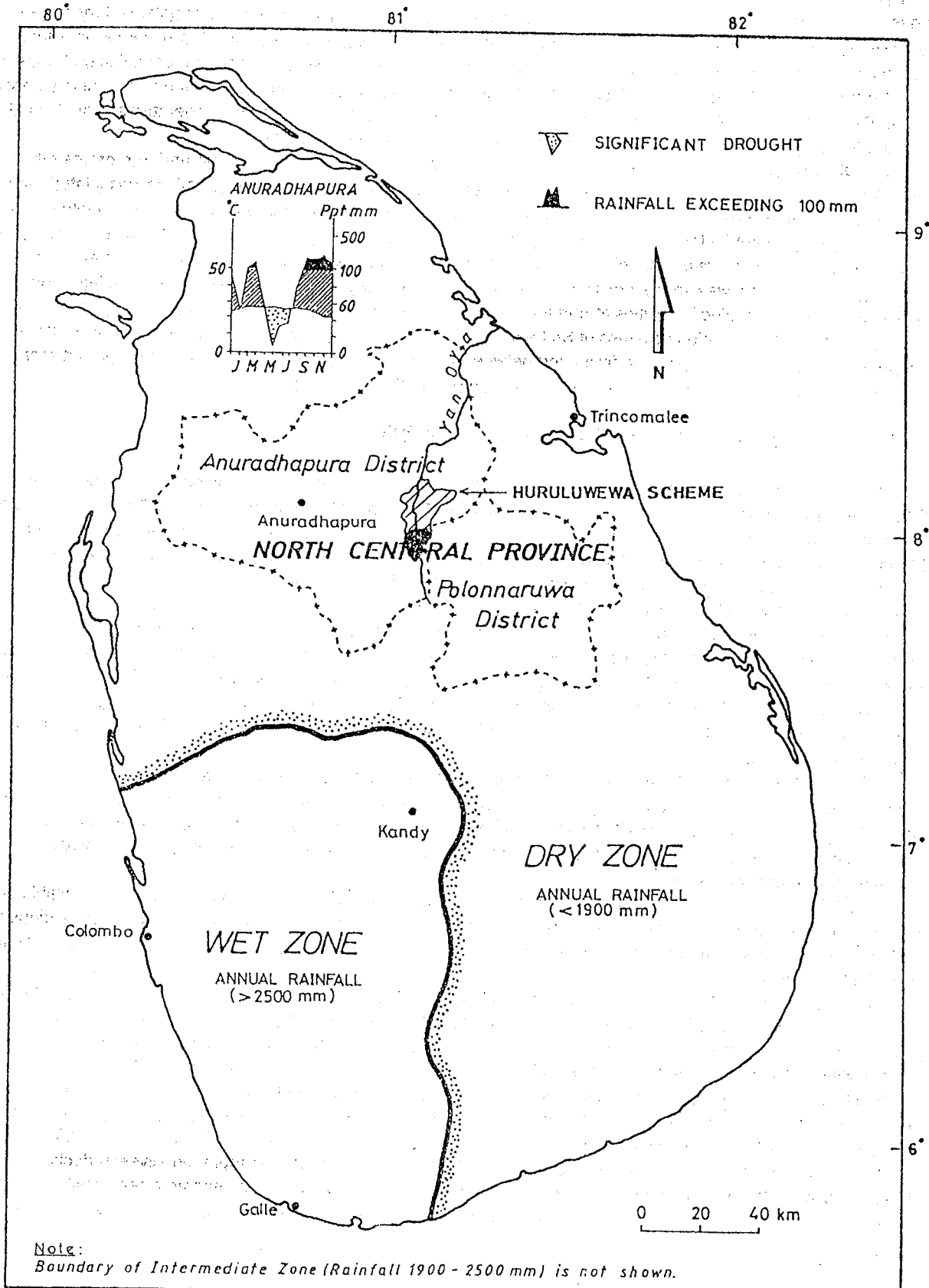
The gross capacity of the reservoir at full supply level (F.S.L.) amounts to 6,790 hectare meters (HM) including the dead storage of 278 HM. The reservoir covers 1,640 ha at the F.S.L. Water distribution from the reservoir is effected through two main canals. The left bank canal is 15 km long and delivers water to 10 distributary canals (DCs). The right bank canal is 15.6 km long. As the latter failed to supply water to the tailend of the scheme another tank - Kivulekada - was developed and absorbed into the system to distribute irrigation water to 3 tracts at the tail-end. The main canal of Kivulekada is 7.6 km long. The right bank canal including the 3 DCs of Kivulekada, possesses 16 DCs. The irrigation system consists of a total of 304 field canals (FCs). Table 1 shows the details of the canal system and the extent of the irrigated area.

### **Rehabilitation, Operation and Maintenance**

Huruluwewa scheme came under the Major Irrigation Rehabilitation Project (MIRP) in 1986. By that time FOs had not been formed and there was no effective dialogue with the farmers to incorporate their views in rehabilitation work. Field evidence points to the fact that a proper assessment of the irrigation problems was not made prior to rehabilitation. A survey conducted by the IMD two years after the commencement of the MIRP revealed that much of the irrigation problems remained unresolved even after the rehabilitation of the irrigation system. Defects of the structures of the FCs and difficulty of conveying water to the tail end of the left bank main canal are some cases in point.

The post-rehabilitation era has shown a steady rise in operation costs and a general rising trend in maintenance costs. Table 2 shows that expenditures on both items have recorded peaks in 1989 after which year the expenditures decreased for about two years. However, the figures for 1992 and 1993 have escalated owing to the increasing costs of materials and labour.

Figure 1. Location of Huruluwewa Scheme.



## **The Agricultural Context**

Agriculture in the Huruluwewa scheme pivots on rice cultivation. The major cultivation season - Maha - extends from November to February and coincides with the north-east monsoonal rains. However, supplementary irrigation is necessary to ensure a continuous water supply to rice cultivation during this season. It is observed that there are intermittent years where cultivation was not possible even during Maha owing to inadequate precipitation to raise the tank storage to the required level. Cultivation during yala - the dry season - is rare. Crops should be entirely irrigated during this season owing to the occurrence of drought conditions. Further, increased temperatures, cloudless skies, dry winds and high rates of evaporation reduce the moisture availability for crops.

Attempts have been made by the authorities to discourage rice cultivation during yala and to promote other field crops (OFCs). The general reluctance of the farmers to adopt OFCs and the complications associated with the distribution of water to limited areas on the basis of suitability and/or demand from the water users together with the market bottlenecks contributed to the limited success associated with such attempts. Among the different crops soya beans and chillies were more acceptable to the farmers. Similarly, OFCs were cultivated in restricted areas during yala while paddy cultivation was rarely practiced in this season. In many years yala season is completely devoid of cultivation. Overall cropping intensities at Huruluwewa are generally low, even lower than the average (i.e., around 120 percent) for the major irrigation schemes of Sri Lanka. The yield levels of rice have not shown a steady increase over the years, instead they seem to have fluctuated between 2 metric tons per hectare (mt/ha) to 4 mt/ha between 1983 and 1993. The average yield of soya beans for the same period was 1.7 mt/ha

## **FARMER MOBILIZATION: COMMENCEMENT AND PROGRESS**

FOs in the Huruluwewa Scheme originated with the INMAS Program of the IMD of the Ministry of Lands in the mid-1980s. Under this program institutional organizers (IOs) were appointed to be resident in the scheme and to conduct awareness and training programs in an informal way. Field evidence reveal that the IOs, young graduates just out from the universities, were not considered as officers by the farmers. Their role as catalysts and close associates of the farmers contributed to bridge the gap between the latter and the irrigation staff.

Although the idea of farmer mobilization came from the top with the INMAS Program, by the time farmer organizations were formed majority of the water users were made aware, through formal meetings and informal discussions with the IOs, as to the value of such organizations and benefits they can derive by active participation. FCOs were the first to be formed as informal organizations with an average of about 10 farmers. The representatives from the FCOs formed Sub-Project Committees from which two office bearers including the president made representation in the Project Committee (PC). Sub-Project Committees were later termed as Distributary Canal Farmer Organizations (DCFOS).

DCFOS were considered to be formal institutions which were recognized by the government departments. They could register with the ID, IMD and the Agrarian Services Department to undertake contracts within their respective areas. They were not required to hold assets that a normal contractor is expected to possess or go through the open tender procedure. They could also be engaged in other fund raising activities such as the sale of agricultural inputs and purchase of rice for re-sale.

The INMAS Program, from its inception, tried to define the role of FOs and to make these institutions viable. Their constitution, rules governing them and the expected roles were clearly laid down. Although these organizations were confined to water management functions at the beginning, their horizons were later enlarged to cover many other facets of agriculture affecting settler life.

FOs progressively increased in the Huruluwewa Scheme, since their inception in 1986. DCOs which amounted to 6 in 1986 increased to 13 in 1993 while the FCOs multiplied from 126 to 205 during the same period. It is now proposed to have 15 DCFOS. The increase of the latter is due to the split of the existing organizations. The total membership of the FOs increased from 2,283 in 1986 to 3,014 in 1993. There is conclusive evidence to suggest that farmer involvement in operation and maintenance work in the scheme increased with the FOs. Another significant step associated with the INMAS Program was the provision made available to the DCOs to send their presidents and secretaries to the PC. At Huruluwewa there are 26 farmer representatives in the PC coming from 13 DCFOS and they outnumber the officials from various line departments. Participation of the farmer representatives in decision making at project level and sharing management responsibilities with the agency staff has become a reality with the INMAS Program. It has been observed that farmers' involvement at PC level is rare outside Sri Lanka (Chambers, 1988).

## THE TURNOVER PROCESS

### Collection of O&M Fees

The first step in the turnover process was the collection of O&M fees introduced to Huruluwewa in 1986. The rate was Rs.250 (US\$5.1) per ha of irrigated land per season. The Colonization Officers (COs) of the Ministry of Lands were entrusted with collecting this fee and they were allowed a commission. Funds collected had to be deposited with the Government Agent - the chief administrative officer of the district - who had to send the collection to the Treasury. The system worked well for about two years at the inception and a separate Deputy Director for O&M collections was appointed under the IMD. Nevertheless, the IMD was forced to abandon the system in 1989 for several reasons such as the mounting political pressure from the opposition, farmer reluctance to pay an area-based fee vis-a-vis the inequalities in water distribution and failure to take legal action against absconders.

### Handing over of Canals to the Farmers

With the creation of the IMD directly under the Ministry of Lands and the establishment of FOs under its sponsorship, maintenance of FCs and water distribution to the individual blocks were entrusted with the farmers. Under Irrigation Department Circular No. 01 of 1989, DCs in major irrigation schemes were to be handed over to the DCFOs. Turnout attendants who operated the gates had to be withdrawn and the DCFOs were to be paid a lump sum calculated on the basis of a formula prepared by the ID for operation purposes. However, release of water from the main canal (MC) to the DCs was accomplished by paid labourers of the ID. O&M of the MC are still the sole responsibility of the ID.

With the handing over of the DCs, maintenance other than major repairs to the structures, also passed on to the hands of the DCFOs. The government makes financial allocations twice a year for the maintenance of the irrigation systems. Prior to the establishment of the FOs work was done through paid labourers. However, presently FOs perform these tasks on a *shramadana* (voluntary communal labour contribution) basis and obtain government payments to enhance the financial strength of the DCFOs. Farmer participation in *shramadana* and the value of labour contributed in financial terms seem to be substantial (Table 3).

The role of the ID in maintenance with reference to FCs and DCs has now been reduced to one of imparting technical know-how through on-the-job training of the farmers, advice on what tasks to be accomplished and overall monitoring and supervision. However, financial allocations made from the Treasury are disbursed to the FOs by the ID expecting the farmers to engage in maintenance functions and water distribution at tertiary and secondary levels of the canal network.

DCFOs are also given such construction and maintenance jobs as concrete work up to 1/4 cube, earth work, jungle clearing along the DCs, etc. In most cases, the farmers perform these jobs at low cost enabling the profits to accrue to the funds of their respective DCFOs.

DCFOs at Huruluwewa are now engaged in certain functions related to overall system improvement as well. Contracts pertaining to concrete lining of channels, concrete rings for bridges, gates for controlling water flow at the turnouts, provision of drainage and building of DC roads have already been undertaken by the DCFOs which hold the registration as contractors with the ID. They are legally empowered to do contracts up to the value of Rs.750,000 (US\$15,306). However, they are usually given contracts up to Rs.250,000 (US\$5,102) at the completion of which a second contract can be undertaken. This procedure where a DCFO is functioning for the benefit of its own members has a distinct advantage over the private contractor system in which case the quality of work is largely sacrificed for the profit motive.

With the strengthening of the FOs the existing setup with maintenance has taken a new turn. Since the collection of O&M fees was abandoned the Treasury disbursed the money through the ID for the DCFOs to accomplish the work. The discussions with the farmer leaders revealed that the FOs are prepared to handle water distribution and maintenance tasks under their command on a self-reliant basis provided they are in a position to generate the necessary funds. However, the government has no plans to extend farmer responsibility above the DCs in the immediate future and to advance towards self-management of the total system by the farmers.

## AGRICULTURAL SUPPORT SERVICES THROUGH FARMER ORGANIZATIONS

DCFOs at Huruluwewa are not confined to water distribution alone. It is noteworthy that they have ventured into many other support services needed by the farmers such as agricultural credit, supply of fertilizer, weedicides and pesticides and provision of extension services. The Philippine experience shows that this type of production-related support services by innovative associations enhance their collective capacity to facilitate the acquisition of agricultural inputs (Wijayarathne and Vermillion, 1994).

## **Agricultural Credit**

DCFOs have arranged their own credit disbursement systems to the farmer members depending on the funds at their command. Purposes for which the loans are granted vary. The most common category includes the loans given for cultivation purposes including the purchase of agro-chemicals. There has been instances when the loans were disbursed for self-employment. According to the records kept at the IMD office at Huruluwewa the total loans disbursed by the 13 DCFOs of the scheme up to the end of 1993 amounted to Rs.148,090 (US\$3022) and the recoveries are reported to be satisfactory.

It is interesting to note that the interest charged in many occasions is as low as 5 percent, a rate much below the interest charged by the banks. Another advantage of the credit system is the ease with which loans could be obtained. However, the major constraint to the expansion of the credit scheme operated by the DCFOs is the inadequacy of funds to cater to the demand from the farming community.

## **Fertilizer**

It is learnt that certain DCFOs in the Huruluwewa scheme have introduced an effective fertilizer distribution system whereby the organization undertakes to obtain fertilizer from outside and distribute from a point within the scheme easily accessible to the farmers. This procedure reduces farmers' transport costs and saves them from high prices usually quoted by the private traders.

## **Pesticides and Weedicides**

In the case of pesticides and weedicides, DCFOs negotiate with the companies dealing with such products, collect money from the farmers according to their requirements and obtain and distribute the products from a convenient point to the farmers. There are instances where the DCFOs disbursed such products on credit to farmers. The records indicate that 99 percent of the money advanced have been recovered. Similar arrangements are made with the Agrarian Services Department to procure seed paddy.

## **Extension Services**

There are also instances where the demand was raised from among the farming community for specific services. In the circumstance DCFOs have mediated to obtain such services from the line departments/agencies. Demand for training in soya processing is a case in point. Similarly, farmers indicated a willingness to receive agricultural extension services for onions and vegetables under agro-wells.

## **CONSEQUENCES OF TURNOVER**

Although the turnover process has gathered momentum over the years, it has been restricted to the secondary and tertiary levels of the irrigation system. However, both the farming community and the agency staff at Huruluwewa have realized the positive consequences of the process. The agency staff now feel that their work has become easier as the farmers are made aware and the farmer representatives have first hand experience of the problems associated with the system.

Changed behavior of the farmers at the *kanna* (cultivation season) meeting proves this point. The idea of this meeting is to convene as many farmers as possible and to discuss matters pertaining to the cultivation season in advance. The usual procedure in all major irrigation schemes was for the agency staff to thrust upon pre-conceived decisions on the farmers (Murray-Rust and Moore, 1983). The latter in many cases resisted such decisions and the meeting often ended in a chaotic situation. Nevertheless, as the turnover process set in, a pre-kanna meeting is held where the agency staff and the farmer representatives discuss the issues relating to the forthcoming cultivation season and jointly arrive at decisions. The representatives in turn convey such decisions to the farming community at large before the kanna meeting. The revised procedure has been instrumental in avoiding unnecessary confrontation and in developing a friendly atmosphere at the meeting.

Similarly, in all fields of system management the agency staff has now inculcated the habit of consulting the farmers, notably through the farmer representatives. It is noted that the orthodox attitude of the irrigation staff has changed and they are prepared to accommodate the views of the farmers in operation, maintenance and system improvement activities. The significance of FOs has been recognized by many line departments and activities of the organizations are expanding to embrace different facets of irrigated agriculture and farmer welfare. Selection of farmers for training programs, recommendation for bank loans, resolution of petty disputes, etc., are increasingly handled by the FOs. It

is also observed that direct contacts with the officials to resolve individual problems have been reduced to a minimum. Instead, farmers initially approach the organization which in turn takes up the matters with the agency staff. The procedure has facilitated the work of the latter on the one hand and has saved the unnecessary trouble that the farmer has to undergo on the other.

Attempts at turnover have also improved the water distribution within the irrigation system. The majority of the farmers are now concerned in sharing the available quantity of water without jeopardizing the interests of the fellow water users. Such measures as distribution of water commencing from the tail end of the main and DC systems and the selection of farmer representatives from the water-deprived areas of the system have contributed to minimize the inequitable distribution of water. There is conclusive evidence to suggest that breakage of structures by farmers is a phenomenon of the past.

The operational efficiency of the irrigation system has also increased over the years since farmer representatives commenced handling water distribution. There were many lapses on the part of the casual labourers of the ID who handled water distribution earlier, specially when they were resident away from the areas entrusted to them. On the other hand, farmer representatives take a keen interest in opening and closing the gates of the FCs allowing only the required quantity of water. Handling of the secondary and tertiary level operation by FOs undoubtedly helped save irrigation water and reduce water duty, particularly since 1990.

With the handing over of the secondary and tertiary canal network, farmers took an increasing interest in the maintenance work as well. Whenever the maintenance expenditure was reduced by the government, participation in shramadana also increased. A comparison of Table 2 and Table 3 proves this point. It should be noted that farmer indulgence in maintenance not only enhances the possessiveness but increases the commitment to protection.

As the turnover process advanced some DCFOs ventured into different agricultural support services discussed earlier. Such steps strengthened the bond between the individual farmer and the organization and helped realize the potential of organized action to derive benefits unattainable through individual effort. Experience in the Huruluwewa scheme indicate that a few DCFOs are not only engaged in input supplies, but are active in purchasing the produce of the farmers. Field evidence points to the fact that such purchases at prices favorable to farmers were instrumental in stabilizing the prices at a higher level and breaking the monopoly of the private traders who were compelled to raise their purchase prices in a competitive bid thus benefitting the farming community.

## **MAJOR CONSTRAINING FACTORS**

The irrigation sector in Sri Lanka was highly subsidized throughout the years and farmers never paid back anything until the introduction of O&M fees in the mid-1980s. As indicated earlier this scheme had to be abandoned after about four years from its inception. Even after the FOs were formed and the turnover process commenced, the organizations were not in a position to manage their affairs independently owing to the weak financial position. Finances for O&M had to be continually released to the DCFOs from the government funds. Although these organizations have made a concerted effort to raise funds during the last few years, their financial resources are still thoroughly inadequate for self-management. All programs such as provision of credit, supply of inputs and purchase of farm produce which need a substantial capital outlay have suffered because of the financial constraints. It should be noted that the office-bearers of the FOs work on a voluntary basis. Although there is legal provision to get 0.5 bushels of paddy per season per acre (26 k.g./ha) of irrigated land in lieu of the services rendered by a farmer representative, all farmers do not pay this levy and it is not easy to resort to legal action against the absconders. However, the activities of the FOs consume a fair amount of time which otherwise can be devoted to private work by the office-bearers. In the absence of adequate remuneration some office-bearers of the FOs do not work with much dedication. This exerts an undesirable impact on the advance for self-management.

A rapid assessment of the FOs in the Huruluwewa scheme revealed that a very small proportion of the farming community is not at all interested in FOs. Varied factors such as indulgence in activities other than farming, personal disagreement with the farmer representatives, temporary interests in land owing to leasing or other tenurial arrangements, inter alia, explain this position. It is interesting to note that there are hidden tenancies which jeopardize the interests of the FOs. Such tenurial arrangements are the results of sub-division of original allotments among subsequent generations and unauthorized sale or mortgaging of land owing to poverty or non-residence in the scheme. On the whole, the situation negates the effectiveness of the FOs and minimizes the positive impacts of management turnover.

It is reliably understood that all farmer representatives are not equally committed and / or competent to impart the knowledge gathered through training programs as well as to pass all the messages they receive from the project staff and the officials of the line departments to the farming community. The existence of such communication gaps in the scheme has retarded the benefits that should be accrued to the farmers by the turnover process.

All DCFOs at the Huruluwewa scheme are not equally effective. Some have ventured into a combination of activities such as undertaking contracts, possessing and hiring of tractors to farmers, sale of agricultural inputs such as seed paddy, fertilizer, pesticides and weedicides, purchase of paddy and disbursement of agricultural credit while still others are confined to the routine activities related to O&M within their respective areas. Different DCFOs of the Huruluwewa scheme come together only at the monthly meetings of the PC. However, integration of the DCFOs into a federation at project level, as has been attempted at Gal Oya will undoubtedly help increase the efficiency of the weak organizations and distribute the benefits of turnover on a more equitable basis.

## CONCLUSIONS

With the introduction of FOs and management turnover, farmers have progressively established their control over the secondary and tertiary canal network of the Huruluwewa scheme during the last ten years. The positive consequences of the turnover process are the attitudinal changes of the farmers towards agency staff as well as towards system maintenance and protection, increased water use and operational efficiencies, approximating water distributional equity, minimization of conflicts and adoption of mechanisms to resolve them and capacity building with reference to the provision of agricultural support services. However, smooth turnover has been constrained by the inadequacy of funds at the farmers' command, unfavorable tenurial arrangements, insufficient remuneration to the office-bearers of the FOs and lack of integration of the DCFOs at project level.

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Table 1. Canal network and irrigated area of Huruluwewa.

Sector	No. of DCs	Length of DCs (km)	No. of FCs	Length of FCs (km)	Irrigated area (ha)	Ave. area per FC (ha)
L.B.	10	14.8	89	52.7	1248.8	14.0
R.B.	16	26.5	215	108.4	2348.2	10.9
Total	26	41.3	304	161.1	3597.0	11.8

Notes: Total area irrigated at present according to the Irrigation Engineer's office at Huruluwewa is 3,850 ha Excess is due to the water issues to encroached areas and to a limited extent (about 25 ha) from a central sluice.

Source: Irrigation Management Division Office, Galenbindunuwewa.



Table 2. Operation and maintenance costs of the Huruluwewa Scheme, 1985-1993 (US\$).

Year	Operation	Maintenance
1985	5,910	22,553
1986	9,020	19,928
1987	9,918	24,390
1988	10,090	20,208
1989	12,986	26,328
1990	9,215	21,456
1991	7,922	13,195
1992	9,796	14,687
1993	10,608	18,362
1985-93	85,465	181,107

Exchange rate: 1.00 US\$ = 49.00 Sri Lanka rupees.

Source: Computed from the data obtained from the Irrigation Engineer's Office - Huruluwewa.

Table 3. Voluntary labour contributions by farmers in the Huruluwewa Scheme, 1989-1993.

Year	No. of participants	Value of work (US\$)
1989	1992	2233
1991	4856	4955
1990	4772	3652
1992	3452	5284
1993	1726	2642
1989-93	16798	18766

Exchange rate: 1.00 US\$ = 49.00 Sri Lanka rupees.

Source: Computed from the data available at the Irrigation Management Division Office, Galenbindunuwewa.

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