6.0 Conclusions and Recommendations

6.1 Conclusions

The objectives of this research were to explore the viability of PSP and the use of ISF and CRF in the rehabilitating of existing irrigation schemes in Sri Lanka. The study expects to collect ISF from the beneficiaries as a way of releasing financial burden on the government / investor in rehabilitating irrigation facilities. The followings are the main conclusions of the study.

1. The rehabilitation of irrigation schemes brings high economical benefits, even though the recovery of full capital cost of the investment from beneficiaries seems to be practically difficult.
2. The case studies highlight the possibility of recovering ISF from the beneficiaries.
3. The GOSL can reap the economic benefits of rehabilitating irrigation systems without using its scarce capital with PSP. Then the GOSL gets to convert capital expenditure into annual recurrent expenditures as net subsidies for PSP in the rehabilitation of the irrigation schemes. The ISF is the minimum recoverable from beneficiaries (i.e. the farmers)

6.2 Recommendations

The following recommendations are made with regard to studies carried out on rehabilitation of existing irrigation schemes.

1. The further studies on the possibility of recovery of CRF and ISF should be made by selecting more schemes, which are having different performances from other areas.
2. The awareness programmes, training programmes and workshops should be conducted with aiming to educate the farmers in modern agricultural systems and discard wrong concepts on agricultural activities.
3. The strict control of cropping calendar, supervision of farmer activities, introduction of technological expertise, provision of irrigation facilities should be incorporated to increase productivity.

4. The steps should be taken to keep up the targets such as type of cultivation, extend of cultivation and yield as variations may cause the failure of project.
5. The possibility of individual farmer to take his own decisions, which affects the functions of the schemes should be minimized.
6. Since the study is based on several forecasts and also there are possibilities of occurrence of other disasters which affect the viability of projects. Therefore, precautions should be taken to overcome them.
7. It is difficult to find literature on PSP in rehabilitation of irrigation projects and the details and practices of them in other countries. The literature review should be extended to collect information from the other countries.

References

Antonio, D.Jr. and Photios, G.I (1995), Debt Capacity and Optimal Capital Structure for Privately Financed Infrastructure Projects, Journal of Construction Engineering and Management, December 1195, pp. 404-414.

Archauer, D.A (1991), "Infrastructure: America's third defict." Challenge, 34, 39-45.

Bazin, M.L (1986), Project management in progress, tools and strategies for the '90s' The Manageability of the Development Process Elservier Science Ltd, The Netherlands, pp. 167-180.

Beidleman, C.R., Fletcher, D., and Veshosky, D. (1990), "On allocating risk: the essence of project finance". *Sloon Mgmt Rev.*, 31(Spring), pp. 47-55.

Dias, A.J and Ioannou, P.G (1996), Company and Project Evaluation Model for Privately Promoted Infrastructure Projects, Journal of Construction Engineering and Management, pp. 71-82, March (1996).

Diseases of Paddy Cultivation (1997), Publication of Department of Agriculture

Feasibility Report on "The rehabilitation of tank irrigation project", March 1986, Japan International Corporation Agency (JICA)

Jae So, J and Shin, B (1995), "The Private Infrastructure Industry – Company Approaches" pp. 9-12.

Jenkins,GP and Harberger, AC (1992), Cost-Benefit Analysis of Investment Decisions, Harvard Institute for International Development, Cambridge, USA.

Karasapan, O (1995), The World Bank Contribution to private Participation in Infrastructure, World Bank Group, pp 109-112.

Lammie, J.L. (1988), "Lending opportunities in privatization" J. Commercial Bank Lending, 71(1), pp. 4-12.

Liddle, B.T (1997), Privatization Decision and Civil Engineering Projects, Journal of Management in Engineering, May/June 1997, pp. 73-78.

McCarthy, S.C and Perry J.G (1989), "BOT contracts for water supply", Conference Proceedings, World Water 89 (Thomas Telford, London), pp. 215-220

McCarthy, S.C and Tiong, R.L.K (1991), Financial and contractual aspects of build – operate – transfer projects", International Journal of Project Management, 9 (4), pp. 222-227

Munasinghe, M and Lutz, E (1993), Environmental Economics and Valuation in Development Decision making, Environment Working Paper No.51, World Bank, USA.

Plamer, C.F (1986), Introduction of special public works projects to Sudan Int J Project Management, Index to Vol 4.

Quartey, E.L.J (1996), Development projects though build-operate schemes : their role and place in developing countries, International Journal of Project Management, Vol.14(1), No.1, pp. 47-52, 1996.

Ranasinghe, M (1998), Thoughts on methodology to analyze viability of private sector participation in new infrastructure projects in developing countries, Impact Assessment and Project Appraisal, September 1998, pp. 203-213.

Ranasinghe, M (1998a), A Method to analyze Viability of Private Sector Participation in New Infrastructure Projects in Sri Lanka, Institute of Policy Studies, Sri Lanka, February 1998, ISBN 955-9122-67-3.

Recommended fertilizer for paddy cultivation (1998), Publication of Department of Agriculture

Shen, L, Lee, R.K.H, and Zhang, Z (1996), Application of BOT System for Infrastructure Projects in China, Journal of Construction Engineering and Management, pp. 319-323, December 1996.

Socio Economic data of selected village irrigation schemes in Sri Lanka (October 1985), Working Paper No 3, Department of Agricultural Economics and Extension, Faculty of Agriculture, University of Peradeniya.

Study tour on operation and maintenance of irrigation systems, November 30~December16, (1996), NIACONSULT, Inc, A subsidiary Corporation of the National Irrigation Administration, Philippines

Tam, C.M (1995), Features of power industries in Southeast Asia, International Journal of Project Management, Vol. 13. No.5. pp. 303-311, 1995

Techno Guide Line (1986), Publication of Department of Agriculture

Teck, Y.K and Tiong, R , Project Financing as a Competitive Strategy in Winning Overseas Jobs.

CALCULATION OF OPERATION AND MAINTENANCE COST (O & M) - BANDARAWELA RANGE
(TYPICAL O & M COSTS PER ACRE PER ANNUM FOR GRAVITY IRRIGATION WORKS - YEAR 2000 PRICES)
BASED ON ANALYSIS OF 1981 PERFORMANCE ON 16 SELECTED SCHEMES AT ONE PER RANGE

Description	Unit	Qty	Man Power		Unit Rate	Amount	Labour in man day		Conversion	Economic
			Out put/day	Daily Wage	(Rs.)	(Rs.)	Regular	Casual	Factor	Value
A. LABOUR										
1. TO Attendents including + 10% to cover head works	Ac	1	1.39 (500ac/360)	220.00 a	158.40	158.40	0.72	-	0.785	
2. Weeding	Sqr	20.00	25.00	200.00 b	8.00	160.00	0.80	-	0.785	125.60
3. Removal of Salvenia	Sqr	2.00	12.00	200.00	16.67	33.33	-	0.17	0.722	24.07
4. Desilting	Cu	0.50	0.50	200.00	400.00	200.00	-	1.00	0.722	144.40
5. Filling scours	md	0.15	1.00	200.00	200.00	30.00	0.15	-	0.785	23.55
6. Repairs to structures	md	0.10	1.00	500.00 c	500.00	50.00	0.10	-	0.785	39.25
7. Spreading gravel	Sqr	0.20	10.00	200.00	20.00	4.00	0.02	-	0.785	3.14
Total for A						635.73	1.79	1.17		360.01
B. SUPERVISION										
Work Supervisor	Ac	1.00	6.94 (2500ac/360)	200.00	28.80	28.80	-	-	0.785	22.61
Total for B						28.80				22.61
C. DRIVERS AND OPERATORS										
1. Drivers of jeeps, lorries, trippers @ 4% of labour cost in A	Ac	1.00	-	-	25.43	25.43	-	-	0.785	19.96
2. Operators of farm tractors @ 2% of Labour Cost in A	Ac	1.00	-	-	12.71	12.71	-	-	0.785	9.98
Total for C						38.14				29.94
D. TRAVELLING & COMNINED ALLOWANCE										
1. Work Supervisor - 3600 mls m/c @ Rs. 2/= + 72 days @ Rs. 230/-	Ac	1.00	6.94 (2500ac/360)	66.00	9.50	9.50	-	-	0.814	7.74
2. TO Attendant - Bicycle allowance @ Rs. 40/= per month	Ac	1.00	1.39 (5000ac/360)	1.33	0.96	0.96	-	-	0.814	0.78
Total for D						10.46				8.52
E. FUELS & REPAIRS TO VEHICLES										
1. Fuel for jeeps, lorries, trippers and farm tractors	Gl	0.25	-	-	89.89	22.47	-	-	0.650	14.61
2. Repairs to vehicles @ 50% of fuel cost	Ac	1.00	-	-	11.24	11.24	-	-	0.776	8.72
3. Overtime for Drivers and Operators @ 5% of item 1	Ac	1.00	-	-	1.12	1.12	-	-	0.785	0.88
Total for E						34.83				24.21

Description	Unit	Qty	Man Power		Unit Rate	Amount	Labour in man day		Conversion	Economic
			Out put/day	Daily Wage	(Rs.)	(Rs.)	Regular	Casual	Factor	Value
F. PURCHASE OF MATERIALS AND TOOLS										
1. Cement	Bg	0.10	-	-	315.00	31.50	-	-	0.746	23.50
2. Sand	Cu	0.01	-	-	400.00	2.00	-	-	1.000	2.00
3. Metal	Cu	0.01	-	-	2990.00	14.95	-	-	0.717	10.72
4. Rubble	Cu	0.01	-	-	2447.00	12.24	-	-	1.000	12.24
5. Gravel	Cu	0.05	-	-	500.00	25.00	-	-	1.000	25.00
6. Paints	Gl	0.01	-	-	1419.00	7.10	-	-	0.650	4.61
7. Gunnybags	Bag	0.15	-	-	30.00	4.50	-	-	1.000	4.50
8. Cane baskets	No	0.05	-	-	15.00	0.75	-	-	1.000	0.75
9. Miscellaneous materials @ 5% of items 1 to 8	Ac	1.00	-	-	5.17	5.17	-	-	1.000	5.17
10. For replacement of tools @ 5% of items 1 to 8	Ac	1.00	-	-	5.47	5.47	-	-	1.000	5.47
Total for F						108.67				**93.95**
G. PHYSICAL CONTINGENCY										
at 5% of items A to F Base cost for O & M per ac per annum	Ac	1.00	-	-	-	42.83	-	-	1.000	42.83
Total A to G						899.47				**582.07**

H. ADMINISTRATION AND OVERHEADS

Description	Annual Salary in Rs.	No.	Range Amount Rs.	No.	Division Amount Rs.	Conversion Factor	Economic Range Amount	Economic Division Amount
Deputy Director of Irrigation	200,000.00	1	200,000.00	-	-	0.785	157000.00	-
Chief Irrigation Engineer	160,000.00	1	160,000.00	-	-	0.785	125600.00	-
Irrigation Engineer	111,000.00	1	111,000.00	1	111,000.00	0.785	87135.00	87,135.00
Administrative officer	95,000.00	1	95,000.00	-	-	0.785	74575.00	-
Accountant	125,000.00	1	125,000.00	-	-	0.785	98125.00	-
Chief Clerk	80,000.00	1	80,000.00	1	80,000.00	0.785	62800.00	62,800.00
Clerks and Typists	75,000.00	12	900,000.00	7	525,000.00	0.785	706500.00	412,125.00
Minor Employees	60,000.00	5	300,000.00	3	180,000.00	0.785	235500.00	141,300.00
Drawing office assistant	98,000.00	1	98,000.00	-	-	0.785	76930.00	-
Draughtmen	75,000.00	5	375,000.00	2	150,000.00	0.785	294375.00	117,750.00
Divisional Assistant	100,000.00	-	-	1	100,000.00	0.785	-	78,500.00
Total			2,444,000.00		1,146,000.00		1918540.00	899610.00

Note : The administration costs tabulated on the left hand side are apportioned equally for " Investigation, Design and Construction " and " Operation and Maintenance " respectively.

Description	Unit	Quantity	Out Put per annum	Annual Cost in Rs.	Unit Rate in Rs.	Amount in Rs.	Conversion Factor	Economic Value
1. Technical Assistants	Ac	1.00	5000	72,000.00	14.40	14.40	0.785	11.30
2. Administration & OH of Range Office	Ac	1.00	40000	1,222,000.00	30.55	30.55	0.785	23.98
3. Administration & OH of Divisional Office	Ac	1.00	12000	573,000.00	47.75	47.75	0.785	37.48
4. Travelling, CA, O/T and repairs @ 20% of items 1 to 3	Ac	1.00	-	-	18.54	18.54	0.814	15.09
5. Physical Contingency @ 5% of items 1 to 4 Administration and OH cost for O & M per ac per annum	Ac	1.00	-	-	5.56	5.56	0.785	4.37
Total O & M Cost per Ac per Annum						116.80		92.23

I. INSPECTION OF VEHICLES AND EQUIPMENT

3 Jeeps, 1 Lorry and 5 Farm Trailers are required for O & M for 15,000 Acs.
Assumed deprication period is 5 years
Average Investment Cost (AIC) = 0.6 Capital Cost
Insurance is 1% of AIC
Depriciation per annum is as below.

	3 Jeeps	1 Lorry	5 T/Trailers
Fixed Cost	1,080,000.00	300,000.00	700,000.00
Insurance	45,000.00	15,000.00	60,000.00
OH at 10%	112,500.00	31,500.00	76,000.00
	1,237,500.00	346,500.00	836,000.00

Description	Unit	Quantity	Out Put per annum	Annual Cost in Rs.	Unit Rate in Rs.	Amount in Rs.	Conversion Factor	Economic Value
1. Depriciation cost of jeeps	Ac.	1.00	-	-	82.50	82.50	0.776	64.020
2. Depriciation cost of lorry	Ac.	1.00	-	-	23.10	23.10	0.776	17.926
3. Depriciation cost of tractor trailers	Ac.	1.00	-	-	55.73	55.73	0.776	43.249
4. Depriciation cost of miscellaneous items @ 5% of item 1 to 3			-	-	8.07	8.07	0.776	6.260
5. Contingengy at 5% of 1 to 3 Depriciation Cost	Ac.	1.00			8.07	8.07	0.776	6.260
for O & M per ac. Per annum Total O & M Cost per Ac. Per annum						177.47		137.71

a. Semi skilled wage Rs. 220.00 b. Unskillled wage Rs. 200.00
c. Skilled wage + Unskilled wage Rs. 500.00

Total allocation requirement for O &M Rs. 1193.74 When H & I are excluded 75% of total O&M cost
Economic Value Rs. 812.01 72% of total O&M cost