Village Water Resources and State Administration: Rehabilitating Small-Scale Weir Systems in Sri Lanka

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INTRODUCTION

SMALL-SCALE IRRIGATION SYSTEMS[‡‡] irrigate about 235,000 hectares (ha) or about a third of the total irrigated area under rice in Sri Lanka. From ancient times they have been important as sources of subsistence and references to them exist from at least the first century B.C.

There are two main types of small-scale systems: tanks (reservoirs) and anicuts (weirs). Small-scale tanks are a distinctive feature of the dry-zone areas of the country and are usually dependent on direct rainfall or runoff water from their own catchment areas. Anicut systems tend to be located in the more mountainous regions which correspond to the wet and intermediate zones.[‡‡‡] While small-scale anicuts and tanks number roughly the same (9,795 and 9,294 respectively) the area under village tanks is estimated to be about 148,589 ha of which 87,074 ha are irrigated by anicuts.

Historically, village tanks featured more prominently than anicuts as items for government intervention and administration. This was for several reasons. First, tanks had physical structures (notably sluices) which were deemed to require a certain degree of sophisticated expertise to be kept in working order and it was believed that villagers could not handle this without government

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[‡‡]Also referred to as village irrigation and minor irrigation systems. The three terms are used interchangeably in this paper.

[‡‡‡]The ecological zones are delineated on the basis of annual rainfall as follows: dry zone = 1,270-1,900 millimeters (mm); intermediate zone = 1,900-2,540 mm; and, wet zone = over 2,540 mm.

assistance. And second, tanks were often hydraulically interdependent, so that the lack of maintenance of some could lead to deleterious results in others. The state was particularly concerned about tank-bund breaches that could result in loss of life and property under village tanks further downstream. Despite government intervention, because of the topography and relative remoteness of the dry zone, tank villages tended to be relatively cohesive communities ordered around the tank-water source. In turn, they provided an economic livelihood and social status and identity to the villagers.[i]

Until about the mid-1960s, anicuts on the other hand, remained temporary constructions usually made of large boulders plugged with mud and straw. When floods and heavy rains washed away the weirs local effort was expended to replace them. Thus, repairs and maintenance to the anicuts were locally based efforts and the government saw little need to intervene. To this was added the peculiar nature of the land-tenure structure in areas where anicuts predominated and where much of the land was owned by both monasteries and feudal land-owning families having tenants to farm the land. Tenancy conditions were highly exacting,[ii] and gave little motivation to invest extraordinary efforts in irrigation-system maintenance. Anicut-irrigated rice agriculture remained, as a result, at low levels of productivity while a major part of the people's livelihood was based on slash-and-burn cultivation. Given the marginal contributions of irrigated agriculture to peasant welfare in these areas, coupled with private temples and land-owning manors operationally owning extensive tracts of land, the government saw little need or possibility in investing in improvements of these systems. This was evident in the government-administrative framework for supervision of irrigation which was less intensive in the anicut areas, as was its investment in rehabilitation activities.

From the 1960s, following the enactment of the Paddy Lands Act in 1958 when the Department of Agrarian Services was set up and became formally entrusted with *all* small-scale irrigation systems,[iii] the government began to look into village anicut refurbishment. Typically, this was to replace temporary weirs with concrete ones. Sometimes channels were also lined. But besides obviating the need for seasonal replacement of the washed-away weir, rehabilitation was rarely aimed at augmenting water supplies. Also seldom, unlike in the case of tank systems, did the government become involve in land-settlement programs in the immediate area. These two factors were in fact interrelated: more land was available for government-sponsored land distribution/settlement programs in the dry zone and as a result, tank rehabilitation also had the goal of extending the command area. Anicut rehabilitation on the other hand, was aimed purely at obviating the need for maintenance of the headworks. Thus, arrangements for water-distribution devised at the local or rice *yaya* (rice tracts/fields) level flourished undisturbed and worked well to distribute water within the system.

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[i] Leach's study on Pul Eliya (1961) provides a detailed description of the socioeconomic organization of a tank village.

[ii] Fifty percent of the harvest share had to be given to the landowner and tenants could be seasonally evicted.

[iii] All systems with command areas of 200 acres (80 ha) or less were designated as minor systems.

BACKGROUND TO THE RESEARCH STUDY

One of the major programs aimed at rehabilitating minor or small-scale irrigation in Sri Lanka today is the Village Irrigation Rehabilitation Program (VIRP). Sponsored by the World Bank it seeks to rehabilitate over 1,500 tanks and anicuts in 14 districts of the island. This paper is based on some of the data collected under a larger research study conducted by the author and it focuses on the intervention process and its impact on a weir system. The paper will first present a description of the organization of irrigation prior to rehabilitation. Thereafter it will review the process of rehabilitation, and finally, it will investigate the implications of intervention for the long-term management of the system.

The anicut or weir under consideration is located in Ratnapura District, in the south-central part of the island. This area falls into the agro-ecological area of the intermediate low country with an average rainfall of 75 to 100 inches distributed bi-modally. Agriculture is predominantly rice, along with plantation crops of tea and rubber. Recently, fruit crops and high-income cash crops such as pepper have been introduced. Ratnapura District is famous for its gems and many farm families combine mining with agriculture or sometimes convert rice fields into gem pits, temporarily taking them out of production. Fifty-one percent of Ratnapura District is irrigated by small-scale irrigation systems, mostly by anicuts.

Thambagamuwa, the anicut system under review here was selected because it had a long irrigation history, was consistent with the national picture, and had experienced relatively little direct outside intervention to the irrigation system until the VIRP in 1987. We were in the field during this time and as a result, we had the opportunity to obtain a firsthand view of the actual rehabilitation process and ascertain the immediate and long-term consequences for system management.

SOCIAL ORGANIZATION OF IRRIGATION PRIOR TO THE VIRP

Thambagamuwa is located about 50 km from the district capital, immediately off the main road leading from Colombo to the southern part of the island. Though the two main rice tracts belonging to the village are on the side of the asphalt road the rest of the village is located deep in the interior and is accessible only by steep and winding footpaths. The main anicut is a 20-minute walk from the two main rice tracts and consists of a large natural rock dam with lined channels leading off it. The concrete construction of the main structures was done in the 1960s by the government-sponsored local organization in existence then. However, six of the remaining eight anicuts in the Thambagamuwa system are still temporary constructions of boulders plugged with straw, needing repair a few times each season.

The two main rice tracts are the Mahawelyaya and Kanathiriyanwelyaya. The Kanathiriyanwelyaya tract was developed as an extension to the Mahawelyaya in the 1950s in response to population pressure. However, the capacity of the anicut has set limits to the further expansion

of cultivation, as has topography. As a result, we see an elaborate form of rotational or *thattumaru* tenure where people, land, and water are rotated. This is a local adaptation made possible as a result of government legislation, notably the Paddy Lands Act of 1958 which allows for the registration and security of tenure on a rotational basis.

Briefly, rotation of owners of rice land functions as a mechanism to prevent excessive land subdivision through inheritance. In this manner, nominal ownership rights to rice land and the associated social status are maintained. A thattumaru rotation by tract as a response to a scarce water supply is evident in the rotation of water rights so that either the available water supply is used alternately by each tract each season, or on an annual basis. Since 1985, there has been rotation by season whereby Kanathiriyanwelyaya (being further from the anicut) gets wet season water rights and Mahawelyaya gets dry season water rights. In the event of a water shortage within a season, a rotation is instituted and water is first delivered to the tail end of the tract[8] and then worked up towards the head-reach areas. At other times, there is continuous irrigation with water being delivered to a series of land shares through earthen- and wooden-proportioning devices and to single land shares through pipe outlets of predetermined width. These reflect the property rights in the system which in turn reflect the rights of prior appropriation enjoyed by certain land sharers.

How are irrigation/cultivation rights determined when there is a rotation of people, of access to land, and of water? In this case, it was found that rotation of water takes precedence and determines ownership and tenancy rights. Thus, access to land (i.e., tenancy rights) and land ownership rights are defined in terms of the season when irrigation-water rights are accorded and cultivation is made possible. Hence, if irrigation rights are given only in alternate years, a tenant cultivator whose turn comes quarterly would have to wait eight years to get his cultivation turn. However, if irrigation rights were given for both wet and dry seasons his turn would come every two years. Thus, overall irrigation rights determine the frequency of the "people" and "land" rotation.

For all intents and purposes the water rotation by tract works smoothly and every effort is made to stick to the cultivation schedule and not extend it into the alternate yaya's "season." Similarly, though highly elaborate, the different forms of rotational tenure bind the community together and spread each cultivator's cultivation risks and interests as widely as possible. This also serves to equalize access to the critical resource of water and the system appears to work with little conflict.

IMPLEMENTATION OF THE VIRP

The agencies involved in the Village Irrigation Rehabilitation Program (VIRP) are the Irrigation Department, responsible for physical construction and rehabilitation, and the Department of Agrarian Services, entrusted with the task of formulating water-management programs for the

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[8]The amount of water delivered is based on a calculation of time (in Sinhala, "reckoning time") per acre.

rehabilitated systems. The vehicle utilized for the latter is the Agricultural Planning Team which consists of three officers who are expected to visit the rehabilitated system and function as catalysts to organize farmers to undertake improved water-management practices. In addition, the project aims to strengthen the major government departments involved with small-scale irrigation systems by providing the staff with necessary training, equipment, and transport to ensure their proper maintenance (Abeyratne 1986).

According to the established procedures for VIRP (World Bank 1981) there are several preliminary steps both for informing farmers and for eliciting their participation in the rehabilitation process. These include ratification meetings where farmers come to an agreement with the Irrigation Department personnel as to the components of rehabilitation and their own contributions to the process. However, in Thambagamuwa the actual process was as follows. Thambagamuwa was selected for rehabilitation sometime in 1987, a fact brought to the notice of the villagers only because piles of quarry stones were unloaded and left in different parts of the village. In early May, the technical assistant of the Irrigation Department along with the contractor, met with the farmer representative and the three of them walked up to the anicut and took some measurements. A few days later the stipulated farmers' ratification meeting was called by the farmer representative (on the instructions of the technical assistant) and farmers gathered as requested. But the Irrigation Department personnel and the Agricultural Planning Team members were absent. This was repeated a few days later when the farmers gathered for the meeting but once more the officers did not come.

At the end of May, construction began with no warning and consisted of building several feet of retaining walls along the main canals and laying 28 controlling pipe outlets to individual fields in Mahawelyaya and to clusters of fields in Kanathiriyanwelyaya. Two regulators were also constructed on the main canal. By this time however, the cultivation season was in full swing in Mahawelyaya for the dry season. Fields had been plowed and the rice sown approximately two weeks earlier; hence the demand for irrigation water was high. The technical assistant discussed the matter with the farmer representative and they came to an agreement that there would be intermittent water issues so that construction work could be done. But two cultivators towards the tail end of the tract who were facing water shortages broke some of the structures and started taking water to their fields.

In the meantime, farmers had no idea of the kind of construction being installed until the structures were literally in place. When asked, the contractor said that the locations of the controlling pipe structures were stipulated in "the plan;" likewise, when farmers suggested modifications, or more frequently, a change in the angle of an outlet, the contractor said he could not deviate from "the plan." The fact that all 28 controlling pipe outlets had a uniform diameter of four inches irrespective of the acreage they were to irrigate caused even more acrimony. When some farmers protested that acreages less than their own received the same volume of water as their own fields they were told that the Irrigation Department had only four-inch outlet pipes in stock. In frustration, a tenant-cultivator originated a petition requesting a proportioning weir, a device that farmers were familiar with and which they relied on for water distribution within the tract. All the farmers signed the petition and gave it to the cultivation officer. However, when we checked the Agrarian Services Center files a few weeks later, there was no such petition on record, suggesting that it had been "lost" en route.

The petition also mirrored the farmers' displeasure with the farmer representative who, having had the first and sole contact with the contractor and technical assistant, had obtained a separate

and strategically placed pipe outlet to his field. He had also managed to obtain the subcontract to provide labor for the earthwork component of the project. However, as the position came to naught farmers had to accept the designs and structures imposed on them. Before the season was over, farmers had on their own "modified" several of the controlling pipe outlets. Mostly, they tended to circumvent the impositions and to irrigate as before.

The technical assistant who had done the preliminary investigations was interviewed. He insisted that the farmer meetings had been held and that "procedures" had been followed according to established rules. He also insisted that the district irrigation engineer visited the project every two weeks to supervise the work when in reality no one other than he himself had come there. He was also emphatic in maintaining that the designs had been modified to suit farmers' wishes/needs though several times he stressed that the Irrigation Department was a "technical department" and therefore "must construct mechanically." In other words, alterations to fit individual and/or tract requirements would be impossible. When questioned repeatedly on what the anticipated project benefits were, he spoke of better water management that would lead to increased cropping intensity, meaning cultivating both seasons in both tracts, but that to ensure this "we have to forcibly control water." When probing his views on how this would be achieved he talked of the need for "a strong farmer representative" and "disciplined farmers" but was quick to add that water-management would be the "task of the Department of Agrarian Services."

The technical assistant who replaced the above-mentioned technical assistant halfway through the project knew even less about the system as he had not done the "preliminary investigations." He was however more conscious of the limitations of the technical solution and said that he could not anticipate more benefits from the rehabilitation work than a small reduction in seepage and wastage in the conveyance system. He did not believe that this would be significant enough to allow for simultaneous cultivation of both tracts in the wet and dry seasons. He was also ready to admit that the concrete controlling pipe outlets may in fact require extra management on the part of the farmers and that to elicit this extra effort may prove to be difficult. He even went on to say that there really was "no point to the expense but for the fact that an external donor agency was paying."

IMPACT OF THE NEW STRUCTURES

Despite the rhetoric of local participation contained in VIRP documentation the rehabilitation process in Thambagamuwa was externally orchestrated. In fact, this followed the pattern of preceding rehabilitation programs that had been undertaken for small-scale systems, especially tanks. The Thambagamuwa anicut was selected on criteria determined by national policy and recommended by the political representative of the area. Despite recommendations for a "pre-construction phase" that would enlist farmers, if not at least inform them of what was to take place, construction work was started without the farmers' knowledge. The Irrigation Department personnel talked of the irrigation system belonging to the Department of Agrarian Services but

"handed over" to the Irrigation Department for the duration of the rehabilitation since the latter had the technical skills. It was a "taking over" and "handing over" exercise between two government departments.

In terms of the impact of the new structures, from preliminary observations and discussions with farmers, we could observe and/or predict the following overall outcomes.

1. The controlling pipe outlets (CPOs) have allowed for inequities to be introduced and made permanent by their very positioning in the system.
2. The CPOs' permanent size has introduced rigidity into the rotational water schedule as the width has set limits on the time/flow measurements and cannot be adjusted.
3. The CPOs have introduced other inflexibilities into a system that was able to adapt to constraints in land and water including land fragmentation.
4. The CPOs have gone against entrenched property rights in the system. Where earlier, only one pipe inlet was allowed per land share and subdivided land shares had to rely on plot-to-plot irrigation, now, subdivided land shares sometimes have several CPOs while a single land share may not even have one CPO.
5. Traditional patterns of water distribution have been disrupted as uniform CPOs have been introduced irrespective of the acreage to be irrigated. This has increased the incidence of conflict within the system.
6. In the context of continuous flow irrigation, CPOs tend to favor head-reach irrigators which has resulted in heightening existing inequities.
7. Regulators can be made to favor irrigators at the head reach. Also, regulators may require increased management, necessitating skills beyond those of the farmer representative (requiring government assistance) and/or concentrating in him discretionary powers in managing water that he could abuse to the detriment of other farmers.
8. The new structures are "management intensive" and may require more time (and skills) in management than farmers are willing to contribute in a system not solely dependent on irrigated rice farming.
9. The retaining walls in most locations were useful in preventing submersion of the rice-field plots below. Some, however, were put in merely to spend budgeted funds.

Consequences for the old water-distribution system are most evident in Kanathiriyanwelyaya where an earthen-proportioning weir made seasonally by farmers has been replaced by complicated concrete structures that do not match the old division of water and in fact, defy description. Moreover, whereas continuous management in the form of alterations to the proportioning weir were possible earlier in accordance with property rights and reflected changes in the water supply, the new concrete structures do not afford the same flexibility.

In the questionnaire survey conducted to assess views on the VIRP, 71 percent of the cultivators said that the CPOs adversely affected intra-yaya water distribution. In fact, most farmers were explicit in stating that the old outlets were much better and the traditional system of water distribution much more equitable than what had just been introduced. In terms of individual water supply, one third of the farmers stated that the new structures made their own water supply much worse. The only part of refurbishment they talked about favorably was the reinforcing of walls. Farmers felt that they played a useful role in protecting the channel bunds and preventing seepage.

The overall management of the system seemed to pose a further problem and many farmers had already voiced their apprehensions. The most basic fear was the supposed enhancement of the farmer representative's position as a result of the new structures. Where earlier the farmer representative played an informal leadership role but most of the actual water distribution was done by the farmers -- albeit more or less individually -- now decision making plus actual implementation of water distribution had become concentrated in a single individual. Farmers were concerned that the farmer representative could abuse his new status as was already evident in the construction phase. Certainly there are no checks, physical or organizational, on his future actions.

CONCLUSIONS

Based on the farmers' responses plus our own observations in the field,[1] it appears that sometimes the Village Irrigation Rehabilitation Program (VIRP) is undertaken in a blueprint mode with little understanding of the patterns of water distribution or leadership in the local community. The merits of a system like Thambagamuwa were precisely those that the new structures hoped to change. Thambagamuwa, because of the nature of its land history, its tenurial interactions, and its social/kinship bonds had a relatively well-defined pattern of water allocation and distribution. The water-"thattumaru" by yaya was accepted and adhered to, as was a switch to a rotational schedule when water was perceived to be inadequate. During times of continuous irrigation the system functioned more or less automatically underscored by property rights in the system. The farmer representative in this context functioned mostly as an "ombudsman" and more weighty decisions were left to the government officers at the seasonal cultivation meeting.

Consequently, VIRP rehabilitation should not have taken place within the realm of intra-yaya water distribution as this was the strength of the system. Expenditure may have had better returns if it had been made higher up in the system -- for example, at the level of the headworks or the conveyance system. A clear place for intervention, for example, would have been the temporary anicuts irrigating parts of the system. When we asked the technical assistant why money was not put into making these anicuts into permanent structures we found him to be unaware of the temporary anicuts in the system. The fact that he was not informed of their existence highlights the problems that exist when we expect farmers to act as a community, with homogenous interests which would be articulated to the officers.

The result of the VIRP intervention can be summarized as follows. New physical structures have been introduced, supposedly to prevent wastage in the system and therefore to increase cropping intensity (i.e., cultivation of both tracts in both seasons). But in reality their advantages are in providing more control and more predictability; both advantages however are contingent

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[1]In this site and elsewhere in Sri Lanka. See Abeyratne and Perera 1986.

on a relatively abundant water supply. As soon as there is water stress the controlling pipe outlets (CPOs) introduce inflexibilities into the system while the previously existing system was able to adapt to both land and water constraints.

The new structures are also management increasing, requiring a different mode of organization than the one currently in operation. Whether a suitable adaptation will be made is yet to be seen. Meanwhile, the new structures run counter to the existing organizational fabric, have heightened inequalities in the system, and have made it more open to individual abuse. Even worse, the imposition of structures that appear to be incompatible with existing traditions and practices may in time destroy the merits in local organizational and/or leadership resources that exist.

The consequences are far reaching. Land and irrigation policy in Sri Lanka, from at least the middle of the 19th century, demonstrates that the government has thought it fit and proper to intervene in the rehabilitation and management of small-scale irrigation systems, particularly tanks. Interventions made for the rehabilitation of anicuts were at the level of the headworks or main irrigation structures. As these facilities were thought to belong to the government, this was considered appropriate from the people's point of view (Abeyratne and Perera 1985). However, cultivators expressed their right to the use of irrigation water through their access to land, and this was evident in the intricate patterns of water distribution developed at the yaya level under anicuts. This, in Sri Lankan small-scale systems, was the only realm that could be considered "farmer-managed." However, with VIRP intervention, even that realm appears to have become wholly government-managed.

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