Irrigation Infrastructure Management by Public Funds: How It Can Be Made Justifiable

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Introduction

About 80 % of the paddy production is being done under major and medium irrigation schemes in our country. Investment for irrigation development is considered to be the responsibility of the government, especially in a welfare state like Sri Lanka. Once constructed, the responsibility of operation and maintenance (O&M) of these schemes is also shouldered by the government. Subsidies such as fertilizer and seed paddy or a guaranteed price for paddy are arranged by the government from time to time to attract farming communities for agriculture or sometimes to attract votes. But, there is a concealed value in all these subsidies. When also considering the input of other agrarian services, a colossal sum of funds is diverted for the survival of irrigated agriculture.

This paper aims to compare the actual annual fund requirements and the available funds to operate and maintain an irrigation scheme. The Huruluwewa Irrigation Scheme was selected to compare actual requirements and the expenditure within the scheme (Annex 1: Table 1 for details of Huruluwewa Irrigation Scheme). Funds received from various sources and the labor contribution by the beneficiaries to fill the gap between the actual O&M requirement and the funds received is also highlighted in the same scheme. The scheme also compares the financial inputs of the Mahaweli Authority of Sri Lanka (MASL) and the North Central Provincial Council, the other two major institutions responsible for the O&M of irrigation schemes.

Sustainability of an Irrigation Scheme

The medium and major irrigation schemes are operated and maintained by the Irrigation Department, MASL and the nine Provincial Councils. Their approach and financial commitment for O&M activities differs from one to another. The sustainability of an irrigation scheme wholly depends on the degree of maintenance and the nature of operations, especially flood operations attended by the owner and the beneficiaries. To have a properly maintained and correctly operated irrigation scheme, at least the following requirements must be fulfilled.

1. Tested and validated O&M manual
2. Regular inspection and identifying maintenance requirements

3. Identification of best suitable technical solutions as remedial measures
4. Accuracy of methods adopted and implementation
5. Availability of funds for inspection and implementation of remedial measures
6. Beneficiaries sharing the responsibilities of O&M

Factors 1 to 4 as mentioned above normally depend on the management systems adopted by various organizations. The Irrigation Department, MASL and Provincial Councils adopt different strategies. Availability of funds, which is normally channeled through the government budget, also varies from one organization to the other.

Position of Funds and Requirement by the System

The actual requirement, funds provided, subsidiaries and value of crops of the Huruluwewa Irrigation Scheme are discussed in this paper.

Operation and Maintenance (O&M)

The Huruluwewa Irrigation Scheme is located (at the coordinates 325,345 mN, 160,195 mE) in the Anuradhapura District. The irrigation engineer is responsible for the O&M as well as necessary improvements to be carried out in the scheme.

Technical Data of Huruluwewa Scheme (Irrigation Department 2007)

Extent in Acres	
Left bank sluice	3,200 acres
Right bank sluice	7,200 acres
Center sluice	27 acres

Tank Bund Length	2.37 km
Bund lop width	6.7 m

Canals	
Main canal	31.6 km
Branch canal	5.0 km
Distributory canal	38.62 km
Field canal	168.25 km
Agricultural roads	178.8 km

Table 1. Gives the actual fund requirement for the O&M of the Huruluwewa Scheme for 2007.

The present practice adopted in most of the major and medium irrigation schemes under the purview of the Irrigation Department is that funds are provided only for O&M of head-works (bund, land roads and sluice as spill) and main and distributory canals. Operation and

Table 1. Actual requirement of funds for operation and maintenance of the Huruluwewa Scheme (Irrigation Department 2007).

Item	Description	Actual fund requirement (Rs.)
Operations of main system	Purchase of equipment, fuel and allowances for O&M staff	681, 230
Maintenance of main system	Head-works (clearing, removing of ant holes, applying grease to moving parts and painting, etc.)	179, 625
	Main canal and branch canal (clearing, de-silting, improvements to structures, greasing and painting of gates, improvements to agricultural roads)	772, 984
Sub-total	Operation and maintenance cost for head-works, main canal and distributory canal	1,633,839
	Operation and maintenance of downstream system from D-canal (see Table 2 below for details)	3,245,025
Total requirement		4, 878,864

maintenance of field canals and in some cases drainage canals is carried out by the farmer organization (FO) with their funds and labor. Only machinery and equipment required and a part of the funds needed are provided by the government. Table 2 shows the actual requirement and expenditure by various sources for the O&M of the field canal and downstream system in Huruluwewa.

Funds Provided by Government

DCB fund-(Contribution from scheme relevant district)
Rs. 325,000
Irrigation Department/Irrigation Management Division IMD
Rs. 2, 245,872
(Equipment charges are accounted here)
Sub-total = Rs. 2,570,872

Contribution from Farmer Organization and Farmers as Labor Input

Direct funds from farmer organizations	Rs. 1,013,079
Indirect contributions	Rs. 1,328,400
Sub-total	Rs. 2,341,479

This calculation shows that the FO (farmer organization) contribution (labor input and FO funds) in up-keeping the irrigation system is significant (about 72 % of total requirements in field canal (FC) maintenance). Nevertheless, this labor input is frequently ignored in financial analysis, due to difficulties in accounting.

Table 2. Requirement for operation and maintenance of field canals and the funds received from sources (Resident Project Manager – IMD (2007).

FC area and name of farmer organization	Estimate (actual requirement) Rs.	Financial or labor contribution (Rs.)				
		ID funds	IMD	FO funds	Shramadana funds	Provincial council/ District fund (DCB)
Meegahapattiya FO	266,766	Equipment	31,517	166,859	68,800	
Gomarankalla FO	127,621	Equipment	39,667	47,977	48,800	
Yaya 05 FO	144,005	Equipment	42,896	32,100	76,000	
Galenbidunuwewa FO	187,266	Equipment	30,518	81,749	75,000	
Ulpathgama FO	95,000	Equipment	30,140	29,600	41,600	
Yaya 06, 21 Janapada FO	161,685	Equipment	34,770	51,600	80,400	
D11 Dutuwewa FO	136,700	Equipment	44,690	26,600	70,400	
D12/13 FO	177,689	33,818	44,742	81,100	110,800	
Kokawewa FO	410,077	Equipment	42,652	15,400	106,400	250,000
Gettalawa Udara FO	258,284	Equipment	63,999	82,600	127,600	
RB Yaya 06, Ekamuthu FO	141,495	Equipment	15,250	80,600	46,000	
Janasirigama FO	230,982	Equipment	22,509	47,073	86,400	75,000
Huruluwewa Nikawewa FO	202,186	Equipment	48,229	29,600	126,000	
Padikaramaduwa Mahasen FO	94,622		15,378	36,900	40,800	
Padikaramaduwa Gemunu FO	214,841		34,143	91,600	940,00	
Kivulekada FO	250,332		32,012	101,600	120,000	
Aluthdivulwewa FO	87,123		14,252	32,600	42,400	
Total	3,245,023	33,818+ equipment charge	578,544	1,013,079	1,328,400	325,000

Improvements, Repairs and Preventive Maintenance

The above figures give only an idea about the funds required for essential annual O&M required to up-keep the irrigation systems at their minimal service condition as identified in the 'O&M Plan'. In addition to this, requirements for improvements, modifications, flood-damage repairs and preventive maintenance are also identified by the O&M staff and need to be accounted for. Meeting such requirements is the responsibility of the Irrigation Department.

Estimates thus prepared for improvements and repairs of the Huruluwewa Scheme for 2007 and allocations made available are tabulated in Table 3 below.

These figures show that due to limited availability of funds, general improvements and immediate repairs cannot be attended to, as and when needed. Contribution from farmers for

Table 3. Actual amount needed for improvements and repairs and available funds.

Item	Estimated amount (Rs.)	Funds available(Rs.)
Improvements to the main system	1,315,000	Nil
Preventive maintenance	1,927,000	176,515
Irrigation water management	2,891,700	370,100
Improvements to head works	1,806,500	Nil
Improvements to agricultural roads	1,490,000	Nil
Repairs following flood damage	400,000	Nil
Total	9,830,200	546,615

Source: Irrigation Department 2007

improvements and repairs (for the work beyond FCs) cannot be expected as their income is marginal. Delays in attending to repairs and improvements eventually lead to more damages and an increase in demand for funds for maintenance of the schemes, and ultimately culminate in a need for rehabilitation earlier than the guaranteed life span of the systems. Although these figures only relate to the Huruluwewa Irrigation Scheme, they reflect the real situation of most irrigation systems.

Fertilizer Subsidies

The government provides fertilizer for paddy at a low price (less than one-third of the actual cost) in order to encourage paddy farming. The Agrarian Services Department records indicate that the subsidy provided by the government for fertilizers during 2007 for farmers of the Huruluwewa Irrigation Scheme is as high as Rs.122 million.

Production

The value of production of the Huruluwewa Scheme in 2007 is depicted in Table 4 below.

Table 4. Value of production for two cultivation seasons in the Huruluwewa Scheme.

	Acreage cultivated (ha)	Production (kg)	Gross income (Rs.)
Maha (2006/2007)			
Paddy	4,345	3,059,000	97,900,000
Yala (2007)			
Paddy	745	524,500	16,800,000
Soybean	660	1,185,000	142,000,000
Maize	245	1,168,000	31,500,000
Vegetables	90		21,500,000
Total income			309,700,000

Source: Irrigation Department 2007

The above figures give only the direct income from production. When compared with government expenditure on O&M activities, which amounts to nearly Rs.3 million, the value of production of the scheme is very high. However, if the fertilizer subsidy, introduced recently (amounting to Rs.122 million), is included in the calculation, this picture changes dramatically.

Since the actual requirements of the annual O&M are not fulfilled, frequent rehabilitation requirements can be witnessed. Most of the schemes that have been recently rehabilitated show symptoms of deterioration demanding another round of rehabilitation earlier than the guaranteed life span of the system, while other systems are also in dire need of attention.

Comparison of O&M Costs among the Institutions

Three institutions are mainly responsible for the management of irrigation schemes namely, the Irrigation Department, MASL and Provincial Councils. Table 5 gives the estimated funds utilized for the O&M of irrigation schemes in these organizations where different types of technical and financial approaches are adopted. The summary of the average expenditure on the O&M of irrigation system per acreage by the three institutions are as follows:

Table 5. Average expenditure on O&M and improvement of the irrigation scheme by different organizations.

Institute	Name of scheme	Average expenditure Rs./Ac
Irrigation Department	Huruluwewa (Anuradhapura)	246
	Muruthawela Scheme(Hambantota)	212
Mahaweli Authority	Udawalwe Scheme	208
North Western Provincial Council (NWPC)	Mohariya Scheme	593
	Siyambalankotuwa Scheme	563
	Maha Karukkumaduwa Scheme	725

Sources: Irrigation Department 2007; MASL 2007; NWP 2007

There are several reasons for the high variation between the institutions.

- It can be observed that the NWPC spent a considerably higher amount of funds on the management of irrigation schemes, which included expenditure on improvements.
- Active, well-established and financially sound farmer organizations exist in major and medium irrigation schemes and their active participation in O&M is higher.
- After launching programs to improve system performance through farmer participation, farmers are well aware of their responsibilities for safeguarding schemes for their benefit and, hence, their participation is high. The FOs in major and medium irrigation schemes managed by the ID and MASL are performing better in O&M than the FOs in Provincial Councils.

Conclusions

The contribution to the national economy by an irrigation scheme is much higher than the investment in O&M by the government. Inputs from farmers for O&M are also significant in major and medium irrigation schemes where well organized farmer organizations exist. The pattern of expenditure by various government organizations on O&M does not vary much (except O&M expenditure by Provincial Councils). Frequent rehabilitation requirements arise due to the failure to attend to repairs in a timely manner and inadequate maintenance due to the lack of funds. If the government can increase input for O&M, the rehabilitation costs will become less. It is necessary to review the investment on fertilizer subsidy as it has made a significant change to the cost-benefit balance of irrigation systems.

References

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Annex 1

Table 1. Details of three irrigation schemes on O&M

Technical data, allocation requirement and expenditure on operation and maintenance of irrigation schemes by three institutions							
	Irrigation Department			Mahaweli Authority	Provincial Council – North-West		
	Huruluwewa	Muruthawela	Uma Ela	Udawalawe	Mohariya	Siyambalan-kotuwa	Mahakumbukkada-wala
Extent (acres)	10,427	4,426	2,004	22,432	270	774	250
Bund							
Bund length (km)	2.37	1.464	0.214	4	2.75	1.5	1.82
Max bund height (m)	37.5	31.5	12.2	36.6			
Canal							
Main canal							2
Nos.	3		1	2	2	3	2.6
Total length (km)	31.6	14	16	125	2.4	6.9	
Field canal			(85 TOO)				
Nos.			Non		7	40	4.94
Total length (km)	211.87	123.6		1,350	2.5	6.78	
Agricultural roads							
Nos.				(data Not	2	4	2
Length (km)	178.8	40	10	available)	1.9	4.0	4.9
Estimate for O&M	4,878,862	1,605,221	1,809,680	13,838,000	200,000	621,467	212,321
Expenditure	2,570,872	939,000	865,485	11,172,000	160,040	435,492	181,418