PD-AAM-815
ISN= 29734

383-0057/43

UNCLASSIFIED

AGENCY FOR INTERNATIONAL DEVELOPMENT

WASHINGTON, D.C. 20523

PROJECT PAPER AMENDMENT

SRI LANKA

WATER MANAGEMENT

383-0057

April 1983

UNCLASSIFIED

ACTION MEMORANDUM FOR THE DIRECTOR April 21, 1983

THRU: Mr. W.P. Schoux/Deputy Director

FROM: Leroy Purifoy/Chief, MWRD

SUBJECT: PP Supplement No.1, Water Management Project No.383-0057

1. Problem: Your approval of the attached PP Supplement is required.

2. Discussion: USAID, in Colombo 0438, January 21, 1983, advised AID/W of the Mission's intention to extend the PACD of the subject project by 21 months and increase AID's life of project funding from $9.8 million to $15.9 million. This cable requested an ad hoc delegation of authority be granted to you to extend the project for 21 months. State 059493 of March 4, 1983 advised that the Assistant Administrator for Asia (AA/ASIA) had approved the ad hoc delegation for the time extension. You have authority under Delegation of Authority No.133.1 dated April 15, 1982, to authorize project amendments where total life of project funding does not exceed $30.0 million.

   Your approval of the supplement will enable the project to achieve its original stated objectives and to prepare for a follow-on irrigation sector project scheduled for FY 1985, which will support a longer term USAID commitment to improve water management country-wide.

3. Recommendation: That you approve this PP Supplement No.1 to the Water Management Project by signing the PP Data Sheet and the attached Project Authorization Amendment.

Approved: _____

Disapproved: _____

Date: 4/28/83

Attachment: a/s

AID:MWRD:HGBLANK:ads

UNITED STATES OF AMERICA

AGENCY FOR INTERNATIONAL DEVELOPMENT

44, Galle Road, Colombo 3, Sri Lanka.

PROJECT AUTHORIZATION AMENDMENT

Sri Lanka

Water Management Project
A.I.D. Project No.383-0057
A.I.D. Loan Nos.383-T-023/023A

Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, and delegations of authority from the Assistant Administrator for Asia, the Project Authorization is hereby amended:

(a) to increase planned obligations over the Life of the Project from not to exceed $3,000,000 to not to exceed $5,100,000 in grant funds, and from not to exceed $6,800,000 to not to exceed $10,800,000 in loan funds, both subject to the availability of funds in accordance with the A.I.D. OYB/ allotment process,

(b) to revise the planned Life of the Project by extending the Project Assistance Completion Date from April 30, 1984 to December 31, 1985,

(c) to enlarge the authorized source/origin/nationality of ocean transportation services financed with loan funds to include vessels under flag registry of the United States, other countries included in AID Geographic Code 941, and the cooperating country and,

(d) to limit the authorized source/origin/nationality of ocean transportation services financed with grant funds to vessels under flag registry of the United States, except as A.I.D. may otherwise agree in writing.

In all other respects the Project Authorization remains in full force and effect.

Clearances:	Date	Initials
H. Blank, MWRD	4/18/83	
L. Purifoy, Chief/MWRD	4/18/83	
R.M. Singleton, Chief/PDSP	4/20/83	
T.A. Muntsinger/LA	4/18/83	
A. Schantz/Controller	4/18/83	
J.M. Miller/Program Officer	4/21/83	
W.P. Schoux/Deputy Director	25 Apr 83	

Signature:

S.J. Littlefield
Director
USAID/Sri Lanka
Date: 4/28/83

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: C (A = Add, C = Change, D = Delete)

Amendment Number: 1

DOCUMENT CODE: 3

COUNTRY/ENTITY: Sri Lanka

3. PROJECT NUMBER: 383-0057

4. BUREAU/OFFICE: ASIA 04

5. PROJECT TITLE (maximum 40 characters): Water Management

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 12 DD 31 YY 85

7. ESTIMATED DATE OF OBLIGATION (Under "B." below, enter 1, 2, 3, or 4)

A. Initial FY 79 B. Quarter 4 C. Final FY 84

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY 79 B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total						
(Grant)	(420)	(80)	(500)	(4945)	(155)	(5100)
(Loan)	(5350)	(50)	(5400)	(4561)	(6239)	(10,800)
Other U.S. 1.						
Other U.S. 2.						
Host Country		1430	1430	-	8578	8578
Other Donor(s)						
TOTALS	5770	1560	7330	9506	14,972	24,478

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	2. Loan	D. OBLIGATIONS TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
(1) FN	B-283	064	064	3000	6800	2100	4000	5100	10,800
(2)									
(3)									
(4)									
TOTALS				3000	6800	2100	4000	5100	10,800

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each): 242, 022, 091

11. SECONDARY PURPOSE CODE: B-243

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code	RESA	ENVR					
B. Amount							

13. PROJECT PURPOSE (maximum 480 characters)

Development of an institutional capability which can be replicated to manage large irrigation schemes in Sri Lanka more efficiently and effectively with active farmer assistance.

14. SCHEDULED EVALUATIONS

Interim MM 06 YY 82 | MM YY | Final MM 10 YY 85

15. SOURCE/ORIGIN OF GOODS AND SERVICES: [X] 000 [X] 941 [X] Local [ ] Other (Specify)

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a ____ page PP Amendment.)

Project funds (AID Contribution) increased by $6,100,000
PACD extended to 12-31-85.

17. APPROVED BY

Signature: [signature]

Title: Director, USAID/Sri Lanka

Date Signed: MM 04 DD 28 YY 83

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION

MM DD YY

Water Management Project

Project Paper Supplement

Clearance Sheet

Position	Name	Signature	Date
Project Officer, Committee Chairman	H.G. Blank		4/15/83
MWRD, Committee Member	D.B. Clark		4-15-83
PDSP, Committee Member	C. Schoux		4-20-83
ARD, Committee Member	J. Bonner		4/18/83
Program, Committee Member	T. Samaranayake		4/18/83
CONT, Committee Member	A. Schantz		4/18/83

Principal Abbreviations and Acronyms Used

AID/W	Agency for International Development/Washington
ARTI	Agrarian Research and Training Institute
D-Channel	Distributary Channel
FAR	Fixed Amount Reimbursement
FO	Farmer Organization
GAO	General Accounting Office
GITI	Galgamuwa Irrigation Training Institute
GSL	Government of Sri Lanka
HC	Host Country
ID	Irrigation Department
IFB	Invitation for Bid
I.O.	Institutional Organizer
IRR	Internal Rate of Return
IRRI	International Rice Research Institute
MLLD	Ministry of Lands and Land Development
NIA	National Irrigation Administration (Philippines)
OFWM	On-Farm Water Management
O&M	Operations and Maintenance
PACD	Project Activity Completion Date
PIL	Project Implementation Letter
PIO/C	Project Implementation Order/Commodities
PIO/P	Project Implementation Order/Participant
PIO/T	Project Implementation Order/Technical Services
PO	Purchase Order
PP	Project Paper
PRC/ECI	Planning Research Corporation/Engineering Consultants Incorporated
T.A.	Technical Assistant (Subprofessional engineering technician)
TA	Technical Assistance
USAID	United States Agency for International Development (Colombo)
WMS	Water Management Synthesis Project

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PROJECT PAPER SUPPLEMENT

WATER MANAGEMENT PROJECT

AID PROJECT NO: 383-0057

I. SUMMARY AND RECOMMENDATIONS:

A. SUMMARY:

The Water Management Project, as amended by this PP Supplement, remains financially, economically, technically, administratively, socially, and environmentally feasible.

B. RECOMMENDATIONS:

It is recommended that:

a. The-Life-of-Project (LOP) be increased from $18.34 million to $24.478 million;

b. The Project Assistance Completion Date (PACD) be extended from April 1, 1984 to December 31, 1985;

c. AID authorize an additional $2.1 million to increase the grant amount from $3.0 million to $5.1 million. It is proposed to obligate $0.6 million in FY 83 and $1.5 million in FY 84; and

d. AID authorize an additional $4.0 million to increase the Loan amount from $6.8 million to $10.8 million. It is proposed to obligate $3.0 million in FY 83 and $1.0 million in FY 84. The terms of the loans are:

1. Maturity: - Forty (40) years including a ten (10) year grace period.

2. Interest: - Two percent per annum during the grace period and three percent per annum thereafter.

3. Currency: - Interest and principal are payable in U.S. Dollars.

II. PROJECT RATIONALE AND DESCRIPTION

Sri Lanka's economic growth will for the foreseeable future depend upon the performance of the agricultural sector. In 1981, this sector accounted for 29% of Gross Domestic Product, 50% of employment and 60% of the country's total export earnings.

It is estimated by the GSL that food production will need to grow at about 5% per annum to meet the demands imposed by increases in population and incomes. Progress over the past few years has been impressive, especially in the production of paddy, the country's principal staple food. Paddy production has increased from 102 million bushels in 1980 to an estimated 115 million bushels in 1983, an all-time record though still short of rice self-sufficiency. This production response has also created increased employment opportunities in the rural sector as evidenced by labor shortages now reported during the peak planting and harvesting periods, and increased incomes for paddy farmers as the farmgate price for paddy has regularly been above the guaranteed floor price.

Water availability is the key variable determining how much acreage can be sown under paddy. An adequate, well-regulated, and reliable supply of water is critical if yields and acreages of paddy production are to be maximized. Unreliable irrigation increases risk to the farmer, and negatively affects yields by discouraging optimum use of production inputs. For example, both transplanting and fertilizer use vary proportionately with water dependability. Concurrently, poor water management practices, including the excessive use of available water, also negatively affect yields and acreages.

By improving water management practices as well as improving the physical water delivery capability of the Gal Oya Irrigation Scheme and by improving the institutional capability of the Irrigation Department, it is anticipated that the Water Management Project will provide a valuable contribution to a principal GSL objective: the attainment of food self-sufficiency, particularly rice.

It is in this context that AID has and will continue to support investments in irrigation and specifically the Water Management Project. This approach is also in accordance with the Asia Bureau's recent Strategic Plan which emphasizes irrigation, particularly water management, training and "software" as a long-term core program in the agricultural sector.

The Water Management Project is an integral part of the Mission's development strategy for Sri Lanka, as described in the January 1983 Country Development Strategy Statement. Specifically, this project is supportive of efforts concerning: (a) strengthening institutional development (CDSS, pp.24-25), and (b) food production and natural resource management (CDSS, pp.43-45). Concerning overall Agency guidelines, this project is making a particularly significant contribution to institutional development of the GSL Irrigation Department. An end product of this project will be a substantially improved capability of the Irrigation Department to plan, design, construct, maintain and operate irrigation schemes throughout Sri Lanka. In fact, the models developed and lessons learned under this Project have already gained national attention, thus

setting the stage for the successful replication of improved practices in irrigation systems nationwide, including those under the Mahaweli Development program.

The purpose of the Project as stated in the Project Paper is "To develop an institutional capacity in the GSL Irrigation Department which will enable it to manage large irrigation schemes in a more effective and efficient manner." The Project Paper stated that "This Project is viewed as the first of a possible series of major efforts by USAID over the next 20 years to assist the Government of Sri Lanka to improve water management in the country with special emphasis on major irrigation schemes." The recommendation made in this Supplement is in support of completing the Project as originally designed and in support of the longer term commitment to improving water management country-wide as articulated in the PP. The longer term effort is envisioned to include a follow-on Project for which preparatory work funding is provided in this Supplement.

The Project is to develop an institutional capability of the GSL to manage large irrigation schemes in a more efficient manner. Specifically the Project was to rehabilitate the Left Bank of the Gal Oya system, develop Master Plans and conduct on-farm water management research at Gal Oya and Uda Walawe, improve the central support provided by the Irrigation Department, and assist in the establishment of farmer organizations whereby farmers participate with government organizations in the construction, operation and maintenance of systems. The project was to develop procedures and techniques which can be replicated throughout Sri Lanka to upgrade irrigation systems and improve agricultural production.

The Project was obligated in August 1979 with the Irrigation Department (ID) as the agency responsible for implementation. The ID has been assisted, under a Host Country Contract, by PRC/ECI, a U.S. engineering firm which presently provides five long-term advisers. The contract provides for an estimated 224 person months of services, these are currently being provided in the areas of design, construction supervision, equipment maintenance, and training. The rehabilitation work is carried out by small firms contracted by the Irrigation Department through a competitive bid process. Through a Letter of Understanding the Irrigation Department is further assisted by the Agrarian Research and Training Institute (ARTI) which works on the farmer organization and socio-economic component of the Project. ARTI has been assisted by Cornell University initially under an AID/W centrally funded project and currently by an AID direct contract which provides the services of a water management specialist. In addition, short-term advisory services are supplied by the centrally funded Water Management Synthesis Project. Commodities were initially procured under an IFB which was formally advertised. Subsequent procurement in the U.S. has been through a Procurement Service Agent with local procurement handled by the Irrigation Department.

Project progress as reported by the PRC/ECI Contractor was estimated at 40 percent as of January 1, 1983, versus a scheduled completion of 74 percent based on a subjective evaluation of individual component's contribution to the overall Project. Physical progress on the rehabilitation work on the Left Bank of the Gal Oya system was reported as 6 percent. Other components of the project have shown greater progress, particularly training activities and the farmer organization program. In recent months, construction progress has accelerated, and through improved construction management and improved GSL budgetary allocations, USAID has been assured that the Project will be completed by the new target date of December 31, 1985.

A Mid-term Evaluation of the Project, conducted in June 1982, reviewed progress to date, recommended redirecting various components of the project and recommended that additional time and funds be made available (See Annex E 8). An Irrigation Sector Study was conducted in July 1982 which investigated future investment possibilities in the irrigation sector (See Annex E 9). The AID Mission has endorsed the major recommendation of the evaluation to extend the Project and provide additional funds. The evaluation endorsed much of the activity conducted under the Project. Specific recommendations are discussed in later sections but briefly those which redirect the project include improvements in the Master Plans, a pragmatic approach to design, improved organization of construction activities and establishment of an operations model. The Irrigation Sector Study recommendations have led to a proposal which is being implemented for the establishment of a Water Management Cell which would have monitoring and evaluation responsibilities and conduct studies of systems prior to rehabilitation.

Under the PP Supplement it is planned to complete the Project as originally designed. The Gal Oya Left Bank System is to be rehabilitated utilizing a pragmatic approach which focuses on establishing system safety and improving water control ability. The Master Planning effort will be completed and emphasis will now be placed on improving operations and maintenance. A major aspect of this element is the establishment of an Operations Model which will more closely schedule irrigation releases to system demands. Training activities are to continue with increasing emphasis on improving in-country training facilities and curriculum and presentation of water management principles to Agricultural Department staff and others outside the Irrigation Department. A major institutional development initiative is the establishment of a Water Management Cell which will assist the Irrigation Department in the monitoring and evaluation of irrigation system performance countrywide and prepare prefeasibility studies of major systems scheduled for rehabilitation. The establishment of farmer organizations is to continue as an integral part of the rehabilitation program,

maximizing farmer involvement in design, construction, operations and maintenance of the Gal Oya System. The role of ARTI in socio-economic work will continue, and assistance is to be provided to enhance the capability of the Water Management Group by incorporating it into a new Water Management Research Center which will be able to provide increased water management advisory services.

This Supplement addresses two problems faced by the Project: a shortfall in Project funds and an inadequate time period to achieve the project purpose. A detailed justification is included in Part III. Briefly, the extension is justified on the following grounds. After a slow implementation period, construction progress has accelerated and systems have been installed which lend assurance that the construction schedule will be adhered to. Lessons are being learned, particularly concerning farmer participation and the institutional organizer program, which are important to other irrigation systems nationwide. On an operational level, the Project has faced several unexpected problems which have resulted in a shortfall of funds and delays in implementation. These include an underestimate of the physical extent of rehabilitation work, an unusually high inflation rate which has affected construction costs and an ethnic disturbance in the area which resulted in a delay in implementation and highstaff turnover.

III. COST ESTIMATE AND FINANCIAL PLAN:

The Project has seven major components. The largest component by far is the rehabilitation of the Left Bank of the Gal Oya Irrigation Scheme. The cost of this component represents approximately 79% of the total AID/GSL Project. Other components include: the Institutional Organizer (I.O.)/Impact Monitoring Program, a Training Institute (GITI), a Water Management Cell, Planning and On-Farm Research, a Water Management Center, and a Water Use Model. Costing of each of these components is included in Table I below.

TABLE I

COSTING OF PROJECT OUTPUTS/INPUTS[1]

($000)

PROJECT NO: 383-0057 TITLE: WATER MANAGEMENT

OUTPUT	AID Appropriated	GSL	Total
1. Rehab of Gal Oya LB	12,017	7,242	19,259
2. I.O. Program/Impact Monitoring	998	963	1,961
3. Training Institute (GITI)	1,008	278	1,286
4. Water Management Cell	718	17	735
5. Planning/On-Farm Research	495	57	552
6. Water Management Center	367	21	388
7. Water Use Model	297	-	297
	15,900	8,578	24,478

1. GSL accounting groups these activities into three categories: (a) Gal Oya Rehab Project; (b) GITI; (c) New Proposals. Their division of inputs assigned to these three outputs is included in Annex F.3.

Table II below presents a summary of project costs. It should be noted that the increase in AID project funds does not represent a reduction in the GSL contribution. In fact, despite a marked reduction in the rupee-dollar exchange rate, the GSL contribution will increase slightly. The GSL contribution remains a healthy 35% of overall project costs. For further details concerning the GSL contribution, see Annex F.3. In addition, it should also be noted that an earlier revision in the project budget was undertaken in June 1982. This revision was effected by PIL No.13. For a comparison of how the budget has changed (original budget, 1982 budget, current revised budget), see Annex F.1. See also Annex F.2 for the revised detailed budget.

TABLE II

BUDGET SUMMARY
($000)

I. GRANT (AID Contribution)

A. Technical Assistance	ORIGINAL	REVISED
1. PRC	2450	3777
2. Cornell	-	519
3. Irr.Sec.Pre Project	-	396
4. Evaluation	-	61
5. Misc./Other Costs	280	155
6. Contingency/Infla.	270	192
Total Grant	3000	5100

II. LOAN (AID Contribution)

	ORIGINAL	REVISED
A. Commodities	4170	4041
B. Rehabilitation/ Construction	-	4520
C. Training	700	1007
D. Other Costs	230	335
E. Contingency/Infla.	1700	897
Total Loan	6800	10800
III. GSL CONTRIBUTION	8540	8578
TOTAL PROJECT	18340	24478

Tables III and IV below present the Revised Project Funding Forecast and a Summary Cost Estimate/Financial Plan.

TABLE III

PROJECTED ANNUAL EXPENDITURES
($000)

	1980	1981	1982	1983	1984	1985	Total
I. AID Contribution							
A. Tech. Asst.							
1. PRC/ECI	308	766	813	992	731	167	3777
2. Cornell	-	100	49	144	144	82	519
3. Irr. Sec.	-	-	-	-	216	180	396
Pre-Project							
4. Evaluation	-	-	25	-	-	36	61
5. Misc.	-	-	20	100	25	-	155
B. Commodities	2086	712	464	405	374	-	4041
C. Construction/Rehab.							
1. Gal Oya	-	-	-	950	1750	1600	4300
2. GITI/ARTI	-	-	-	100	120	-	220
D. Training	27	31	281	273	221	174	1007
E. Other Costs	-	20	10	100	120	85	335
F. Contingencies/Infla.	-	-	-	300	350	439	1089
Sub Total	2421	1629	1662	3374	4051	2763	15900
II. GSL Contribution	232	746	1078	1913	2826	1783	8578
GRAND TOTAL	2653	2375	2740	5287	6877	4546	24478

TABLE IV

SUMMARY COST ESTIMATE AND FINANCIAL PLAN
($000)

SOURCE:	AID Grant		AID Loan		GSL	
USE:	FX	LC	FX	LC	LC	TOTAL
Technical Asst.	4753	155	-	-	-	4908
Commodities	-	-	3629	412	172	4213
Training	-	-	932	75	48	1055
Const./Rehab.	-	-	-	4520	4843	9363
Other Costs	-	-	-	335	1847	2182
Infla./Con.	192	-	-	897	1668	2757
TOTAL	4945	155	4561	6239	8578	24478

SHORTFALL OF FUNDING:

Although from inception it was suspected that the Project was underfunded, this fact was made clear only after completing the detailed survey of the Gal Oya System in 1980. The original Project downstream system had been built without a complete detailed set of plans; existing plans were destroyed in the 1978 cyclone. Additionally, the system had evolved for many years with little control by the Irrigation Department and with few records of changes made in the system. The detailed survey conducted under the Project showed an increase by 43 percent in the total kilometers of canals as compared to figures originally stated. This increase in length of canals has resulted in a considerable increase in the total cost of the rehabilitation.

A second reason for the cost overrun is the continuing high inflation faced by the Project. The original Project budget allocated 20 percent of Project costs to contingency and inflation. In actuality the combined inflation rate in Sri Lanka from October 1979 through August 1982 has been 54 percent, significantly higher than world rates. The annual inflation rate for 1980 alone, based on the Colombo Consumer Price Index, was 26 percent compared to a U.S. rate of 11 percent. The index of cost of construction stands at 180.3 as of August 1982 from an October 1979 base. Project costs have escalated significantly above budgeted amounts despite cost saving designs recommended by the Evaluation Team and PRC/ECL

In 1982, USAID agreed to use the remaining funds in the contingency and inflation item to help support the short-fall in construction costs. This has alleviated the budget problem in 1982 and for most of 1983. However, without additional budgetary support for 1983, 1984 and 1985, the Irrigation Department will not be able to complete the rehabilitation work in the four year time frame. A final contribution to the need for additional AID financing was an insufficient allowance of technical assistance funds in the original PP. The PP called for 329 person months of technical assistance but budgeted only $2.42 million which allowed funding of only 250 person months. The revised budget is based on a total project technical assistance requirement of 436 person months. See Annex F.2.

EXTENSION OF TIME:

The Project got off to a good start in 1980 with the purchase of the required commodities and selection of a contractor to provide the necessary Technical Assistance. The contractor and equipment arrived on schedule, however, the Irrigation Department was unable to provide the required local staff to support the consultants for over one year. The contractor, under an advisory type contract, had no local technical staff to support the expatriates to do the physical work of data collection, master planning, surveying, design and construction, and were in fact dependent on the Irrigation Department for getting the actual work done. Because of delays in completing the designs, the start of construction work for rehabilitation was not started until late 1981. Even then some construction, particularly canal bank stabilization, was of an experimental nature. Therefore, the four year construction program originally scheduled for completion in early 1984 has necessarily been extended through 1985. Compounding the staffing problem, an ethnic disturbance occured in the Amparai area in 1981 which resulted in a hiatus in project implementation and a near complete turnover in Irrigation Department professional staff. Adequate numbers of qualified staff have now been assigned and the prospects of the Project meeting the revised construction schedule (see Annex E.3) appear good. The possibility of accelerating the construction pace is not likely because of budgetary constraints imposed on the Irrigation Department by the Ministry of Finance as part of an overall GSL budget limitation. The continued support for the Project by the GSL in terms of a comparatively high HC contribution is an indication of the importance of this Project despite the general GSL budget constraints.

EFFECTS IF ADDITIONAL FUNDS/TIME ARE NOT PROVIDED:

If additional funds are not provided or if additional time is not allowed the Project will not be completed as designed. The contractor now estimates that the overall Project will be 77 percent completed by the current PACD, April 1984. However, the physical completion of the rehabilitation component would be only 40 percent.

Although it is possible that the Irrigation Department could eventually complete the rehabilitation effort from this stage, it is unlikely that GSL funds would be made available in a timely manner, given the likely continuing budgetary crisis.

A critical point is that if no additional funds are made available, the Technical Assistance input to the Project would cease as of July 1983. This would have two serious consequences. First, the rehabilitation momentum built up in the past six months by the technicians would be lost. Second, without the required assistance, programs such as training and institutional organizers would suffer, resulting in an inability to meet critical institution building goals. The latter are perhaps the Project's most important feature. A recent GAO team applauded the farmer organization approach being tested under the Water Management Project indicating positive implications for irrigation island-wide. Interest in the program has been shown by other GSL agencies and donors involved in water management. The IO Program and related socio-economic research are key components of the Project for which continued USAID assistance is considered vital, particularly if the results of this innovative approach are to be shared with other LDC's as recommended by the GAO team. Finally, strengthening this Project as recommended by the Evaluation and Sector Survey Study and as described above will help lay the groundwork for AID's continued long-term involvement in this key sector.

IV. IMPLEMENTATION AND MONITORING PLAN

A. IMPLEMENTATION PLAN:

The implementation of the Project will continue as described in the following paragraphs.

1. Technical Assistance:

The Regional Legal Advisor has determined that amendment of the PRC/ECI contract will not require a waiver of competition. Assuming successful negotiation of a contract amendment, technical assistance will continue to be provided by PRC/ECI whose major emphasis will be on the design and supervision of rehabilitation work, training, and improvement of operations and maintenance of the Gal Oya System. Establishment of the Operations Model is expected to be included in the PRC/ECI contract. The project extension will provide approximately 113 additional person months of services in these areas. The I.O. Program will continue with the project-funded services of a socio-economic advisor supplemented with short-term services from Cornell University funded by the Water Management Synthesis Project. The work to be conducted by the new Water Management Cell will be assisted by approximately 36 person months of a long-term advisor and various short-term specialists from the Water Management Synthesis Project. Since the work is essentially an outgrowth of the Diagnostic Analysis Workshop conducted by the Water Management Synthesis Project (WMS), it would be desirable to have Colorado State University, the lead university in the Project, p[illegible]e these services. The Mission will co-share costs with the Water Management Synthesis Project.

2. Commodities:

Additional commodities will be purchased to support the rehabilitation effort and other components of the Project. Commodities, including additional vehicles, spare parts and equipment, will be purchased directly from suppliers or the Contractor. Other commodities will be purchased off-shelf in Sri Lanka. See Annex G, Procurement Plan.

3. Training:

Nine long-term participants will be trained during the life of the Project. During the extension additional short-term training courses of an estimated 67 person months will be arranged, primarily to third countries. Increased emphasis by the PRC/ECI Training Advisor will be placed on developing short-term in-country water management courses for ID personnel and other extension workers.

4. Rehabilitation:

A further $2.3 million will be added to the fund of $2.0 million established in 1982 for Fixed Amount Reimbursement of agreed-upon sub-projects with supervision provided under the PRC/ECI contract and periodic monitoring and final inspection carried out by an AID engineer.

5. Construction and Other Costs:

Construction of facilities at GITI will be financed according to the Fixed Amount Reimbursement method under a cost sharing formula with the GSL. Plans and specifications will be approved by an AID engineer who will also perform final inspections prior to reimbursement. Construction will be carried out by a Sri Lankan construction firm under contract to the Irrigation Department. Renovation work at ARTI will be conducted by a local construction firm contracted by ARTI and reimbursed through the Irrigation Department by AID. Other costs include (1) financing of a Sri Lankan engineering firm to carry out a feasibility study of a representative irrigation system being considered for rehabilitation under the proposed AID follow-on Irrigation Sector Project, (2) support costs for project preparatory teams, and (3) funding of special studies, seminars and publications of the Water Management Research Center. The feasibility study will be funded by AID under a contract between the Irrigation Department and a local engineering firm. Support costs and special studies funding will be earmarked by a PIL which will establish eligible items for funding, procedures for reimbursement, etc.

B. IMPLEMENTATION SCHEDULE:

1. Completed Actions:

Date	Action	Responsible Agencies
08/79	Project Agreement signed	GSL/USAID
11/79	Initial Conditions Precedent met	GSL/USAID
11/79	Approval of RFTP	USAID
11/79	Approval of IFB (Commodities)	USAID
02/80	Contractor Selected/Approved	GSL/USAID
03/80	Amendment No.1 to Project Agreement signed	GSL/USAID
03/80	Contract signed by ID and PRC/ECI	ID/PRC
04/80	PRC/ECI Contract Approved	USAID
05/80	Arrival initial PRC/ECI LT Staff	PRC
06/80	Arrival Cornell LT Contractor	USAID
09/80	Approval of ECI Sub-Contract	ID/USAID
12/80	Amendment No.2 to Project Agreement signed	GSL/USAID
12/80	Arrival initial major equipment at site	Suppliers
08/81	Departure initial ST trainees	
10/81	Concurrence with ID/ARTI Letter of Understanding	USAID
12/81	Amendment No.1 to ID/PRC Contract	ID/PRC
06/82	PIL No.13 issued	USAID

06/82	Mid-term Evaluation	GSL/USAID
07/82	Irrigation Sector Survey (not project funded)	GSl/USAID
07/82	WMS Diagnostic Analysis Workshop (not project funded)	GSL/USAID/
09/82	Approval of ID's Contracting Procedures for FAR	USAID
01/83	Arrival second LT Cornell Water Management Advisor	Cornell

2. Future Actions:

Date	Action	Responsible Agencies
04/83	Approval of PP Supplement	USAID
05/83	Execution of amended Grant and Loan Agreement	USAID/GSL
05/83	Amendment of PRC Contract	GSL
06/83	Conduct second Water Management Synthesis Training Course	AID/W
07/83	Establish Water Management Cell	GSL/ID
07/83	Issue PIO/T for coordinator and ST Technical Assistance for work with Water Management Cell	USAID
12/83	Gal Oya Rehabilitation at 35% completion	GSL/ID
01/84	Coordinator on-board	AID/W
01/84	Conduct Annual Evaluation	GSL/ARTI
03/84	Feasibility Study contract signed	GSL/AID
12/84	Gal Oya Rehabilitation at 70% completion	GSL/ID
03/85	Irrigation Sector Project obligated	USAID
10/85	Final Evaluation conducted	USAID/GSL
12/85	Water Management Project completed	GSL

C. MONITORING PLAN:

Monitoring of the Project falls under the USAID Office of Mahaweli and Water Resources Development which has adequate staff to monitor the Project. This office includes three U.S. direct hire engineers and two FSN engineers. The Project Officer is a Civil Engineer with an irrigation specialization, who is expected to remain at post through 1985. Prior to construction, plans and specifications are reviewed and site visits are made by either a direct hire or FSN engineer. Work in progress is inspected and final inspections are made prior to reimbursement for completed work. A USAID engineer visits the Gal Oya site at least monthly to inspect construction progress and monitor other Project elements. In addition the Project Officer monitors the effectiveness of other Project elements - Water Management Cell, Water Management Research Center, GITI training and facilities upgrading, development of an operations model, etc. Visits to other sites where construction will be carried out (GITI, ARTI) will be made as necessary during construction and final inspections will be carried out prior to reimbursement.

V. PROJECT ANALYSES

A. TECHNICAL ANALYSIS:

1. Original Project Description:

The project description included in the PP established six Project components including major end-of-project outputs and objectives. The components are discussed in summary below and the detailed project description is included as Annex E.1.

a. Gal Oya Rehabilitation:

The PP called for preparation of plans and physical rehabilitation of the Left Bank System of the Gal Oya Irrigation Projeect, a large irrigation scheme constructed in the 1950s comprising 52,000 acres of irrigable land allotted to resettled farmers in irrigable parcels of 3 acres. The rehabilitation work was to have included silt removal, restoration of eroded banks, repair and replacement of control gates and water measurement devices, installation of regulating structures, and reshaping of field channels. Also included in this component were establishment of a field office and preparation of maps of the service area.

b. Planning and On-Farm Research:

Work on the component included preparation of Master Plans for the Gal Oya System and for Uda Walawe, a second large irrigation system requiring rehabilitation. It also included a program of water management research on one tract in each system and the preparation of plans and the initial implementation of a water management program in other tracts.

c. Training Program:

The in-country training program consisted of support to the Galgamuwa Irrigation Training Institute (GITI) to upgrade and expand the curriculum for irrigation engineers and technical assistants. Additionally, the PP called for training for civil engineers, Agrarian Services Department employees, agricultural extension workers and farmer leaders. Participant training was to consist of short-term training for twelve extension worker trainers and others and 20 observation tours for policy makers and high level officials annually.

d. Extension/Application Program:

Under this component training was to be provided to agricultural instructors stationed in the Project area who would insure that extension workers are trained in water management. A film on water management was also to have been prepared.

e. Improved Central Support to the Field:

This component called for an expanded staff in the Head Office of the Irrigation Department to support, administer, and monitor the Project and provide improved operations and maintenance support country-wide.

f. Farmer Organization and Socio-Economic Research:

This component was to have tested models of farmer organizations, selected a suitable model and replicated it to the extent possible to organize farmers in field channel groups. The farmer groups were to have participated in the design of field channel improvements, in rehabilitation work and then to operate and maintain field channels, including determining water allocations along their field channels. The socio-economic component was to have included bench-mark surveys of farmer conditions in Gal Oya, monitoring of change in the area, conducting bi-annual evaluations and conducting special studies on selected water management problems.

2. Progress to Date:

A mid-term evaluation of the Project was conducted in June 1982. Since then a number of the recommendations have been adopted, some have been rejected and progress has been made on meeting others. Two major recommendations that this PP Supplement addresses are that the Project be extended and that additional funding be provided. The Executive Summary and Recommendations are included as Annex E.8. Quarterly Reports prepared by the PRC/ECI Contractor provide more recent information on Project progress. The following sections summarize project progress to date and include progress on adoption of the draft evaluation recommendations. The overall progress of the Project as reported by the PRC/ECI Contractor is shown in Annex E.2. This table shows Project progress as of January 1, 1983 as 40 percent and an estimated completion date of December 1985. Project weights in this chart are based on a subjective evaluation of individual component's contribution to the overall Project. A weighting based on the cost of each component would result in a lower percentage completion since rehabilitation work, where progress is slow, would be weighted more heavily.

a. Gal Oya Rehabilitation:

A chart showing progress on the Gal Oya Left Bank Rehabilitation is shown in Annex E.3. Progress was reported as 6 percent as of January 1, 1983. This chart shows the rehabilitation woek broken down in major units and projects the work schedule through to completion in December 1985. Rehabilitation costs are estimated in current prices with no contingency at Rs.175 million or $8.74 million. Ancillary

rehabilitation elements raise the cost to Rs.198 million (See Annex E.3. Estimated expenditures on rehabilitation through 1982 are Rs.11 million with Rs.50 million budgeted for 1983. Projected expenditures for remaining years include an allowance for inflation estimated at 5 percent on the undisbursed balance. Section III contains additional financial data.

The Evaluation Report made four recommendations concerning the rehabilitation work. The first two recommendations call for a pragmatic approach to the design and rehabilitation work. This approach, which has been adopted, places first priority on establishing system safety, second on improving water control, and third on improving ease of operation and maintenance and meeting such farmer needs as crossings and buffalow wallows. The approach to design gets the engineers and designers out of their offices and into the field where rehabilitation requirements are formulated and agreed upon by all parties concerned. This approach has improved the pace of design work which is now comfortably ahead of construction. A continuing problem is the lack of adequate project maps. To date designers have used original blocking out plan maps and uncontrolled aerial photos. The Survey Department has initiated a mapping program, the output of which will be very helpful for field channel design.

A third recommendation was that construction scheduling be better organized, particularly that heavy equipment utilization be improved. Recently it has been agreed that PRC/ECI would take a more active role in operating the equipment and managing the workshop due to the lack of suitable trained personnel in the Irrigation Department to undertake this task. A detailed reporting system for equipment utilization has been developed and utilization is expected to improve. In addition, PRC/ECI has fielded a construction supervisor who is working with the ID to improve the management of the numerous small contractors working on the Project. Between September and December 1982, the number of contractors increased from 20 to 90. On-the-job training courses are being arranged for technical assistants[1] to improve their construction supervision skills. Construction work has been divided into subprojects and a progress monitoring system has been instituted. Reimbursement for completed subprojects is made after certification by PRC/ECI and inspection by an AID engineer. Fixed Amount Reimbursement of completed subprojects encourages the ID to improve construction organization and fully complete independent sections of channels.

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1. Technical Assistants are subprofessional employees of the Irrigation Department who have undergone a two year training program which includes theoretical and practical experience in drafting, surveying and construction supervision.

The fourth recommendation, that the contract between PRC/ECI and the Irrigation Department be terminated, has not been adopted on the basis of improved performance of the Contractor. A contract amendment will be negotiated when additional funds from this Supplement become available and the Scope of Work will be re-directed within lines laid out herein.

b. Planning and On-Farm Research:

A draft Master Plan for Gal Oya prepared by PRC/ECI has been submitted, and a termination report for Uda Walawe is being prepared. Although the Evaluation Report stated that the Master Plan was unacceptable as a working document, the Gal Oya Plan has proven useful as a reference document; the Uda Walawe report is intended to be a compilation of available data with limited analysis and preliminary recommendations for rehabilitation. Subsequent to the Master Plan, a Reservoir Operations Study for Gal Oya has been submitted which contains additional planning information which will be useful to the ID over the longterm.

On-Farm Research was conducted at Gal Oya and Uda Walawe as described in the PP. Difficulties were encountered in conducting this research because of the lack, primarily, of a direction for this research. The primary question - what will be the farmer's response to an adequate and reliable water supply? - can only be answered when improved water control means are installed. The first area where this control will be available will only come on-line Yala 1983. The research determined that land leveling and consolidation of basins were not economically viable water management alternatives. The Evaluation recommended that priority be given to a detailed water balance model that would take into account acreage irrigated by return flows and would determine what system changes are feasible and have a potential for improving agricultural output. Prior to development of this model, a significant amount of data must be gathered. A proposal has been received from PRC/ECI to undertake this data collection and calibration effort as part of a larger operations and maintenance effort.

c. Training Program:

With project support, the Galgamuwa Irrigation Training Institute (GITI) was reopened after a long period of inactivity. Work is on-going to improve the physical facilities as recommended in the Evaluation. A Training Advisor associated with the National Irrigation Administration in the Philippines has provided input to this component. A curriculum was developed for a short-term in-service training course in Water Management for Technical Assistants (T.A.) and suggestions for curriculum development for the two-year T.A. training course have been made. In 1982 three in-service courses were attended by 64 T.A.s out of the 900 of these sub-professional

technicians employed by the ID. Long-term training has been provided to an engineer and an agricultural lecturer from the Agriculture Department who will join the faculty of GITI.

Short-term training has been provided to 62 GSL officials, including 14 senior level Government officials, 17 irrigation engineers, 22 technical assistants and 9 officials from other Departments. Additionally, long-term training is being provided to an ARTI Researcher who has worked with the Project since inception. A summary of training activities through January 1983, is included as Annex E.7.

Addtional in-country orientations and workshops have been conducted and a Diagnostic Analysis Project was conducted in July 1982 and attended by participants from the Irrigation Department (3), Mahaweli organizations (6), Agriculture Department (9), Agrarian Services Department (2), and Land Commissioner (1). Continuing assistance from the Water Management Synthesis Project, the objectives of which coincide with those of this Project, is envisaged.

d. Extension/Application Program:

The extension program as described in the PP has been modified to include training in soil-water-plant inter-relations for technical assistants and institutional organizers, both of whom work closely with farmers. It is expected that an increasing emphasis will be placed on the extension program during the remainder of the Project. The in-service training course has been developed and refined over the past year. Current plans are to modify the water management curriculum specifically for agricultural extension agents and other field level staff from other departments and present the course in 1983. The course would be conducted by the staff of GITI for extension workers from Amparai. Future plans include either replication of the course or integration into the in-service courses presented by the Department of Agriculture. A Water Management Course aimed at higher level lecturers at Agricultural Training Colleges and irrigation engineers is planned for 1984. A slide show with recorded audio has been prepared as a general orientation of the Project. Further slide presentations for specific training purposes are envisaged.

e. Central Support:

Although central support of the Water Management Project has been weak at times, it has improved recently and is adequate to support and administer the Project. Backstopping of commodity procurement has in certain instances been weak but in general Project support in terms of personnel allocations, delegation of authority to the field office and preparation of Annual Work Plans has been adequate. Problems have arisen outside the control of Project officials in terms of budget allocations, but current and planned budget levels appear

adequate. A computer installed at ID Headquarters has been used to improve and facilitate computational work particularly dealing with reservoir studies. Use of the computer to improve accounting and financial reporting and for other department-wide uses is envisaged. The ID overall is short of engineering staff and workloads tend to be high. Discussions have been held with the ID regarding placing a greater emphasis on operations and maintenance. However, funding is a continuing problem, compounding the traditional emphasis on design and construction.

f. Farmer Organization and Socio-Economic Research:

To date 125 farmer organizations have been established over 10,000 acres of the project area. Annex E.6 contains a map of the Project area showing locations of farmer organizations. Two groups of Institutional Organizers have been trained and presently 44 work in the field as facilitators in the establishment of farmer organizations. A model has been adopted where the IOs are trained to work with farmers and assist in establishing organizations without becoming involved directly as advocates of either the farmers or the Irrigation Department. The system being evolved includes farmer groups organized around field channels at the lowest level. See Annex E.11 for additional details. These organizations are then planned to be federated at the distributary level and area level with plans now to integrate with the District Agricultural Committees. Farmer organizations are responsible for rotations of water among farmers on the field channel and for seasonal maintenance activity.

It is envisioned that D-channel groups will assume O & M responsibilities for these channels as well. Farmers have been consulted by the ID for design suggestions such as placement of canal crossings, buffalo wallows, etc. Farmers have also been participating in construction, both as employees of small local contractors and in some instances as contractors.

The Evaluation recommended that the IO program continue in an experimental mode though it recognized that the program would need a permanent agency home. It has recently been accepted in principle that a core group of IOs be offered permanent positions within the MLLD. This core group while working essentially under the ID at Amparai, would provide training and serve as supervisors for the IO program at Gal Oya as well as for other projects being considered for rehabilitation.

The socio-economic component being implemented by ARTI has conducted a bench-mark survey of the Gal Oya project area, has conducted the testing of irrigation association models and continues to monitor the Project and conduct special studies.

Approximately 15 research assistants work in the field continuously collecting data while five additional assistants transcribe and process data. Until recently processing of these data has been a bottleneck. With the arrival of a Cornell University long-term advisor who has a background in data processing, the backlog should eventually be cleared. To date three special studies have been contracted[1] and plans are to conduct additional studies on topics of particular concern. A Ph.D. dissertation on the Project has recently been published and a Water Management Workshop was conducted in 1982, with the participation of irrigation, agriculture, university and other interested parties.

3. Planned Extension:

Under the planned extension the major outputs of the Project are expected to be met and the Project purpose achieved. Additionally, work is to be carried out under the extension which will lay the groundwork for a follow-on Irrigation Sector Project. It is recognized that improvement of the water management capability and the institutional capacity of ID is a long-term effort and that the work to be carried out under the extension, while falling within the original scope of the Water Management Project, is intended to provide the base for the follow-on Project. The following sections describe by components the expected Project outputs over the period of the extension.

a. Gal Oya Rehabilitation:

Under the Project extension the Gal Oya Left Bank rehabilitation work will be completed. Initially estimates stated that 1500 kilometers of channels would be rehabilitated. After completing the detailed survey it was found that there were over 2100 kilometers of channels. The following table is a comparison of the lengths of canals reported in the PP versus the results of the detailed survey.

TYPE CANAL	P.P.	ACTUAL
Main Canal	51.2 km.	41.2 km.
Branch Canal	80.0 km.	100.2 km.
Distributary Canal	108.8 km.	437.0 km.
Field Channels	Not stated	1080.0 km.
Drains	Not stated	487.0 km.

1. These are "Women's Participation in Agricultural and Non-Agricultural Activities" by Ms. H. Karunaratne, "Second Generation Settlers in the Gal Oya Left Bank Scheme" by Ms. S. Abeyratne, and "Economic Analysis of Some Productivity and Equity Issues in Irrigation" by Mr. C.M. Wijayaratne.

This increase in quantity, estimated at 43 percent, has resulted in a considerable increase in the total cost of the rehabilitation. The scope of rehabilitation remains as described in the PP which is essentially to stabilize canal banks, remove silt deposits, install or replace structures where necessary, and install water control and measurement devices. As mentioned earlier, a "pragmatic" approach has been adopted which gets away from the concept of restoring the system to its original condition; rather the approach is to establish system safety, improve water control and improve ease of operation and maintenance.

The purpose of the rehabilitation effort, as described in the PP logical framework, is to increase irrigated acreage from 67,000 to 85,000 acres and increase rice production from 59.4 metric tons to 78.4 metric tons per annum. The actual acreage of irrigable land in the Left Bank System is 52,000 acres, which with a cropping intensity assumed in the Project Paper of 129 percent translates to 67,000 acres. The PRC/ECI Contractor has estimated under certain assumptions a potential cropping intensity for the entire Gal Oya System of 157 percent which indicates a total yearly acreage on the Left Bank of 81,600 acres, which is slightly less than that projected in the PP. This figure represents a long-term average; acreage in any year is dependent on reservoir inflow and other factors. According to the PP, production was expected to increase primarily on the basis of increased intensity rather than increased yields. Indications to date are that yield increases will occur as well. With a more reliable water supply it is postulated that farmers will tend to make additional investment in inputs resulting in higher yields.

As shown in the Budget, see Annex E.1, the AID contribution to the FAR account for reimbursement for completed subprojects will increase by $2.3 million. In addition, the budget includes funds for construction equipment spare parts and funds for reimbursement of construction of measurement structures which contribute to this component of the Project.

b. Planning and On-Farm Research:

Under this component the Master Plan work has essentially been completed. It is planned now to redirect this component of the Project to three priority areas: establishment of a Project Operations Model, and planning and follow through support for operations and maintenance activities. Establishment of a Water Balance Model was strongly recommended by the Evaluation Team. Further consideration of this recommendation has resulted in a proposal for an Operations Model which would recommend water releases to planted acreages during the irrigation season. This model would commence with a data collection effort and calibration on a limited acreage. Short-term assistance and equipment, including a small computer, will be provided to establish this model. Additionally, several large measurement

structures are required on the main and branch canals to enable the required measurement of flows.

Operations and Maintenance were priority areas identified by the GAO team in late 1982. Under the extension, one irrigation engineer will be provided with long-term training in the U.S. on system operations and maintenance. In addition,a consultant will provide short-term assistance in the preparation of operations plans and evaluation of the irrigation system in post rehabilitation areas. Improvement of system maintenance is expected through suggestions being made by the contractor. Recommendations for reducing O & M costs and improving equipment maintenance are areas receiving attention by the Contractor. Equipment to improve system operations and maintenance (i.e., shop tools, canal maintenance equipment, etc.) will be provided.

Since inception, the Project has suffered from the lack of adequate maps. Maps were prepared showing farmer allotments at the time of settlement. However, these are inaccurate and out of date. Aerial photos were prepared in 1980 but these have limited usefulness because of lack of control points and inadequate detail. Recently a set of maps prepared by the Survey Department has come to light. These are at an adequate scale for the layout of field channels and will be helpful for construction work and other purposes. Arrangements will be made for the Survey Department to provide full mapping coverage and to provide aerial photos at a matching scale. Costs of this effort will be met by the Irrigation Department as a contribution to the Project.

c. Training:

Training is to continue as a high priority component under the Project extension. The training program will continue to emphasize in-service training of Irrigation Department and other staff in improved water management practices through a multi-disciplinary approach. A Training Advisor and short-term assistance will continue to be provided. It is estimated that 270 Technical Assistants from the ID will receive in-service training at Galgamuwa Irrigation Training Institute (GITI) from 1983 through 1985. Training in the operation of the rehabilitated system will be provided to ID and other field staff, e.g., from Agrarian Services, the Department of Agriculture, located in the Project area. Short courses will also be provided to farmer leaders as rehabilitated areas phase in to the improved delivery system. Additionally, short courses are to be provided to T.A. construction supervisors, operations personnel and others by the PRC/ECI Advisors and ID staff. To further assist the in-service training effort, long-term training will be provided to an additional member of the GITI staff. Funds will be provided for facilities rehabilitation and construction (e.g., additional dormitory facilities) and equipment for training will be provided.

Participant training will be provided to an estimated 45 individuals over the remaining life of the Project. A tentative plan showing the proposed training is shown in the Detailed budget Annex F.2. Based on experience to date, training in the Philippines in association with the National Irrigation Administration has proven particularly useful. It is planned to conduct further short-term programs there and to send 2 to 3 individuals from ARTI for long-term training in fields pertaining to water management. Training in the U.S. will be conducted at universities having strong water management programs. The participant training program for the Project is estimated at $1,007,000, of which $307,000 of additional loan funds are required. In-country training costs of Institutional Organizers is included in this funding line item.

d. Extension/application:

This component of the Project is still in an early stage of implementation. Training has been provided to key field officials from other departments stationed in the Gal Oya area. Additional training will be provided to field level officials and farmer representatives as rehabilitation is completed by areas and the new water delivery method is introduced. Continued in-service training programs will be offered to Technical Assistants and Institutional Organizers to make them aware of agricultural production aspects of the Project. Courses specially directed to Agricultural Extension Agents and Agricultural College Lecturers are being developed and will be presented. Additional training courses can be arranged as necessary utilizing PRC/ECI staff and GSL staff who have received training . Recently a District Agricultural Officer has been assigned to work specifically with the Gal Oya Left Bank System. A proposal for demonstrating upland crop production in selected areas has been prepared. Additionally, it is planned to include Extension Officers in a program to determine crop water requirements on field channels. USAID intends to encourage involvement in the water management effort by assisting agricultural extension staff and other field staff of related departments through the provision of funds for demonstration plots and other agricultural extension activities. A Complementary Plan is being prepared which comments on availability of other inputs to the farmer.

With the opening up of private sector involvement in the distribution of agricultural inputs, these are now freely available. As discussed earlier, it has been hypothesized that when farmers perceive that the reliability of the water supply has been improved, increased levels of inputs and higher production will result. The continued presence of the Institutional Organizers in areas post rehabilitation is expected to be the key to improved water management as well as important in establishing cooperation among farmers in other areas, such as cooperative purchasing of inputs, etc. AID

inputs to this component of the Project include involvement by the PRC/ECI and Cornell staff, support for the I.O. training program and the in-service courses at GITI as well as short-term third country and the training courses.

e. Central Support:

Under this component the major pre-project work leading to the Irrigation Sector Project is to be implemented. The Irrigation Department and the MLLD have instituted a command area/project manager system for 27 major systems throughout the dry zone. Through instituting improved water management practices, improved maintenance, and a system of performance monitoring, production is expected to increase. The World Bank and AID have agreed in principle to provide assistance for rehabilitation of selected systems commencing in 1985. The Irrigation Sector Study conducted in 1982 recommended the establishment of a Water Management Cell which would be responsible for monitoring and evaluating the performance of irrigation schemes in relation to predetermined operational objectives. Also recommended in the Study is the establishment of multi-disciplinary teams to conduct prefeasibility studies of irrigation schemes scheduled for rehabilitation. These teams would investigate alternatives to traditional rehabilitation approaches, including the alternative of increased involvement by farmers in relevant aspects of system rehabilitation and subsequent operation and maintenance. It has been proposed that a multi-disciplinary approach similar to that introduced by the Water Management Synthesis training be adopted with disciplines in irrigation engineering, agricultural or on-farm engineering, agriculture or agronomy, soils, economics and sociology taking part.

Under the Water Management Project during 1984 and 1985, it is proposed to commence the work of at least one water management team which would work with field level personnel of appropriate departments to prepare prefeasibility reports or proposals which would identify rehabilitation work on selected systems. The team would also work with Project Managers and District Committees as well as with central level officials to establish a performance monitoring system. The team or "cell" would initially be staffed with well qualified personnel either on secondment from their parent departments or on contract. The team would work either with the Irrigation Department directly or with the Water Resources Development branch of the MLLD. In either case, the teams would work closely with the Irrigation Department as the lead organization in developing plans for rehabilitation and improved water management for major irrigation schemes countrywide. The teams will also work closely with the Secretary of the MLLD who will chair the Central Coordinating Committee for this activity. The ID will be reporting major system performance to the MLLD which serves as a policy setting and evaluation body.

USAID will provide training of the teams through the Water Management Synthesis Project, will provide opportunities for continued short-term training in a third country, and will fund travel and miscellaneous expenses incurred in-country by the teams as well as provide office equipment and vehicles. It is proposed to provide long-term technical assistance to the Cell to direct and coordinate the teams' activities and short-term assistance in specific disciplines. Funds have also been budgeted for conducting a detailed feasibility study, performed by a Sri Lankan firm, of one or more representative systems which would provide input to the Project Paper for the follow-on Project. This study would follow-on from the prefeasibility work done by the multi-disciplinary team.

f. Farmer Organization and Socio-Economic Research:

Under the project extension it is planned to expand the Institutional Organizers throughout the Left Bank Gal Oya system. This will require additional recruiting, training and fielding of I.O.s in accordance with the construction schedule. In 1983 three groups of I.O.s are to be trained including two groups of 30 each who will be Tamil speakers. These groups will bring the total number of I.O.s trained to 140. With anticipated attrition this number is expected to be reduced to 110, which is adequate coverage for the areas scheduled for construction this year. The mid-year evaluation to be conducted by ARTI is expected to include an analysis of the scheduling and requirements for additional I.O.s. If additional I.O.s are required additional courses will be conducted either in late 1983 or early 1984, prior to the major field channel construction work scheduled for the next two years.

To date the entire budget of the I.O. Program, with the exception of the Cornell Technical Assistance and some commodity assistance has been provided by the Irrigation Department. With the increasing numbers of I.O.s this budget has increased substantially. AID has agreed to contribute to this Project component through funding training costs of the I.O. Program, exclusive of salaries. At the conclusion of the Project, trained I.O.s will be available for assignment to other irrigation projects scheduled for rehabilitation. The establishment of a core group of I.O.s as permanent staff is the first step in the move of this program from a pilot to an island-wide institutionalized program. This will be followed by a transfer of certain functions currently handled by ARTI to the permanent staff. Recruitment, personnel, logistics and day-to-day support of the I.O.s will be gradually shifted from ARTI to the permanent group. ARTI will continue its training function. In addition to funding of I.O. training costs, estimated at $75,000, AID will fund commodities estimated at $12,000 for the I.O.s (bicycles, motorcycles for supervisory staff, etc.), provide short-term training to selected I.O. staff, and continue to provide technical assistance through the Cornell contract.

It is planned to continue the work of ARTI to monitor and evaluate the Project and conduct special studies. The Water Management Group of ARTI has been faced with increasing demands for its services by other donors and GSL projects. To date the group has been unable to expand beyond its present staff level due to the regulations of ARTI. In order to meet the demands for additional work and in order to better serve the Water Management Project, it has been proposed that a Water Management Research and Training Center be established under an Additional Director of ARTI. See Annex E.12. The proposal will be approved by the ARTI Board of Governers and GSL funds are expected to be budgeted from 1984. The Center, which would be established within the existing ARTI facilities, is initially projected to have a staff of 8 officers from disciplines including sociology, economics, water resources engineering, agriculture and planning. The Center would eventually serve as a focus for water management research throughout the country. Of particular interest to AID is that the Center would be able to provide services to Mahaweli Projects as well as to those of the Irrigation Department and Agrarian Services. The Center would be established with a Consultative Group, representing Departments involved in water management work. Among other functions of the Center, it is planned that a Water Management Newsletter be published. This would serve a dissemination as well as a coordination purpose. AID support will be provided to this component subject to approval of the Center concept by the ARTI Board of Governers. AID will provide additional long-term training, additional funds for special studies, funds for remodeling of the existing facilities for the Center, provision of office equipment, and funding for expenses of the Newsletter.

B. REVISED ECONOMIC ANALYSIS:

The capital cost of the Gal Oya Left Bank rehabilitation has been revised from Rs.197.2 million to Rs.411.8 million and this revision increases the cost by Rs.214.6 million. The Life of Project (LOP) has also been extended by 21 months from April 1984 to December 1985. These changes in the Project cost and timing require an update of the economic analysis presented in the original Project Paper.

The extent to which the Project is still economically viable, following these revisions, has been first assessed by re-computing the Internal Rate of Return (IRR) with added costs, but without any adjustments on benefits. This computation resulted in the following changes in the IRRs: (a) Base case, 15.6; (b) High alternative, 23.6%; and (c) Low alternative, 6.3%. The IRR's in the base case as well as in the high alternative still show a rate more than the prevailing opportunity cost of 13% generally anticipated for public sector projects, and, accordingly, the Project is economically sound in accordance with the assumptions of those two cases. However, if the resulting project benefits are in accordance with the low alternative, the IRR is rather unsatisfactory and this warrants a reassessment of the variables that entered the IRR computation.

Four critical assumptions were considered in the original IRR computation: (a) cropping intensity; (b) yield; (c) labor shadow price adjustment; and (d) price of rice. On the basis of currently available information, assumptions (a) and (c) require no adjustment, the other two need adjustments as they show some deviation. According to a survey carried out by the ARTI, the average yield prior to rehabilitation work in Gal Oya Left Bank, area has been approximately 43 bushels per acre, and the maximum and minimum observed yields are 88 and 19 bushels per acre. It should be noted that these figures are significantly lower than district figures reported by the Census Bureau. The lowest yield has been reported at the tail end of the irrigation channel system. This study reports unreliability of water availability and timely deliveries as the main constraints for low yields at the tail end. The main objective of this Project is to eliminate these constraints and to educate the farmers with regard to better use of water and inputs with a view to obtaining better yields from irrigated lands.

Given these Project objectives, the average yields in the project area could be increased to at least between 65-90 bushels per acre which are the minimum and maximum averages currently attainable in areas where regular water supply is well assured. Based on this assumption, the incremental yield has been increased from 65 bushels from the third year to 88 bushels in the 20th year. This results in an incremental total yield of around 5.3 million bushels in the 20th year compared to 4.0 million bushels considered in the original computation.

In the case of price, the dollar value of rice has recently declined to $240 per metric ton. However, this works out to Rs.5520 in rupee terms compared to Rs.4030 when the world market price of rice was taken as $260 per metric ton. This difference in the rupee price is due to changes in the exchange rate which stood at Rs.15.5 in 1978 and since has been devalued to the current price of Rs.23.0. The yield and the price

adjustments on the benefit side along with increased project rehabilitation costs result in the following new IRR's for the three alternatives:

(a) Base Case: = 34.7%
(b) High Alternative: = 44.2%
(c) Low Alternative: = 23.7%

The revised IRR computation substantially improves the viability of the Project.

All three IRR's are very impressive indicating that the Project is economically sound under all possible conditions. It should be noted that the depreciated rupee is a major contributary factor for high IRR's under revised computation, as the current cost of rice imports has gone up appreciably despite a decline in the world market price of rice. This means that the pay-off for increasing rice production domestically increases with declining value of the rupee. Given the possibility of a further devaluation of the rupee of between 10% to 15% the economic soundness of the Project will be further strengthened since the import of rice will become still more expensive.

C. SOCIAL SOUNDNESS ANALYSIS:

Essentially, the social soundness analysis included in the original PP remains a valid description of the expected beneficiaries and how they will benefit from this Project. Furthermore, changes which occured earlier in the Project and modifications which are included in the present PP Supplement will result in benefits to a larger beneficiary group. First, the Project has and will continue to rely heavily on small scale local contractors for rehabilitation/construction work at Gal Oya. Currently, approximately 90 small scale contractors are at work. The original PP anticipated that this work would be undertaken by Irrigation Department force account. Second, the preparatory work which will now be included in this Project will lead to the identification of other irrigation schemes suitable for rehabilitation under subsequent projects. Although farmers in those schemes will not benefit directly from this Project, to the degree that identification of suitable irrigation systems leads to GSL and/or donor financing of these systems, these farmers will receive indirect benefit from the Water Management Project which helped make follow-on projects possible.

Finally, although not increasing the number of beneficiaries, one change in the Project has resulted in a substantially improved participation of the target beneficiaries in the design and implementation of the Gal Oya rehabilitation effort. The Project Evaluation undertaken in 1982 helped redefine the engineering design approach used from an office-orientation practice to a more pragmatic field-orientation method. Now, farmers are increasingly consulted by Irrigation Department engineers (e.g., in the placing of channel crossings) prior to final design of rehabilitation work to be done.

D. ADMINISTRATIVE ANALYSIS:

The Irrigation Department is the principal implementing agency for this Project. The Project Paper pointed out the strengths and weakness of the Irrigation Department particularly the good record of the ID in design and construction work on the plus side and the relatively low priority placed on operations and maintenance on the minus side. This bias still exists though there is a greater awareness of the problem within the GSL, and various alternative solutions are being investigated. Project training has been important in this regard: A number of ID staff have been exposed to water management organizations in other countries and can make valuable suggestions regarding a reorganization.

The administrative organization as outlined in the PP has essentially been followed. The Water Resources Development office within the MLLD has been established but has had limited capability due to lack of staff. Similarly, the central support

office in the ID has been established and has been adequate to support the Project, but has not had the staff to accomplish the country-wide programs envisaged. The field office at Gal Oya has been staffed up to carry out the rehabilitation effort (See Annex E.10), and efforts to improve O & M are underway. The training staff at GITI has been built up with the return of participants from long-term training. PRC/ECI have prepared a proposal for further strengthening the head office training branch of the ID. It is concluded that the administrative organization is adequate to implement the Project as designed. Institutional development of the ID, the major thrust of the Project, is in progress and the organization is receptive to suggestions and proposals being made.

E. ENVIRONMENTAL CONCERNS:

The initial Environmental Examination concluded that the Water Management Project will have an overall positive impact on the environment as water management is improved, thereby resulting in increased rice production. The analysis accompanying the IEE (which recommended a "negative determination" and was approved) remains a valid statement of the anticipated environmental effect of this Project.

F. ENERGY:

The IEE addressed the likely impact on energy use by farmers in Gal Oya and concluded that no significant increase was likely. The construction period will include consumption of diesel fuel which is necessary for the operation of heavy earthmoving equipment and vehicles employed on this Project. Because labor is relatively plentiful and cheap in Sri Lanka, construction efforts maximize the use of manual labor wherever technically feasible. However, much of the work to rehabilitate the Gal Oya System requires the use of mechanized earthmoving and compacting equipment. The equipment employed on the Project is essentially of U.S. source and origin and is as fuel-efficient as practical.

VI. EVALUATION ARRANGEMENTS

A major evaluation of the Water Management Project was undertaken in 1982 (See Annex E.8, for Executive Summary). This Evaluation provided a valuable input to redesign of this Project and included a recommendation to extend the current Project. A second major evaluation will be conducted during 1985 to assess the success the Project has made in meeting its objectives. Funds have been provided in the revised budget for this purpose (3 pm at $12,000/pm).

In addition, during 1983, as part of its ongoing compilation of a socio-economic profile of the target beneficiaries, ARTI will produce an interim report which will focus on assessing the impact the Project has had to date on the farmers benefitting from the Gal Oya irrigation scheme. ARTI's socio-economic/monitoring will continue during the Life of the Project and will provide a major input to the final evaluation.

Finally, the Project will be routinely evaluated on a regular basis at the semi-annual meeting of the Project Steering Committee. These meetings have proven valuable in terms of bringing problems to management's attention in a timely fashion.

VII. NEGOTIATING STATUS AND CONDITIONS

The following are Conditions Precedent that USAID and the Government of Sri Lanka have tentatively approved.

A. Initial Conditions Precedent to Disbursement for amount of Loan added by Amendment No.3

Prior to the first disbursement of Loan funds under Amendment Number Three to this Agreement, or to the issuance by A.I.D., of documentation pursuant to which disbursement of such funds will be made, the Cooperating Country will, except as the Parties may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., an opinion of counsel acceptable to A.I.D. that the said Amendment Number Three has been duly authorized and/or ratified by, and executed on behalf of, the Cooperating Country, and that it and the Agreement as thereby amended constitute valid and legally binding obligations of the Cooperating Country in accordance with all of their terms. If the condition specified in this Section has not been met within ninety (90) days from the date of Amendment Number Three or such later date as A.I.D. may agree to in writing, A.I.D., at its option, may terminate this Agreement, as amended, by written notice to the Cooperating Country. A.I.D. will promptly notify the Cooperating Country when it has determined that the condition precedent specified in this Section has been met.

B. Additional Conditions Precedent to Disbursement:

1. Condition Precedent to disbursement for Water Management Cell:

Prior to the first disbursement of funds or to the issuance by AID of documentation pursuant to which disbursement will be made to finance technical assistance and office equipment for the Water Management Cell, the Borrower/Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., evidence that a minimum of five professionals have been hired or seconded for the new unit and a central coordinating committee appointed.

2. Condition Precedent to disbursement for Water Management Research Center (Agrarian Research and Training Institute):

Prior to the first disbursement of funds or to the issuance by AID of documentation pursuant to which disbursement will be made to finance long-term training for ARTI staff (in addition to those included in the present Training Plan), renovation of ARTI facilities, or procurement of office equipment, the Borrower/Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., evidence that a Water Management Research Center has been established, a Deputy Director appointed, and at least two additional Research and Training Officers have been hired.

ACTION

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TELEGRAM

AMERICAN EMBASSY COLOMBO

ANNEX A

P 040656Z MAR 83
FM SECSTATE WASHDC
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UNCLAS SECTION 01 OF 02 STATE 059493

4 MAR 83

ACTION COPY

AIDAC

E.O. 12356: N/A
TAGS:
SUBJECT: WATER MANAGEMENT PROJECT (383-0057) - PP AMENDMENT

REF: COLOMBO 0438

1. SUMMARY: AD HOC DELEGATION OF AUTHORITY FOR 21 MONTH EXTENSION OF WATER MANAGEMENT PROJECT APPROVED BY AA/ASIA. COMMENTS FROM PROJECT COMMITTEE REVIEW AND SUGGESTIONS TO BE TAKEN INTO CONSIDERATION IN DEVELOPMENT OF PROJECT AMENDMENT ARE DESCRIBED BELOW. END SUMMARY.

2. MISSION DIRECTOR IS HEREBY GIVEN AD HOC DELEGATION OF AUTHORITY TO AUTHORIZE A 21 MONTH EXTENSION OF THE WATER MANAGEMENT PROJECT TO DECEMBER 31, 1985. MISSION DIRECTOR ALREADY HAS AUTHORITY UNDER DELEGATION OF AUTHORITY NO. 133.1, DATED APRIL 15, 1982, TO AUTHORIZE PROJECT AMENDMENTS WHERE TOTAL LIFE OF PROJECT FUNDING DOES NOT EXCEED DOLS 30.0 MILLION. REQUEST MISSION SUBMIT COPIES OF COMPLETED PP SUPPLEMENT, AUTHORIZATION AND PROJECT AGREEMENT AMENDMENT DOCUMENTS FOR OUR INFORMATION AND FILES.

3. COST INCREASES AND IMPLEMENTATION PERIOD EXTENSION: COMMITTEE DISCUSSED THE BACKGROUND PERTAINING TO COST INCREASES AND EXTENSION OF IMPLEMENTATION PERIOD. WHILE EQUIPMENT COST INCREASES ARE SUBSTANTIAL CONCERN, COMMITTEE VIEWED THE AID GROUP DECISION OF 1981 TO ASSUME MORE LOCAL COST FINANCING FOR ONGOING PROJECTS AS SIGNIFICANT FACTOR IN PROJECT INCREASES AS WELL AS OTHER POINTS, I.E., VERY HIGH INFLATION RATE AND INCREASE IN REHABILITATION WORK, RAISED IN REFTEL. EXTENSION OF IMPLEMENTATION PERIOD BY 21 MONTHS APPEARED CONSISTENT WITH SUGGESTED CHANGES IN ORGANIZATION OF REHABILITATION WORK, INSTITUTIONAL CHANGES, FEASIBILITY STUDIES AND ADVANCE WORK FOR BROADER INVOLVEMENT IN IRRIGATION SECTOR IN 1985. SINCE (1) MID-COURSE EVALUATION INDICATES THAT PROJECT IS ADDRESSING OBJECTIVES, (2) SUCCESSFUL INSTITUTIONAL ORGANIZER COMPONENT IS TO BE REPLICATED IN OTHER IRRIGATION SYSTEMS, AND (3) PROJECT WILL SERVE AS BRIDGE FOR BROADER IRRIGATION SECTOR INVOLVEMENT IN FY 85, THIS PROJECT IS NOT CONSIDERED FOR DEOBLIGATION.

4. PROJECT COMMITTEE DISCUSSED FOLLOWING DESIGN AND TECHNICAL POINTS WHICH WE REQUEST BE ADDRESSED IN PP SUPPLEMENT.

5. WATER MANAGEMENT CELL: MISSION PROPOSAL FOR SUPPORT OF A WATER MANAGEMENT CELL (WMC) WITHIN MINISTRY OF

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LANDS AND LAND DEVELOPMENT WAS DISCUSSED. WE ARE NOT SURE, FROM BRIEF DESCRIPTION OF WMC, WHAT MISSION INTENTIONS ARE BEYOND MONITORING AND EVALUATION AND INSTITUTIONAL LOCUS FOR ID PROGRAM. IS MISSION PROPOSING TO SUPPORT WHAT APPEARS TO BE BROADER ROLE FOR WMC IN OPERATION AND MANAGEMENT OF PORTIONS OF IRRIGATION SYSTEMS IF SO, HOW IS PROJECT INTENTION TO DEVELOP INSTITUTIONAL CAPACITY TO MANAGE IRRIGATION SYSTEMS WITHIN ID AFFECTED? ALSO, HOW WILL WMC AND ID RELATE PARTICULARLY WITH REGARD TO REHABILITATION AND OPERATIONS OF IRRIGATION SYSTEMS GIVEN CONTINUING ID RESPONSIBILITIES FOR THESE ACTIVITIES? REQUEST MISSION ADDRESS THE SHORT AND LONG TERM INSTITUTIONAL PLANS FOR WMC AND ID IN PP SUPPLEMENT. ALSO SUGGEST MISSION CONSIDER DURING THIS TRANSITION PHASE, HOW THE ID AND WMC WILL WORK TOGETHER.

Tech: This needs to be more clearly detailed in the PP's WMC in ID.

6. REHABILITATION: PROPOSED ORGANIZATIONAL ARRANGEMENTS AND PRAGMATIC APPROACH TO DESIGN FOR IMPROVING PACE OF REHABILITATION APPEAR APPROPRIATE. HOWEVER, THESE CHANGES MAY NOT ADDRESS PROBLEM OF LACK OF COORDINATION OF REHABILITATION EFFORTS WITH OPERATIONAL REQUIREMENTS OF THE IRRIGATION SYSTEM AND FARMERS. FOR EXAMPLE, AS INDICATED IN HAMMOND MURRAY RUST'S FIELD TRIP REPORT DATED JANUARY 20, 1983, REHABILITATION ASSUMES GREATER MANAGEMENT EXPANSION AND FIELD CONTROL OVER MANY NEW STRUCTURES AND

Issue this adequately addressed

OPERATIONAL STRATEGY THAT FOCUSES ON DISCHARGES BY ID. HOW WILL ID ADDRESS THESE NEW OR EXPANDED RESPONSIBILITIES WITHOUT SUBSTANTIAL INCREASES IN OWN RESOURCES? THESE AND OTHER REHABILITATION AND OPERATIONAL PROBLEMS SHOULD ALSO BE ADDRESSED IN PP SUPPLEMENT. ONE SUGGESTION FOR IMPROVING COORDINATION IS TO INCLUDE AN IRRIGATION SYSTEMS OPERATION SPECIALIST AS PART OF ECI CONTRACT TEAM TO WORK WITH REHABILITATION DESIGNERS AND OPERATIONS STAFF. ALSO, DESIGN ENGINEERS SHOULD PROVIDE RECOMMENDATIONS ON HOW THE REHABILITATED SYSTEM SHOULD BE OPERATED.

reorganize to eliminate management staff

7. OPERATIONS AND MONITORING AFTER REHABILITATION: ALLIED TO THE PROBLEM OF REHABILITATION AND OPERATIONS DESCRIBED ABOVE, IS THE LACK OF INFORMATION ID STAFF WILL HAVE ON THE OPERATIONAL CHARACTERISTICS OF THE REHABILITATED SYSTEM. AS POINTED OUT IN MURRAY-RUST TRIP REPORT, IN THE PAST THE ID HAS HAD THE BENEFIT OF AN ACCUMULATION OF EXPERIENCE ABOUT SYSTEMS OPERATIONS BY

WHICH BECAUSE OF REHABILITATION DESIGN CHANGES IS NO LONGER THE CASE. THERE WILL NEED TO BE A GREAT DEAL OF FIELD ACTIVITY BY THE ID NOT ONLY TO ENSURE RELIABILITY OF THE SYSTEMS BUT MORE IMPORTANTLY THE SYSTEMATIC MONITORING OF PERFORMANCE OF THE SYSTEM. CRUCIAL DESIGN ASSUMPTIONS RELATING TO SOIL WATER REQUIREMENTS, CONVEYANCE LOSSES, AND EFFICIENCY OF WATER DELIVERIES SHOULD BE CLOSELY MONITORED AS WELL AS IRRIGATION STRUCTURES. THIS MONITORING OF THE IRRIGATION SYSTEM WILL BE INSTRUMENTAL IN FINE-TUNING THE OPERATION OF THE REHABILITATED SYSTEMS AND ENSURING THAT EXPECTED BENEFITS AND PROJECT OBJECTIVES ARE ACHIEVED.

8. WATER BALANCE STUDY AND OPERATIONS MODEL: INFORMATION GATHERED FOR WATER BALANCE STUDY AND OPERATIONS

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MODELING CAN BE USEFUL FOR ENHANCING AWARENESS OF HOW SYSTEM IS OPERATED AND SHOULD BE USED IN CONJUNCTION WITH OTHER MONITORING STUDIES. ONE VIEW IS THAT USEFULNESS OF STUDY IS STRONGLY DEPENDENT ON ABILITY OF ID TO OPERATE IT AND WOULD BE ENHANCED IF ID CONDUCTED THE STUDIES WITH ASSISTANCE OF OUTSIDE CONSULTANTS. OTHERWISE MUCH OF THE INFORMATION AND BENEFITS FROM CONDUCTING STUDIES ARE LOST WHEN CONSULTANTS LEAVE.

9. WATER MANAGEMENT CENTER: PROPOSAL FOR WATER MANAGEMENT CENTER AT ARTI WAS VIEWED AS A POSITIVE MOVE CONSISTENT WITH LONG-TERM IRRIGATION SECTOR REQUIREMENTS FOR MULTI-DISCIPLINARY RESEARCH AND IRRIGATION ASSISTANCE. COMMITTEE ALSO CONSIDERED THAT OTHER DONOR ASSISTANCE TO CENTER WOULD BE ADVISABLE IN ORDER TO BROADEN AND

STRENGTHEN INSTITUTIONAL BASE AND EFFECTIVENESS.

10. WATER MANAGEMENT SYNTHESIS (WMS II) COLLABORATION: SEPTEL FOLLOWS ON PLANS FOR WMS II COLLABORATION AND SECOND WATER MANAGEMENT SYNTHESIS TRAINING COURSE PLANNED FOR JULY.

Pincus feels Tom to determine if we need a waiver. JR

11. CONTRACTS: THE AMENDMENT TO PRC/ECI CONTRACT FOR ADDITIONAL TECHNICAL ASSISTANCE UNDER PROPOSED AMENDED PROJECT WILL REQUIRE A WAIVER OF COMPETITION. SEE PARA 2.4.2.B.8, CHAPTER 1, HANDBOOK 11. PLEASE PROVIDE DETAILED JUSTIFICATION FOR WAIVER, AND YOUR REQUEST WILL BE GIVEN EXPEDITIOUS CONSIDERATION. NOTE THAT THIS WAIVER ACTION, IF REQUIRED, SHOULD BE COMPLETED PRIOR TO AUTHORIZATION OF THE PROJECT AMENDMENT. DAM
BT
9493

Annex B

Life of Project
From FY 1979 to FY 1986
Total U.S. Fundings 15.9 Mil
Date Prepared: June 1979
Date Revised: March 1983

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Water Management -- 383-0057

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Program or Sector Goal: (1979-1983) 1/ Agriculture development that: 1) increases domestic food production; 2) expands employment opportunities; 3) improves the small farmers' standard of living.	1) Increase paddy production from 1.88 to 2.30 million metric tons. 2) Absolute and relative numbers of productively employed people in the Agriculture Sector increased from 2.09 to 2.7 million. 3) Small Farmer incomes increased in real terms by 25%.	GSL Reports	(Same assumptions as listed under Purpose)
Project Purpose: Development of an institutional capability which can be replicated to manage large irrigation schemes in Sri Lanka more efficiently and effectively with active farmer assistance.	**End of Project Status:** 1) By improvement in the Gal Oya scheme: a. Increase in irrigated acreage from 67,000 acres to 85,000. b. Increase in production from 59,400 metric tons (2.84 million bu) to 78,433 metric tons (3.75 million bu.). 2) Improve operations and maintenance capability in project areas 3) Government policies and regulations enacted to insure better water management.	**Purpose:** 1) Yearly joint GSL/ USAID Assessments 2) Mid-Project evaluation by April 1982 3) GSL Reports. 4) Final Evaluation	1) GSL policy will continue to encourage domestic food production through incentive pricing of commodities. 2) Rainfall will approach historical trends. 3) Sufficient production inputs, such as seeds and fertilizer, and credit are available.

1/ 1979-83 is used since verifiable indicators (1 & 2) are taken from the Government's Investment Plan.

4) Publicity and awareness program for policy makers, officials and farmers to better manage irrigation water.
5) Replicable technology developed that can be applied to other irrigation systems.
Management capability of irrigation department improved, specifically in maintenance areas.

Outputs:

1) Organization of farmers to reconstruct, operate and maintain their field channels
2) Water Management training facility rehabilitated and other WM training including long and short term training for ID and other department staff.
3) Research program established for Uda Walawe and Gal Oya.
4) Master plans for Gal Oya and Uda Walawe.
5) Upgrading capability to improve on-farm water management at Gal Oya.
6) Rehabilitation of Gal Oya Left Bank irrigation system.
7) Irrigation Department re-organized at both project and central level to better operate and maintain system.
8) Water Management Cell established on pilot basis to conduct pre-feasibility studies and monitor system performance.
9) Water Management Research Center established at ARTI to improve WM research and coordination.

Magnitude of Outputs:

1) 19,000 farmers organized into irrigation organizations
2) a. Rehabilitation of one physical facility and training program established.
   b. In-service training courses on water management presented to 90 T.A.'s per year from Irrigation department and other field level personnel from other departments.
   c. Curriculum upgraded for basic T.A. training course to include water management training for 60 T.A.'s per year.
   d. Seven training staff posted at GIII.
   e. Twenty participants per year from I.D. and other department provided short-term water mana ment training in the U.S. and third countries.
   f. Eight long term participants trained in disciplines related to water management to upgrade research, training and operati and maintenance.

Outputs:

1) Quarterly GSL progress reports.
2) USAID annual evaluation.
3) Consultant regular reports.
4) ARTI semi-annual evaluation and other reports.
5) Field trips and inspections.
6) Extension Department records.

1) Qualified personnel available for senior/mid-level positions
2) Sufficient lower-level personnel available.

g. A minimum of 140 Institutional Organizers trained and fielded to fully cover project area.

3) On-Farm field research completed on Unit 21 in Gal Oya (572 acres) and tract 3 in Walawe (500 acres).

4) Master Plans and other reports prepared, approved and distributed to include recommendations on:
   a. Return flow re-use.
   b. Operation of main canal and reservoir system.
   c. Domestic water.
   d. Operations and Maintenance procedures.

5) a. Training provided to extension staff and agricultural officers (see 2 e)
   b. Demonstration plots of subsidiary crops established at locations through/out project area.
   c. Meetings held with an estimated 200 farmer leaders per year to provide orientation on improved water management practices.

6) a. Rehabilitation of
      (1) 41.2 kms main canal
      (2) 100.2 Kms branch canal
      (3) 437.0 Kms distribution canal
      (4) 1080 Kms Field channels
      (5) 487 Kms drains
   b. Specificacions developed, orders placed and 2 excavation and 2 maintenance units arrive. and are in full operation.
   c. develop and begin water delivery schedule and measurement program. Develop irrigation operations model.
   d. Prepare and implement operating and training program for equipment.

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7) Re-organization takes place with appointment of key and other supporting personnel. Better operations and maintenance procedures established.
8) Prefeasibility studies prepared for 6 major irrigation systems. One full feasibility study conducted of representative system.
9) One center established and staffed by 8 professional researchers. Training provided to selected staff (see 2e and 2f). Annual research report prepared; Water Management Newsletter established.

Inputs:

1. GSL
   - Personnel
   - Commodities
   - Training
   - Local Cost
2. USAID
   - Technical Assistance
   - Commodities and Equipment
   - Partiicpants
   - Other

Inputs	GSL ($000)	USAID ($000) 2/
Technical Assistance	-	4,908
Commodities	172	4,041
Training	48	1,007
Construction/ Rehabilitation	4843	4,520
Other Costs	1847	335
Inflation/ Contingencies	1668	1,089
	8578	15,900

Inputs

Quarterly AID Implementation, Shipping and Financial Reports.

2/ USAID originally provided $3 million grant for TA, research and evaluation, and $6.8 million loan, revised to $5.1million grant, $10.8 million loan

UNITED STATES GOVERNMENT

memorandum

DATE: March 31, 1983.

REPLY TO ATTN OF: H. Blank, Eng. Officer (Water Resources)

SUBJECT: Water Management Project 383-0057 611(a) Certification.

TO: Ms. S.J. Littlefield, Director

THRU Mr. L.Purifoy, C/MWRD
Mr. W.P.Schoux, DD

I have reviewed all plans relating to the Water Management Project and have found that these plans are adequate to carry out the project. A reasonably firm estimate of the cost of this assistance has been prepared.

The PRC/ECI Contractor and the Irrigation Department have prepared a detailed construction schedule and cost estimate for the rehabilitation work at Gal Oya. This schedule is based on a realistic (1) estimate of the availability of project funds, (2) schedule of detailed design work, (3) estimate of construction manpower availability and (4) detailed estimate of costs based on quantity take offs. Means have been developed for managing the construction program so that the schedule is adhered to. Detailed plans and cost estimates are reviewed prior to making a commitment to fund individual subprojects.

For the construction at GITI the ID has prepared complete bid documents (drawings, specifications, bills of quantities) and a detailed cost estimate. AID has reviewed the initial design documents and will review the detailed documents prior to making a commitment, through a PIL, to fund the construction. Renovation work at ARTI will similarly be reviewed prior to a commitment of AID funding.

Based on the foregoing it is hereby recommended that, the Mission Director certify that conditions specified in Section 611(a) of the FAA are met.

Approved:

Disapproved:

Date: 4/28/83

OPTIONAL FORM NO. 10
(REV. 1-80)
GSA FPMR (41 CFR) 101-11.6
5010-114

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ANNEX C

STATUTORY CHECK LIST

The Statutory Checklist submitted with the original Project Paper has been reviewed in light of the changes introduced by this Project Paper Supplement. It is concluded that the original checklist remains a valid statement of how the overall project complies with statutory requirements. Nonetheless, the following brief statements concerning 611(a) and 611(e) requirements have been included to reaffirm the ongoing validity of the Water Management Project. In addition, Sections 634A and 653(b) are updated as follows:

FAA Section 634A, Section 653(b)

Congress was notified about the changes to this project by the FY 1983 and FY 1984 Congressional Presentations. FY 1983 funding is included in the Operating Year Budget for FY 1983.

611(e) Certification

Water Management

Certification pursuant to Section 611(e) of the Foreign Assistance Act of 1961, as amended.

I, Sarah Jane Littlefield, USAID Mission Director for Sri Lanka, having taken into consideration, among other things:

A. Sri Lanka's continued importation of rice;

B. The importance the Government of Sri Lanka places on achieving self sufficiency in rice;

C. The essential role that improved water management can play in increasing rice production.

D. The long experience of the Irrigation Department in constructing, improving, and managing irrigation schemes;

E. The willingness of the Ministry of Lands and Land Development to redirect, redefine and improve water management practices in Sri Lanka;

F. The important role that U.S. technicians are playing in helping the Irrigation Department improve water management at Gal Oya;

G. The continued financial commitment (budget allocation) the GSL has made to this project;

do hereby certify and reaffirm that in my judgement, Sri Lanka has both the financial capability and the human resources capability effectively to maintain and utilize the inputs provided by this project.

Sarah Jane Littlefield
Mission Director
Colombo, Sri Lanka

Date: 4/28/83

ANNEX D

7

Urgent

Telephone 24183

Telegrams FORAID

Telex FORAID Colombo 1232

My No. CA 9/9/52

Your No.

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DEPARTMENT OF EXTERNAL RESOURCES

Ministry of Finance and Planning

Ceylinco House (2nd Floor)

P. O. Box 277, Colombo 1

20th April, 1983

Miss S.J. Littlefield,
Director, USAID.

Dear Miss Littlefield,

Gal Oya Water Management Programme

I refer to the Agreement signed with USAID on August 30, 1979 for the Gal Oya Water Management Project. This project which is being implemented by the Ministry of Lands and Land Development has already made a significant impact on the conceptual formulation for better water management in Sri Lanka. The project also performs a very crucial role in enlisting farmer support in the rebuilding operation and maintenance of field channels and in the maximization of water use. As such the benefits of the project would not only be confined to the farmers in the project area but would be available to the farming population throughout Sri Lanka.

Unfortunately the project has run into two specific problems in the course of implementation, namely a shortfall of funds and an inadequate time frame to acheive the project objectives. In order to overcome these problems we understand a Project Paper Supplement has been prepared with the following objectives:

a) to increase the AID financed grant portion of the project by US $ 2.1 million to a total of US $ 5.1 million

b) to increase the AID financed loan portion of the project by US $ 4.0 million to a total of US $ 10.8 million ; and

c) extend the PACD by 21 months upto 1st January, 1986.

On behalf of the Government of Sri Lanka we strongly support the above proposals and shall be grateful if you would recommend to AID/Washington our request for additional funds for the completion of the project and for the extension of the PACD by a period of 21 months.

Yours faithfully,

(Mrs. S.L. Kuruppu)
for Director of External Resources

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Action Taken

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Annex D

ඉඩම් හා ඉඩම් සංවර්ධන අමාත්‍යාංශය
MINISTRY OF LANDS & LAND DEVELOPMENT

P. O. Box 512

500, T. B. JAYA MAWATHA
Colombo 10.

Telephones 36171 - 75

My No. 09/7/2/1.

Your No.

Date 1983.

RECEIVED APR 1983

Director,
Dept. of External Resources.

Gal Oya Water Management Programme

The Gal Oya Water Management Programme, which is being implemented by this Ministry with assistance from USAID, has already made a noticeable country-wide impact in the concepts and programmes for better water management. However, the project encountered two specific problems in implementation, namely, a shortfall of funds and an inadequate time period to achieve the project purpose. For these reasons USAID has prepared a Project Paper Supplement which seeks to :-

(1) increase the AID financial grant portion of the project by US $ 2.1 million to a total of US $ 5.1 million;

(2) increase the AID financial loan portion of the project by US $ 4 million to a total of US $ 10.8 million; and

(3) extend PACD by 21 months so that the revised PACD is 1st January, 1986.

During the discussions that I had with AID officials, it was agreed that this revision should also finance the preparatory work which has to be undertaken for a Water Management Stage 2 under USAID Programme for Assistance which is expected to improve and rehabilitate a few major irrigation systems in the country. These proposals are acceptable to this Ministry. I shall, therefore, be grateful if you would make a formal request to USAID on behalf of GOSL to proceed with the Proposed Project Supplement.

Nanda Abeywickrema,
Secretary/L. & L. D.

RECEIVED 6 APR 1983

Copy to: Director, National Planning,
Director, USAID.

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PP Detailed Description

C. Project Description

1. Long Range Planning Activity

This project is viewed as the first of a possible series of major efforts by USAID over the next 20 years to assist the Government of Sri Lanka to improve water managment in the country with special emphasis on major irrigation schemes. The CH2M Hill report, while providing the basis of the Mission's first project as described in this paper, was much too ambitious for either the GSL or USAID to fully undertake at this time. The report was very useful in explaining in financial and technical terms, how costly and difficult it would be to improve water management in the country on large irrigation schemes, since these systems have to be rehabilitated to gain operational control of the water.

2. The Project

The purpose of this project is, "To develop an institutional capacity in the GSL Irrigation Department which will enable it to manage large irrigation schemes in a more effective and efficient manner." The logical framework, which provides the specific outputs, inputs, objectively verifiable indicators, as well as the means of verification and assumptions, is attached in Annex 6.

After detailed discussions with the Government, a decision was taken that major modernization and rehabilitation work would only be undertaken in one of the two major irrigation schemes recommended by the Consultants. Therefore, in this first four-year project, construction work will be undertaken on only the Left Bank of Gal Oya, but master planning and on-farm research will be carried out in both Gal Oya and Uda Walawe systems. Other major aspects of the project are extensive training, central support, socio-economic research, extension work, and assisting the GSL in [illegible] farmers to participate in determining the allocation of irrigation water and to rebuild, operate and maintain field channels. All of these project elements will be coordinated and directed so as to provide direct and indirect benefits to the major irrigation schemes in Sri Lanka. The major End-of-Project outputs and objectives are further defined as follows:

a. The Gal Oya Modernization Scheme:

— Prepare a modernization/rehabilitation plan for Left Bank System.

— Remove silt and restore eroded banks on the main Left Bank, its branch and distributary canals, and the large field channels. Repair and replace control gates and install measuring devices.

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— Reshape and regrade field channels on Left Bank system with farmer assistance to provide flows required by delivery schedules. Also, install adequate farm takeouts and added regulators to facilitate internal rotation of water.

— Re-organize and appoint staff, equip and train a water management field office which will have the responsibility for the operation, modernization and maintenance of the system.

— Prepare maps of the irrigated service areas for canal systems. Prepare and implement delivery schedules for those field channels for which water delivery can be guaranteed.

3. <u>Planning and On-Farm Research (Gal Oya and Uda Walawe)</u>

— Plan and implement with farmer assistance a detailed water management program on one tract in each system. (Tract 3 in Uda Walawe and Unit 21 in Gal Oya). Elements of the program would include analysis of physical and social aspects for current water use practices, on farm management training, advice, equipment, and financial assistance for improvements, maintenance and modification of structures, and provision of facilities for special water measurement and control.

— Prepare plans to extend the program on the one tract to all tracts and begin implementation in other tracts with farmer assistance.

— Prepare three master plans for each of the two major systems:

(1) Conduct a drain and river flow measurement program. Prepare a master plan for reuse of water and an estimate of program costs.

(2) Prepare a plan to optimize the operation of the Left and Right Bank main canal systems.

(3) Prepare a domestic water plan to meet the requirements for domestic and animal use without wasting water or damaging structures.

4. <u>Training Program:</u>

— Establishment of a permanent water management training school under the Irrigation Department at Galgamuva. The school would run four courses which are further explained in Part III 1 - 4., but would include:

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(1) An annual four-week course for 15 staff irrigation engineers and senior technical assistants.

(2) A 12-week course for 40 staff technical assistants twice a year.

(3) A 12-week apprenticeship course for 40 newly trained and recruited technical assistants annually.

(4) A one-week course for 160 students of the National Diploma and Technology (NDT) course to familiarize students with the use of laboratory and field equipment.

— The provision of equipment and training for four staff members to strengthen the NDT course in civil engineering at Katubedde and the Hardy Institute, Amparai.

— Three special two to four week courses for a total of 150 persons of the Irrigation Department, Agrarian Services Department and farm leaders at the Hardy Institute in Gal Oya.

— Special short courses or in-service training in water management at the Agriculture Training School for 80 agriculture extension workers annually.

— Special farmer leader training in water management and related subjects will be taught at the Agrarian Services Centers for an annual total of 480 farmer leaders.

— <u>Two Types of Participant Training will be Provided</u>:

(1) A special 3-month training course at the International Rice Research Institute, Philippines and in the United States for a total of 12 training instructors, project staff of Gal Oya, for Central officers and staff of the Agriculture Department. The staff of the Agriculture Department will be responsible for the training of extension workers in the project areas.

(2) Special observation cum training tours for a total of 20 policy makers and high level officials to visit nearby countries to study water management annually.

4. <u>Extension/Application Program</u>:

The project plans training of two experienced agricultural instructors in soil-water-plant inter-relationships plus work on use of visual equipment and other educational techniques. After completion of training the extension instructors will be stationed at Gal Oya to help insure that all extension workers are adequately training in water management. The project also includes production of a film on water management to be produced in the first year of the project.

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e. Improved Central Support to the Field:

The project also provides for an expanded staff to administer the water management unit in the Irrigation Department in Colombo. The Water Management Section will support, administer, and monitor the effectiveness of the Gal Oya project and provide operations and maintenance support to the country wide program.

f. Organizing Farmers and Socio-Economic Research:

A major objective of the project will be the organization of farmers along the minor systems (field channels) to participate in determining the allocation of water, to reconstruct and when necessary rehabilitate field channels, and then to operate and maintain them. Unification of these irrigation organizations into larger units is also planned for the future. Initially, various models or types of farmer organizations will be designed and developed. These models will then be tested in the field during the first year of project implementation as a major aspect of project activities. Every effort will be made to involve the farmers in the conception and design and implementation phases. The model(s) chosen will then be widely replicated to maximize the organizing of the farmers on the Left Bank by the end of project.

Specific applied research activities will also be conducted with the assistance of the Agrarian Research and Training Institute (ARTI). This will include: 1) a bench-mark survey of socio-economic conditions in the Gal Oya area; 2) help to articulate various irrigation association models and test them in the field; 3) continuous studies to monitor changes in the area in the form of bi-annual evaluations; 4) special water management studies. The results of this applied research will provide continuous input into project implementation and will also provide useful information for both annual and mid-project evaluation to be conducted by the GSL/USAID (See Part VI, Evaluation Plan).

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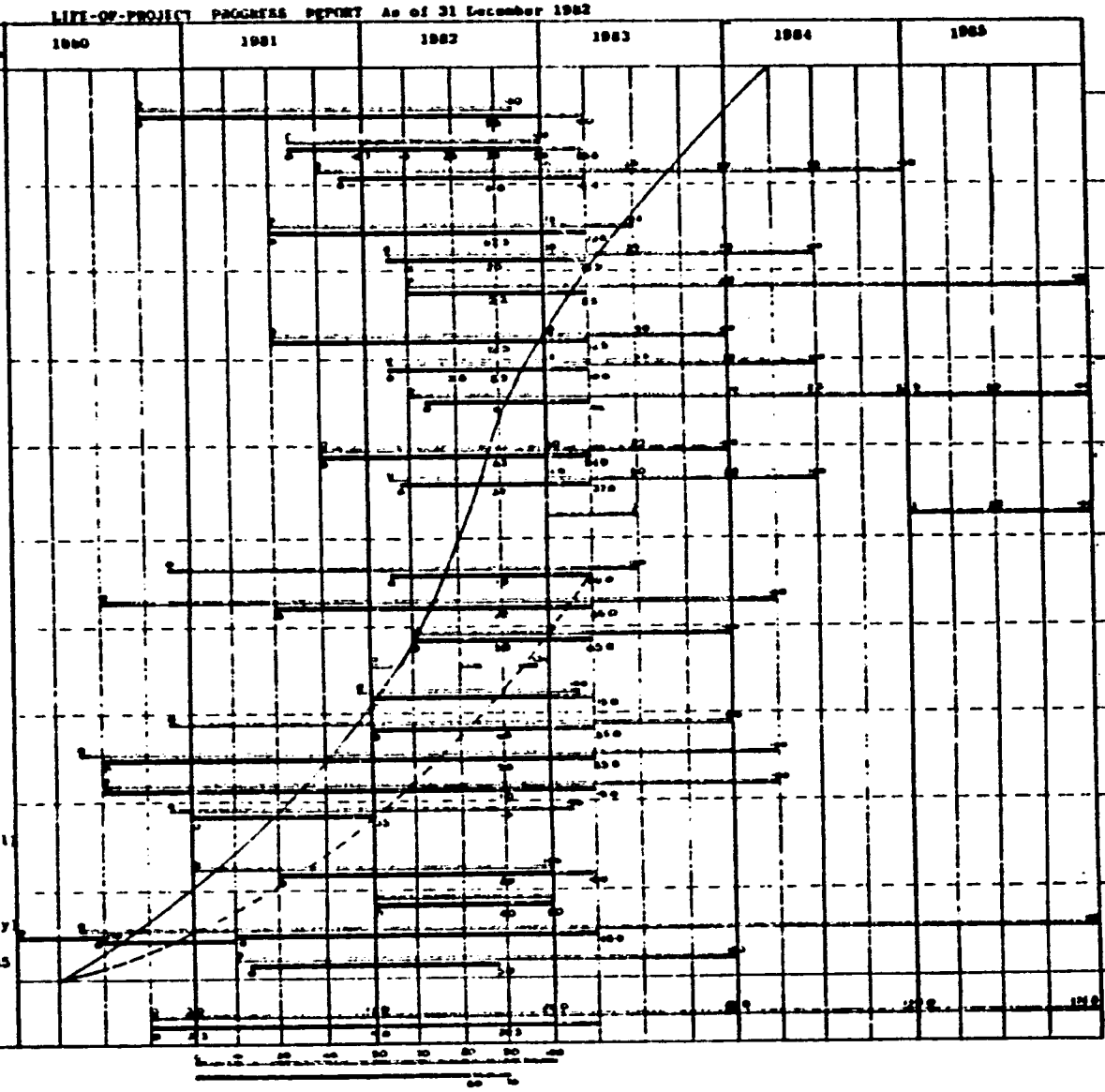
LIFE-OF-PROJECT PROGRESS REPORT As of 31 December 1982

WORK COMPONENT/ITEM	Project Weight %	% Compl. for item	Complin.% LOP basis
1. REHABILITATION LB SALOYA	30.7		7.38
A. MAIN AND BRANCH CANALS			3.80
(Total Est.length=(144.90km)			
a. SURVEY (10%)	130	104.8	
b. DESIGN (20%)		68.6	
c. CONSTRUCTION (70%)		13.4	
B. DISTRIBUTORY CHANNELS	12.1		3.30
(Total Est.length=437.00km)			
a. SURVEY (10%)		72.6	0.86
b. DESIGN (20%)		28.9	0.70
c. CONSTRUCTION (70%)		8.5	0.72
C. FIELD CHANNELS	8.2		0.38
(Total Est.Length=1,000km)			
a. SURVEY (20%)		12.5	0.16
b. DESIGN (30%)		10.0	0.19
c. CONSTRUCTION (50%)		NIL	
D. DRAINAGE CHANNELS	6.5		0.84
(Total Est.length=303.00km)			
a. SURVEY (10%)		54.9	0.36
b. DESIGN (20%)		37.8	0.48
c. CONSTRUCTION (70%)		NIL	
2. TRAINING	8.8		4.14
A. Facilities Improvements & Equipment Installation	2.2	20.0	0.44
B. GITI Training course (Staff & Curriculum)	1.1	65.0	0.72
C. GITI Water Mgt. Training	1.1	65.0	0.72
D. Water Management W.Shops	1.1	15.0	0.17
E. Proj.Area Water Mgt.Trng	1.1	20.0	0.22
F. Training Abroad	2.2	85.0	1.87
3. SOCIO-ECONOMIC RESEARCH	18.0		11.42
(ARTI/CORNELL)	3.1	65.0	2.01
4. WATER USERS ORGANIZ.(ARTI)	2.1	15.0	0.31
5. ON-FARM WATER MGT.RESCH.	2.7	35.0	0.95
6. MASTER PLANNING	7.3	(Terminated/cancel)	6.70
Saloya (68%)		100.0	
Bonaloso (32%)		80.0	
7. EQUIPMENT SELECTION PROCUREMENT.AND O.M LB		(Terminal Report only)	
	34.5	65.0	22.42
8. FORMULATION OF O&M SYSTEM	2.9	50.0	1.45
	100.0		55.36
• Total planned exp.(cumult) for Rehab. Const. (ml. Rs)			

Actual Expd (ml. Rs.(cumult).

Subject to future adjustments.



Annex 2.2

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IRRIGATION DEPARTMENT
WATER MANAGEMENT PROJECT
GAL OYA LEFT BANK REHABILITATION
CONSTRUCTION PROGRESS CHART

PREPARED BY DATE
SUBMITTED BY DATE
APPROVED BY DATE

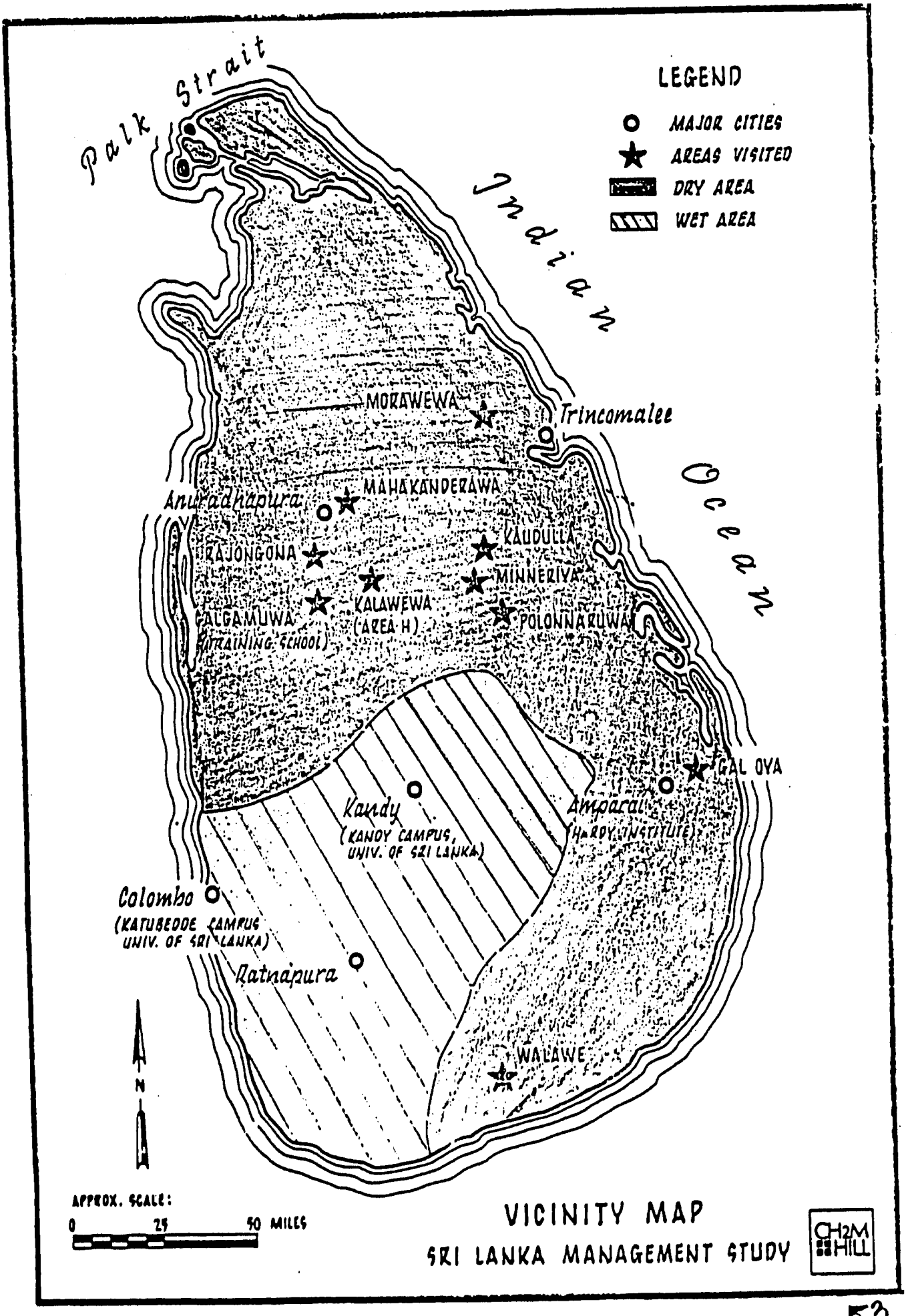
SCHEDULED PROGRESS
ACTUAL PROGRESS
QUARTED ENDING 31 MARCH 1985

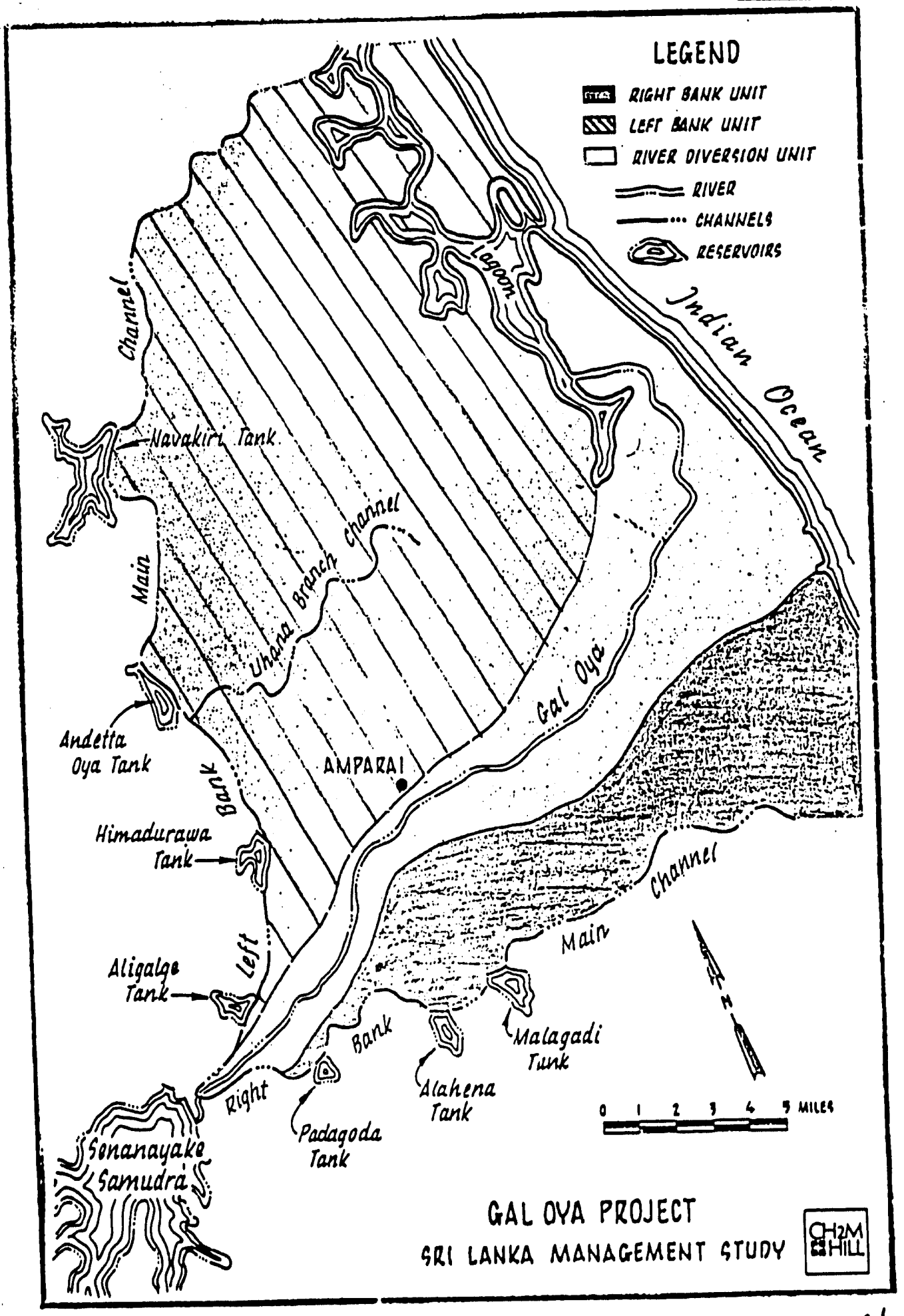
DESCRIPTION OF WORK	RESPONSIBLE I.E.	TOTAL ESTIMATE LENGTH Km	TOTAL ESTIMATE COST MILLION RUPEES	PROGRESS MARCH WEIGHT %
1 LEFT BANK MAIN CANAL TO NAMAMA	GAL OYA	27·7	37·0000	10·10
2 LEFT BANK MAIN CANAL REHANDE	MADURAPPA	13·5	6·17430	3·53
3 NAMA BRANCH CANAL	GAL OYA	16·2	20·50	5·94
4 NAMA DIST'Y CANAL	GAL OYA	30·0	4·0007	2·81
5 NAMA FIELD CANAL	GAL OYA	70·0	1·7000	1·03
6 MANDUR BRANCH CANAL	GAL OYA	16·4	6·8779	3·93
7 MANDUR DIST'Y CANAL	GAL OYA	144·0	18·096	10·30
8 MANDUR FIELD CANAL	GAL OYA	240·0	6·2065	3·60
9 KALWATTA BRANCH CANAL	KALMUNAI	4·0	1·66	0·96
10 SAMMANTHURA BRANCH CANAL	KALMUNAI	10·5	3·16	1·80
11 CHAGAMANTALAWA BRANCH CANAL	KALMUNAI	5·6	2·04	1·51
12 KALWATTA, SAMMANTHURA & CHAGAMANTALAWA DIST'Y CANALS	KALMUNAI	60·0	7·5396	4·31
13 KALWATTA, SAMMANTHURA & CHAGAMANTALAWA FIELD CANALS	KALMUNAI	200·0	5·14	2·94
14 GONAGOLLA BRANCH CANAL	GAL OYA	13·5	6·0204	3·45
15 GONAGOLLA DIST'Y CANAL	GAL OYA	40·0	5·0204	2·87
16 GONAGOLLA FIELD CANAL	GAL OYA	90·0	2·313	1·32
17 VELLAVELI BRANCH CANAL	MADURAPPA	10·4	3·120	1·78
18 VELLAVELI DIST'Y CANAL	MADURAPPA	30·0	4·907	2·81
19 VELLAVELI FIELD CANAL	MADURAPPA	100·0	4·626	2·65
20 SILMEDDY BRANCH CANAL	MADURAPPA	5·4	1·06	0·62
21 SILMEDDY DIST'Y CANAL	MADURAPPA	10·0	1·2566	0·72
22 SILMEDDY FIELD CANAL	MADURAPPA	15·0	0·3656	0·22
23 THIRUMANKERNI BRANCH CANAL	MADURAPPA	11·5	2·32	1·33
24 THIRUMANKERNI DIST'Y CANAL	MADURAPPA	25·0	2·5132	1·44
25 THIRUMANKERNI FIELD CANAL	MADURAPPA	65·0	2·1045	1·36
26 KADUKKAMUNAI BRANCH CANAL	MADURAPPA	7·7	1·54	0·88
27 KADUKKAMUNAI DIST'Y CANAL	MADURAPPA	8·0	0·6253	0·36
28 KADUKKAMUNAI FIELD CANAL	MADURAPPA	40·0	1·1065	0·66
29 L.B. MAIN DIST'Y & FIELD CANAL	GAL OYA / MADURAPPA	230·0	13·0070	7·98
30 DRAINAGE CHANNELS	GAL OYA / GAL BANK / MADURAPPA	40·7	29·5	16·87
TOTAL			170·0300	100·0

POTENTIAL ACTUAL PROGRESS
PERIOD % ACTUAL PROGRESS

1982 | 1983 | 1984 | 1985

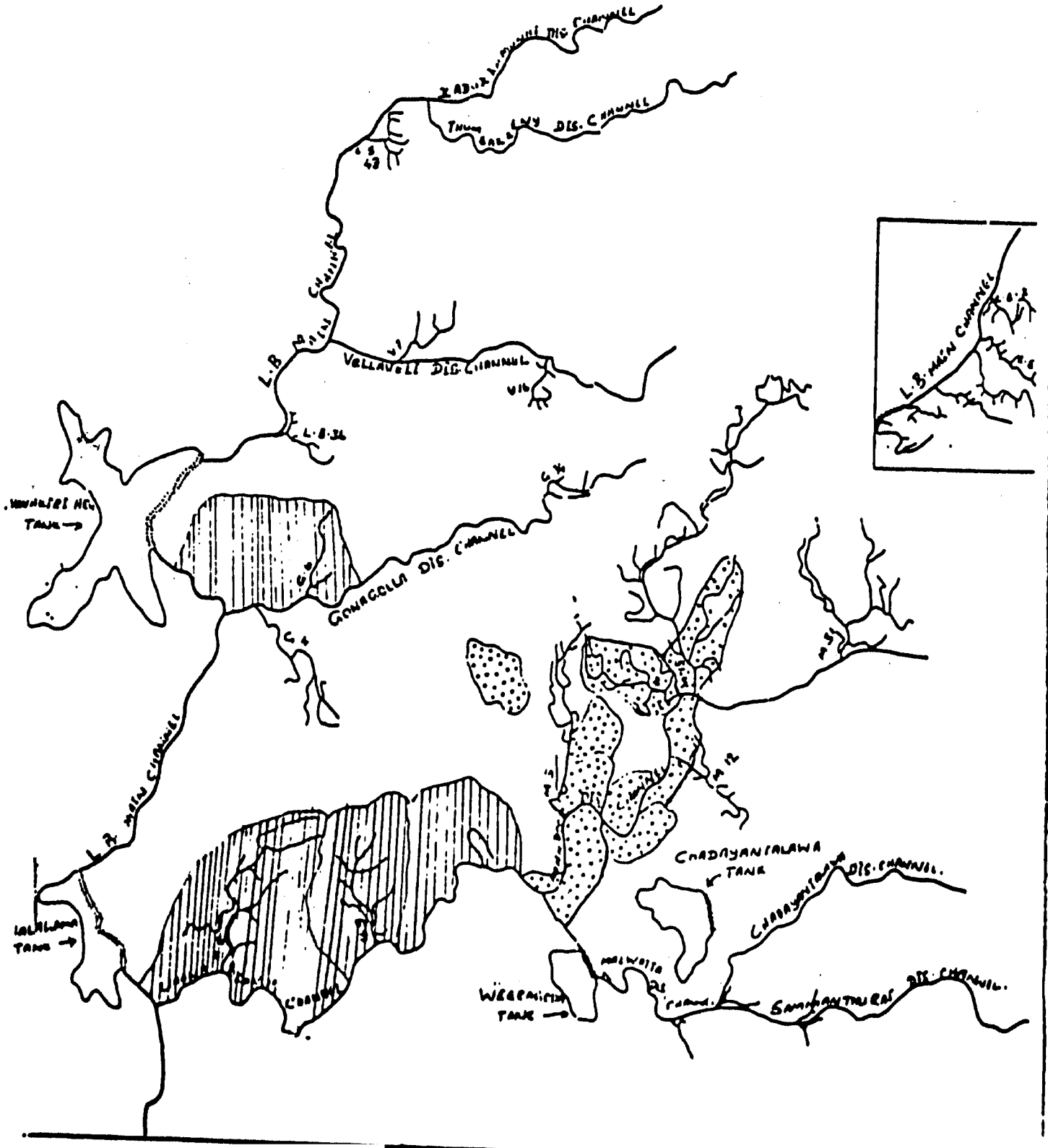
Annex E.3


LEGEND
MAJOR CITIES
AREAS VISITED
DRY AREA
WET AREA
Palk Strait
Indian Ocean
MORAWEWA
Trincomalee
MAHAKANDERAWA
Anuradhapura
KAUDULLA
RAJONGONA
MINNERIYA
KALAWEWA
(AREA H)
GALGAMUWA
(TRAINING SCHOOL)
POLONNARUWA
GAL OYA
Kandy
(KANDY CAMPUS, UNIV. OF SRI LANKA)
Amparai
(HARDY INSTITUTE)
Colombo
(KATUBEDDE CAMPUS UNIV. OF SRI LANKA)
Ratnapura
WALAWE
N
APPROX. SCALE:
0
25
50 MILES
VICINITY MAP
SRI LANKA MANAGEMENT STUDY
CH2M HILL


LEGEND
RIGHT BANK UNIT
LEFT BANK UNIT
RIVER DIVERSION UNIT
RIVER
CHANNELS
RESERVOIRS
Indian Ocean
Lagoon
Channel
Navakiri Tank
Main
Uhana Branch Channel
Gal Oya
Andetta Oya Tank
AMPARAI
Bank
Himadurawa Tank
Left
Aligalge Tank
Right
Bank
Padagoda Tank
Alahena Tank
Malagadi Tank
Main
Channel
N
0 1 2 3 4 5 MILES
Sonanayake Samudra
GAL OYA PROJECT
SRI LANKA MANAGEMENT STUDY
CH2M HILL

MAP OF THE PROJECT AREA

Farmer Organization IO Programme



WATER MANAGEMENT PROJECT 383-0057
TRAINING ACTIVITIES
Through January 1983

Training is an important component of the Project. In the quarter October-December, 1982, the following training activities were completed.

- The third In-Service Water Management Workshop was completed by 23 Technical Assistants
- The two-year curriculum for Technical Assistant Learners at Galgamuwa Irrigation Training Institute was analyzed and a revision to this curriculum was completed and submitted
- Three Deputy Directors: (The Project Director, the Project Manager in Amparai, and Deputy Director, Designs) completed a study tour and course with U.S. Bureau of Reclamation, N.I.A., Philippines, and Rehabilitation in Indonesia
- Meetings, training schedules, and content for farmer representatives in Gal Oya were completed
- Extensive Project Training Plan for 1983-84 completed and submitted

Previous Project training activities include:

A. U.S. and Third Country Training:

August 17, 1981	4 Irrigation Engineers 2 Sr. Technical Assts.	Intl. Irrig. Center, Utah & N.I.A. Philippines
November 16, 1981	10 Technical Assts.	N.I.A. Philippines
April 1982	10 Technical Assts. 2 Agric. Officers	Pakistan
January 82 - January 83	1 Irrigation Engineer 1 Agric. Lecturer	Colorado State University
August 8, 1982	1 Designs Engineer	Intl. Irrig. Center, Utah
September 10, 1982	3 Dy. Directors, Irrig.	U.S.B.R.: N.I.A. Philippines and Indonesia
January 22, 1983	1 ARTI Researcher (Ph.D.)	Cornell University
January 23, 1983	9 Irrigation Engineers 1 Agric. Officer	N.I.A. Philippines
January 26, 1983	6 Institutional Organizers	N.I.A. Philippines

In addition, 14 senior level Govt. officials have participated in five short-term study tour activities in Thailand, the U.S.A., Pakistan, or the Philippines.

B. In-Country Training:

November 1981	Project orientation & Water Mgmt. 30 + officers of several Depts. serving Gal Oya Left Bank	Hardy Institute Amparai
July 1982	Gal Oya Training Team orientation	Colombo
	Water Management Synthesis Training	Maha Illuppallama
	Training Methods Workshop GITI & Gal Oya Training Team Staffs	Galgamuwa
May 1982 July 1982 & November 1982	2 week In-Service Workshop for 23 + 18 + 23 Irrigation Tech. Assts. on Water Management Improvement	Galgamuwa Irrigation Training Institute

Mid-term Evaluation[1]

EXECUTIVE SUMMARY AND RECOMMENDATIONS

The Review Team views the Gal Oya Irrigation as a mature paddy irrigation system in which in general the farm fields are nicely leveled and the major part of the deep percolation and runoff from the directly irrigated areas is now being utilized through reuse systems. Cultivators have developed these systems and lands to utilize this so called waste water using their own resources. These indirectly irrigated lands now compete with plans to extend the directly irrigated lands to the "official" area.

The above efficient hydro-ecology which has evolved would not have happened without sufficient time, suitable topography, and paddy irrigation. Therefore, one can conclude that the Gal Oya Irrigation System as it has now evolved is somewhat unique. The following provides a brief summary of the major conclusions and recommendations of the Evaluation. More details are provided in the text.

Planning:

The Master Plan which has been prepared is unacceptable as a working document.

Recommendation 1:
We recommend that the follwoing be included: a careful estimate and detailed description of the areas irrigated (both the official and encrochment, direct and return flow, irrigated lands); a detailed description of how the system is working now which should include the meteorological and hydrological information necessary for developing a water balance model to evaluate the effect planned changes might have on the system; a detailed plan for rehabilitation; and more specific recommendations for domestic water supplies and raising the Navakiri Dam.

Rehabilitation Design and Construction:

Rehabilitation is essential, however, the current plans (survey and design through construction) are overly optimistic in terms of the value of the activities, the human resources to carry them out, and the time and money involved.

Recommendation 2:
The rehabilitation plans should specify a more pragmatic approach directed toward: 1) system safety; 2) adequate ability to deliver available water in an efficient manner; and 3) ease of operation, management and maintenance. Detailed design drawings are prepared but these are not followed in the field. This is especially true for the canal section rehabilitation activities. Furthermore, it does not appear that the heavy equipment is being effectively and efficiently utilized.

Recommendation 3:
Design activities should be minimized to what sections need work; the general specifications and the form of the work to be done; and the expected finished product.

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1. Conducted in June 1982 by Jack Keller et al.

Recommendation 4:
It is recommended that scheduling of construction activities be better organized.

The Training Programs:

The Training Program at Galgamuwa is a priority activity which is behind schedule in construction, staffing and curriculum development. Training of Farmer Leaders and Village Level Workers is also behind schedule and must proceed with a curriculum based on a sound knowledge of the rehabilitation scheme and the agricultural economy of the region. Care must be taken to coordinate this cirriculum with changes in the overall program which are occuring as a result of the evaluation.

The training of Institutional Organizers, although it will need considerable expansion, seems basically sound. Cornell training activities with ARTI are well measured and on track.

The overseas component of the training has generally been acceptable but a constant vigil must be maintained so that as far as possible the overseas experience is relevant to the Gal Oya Project.

Recommendation 5:
It is recommended that the indicated deficiencies in staffing, curriculum and facilities be corrected as soon as possible as one of the highest project priorities.

The Institutional Organizer (IO) PROGRAM

The I.O. program has had considerable acceptance by cultivators. More experience in working in other community types, in expanding the function of the turn out groups, and in federating these groups into larger units, and a better understanding of the motivations of the farmers should be gathered before a total commitment is made to the present model. The I.O. program may eventually need a permanant agency home. There are strong reasons for considering the Irrigation Department in this role.

Recommendation 6:
It is recommended that the I.O. program continue in an experimental mode as a high priority activity.

Research and Technical Assistance

The data collected and analysis as it is being conducted by ARTI seems satisfactory and on a reasonable tract. Cornell assistance has been quite useful in this regard.

Recommendation 7:
The research on controlling flows through farm turnouts should be considered complete and further consideration should not be given to rotational irrigation without a carefully controlled and documented experiment covering a number of water courses with various return flow, soil and topographic circumstances.

Recommendation 8:
A detailed operational water balance model should be developed and run to determine what system changes are feasible and have a potential for improving agricultural output from the Project in an economical manner.

Recommendation 9:
Technical assistance should be reoriented in accord with the above recommendations.

Future Technical Assistance

While the original concept of the Project is valid, there are serious shortcomings in terms of master planning, design, and rehabilitation activities. As indicated by the above recommendations, major project reallignment is necessary in these areas.

Recommendation 10:
To accommodate the needed Project reorientatation more clearly, the existing contract between the consultant (PRC/ECI) and the Irrigation Department should be terminated as of March 31, 1983. In the meantime, plans and negotiations for a re-directed new contract which would still fall within the scope of the initial project paper should be initiated.

We make this recommendation because we feel this is the most appropriate way to obtain the needed prioritization of the project activities. We would hope the new contract would be underway by April 1, 1983 and encourage the present contractor to actively pursue it.

Extension of Project.

In reviewing the implementation plan, other aspects of the project paper and status of the project to date, it is evident that the project must be extended in order to meet the project objectives. While initially the project remained on schedule in terms of putting the contractor on board and in procuring and obtaining project equipment and other commodities, the other aspects of the project are seriously behind schedule. Two major reasons for this slow implementation are lack of adequate personnel within the Irrigation Department and the racial problems which occured in the project area last year.

Recommendation 11.
It is recommended that the project be extended by two years to April 31, 1986 by which time project work should be completed.

Additional Funding:

Another constraint to project implementation has been lack of funding, especially the lack of GSL inputs. This has resulted in delays in upgrading the training facilities at Galgamuwa for example. The details on both the U.S. dollar contribution to the project as well as the GSL contribution are outlined in the report. Also, due to major and severe financial constraints within the GSL, it is unlikely that they will be in a position to provide 46% of the project funding as envisioned when the project paper was prepared. Also, due to inflation as well as an increase in the total length of canals to be rehabilitated, the overall cost of the project has increased.

Recommendation 12:
The Team recommends that USAID consider providing additional loan and grant funding (up to 75% of project requirements) as needed to modify and complete the project based on the above recommendations.

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Irrigation Sector Study [1]

RECOMMENDATIONS

A. Agricultural Policy Analysis.

Much of Sri Lanka's irrigation development has centered around the resettlement objective, with significant success. Irrigation investments now, however, must be productive over the next 25 years and it is clear that both the new and rehabilitated systems must meet production as well as equity objectives to meet national social goals. When one looks toward the future, with its energy uncertainties, growing population, and higher public aspirations, the implications of major government agricultural policies must be evaluated in terms of their impact on the utility of the current and planned irrigation development. Therefore, we recommend that:

1. A series of workshops be held to evaluate the potential impacts of alternative policies relating to the agricultural sector of the future.

   These workshops should address questions such as:

   a. The appropriate balance between paddy and other crops, considering the physical suitability for each and the production needs related to domestic consumption, import substitution and export possibilities e.g. of the three major imports - rice, wheat and sugar - rice comprised only 17% in 1980. This has special relevance for Sri Lanka because of the characteristics of its soil resources. This study of balance should include, not only the irrigated area, but the total agricultural picture. For example, Sri Lanka appears to have significant potential for cassava production for cattle, which in Thailand has revolutionized thinking about the pattern of agricultural production appropriate for the Northeast.

   b. Options for reducing energy imports related to fertilizer. Again, this is of special importance to Sri Lanka because of the high proportion of paddy currently grown on permeable soils.

1. Conducted in June 1982 by Dr. Gil Levine et al.

c. Implications of intensification vs extended area production. During the past 10 years approximately half of the increase in irrigated area production has come from increased yield per acre and half from expanded area. As opportunities for expansion decline the role of intensification will be more important, with undefined implications.

2. <u>The implications for the agricultural support system of possible changes in the emphasis on paddy should be evaluated.</u>

The current price support, credit, marketing, research and extension systems appear to be geared almost entirely to support paddy production. The difficulties encountered by many of the irrigation systems designed for diversified cropping can be traced, at least in part to the bias of these support systems.

3. <u>Research on the use of pulses and other nitrogen-fixing crops, in rotation with paddy, should be encouraged.</u>

The almost unique soil and water conditions associated with Sri Lanka paddy production make nitrogen fertilization and its related energy implications difficult to assess. Data specific to Sri Lanka are essential to accurate analysis.

B. Social, Institutional and Legal Infrastructure for irrigation.

There is a growing recognition that farmers are not only a part of the irrigation problems, but that they are an essential part of the solutions. There also is an understanding that it is difficult for them to participate in these solutions as individuals. Yet the institutional and legal system does not foster their participation in groups.

1. <u>There should be a systematic program for development of water-user organizations in all of the agencies with irrigation operation responsibilities.</u>

   The specific form of these organizations cannot be suggested by the team. At least three types are being utilized in Sri Lanka at this time; the Minipe type, the Gal Oya model, the JSPS of Uda Walawe. Each has different characteristics and functions in a different bureaucratic setting. There should be a careful evaluation of each during the next two years.

2. <u>Linkages between the farmers and the irrigation authorities should be such that individuals and groups can settle issues at the project level.</u>

   The range of possible forms for this linkage should be evaluated to determine which are reasonably effective and feasible. The water-user organization, authorized government official, ombudsman or combination may be appropriate.

3. <u>The legal basis for irrigation discipline should be strengthened by the development of local legal tribunals authorized to deal expeditiously with water problems.</u>

   There is a strong feeling among some members of the team that the legal system is the recourse of last resort in relation to water problems; effective water-user organizations should be capable of solving most such difficulties. However, there was agreement that the existence of an effective legal option would foster the development of water-user organization capability in this area.

C. <u>The Physical Base for Irrigation</u>.

Sri Lanka has developed a strong local capability to design and construct major irrigation works. This capability, based upon a high degree of civil engineering competence and professionalism, was instrumental and effective in meeting the needs of the country during the stage of its development where the capture and distribution of the water resource was primary.

As Sri Lanka moves into the stage where it must make its land and water resources more productive, and where more of its engineering efforts will relate to operation, maintenance and rehabilitation rather than design and construction, greater recognition of the agricultural factors affecting utilization must be incorporated into the engineering process, and a more pragmatic approach to structural repair and improvement. This does not mean that professionalism is not critical to satisfactory performance, but that the standards by which professionalism is measured must be appropriate to the new circumstances.

1. <u>The design of new systems and the rehabilitation of existing systems should reflect a combination of a "bottom up" and "top down" approach.</u>

   To facilitate the incorporation of field level con into the design process it is necessary to incorp data on the physical characteristics of the projec area (climate, hydrology, topography, soils, etc.) on the pattern of cropping and yield distributions, on the distribution of ethnic groups, and on the irrigation problems identified in the area.

   These data should be made available as expeditiously as possible to those concerned with design or rehabilitation of the project and to related agencies. The data should be provided in "interpreted" form, i.e. evaluated and grouped to be most useful for rehabilitation and subsequent operation.

2. <u>To facilitate project data collection, multi-disciplinary teams should be developed with this specific responsibility.</u>

   These teams should include agricultural, engineering, economic and social science skills. To encourage a focus on those factors important for <u>utilization</u> of the irrigation, the teams should be headed by the <u>agriculturalist.</u> (Given the relative demands for engineers vis a vis the other disciplines, this should make for more stability of the teams, over time.)

3. <u>To enhance the use of the information obtained, the teams should be located organizationally within the Ministry or Department with responsibility for design, rehabilitation and operation of the project.</u>

At the present time, the closest unit to that recommended here is the Land Use Division of the Irrigation Department. However, it does not seem to encompass the needs identified, nor to have had the impact on design, rehabilitation, or operation that is required. An expansion of responsibilities and resources of the Division could be considered a first step in improving management capability.

4. <u>There should be a restructuring of the system rehabilitation program.</u>

Effective rehabilitation of irrigation systems requires a three phase program:

1. <u>Preparatory</u> - data collection and interpretation, farmer organization, and design of rehabilitation.

2. <u>Rehabilitation.</u>

3. <u>Monitoring and revision.</u>

Given the current lack of data in the form necessary, the lack of farmer participation and the lack of experienced engineers it appears logical to suggest a two or three year emphasis on phase <u>1</u> for those systems anticipated for rehabilitation and on phase <u>3</u> for those that have been rehabilitated recently.

Programming or rehabilitation can then proceed in anticipation that important manpower, informational organizational and institutional constraints will be reduced to manageable levels.

5. <u>A concerted effort should be made to involve the farmers in relevant aspects of system rehabilitation and subsequent operation and maintenance.</u>

From the standpoints of information gathering, relationships with irrigation system personnel, system utilization and system maintenance participation by the farmers is essential. Evidence in Sri Lanka, (Minipe, Gal Oya) suggests that this can be obtained.

6. <u>Involvement of the farmers should be initiated at least one-year prior to the start of formal rehabilitation work.</u>

Effective participation of the farmers can take place only through groups. To facilitate the formation of effective groups, to establish the necessary linkages and working relationships within the groups and among the groups, and between the groups and the irrigation agency takes a significant period of time. An early stage should involve contact with the data collection team.

7. <u>Farmer participation should involve both responsibility and authority.</u>

Farmers should be required to provide significant (but reasonable) contributions to rehabilitation efforts and to maintenance. These should concentrate at the field channel level. At the same time, farmers should have the ability to influence, both directly through field activities of their user groups or indirectly through group participation, the operational decisions of the system. At the D channel level, this would permit them to adjust system operations to adapt to local soil and topographic conditions. At the system level, this would permit them to influence decisions with equity implications. (Area and timing decisions.)

8. <u>Reliability and adequacy of water delivery should be primary criteria for design and operation. Area coverage should be secondary.</u>

A prerequisite for effective farmer participation, and for utilization of the inputs necessary for increased production per unit area is a reliable and adequate water supply. To achieve this, given the variable nature of Sri Lanka's rainfall, while striving to increase equity within systems options for sharing should be evaluated:

1. Annual rotational zoning.

2. Bethma cultivation.

3. "Modified" bethma - temporary sale of water rights.

D. Irrigation Management Systems.

To achieve the "hoped for" system productivity there will have to be a much greater emphasis on the management of the systems than has characterized Sri Lankan irrigation in the past. Before suggesting recommendations leading to this end, it may be helpful to clarify our concept of management by contrasting it with our view of administration. We consider administration to be concerned with adherence to policies, prescribed procedures and rules; it is input oriented. By contrast, management is concerned with solving problems; it is output-oriented.

Obviously, neither is likely to be found in its pure form, but we think it fair to say that there is a much greater focus on system administration than on system management at the present time. The primary question facing the GSL, as it looks to the future of its irrigation sector is how to develop the necessary management capability -- its operational form, its institutional base and its human resources. Attempts to define the form appropriate to Sri Lanka are underway, more or less informally, in Minipe, in Gal Oya, in Uda Walawe. Similarly, there is a search for an appropriate institutional base.

Can the existing operating agency - for the major systems, the Irrigation Department - change its focus sufficiently to accommodate effectively the management function is a major question. In the case of the Mahaweli program it was found necessary to establish a separate agency directly under the Ministry of Mahaweli Development, rather than modify the design and construction unit, the Mahaweli Development Board, to carry out the operational management role. The Mahaweli Economic Agency is too new to judge the success of this change, but careful evaluation over the next year should provide strong clues to the appropriate direction.

The need to develop the human resources for improved irrigation management is recognized, but perhaps too limited in scope. While there is emphasis at developing capability at the lower, technical levels, there perhaps should be more emphasis at senior levels. IE's and DD's, or their management equivalents could benefit from training in management science.

To further the improvement in irrigation management we recommend that:

1. Every major irrigation project have a performance monitoring unit (PMU) which,

   a. Helps to define operational objectives.

   b. Systematically monitors performance in the command area, in relation to these objectives.

   c. At a minimum, obtains water and crop yield distribution at representative locations in the command area.

2. A separate cadre be established for management responsibility.

   Without attempting to specify the specific institutional setting for the management cadre, we still believe that the skills and qualifications appropriate for management are sufficiently different from design and construction that using scarce engineering talent for management purposes is neither efficient nor effective. To establish a professional management cadre will require significant changes in personnel policy.

3. A careful evaluation of the management patterns and output results of the Minipe, Gal Oya and Uda Walawe systems should be made next year.

   These systems represent three different institutional bases for management activities. Minipe is a modified line-agency (inter-agency) mode; Gal Oya is planned for direct line-agency management, while Uda Walawe is managed as an area authority (MFA). These are sufficiently different that valuable lessons can be learned.

4. Management training should be provided to the full range of personnel with management responsibilities.

   Special training facilities probably will be required, and special courses appropriate for each level will be necessary. The Gal Oya Water Management Project only partially meets these needs.

RECOMMENDATIONS TO USAID

It is the opinion of the team that USAID can play an important role in the irrigation sector in Sri Lanka- assisting in the development of project and system management capability.

This report identifies a number of aspects in which USAID could develop project activity which would have long-lasting beneficial effects with modest costs. Specifically we recommend:

1. An expansion of support to training for management.

   While the Gal Oya Water Management Project provides support for training in the technical aspects of water management, there does not appear to be any emphasis on developing 'managerial' skills, to mobilize and utilize effectively the technical skills and capabilities.

   a. Consideration should be given to the establishment of a water management training center focussed on developing technical and managerial skills. This center should be suitable for short course training for higher level officials of the MLLD, MEA and other agencies with irrigation responsibilities. It should have capability for longer programs (e.g. 6 months) for lower-level staff.

   b. Support should be provided for development of appropriate training materials using Sri Lankan data, examples and experience. The Asian Institute of Management, with Ford Foundation support, has worked with the National Irrigation Administration in the Philippines to develop training courses and materials. A similar relationship could be visualized between a Sri Lankan management institute and the MLLD, MEA or other irrigation project agency. The USAID irrigation management program in India and its consulting and PID documents might be reviewed.

2. Support for the development and trial operation of Project Preparatory teams.

As suggested in our general recommendations, these teams should play an important role in making the rehabilitation investments more effective. The Water Management Synthesis 2 Project should be useful in relation to this effort.

3. Support for the development and evaluation of pilot project monitoring units in the MLLD and MEA.

A prerequisite to effective project management is systematic information about system performance . The work of ARTI in the Gal Oya Project can provide a base for the development of an effective monitoring program. Trial units can be established and evaluated.

4. Development of a Model Management Project.

There is a need to demonstrate the utility of technical and managerial innovation. Improved management procedures, including standardized performance monitoring, forward planning, etc. could be designed, implemented and evaluated in the Gal Oya Project as a "Model Management Project."

5. The addition of resource mapping components to Project 0045, Agricultural Base Mapping, or

the development of a complementary project for that purpose. Consideration should be given to the techniques developed by the Ministry of the Environment and Renewable Natural Resources, Venezuela (with UNDP support).

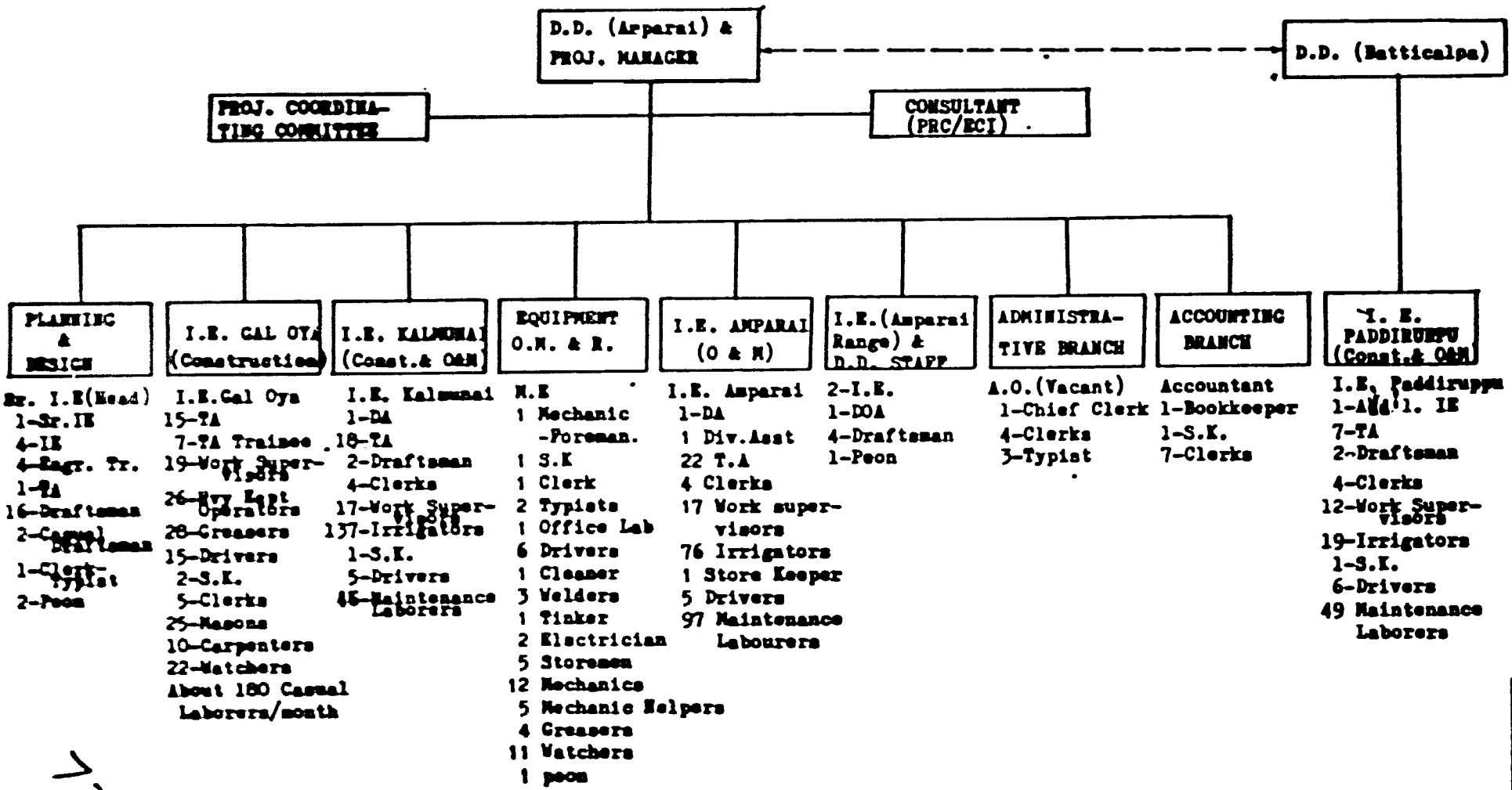
6. Evaluation of the assistance program to the University of Peradeniya, (Project 004A), in

relation to its potential for meeting some of the training needs for improved project design and management. Specifically, the potential for modifying the curriculum of the Civil Engineering program to incorporate agricultural considerations into the irrigation engineering option should be evaluated. Similarly, the potential for specialized post-graduate courses should be explored.

GAL OYA REHABILITATION AND WATER MANAGEMENT PROJECT

ORGANIZATION CHART

(As of 31 March 1983)



ANNEX E.10

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Excerpts from

A Case Study of "Learning Process" Applied to Farmer Organization and Participation in Water Management - The Institutional-Organizer Program in Gal Oya, Sri Lanka by Norman Uphoff

and

The Institutional-Organizer Programme After Two Years by Norman Uphoff.

The Gal Oya Water Management Project being implemented by the Irrigation Department of the Government of Sri Lanka, with financial assistance from USAID, has some very innovative provisions, including farmer organization and participation, socio-economic baseline studies and monitoring of water management in the project area, special studies of water management even beyond the project area, and building up an institutional capacity for water management analysis at the Agrarian Research and Training Institute (ARTI), a government institution serving the whole agricultural sector.

As the participation and organizational issues had been left rather undefined, responsibility for working out the details and means were delegated to ARTI (at ID suggestion) and to Cornell's Rural Development Committee, which already had a cooperative agreement with DS/RAD to assist AID missions in making project efforts more participatory. Right from the outset, ARTI and Cornell took exception to the "free labor" form of participation as the only clearly specified form and as probably the first form expected of farmers. Farmers had never been consulted at all about this "requirement" - their participation was being taken for granted, and ARTI/Cornell were expected to bring about such participation as part of the effort to implement the project. This seemed a rather undesirable way to begin farmers' participation in water management, by demanding unpaid labor to renovate the system as specified by the ID.

ARTI began an extensive research and monitoring program in November 1979, taking measurements of water flows and maintaining detailed record-keeping on production practices with cooperation of over 500 households through some 20 investigators posted in the field. The first assessment in the field of problems and possibilities for farmer organization came in January 1980, when David Korten, Walt Coward and I visited Gal Oya with our ARTI colleagues, CM (Wijay) Wijayaratne and Lakshman (Lucky) Wickramasinghe. It did not take us long to come to a realization that was formulated in an operating premise as follows: farmers cannot be expected to change their attitudes and activities with regard to water management until and unless technical staff of the ID change their attitudes and activities vis-a-vis water management and farmers.

The farmer behavior which we observed appeared largely a function of the unpredictable way in which the system was operated. The farmer's response - to break structures and take water to which they were not entitled — increased the unpredictability by reducing engineers' control capacity and accelerated a pattern of deterioration of the system physically and operationally. Farmers were not without fault. But their lack of organization meant they could not define and promote collective well-being. In a condition of near-anarchy, private selfishness prevailed, but it was not the fundamental cause of the problem in our view. This has been subsequently confirmed by the improvements in water management farmers have been willing to make.

What was initially considered as "action research," representing an innovative and non-academic mode of research, became "experimental implementation," a mode of action which was to be theoretically informed and closely monitored to adapt to emerging circumstances and experience. Our concern became to develop a process, a strategy, an institutional mechanism which would "work", making appropriate modifications along the way. This meant that we were operating according to certain "hypotheses" spelled out in consultancy reports from January and June 1980, but we were not "testing" them in any conventional way. In fact, we have seen most of them supported, though not in a "scientific" way, by subsequent experience, though emperical results indicate that they are tenable propositions rather than the only ones (i.e., our methodology has not ruled out other possibilities). The principal hypotheses were the following:

(1) Need for Catalyst Role. Given the negative attitudes of farmers toward the ID, with some justification, we felt the organizational effort should not be launched through existing channels. We were impressed by the imploring request from one farmer in Unit 36 who came up to us as we were ending a 2-hour disucssion in the home of his neighbor, asking if ARTI could get some other agency than the ID designated to implement the rehabilitation project. Of course not. The project was intended to increase the capacity of the ID to undertake rehabilitation not only in Gal Oya but in other major irrigation schemes and further to improve water management by engineers and farmers to raise agricultural productivity. There was no choice but to make the ID's system work. This might require not just "reorientation" but also some structural change. In the project design, in an innovative departure perhaps not fully understood by AID and certainly not really accepted by the ID, it was provided for the ID to have a Deputy Director for Institutional Development, as well as one in the Ministry of Lands and Land Development (MLLD). (This is the supervising ministry for the ID, though the ID as a technical department does not readily accept direction by any other agency. We saw in the provision for a DD/ID, an opporutnity to create a core within the ID which would introduce and support farmer organization working actively with the Department on water management.

In the Phillippines, the National Irrigation Administration had depended on a special role of Community Organizer. This was a specially trained person helping farmers establish an Irrigators Service Association to contract with NIA for the construction and repayment of improved dam and channel facilities. This activity, assisted by the Ford Foundation, involved Frances and David Korten as consultants to NIA. It appeared that someone like this could help get farmer organizations started in Gal Oya on a sound basis. Also we were impressed by the use of Group Organizers as they key element in a very successful Small Farmers Development Programme in Nepal (also Bangladesh and Phillippines) supported by FAO. Moreover, a study done for the Rural Development Committee by Cheryl Lassen, assessing programs that had assisted the rural poor, underscored the importance of a "catalyst agent". Now that the RDC has gone into a broader, comparative analysis of rural organization experience in LDCs, we are finding on the basis of 130 case studies, that such"catalysts" are quite often effective instruments for breaking past patterns of poverty and inactivity.

So, we provided for a new role called Institutional - Organizer (IO) (Govi Sangvidayake - "farmer organizer" in Sinhala) on an experimental basis. The ID was not prepared to create such a role at the outset (and civil service rules would have require 6 to 9 months to get approval even if there was ID support). So we employed them officially as ARTI investigators, on a one-year contract, with the promise of a second years renewal if they and the program were working effectively. The expectation was that the ID would have by this time created permanent roles and would take them on by the end of year two if we had demonstrated a reasonable degree of success. This was an improvisation since actually the

project paper had made no provision for IOs or for any manas of setting up the organizational "models" that ARTI was to be "testing".

We could have tried to establish IOs even more independently of the ID. But a corollary hypothesis was that this catalyst role should be integrated with the ID, not independent of it, since the goal was to establish cooperative relations between farmers and engineers. The CO role in the Philippines was initially more "confrontational", inspired by the Sol Alinsky model of community organizing but was not successful. The IO role was conceived as more"collaborative," and this seems to have been a correct conception. Although the IOs were ARTI employees, their salaries were paid with funds transferred from the ID, and they were expecting to be taken into the ID.

(2) Informal Organization First. Sri Lanka had a history of many rural local organizations being set up, but then either lapsing into inactivity or becoming simply tools for a privileged minority. We wanted to avoid both outcomes since it was necessary that water management functions be discharged regularly and continuously once the system was operating in its new mode. Lapses would be serious, and this also justified the more intensive effort launched under the first hypothesis. Our second hypothesis was that rather than begin by setting up a formal organization, with a constitution or by-laws and elected officers, which would undertake specified tasks, we would start with the tasks that farmers could agree upon, working with only informal organization — ad hoc committees or leaders chosen by consensus - and then evolve toward formal organization when and as farmers were ready for this. Starting with formal organization seemed to put the cart before the horse.

This was, of course, something to be tested. We knew that the other way, tried often before, did not seem to work very well. We had two corollary hypotheses: (1) this method would build more commitment to the organization when it finally emerged — we have some indications this is correct but it has not been tested over a long enough period to be established; and (2) this method would produce some new leadership which would be more committed to developmental and equitable outcomes than the usual (elite) leadership one would get if the first step was to elect "leaders." We wanted and needed to mobilize new leadership resources, willing to work for the good of the group, not for political or economic profit. We think there is enough evidence of the second effect to be greatly encouraged, particularly because two of the most powerful "old"leaders have been quite literally "converted" to the new approach, as discussed later.

(3) Task-Centered Development of Organization. The original design of the project conceived the organizational activity proceeding separately and independently from the physical rehabilitation effort carried out by the ID. ARTI with Cornell assistance, was to "organize the farmers: and by the end of the project, these organizations were to take over management activities at the field channel level, almost in a "turnkey" manner. This seemed to have no justification in learning or organizational theory. So we proceeded to try to integrate the organizational efforts with the rehabilitation program. This caused many difficulties. (That no medically certifiable ulcers resulted is a miracle). At various times, we tried, despite our commitment to this principle in theory, to decouple the organizational effort from the rehabilitation work because it was so arbitrary, so inhospitable to farmer participation, so often accelerated and then greatly delayed. But in retrospect this linkage was one of the most important aspects of the IO program, particularly for winning acceptance from the engineers of the DO program and of farmer participation. The IOs proved themselves useful in organizing meetings with farmers and getting constructive farmer input to the redesign/channels, and of the input itself impressed engineers in many ways.

Our concern in particular was that the rehabilitated system be one indeed alleviating farmers'actual problems and that farmers would come to regard the system as "theirs" if they were expected to participate actively in its management. Thus farmer involvement in the redesign efforts put a great rush on getting the IO program started and operating in the field, and it greatly constrained the degree to which we could be experimenting with different "models" and "approaches" of organization. But it also provided a helpful rationale for the ICs to be working with farmers. Farmers knew there was to be/rehabilitation effort, and IOs' facilitating their making inputs to this redesign made sense to farmers. Actually as will be pointed out, once the work was started, the farmers moved rapidly beyond this into water management activities, but even so, the rationale of linkage to rehabilitation was probably useful. Also, a better system should result, one which farmers will be more willing and able to help operate, because the specific details should have been improved and, one hopes, the whole rehabilitation effort should lead more beneficially into subsequent operation than initially anticipated because of farmer demonstrations of competence and responsibility.

(4) Water Management Central but not Exclusive Concern. The IOs were operating as part of a water management project and under the auspices of the ID. But farmers' water management required linkages to agricultural inputs and knowledge, so that at a minimum there must be some coordination with the Department of Agrarian Services and the Department of Agriculture. Although this was never discussed in detail with the ID, there was general agreement, and discussions were held particularly with the Commissioner of Agrarian Services, who pledged his support and the cooperation of his staff. So although IOs would begin with a concern for improved water management, the farmer groups that emerged could move into purchasing inputs, coordinating their application, getting credit, introducing new practices, etc. as much as the farmers were willing and able to do in conjunction with the WM activities. This meant IOs had to have some liaison with local staff of the DAS and Agriculture Department.

Sri Lanka has a history of each department or ministry trying to set up its own exclusive channel to the farmers or rural community. We wanted to try to minimize such duplication and competition, and at least informally to get coordination at the grassroots, as this should strengthen farmers' incentive to improve water management. It should also contribute to achieving the project's purpose which was to increase agricultural output and human well-being, not just water distribution, which was instrumental to the larger purpose.

(5) Learning Process Approach. Just as we were disenchanted with the "blueprint" approach to projects in general, we had to try to avoid this in our activity. We wanted to proceed from hypotheses and with general presumptions, but to be able to review and modify these as experience showed them inadequate or wrong; and we needed to add new premises or procedures as they proved necessary, not assuming that we could design a program like this in detail in advance. We emphasized in the training of the IOs that there would be mistakes, and that we would not hold it against anyone for making mistakes. What would be faulted would be covering up mistakes or repeating them. An attitude of criticism and self-criticism was emphasized, having seen how important this was to the progress which was achieved at Comilla in what is now Bangladesh. We drew very much on concepts of "learning process" as articulated by David Korten, as well as the principles of "process documentation" as used in the Philippines NIA experiment.

We also wanted to be flexible with regard to the resulting organization, having no "blueprint" to introduce among farmers. We wanted IOs to discuss with farmers how they would organize themselves to deal with their problems of water management. We would learn from this. If they wanted to engage in sideline activities, that

would be part of the experiment. As it turned out, they have shown more consensus on organizational forms and approach so far than might have been expected but in any case we want and need to keep monitoring and assessing what results.

There was something of a contradiction in the way the project approached farmer organization. The project paper included a description of a legal framework which could be introduced to establish water user associations, and the consultant who contributed this was invited out by AID and the MLLD to draft an amendment to the Irrigation Ordinance to this effect. At the same time, ARTI and Cornell were being asked to experiment with introducing farmer organization in Gal Oya and to determine what would work best. We found the draft amendment particularly contestible in terms of its provision that the ID through its Project Engineer would introduce the organizations. Our "catalyst" approach was the opposite of this. Even if there had been a more favorable attitude by the ID toward farmers, there was not enought staff time and competence in such matters within the ID to carry it out. (Though one unusually competent and creative Deputy Director had already introduced a farmer organization scheme at Minipe with some good results. There was no basis for believing that the DD for Ampare at that time would succeed in such an endeavor).

The structure prescribed by the law was itself rather too uniform though our experience so far suggests that it may not be very far from what farmers would themselves evolve to deal with water management problems. In any case, the MLLD was willing to hold off enactment of the amendment pending some field experience from Gal Oya. It did not make much sense to push through a law which might not be reasonable in terms of its implementation. That there was support for the law at the Ministry level was itself a good sign of support for farmer organization, and that the amendment was deferred was an indication that the Ministry understood the value of taking a more experimental, inductive approach to the question.

Farmer Organization Programme

Because our initial preoccupation was with the means whereby farmer water user associations could be introduced on an experimental basis and then monitored and strengthened, we have thought of it as the I-O programme. At this point we have about 125 field channel groups started in the first phase organizing area (Uhana and ahead of Gonagolla branch canals - over 4,000 acres). They are functioning with varying degrees of effectiveness but on the whole well enough to have made an impact already. One specific indication of changed farmer behavior is that, according to the Deputy Director of Irrigation, when the D-channel gates along Uhana branch canal were closed after five days' issue the first week of January and water continued to be issued to areas downstream, for the first time the gates were left closed. The organizing effort in the second phase organizing area (Weeragoda and Mandur - over 11,000 acres) is in its initial stages but is proceeding well enough under very difficult conditions.

Organizing Strategy

The earlier idea of two stages of organizing effort has evolved into three stages, which seem more realistic, though the same principle of an intensive initial organizing effort followed by a thinning out of organizers and a period of assisting organizations thereafter seems correct. The first stage (organization) can be done in about a year (two seasons) if the organizers have some experience; otherwise it may be more realistic to think in terms of a year-and-a-half (three seasons) with the period regarded as including some training component. The organizing stage runs through initial formation of some D-channel level organization, once field channel groups are operating to share water, keep channels cleared and to save water if possible.

The second stage (consolidation) involves work not so much with individual farmers, which was the key to the first stage, as with representatives individually and collectively to strengthen the field channel and D-channel organizations. A concerted effort at formal and non-formal training, in water management knowledge in organizational procedures, in leadership skills, etc. is needed. Only half to one-third the number of I-Os engaged in the initial organizing effort may be needed for this consolidation period, with the other I-Os released to being organizing work elsewhere. This consolidation is likely to take another year or year-and-a-half, though we are still gaining experience about this stage, having just begun it in Uhana and Gonagolla. We have noticed some slipping back of some groups because we were not prepared with appropriate strategy and training activities to follow the initial effort. We need to be assessing critically our experience in this stage and to be experimenting as was done in the first stage through I-O and farmer initiative.

A third stage (maintenance) can only be envisioned at present. With consolidated organizations, an I-O presence in the area of only half to one-third of the second stage staffing may be needed. There needs to be continued training of representatives since we expect and want some turnover, and training also for farmers (though this may be done in large part through representatives or government staff). The I-Os working on maintaining farmer organization strength serve like ombudsmen, trouble-shooting, monitoring, if necessary arbitrating disputes. The groups will have responsibilities evolving for agriculture more generally, not just irrigation, so they need to be strong.

Institutional-Organizer Cadre

The first part of our experiment, whether carefully selected and trained graduates could go into rigorous field conditions and win the confidence of farmers enough to initiate new attitudes and new cooperative behavior, has been well confirmed. Not all I-Os have performed up to the same high mark, but their collective performance is one which all associated with it can be pleased with. A number of things have become clear, however. Not all can or want to sustain the rigorous and intense effort which organizing requires and not all have leadership qualitites which are needed to to sustain the rigorous and intense effort which organizing requires and not all have leadership qualities which are needed to sustain the program. We have taken it as a goal that, having seen the constructive role which I-Os can play, the programme should be 'institutionalized' without becoming 'bureaucratized'. If it becomes the latter, it cannot continue its success

and might as well not exist.

It is also clear that there must be some career opportunities for I-Os or we will not be able to keep them in the programme, and they will drift off into more permanent positions. Particularly the most enterprising ones are likely to leave for personal reasons that are quite understandable. We have lost two of our most effective organizers to teaching positions, but both say they would be glad to rejoin the programme if they could have some security of permanency. These persons we think could maintain the spirit of the programme and help others to do so without becoming complacent. So we need to find a way to have some possibility of permanency for at least some I-Os, those who can provide leadership in various ways. This becomes an urgent need not only because we are losing good persons but also because the demand for I-Os is rapidly expanding, with prospective needs for I-Os in projects for rehabilitation of large tanks with USAID and World Bank support, and possibly for work with the Department of Agrarian Services on small tanks and with the Mahaweli Authority on a pilot basis.

Our proposed solution is to create a 'core cadre' of I-Os with permanency and some career prospects, which would train and supervise a 'contract cadre' of persons coming into the programme on, say, a two-year basis. Those who were most effective as organizers and most committed to the programme's purposes would be recruited into the core cadre. Others who wished to continue in the work could be given extended contracts if their work was good enough. Others would leave to take other jobs, presumably becoming more desireable employees because of the training and experience they had gained in the programme. Our experience thus far suggests that I-Os gain skills and confidence which benefit them in other positions. So I-Os who do not gain permanency should be better off than when they entered the programme. Some may be able and willing to continue in straight field organizing capacity for some time and be quite good at this but not have the leadership capacity to direct the programme in various ways as discussed below. The programme would benefit from keeping them on contract, giving them some incentive increment in recognition of their experience. It is expected that the majority of field organizing would be done by a through-flow of contract organizers under the supervision of the permanent staff who recruit, train, supervise and monitor in keeping with the objectives of the programme.

ARTI Role

Considering the six month lead time in setting up the programme and the training before the first batch of I-Os was recruited and trained, the ARTI involvement has now gone on for 2½ years. There are many opportunities for the Water Management Group of ARTI to extend its effort to introduce and evaluate farmer organization for water management. The Village Irrigation Rehabilitation Project funded by the World Bank and implemented by the ID and Agrarian Services will probably provide an opportunity to study water management and rehabilitation in small tank schemes, with the possibility of introducing I-Os or some role or at least I-O kinds of training for minor irrigation. The proposed major irrigation rehabilitation projects to be supported by the World Bank and USAID are likely to include farmer organization components with I-O responsibility. A new possibility has recently arisen for an I-O experiment with a somewhat different approach in B Block of the Mahaweli Programme. At the same time, the Water Management Group has not been able to begin analysing in any detail the extensive and rich data generated

in Gal Oya since 1979 through baseline studies and farmer record-keeping.

Over the past three years since the data gathering began, well in advance of the farmer organization effort, the water Management Group has become much more knowledgeable and has gained a leadership role on problems of water management in Sri Lanka. It is still constrained by having too few professional staff for the amount of activity which is open to and expected of them if the country's needs are to be met in this area, It is very important that the Irrigation Department or Ministry of Lands and Land Development as the parent ministry for this area take initiative to regularize the I-O cadre as is currently under discussion and then that steps be taken to establish at least the forerunner of an Institutional Development Division, which ARTI can relate to and support but which will take over most of the administrative and training duties. Only then can ARTI concentrate on the research and monitoring work which is its comparative advantage. Such re-focus of effort should make its contribution to training more substantive than it can be now with so many administrative tasks to manage day-in day-out, which ARTI is not equipped to handle.

All associated with the I-O programme can take satisfaction in its progress so far. The expectations held out for the I-Os have been proved justified. Every outside team that has visited Gal Oya so far seems to have met I-Os on their duties in the field and found both officials and farmers expressing appreciation for the changes that have been introduced. Perhaps most important, the expectations on which the I-O programme was based, that farmers would respond positively and constructively if approached in a respectful, reasonable manner, have been just as impressively justified. Without wanting to exaggerate the progress toward institutionalizing farmer organization in Gal Oya, one can say that farmers have shown motivation and skills that warrant continuing encouragement and support in a widespread effort to improve water management with their active particpation.

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BOARD PAPER NO. 672

From: The Director

To: The Chairman and Members of the Board of Governors

PROPOSAL TO ESTABLISH A WATER MANAGEMENT RESEARCH CENTRE AT ARTI

INTRODUCTION

Currently, Sri Lanka is investing enormous amounts of capital and resources in both large and small irrigation projects with an aim toward increasing food production. Good water management by both farmers and government agencies is essential for the effective and efficient operation of these irrigation systems. Good water management improves the productivity and rates of return on investments in irrigation. There is a growing need for interdisciplinary research into water management theory and practice to support the organization and training of officers and farmers for efficient and effective water management.

Because of the neglect of water management studies both in Sri Lanka and elsewhere, present capabilities are limited. The Agrarian Research and Training Institute has been deeply involved in the Irrigation Rehabilitation and Water Management Project at Gal Oya since 1979 (see the accompanying paper, "Lessons from Gal Oya"). The Irrigation and Water Management Group (IWMG) has been responsible for research in this area since the formation of Professional Groups. Because of the fund of experience and special knowledge gained from Gal Oya, the IWMG has begun to receive numerous requests from government and other agencies for its help in solving water management problems. However, the manpower and other resources available to the IWMG are limited. Of the five Research and Training Officers in the IWMG, three are committed full time (along with three Cornell consultants) to the Gal Oya Project which is an action research programme with a very large institution building component. The fourth is working on the World Bank funded Tank Irrigation Modernization Project as part of his doctoral studies, and the fifth has recently taken on two smaller projects in Mahaweli System H for the Mahaweli Economic Agency and has agreed with the Department of Agrarian Services to coordinate a study under the World Bank funded Village Irrigation Rehabilitation Project. Because of the shortage of manpower, the IWMG had to turn down requests from the Asian Development Bank and the Mahaweli Economic Agency

Contd..... 2/

to participate in some other projects as well. Recently, a representative of the World Bank has requested the IWMG to participate in the Major Irrigation Rehabilitation Project which is to begin soon and has indicated that he will recommend that the IWMG be asked to participate in a followup to the Tank Irrigation Modernization Project. The five members of the IWMG cannot handle all of these responsibilities in addition to the current ones.

Moreover, the IWMG currently includes two sociologists and three economists. Water management research, however, requires detailed knowledge of the engineering characteristics of irrigation systems and of crop water requirements. For the IWMG's current activities, engineering and agronomic information is provided by a resident Cornell University consultant in engineering and by advice from Cornell faculty members. Water management research at ARTI requires a more permanent source of expertise in engineering and agronomy since Cornell's services end in 1985 when the Gal Oya Project ends.

As a Professional Group the IWMG cannot be given special treatment by the ARTI administration by increasing the number of R & T.O. allocated or by allowing greater flexibility in its operations. All Groups have to be treated equally for smooth functioning of the Institute. Hence, the professional staff have to be paid the same salaries whatever their disciplines may be and they cannot be given priority when it comes to post-graduate training. So long as the IWMG remains a Group within the organizational structure of the ARTI there is no possibility of overcoming these constraints.

THE WATER MANAGEMENT RESEARCH CENTRE

To satisfy the growing demand for water management research and to provide the multi disciplinary research capabilities needed and to overcome the constraints mentioned above it is proposed that a Water Management Research Centre be established at ARTI.

The Water Management Research Centre will undertake a wide variety of activities, including:

(a) basic and action research into water management organization and practices, with an initial focus on farmer-system interaction,

(b) training of field personnel charged with organizing farmers for water management,

Contd..... 3/

(c) training of other officers in the sociology of water management and the promotion of good water management practices by farmers,

(d) dissemination of water management research results and other information on water management through a newsletter and other publications,

(e) sponsoring and organization of seminars and workshops on water management.

In addition to research, the Centre will attempt to keep track of all water management research and experimentation in Sri Lanka and will make the results available both here and abroad.

The proposed Centre will be headed by a Deputy Director of the Institute and will take over the present personnel and projects of the Irrigation and Water Management Group. Additional Research and Training Officers will be recruited as a funding becomes available. The additional officers will include persons with training in irrigation engineering and agronomy.

A Consultative Committee will be established to facilitate interaction between the Centre and project implementing agencies. The Consultative Committee will consist of nominees from the agencies including the Ministry of Lands and Land Development, Irrigation Department, Ministry of Mahaweli Development, Mahaweli Authority, Department of Agrarian Services, and Land Commissioner Department.

The Centre will require office space in addition to the space currently occupied by the IWMG. The most logical space is the wing that includes the Recreation Room. If this space is assigned, some renovations and improvements will be necessary. Because of the increased workload and the proposed publication programme, additional office equipment and support staff will be required.

SUPPORT FOR THE CENTRE

Funding for building renovations, office equipment, publications, workshop and seminars, and research will be made available from USAID as part of the extension of the Water Management Project. The proposed amounts are:

(a)	Building renovations	$ 20,000
(b)	Office equipment	$ 30,000

Contd..,..... 4/

(c)	Publications, seminars and workshops	$ 30,000
(d)	Support for special water management studies	$ 25,000

The Ford Foundation has also indicated interest in supporting in the Water Management Research Centre but no concrete proposals have been made. As stated in an Aide Memori of 28th March 1983, the World Bank also supports the establishment of the Water Management Centre at ARTI.

LESSONS FROM GAL OYA:

A Report of the Work of the ARTI Irrigation and Water Management Group

31st March, 1983

Since 1979 the Irrigation and Water Management Group (IWMG) at ARTI has taken an active part in the Government of Sri Lanka/U[illegible] Water Management Project on the Left Bank of the Gal Oya irrigat[illegible] system. The IWMG has had two responsibilities in the Project: monitoring the effects of system rehabilitation and organizing farmers for water management.

Monitoring the Effects of Rehabilitation

The monitoring effort has included a baseline survey of 762 farm households conducted in March 1980 and will include future surveys to assess the socio-economic impacts of the project. The effort also includes a programme of continuous recordkeeping for all seasons since Maha 1979/80. In the recordkeeping programme, 15 investigators are stationed full time in Gal Oya. These investigators take 110 daily measurements of channel water levels, make over 900 daily observations of water conditions in sample fields, keep detailed records of farming operations for some 460 farmers, and take crop cuts on the more than 900 sample fields.

The monitoring programme has resulted in a very large body of data describing the performance of the Gal Oya Left Bank system, the farming practices of Gal Oya farmers, and the social and economic conditions of the Gal Oya population. Much of the data remains to be analyzed. Also, because rehabilitation has not yet proceeded very far, few effects have yet been discerned. To date, analysis of the data have served to describe the pre rehabilitation situation in Gal Oya. The following list includes the most important findings; figures backing up these statements as well as additional findings are available in the sources listed at the end of this paper.

1. The distribution of water and benefits varies greatly over the Left Bank.

   (a) The variation in the adequacy and reliability of water supply is greater among distributory channels than among field channels on the same distributory or along field channels.

   (b) Lower portions (the tail end) of the system [illegible] only have no water during Yala but also receive little water during Maha; most of the tail is effectively a rainfed area.

   (c) The maldistribution of water and unreliability of delivery are due to the general deterioration of the system, the lack of control structures, and to irregular issues of water from the major control points.

(d) The total area served by the Left Bank system is far in excess of the planned 42,000 acres, and may be as much as 70,000 acres. The additions include encroachments, unauthorized turnouts to private lands, and drainage water farming. The total storage of Senanayaka Samudra is not sufficient to irrigate the current command area of the Gal-Oya system.

2. The tail end portions of the system - the rainfed areas - are inhabited by Tamil speaking farmers while the head areas of the system are inhabited by Sinhala speakers. This ethnic difference complicates social and cultural analyses.

Several productive and economic factors are correlated with differences in water availability.

(a) Yields decrease with distance from the Uhana gate; total returns to farming also decrease.

(b) Holding sizes are larger in the tail portion than in the head portion but are small overall and are growing smaller.

(c) Staggering of cultivation during Maha is less in the tail portions because rainfed agriculture has more stringent time requirements. Many head end farmers stagger cultivation so as to make more use of family labour. Thus hired labour is more prevalent in the tail and family labour in the head areas.

(d) Seeding rates are much higher at the tail because many farmers practice dry sowing.

4. Noncooperative and inefficient water management by farmers is partly a response to the inadequacies and unreliability of the system.

(a) Farmer statements show responsible attitudes toward water conservation and system maintenance but their actions have included overuse of water by head end farmers, the breaking or unauthorized changing of structures, and the unauthorized taking of water from channels.

(b) Very few farmers have no water problems. Farmers identify the biggest problem as "bad system maintanance".

(c) Head end farmers overuse water as a hedge against unreliable deliveries; that is, they store water in their fields in case an expected delivery does not occur.

(d) Most conflicts between farmers are over water.

(e) Communication between the Irrigation Department and farmers has been inadequate and Cultivation Meetings are perceived as useless. In large part this has been because the water issue schedules announced at Cultivation Meetings have often been changed without informing the farmers.

Many of these farmer attitudes and actions have begun to change with the rehabilitation of the system, the organization of farmers, and with changes in the attitudes of Irrigation Department officers.

Organizing Farmers for Water Management

The farmer organization programme began in March 1981 with the training and deployment in Uhana and Gonagolla of 30 Institutional Organizers (IOO). These IOO are trained to live with farmers and convince them by discussion and example to:

a) make use of more efficient and equitable water management practices,

b) form small farmer organizations for water management and to represent their interests to other farmers and to the Irrigation Department.

A second group of IOO was fielded in September 1982 in another area. A third group was fielded in March 1983. More IOO will be fielded in August 1983 and January 1984 to bring the total to 120 to cover the whole Left Bank. Also, within the next year most of the first group of IOO will be pulled out of Uhana. All of these IOO are recruited, trained and supervised by the IWMG.

The IOO have accomplished several goals. In Uhana and Gonagolla areas 125 farmer organizations have been formed. These organizations have instituted regular shramadana work for the cleaning and repairing of field channels. During the last two Yala seasons, most groups instituted and kept up water sharing and rotations for more equitable water distribution. Disputes among farmers over water have greatly decreased and relations with the Irrigation Department officers have improved. Damage to structures has also apparently decreased. In part, these changes have occured because of a change in attitude toward farmers by the Irrigation Department officers; many now view farmer concerns as legitimate, particularly when channeled through the farmer representative selected by each organization.

Farmer organizations have also participated in the rehabilitation work. Most have been consulted by the engineers when planning the rehabilitation of field channels and some farmer suggestions have been incorporated in the designs. Each organization has agreed with the Irrigation Department to undertake the earthwork needed on its field channel while the ID is responsible for the structures. In Uhana, where much of the rehabilitation has been completed, many of the groups have finished their earthwork but some others have not fully completed their work.

This programme has demonstrated that trained IOO can generate farmer organizations that can effectively control water. The exact methods used by the IOO have been developed by trial and error and have been partially documented for analysis and publication. It remains to be seen whether the farmer organizations will still function effectively once the IOO have been withdrawn . And important operational and maintenance responsibilities have been given to the organizations. Some answers to this question will emerge in the coming year.

PUBLICATIONS FROM THE GAL OYA WATER MANAGEMENT PROJECT BY MEMBERS OF THE IRRIGATION AND WATER MANAGEMENT GROUP AND CORNELL COLLEAGUES EXCLUDING PROGRESS AND CONSULTANCY REPORTS

31ST MARCH, 1983

THE MONITORING PROGRAMME

1. Wijayaratne, C.M., H.A. Ranbanda, and M.L. Wickramasinghe
A Proposal for Socio economic Research in Water Management in Sri Lanka, Agrarian Research and Training Institute, Colombo, 1979.

2. Wijayaratne C.M., M.L. Wickramasinghe and N. Uphoff, eds.
1980 Yearbook for Sri Lanka Water Management Research, Initial Analysis of Pre-Rehabilitatio Situation in Left Bank Gal Oya, Agrarian Research and Training Institute, Colombo, 1982.

3. Svendsen, M. and C.M. Wijayaratne
"The Spatial Distribution of Irrigation Water and Yields on the Gal Oya Left Bank", Sri Lanka Journal of Agrarian Studies, forthcoming

4. Wijayaratne, C.M.
"Spatial Pattern of Water Adequacy and Resultin Farmer Responses in a Tank Irrigation Scheme of Sri Lanka" Proceedings of the Workshop on Modernization of Tank Irrigation: Problems and Issues (Feb. 1982) Perarignar Anna University of Technology, Madras, forthcoming.

5. Murray Rust, H, N. St. Julien, M. Svendsen, N. Uphoff, M.L. Wickramasinghe, C.M. Wijayaratne
"Productivity and Equity in Gal Oya Left Bank, A Sri Lankan Irrigation System" in Proceedings of the Workshop on Productivity and Equity in Irrigation Systems (September 1982) Giri Institute of Management, Lucknow, forth coming.

6. Vidanapathirana, A.S.
"Economics of Agro Chemical Use in Paddy Production - Experience at Gal Oya" Economic Review, People's Bank, 1983.

THE FARMER ORGANIZATION PROGRAMME

1. Wickramasinghe, M.L.
"Participatory Approach to Water Management - A Proposal for Gal Oya" Economic Review People's Bank, 1980.

2. Wickramasinghe, M.L. and E.J. Vander Velde
"Action Research into Farmer Participation in Irrigation System Management: A Sri Lankan Experiment" in Proceedings of the International Seminar on Field Research Methodologies For Improved Systems Management, Tamil Nadu Agricultural University, Coimbatore, India, 1981.

3. Vander Velde, E.J., C.M. Wijayaratne, and Wickramasinghe
"Rehabilitating Gal Oya: Improving Water Management Through Rural Participation in Sri Lanka", Proceedings of the Symposium on Rural Development: Theory and Practice, (April 1981) International Geographical Union, forthcoming.

4. Wickramasinghe, M.L.
"The Gal Oya Experiment With Farmer Participation" Proceedings of the Workshop on Water Management in Sri Lanka, (January 1982) Agrarian Research and Training Institute, forthcoming.

5. Wickramasinghe, M.L., C.M. Wijayaratne, Sena Ganewatte
"The Institutional Framework of Irrigation and Cropping on Major Colonisation Schemes" Proceedings of the Regional Seminar on Farm Power, (October 1982) Agricultural Development Council, forthcoming.

6. Wickramasinghe, M.L.
"Development and Community Participation: The Challange Ahead" to appear in Sanskriti (in Sinhala)

7. Uphoff, N., M.L. Wickramasinghe, C.M. Wijayaratne
"'Optimum' Participation in Water Management: Issues and Evidence from Sri Lanka", paper to be published.

8. Uphoff, N.
"A Case Study of 'Learning Process' Applied to Farmer Organization and Participation in Water Management - The Institutional Organizer

OTHER STUDIES

beyratne, Shyamala
A Study of Second-Generation Settlers in the Gal Oya Project, Sri Lanka, Master's Thesis, Dept. of Rural Sociology, Cornell University 1982.

unawardana, A.M.T.
Water Management Under Small Village Tanks, Agrarian Research and Training Institute, Colombo, 19 1

3. Murray-Rust, D.H.
Irrigation Water Management in Sri Lanka: An Evaluation of Technical and Policy Factors Affecting Operation of the Main Channel System, Doctoral Dissertation, Cornell University, 1983.

4. Uphoff, Norman
"Contrasting Approaches to Water Management Development in Sri Lanka" in Law and Alternative Strategies of Rural Development, International Third World Legal Studies Association. 1982.

5. Wickramasekera, P.
Water Management Under Canal Irrigation - A Study of Minipe Settlement Scheme; to be published.

6. Wickramasinghe, M.L., and L. Dunne.
"Diagnostic Analysis of Farm Irrigation Systems in the Kalawewa M, System, Sri Lanka" to appear in a Colorado State University Publication and to be submitted to the ARTI Board for consideration for publication.

Wickramasinghe, L.
"Rajangana Irrigation Scheme" to appear in a Colorado State University Publication.

TABLE

Summary AID Budget

Loan

	Original	Revised PIL 13	Current Revision
Commodities	4170	3870	4041
Training	700	700	1007
Rehabilitation	-	2000	4300
Construction	-	-	220
Other Costs	230	-	335
Contingencies	1700	230	897
Total	6800	6860	10800

Grant

	Original	Revised PIL 13	Revised PP Supplement
Technical Assistance	2450	2630	4908
Other Costs	280	180	-
Contingency	270	190	192
Total	3000	3000	5100

TABLE

DETAILED BUDGET

(AID Financed, $ 000)

I. GRANT

A. Technical Assistance

1. PRC Contract

Project Mgr.	66 pm	
Design Engr.	36 pm	
Construction Engr.	39 pm	
Equip. Specialist	45 pm	
Trng. Advisor	37 pm	
Water Management	17 pm	
Trng. Specialist	12 pm	
Institutional Advisor	18 pm	
Planning/Research	23 pm	
O & M Advisor	15 pm	
Planning Engr.	12 pm	
Misc. ST.	43 pm	
Total	363 pm 1/	$ 3777

2. Cornell - Farmer Organization/Research 2/

Water Management Advisors (2)	30 pm	
Socio-Economic Advisor	10 pm	
Total	40 pm	$ 519

1/ Of total, supplement will fund 113 pm at $12,000/pm. Cost of initial 250 pm (including 24 pm subcontract) was $2,421,000. Present contract funded through 6/30/83.

2/ Present contract funded through 6/30/84. Additional TA funds (10 pm) are calculated at $12,000/pm.

3. Irrigation Sector Pre Project

Water Management Specialist/Coordinator	24 pm	
Misc. TDY's	9 pm	
($12,000/pm)	33 pm	$396
4. Evaluation 1/		61
5. Miscellaneous 2/		155
6. Contingencies/Inflation 3/		192
	Total	$5100

1/ Includes $25,000 spent on 1982 evaluation plus $36,000 ($12,000/pm x 3 pm) for 1985 evaluation.

2/ ARTI special studies already completed or underway.

3/ Calculated at 10% of additional T.A. amount added by PP supplement. These funds will be expended during the period 1983-85.

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II. LOAN

A. Commodities

Original Equipment 1/	3,327
Gal Oya Operations & Maintenance Equip.	90
Training Equipment for GITI (audio-visual equip., lab equip., workshop equip., etc.)	160
Water Balance Equipment (Gal Oya)	32
Construction Equipment Spare Parts (Gal Oya)	300
Office Equipment -Water Management Research Center	30
Office Equipment - Water Management Cell	30
Vehicles (4 light weight) - Water Management Cell	60
Field Equipment - I.O Program	12
Total Commodities	4,041

B. Rehabilitation/Construction

Gal Oya Rehabilitation (FAR)	4,200
Measurement Structures - Gal Oya	100
Water Management Center - ARTI	20
GITI Construction	200
Total Rehab/Construction	4,520

1/ Equipment already procured or in the process of being procured - includes primarily heavy earthmoving equipment and vehicles. This procurement funded under existing project.

C. Training

1. Completed/On-going:
65 trainees 1/ 478

Sub total 478

2. Planned

a. Long Term 2/

1 Ph.D. (ARTI Sociologist) 30 pm x $2,500	75
1 M.A. (ARTI Research & Trng. Officer) 24 pm x $2,500	60
1 Non Degree (ARTI Research & Trng. Officer) 1 x 12 pm x $1,500/pm	18
1 M.A. (G.I.T.I. Trainer) 24 pm x $2,500	60
2 Non Degree (I.D. Staff) in Operations & Maintenance 24 pm x $2,500	60
Sub total	273

b. Short Term

30 Third Country - various disciplines 30 x 1.5 pm x 1,500/pm	68
15 Specialized U.S. Courses 15 x 1.5 pm x 5,000	113
Sub total	181

c. In-Country

ARTI I.O. Trng. Cost (per diem, travel, misc. expenses, etc.).	75
Sub total	75
Total Training	1,007

1/ Includes 3 L.T. participants in economics, engineering and agriculture related to Water Management and 62 S.T. trainees in various Water Management short courses and study tours.

2/ All L.T. training in U.S. except non degree training (12 pm) of ARTI Research and Training Officer in third country.

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D. Other Costs

Gal Oya Agricultural Extension/Demonstration Plots	100
Water Management Cell Feasibility Study	150
Project Preparatory Teams Support Costs	30
Special Studies (I.O. Program)	25
Water Management Center Support Costs	30
Total Other Costs	335

E. Contingency/Inflation 1/

Total Contingency/Inflation	897
TOTAL	10,800

1/ Calculated at approximately 15% of the unexpended balance of the loan (including additional loan funds to be provided by this PP Supplement)

Best Available Document

USAID Funding : Loan Grant
Initial Provision: $ 6.8m $ 3.0 m
Project Extension: $ 4.0 $ 2.1 m

February 1983

WATER MANAGEMENT PROJECT
USAID Project 383-0057 Irrigation Department
PROJECT ESTIMATES (REVISED 1983) & FUNDING DETAILS

US $ Rates
Project Inception(1980) 1$ = Rs.15.50
Exp. todate (1983) 1$ = Rs.18.00
Balance 1$ = Rs.23.00

US $ '000 GSL Rs. '000

Item	Technical Assistance AID $	Technical Assistance GSL Rs.	Commodities AID $	Commodities GSL Rs.	Training AID $	Training GSL Rs.	Rehabilitation Constn/Investn. AID $	Rehabilitation Constn/Investn. GSL Rs.	Other Cost AID $	Other Cost GSL Rs.	Contingencies Inflation AID $	Contingencies Inflation GSL Rs.	TOTALS $	TOTALS AID Rs.	TOTALS GSL Rs.	TOTALS TOTAL Rs.
PART 1. : GAL OYA REHAB.PROJECT																
1. Rehabilitation Construction							4380	99,500					4380	98,900	99,500	198400
2. Machinery & Equipment			3749	3750									3749	69,687	3,750	73357
3. Master Planning & On-farm Res.									-	1250			-	-	1,250	1250
4. Central Support PRC/ECI	2780*	17000							-	-			2780*	76,840*		
4. Central Support other	-	-			75					283			75	1,565	17,283	95708
5. Training I.D etc.					628	1050							833	17,249	1,050	18299
5. Training ARTI					205											
6. Socio Econ. & ARTI	-	21000	12 /1		75 /1				*100 /3				698*	18,184*	21,000	38760
6. Water User Assn. Cornell:	810*				-				25 /3				122	2,576		
7. Contingencies & Inflation											73 /8 *180*	16020	180*	4,370*	36,373	37226
											289	20353	1021	23,683		27000
											Sub	Total	4860*	309,874	180,126	490000
													10000			
PART 2 : G.I.T.I																
1. Impts. to Colgamuwa I.T.I.			160	1590			200	4,480					360	7,930	6,070	14000
PART 3 : NEW PROPOSALS																
1. Investigations for follow-on Project	430*							-	150	-			430*	8,930*		
													150	3,450		13380
2. Water Management Cell			90				-		30 /4	360 /5			120	2,760	360	3120
3. Water Management Center			30				20		30 /6	450 /7			80	1,840	450	2290
TOTAL Grant	4720*	38000	4041	5340	983	1050	4520	103,980	180*	2261	180*	36373	8180*	335,790	187,886	522796
TOTAL Loan									235		1021		10000			

/1 10 Training /2 Special Studies /3 Sub Studies and seminars. /4 Project Prep Team Support costs. /6 Seminars & Publications /5 /7 Staff Salaries
/8 Includes $180,000 Ag. Extension

Annex F.3

ANNEX G

PROCUREMENT PLAN

Most of the procurement undertaken to date was done by the Irrigation Department (ID). In addition, two procurement actions (primarily GITI training equipment and farm tractors) were handed over to a U.S. procurement agent. Additional procurement included in the PP Supplement will be accomplished in a variety of ways.

Vehicles (4 light weight, 4-wheel drive, right hand drive AMC jeeps) will be procured directly from the U.S. by the ID under small value procurement rules. AMC jeeps will be purchased because AMC is currently the only U.S. manufacturer of such right hand drive vehicles. Different AMC dealers will be given an opportunity to bid on this procurement which will be advertised in the AID Export Opportunities Bulletin.

The majority of office equipment will be purchased "off the shelf" in Sri Lanka according to AID's off-shelf procurement rules. Similarly field equipment in support of the ID program will be procured "off the shelf". Finally, off-shelf procurement will also be used to obtain spare parts for existing machines and equipment, whenever local dealers/representatives exist and have the necessary spare parts in stock. Spare parts which are not available locally will be obtained from the U.S. by the ID under small value procurement rules.

A mini-computer will also be procured "off the shelf" from a local dealer subject to AID/W approval. The amount of this procurement is estimated at $3000. Competitive bids will be obtained from local suppliers.

Other remaining procurement is expected to be from the U.S. through the contractor or directly by the ID under small value procurement rules. Such equipment will include training equipment, operations and maintenance equipment (e.g. back hoes), and water balance equipment.

TABLE I

PROCUREMENT LIST 1/
($000)

Gal Oya O&M Equipment (Back hoes etc.)	90
Training Equipment for GITI 2/	160
Water Balance Equipment	32
Construction Equipment Spare Parts	300
Office Equipment - Water Management Center	30
Office Equipment - Water Management Cell	30
Vehicles (4 light weight 4WD RH Drive jeeps)	60
Field Equipment - IO program	12
Total	714

1/ Commodities funded under the PP Supplement.

2/ (a) workshop equipment for carpentry and metal working,
(b) lab equipment for soil testing, hydraulics and meteorology,
(c) office equipment: typewriter, duplicating machine, etc.,
(d) audio-visual equipment.