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FILE

AGENCY FOR INTERNATIONAL DEVELOPMENT

WASHINGTON, D.C. 20523

PROJECT PAPER

SRI LANKA: Mahaweli Downstream Support
(383-0103)

July 17, 1987

UNCLASSIFIED

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE

A
A = Add
C = Change
D = Delete

Amendment Number

DOCUMENT CODE

3

COUNTRY/ENTITY

Sri Lanka

3. PROJECT NUMBER

383-0103

4. BUREAU/OFFICE

ANE Bureau

04

5. PROJECT TITLE (maximum 40 characters)

Mahaweli Downstream Support Project

6. PROJECT ASSISTANCE COMPLETION DATE (FACD)

MM DD YY
08 | 1 | 92

7. ESTIMATED DATE OF OBLIGATION

(Under "B" below, enter 1, 2, 3, or 4)

1. Initial FY 817 3. Quarter 4

C. Final FY 819

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

A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total	534	1821	2355	1595	13,405	15,000
(Grant)	534	68	602	1595	405	2,000
(Loan)	-	1753	1753	-	13,000	13,000
Other						
U.S.						
Host Country	-	3061	3061	-	20,097	20,097
Other Donors)						
TOTALS	534	4882	5416	1595	33,502	35,097

9. SCHEDULE OF AID FUNDING (\$000)

A. APPRO- PRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) DA	200B	060	060			700	5,735	2,000	13,000
(2)									
(3)									
(4)									
TOTALS						700	5,735	2,000	13,000

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)

252 091 070

11. SECONDARY PURPOSE CODE

100B

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

A. Code BSW EQTY NJTR
B. Amount 5000 5000 3000

13. PROJECT PURPOSE (maximum 180 characters)

To complete the construction of the tertiary irrigation system (distribution, field and drainage canals), roads, and settlements, primarily in Zone 4A, but also in other Zones on the left bank of System B should critical infrastructure gaps be identified.

14. SCHEDULED EVALUATIONS

Interim MM YY MM YY Final MM YY
0 9 8 9 | | | | 0 7 9 2

15. SOURCE/ORIGIN OF GOODS AND SERVICES

000 91 Local Other (Specify) Sri Lanka

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

Clearance: R. Albores/Controller *Albores*

7/17/87

17. APPROVED BY

Signature

Gary L. Nelson

Gary Nelson

Title

Acting Director, USAID/

Sri Lanka

Date Signed

MM DD YY
07 | 17 | 87

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

MM DD YY

2

MAHAWELI DOWNSTREAM SUPPORT
CONTENTS

	<u>Page</u>
Table of Contents.....	
Acronyms.....	
Face Sheet.....	
Project Maps.....	
Project Authorization.....	
I. SUMMARY AND RECOMMENDATIONS.....	1
II. PROJECT RATIONALE AND DESCRIPTION.....	8
A. Rationale.....	8
B. Project Description.....	11
1. Project Goal and Purpose.....	11
2. Project Activities.....	12
- Final Design of the Irrigation System and revision of the Land Use Plan.....	12
- Construction of the Tertiary Irrigation System..	13
- Road Construction.....	13
- Construction of the Settlement Areas.....	13
- Settlement Implementation.....	13
3. Project Inputs.....	14
a. USAID.....	14
b. Government of Sri Lanka.....	14
III. COST ESTIMATES AND FINANCIAL PLAN.....	15
IV. IMPLEMENTATION PLAN.....	20
A. Implementation Schedule.....	20
B. Administrative Arrangements - GSL.....	21
Mahaweli Authority of Sri Lanka (MASL).....	21
Mahaweli Engineering and Construction Agency.....	22
Ministry of Lands and Land Development (MLLD).....	23
Mahaweli Economic Agency (MEA).....	23
C. Administrative Arrangement - USAID.....	24
D. Project Activities.....	25
V. MONITORING AND EVALUATION PLAN.....	29
VI. CONDITIONS AND COVENANTS.....	30
VII. PROJECT ANALYSES.....	33

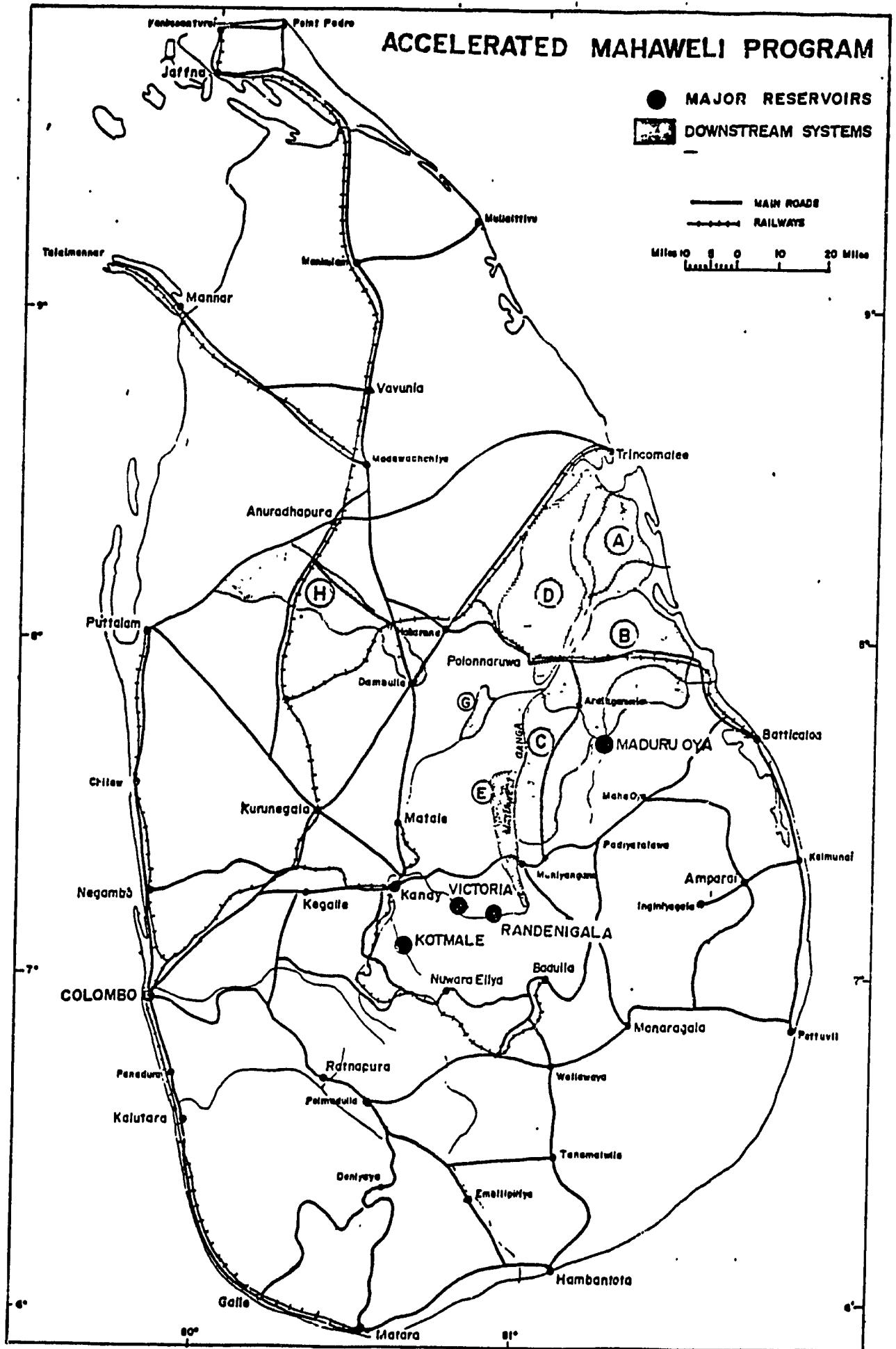
	<u>Page</u>
A. Technical Analysis	33
1. Summary.....	33
2. Design Issues.....	34
a. The Revised Land Use Plan.....	34
b. The Tertiary Irrigation System.....	36
c. The Drainage System.....	37
d. Land Clearing and On-farm Development.....	40
e. Agronomic Issues Related to Soil and Water Management.....	40
f. Floodplain Improvements.....	41
g. Farm-to-Market Roads.....	42
h. Social and Administrative Infrastructure.....	43
3. FAR-Related Issues.....	43
B. Economic Analysis.....	45
C. Financial Analysis.....	68
D. Social Soundness Analysis.....	72
1. Settlement Issues.....	72
a. Type of Settlers.....	72
b. Settler Orientation.....	73
c. Settlement Timing.....	73
d. Land Tenure.....	74
2. Ethnic/Minority Distribution.....	75
3. Gender Analysis.....	79
4. The "Second Generation" Problem.....	81
5. Security Concerns.....	81
E. Environmental Analysis Summary.....	82

Annexes

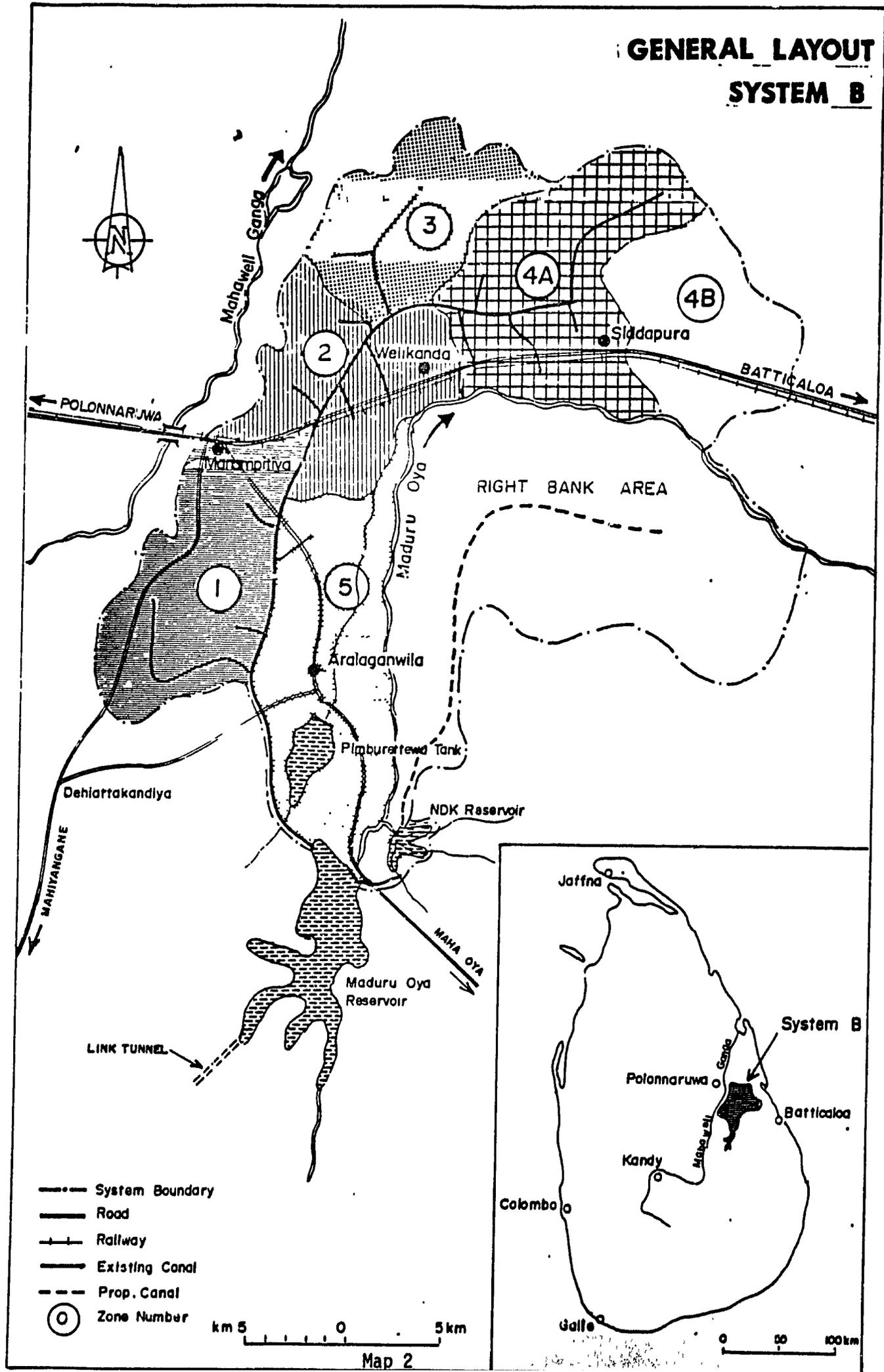
- A. PID Approval Cable
- B. GSL Request for Assistance
- C. Logical Framework
- D. Detailed Construction and Settlement Cost Estimates
- E. Detailed Implementation Schedule
- F. Procurement Plan
- G. Economic Analysis Tables
- H. Environmental Analysis
- I. Sample Annual Workplans
- J. Statutory Checklist
- K. FAA 611(e) Certification

ACRONYMS

ACO	Area Contracting Officer
AID	Agency for International Development
AMP	Accelerated Mahaweli Program
ANPAC	Asia Near East Project Advisory Committee
AWP	Annual Construction Workplan
COP	Chief of Party
DARP	Diversified Agriculture & Research Project
DOA	Department of Agriculture
FAR	Fixed Amount Reimbursement
FSE	Farming System Extension
FSN	Foreign Service National
GSL	Government of Sri Lanka
IRR	Internal Rate of Return
LOP	Life of Project
LUP	Land Use Plan
MARD	Mahaweli Agriculture & Rural Development Project
MASL	Mahaweli Authority of Sri Lanka
MDS	Mahaweli Downstream Development
MEA	Mahaweli Economic Agency
MLLD	Ministry of Land and Land Development
MMD	Ministry of Mahaweli Development
O&M	Operations & Maintenance
PACD	Project Assistance Completion Date
PES	Project Evaluation Summary
PID	Project Identification Document
PIL	Project Implementation Letter
PMU	Planning & Monitoring Unit
RCMO	Regional Commodity Management Office
REDS	Rural Enterprise Development Sector Project
RFP	Request for Proposal
RPD	Resident Project Director (MECA)
RPM	Resident Project Manager (MEA)
SD	Survey Department
SFC	Subsidiary Food Crops
TAC	Technical Assistance Contractor
USAID	United States Agency for International Development
USDH	U.S. Direct Hire



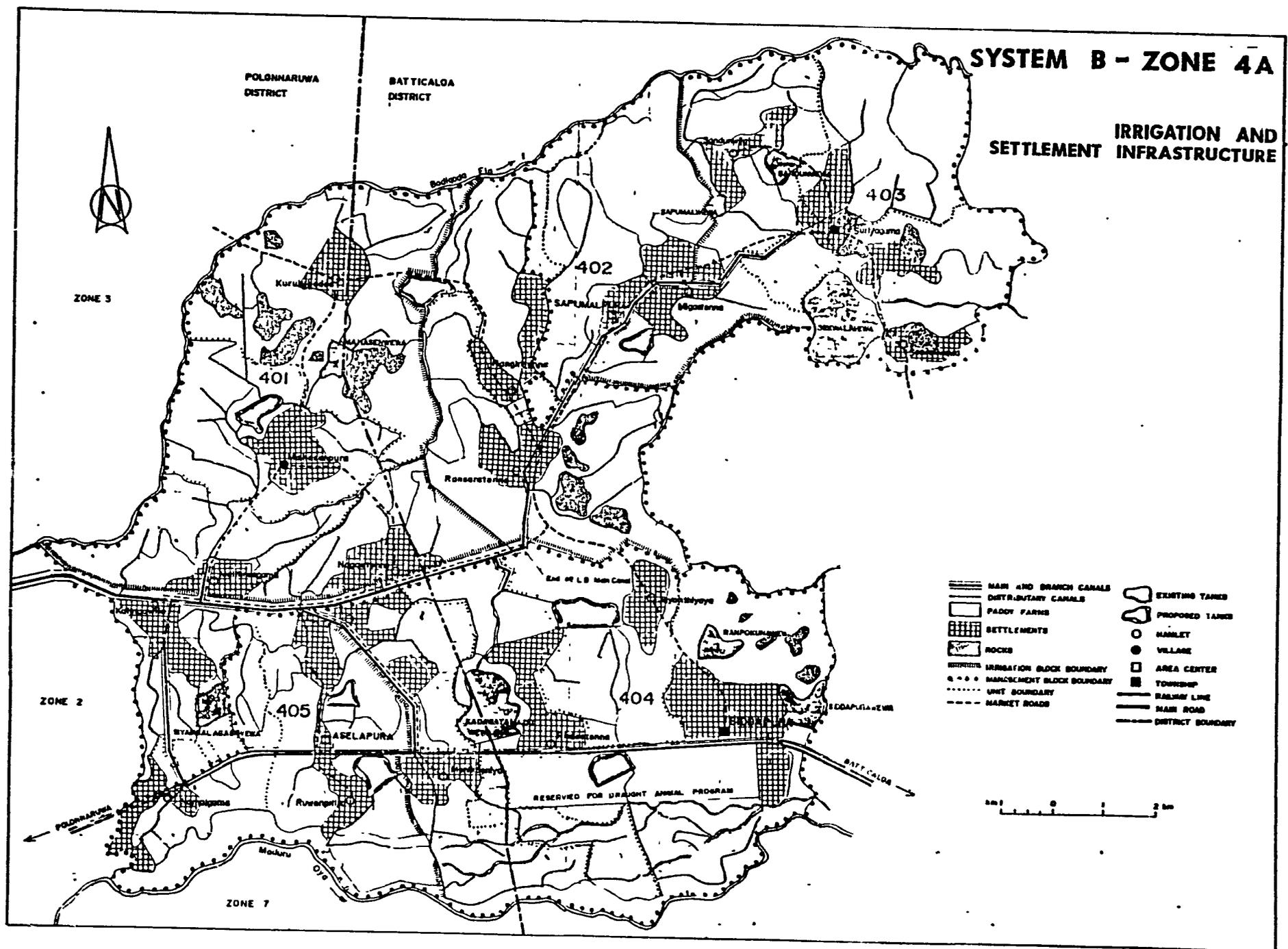
GENERAL LAYOUT SYSTEM B



Map 2

SYSTEM B - ZONE 4A

IRRIGATION AND SETTLEMENT INFRASTRUCTURE



- | | | | |
|--|---------------------------|--|-------------------|
| | MAIN AND BRANCH CANALS | | EXISTING TANKS |
| | DISTRIBUTARY CANALS | | PROPOSED TANKS |
| | PADDY FARMS | | HAMLET |
| | SETTLEMENTS | | VILLAGE |
| | ROCKS | | AREA CENTER |
| | IRRIGATION BLOCK BOUNDARY | | TOWNSHIP |
| | MANAGEMENT BLOCK BOUNDARY | | RAILWAY LINE |
| | UNIT BOUNDARY | | MAIN ROAD |
| | MARKET ROAD | | DISTRICT BOUNDARY |



Map 3

8

PROJECT AUTHORIZATION

Sri Lanka

Mahaweli Downstream Support
Project No. 383-0103
Loan No. 383-T-039

1. Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Mahaweli Downstream Support Project for the Democratic Socialist Republic of Sri Lanka ("the Cooperating Country") involving planned obligations of not to exceed \$13,000,000 in loan funds and \$2,000,000 in grant funds over a three year period from the date of this authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project. The planned life of the project is five years from the date of initial obligation. Funds are not authorized for obligation until the Congressional Notification expires without objection.
2. The project consists of assisting the Cooperating Country to complete the construction of the tertiary irrigation system, drainage and flood control works, and roads, in the left bank of System B in the Mahaweli Basin, primarily in Zone 4A. The project will provide funds for technical assistance, construction, commodities, training, salaries for locally-hired engineers and other operating costs.
3. The Project Agreement(s) which may be negotiated and executed by the officer(s) to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.
4. a. Interest Rate and Terms of Repayment

The Cooperating Country shall repay the Loan to A.I.D. in U.S. Dollars within forty (40) years from the date of first disbursement of the Loan, including a grace period of not to exceed ten (10) years. The Cooperating Country shall pay to A.I.D. in U.S. Dollars interest from the Date of first disbursement of the Loan at the rate of (a) two percent (2%) per annum during the first ten (10) years, and (b) three percent (3%) per annum thereafter, on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

b. Source and Origin of Commodities, Nationality of Services

Commodities financed by A.I.D. under the project shall have their source and origin in the Cooperating Country or in the United States if grant-funded, or in countries included in Code 941 if loan-funded, except as AID may otherwise agree in writing. Except for ocean shipping, the suppliers of commodities or services shall have the Cooperating Country or the United States if grant-funded, or the countries included in Code 941 if loan-funded, as their place of nationality, except as A.I.D. may otherwise agree in writing.

Ocean shipping financed by A.I.D. under the project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States if grant-funded, or the flag vessels of the Cooperating Country and countries included in Code 941 if loan-funded.

c. Other

Prior to disbursement for any activities in any calendar year during the Project, other than to finance technical services, the Borrower/Grantee will furnish to A.I.D.:

- i Annual construction and policy workplans which are satisfactory to AID and which cover all components of the project. Before the first annual workplans are approved, the Borrower/Grantee will furnish evidence of the detailed surveys and topographic maps required for the Revised Land Use Plan and the field canal blocking out plan.
 - ii Evidence that adequate budgetary resources are being made available for the calendar year.
- d. The Cooperating Country shall covenant:
- (i) to design and implement a system to foster participatory farmer irrigation organizations;
 - (ii) to contract for irrigation community organizers to develop farmer irrigation organizations in the left bank of System B;

I. SUMMARY AND RECOMMENDATIONS

A. Recommendations

1. Funding

USAID/Sri Lanka will authorize

- a. A development loan of \$13 million, to be disbursed over five years with a 40-year repayment period including a 10-year grace period at 2 percent annual interest and 3 percent annual interest thereafter; and
- b. A development grant of \$2 million to be disbursed over a period of five years, to the Government of Sri Lanka for the Mahaweli Downstream Support Project.

AID project funds would be obligated as follows:

<u>U.S. Fiscal Year</u> (US\$ millions)	<u>Loan Amount</u> (US\$ millions)	<u>Grant Amount</u>
1987	5,735	700
1988	4,290	1,000
1989	2,975	300
1990	0	
1991	0	
1992	0	0
TOTAL	\$13,000	\$2,000

B. Summary Project Description

The Mahaweli Downstream Development Project (MDS) will complete the infrastructure development on the left bank of System B, bringing 4,516 hectares under irrigation and creating a completely new series of communities where there is now mostly under-utilized jungle. In accomplishing this objective, MDS will follow proven models of settlements established in Sri Lanka, and replicated within the Mahaweli Systems H and C over the past eight years. The Mahaweli Authority, with its major implementing agencies, Mahaweli Engineering and Construction Agency (MECA) and Mahaweli Economic Agency (MEA), has a well conceived plan for bringing the developed lands under cultivation, relocating settlers, and establishing a viable framework for profitable agricultural production.

MDS has examined the results of past Zonal development within Mahaweli and found a thoughtful and well-planned schedule and proven engineering capacity. Because of the special requirements of diversified agricultural, to be supported by the companion project Mahaweli Agriculture and Rural Development (MARD), there will be far greater attention to planning at the front end of infrastructure construction in Zone 4A than has normally been the case. Specifically, MDS supports the revision of the original land use plan designed for two paddy crops so that diversified crops may also be grown. The new plan will call for improvements in drainage and irrigation layouts required by diversified cropping.

12x

In addition, more detailed surveys and designs will be used for the farm-level irrigation systems, while the homesteads will be enlarged to double their originally-estimated size.

Once the planning stage has been completed, MDS will support the construction of the tertiary irrigation system, with an estimated total of nearly 1240 kilometers of distribution canals, field channels, farm-level drainage channels and turnout drains, all serving 4,516 irrigated, one hectare irrigated settler plots. In addition to the irrigation system, there are major flooding and drainage problems in Zone 4A which the project is designed to mitigate to the extent feasible.

MDS will also support 275 kilometers of various grades of road construction, and the full range of population settlements: townships, area centers, village centers and hamlets, which have been shown as necessary to accommodate new settlers in the past. In addition, the project will construct the public buildings and village water tanks.

The actual arrival of the settlers will begin in 1989, and continue for the next two years, with service to the new arrivals provided by MASL until the crops have been planted. At that time the services of the Mahaweli Economic Agency, supported by MARD, come into play.

MDS will also provide training and technical assistance to MECA engineering staff overseeing the private contractors who will actually perform construction tasks, and ensure that the completed structures meet the agreed upon standards. The Fixed Amount Reimbursement system will be used to reimburse the Government of Sri Lanka for 74 percent of the agreed upon costs of the irrigation system, roads and settlement areas as defined in the following sections of this paper.

<u>Project Element</u>	<u>AID</u>			<u>GSL</u>	<u>Total</u>
	<u>Grant</u>	<u>Loan</u>	<u>Total</u>		
Technical Assistance	1,186		1,186	53	1,239
Commodities	180		180		180
Training	111		111	41	152
Construction		10,608	10,608	13,202	23,810
Settlement Activities				1,488	1,488
Evaluation	151		151		151
Base Cost	1,628	10,608	12,236	14,784	27,020
Contingency	156	1,016	1,172	1,478	2,650
Inflation	213	1,376	1,589	3,835	5,424
	<u>1,997</u>	<u>13,000</u>	<u>14,997</u>	<u>20,097</u>	<u>35,094</u>

The project is in direct support of the Mahaweli Authority of Sri Lanka (MASL) and its operational agencies and divisions. The primary implementing agency will be the Mahaweli Engineering and Construction Agency (MECA) through the office of the MECA Resident Project Director for System B.

C. Summary of Findings

The analyses completed during project design, the analyses of prior Mahaweli irrigation systems design and construction, the studies completed for the implementation of a similar settlement plan for other zones on the left bank of System B, all support the conclusion that the project is technically feasible, socially sound, and can be effectively completed as designed. The analyses further demonstrate that the costs of the project have been fully provided for in the budget and that the project, when implemented with its companion project, Mahaweli Agricultural and Rural Development, provides an acceptable economic return. The project meets all AID statutory criteria (Annex I) and Section 611(e) certification requirements (Annex J).

D. ANPAC Concerns and Design Guidelines

1. Policy Performance and Donor Coordination

As anticipated by the ANPAC review, the proposed linkage between policy performance and the MDS project has been tempered by the inclusion of major Mahaweli policy issues within the implementation designs of MARD. A policy issues paper was submitted to MASL, discussed, and agreed actions specified during the course of project implementation. Progress under these policy agreements will be monitored annually, and made a part of each project evaluation. Since the AID REDS Project and the World Bank's agricultural sector credit appraisal may closely coincide, these projects offer the opportunity for close donor coordination on policy issues in agriculture which are raised above the level of the Mahaweli Authority.

2. Private Sector Participation

Both MDS and MARD support private sector involvement in agricultural input supply, credit and marketing--a position now increasingly advocated by MASL. Project designs further encourage privatization of input, credit and marketing arrangements. The projects, while supportive of the private sector in general, appropriately leave to REDS the direct encouragement of entrepreneurs and private investment in the left bank of System B.

3. Economic Returns on MDS and MARD

The two projects contain within them an overall assessment of the System B, left bank economic return from MDS and MARD. An IRR of 16.7 percent was determined under reasonable and conservative assumptions of project beneficiaries, crop diversification, adoption of high-yielding plant materials, and access to marketing channels. The analysis supports very significant benefits to be derived from MDS and MARD given the existing infrastructure investment to date.

4. Subsistence Farming and the Half-acre Homesteads

The design team was encouraged by MASL to review the half acre size of the homestead for settlers in Zone 4A to determine if increasing the size to one acre would provide economic benefits over alternative uses of the land. This analysis concluded that such an increase would be valuable, not only in assisting the settlers in their rise above subsistence, but to economic output from the area as a whole. Thus the revised allotment has been included in the MDS design specifications and will lead, as the project is implemented, to new layout, land use and structure plans for Zone 4A.

5. Credit

The design for MARD calls for the provision for a Farmer Investment Program and a linked incentive savings fund, to be used as capitalization by resource poor settlers to begin their conversion to commercial farmers. In the strict sense of the word, this is not a credit fund, and is not expected to be directly repaid. As the program generates rural savings, the re-flows would be lent to settlers at commercial interest rates, by a commercial bank, utilizing their own definitions of credit-worthiness and terms. The Farmer Investment Program was the subject of Colombo 3540 of May 28, 1987, and State 188724 of June 19, respectively, describing the program and approving the allocation of funds, with details to be worked out during implementation.

The design team found that credit availability to rural banks was not the issue, as the Central Bank provides subsidized production credit to government and private banks for agricultural loans at 1.5 percent, and offers a 50 percent guarantee on non-recoveries. Rather, the issue is the credit-worthiness of settlers, and the administrative cost of providing small loans--subjects that MARD will address.

6. The Environment

An updated Environmental Assessment for the Mahaweli program was conducted as reported in Annex H. It found substantial progress on prior recommendations to upgrade programs which prevent deterioration of the environment. The sole issue addressed is a covenant on the establishment of fuel wood plots for the left bank of System B.

7. Contracting Mechanisms

Full and open competition is planned for a single direct AID contract to provide assistance for both MDS and MARD with ample opportunities for Gray Amendment subcontracting - particularly for short-term assistance. Neither project has an institutional building purpose or a large training component and neither, therefore, is identified for Title XII selection procedures.

E. Project Issues

Completing the Settlement Program in Zone 4A

The Mahaweli Downstream Support Project completes the settlement infrastructure on the left bank of System B. It allows the full potential of the system to be exploited and the best of the revised and improved agricultural programs to be implemented. MDS should not be viewed as a construction project, rather it is the ultimate testing ground for the concept supported in MARD--that of a highly efficient, diversified, profitable agricultural community with market-driven land utilization, effective water management, organized domestic and international marketing, all based upon cooperative organizational patterns and supporting services to and from the private sector. If MDS were to be counted as merely another 4,516 hectares of irrigated paddyland, it would make one level of contribution to the Mahaweli program. But MDS provides MARD with the resources, the time and the leverage to test concepts which may not be much more difficult in older, already established settlements. Once proven in Zone 4A, if they have not been already, the new methods become candidates for extension and expansion throughout the Mahaweli systems. MDS is thus directly tied to the policy decisions necessary to implement MARD successfully, and can only be successful as both projects fulfill the promise of profitable, commercial, agriculture on the left bank of System B.

Developing the Left Bank of System B in the Context of National Agricultural Production

The left bank of System B represents 26 percent of potentially irrigated land within the major irrigation systems of the Accelerated Mahaweli Program. All the Mahaweli systems, and many of the two-season irrigation systems outside of Mahaweli, can produce the same crops as System B. Thus, laments over a lack of a market for Mahaweli produce often mask the economic and planning problems of a vast potential for agricultural production which has no obvious and immediate market beyond the satisfaction of domestic demand.

The left bank of System B can maximize its income at the expense of other Systems in Mahaweli, competing in the chilli market, for example, when System H has few other alternatives and less than 50 percent irrigation for the Yala season. Any other System can and will duplicate the successful cropping patterns proposed for the left bank, with the result that any intended relation between the satisfaction of domestic demand and producer price may be in error, due to an unanticipated replication effect. Our best efforts in System B might lead to Mahaweli-wide near-subsistence farming when local markets become saturated, particularly if the ethnic conflict mitigates. This presents MARD with its greatest challenge and best opportunity for real impact on agricultural production in Sri Lanka.

The Research Task Force within MARD will move quickly from providing the best technology available to satisfy domestic market outlets for diversified crops, to the quality, producer prices, storage and transportation required for international sales. While care must be taken not to overpromise, either Mahaweli can or cannot compete in the international market for the kind of crops best suited for thousands of hectares of irrigated farming. MARD is premised on the assumption that those markets must be sought, not to the exclusion of import substitution or the satisfaction of domestic requirements, but to establish a viable economic base in agriculture which can grow faster than the population rate.

When this pilot effort is successful in System B, it needs to be implemented Mahaweli-wide, to provide the coordination necessary to have complementary production schedules and cropping plans. This highlights a need for national agricultural planning, to allow the crops most appropriate to be grown on land which has a special comparative advantage due to a particular resource endowment. With USAID assistance, the Ministry of Agricultural Development and Research has drafted a Diversification Plan for agriculture, one which is a remarkable match for the objectives and strategy described in MARD. As this plan is implemented, some of the issues which MARD must resolve may be attacked on a national scale, providing the planning which is essential to demonstrate that Subsidiary Field Crop markets and producers can be joined in ways which maximize the utilization of the national resource base and farmer income.

Correctly established, MDS and MARD, through System B, will lead settlement farmers into large-scale export agriculture. To do less will not fulfill the promise of the Accelerated Mahaweli Program.

F. Contributors to Project Development

The following contributors reflect the cooperation between and involvement of USAID personnel, technical consultants, and the personnel from MASL, MECA and MEA, who gave generously of their time.

1. USAID/Sri Lanka

a. Project Committee

Jack Pinney, Chairman, Chief, Office of Engineering and Water Resources
Herb Blank, Office of Engineering and Water Resources Development
Jan Emmert, Office of Program
Jeff Lee, Office of Food and Agriculture Development
Monica McKnight, Office of Projects
Walter Abeygunewardena, Office of Food and Agriculture Development

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Robert Chase, Director
Gary Nelson, Deputy Director
Dennis Zvinakis, Chief, Office of Projects
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Richard McLaughlin, Chief, Office of Program
John Flynn, Chief, Office of Food and Agriculture Development
Jack Pinney, Chief, Office of Engineering and Water Resources

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K. Satgunasingham, Irrigation Engineer
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David Wilcock, Agricultural Economist
Kapila Wimaladharma, Sociologist
William Selleck, Chief of Party, DARP
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Richard Morris, Farming Systems Agronomist, DARP
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II. PROJECT RATIONALE AND DESCRIPTION

A. Rationale

The two linked projects under joint development, the Mahaweli Downstream Support Development Project (MDS) and the Mahaweli Agriculture and Rural Development Project (MARD), are the latest AID contributions to the Accelerated Mahaweli Program (AMP). The AMP is by far the largest program undertaken by the Sri Lankan Government to transform agricultural production and farmer incomes. Supported by the international donor community, four dams were constructed between 1980 and 1985 to provide the storage for far-reaching irrigation schemes and power generation. The Mahaweli program has captured world-wide attention by bringing the benefits of development within nine years to 53,000 families, many previously landless or chena cultivators, who were provided with irrigated land, roads, homes and settlement infrastructure.

The development of the Mahaweli River Basin includes six major systems. System H is largely completed with 27,000 hectares under irrigation. System C, with 23,000 hectares of potentially irrigable land, has been under development since 1980, and represents the second major Mahaweli development model, building on the lessons from System H. System G is nearly completed and there are as yet no definite plans for the development of Systems A and D. System B, the last major initiative planned for 41,000 hectares of irrigated land, is in the initial stages of development, with the main and branch canals completed for the left bank by USAID. Zones 1 and 5 are 98 percent completed and 11,000 hectares are expected to be cultivated in the Maha season of 1987/88. Two donors, the Government of Saudi Arabia and the European Economic Community (EEC), are financing the settlement infrastructure in Zones 2 and 3, respectively, scheduled for completion in October 1988.

The MDS project will clear 5,800 hectares for irrigation in Zone 4A. A donor consortium is funding construction of the main and branch canals and supporting settlement infrastructure for the right bank of System B, to add an estimated 17,000 hectares of irrigated cropland. See map No. 2 for an overview of the area within System B. Table 1 presents the land resources and settler population estimates for all irrigation zones on the left bank.

TABLE 1
LAND RESOURCES AND SETTLER FAMILIES IN SYSTEM B, LEFT BANK

<u>Zone</u>	<u>Irrigated Has</u>	<u>Nonirrigated Has</u>	<u>Settler Families*</u>
Zone 1:	6,496	3,847	6,076
Zone 2:	5,053	4,307	6,064
Zone 3:	2,420	4,709	2,849
Zone 4A:	4,606	8,946	5,496
Zone 5:	5,035	6,800	4,666
Total	23,610	28,609	25,151

[* Settlers allocated irrigated land equal 80 percent of this total]

Compiled by MASL/PMJ, April 1987.

AID has made a major commitment to the development of System B. The Mahaweli Basin Development Project Phase I financed the design and supervision of construction of the main and branch canals and the design of the main drainage system on the left bank of System B. The Mahaweli Basin Development Project Phase II financed the construction of 52.9 km of concrete lined main canals and 86.6 km of concrete lined branch canals, providing the fundamental pre-requisites for irrigation to the left bank of System B. The total cost of these two projects was approximately \$265 million of which AID financed \$120 million (\$117 million loan and \$3 million grant). AID's Mahaweli Sector Support Loan provided an additional \$50 million for GSL costs of Mahaweli development. In all, combining grants and loans, AID has \$170 million invested to date in the left bank of System B.

To bring the left bank of System B to full potential, the Mission is now proposing two projects as the final phase in this stage of Mahaweli development. The Mahaweli Downstream Support Project will finance construction which completes the tertiary irrigation and settlement infrastructure in Zone 4A and, as financing allows, provides essential facilities elsewhere on the left bank. If 4A is not developed, the investment which completed 29 km of main and branch canals serving 5,800 hectares (one-fifth of the irrigable area of the left bank) will yield no return. Constructing the infrastructure which allows irrigated agricultural production is a necessary pre-condition to obtaining full economic benefits from the left bank.

It is to the Mahaweli Agriculture and Rural Development Project to exploit the natural resource base and obtain maximum benefits from the investments which have been made along the left bank of the Madura Oya in System B. MARD is designed to move new settlers into high yielding paddy production, and from paddy to more profitable diversified crops for both domestic and foreign markets. This is not a trivial task in the poorly or imperfectly-drained soils of System B. To be successful, MARD will require an integrated attack on the constraints to increased agricultural production and productivity, and far more cooperation among farmers than has been necessary for the limited cropping systems employed in the past. It is for MARD to develop the third model for Mahaweli development, drawing on the experiences in Systems H and C, distilling the lessons provided by nearly 10 years of dedicated and innovative intervention into the underutilized dry zone of Sri Lanka.

In the midst of doing a great deal right, the early years of the Accelerated Mahaweli Program had setbacks which provided the basis for the MARD project. Improvements in the Mahaweli processes and procedures are possible which will significantly increase economic returns to the resettlement schemes. First, as Sri Lanka approaches self-sufficiency in rice, farmers will need to diversify into other crops to improve their standards of living. In the squeeze which has developed between producer prices and inputs costs, the income from a double cropping of paddy on the one hectare of irrigated land allocated to each farm family is barely enough for subsistence. At present prices, shifting into other crops could double the net return per hectare for some farmers. For expected prices in the future, the export market provides the only certain buyer for increasing Mahaweli output. What is needed is a program of adaptive research and extension that generates immediate results, providing the farmer with the technical knowledge necessary for diversified cropping under the conditions that prevail on the left bank of System B. This is one major thrust of MARD.

Second, since there is plenty of water available now for double cropping, there has been little pressure to make optimal use of the irrigation capacity. When System B is fully developed the available water must irrigate a far larger area than at present, with far more complex and diverse cropping patterns. To manage water, and to gather the benefits of growing crops other than paddy, farmers will have to organize and cooperate in ways not presently critical. MARD will work to improve both operations and maintenance of the main and branch canals, to achieve efficiency in the use of on-farm water, and to bring farmers together to make necessary consensus decisions for cropping, rotation, timing of planting, maintenance and drainage.

The lack of supporting services to new agricultural output is also a constraint to increased agricultural productivity in System B. One urgent need is production inputs for recently settled farmers. Present government-sponsored credit programs are reaching only a small percentage of farmers and are experiencing high default rates. As farmers diversify into crops other than rice, new marketing channels and storage and handling facilities must be created. MARD will address these constraints, seeking to expand farmer's opportunities, increase their production possibilities, and multiply their disposable income.

When successful, the new model being tested by MARD will assist other systems to diversify, organize, market and carry forward Mahaweli development.

B. Project Description

1. Project Goal and Purpose

The development goal of this project is to obtain the maximum possible economic benefits from the land and water resources available to settler families on the left bank of System B. By having access to irrigated lands and benefitting from the productivity increasing interventions of the MARD project, at least 4,512 farm families in Zone 4A and in other zones of the left bank will be earning incomes that are at least double what they are now earning. In addition, 1,200 families will be settled in hamlets and villages and employed in non-agricultural activities. The specific purpose of this project is to complete the construction of the tertiary irrigation system (distributory, field, and drainage canals), roads, and settlements, primarily in Zone 4A, but also in other zones on the left bank of System B should critical infrastructure gaps be identified.

At the end of the project all of the downstream infrastructure will be in place in Zone 4A of System B to produce diversified crops under irrigation, market the crops, and meet the economic and social needs of the local population. In addition, critical infrastructure needs will have been met in other zones on the left bank of System B. The specific infrastructure to be put in place is described in detail in the remainder of this section.

2. Project Activities

The Planning and Monitoring Unit (PMU) of the Mahaweli Authority of Sri Lanka (MASL) has prepared a detailed implementation plan for downstream infrastructure development in Zone 4A. The infrastructure to be constructed consists of:

- the tertiary irrigation system
- the clearing and development of irrigated plots
- market and hamlet roads
- settlement areas
- social and administrative infrastructure

The overall design is similar to the development of other zones throughout the Mahaweli. There are, however, several minor but important changes provided for in the MDS project. These are:

- a) A revised Land Use Plan possibly resulting in a new layout of the agricultural land;
- b) A doubling in the size of the settler homestead;
- c) The final layout of the turnouts and farm plots based on a much more detailed survey than was used in previous zones in System B;
- d) An expanded and improved drainage system to increase the potential for diversified crop production; and
- e) Special interventions to develop floodplain areas.

The activities to be carried out under this project are the following:

- a. Final design of the irrigation system and revision of the Land Use Plan. More detailed topographical surveys will be carried out to correct deficiencies in farm-level irrigation observed in other zones of System B. Also, more detailed land use planning will be carried out to 1) determine the optimal use of soil resources in the project area, 2) maximize the use of irrigated land for crops that could be more remunerative than rice, and 3) take account of an increase in the size of the homestead from .2 hectare to .4 hectare. AID will finance short-term technical assistance to work with MECA and the Survey Department on these essential design and planning tasks.

- b. Construction of the tertiary irrigation system. This activity will consist of 143 km of distribution canals (D canals), 311 km of field channels (F channels), 370 km of farm-level drainage channels, and 415 km of turnout drains leading to natural waterways. In addition, jungle will be cleared and land will be levelled for 5,768 hectares of gross irrigated area which will be blocked out into 4,516 one-hectare farm plots. The detailed surveys and further land use planning mentioned above is not likely to result in major changes in the location or design of the D canals. However, there could be significant changes in the field and drainage channels from what is now provided for in MECA plans. The existing plan was prepared in 1980 when System B was seen primarily as a paddy production area. Zone 4A has a very large flood plain area (approximately 900 hectares) which will be subject to frequent inundation. MDS will test alternative approaches to solving this complex problem and will finance improvements where technically and economically feasible.
- c. Road construction. The project will construct 64.5 km of paved market roads and 207 km of unpaved hamlet roads. The system of market and hamlet roads will provide access from the settlement areas to the trunk roads. Annex A contains a map showing the location of the settlements and the proposed roads.
- d. Construction of the settlement areas. As presently designed Zone 4A will have one township, two area centers, two village centers, and 15 hamlets. These settlements represent the appropriate distribution of commercial, social and administrative services to meet the needs of the proposed population of the zone. The public and administrative buildings to be constructed by the project include MEA and MECA staff housing, MEA block and unit service centers, cooperative centers, primary schools and health clinics. In addition, 15 village water storage tanks will be either constructed or rehabilitated.
- e. Settlement implementation. The settlement phase of this project involves the selection of settler families, transportation to the zone, construction of houses, wells and latrines, and on-farm development. The construction of downstream infrastructure and settlement of farm families will be phased by block with 1,700 families settled the first year, 2,000 the second, and 815 the third. The project, with GSL funding, will provide the following assistance to each newly settled farm family, in cash or kind:

House construction assistance:	Rs	1,750
Tools and implements:		350
Drinking water well construction:		2,750
Latrine construction:		400
Planting materials for homestead plot:		500
Assistance to paddy plot development:		2,500

3. Project Inputs

a. USAID

AID will provide funding for technical assistance, salaries for locally hired engineers, training, commodities, and construction. There will be one long-term technical assistance position (30 months) to provide irrigation engineer services related to drainage trials, flood control experiments, training of MECA engineers and local contractors, and the supervision of locally hired engineers and short-term technical assistance. He will be assisted by three local engineers who will be primarily responsible for overseeing AID-financed construction but will also participate in training and experiments under the supervision of the expatriate technical advisor. Short-term technical assistance (24 person-months) will be provided to carry out special studies, including the revised LUP, and address special problems related to drainage, flood control, and irrigation facilities.

USAID will also finance training abroad for MECA professional staff (18 person-months) and in-country training for MECA construction supervisors and local contractors, as well as vehicles (9) and equipment needed for increased MECA, MEA, and PMJ activities related to the MDS project.

Finally, USAID will finance 74 percent of the costs of the tertiary irrigation system, including D canals, field channels, drainage canals and flood control measures, as well as the market and hamlet roads. The detailed costs of this construction are presented in Annex B.

b. Government of Sri Lanka

The project inputs to be financed by the GSL consist of 26 percent of the tertiary irrigation system, drainage, floodplain measures, and roads; and 100 percent of the costs of land clearing, on-farm development, settlements, and social and administrative infrastructure. The GSL will also finance the Engineering and Administrative costs associated with the construction activities, settlement assistance as described above, and the salaries of local support staff.

III. COST ESTIMATE AND FINANCIAL PLAN

A. Introduction

The total project cost is estimated to be \$35.1 million, of which AID will provide \$15 million (43 percent) through a development loan of \$13.0 million and a development grant of \$2.0 million. The GSL contribution, which may include funds from other donors, is estimated to be approximately \$20.1 million (57 percent). This includes 10 percent for contingencies and inflation allowances of 10 percent for GSL and five percent for USAID funding, compounded annually.

Major AID-funded inputs include fixed amount reimbursement for 74 per cent of the agreed-upon construction costs of key downstream infrastructure (tertiary irrigation canals, drainage measures, flood plain measures and roads); long and short-term technical assistance; overseas and in-country short-term training; and commodities in support of MASL and the TA contractor (vehicles, technical equipment, office equipment and supplies).

The GSL will fund approximately 26 percent of the agreed-upon total construction costs for the tertiary irrigation system, drainage and flood plain measures and roads, and 100 per cent of the costs of land clearing, on-farm development, settlements and social and administrative infrastructure. The GSL will also finance the engineering and administrative costs associated with the construction activities, settlement assistance, the local salaries of support staff for the TA contractor, and in-country training costs. Details are shown in Tables 2 and 3 and in Annex B.

B. Cost and Timing of Project Inputs

AID funds for the project will be obligated in FY 87, 88 and 89. Implementation will take place over a period of five years-- from FY 87 through FY 92. The GSL implementing agency will be the Mahaweli Authority of Sri Lanka (MASL) operating through its two agencies, the Mahaweli Engineering and Construction Agency and the Mahaweli Economic Agency. MASL will have specific responsibility for coordination and monitoring of project activities.

1. Construction: AID's share of estimated construction costs totals approximately \$13.0 million, including contingency and inflation, all of which will be local currency expenditures. Construction financing by AID will be done according to Fixed Amount Reimbursement (FAR), with AID reimbursing an anticipated amount of 74 percent of the agreed-upon engineers estimate of construction costs, upon completion of each subproject, according to AID-approved designs and specifications. Construction is scheduled for the years 1988-92, with the major share in calendar years 1988 through 1990.

Table 2: Cost Estimate and Financial Plan
(^{000s})

Major Project Element	USAID		Grant		GSL	TOTAL
	Loan FX	LC	FX	LC	LC	
A. Technical Assistance						
1. Long Term			555			55
2. Short Term			322			32
3. Local Staff						
a. Engineers				240		24
b. Support Staff				35	53	8
4. Vehicle O&M				34		3
B. Commodities and Equipment						
1. Technical Assist.			90			9
2. MASL			80	10		9
C. Training						
1. Participant			102			10
2. In-Country				9	41	5
D. Construction						
1. Tertiary Irrigation Infrastructure		4,863			1,709	6,572
2. Drainage & Flood Plain Measures		2,193			771	2,964
3. Roads		3,552			1,248	4,800
4. Land Clearing & OFD					2,177	2,177
5. Social & Administrative Infrastructure					3,777	3,777
6. Project Buildings & Facilities					1,355	1,355
7. Engr. & Admin					2,165	2,165
E. Settlement Assistance					1,488	1,488
F. Evaluation			151			151
BASE COST	10,608	1,300	328		14,784	27,020
Contingency	1,016	124	32		1,478	2,650
Subtotal	11,624	1,424	360		16,262	29,670
Inflation Factor	1,376	170	43		3,835	5,424
TOTAL	13,000	1,594	403		20,097	35,094

TOTAL USAID

14,997

Table 3. PROJECTED EXPENDITURES BY FISCAL YEAR

ITEM	Unit	Amount	Rate	Total	1988	1989	1990	1991	1992
						(^{000s})			
I. USAID Budget									
A. TECHNICAL ASSISTANCE									
1. Technical Staff									
a. Irrig/Drain. Eng	No.	30.00	18.50	555.00	222.00	222.00	111.00	-	-
b. S.T. Consultants	No.	15.00	21.50	322.50	107.50	86.00	64.50	43.00	21.50
c. Local Hire Eng	Yr.	12.00	20.00	240.00	40.00	60.00	60.00	40.00	20.00
2. Support Staff									
a. Administrative	No.	4.00	5.40	21.60	5.40	5.40	5.40	5.40	-
b. Clerical	Yr.	5.00	2.70	13.50	2.70	2.70	2.70	2.70	2.70
3. Vehicle O&M									
	No.	120.00	0.28	33.60	6.72	8.74	8.73	6.72	2.69
SUB TOTAL				1186.20	384.32	384.84	252.33	117.82	46.89
B. COMMODITIES									
1. Tech. Assist. Team									
a. Vehicles (4WD)	No.	4.00	10.00	40.00	40.00	-	-	-	-
b. Equipment (Tech)	Sum	1.00	50.00	50.00	25.00	25.00	-	-	-
2. MASL									
a. Vehicles	No.	8.00	10.00	80.00	80.00	-	-	-	-
b. Other	Sum	1.00	10.00	10.00	5.00	5.00	-	-	-
SUB TOTAL				180.00	150.00	30.00	0.00	0.00	0.00
C. TRAINING									
1. Participant									
S. T. Overseas	No.	17.00	6.00	102.00	-	25.50	25.50	25.50	25.50
2. In-Country									
a. Admin. Support and Other	Sum	1.00	9.00	9.00	-	2.25	2.25	2.25	2.25
SUB TOTAL				111.00	-	27.75	27.75	27.75	27.75
D. CONSTRUCTION									
1. Tertiary System (74%)									
				4863.28	1009.10	1983.20	1504.10	366.88	-
2. Drainage (74%)									
				2193.36	20.00	558.10	877.30	498.50	239.46
3. Roads (74%)									
				3552.00	529.30	1424.40	1206.70	291.60	-
SUB TOTAL				10608.64	1558.40	3965.70	3588.10	1256.98	239.46
E. EVALUATION									
	No.	7.00	21.50	150.50	-	-	64.50	-	86.00
BASE COST				12236.34	2092.72	4408.29	3932.68	1402.55	400.10
CONTINGENCY (10%)				1172.00	157.64	440.83	393.27	140.25	40.01
INFLATION (5%)				1589.07	104.63	451.85	619.79	302.25	110.55
TOTAL AID BUDGET				14997.41	2354.99	5300.97	4945.74	1845.05	550.66
II. GSL BUDGET									
A. Tech. Asst. Support									
1. Drivers									
	Yr.	18.00	2.10	37.80	8.40	8.40	8.40	8.40	4.20
2. Minor Staff									
	Yr.	12.00	1.26	15.12	3.78	3.78	3.78	2.52	1.26
SUB TOTAL				52.92	12.18	12.18	12.18	10.92	5.46
B. In-Country Training									
1. Construction Mngt.									
	No.	180.00	0.15	27.00	-	6.75	6.75	6.75	6.75
2. Trainers									
	No.	72.00	0.20	14.40	-	3.60	3.60	3.60	3.60
SUB TOTAL				41.40	-	10.35	10.35	10.35	10.35
C. Construction									
1. Tertiary System (26%)									
				1708.72	354.50	696.80	528.50	128.92	-
2. Drainage (26%)									
				770.64	7.00	196.10	308.20	175.10	84.24
3. Roads (26%)									
				1248.00	186.00	500.50	424.00	137.50	-
4. Land Clearing									
				2177.00	663.20	937.60	503.30	72.90	-
5. Social Infrastructure									
				3777.00	703.60	1541.00	1184.80	347.60	-
6. Project Buildings									
				1355.00	252.50	557.00	425.20	124.30	-
7. Administration (10% Constr.)									
				2165.00	372.00	839.00	696.00	225.00	33.00
SUB TOTAL				13201.36	2534.80	5264.00	4070.00	1211.32	117.24
D. Settlement Costs									
				1488.00	-	554.40	660.00	273.60	-
BASE COST				14783.68	2550.98	5840.93	4752.53	1506.19	133.05
CONTINGENCY (10%)				1478.36	255.10	584.09	475.25	150.62	13.30
INFLATION (10%)				3835.03	255.10	1226.59	1573.09	699.02	81.23
TOTAL GSL BUDGET				20097.07	3061.18	7651.61	6800.87	2355.83	227.58
III. GRAND TOTAL AID AND GSL				35094.48	5416.17	12952.58	11746.61	4200.88	778.24

1/ Approximately 8%

2. Technical Assistance: The project provides for 30 person months of long-term and 15 pm of short-term expatriate technical assistance, and 12 person years of TA to be provided by three locally hired Sri Lankan engineers. The long-term expatriate TA will be concentrated in the initial two and one-half years of the project. The long-term Sri Lankan TA and the short-term expatriate TA will be provided over the five-year life of the project.

The TA will be provided through a single, AID direct contract for both MDS and MARD. The TA will be grant funded with a total estimated cost of \$1.45 million, using 1987 base costs of \$18,500 and \$21,500 per person month for long and short-term expatriate TA, respectively, plus contingency and inflation. Drivers and minor staff for the TA team will be provided by MASL at its expense.

3. Training. Short-term overseas training is projected at 17 person months in the United States at a cost of \$137,000, including contingency and inflation, and will be grant funded. Budgets are based on 1987 monthly costs for short-term training in the United States, transportation, fees and per diem which average \$6,000 per person per month.

Overseas training will be financed by AID under the grant. Arrangements for training will be made by the GSL with backstopping assistance from the USAID Mission.

Funding is also included in the project for 252 pm of in-country training for MECA construction supervisors, trainers, and local contractors. All in-country training will be arranged by the GSL, will be local currency costs and will be financed by the GSL except for miscellaneous support cost which will be funded by AID.

Training activities will be equally divided among the last four years of the project.

4. Commodities: AID-funded commodity purchases are estimated at \$222 thousand of grant funding, including contingency and inflation, of which approximately \$12 thousand will be local procurements. The majority of off-shore procurements will be for four-wheel drive vehicles to support of the project work of MASL's agencies and the TA contractor. Off-shore and local procurement will be handled by GSL and they will be responsible for all customs clearance, inland transport, and handling charges. The bulk of the commodity procurement will take place during the first two years of the project.
5. Evaluation: Evaluations are scheduled in 1990 and 1992. Total costs are estimated at \$186,000 of grant funding, with contingency and inflation, based on seven person months at \$21,500 per pm.
6. Audit: FAR procedures will be used for all loan disbursements. Technical assistance accounts for two thirds of the grant element which will be subject to audit by AID/IG. Of the remaining balance \$ 222,000 is for commodities and \$ 186,000 is for evaluation and will be disbursed either by direct payment or

Direct Letter of Commitment. Mission Controller will conduct periodic reviews of GSL accounting procedures and records applicable to project disbursements for in-country training. To the extent that of any large contracts or activities are initiated which are not satisfactorily verified by other means, funds will be set aside from the contingency portion of the project budget for audit by non-federal auditors, i.e. through local affiliates of U.S. CPA firms. The selection of these firms would be approved by the GSL, the Mission and RIG/A/Singapore. These reviews will be procured by AID direct contract following direct payment procedures.

C. Proposed Payment Procedures

The proposed payment procedures are given in Table 4.

TABLE 4
PROPOSED PAYMENT PROCEDURES

Item	Method of Implementation	Method of Financing	Approximate Amount including contingency and inflation (\$'000)
Technical Assistance	AID Direct Contract	Direct Payment	1,452
Training	GSL Arrangements	Reimbursement	137
Construction	HC Construction Contracts	FAR	13,000
Commodities:			
A. Foreign Exchange	GSL Tender and Through TA	Mission-Issued Director L/Comm or Reimbursement of TAC	210
B. Local Currency	GSL Procurement and Through TA Contract	Direct AID Payment or Reimbursement of TAC	12
Evaluations	Direct AID Contract, buy-in to centrally funded project, or PSC	Direct Reimbursement	186
		Total	14,997

IV. IMPLEMENTATION PLAN

A. Implementation Schedule

The key targets of this five-year project that essentially determine the implementation schedule are the settlement of farm families in three annual phases beginning in 1989 by irrigation block proceeding down the main and branch canals of Zone 4A. (See map No. 3). The first phase will settle 1,700 farm families in Block 401, part of Block 402, and the part of Block 405 that is above the main road. The second phase will settle 2,000 farm families in the rest of Block 402, Block 403, and Block 404 above the main road. The parts of Blocks 404 and 405 that are below the main road are subject to frequent flooding. The third phase will settle, at the most, 815 farm families in these zones, but the final figure could be significantly less depending on the outcome of the flood control activities to be funded by the project.

To meet these settlement targets, it is essential that preconstruction activities begin by mid-1987, and construction of the irrigation system, roads and settlements begin in early 1988. The critical actions that must occur in 1987 are as follows:

<u>ACTION</u>	<u>RESPONS.</u>	<u>START</u>	<u>COMPLETE</u>
1. Detailed topo. survey	SD	10/86	9/87
2. Strip survey of D canals	SD	5/87	12/87
3. Final alignment of D canals	SD/MECA	6/87	2/88
4. Strip survey for market roads	SD	7/87	10/87
5. Preparation of D canal design and tender documents	MECA	9/87	4/88
6. Prepare design and tender documents for market roads	MECA	8/87	12/87
7. Prepare layout plans for settlements	MECA	6/87	6/88
8. Preparation of revised LUP	TA/MLLD	8/87	12/87
9. Design and tender doc. for village tanks	MECA	9/87	8/88
10. Prepare design and tender documents for hamlet roads	MECA	10/87	3/88
11. Prepare blocking out plans for homesteads	MECA	10/87	6/88
12. Prepare F channel trace & farm blocking out plans	MECA	7/87	12/87

This schedule will make possible the construction necessary for the Phase I farmers to arrive in March 1989 to prepare their lands for September 1989 planting. (See Annex E for the detailed implementation schedule.)

The schedule of 1987 activities related specifically to the MDS project are:

<u>ACTION</u>	<u>RESPONS.</u>	<u>DUE DATE</u>
1. Project Paper Approval	AID	7/87
2. Contract for LUP redesign	AID	8/87
3. RFP for MDS TA contract	AID	8/87
4. Arrival of LUP team	AID	8/87
5. Project Agreement signed	AID/GSL	8/87
6. Completion of revised LUP	TA/MLLD	12/87
7. TA contract awarded	AID	2/88
8. Arrival of TA irrigation engineer	TAC	4/88

B. Administrative Arrangements - GSL

1. Mahaweli Authority of Sri Lanka (MASL)

Within the GSL, the Ministry for Mahaweli Development (MMD) has overall responsibility for the MDS project. Responsibility for implementation lies with the Mahaweli Authority of Sri Lanka (MASL) through its two agencies, the Mahaweli Engineering and Construction Agency (MECA) and the Mahaweli Economic Agency (MEA). MASL has specific responsibility for coordination and monitoring of project activities.

Coordination is carried out through two inter-agency committees: a Steering Committee at the policy level, and a Coordinating Committee at the working level. All ministries and departments involved in the planning and implementation of Mahaweli programs are represented on these committees. For MDS, the key actions to be coordinated are the preparation of the LUP and the detailed topographic survey. Both of these activities are to be carried out by divisions of the Ministry of Lands and Land Development (MLLD) -- the LUP by the Land Use Planning Division of the Irrigation Department, and the topographic survey by the Survey Department.

Although the MASL-chaired Coordinating Committee meets every month, MECA and MLLD/SD have found it difficult to assure the timely completion of the necessary surveys. This has been an important cause of implementation delays. It now appears that, with the phase-down of activities in System C, the Survey Department will have the capacity to perform MDS surveys in a timely manner. The Mission will address this issue in negotiating the Project Paper by requiring that the detailed topographic survey be completed prior to the approval of the first annual workplan. Future survey work over the five years of the project will also be assured in the context of the approval of annual workplans.

The monitoring of Mahaweli development activities is the responsibility of the Planning and Monitoring Unit (PMU) of MASL. The PMU closely monitors the implementation of projects and submits detailed monthly reports. The system, however, is deficient in two respects, 1) progress is monitored against a workplan but there is little monitoring of the quality of the work being performed, and 2) the PMU does not have a good reporting system for the on-farm development work performed by MEA. As noted below, AID FAR procedures provide for close and effective monitoring of the quality of AID-financed activities. As far as the on-farm development activities are concerned, MEA is now developing its own monitoring capacity. Although AID will not be financing on-farm development under MDS, it is budgeted as a GSL contribution and is critical to the achievement of MDS objectives. The Mission will, therefore, assess the MEA's monitoring capability and will request strengthening as necessary in the context of approving the annual workplans.

2. Mahaweli Engineering and Construction Agency

MECA is responsible to MASL for the investigation, design and construction of all downstream development and is the key agency in the implementation of the MDS project. MECA has over 16 years of experience in this type of work, and has a highly qualified staff of engineers, physical planners, administrators and supporting technical and clerical staff.

The approval of contracts under MDS will occur as follows:

- o Contracts above Rs 10 million are approved by a Cabinet-appointed tender board.
- o Contracts of Rs 5 to 10 million are approved by MMD.
- o MECA approves contracts that are less than Rs 5 million; contracts between Rs 1 and 5 million require a bidding process; contracts between Rs 500,000 and Rs 1 million can be approved by the MECA Chairman using standard rates; and contracts of less than Rs 500,000 can be approved by the Resident Project Director (RPD) at the project level (e.g., the left bank of System B is a Mahweli project) using standard rates.

The management of contracts is the responsibility of the MECA field staff under the direction of the RPD. As noted in the technical analysis section, MECA tends to favor small contracts because the approval process is easier and faster than for large contracts. Activities that are suitable for large contracts are artificially subdivided into smaller contracts. The result is too many contracts to manage effectively and assure proper quality control. MDS will minimize the unnecessary subdividing of construction activities.

The types of construction that are suitable for small contracts include excavation of D canals and F channels, the construction of turnout and farm drains, on-farm land development, and miscellaneous small jobs that cannot be easily combined into large contracts. It is estimated that about 25 percent of the construction will be performed under small contracts. Also, the contract management and quality control capacities of MECA will be strengthened by providing technical assistance including: 1) an irrigation engineer for two and one-half years, 2) three locally hired engineers for 12 person years, and 3) in-country and overseas training for MECA staff in construction management and technical aspects of irrigation engineering, especially related to drainage and flood control.

3. Ministry of Lands and Land Development (MLLD)

Two MLLD departments, the Survey Department and Irrigation Department (Land Use Division), are prime contributors to topographic and soil surveys in the Mahaweli area as neither MECA nor MEA have staff to carry out these activities. Payment for services rendered is made on the basis of an agreed rate between MASL and the department concerned.

Topographic surveys are carried out at different stages of a project activity. Initially there are low intensity topographic surveys of the entire area for preliminary planning. This is followed by canal strip surveys and high intensity "detail and contour surveys" of irrigable area. Based on the latter, farm lots are blocked out and field channels set out and constructed. Thus, with three different surveys required, it can be seen that unless the survey activity is suitably dovetailed into the construction program of MECA the entire schedule can become severely disrupted resulting in major delays. As noted above, this has been a problem in the past which MASL's coordination mechanisms have not been able to deal with effectively. The Mission will therefore give priority attention to carefully scheduling survey work at the time annual workplans are reviewed and approved.

4. Mahaweli Economic Agency (MEA)

MEA is responsible for taking over the irrigation, settlement and administrative infrastructure from MECA after the completion of construction. Operation and maintenance of the system and all activities connected with settlement and settler welfare are its main functions. Each project is headed by a Resident Project Manager (RPM) with a professional staff in the areas of water management, agriculture, marketing, land use planning, community development, and administration. In addition, the MEA head office has advisory personnel in credit, draft animal programs, and communal lands management.

The procedure adopted by MEA in taking over works completed by MECA is that if any section of the work malfunctions due to defects in design or construction MECA will repair, correct, or complete it within twelve months of the date of transfer. For MDS, MECA will construct the tertiary irrigation system, roads, settlements, and public buildings. MEA will take over this infrastructure and carry out on-farm development and organize the settlement of farm and non-farm families. In the past, when problems have arisen related to unfinished or faulty work by MECA contractors, remedial actions have frequently been slow or inadequate. This problem will not become critical for MDS until well into the second year of implementation. The Mission intends to relate the approval of annual workplans and FAR disbursements to the satisfactory completion of work by MECA as certified by MEA and MDS engineers.

C. Administrative Arrangements - USAID

1. The USAID Office of Engineering will have overall responsibility for the implementation of MDS. The office has two USDH engineers and three FSN engineers. One of the FSN engineers will have fulltime responsibility for the MDS Project. The project will be managed so as to meet the requirements of the FAR disbursement system. The procedure can be summarized as follows:

- a. An annual construction workplan will be submitted to USAID by MASL for review and approval. The budget portion of the workplan should be agreed upon in May when MASL is working on their input to the national budget. The workplan will be finalized in November for the following year and will provide details of each subproject, including location, designs, specifications, cost standards, total cost and implementation schedule. USAID will review this workplan from the standpoint of sound design, accurate costing, and appropriate implementation arrangements prior to giving final approval.
- b. Early in the project, MASL, the TAC and USAID will collaborate to prepare a long-range policy plan which will set out policy goals to be sought over the life of the project. Then each year, at the same time the annual construction workplan is submitted, an annual policy workplan will also be submitted by MASL to USAID for review and approval. Samples of both these annual workplans are shown in Annex I.

- c. USAID will review the annual construction workplan from the standpoint of coordination of USAID-funded construction activities with the construction activities that are to be financed entirely by the GSL. USAID is financing 74 percent of the costs of the tertiary irrigation system, drainage and roads, while the GSL is financing the entire costs of land clearing, on-farm land development, and the social and administrative infrastructure, including settlements, public buildings and project buildings. All activities will be included in the annual construction workplans.
- d. The review of the past year's construction and policy workplans will assess progress with respect to both AID financed and GSL financed activities as well as GSL progress on the policy workplan. Approval of the subsequent year's construction workplan will be contingent upon satisfactory progress having been made on both the USAID and GSL portions of the annual construction workplan and on the annual policy workplan.
- e. The implementation of the annual construction workplan will be monitored in the field under the Technical Assistance Contract by locally hired MDS engineers who will work under the supervision of the TAC Chief of Party. This monitoring will be supplemented with inspections by USAID engineers.
- f. Final inspection and certification of the satisfactory completion of each subproject will be performed jointly by MECA, MEA, the TA engineers, and a USAID engineer.
- g. Typically, FAR reimbursements are made directly to the GSL Treasury. Evaluations of previous projects have recommended that reimbursements be made to the operating agency in order to keep a revolving fund operating. The project will investigate alternative means of reimbursement in order to speed project implementation.

D. Project Activities

1. Construction - General:

Construction of downstream infrastructure in Zone 4A of Mahaweli System B is a key activity under the MDS project. AID's financing of selected downstream construction will be done using the Fixed Amount Reimbursement (FAR) method of financing.

Of the MDS construction to be undertaken, USAID will reimburse the GSL for 74 percent of the previously agreed-upon costs for the tertiary irrigation infrastructure, the drainage and flood plain measures and the roads, provided that these construction elements are completed according to plans and specifications approved in advance by AID. The GSL, in turn, will finance the remaining actual costs of these same construction elements as well as 100 percent of the costs of the land clearing, on-farm development, social and administrative infrastructure, and Project buildings and facilities.

MECA will develop detailed designs for the tertiary irrigation system, drainage and flood plain measures, and roads. Finalization of all plans and specifications must be approved by AID prior to commencement of tendering procedures.

The design, tendering, contracting and construction supervision will be the responsibility of MECA. Construction will be by private local firms, selected under MECA's standard tendering and contracting procedures. The Mission Director has determined that MECA's contracting policies and procedures are acceptable for the utilization of the FAR financing method subject only to the satisfaction of AID's requirements on shelf-item and commodity import procurements and the utilization of the technical assistance inputs planned for this project.

2. Technical Assistance

Technical assistance (TA) and training will be implemented by an AID direct contract with a U.S. consulting firm. Because the project will operate in a remote, frontier area and the Technical Assistance Contractor (TAC) will have to provide all its own support, logistics and administration, a highly experienced TAC with adequate support capabilities is required. Consequently, the Mission intends to use the same TAC for both MDS and the companion MARD projects under one contract. The Mahaweli Authority of Sri Lanka (MASL) will be actively involved in preparation of the Request for Proposals (RFP), in evaluation of proposals, and selection of the TA contractor, and will be consulted as necessary during contract negotiations. The Area Contracting Officer (ACO) will also be actively involved in the contracting process. The RFP will be released as soon as possible after signature of the Project Agreement.

The TA contract will include long-term and short-term expatriate and Sri Lankan technical assistance as well as provision of supporting vehicles, technical equipment, office supplies and vehicle O&M. It will cover the costs of the recruitment, hiring, supervision and logistic support of the locally hired engineers and support staff. The Chief of Party (COP) for the Technical Assistance for MDS is expected to be a civil or agricultural engineer with strong experience in irrigation and construction and is initially programmed for two and one-half years. An option to extend the contract of the COP may be included in the contract. There will also be three long-term local hire engineers under the TA contract. One will be programmed for three years, one for four years, the other for the full five years. The latter will be designated as the Deputy Chief of Party during the tenure of the expatriate COP and will become the COP after the expatriate COP leaves.

The TA team will be responsible for working with MECA to improve construction management and to assure that completed work meets agreed upon plans and specifications. The COP will have as a counterpart the System B Resident Project Director (RPD) for MECA. The COP will be responsible for working closely with MECA in preparing the long-range policy plan and in the preparation of annual construction and policy workplans, in establishing detailed construction plans and priorities, preparing cost estimates, defining subprojects, and determining size of contracts. The COP will also be responsible for setting inspection criteria and schedules for his/her Sri Lankan engineering staff and assuring that construction work is completed according to schedule, is to specifications and that quality control is maintained. Short-term TA will be utilized to introduce and apply improved construction management techniques. Topics to be addressed through short-term TA include improving tracking of construction progress, improving management contracts, improving budgeting and financial management, etc.

The TAC Chief of Party and its long-term Sri Lankan employees shall be provided with office space and suitable housing in Polonnaruwa by MASL. The contract will include funds for household furnishings, appliances and utilities for the long-term expatriate consultant as well as for operations and maintenance costs for the four vehicles assigned for use by long-term contract personnel. In addition certain items, such as a computer and peripherals, typewriter, photocopying machine, and other small items will be financed with AID project funds. Limited funds will also be included in the contract for local, small-item procurement to be done directly by the contractor.

Four of the twelve four-wheel drive vehicles to be purchased under the Project will be reserved for use by technical assistance personnel for work-related transportation. Drivers and minor staff for long and short-term TA will be funded by MASL.

The selection process for the TAC will be competitive and open to all qualified U.S. firms. Mission analysis of the T.A. requirements for the MDS and MARD Projects indicates a need for a contractor with depth of expertise in Irrigation System Construction, Drainage, Main System Irrigation operating, Agricultural Research, International Marketing, Farming System Extension, and Water Users Organizations. There will be an attendant high demand on field management and home office supervision and backstopping and the Mission has determined this can be best provided by one prime contractor. The Mission has reviewed information AID/W provided on Gray Amendment firms and organizations and our own files on 8(a) and minority owned/controlled businesses but found none with the overall expertise needed. However, the opportunity for Gray Amendment firms to work as subcontractors does appear to be significant. While the Request for Proposals (RFP) will be broad and competitively let, the Mission will include in the Commerce Business Daily notice and the RFP the standard clause that AID will make maximum practicable use of small business concerns. Offerors and/or bidders will be advised that in the case of qualifications being found equal, the participation of such concerns may become a determining factor for selection. The Mission anticipates this strategy will encourage not just the use of Gray Amendment firms and organizations but the formal subcontracting with them as substantive service providers.

The Request for Proposals (RFP) will be developed in close collaboration with staff of MASL/MECA and will be issued by USAID. The Request for Proposals will allow 60 days for preparation of proposals which will be submitted to an office in AID/W for pouching to USAID/Sri Lanka. Proposals will be evaluated by a joint USAID/MASL team. The firms within the competitive range determined by the Area Contracting Officer (ACO) will be invited to Colombo for negotiations. It is assumed that the prime contractor will hire or subcontract some work with local Sri Lankan firms.

3. Training

All training under the project will be short-term. Seventeen months of short-term training will take place overseas -- probably mostly in the United States. Overseas training in Code 941 countries will, however, be considered if a program appears appropriate to the project's purposes and is approved in advance by USAID. Participants for overseas training will be selected by MASL in consultation with the TA contractor and must be approved by USAID.

Overseas participant training will be arranged and scheduled by MASL which will work with the TAC and USAID to prepare a training program and identify selectees. USAID will provide backstopping assistance to MASL for the training arrangements and scheduling. If required for a particular training program, the AID/Washington Office of International Training will be asked to assist.

Short-term, in-country training will continue throughout the life of the project and will concentrate on training for junior MECA staff and contractors in setting out work, construction techniques, equipment utilization, soil compaction, etc. Other training programs will concentrate on computer applications for construction management. The programs will be jointly identified or developed by the TA contractor and MASL. Participants will be selected by their respective agencies in consultation with the TA contractor. Management of in-country training programs and seminars will be handled by MASL. Short-term consultants to design or conduct in-country training courses will also be provided by the TAC as necessary.

4. Commodities:

All commodity procurement under the project will be the responsibility of MASL except for some items of special equipment to be used by the TAC which may be procured through the TA contract. The TAC Chief of Party will work with MASL soon after arriving to prepare a detailed list of commodities to be procured.

All procurement will be from the United States or Sri Lanka except for right-hand drive vehicles which may be obtained from a Code 935 country under the blanket waiver in effect until March 6, 1988.

Details are given in the Procurement Plan, Annex F.

5. Evaluation

The evaluation, as described in Section V., will be done under direct AID contracts or through buy-ins to a centrally funded project. Terms of reference for evaluations will be jointly developed and approved by MASL and USAID.

V. MONITORING AND EVALUATION PLAN

The MASL Planning and Monitoring Unit (PMU) has primary responsibility for monitoring and evaluating Mahaweli projects. This unit visits the project areas frequently and publishes detailed monthly, quarterly, and annual progress reports on construction activities for headworks and downstream infrastructure development. Monthly management briefs are held at MASL where implementation problems are spotlighted and remedial measures taken.

MECA also publishes a detailed monthly progress report giving a statement of progress on all ongoing construction activities. This is done by the Planning and Evaluation Division and this document forms the basis of mid-term changes in MECA staffing and construction reprogramming. Neither the PMU nor MECA reports contain information on quality of workmanship, on the tertiary system components taken over by MEA, or on land which was not allotted due to non-irrigability, flooding or other reasons. In the absence of this information neither of these agencies can assess the final impact of their activities in terms of farm-level production and the overall performance of the Mahaweli program. The Mission will encourage increased and more systematic attention to these matters in the context of the MDS and MARD projects.

As described in the previous section, the FAR procedures to be used in MDS provide for systematic and close monitoring of the planning and implementation of project activities. This will provide the basis for detailed and well documented annual Project Evaluation Summaries (PES) prepared by the Mission. In addition, there will be two evaluations. The first will occur at the end of two years and will address design as well as implementation issues. Activities requiring special attention will include drainage, flood control, and the set of issues related to soils, water management, and crop diversification. The evaluation will focus on the outcome of experimental and pilot activities, since at the end of two years, settlers will not yet have begun production. The implementation issues discussed in Section IV B will also be addressed, including the timing and adequacy of survey work, the effectiveness of MECA contract management, the effectiveness of transfers of infrastructure from MECA to MEA, and the performance of the FAR disbursement system.

The second evaluation will take place at the end of the project and will address the same issues as the mid-term evaluation. The emphasis, however, will shift from implementation issues and the results of experiments to actual on-farm impact. In addition, the final evaluation will assess the impact of the revised Land Use Plan, including cropping patterns, farmer incomes, and the effect of larger homesteads.

VI. CONDITIONS AND COVENANTS

A. Conditions Precedent to Disbursement

1. In addition to the standard legal opinion and designations of authorized representatives, the following conditions are proposed for the Project Agreement:

Prior to disbursement for any activities in any calendar year during the Project, other than to finance technical services, the Borrower/Grantee will furnish to A.I.D.:

- i Annual construction and policy workplans which are satisfactory to AID and which cover all components of the project. Before the first annual workplans are approved, the Borrower/Grantee will furnish evidence of the detailed surveys and topographic maps required for the Revised Land Use Plan and the field canal blocking out plan.
- ii Evidence that adequate budgetary resources are being made available for the calendar year.

B. Covenants

In addition to the standard covenants on evaluation and payment of duties, the following special covenants to provide impetus to the policy elements are included.

1. The GSL will adopt a system to ensure that participatory farmer organizations are fostered and developed in the project area. These organizations will ultimately have the following responsibility and authority.

- a. Complete freedom to choose their own leadership, make decisions that affect the membership and have an effective voice in dealing with the government bureaucracy.
- b. Authority and responsibility for collecting operations and maintenance (O&M) fees and utilizing fees for carrying out O&M activities and related works at the field canal level.
- c. Authority and responsibility for operation and maintenance of the irrigation system above the field canal level as the organization's capacity warrants.

2. The GSL will make available, on a contractual basis, a cadre of irrigation community organizers, on an agreed upon schedule, that will be given sufficient responsibility and authority to develop farmer irrigation organizations in the left bank of System B.

3. The GSL will ensure that the recurrent costs for supporting the Mahaweli System are sustainable and appropriate, that responsibilities for operating and servicing the areas are allocated to the appropriate authorities, and that provision is made for the Mahaweli Authority to transfer its responsibilities consistent with national priorities and plans. A recurrent cost policy will be adopted that will contain the following elements:

- a. A system for identifying, categorizing and analyzing recurrent costs.
- b. A mechanism and time table for shifting part of the burden and responsibility of identifiable irrigation services provided by the Government to project beneficiaries, with the ultimate objective that beneficiaries are to pay for 100 percent of legitimate operations and maintenance irrigation costs.
- c. A plan for the Mahaweli Authority to gradually reduce its recurrent cost expenditure as the systems mature while turning over responsibilities to farmer's organizations as their capability is proven.

4. The GSL will ensure that settlers in the Mahaweli areas have sufficient and secure land and water rights to allow them to become financially viable farmers and that they be provided with title to the lands they are allotted. This policy would contain the following elements:

- a. The allocation of larger than one-half acre homestead allotments for settlers in zone 4A of System B and other areas where sufficient lands are available.
- b. The issuance of titles to all allottees within the shortest possible time from their successful settlement. The titles should be transferable and fully acceptable as bank collateral.

5. The GSL will ensure that the private sector has ample opportunity to invest and freely operate in the special Mahaweli areas and specifically provide for:

- a. The leasing of State owned land and water resources to private sector entities.
- b. Discouraging State owned enterprises from practicing unfair competition to private sector organizations.
- c. Simplified rules and regulations governing operation and establishment of private enterprises in the Mahaweli special areas are coordinated by a single agency.

- d. Public sector entities be considered as suppliers of last resort and that any public sector entities established in the project area be considered as temporary and privatized at the earliest possible opportunity.
6. All project construction activities will be designed and conducted in accordance with environmentally sound practices and procedures.
7. A comprehensive fuelwood development plan will be established and implemented to meet the needs of settlers in the project area.
8. A semi-annual report will be provided to USAID of all Borrower/Grantee funds budgeted and expended in support of the project.
9. In light of AID and GSL concern for equitable ethnic distribution in the settlement of the project area, and recognizing the GSL's stated policy in this regard for the AMP, the GSL will keep USAID advised of progress in achieving this objective and notify USAID of any change in the policy.

VII. PROJECT ANALYSES

A. Technical Analysis

1. Summary

The physical components to be implemented by the MDS Project in Zone 4A are (a) the tertiary irrigation infrastructure system, (b) drainage and flood plain measures, (c) farm-to-market roads, (d) land clearing and on-farm development, (e) social and administrative infrastructure, and (f) project buildings and facilities. In addition to the physical components, the MDS Project will provide for technical assistance, the purchase of commodities, both in-country and overseas training, and assistance to settlers for the initial development of their homesteads and agricultural lands.

The Main and Branch Canals have been completed in the left bank of System B and the components listed above are the remaining physical works necessary for the development of Zone 4A. Prior to starting construction, a revised Land Use Plan (LUP) will be prepared for the zone. The existing plan was prepared essentially for the production of two crops of paddy on virtually all of the irrigated land. As a result, much of the land is aggregated into an undefined "other" category (Class 6), including large areas designated as Horticulture Land. A new LUP is needed to define more precisely the soils, slopes and drainage in these areas and possibly change the configuration and size of the area to be irrigated. Also, the revised LUP will need to reflect the doubling of homestead size to one acre.

The project places an increased emphasis on a complete drainage system and encourages caution in the development of the flood plains. Drainage has been considered as a parallel component of the tertiary irrigation system and has been singled out and expanded for two primary reasons. First, drainage facilities have not been given the attention they should receive. Heretofore, MECA has only designed and constructed shallow surface drains as counterparts to the field channels. They have often not been constructed properly and have not been provided with adequate gravity outlets. Second, in some parts of Zone 4A, the introduction of diversified crop production will require effective on-farm drainage to be successful. Other project components have been reviewed and MECA planning, design and cost estimating found to be essentially satisfactory, and included in the MDS Project. The development of irrigation on the floodplain of the Maduru Oya in Zone 4A will receive special attention. Frequent damage to crops and the irrigation system can be expected due to recurring flooding of this area.

2. Design Issues

a. The Revised Land Use Plan

The preparation of the original land use plan that led to the current structural plan for Zone 4A was made on the basis of a specific land use classification. This original land use classification was made with the intent of grouping soil types and mapping units from the medium intensity soil survey on the basis of their potential for growing two crops of paddy per annum. Because rice self sufficiency is about to be reached in Sri Lanka, MARD has a new emphasis on diversified cropping. Thus, the MARD project will require an entirely new look at the grouping of soil types and soil mapping units into land use classes.

The basic soils and topographic information is made available on maps with a scale of 1:5,000. The process of land use classification generally uses four factors in suggesting the optimum use of the land. These are 1) the productivity of the soil, 2) any major soil limitations or hazards that affect its productive use, 3) the slope and topography of the land, and 4) other overriding factors such as geologic nonconformities or factors due to the landscape position. The soil mapping units provide information on items 1) and 2) and sometimes on 4) and the topographic maps provide the items 3) and 4). In Zone 4A, all the information is available on one set of 34 maps with the soil mapping units placed on the topographic sheets of 1:5,000 scale and with a 1 meter contour interval.

The guidelines for the original land use classification gave instructions for the grouping of the soil types by general productivity category, hazards such as internal drainage class and erodibility, percentage slope, and rock outcrop and geologic landform. These instructions were based on the limited perspective of double cropped paddy. Hence all of the soils mapped with an impeded internal drainage capacity and with a slope less than two percent were lumped together as potential ricelands, with a map designation of paddy land. All other soil mapping units were apparently discarded into the category of Class 6 land, with the exception of 112 hectares of upland crop 1U and 2U categories which were below command. This Class 6 land, with some artificial drainage, can be made very productive for diversified cropping. In addition, land appropriate for diversified cropping might have been excluded from command by the application of a standard formula, which moves imperfectly drained soils with slopes greater than two percent into the Class 6 reject category. Some of these soils might be appropriate for irrigation, potentially increasing the hectareage under command in Zone 4A. Because of this limited original perspective and the new land uses sought under the MARD project, a revised land use plan is essential.

The basic information is available. When supplemented with some ground truth and additional physical measurements relating to the movement of the water through the soil profile and with a new set of guidelines for grouping the mapping units, a revised land use plan can be produced in approximately four months by a team consisting of:

- o A member of the Land Use Division of the Irrigation Department of the Ministry of Lands and Land Development, the Division responsible for the soil surveys and the original mapping from the topography and soil classification to the land use available for the structure plan.
- o A member from MECA with responsibilities for Zone 4A, to interpret the new land use plan and translate it into a revised structure plan.
- o A Land Use consultant who is a soil classification expert with a strong grounding in agronomy and crop production, specializing in determining appropriate utilization patterns from a combination of soils, drainage and topography.
- o An Irrigation and Drainage Consultant with a strong background in soils, who specializes in soil and water management field investigations, land use planning and the requirements for irrigation and drainage design.

The output of the reclassification should be an identification of those lands:

- o on which paddy is the only alternative cropping pattern in any season, lands located, we assume, in the lowest lying portion of the catena,
- o which could be used for diversified cropping during both Maha and Yala when provided with appropriate interceptor drains placed at the boundaries of the individual one hectare farm allotments,
- o which can be cropped for paddy in one season and with subsidiary crops in a second (or third), perhaps as indicated in System C with a dual classification, one for paddy and one for diversified crops.

The land use plan will allow placement of the interceptor drains proposed to be constructed by MECA for Zone 4A. These drains are to be placed on the exterior boundaries of allotments. If experience proves that drains are needed to grow diversified crops within a farmer's allotment, a special fund will provide the layout and connector structures to match

the farmer's labor in drainage construction. Drainage should be planned when it will potentially increase the capacity to move from paddy to diversified cropping, with a priority given to the middle to upper elevations in each catena.

It is also important to re-examine the land classifications above command. Some of these areas may be suited for commercial pasture, smallholder intensive rainfed agriculture, commercial tree crops or wood lots. A more detailed designation of the soil classification and the topography should lead to a better utilization plan.

The revised land use plan will have a major impact on the area to be irrigated, the appropriate cropping pattern and thus the stream of project benefits, particularly as it relates to the higher valued diversified cropping that is expected. The revised land use plan will also have a major impact on the designation of homestead sites, given the expansion of these units from 0.2 to 0.4 hectare. Also the delineation of lands for horticulture, forestry and pasture uses should be affected in a major way by the new land use plan. Thus development of a new structure plan and the detailed blocking out plan will be entirely dependent upon the availability of the new land use plan.

There are some construction activities that can be done while the new land use plan is being produced. The D canal locations are largely predetermined by the topography of the land and confined to the ridges. The D canals, as well as the roads, village tank rehabilitation and construction, and building construction might proceed while the revised land use plan is being prepared, but the information is critical to the successful implementation of settlement and the land use plan should proceed as the first priority of the MDS project.

b. The Tertiary Irrigation System

The tertiary irrigation system is made up of distributor canals (D canals), field channels (F channels), drainage canals and village tanks. The D canals carry water from the main or branch canals to each turnout which has been located to command a block of approximately 15 hectares. D Canals are constructed on a well compacted earthen embankment which serves for both the canal excavation and as base for the canal maintenance road. They are unlined and carry a flow of 2.0 to 0.1 cumecs (cubic meters per second). The D canal structures are of advanced design and constructed of reinforced concrete. Each turnout area is served by an F channel which is located so that it commands each one hectare farm as blocked

out in the turnout area. It is designed to carry 0.0283 cumec (one) on a rotational basis. The turnout areas are bounded on the downslope by drainage channels, either natural or constructed. A cart track is provided along each field channel to provide access to each farm. At the end of each field channel a tail fall is provided with a connection to the nearest drainage. Village tanks are almost always integrated as a temporary storage into the irrigation system, with irrigated land below their outlets.

Planning and layout of the tertiary system is carried out in two separate phases. The first step, which is performed in the MECA headquarters in Colombo, is the initial tentative blocking out of the turnout areas (approximately 15 hectares) on topographic maps with a scale of 1:5000 with a one meter contour interval. These areas are selected in accordance with planned land use and topographic conditions which allow the F channel to command the turnout area which is normally bounded by topographic lows and natural drainageways on the downslope boundary. This phase of the planning is not adequate to assure proper design and needs to be followed by a more detailed survey as discussed below.

The blocking out of the individual farmer allotments (1 hectare) should be carried out at the responsible MECA field office on maps with a 1:2000 scale. Normal procedure is for a new survey for these maps to be performed. In Zones 1 and 5, however, only one survey was completed and the 1:2000 scale was achieved by magnifying existing maps. As observed by the design team, contours remained at the one meter interval which is much too gross for detailed farm facility layout. Discrepancies were noted in the field with regard to improper location of farm inlets, uncommanded areas on the farm and errors in gradient of the F channel. Some of these were definitely the result of lack of detail on the blocking out maps. For Zone 4A, both surveys will be completed. The detailed survey will have elevation shots taken on lines with a 100 meter spacing and 20 meter intervals to produce a 1:2000 scale map with contours plotted to a 0.25 meter interval. This is needed on all slopes less than 4 percent to enable greater accuracy in the layout to the irrigation and drainage facilities. New land surveys will be carried out in a manner necessary to obtain this detail. This operation must precede the planning of the farming areas and will therefore need to be completed as early as possible.

c. The Drainage System

The drainage system recommended for the MDS Project includes an extended drainage system which provides for additional measures both above and below the conventionally planned drains at the downslope boundaries of the blocked out turnout areas. Provision for more adequate outlets from the turnout drains has included, as well as the additional on-farm drainage needed to support a diversified cropping system.

Emphasis has been placed on the proper construction of planned turnout drains in accordance with existing designs and actual catchment area. Some basic guidelines for implementing these drainage components are indicated as follows:

- (a) Design all turnout and improved outlet drains to carry the calculated drainage flow from its total actual catchment area.
- (b) Use a drainage coefficient of not less than seven litres per second per hectare to determine the capacity of the drains.
- (c) The depth of the drain used for the interception of subsurface flows should not be less than 90 centimeters.
- (d) Interceptor drains are to be located across the prevailing ground slope and with a spacing of not more than 100 meters.
- (e) The location of interceptor drains should be on the farm allotment boundaries in so far as possible.
- (f) Interceptor drains need to be supplied with a simple check structure for water table control in areas where paddy cultivation will be included in the crop rotation.

Improved outlet drainage is required to assure that the planned drainages of the tertiary irrigation system can function properly to the natural waterways without restriction. The first rule of drainage is always to provide an adequate outlet and measures have been included in the MDS scheme to satisfy this standard. Outlet channels will nearly always be located in existing and defined natural waterways. Only part of these natural channels will have the capacity to satisfy the drainage requirements without being enlarged. Channel reaches identified as not having adequate capacity or depth will be cleared of trees, brush and debris and excavated to a designed cross section in all areas with a catchment area of five square kilometers or less. In streams with larger catchments only the problem areas would be identified and treated where feasible to remove restrictions to drainage.

The cultivation of diversified crops in Zone 4A will require a crop root zone that is free of excess moisture. As many of the soils in the zone are either poorly or imperfectly drained, the need for on-farm drainage is indicated. Many of the soils are sandy and have good permeability but have an underlying impervious layer or bed rock which restricts

internal soil drainage and will require some form of relief to remove trapped water. The drainage requirements of these soils will also vary considerably between the Maha and Yala cropping seasons. A system of open farm interception drains will enable achievement of maximum flexibility for the production of diversified field crops.

To determine the drainage requirements of the soils in Zone 4A a field trial will be constructed in March and April 1988 and carried out (possibly in the 1988 Yala and 1988/89 Maha seasons in an already settled area). This field trial will include at least six turnout areas (approximately 90 hectares) and test the various types, spacings, configurations, and sizes of interception drains.

A six-step process is envisioned:

1. The site selection will be an important step, as the intensity and method combinations of the drainage trials must be done on representative soils, topography and landform conditions.
2. An intensive characterization of the soil water movement parameters at the site will be done prior to construction.
3. Construction of the combinations of types of drainage channels and intensity of channels on the six existing turnout areas will require several months for completion.
4. The intensive instrumentation of the site with flow measuring devices and shallow observation wells and piezometer for tracking the subsurface flow will require at least one month.
5. Observation of the six turnout areas will require at least two seasons, if the rainfall and hydrology are normal. Otherwise, additional seasons will be required to gather the data.
6. Analysis of the data and conclusion of the resultant drainage application will require an additional two months. In total, if the hydrology is normal, the drainage trial will require 18 months to complete and generate some initial answers. Provision to extend the trial for up to three years will be useful due to the dearth of quantified drainage experiments and information for practical application in Sri Lanka.

These trials should also include the testing of linings of D canals and F channels in areas of excessive percolation to determine the benefits of lining in reducing drainage requirements.

d. Land Clearing and On-farm Development

Land clearing and on-farm development are the initial steps necessary to prepare the land for cultivation by the settlers. Jungle clearing and rough levelling will be the responsibility of MECA. The balance of on-farm development from there onwards will come under the charge of MEA. Jungle clearing and rough levelling will be carried out under MECA supervision using competitive bidding and with awards to large contractors who specialize in this type of work. On-farm development includes initial tillage, bund marking and bund forming.

e. Agronomic Issues Related to Soil and Water Management

The agricultural use of the lands in 4A represents an irrigated agricultural system for which irrigation management has some precedents among the sandiest soils in System H. These soils have serious limitations both in terms of profile characteristics and landscape considerations. The soils are coarse textured and occur in sandy loam to sand categories with resultant low organic matter content and cation exchange capacity. These present severe limitations for fertility management generally requiring frequent small fertilizer doses.

The soils have a low moisture-holding capacity which represents an irrigation management problem requiring frequent small water applications when drained. The soils have a textural incongruity of a thin layer of increased clay content at depths of from 40 centimeters to 80 centimeters. This causes the soil to have internal drainage limitations. The drainage classification falls in the imperfectly drained to poorly drained categories. These lands are good for paddy in Maha, but will generally require artificial drainage for other field crops to be productive. Artificial drainage on the farm will require check gates to allow water retention for paddy and gravity flow for other field crop water management. This represents the requirement for sophisticated on-farm water management for successful diversified cropping in Zone 4A. It also requires the proper design and construction of systems that have these unique cropping conditions in alternative seasons (lowland conditions in Maha and upland conditions in Yala). It will be incumbent on MEA to develop and extend simple guidelines for farmers to operate these sophisticated systems. Strengthening MEA's capacity in this area will be a major output of the MARD project.

The landscape parameters of importance are the shallow soils and sloping lands. The shallow soils present problems of bedrock encounter in levelling and draining 1U and 2U soils with deep surface drains. The sloping lands provide problems

of potential erosion if banded field units higher on the slope are suddenly inundated with a heavy rain and bund breaching occurs in a chain reaction down the slope. The shallow soils also present a significant problem to economic land levelling within limited topsoil depth.

With assistance from the LUP team, MECA will design a blocking out system to avoid the shallow bedrock conditions identified in the new land capability classification and make field layouts that avoid excessive cut and fill volumes for land levelling. In the context of the MARD project, MEA will provide simple guidelines to farmers for soil and water management to 1) control run off, 2) avoid erosion, and 3) prevent field bund breaching and major disruptions to the productive capacity of the system.

f. Floodplain Improvements

Development of irrigation potential on the flood plains of large rivers and streams presents a number of serious problems which have not yet been fully addressed in Zone 4A. The Maduru Oya forms the southern boundary of Zone 4A and although floods will be partially controlled by the Maduru Oya Reservoir, frequent flooding will occur in the portions of irrigation management Blocks 404 and 405 which lie south of the main road and north of the river. (See map in Annex C.) Some flooding can also be expected following periods of heavy rainfall in limited areas adjacent to the Pakkilipatta Ela and the Bodigoda Ela which form the northern and northeastern boundaries of Zone 4A. But the major area of concern is the large area adjacent to the Maduru Oya. It has been estimated by Berger/IECO consultants studying this problem in System B that about one half of the projected 1800 hectares of irrigated land lying between the Maduru Oya and the main road, will be subject to frequent inundation. Crops grown during the Maha season could expect to receive flood damages in one year out of every two or three. Flood damage to the irrigation system would also occur.

Measures that can relieve flooding and expedite the removal of flood waters after the storm flows subside include:

- a) provision for a closure at the point where the Maduru Oya overflows into the area at Namalgama village and near Welikanda;
- b) construction of dikes or closures at other low points to prevent floods of a lesser magnitude from entering the area;
- c) clearance and enlargement of constricted sections to improve the hydraulic characteristics of the interior drainage channels to facilitate rapid removal of floodwaters; and

- d) removal or modification of anicuts or other obstructions that back-up and restrict the orderly drainage of the area and cause waterlogging.

With the above measures in place, serious consideration should be given to the establishment of an alternate cropping pattern which would allow two short duration annual crops to be grown outside of the flooding season. The method, as proposed in the Acres International Report, suggests that there be two 85 day paddy cultivation periods from February through April and from June through August leaving the land idle during the flood prone months of October through January. A method of floodproofing the irrigation channels worth considering is to use rock pitching on fill slopes, provision for overflow sections and other facilities that would limit the damage to the irrigation system caused by the passage of the flood waters.

As the alternate cropping pattern would span the planned timing of closures to the canal system in February and July-August, it would be necessary to find a way to supply irrigation water during these periods. There are a number of tanks which are a part of the irrigation system and they could be filled just prior to closure period to provide water to the portion of the flood plain where alternative cropping will be practiced during the closure period. As the capacity of the tanks is limited it may be found necessary to find a compromise to the closure period by either shortening its length or by finding a way to provide a second filling of the tanks.

Given these many variables additional study will be required to determine more precisely the costs and benefits of alternative solutions. For this reason, development of the floodplain areas should be delayed until the latter years of the project, and is scheduled for year four in the implementation plan.

g. Farm-to-Market Roads

The farm-to-market roads have been strategically located to serve the social and administrative infrastructure of Zone 4A. The road network is made up of market roads and hamlet roads which link the settlements together. Market roads are paved (metalled and tarred) with a carriage way of 5.5 meters (Type 1) for the more heavily travelled roads and 3.65 meters (Type 2) for the lesser travelled roads. Hamlet roads are not paved and are generally 3.5 meters wide. The total length of market roads is estimated at 64.5 km. and of hamlet roads at 207 km. MECA will be responsible for the design, construction and supervision of contracts for the construction of all roads. The planning and construction designs for roads are adequate but increased attention to quality control during construction will be required.

h. Social and Administrative Infrastructure

Building construction for social and administrative infrastructure and project staff will be carried out in all settlement areas. The types of buildings to be constructed include schools, health centers, post offices, co-operatives and all of the buildings for the administrative infrastructure. These buildings will be erected in 15 hamlets, two villages, two area centers, and one township. The hamlet at Rideetenna has been completed. Building designs are standardized and are satisfactory and in keeping with local custom and construction practices.

3. FAR-Related Issues

Cost estimates used in preparation of the MDS project were checked thoroughly with MECA engineers and updated in accordance with current structure plan and contract rates. The estimates were based on sound designs and valid specifications. Those rates and estimated quantities that did not agree with estimates made in the Project Implementation Report prepared by PMJ for Zone 4A were carefully reviewed to assure that reliable figures were used. Although many of the figures used in preparing the cost estimates were based on limited and it is felt that the information is reliable and that the cost information is representative of the actual costs that will be encountered over the life of the project. The quantities used for cost estimates were updated in accordance with the March 1987 revisions made to the Structure Plan provided to the mission by MECA.

The capabilities of implementing agencies were reviewed by the design team. MECA is responsible for most of the activities in the MDS project. Only the implementation of on-farm development is under the supervision of MEA. MECA has accumulated a great amount of experience in the implementation of numerous construction projects to date in the overall Mahaweli scheme and is a highly experienced engineering organization. MECA engineers are willing and capable technicians with the necessary expertise to successfully implement the MDS project. The MEA staff is also capable of carrying out their smaller portion of the project work.

Construction procedures and quality control will be of special significance in implementing a FAR system. In the Mahaweli project, development activities cover the full spectrum of large-to-small construction and contract procedures. Large contracts (over Rs 5 million) are often accomplished using heavy earthmoving and compaction equipment while most small contracts (less than Rs 5 million) are carried out using only simple manpower and hand operations. The use of

modern earthwork machines was witnessed by the team in the construction of the compacted earth pad for a D canal. This equipment was being used properly and performance was good. Also observed were small contractors using hand methods to perform the canal shaping operations on the compacted pad of a D canal. The use of the large contracts for major earthmoving and small contractors for the hand shaping of the canal is the best use of these two widely different construction procedures.

In the past, MECA has shown a decided preference for using small contractors to perform project work and it is a common practice to break down larger jobs into segments that can be accomplished at a cost of less than Rs 5 million. The main reason for this preference is that the contract is simpler to prepare and can be awarded in less time as administrative approval can be given at the regional level without involvement of the Mahaweli Ministry in Colombo.

However, the management of many small contracts places an extra burden on the staff of the implementing agency as direct supervision of the work must be overseen by the construction inspector. Adherence to the specifications and maintaining quality control are also more difficult when dealing with less experienced small contractors. It is recognized that the use of the small contractor is necessary for many of the tasks that must be performed on the MDS project but large formal contracts are easier to administer and usually result in better workmanship. In order to address these management and supervision problems, the use of small contractors will be minimized in the MLS Project, preferably to no more than 25 percent of the total project construction cost, and the practice of dividing larger jobs into smaller segments will be reduced.

B. ECONOMIC ANALYSIS

Summary and Conclusions

Both the MARD and MDS projects, considered together, are economically viable. Were it not possible to do both projects then the other project must be adjusted. Without MDS, MARD will not be able to assist new settlers in Zone 4A to develop its innovative schemes to help new settlers. Without MARD, MDS will deliver water but not the support services necessary to achieve a high level of economic benefits.

All the assumptions of the projects were subjected to sensitivity analysis. The benefits from the MARD project in this analysis are principally derived from high value crops such as potatoes and onions. These benefits depend on the ultimate development of an export market, the ability to provide adequate extension services to show people how to grow these crops and the ability of the research project element to develop alternative high value crops. Very little of the project's benefits come from its livestock, or non-farm work. Thus, these aspects can be de-emphasized, if necessary. The change in the size of the homestead is also not a critical variable. A change in the size of the homesteads is not essential to guarantee project viability although they do contribute to the high level of returns to the project.

Were there not any MARD project then MDS would obviously be revised to include some extension or market development activities. MDS without these activities would not make any economic sense as its IRR would be negative. However, MDS combined with MARD does make economic sense. This further emphasizes the need to ensure that MARD's assumptions are met.

A. Market Analysis

This analysis deals with the market for crops that can be grown in the irrigated areas of System B. The area was originally irrigated for paddy production. With the steady progress toward rice self-sufficiency in Sri Lanka, the returns to rice production have declined so that crop diversification in irrigated areas is needed to increase farmer income and maximize returns to land and water resources. This section will discuss the projected supply and demand situation for rice, the domestic market for other field crops, and export markets for other field crops. The unattractiveness of the world rice market for Sri Lanka has been well documented elsewhere and is therefore not discussed in this paper.**1/

1. Rice Supply and Demand**2/

The long-term growth rate for rice production (1965/66 to 1984/85) in Sri Lanka has been about 5 percent per year, consisting of 3.6 percent annual increases in yields and 1.4 percent annual increases in area cultivated. The increase in yields is due to improved varieties and a greater proportion of rice grown under irrigation. Between 1979 and 1983, production grew by 7.2 percent per year due mainly to improved varieties. The end result of these increases is that rice imports have dropped from one-third of consumption in the early 1970s to less than 10 percent in recent years.

A critical issue for Mahaweli is whether continued increases in production will result in a surplus of rice, falling prices and thus uneconomic returns to paddy farmers. If it is assumed that

i. demand for rice is 117 kg. per capita per year (based on an average minimum nutritional requirement of 105 kg. per capita in Sri Lanka and 10 percent wastage), and

ii. production will continue to increase as in the recent past, then self-sufficiency can be achieved by 1990 and there will be substantial surpluses by the year 2000.

This analysis assumes that there is reason to believe that Sri Lanka may be approaching a temporary plateau in yields. High yielding rice varieties have already been introduced throughout the country. When fully settled, Systems B and C will add about 38,000 hectares of land under major irrigation which amounts to a 10 percent increase for the country as a whole.**3/ Once these major infrastructure projects have been completed, production increases will come largely from increases in planted area and improvements in production, storage and handling practices. Thus it is assumed that increases in planted area, combined with development efforts related to improved irrigation infrastructure and agricultural supporting services will result in production increases of at least 2.6 percent per year until self-sufficiency is reached around 1990. Rice production will increase in line with population (2 percent per year) thereafter. Given the country's performance over the last 20 years, this is a conservative projection.

2. Domestic Demand for Other Field Crops

For Mahaweli, the main implication of growing rice self-sufficiency is that returns to rice production can be expected to fall from current levels as potential surplus production acts to reduce prices. This has already led to a refocus of extension and water management activities in System B from increased paddy production to crop diversification. For the small, intensively farmed plots that we are dealing with in this project the most likely alternatives to paddy production are the subsidiary field crops (SFCs). These include coarse grains (mainly maize and millet), pulses (green gram, black gram, and cowpeas), oilseeds (sesame, soybeans, and groundnuts), and condiments (chillies and onions). As noted in Annexe G, using presently available technologies, many of these crops can be more profitable than paddy. Tables 1 through 8 in the Annex G on "Costs and Returns of Crop Production" present possible returns to selected SFCs. The key issue is whether there are adequate markets (domestic and export) to assure that, as a group, these crops can become a reasonably profitable alternative to rice in the irrigated areas of System B. Table 5 presents the area and production of the major SFCs for the period 1983 - 1985. Except for sesame and chillies, all of the production was for local consumption.

TABLE 5

PRODUCTION OF SELECTED SUBSIDIARY FIELD CROPS
(thousands of hectares/thousands of metric tons)

Crop	1983		1984		1985	
	<u>Area</u>	<u>Prod.</u>	<u>Area</u>	<u>Prod.</u>	<u>Area</u>	<u>Prod.</u>
Coarse Grains:						
Maize	47.2	51.0	45.4	39.1	37.8	30.0
Millet (kurakkan)	19.9	11.7	6.9	7.1	N/A	N/A
Potatoes	6.6	82.5	7.9	98.4	8.4	105.1
Pulses:						
Cowpeas	45.1	31.4	31.3	22.4	24.3	18.8
Green gram	28.6	16.2	29.6	17.5	21.4	14.5
Black gram	7.5	13.0	33.4	5.4	12.5	8.4
Oilseeds:						
Groundnut	13.8	19.5	7.6	6.5	8.3	9.4
Sesame	31.6	20.0	4.9	2.5	14.3	8.2
Soybean	14.6	11.6	11.8	7.9	2.5	2.8
Condiments:						
Chillies	2.1	30.0	30.8	26.9	30.5	1.3
Red onions	11.8	139.9	8.3	39.6	5.9	53.9
TOTALS	<u>228.8</u>	<u>426.8</u>	<u>217.9</u>	<u>273.3</u>	<u>165.9</u>	<u>252.4</u>

Source: DOA statistics

In addition, the following quantities of SFCs were imported in 1985:

TABLE 6
IMPORTS OF SUBSIDIARY FIELD CROPS - 1985

	<u>Thousands of Metric Tons</u>	<u>Millions of Rupees</u>
Dried legumes	3,300	590
Bombay onions	61,600	354
Chillies	4,100	197
Garlic	3,100	31
Turmeric	5,700	13

Source: GSL Customs Data

The prospects for increased production of SFCs for domestic consumption are determined on the demand side by the present level of unmet demand and the growth rate in consumption, and on the supply side by the production potential of the country and comparative advantages of the growing conditions in System B. With respect to unmet demand, Sri Lanka is largely self-sufficient in SFCs, except for masoor dahl and Bombay onions. Imports account for a very small percentage of total consumption. In terms of future growth in demand, since SFCs are mostly staple foods in Sri Lanka, they are income inelastic and demand can be expected to grow in line with population, or by about 8,000 MT per year.

On the supply side, there does not seem to be any reason why domestic production will not be able to keep pace with demand. In 1985, there were over 165,000 hectares planted in SFCs; the largest area was maize with 37,800 hectares, chillies with 30,500 hectares and cowpeas with 24,300 hectares. Most of these crops grow best on well drained irrigated land, but also do well in imperfectly drained soils in the Yala season. Table 7 shows the impact of irrigation on yields.

Sri Lanka has about 84,000 hectares of well drained irrigated soils. The left bank of System B has almost no well drained soils but appears to have at least 11,000 hectares (one-half of total irrigable land) of imperfectly drained soils. There is plenty of land suitable for SFC production and, with demand growing by 8,000 MT per year, supply can be met through expansions in land area and yield. Over supply of the domestic market is a likely problem leading to returns to land and labor declining to levels more comparable to paddy. With production of SFCs averaging 1.5 MT per hectare, the left bank of System B's imperfectly drained soils could produce 16,500 MT per year. If 75 percent of irrigable land in Mahaweli were planted in SFCs in Yala, production could equal one third of all SFCs consumed in Sri Lanka. This would lead to market saturation and depressed prices.

TABLE 7
EFFECT OF IRRIGATION ON SFC YIELDS
(kilograms per hectare)

	<u>Rainfed</u>	<u>Irrigated</u>	<u>% Increase</u>
Chillies	400	1,000	150
Cowpeas	700	1,500	114
Black gram	800	1,500	88
Groundnuts	800	1,500	88
Green gram	600	1,000	67
Onions	7,000	10,000	43
Soybeans	1,500	2,000	33

Source: Ministry of Agriculture and Agroskills Limited, Subsidiary Crops Production and Processing Project, 1987

Research on the income prospects of SFC production, and specifically prospects in System B can be summarized as:

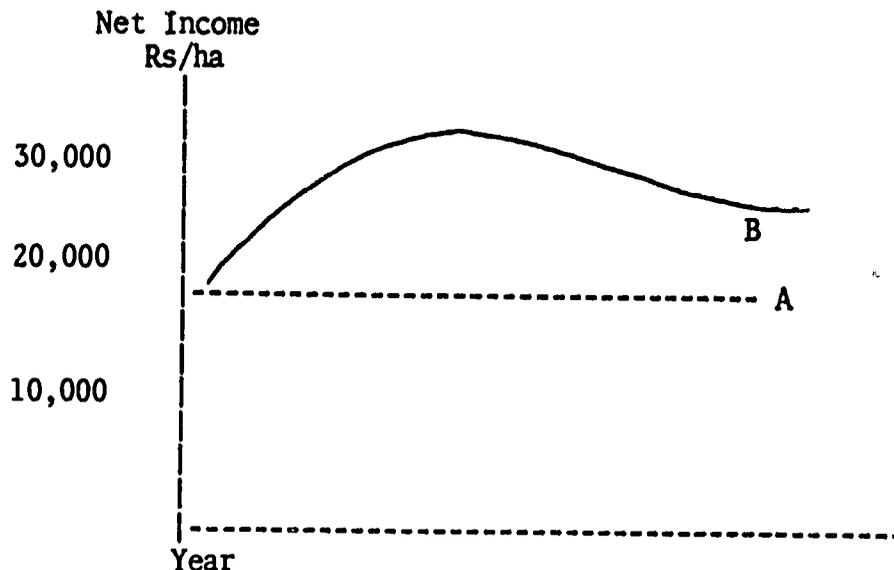
1. In the short-run incomes can be increased substantially by taking advantage of present high prices for selected crops.
2. The only possibility for significant import substitution seems to be Bombay onions. The lack of seeds reduces domestic production.
3. Efforts to introduce alternative crops will also yield longer term benefits because farmers will be more willing to shift in and out of paddy production in response to changing market conditions. This will tend to increase farmer incomes as they change their cropping patterns to take advantage of price fluctuation.

4. There is some scope for linking livestock and crop production in System B. This would involve growing irrigated fodder for dairy production and maize for egg production. Market studies have shown there is unmet demand both within Mahaweli and nationally for fresh dairy products. These are not in direct competition with imports. Since diversifying into these products will require organizing production, processing and marketing, increased incomes would be available to the regions that are first to enter the market.
5. Farmer incomes could be increased through improvements related to post-harvest handling, including storage, packaging, processing, and transportation. Interventions in these areas are likely to be necessary merely to keep System B competitive in domestic markets.

Figure 1 illustrates the impact of crop diversification for the domestic market on farmer incomes in System B. Curve A represents the net income from two paddy crops on one hectare of irrigated land it slopes down slightly because of assumed reductions in the price of paddy as self-sufficiency is reached. Curve B represents the increased income from shifting into SFCs.

FIGURE 1

IMPACT OF CROP DIVERSIFICATION FOR DOMESTIC MARKETS ON FARMER INCOME



During the initial years, income for the Yala season can be increased substantially for those progressive farmers who are willing and able to make the farm management changes necessary to grow crops other than paddy. In time, the much higher returns from these crops induce other farmers to produce them as well, and prices will gradually drop. However, incomes will remain higher than for the two paddy system,

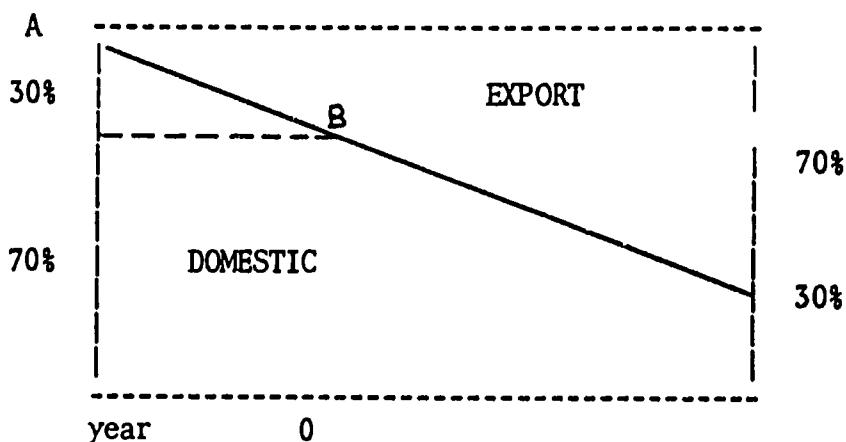
because farmers will now be more responsive to market conditions, and will have gotten into dairy production and other income increasing activities, including, for example a third crop between the Maha and Yala seasons.

3. Exports of Subsidiary Field Crops

The obvious critical constraint to increasing farmer incomes and increasing returns to the investment in the System B irrigation infrastructure through crop diversification is limited domestic demand. In the final analysis, long-term major increases in the value of production and farmer incomes can occur only if System B can produce for the export market. Figure 2 represents what has to happen for farmer incomes to increase significantly above the income obtainable from two paddy crops.

FIGURE 2

GOAL OF AN EXPORT ORIENTED CROP DIVERSIFICATION STRATEGY FOR SYSTEM B



Point A represents the existing situation, where there is virtually no production of SFCs for export. Without an export push, production for export might be expected to reach a maximum of five percent of SFC production. This would keep farmer incomes at the levels reflected in Figure 1. Point B represents the goal of the MARD export oriented crop diversification strategy. At the end of a sustained export push over a sufficiently long period, say 20 years, only 30 percent of SFC production would be for the domestic market; the balance would be for exports.

The MARD strategy directly addresses the problem of limited demand. If System B can become a competitive producer of export crops, production increases are less likely to lead to the vicious cycle of market saturation, lower producer prices, and lower incomes. However, current static analysis indicates that Sri Lanka is not competitive in the international market for its SFCs. This is not surprising since Sri Lanka is not exporting SFCs. It is usually the case that prices of internationally marketed items are lower than domestic prices. People

seek to sell internationally not because the prices are higher than in the domestic market, but because they are able to sell greater quantities. The smaller profit margin per item results in a larger total profit because of the quantities involved. To determine what products are likely to have a chance of becoming internationally competitive (have a comparative advantage) requires determining which products would still be profitable if prices fell to the levels necessary to be traded internationally, yields could be increased and/or delivery costs reduced. At present, other countries are able to provide higher quality SFCs at a lower cost than Sri Lanka.

Figure 2 also reflects a key MARD objective of producing 30 percent of SFCs for export markets by the end of the project (point B). Another MARD objective is that 15 percent of the irrigated area in Maha and 85 percent in Yala will be producing SFCs. This amounts to a total of 23,610 hectares of irrigable land used for SF C production. If 30 percent of the SFCs produced are for export, and yields average 1.5 MT per hectare, total production for export will be about 11,000 MT by 1996. The Agricultural Support Services section of the Technical Analysis above describes the marketing measures that are proposed under MARD to help achieve these objectives.

As can be seen from Table 8, compared to the exports of SFCs in recent years, this is a very ambitious strategy. At present, however, it appears that a strong export oriented program is the only way to achieve sustained increases in farmer incomes and an optimal return to the land and water resources of System B. The assumption is that the investment in irrigation has created an agricultural resource base that can produce competitively for the world market. It is proposed that System B seriously test this hypothesis with a view to applying the lessons learned to the rest of the Mahaweli Scheme.

At present, SFCs account for a very small percentage of Sri Lanka's agricultural exports. Green chillies are exported to the Middle East; black gram to the Far East; and sesame to Asian and Middle Eastern markets. Small quantities of castor seed and ginger are exported.

TABLE 8
EXPORTS OF SFCs IN 1985

	<u>Metric Tons</u>	<u>Value Millions of Rupees</u>
Sesame	2,340	31.4
Black gram	590	6.0
Castor seed	1,818	1.6
Ginger	193	2.4

The major constraints to increasing exports are:

1. Low productivity. Although Sri Lanka seems to be competitive in a few crops, low productivity in most SFCs is the most basic constraint in the long run and the most difficult to solve. It is generally recognized that Sri Lanka's successful effort to achieve rice self-sufficiency caused a relative neglect of other crops. It will now take a major research and extension effort to introduce the yield increasing technologies that will make Sri Lanka internationally competitive in SFCs.
2. Wrong varieties. Although Sri Lanka appears to produce sesame and groundnuts at below the world price, it produces the wrong varieties. World demand is for three seeded groundnut kernels while Sri Lanka produces kernels that have one or two seeds. Sesame is produced at very low cost but world demand is for white sesame and to a lesser extent brown sesame. Because of cross pollination, Sri Lanka produces a mixture of the two which has a limited export market.
3. Low quality. This applies to all exports of SFCs, and would seem to be the easiest to solve. The problems are poor grading, and a high percentage of extraneous matter, sometimes introduced deliberately by traders.

There is very limited exports of SFCs in System B. However, there is some indication that Sri Lanka can produce many of these crops competitively. The problems of marketing, especially production of the right varieties, assurance of steady supply, and quality control must also be addressed. The magnitude of the difficulties of entering the international market means that good information on marketing possibilities must play a major role in the attempt to improve incomes and crop diversification in System B.

B. Farm Level Economic Analysis

The analysis here deals with five topics:

- o Basic crop budgets which contain the assumptions concerning costs and returns to System B farmers growing specific SFCs;
- o Three assumed baseline models of annual farm cropping patterns which are based on the crop budgets and which include the use of land in Maha and Yala seasons and the ways in which this may change as a result of the impact of MARD project actions. These three cropping patterns form the basis of the Internal Rate of Return calculations;
- o Other agronomic possibilities which can contribute additional farm income from the use of the one hectare irrigated plot (such as triple cropping and intercropping);

- o An analysis of homestead production, including cropping patterns, budgets for selected farm households to engage in livestock (dairy and poultry) production in addition to limited production of commercial crops, and an economic rationale for increasing the homestead size to one acre from the current half acre; and
- o A brief discussion of non-farm activities in System B which can improve basic farm household income and welfare.

1. Basic Crop Budgets

Existing information on the costs and returns to the production of paddy (in both the Maha and Yala seasons) and to the production of a variety of other field crops, which are potential candidates for inclusion in the widespread crop diversification assumed in the MARD project, are presented in Tables 1 through 8 of Annex I, Economic Analysis Backup.

The data for these tables have come from three basic sources: (a) the annual cost of production studies and crop cutting trials conducted by the regional personnel of the Department of Agriculture, (b) on-farm data collection in Mahaweli System H conducted by an IMMI farming systems team, and (c) irrigated crop production recommendations from the Department of Agriculture's MI Research Station.**4/

The data have been used to produce estimates concerning yields, prices and costs of production which form the basis of our overall rate of return calculations contained in the next section of the economic analysis. The estimates used are in Annex G, tables 1-8.

It should be noted that there is a wide divergence in some of the yield figures. For example the DOA crop cutting yields for System B paddy average around 5 MT per hectare in Maha and 4.5 MT per hectare in Yala,. Lower figures come from other sources. This largely reflects problems other areas have had with water distribution, a problem which has not yet surfaced in Zones 1 and 5 because such a small proportion of System B has been settled. With increased settlement some of the water distribution problems will begin to exist and thus this analysis used the lower figures for current production: 4.5 MT per hectare in Maha and 3.5 MT per hectare in Yala season.

The "bottom line" in these crop budgets is net returns, in rupees, per hectare. Based on the data available, net returns are higher for some of the other field crops than for paddy, assuming that the yields, costs and prices can be obtained for the entire crop and that the farmer is not otherwise constrained by shortage of operating cash or labor, etc. When more complete and accurate information becomes available a linear programming model can be constructed to determine optimal returns. The data currently available have not been optimized but provide information on the diversity of production and a possible scenario.

The initial net returns and assumed increases over the Life of Project (LOP) are arrayed in Table 9 below. The initial year figures refer to the first year in which the farmer chooses to grow the crop as a result of the adaptive research and extension program. The current situation is used for crops already under cultivation. This means that the assumed LOP yields reflect what can be achieved with known technologies rather than what is currently being obtained on farmers fields.

TABLE 9

ASSUMED NET RETURNS PER HECTARE, FOR SELECTED CROPS IN SYSTEM B
(in Rupees per hectare)

<u>Crop</u>	<u>Initial</u>	<u>LOP</u>	<u>Crop</u>	<u>Initial</u>	<u>LOP</u>
Maha Paddy	10,175	13,000	Yala Paddy	7,745	9,950
Chillies	13,650	39,200	Mung Beans	4,600	13,650
Black Gram	2,900	9,610	Cowpeas	5,571	9,600
Crops Not Currently Grown					
Groundnuts	9,514	14,800	Potatoes	55,714	80,250
Soy	6,571	9,200	Red Onions	68,414	111,200
Bombay Onions	99,711	126,000	Maize	3,390	7,300
Castor Bean	7,200	10,200	Sesame	8,250	9,000

Source: Annex G, Tables 1-8

The projections assume constant prices except for paddy which is assumed to have falling real prices as national self-sufficiency is passed and increasing prices for chillies, mung beans, black gram and maize which, if they are produced in large quantities, will have shifted to varieties and quality standards that are more highly valued in export markets. The importance of these assumptions were tested in the final internal rate of return analysis.

It must be emphasized that high per hectare returns for crops such as onions and potatoes do not imply that the average farmer could expect to grow and successfully market an entire hectare of this crop. The costs of production are also considerable, particularly for seeds and hired labor. These crops also are highly perishable and market outlets are not currently available. Thus large farms could not yet be supported. We assume that farmers will be constrained by these factors and will plant limited amounts of these crops until reliable markets can be assured.

In general, land preparation and labor are two of the most critical cost of production variables, and they are two which tend to vary greatly across regions and farm types in the available data.

In land preparation, there are major differences in the amounts reported for this activity by four wheel (4WD) and two wheel drive (2WD) tractors and by buffalo or oxen. In the Mahaweli, much initial land preparation is done by MEA with 4WD tractors, followed by large use of 2WD tractors, particularly until the farm increases the numbers of buffalo and oxen. It is observed that, even where tractors are more commonly used for initial plowing, animals are often used for harrowing or final leveling work. In established farming areas both tractor and animal hire services are available for hire as needed.**5/

The amount of hired and family labor used varies even more greatly among crops and between DOA regions. Hired labor will probably be fairly scarce in System B in the initial years of settlement as there were few people living in the area prior to current activity. This will further contribute to higher costs of production and constrain planting decisions until these cash costs can be met.

2. Farm Cropping Models

The major components of the MARD project _ improved agricultural technology and dissemination, better supporting services in marketing and credit, and enhanced water management through farmer organization and participation _ will lead to increases in crop yields, more effective markets for output, and a greater diversification into non-paddy crops over the life of the project. These impacts are captured in the representative whole farm budgets we assume with and without the project. The basic land use assumptions employed in the MARD project are summarized in Table 10.

In this table it is assumed that the farmer has one hectare which is fully cultivated in the Maha and the Yala season. Thus there are a total of two hectares available for cultivation per year. This table does not indicate which crops, other than paddy, are grown in which season.

A. In the absence of the project

- 1) Initial Assumption: Two paddy crops with yields at 4.5 MT per hectare in Maha and 3.5 MT per hectare in Yala
- 2) Over LOP: 70 percent of farmers continue with a two paddy crops but yields increase to 5.0MT per hectare in Maha and 4.0MT per hectare in Yala.

30 percent of farmers continue with a Maha paddy crop (same yields as above) but 30 percent of the hectare in the Yala season is planted with mung beans, black gram, chilies and cowpeas.

B. Because of the project

- 1) Initial: Same as Above.

TABLE 10

AMOUNT OF HECTARES PLANTED WITH EACH CROP
WITH AND WITHOUT THE INTERVENTION OF THE PROJECT
(assumes two crops per year)

CROP		YEARS							
		1	2	3	4	5	6	7	8-30
Maha Paddy	w/o	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	with	1.00	1.00	0.95	0.95	0.90	0.90	0.85	0.85
Yala Paddy	w/o	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70
	with	0.85	0.75	0.65	0.55	0.45	0.35	0.25	0.15
Chilli	w/o	0.00	0.00	0.05	0.10	0.15	0.05	0.05	0.05
	with	0.05	0.10	0.10	0.05	0.05	0.05	0.05	0.05
Mung Bean	w/o	0.00	0.00	0.00	0.00	0.00	0.05	0.10	0.10
	with	0.05	0.05	0.10	0.10	0.10	0.10	0.10	0.10
Black Gram	w/o	0.00	0.00	0.00	0.00	0.00	0.05	0.10	0.10
	with	0.05	0.05	0.05	0.10	0.10	0.10	0.10	0.10
Cow Pea	w/o	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05
	with	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Crops Only with Project									
Groundnuts		0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05
Potatoes		0.00	0.00	0.00	0.00	0.05	0.10	0.15	0.20
Soybean		0.00	0.00	0.00	0.05	0.05	0.10	0.15	0.20
Red Onions		0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05
Bombay Onions		0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05
Maize		0.00	0.00	0.00	0.05	0.05	0.05	0.05	0.05
Castor Beans		0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05
Sesame		0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05
Total ha.	w/o	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	with	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

- 2) Over LOP: 15 percent of farmers, due to allocation of land which can only be used to produce paddy, continue a paddy/paddy rotation but receive higher incomes due to better varieties, cultural practices, and post-harvest handling. Paddy yields are increased by 20 percent to a Maha paddy yield of 6.0MT per hectare and a Yala yield of 4.8MT per hectare.

70 percent of farmers move to a paddy/SFC rotation, but with substantially higher yields and effective market prices due to market development work.

15 percent of farmers, due to having what turn out to be "better drained" soils and being willing to experiment more, abandon rice completely, even in Maha, due to higher income opportunities from other crops.

3. Additional Agronomic Possibilities

There are quite a number of changes in agronomic practices which hold out the potential of substantially adding to the income possibilities derived from the improvements in the basic cropping production/marketing system assumed above.

By their nature, many of these changes are difficult to incorporate in the basic models, but are receiving major emphasis in on-station research and applied farm work elsewhere in Asia.

- o Triple Cropping: By adjusting the amount of water issued and varieties of crops employed, it is possible for part of System B's Left Bank to engage in triple cropping. Recommended rotations have been developed by the MI Station and need to be tried on a pilot basis in farmers' fields in Zones 1 and 5.
- o Intercropping: A variety of crops and intercropping techniques merit further on-station and on-farm experimentation. However, since most land will remain in a rotation with paddy, the use of more permanent alley cropping methods which could be used on expanded homesteads is limited.
- o Alternative Irrigation Methods: Experimentation may be carried out on semi-permanent mounding methods (such as the Sorjan technique) which allow alternating strips of paddy and SFC production. In addition, some experimentation on supplemental irrigation for land above the irrigation channels merits applied work.

4. Homestead Production

Substantial land area within Mahaweli must be devoted to settler homesteads and total returns will be maximized only when that land is used productively.

The project's assumptions are:

- o The homestead size will be increased to one acre in Zone 4A.
- o Thirty-five percent of homesteads benefitting from the project in Zone 4A and 25 percent of the homesteads elsewhere in System B will achieve substantial commercial production on the homestead by the end of project valued at Rs.1,000 per homestead.
- o Ten percent of the homesteads throughout System B that benefit from the project will also develop a larger, more economically viable dairy with at least five milking cows or a poultry operation. This will yield them an income of Rs.10,000.
- o All households will receive some benefit from crop demonstrations conducted under project auspices through limited increases in basic yields.

It is difficult to be too precise about "homestead economics" at this point in time because (a) there are no reliable data concerning current Mahaweli homestead production patterns and income, and (b) there are a number of promising homestead crop/livestock production plans which need "farmer-testing" as part of the agricultural technology component of MARD. In the next section, illustrative homestead income figures are extracted from the more detailed presentation of hypothetical homestead plans in Annex G, tables 18-21.

a. Economic Rationale for One Acre Homestead

Over time in Sri Lanka, irrigated settlement projects have experimented with farmer homestead lot sizes which have varied from a half an acre to several acres in size. The Mahaweli Authority has generally used a one half acre size in settlement of Systems. AID has reached tentative agreement with MASL to increase the homestead size to one acre in the settlement of Zone 4A to contribute to achieving the strategy of higher farm income through diversification.

The basic rationale for doubling the homestead size is that the extra half acre, put under intensive small farmer production and management, will produce more than that land can produce under either a) some form of communal management for forestry or grazing, or b) large holder, commercial dry land field crop production using hired labor. In the latter case, one of the main reasons for increased production is that the improved, one acre homestead is assumed to have, over time, its own cement-lined dug well which will be used for intensive crop and livestock watering in addition to providing for the farm family's water use requirements. These assumptions will be tested during the project and modification of the practices supported by the project may have to be made.

In addition, as the plans in Annex I indicate, when the size of the homestead is doubled, the area available for intensive crop production is tripled, since the family house, courtyard, outbuildings, are assumed to take up about one quarter of an acre no matter how big the overall homestead lot.

Using the homestead budgets in Annex I as a guide we may conservatively assume that a quarter acre would generate at least Rs.1,000 of net income for the farm family using only moderately intensive production techniques.**6/ A farmer, given access to another adjacent one half acre could therefore be assumed to net at least Rs.2,000 on that additional land. In terms of incremental benefits, the alternative uses of the land can be assumed to be either communal lands or commercial farms. In the former case, the value added per hectare would be only a fraction of what could be obtained from intensive homestead farming. The design team was unable to obtain returns per hectare from commercial farms but it is expected that the homestead will farm the land more intensively and therefore generate more income per hectare than a commercial farm would.

Making this argument does not imply that MARD assumes that there will be no commercial production in zone 4A or that such activities are not economically beneficial. To the contrary, we assume that there will be a higher than average amount of commercial production since (a) there will be substantial land left in 4A once the farmer settlers have been given one acre for their homesteads, and (b) we assume that the "nucleus estate" approach to obtaining commercial quantities of a crop through small farmers will produce a higher rate of overall return for both the farmer and the nucleus estate operator/marketer.

If the net social economic returns to commercial production is higher than the returns to homestead farming, then the project will seek to support the development of large-scale commercial farming. In that case the economic returns would be greater than the Rs.1,000 per 0.25 acre and the economic viability of the project will also be greater.

b. The Economics of Small Scale, Non-Marginal Livestock Production

Livestock and its products are an important part of most farming systems around the world. The integration of crop and livestock production can change the economics of each enterprise area. In Sri Lanka at this time two of the most promising areas to be considered for support in an effort to strengthen the homestead budget are dairy and poultry production.

The dairy sector in Sri Lanka is a "hot potato" as it is in many countries around the world. This is due to the interaction of the underlying economics of basic milk production and processing and various aspects of national economic policy, particularly those having to do with subsidies, import restrictions and donated surplus milk from developed countries which can be sold with a net profit for the government.

Sri Lanka is about 25 percent self sufficient in meeting its aggregate consumption requirements of milk and milk products although the amount of milk produced in the country and the amount consumed in local neighborhood uses is not known with any precision. It is GSL policy to try to promote a gradual increase in the degree of self-sufficiency; how to accomplish this objective is subject to substantial debate within both GSL and donor circles at the moment. **7/

Regardless of how this policy debate is resolved, cattle have a vital role in the overall development of Mahaweli, from the point of view of milk production, animal draft power, and synergistic integration of crop and livestock production. Mahaweli has had draft animal and dairy development programs in both Systems H and C.

The concept which has emerged from these efforts is that of a dual purpose, improved breed animal which can be used profitably for both draft and milk purposes. This is a complex strategy which demands considerable time for implementation. From limited observations in the field the design team was able to draw preliminary conclusions about how well the existing programs have done so far.

First, most users are primarily interested in the draft aspect of the program, both on the owner's land and in custom use. This is reflected in the situation in System C where the average owner of improved dual purpose animals has two bulls and one milking cow. The cows are generally producing milk at far below their genetic capacity; usually only 1.5 to 2 liters of milk a day during lactations (which are also shorter than they ought to be). At an average purchase price of Rs.4. per liter, this activity is quite marginal. MARD has the opportunity to be involved in the improvement of a non-marginal approach to homestead livestock development for dairy and draft power.

In this approach, a farm would gradually acquire a larger herd of milking cows (four or five) and would have enough incentive and support to follow readily available extension programs for getting more income from this activity. Some of the details of this proposal are contained in Part C of Economic Annex I. In it a five cow herd could be reasonably expected to produce net earnings of approximately Rs.10,000 in extra milk income alone (not counting the value of manure produced or the proceeds from the sale of surplus or unproductive animals). This type of income is clearly based on many assumptions and on the presence of a supporting infrastructure necessary to produce improved stock, breeding the milking herd, assuring animal health, and assisting in marketing meat produced for commercial sale. Much of this would presumably be provided by the large MASL/DAP livestock farm in System B. Because of the difficulties the project assumes that only 10 percent of the farmers benefitting from the project will engage in commercial livestock development.

Another important aspect associated with more intensive livestock production is the opportunity it provides to encourage the production and marketing of various feed and forage crops as part of the crop diversification effort. One rule of thumb which we were not able to verify, is that a good stand of forage, available for eight cuttings a

year should produce approximately twice the value of the paddy which can be grown on the same land. This can be complemented by the simple formulation of local feed rations.**8/

5. Other Economically Valuable Activities

The expansion of farming activities and the support the project will give for limited processing of these commodities plus its support for the development of non-farm commercial activities will further boost income of settler farm families. Some of these activities include: benefits derived from wood that is cut from communal woodlots, occasional labor from working on commercial farms in the area or at agricultural processing plants and other non-farm commercial developments in the area. The farm family will only engage in these activities to the extent that they provide remuneration in excess of the benefits obtainable from on-farm enterprises. We assume that one-third of the farm families are able to find off farm employment for the equivalent of 125 days at Rs.30 per day. This is equivalent to one-half the families finding other income for 83 days because of greater overall development within System B attributable to the project's non-farm or livestock activities.

C. Internal Rate of Return

1. Summary

In completing the internal rate of return analysis we have constructed a composite farm which is used to estimate farm incomes because of the project's interventions and what would likely be the case were there no project. Because of the close interconnection of the MARD and MDS projects the assumptions of the MDS project are also given. The detailed sheets for the projects are in Annex G, tables 9-17.

All the analysis is in real terms, that is, the effect of inflation has been removed. USAID, GSL and project participant costs have had their inflationary component removed, however, estimated contingency spending was included. Because of price and market distortions some adjustments in prices is justified. Rather than incorporate these into the analysis directly we looked at them from the standpoint of a sensitivity test. That is, we assessed the impact of different values for the exchange rate and for costs of production (higher costs were subsidies properly accounted for, and lower costs were the true scarcity value of hired labor taking into account).

2. Assumptions

GSL costs for the projects are divided into direct costs and water charges. The direct costs are derived from the project budgets. GSL support for project activities is assumed to continue at the same level as during the last years of the project, except for FSE personnel whose support was steadily dropping. This is assumed to continue to decline over an additional eight years. The water charges for MARD during the life of the project are the line items Operations and Maintenance. After the end of the project water charges are computed at Rs.1,200 per farmer in the project areas. It does not matter for the internal rate of return

analysis whether this is paid by the farmer, as the project feels is best, or paid by the government. Real economic resources are used in either case. The sensitivity of the project to changes in the cost of providing water is analyzed later in this section.

For the prices of the SFCs produced we used effective real prices in that they represent improvements in marketing since the farmer can sell his whole crop at that level. Not all the SFCs analyzed by the project are included in the Annex tables as some were unlikely to figure in a solution because of low net returns. We assumed that prices for some SFCs will decline in real terms over time consistent with the market development assumptions discussed earlier. However, since farmers will have a wider range of crops to choose from and an expansion of export markets, they will be able to shift to new crop combinations which maintain real price parity. For these reasons, all prices have been included in the analysis in constant terms.

The benefits of the MARD project are (1) the improvement in farm income, (2) the expansion in the size of the acreage planted by the homestead, (3) the improvement in livestock production, (4) the improvement in non-farm income possibilities.

In Zones 1,2,3 and 5 only 50% of the farmers are benefitted from the project. In Zone 4A 70 percent of the farmers are benefitted. The other farmers are not substantially effected by the project.

(1) For those people effected by the project the improvement in farm income is the difference between what would be household income were there no project and farm income with the project. It was assumed that were there no project that 30 percent of the farmers would be adopting new farming techniques anyway. With the project 15 percent of the farmers do not change their production methods, 70 percent adopt the basic package of diversification into SFCs and 15 percent decide to abandon paddy production entirely. Each of these assumptions was subjected to sensitivity analysis to determine whether the proportions were critical to project success.

The MDS project has as an additional benefit that the people in Zone 4A were moved from somewhere else. It is assumed that their incomes are 25 percent higher in the new area than in the old area. That is, the people resettled into the Mahaweli irrigation system have an immediate 25 percent improvement in their income.

(2) The expansion in the acreage of the homestead results in 35 percent of the benefitting farm families in Zone 4A (25 percent in the other zones) increasing their incomes by Rs.1,000.

(3) Ten percent of the farmers benefitting from the project are able to engage in commercial livestock/poultry development and increase their incomes by Rs.10,000.

(4) One-third of the farmers in the project area are able to increase their incomes by Rs.3,750 because of off-farm and non-farm activities.

All the benefits from the project have been phased in because the project will not be able to help all the potential beneficiaries the first year. It is assumed that 20 percent of the target population**9/ will receive all the benefits the first year (or alternatively all the population receive only 20 percent of the benefits the first year), with the following years being 30 percent, 40 percent, 50 percent, 70 percent, 80 percent, 90 percent and in the eighth year all of the target population receive the benefits.

Where price or yield changes are assumed over the life of project these are phased in at a constant percentage change per year.

3. Sensitivity Analysis

Based on the assumptions given previously, the real internal rate of return for the two projects combined is 16.7 percent as shown in Table 11. Project success rests on its ability to deliver improved crop packages, and most specifically on the benefits estimated to result from growing potatoes and onions. Many of these benefits assume the ability to export the crops. If the project is not able to assist in improving exports of these crops then their prices must be less than forecast. If these benefits do not exist then the projects would be, at best, marginally viable from a economic viewpoint. Very close attention must be paid during implementation to the ability of the project to meet its assumptions on returns per hectare from a diversified crop package emphasizing SFCs.

Real IRRs are interpreted slightly differently from nominal ones. The difference between the two is the effect of inflation. Barring unusual assumptions the real IRR can be increased by the assumed inflation rate to determine the nominal IRR. Usually the minimum real IRR which is acceptable in USAID projects is 3 percent and for these we usually want there to be substantial social benefits which, if they were evaluated would result in a higher real IRR. An inflation rate of 7 percent means that the minimum acceptable nominal IRR is 10 percent. In this analysis we shall only talk about real IRRs, and thus the minimum acceptable level is 3 percent.

Overall if yields or prices of the outputs increase by 10 percent the IRR increases to 18.4 percent, if costs increase by 10 percent the IRR falls to 16.0 percent. If yields and prices decrease by 10 percent and costs increase by 10 percent then the IRR falls to 11.9 percent. Were the changes 20 percent then the IRR would fall to 7.2 percent. The overall price, cost and yield assumptions will not result in a non-economic result over a wide range of possible values. If we assume that the Sri Lankan rupee is 20 percent overvalued, that is, its market rate ought to be Rs.35=US\$1.00, then the IRR would fall to 14.6 percent. Were we to evaluate the IRR over a twenty year time horizon and not a thirty year horizon the IRR would only fall to 14.9 percent.

TABLE 11

Internal Rate of Return
all figures in U.S. dollars

year	Benefits			MARD costs		water charges	MDS project costs		Net cashflow
	MARD 1,2,3,5	MARD 4A	MDS 4A	USAID	GSL		USAID	GSL	
1	85,022	0	0	2,393,725	242,000	1,789,474	2,238,500	2,418,900	-8,997,577
2	152,885	0	0	2,513,842	341,000	2,000,000	4,576,000	5,823,400	-15,101,357
3	453,358	58,517	353,724	2,750,670	438,900	2,515,838	3,976,500	5,023,700	-15,840,009
4	662,149	114,375	507,217	2,856,210	443,300	2,820,237	1,261,700	1,523,500	-7,621,205
5	1,893,928	344,882	594,260	2,552,265	493,900	3,130,559	207,900	173,800	-3,725,354
6	3,817,915	845,573	779,535	575,440	240,900	3,307,935			1,318,740
7	5,930,256	1,821,977	983,736	499,323	185,900	3,354,218			4,638,539
8	10,894,170	2,986,702	1,007,345	460,526	176,000	3,359,771			10,891,921
9	11,155,630	3,440,681	1,031,522		185,000	1,237,631			14,205,202
10	11,423,365	3,914,730	1,056,278		181,000	1,267,334			14,946,037
11	11,697,526	4,008,684	1,081,629		176,000	1,297,750			15,314,088
12	11,978,267	4,104,892	1,107,588		171,000	1,328,896			15,690,850
13	12,265,745	4,203,410	1,134,170		166,000	1,360,790			16,075,535
14	12,560,123	4,304,291	1,161,390		161,000	1,393,449			16,471,356
15	12,961,566	4,407,594	1,189,264		156,000	1,426,892			16,875,532
16	13,170,243	4,513,377	1,217,806		151,000	1,461,137			17,289,289
17	13,486,329	4,621,698	1,247,033		151,000	1,496,204			17,707,656
18	13,810,001	4,732,619	1,276,962		151,000	1,532,113			18,126,468
19	14,141,441	4,846,201	1,307,609		151,000	1,568,884			18,575,368
20	14,480,836	4,962,510	1,338,992		151,000	1,606,537			19,024,601
21	14,828,376	5,081,610	1,371,128		151,000	1,645,094			19,485,020
22	15,184,257	5,203,569	1,404,800		151,000	1,684,576			19,956,284
23	15,548,679	5,328,455	1,437,731		151,000	1,725,006			20,438,859
24	15,921,847	5,456,338	1,472,237		151,000	1,766,406			20,933,016
25	16,303,972	5,587,290	1,507,571		151,000	1,808,800			21,439,032
26	16,695,267	5,721,395	1,543,752		151,000	1,852,211			21,957,193
27	17,095,953	5,858,698	1,580,802		151,000	1,896,664			22,487,789
28	17,506,256	5,999,307	1,618,742		151,000	1,942,184			23,031,120
29	17,926,406	6,143,290	1,657,592		151,000	1,988,797			23,587,491
30	18,356,640	6,290,729	1,697,374		151,000	2,036,528			24,157,215
Internal rate of return =									16.7%

The next part of the analysis was to determine which were the critical assumptions made by the project. The first one we looked at were the viability of certain crops. That is, what would be the effect of a total failure in some of the SFCs proposed by the project. The only crops whose failure is significant are potatoes or onions. If the benefits to potatoes do not materialize then the IRR is nearly halved to 8.4 percent, there is a three percentage point drop in the IRR if either the red or the Bombay onions fail. If all three of these products are found to be unsuitable, and their production is replaced by other crops in the package then the IRR for the projects falls to 3.8 percent. While this is exceptionally low, because all figures are not adjusted for inflation, it is still an acceptable return. The lowness of the result illustrates the importance of the crop package and being able to modify it quickly if circumstances dictate. In this case, were the package not adjusted and the onion and potato crops failed, then the IRR would have been negative.

The next assumption to be analyzed was how important are the project's assumptions as to the improvement in yields. If the yields did not improve for any crop, other than potatoes or onions, the IRR would only fall 0.1 to 0.3 of a percentage point. Without the yield improvement in potatoes the IRR for the projects would fall to 9.8 percent and were the yield improvements for onions not to materialize then the IRRs would fall to 14.8 percent.

The price assumptions of the model are less critical than the yield assumptions. If potato or onion prices fall by 20 percent then the IRR would fall by less than two percentage points. Individual price changes for the remaining crops would not make much difference in the overall IRR. Even less important are the cost assumptions. Even allowing the cost of imported inputs to increase by 50 percent will not have more than a three percentage point effect on the IRR; assuming that the social cost of hired labor is zero will increase the IRR by less than one percentage point.

We then analyzed each of the remaining assumptions of the model. If rather than 30 percent of the people making the changes in production whether there is a project or not, fully half the people would have made the changes anyway then the impact of the project is less and the IRR falls to 13.5 percent. If the project is not able to get as many people to make any changes, that is rather than 15 percent not making any changes 30 percent do not make any changes then the IRR fall to 12.8 percent.

The project also made assumptions as to the importance of increasing the homestead size. This is not critical to project success as even if there is no change in the size of the homestead, and thus no benefits received from the change in size, the IRR would still be 16.5 percent. Similarly, the livestock assumption is not critical as even if there are no net benefits to livestock or poultry the IRR would only fall to 16.1 percent. The possibilities for off-farm income is a more important assumption, but still, even if no opportunities develop the IRR would only fall to 16.0 percent.

One major cost is the operations and maintenance cost of delivering water. It is assumed to be Rs.1,200 per farm. If the true cost is twice that, Rs.2,400 per farmer, then the IRR falls to 15.8 percent. Unless the increased costs result in substantially less use of water and thus reductions in yields, increasing costs will not effect project viability.

If the project is able to deliver benefits faster than assumed so that the first year it helps 50 percent of potential beneficiaries and increases by ten percentage points thereafter, then the IRR increases to 17.4 percent. If the benefits are phased in over ten years then the IRR falls to 16.0 percent. So long as the benefits are achieved over a reasonable time span the projects remain economically viable.

The critical assumptions of the project relate to price, quantities that can be sold and costs of producing potatoes and onions. If these targets can not be reached then the project must be able to replace these products with other products almost as remunerative.

MARD and MDS are very tightly linked. If MDS were to be unable to deliver water in Zone 4A then MARD work in 4A would not take place. This would eliminate the benefits and the costs MARD has in Zone 4A. Similarly, if MARD were cancelled there would still be benefits from MDS, namely the basic increases in income of the new settlers into Zone 4A because of the more assured supply of water. However, if MDS only delivers increased water and there is no increase in extension services to the people then its IRR alone is a negative 0.3%. If we assume that the government could have delivered 20 percent of the MARD type benefits to the people in Zone 4A even without MARD, then the MDS IRR becomes a real 3.8 percent. This is an acceptable level of real returns.

MARD, could have an IRR of 20.7 percent operating only in Zones 1,2,3 and 5. However, this excludes the significant social returns which the project expects to achieve in Zone 4A, and the importance to the project and the entire Mahaweli area of the innovative programs to be attempted in Zone 4A. These programs, if successful, will be replicated elsewhere.

FOOT NOTES

1 See Tissa de Soyza, The Economic and Marketing Environment in the Rice and Subsidiary Foodcrops Sector, 1985, for a summary of why the world rice markets are essentially closed to Sri Lanka for the foreseeable future.

2 This analysis is taken largely from Rice Supply, Demand and Self Sufficiency by Seneca Abeyratne, 4/86.

3 The still unsettled part of the System B's Left Bank has 10,000 ha., System B's Right Bank has 17,000 ha. and the unsettled part of System C has 11,000 ha..

4 In making assumptions concerning yields and costs of production, members of the Diversified Agricultural Research Project (DARP) team in Kandy provided very useful "ground truth" contributions.

5 For more information on the comparative economics of animal versus tractor draft power, see Ryan, Abeyratne and Farrington, Animal Draft - The Economics of Revival, Colombo: ARTI, 1981.

6 Excluding the very high, but complex and costly, production of potatoes and onions, the average return per 0.25 acre, as derived from the annex tables, rises from Rs.824 initially to Rs.1,345 at the end of the project. It is likely that actual homestead returns would be less.

7 See the following for more detail: Government of Sri Lanka, Ministry of Rural Industrial Development, Livestock Development Policy, Colombo, October 1984, and World Bank, Sri Lanka Dairy Development II Staff Appraisal Report, Washington, May 1985.

8 For example a rice straw and urea, grass hay and molasses feed mix is estimated to be producible at a cost less than one half the value of the extra milk produced at a 4 liter per cow per day production level.

9 The target population is the number of farmers in the zone times the proportion of the farmers that the project feels it is likely to be able to help. In the case of Zones 1,2,3 and 5 this is 50 percent of the total farmers, and in Zone 4A it is 70 percent. All assumptions are tested in the next section of the analysis.

C. FINANCIAL ANALYSIS

The financial plan for this project is presented in Section III. AID will be financing the technical assistance, all of the associated commodities, 72 percent of the training, and both evaluations carried out under the project. About 74 percent of the construction costs of the tertiary irrigation system, drainage and flood plain measures, and roads will be financed by AID. The GSL will fund the balance of technical assistance, commodities, training and construction of the tertiary system, drainage and roads. In addition, the GSL will fund all of the land clearing, on-farm development, social and administrative infrastructure, project buildings and facilities, engineering and administrative costs, and the settlement assistance costs.

This project is providing the infrasture for 5,800 hectares of gross irrigated area and new settlement for 4,512 farm families in Zone 4A of System B. Based on experience in Zones 1 and 5, recurrent expenses related to irrigated O&M, agricultural extension, road and building maintenance, and general administrative expenses can be expected to total about Rs 3,250 per farm family. Applying these costs to Zone 4A indicates that the recurrent costs of the MEA program in that zone can be expected to total Rs 15,000,000 per year in 1987 prices. Since Zone 4A will be funded out of the total MEA budget for System B, the financial analysis for this project consists of determining the financial soundness of the overall System B program.

MEA budgets are divided into operations, maintenance, and capital expenses, but not by type of activity. It was therefore not possible to obtain accurate estimates of the costs of water management and extension in the time available to the design team. A summary of the 1987 MEA budget is presented in Table 12. Since Zones 1 and 5 are the only ones that are fully functioning at this time, these are the costs that are most indicative of what the entire System B requirements will be when it is fully developed.

The largest line item is Operations, which includes all salaries, transport costs, utilities, and office expenses. There is no breakdown of these costs by activity (water management, extension, community services, etc.). However, the staffing pattern presented in Table 13 provides a general indication of how operation costs might be allocated.

To determine the cost of irrigation operation and maintenance (O&M), it is assumed that one-third of the operation costs for Zones 1 and 5 are for activities related to water management. The other two-thirds are assumed to be related to agriculture, land use, community development, and overall administration. This is somewhat in line with professional-level staffing patterns and the allocation of vehicles, drivers, mechanics, and security personnel. Thus, in 1987, the costs of irrigation O&M for Zones 1 and 5 can be estimated to be about Rs 14 million which, when divided by the 11,500 hectares of irrigated land in these two zones, amounts to about Rs.1,200 per hectare. For the 23,600 hectares of irrigable land in System B, left bank, the total cost of irrigation O&M would be Rs.28.3 million. It should be noted that these costs do not include equipment depreciation.

The key recurrent cost issue is whether farmers can pay the full irrigation O&M costs. The present water user fee has been set at Rs 500 per hectare. Since farmers do not start paying this fee until five years after they have been settled, there is not yet any evidence of how it will work in System B. However, assuming 100 percent collections, user fees would generate Rs 11.8 for irrigation O&M on System B, left bank. The remaining Rs 16.5 million would be covered by the GSL through the MASL budget. This gap can be reduced by either reducing O&M costs, increasing the user fee or both. Preliminary estimates indicate that the changes in the O&M system proposed by MARD and CH2M Hill will increase the availability of water to the level necessary when the right bank is fully developed but will not reduce the staff required to operate and maintain the system. However some savings in the contract maintenance of D canals will be possible by increasing the involvement of farmer organizations in this task. The exact amount of savings will be determined during the implementation of the Water Management component of the MARD project.

TABLE 12
SYSTEM B RECURRENT BUDGET - 1987
(Rs.million)

	Zones 1 & 5	Zones 2 & 3	Project Office	Total
Operations	12.0	6.4	9.9	28.3
Maintenance	(14.0)	(0.4)	(0.9)	(15.3)
Roads	0.8	0.1	-	0.9
Irrigation	10.1	0.1	-	10.2
Buildings	0.2	0.2	0.6	1.0
Settler services	0.2	-	0.2	0.4
Farms & agriculture	2.7	-	-	2.8
TOTAL	26.0	6.8	10.8	43.6

SOURCE: MASL, System B 1987 Budget, 1/31/87

Raising user fees comes down to a question of Government policy. Since most of the recently settled farmers have limited resources, they would find it difficult in the early years to pay the full costs of irrigation O&M. However, the budgets in Annex G indicate a net income of about Rs.18,000 from two paddy crops. This is at least Rs.10,000 more than selectees would have earned prior to coming to System B. The objectives for the Left Bank of System B, therefore, should be for settlers to pay at least Rs.1,200 per hectare after they have become established on their new lands, i.e., by the fourth year after they have arrived.

Thus far, financing irrigation O&M has not been a problem for the Mahaweli Scheme, since it is the highest priority development program in the country. Even during this period of budgetary constraints due to increasing defense outlays, the Mahaweli operating budget has not been cut. The capital budget will be reduced by 40 percent in 1988, but this will be accommodated by rescheduling investment expenditures most of which apparently would have been delayed in any event. This situation, however, cannot be expected to continue indefinitely. As priorities change, the Mahaweli Scheme in general, and System B in particular, will have to compete with other development programs for limited GSL funds. If the operation and maintenance of the irrigation system can be fully financed by the benefitting farmers, the chances of the system deteriorating and needing to be reconstructed will be greatly reduced.

TABLE 13
SYSTEM B PERSONNEL - 1987

General	(546)
Resident Project Manager (RPM)	1
DRPM	1
Block Managers	6
Unit Managers	53
Clerical & other support staff	126
Office of Administration	9
Accounting Division	13
Supplies Division	47
Security Division	92
Transport Division, incl. drivers	168
Mechanical maintenance	24
Medical staff	6
Water Management	(116)
DRPM - Water Management	1
Engineers (incl. trainees)	14
Engineer Assistants	12
Technical Officers	29
Draughtsmen	9
Electrician	6
Irrigation laborors	45
Agriculture, Forestry, & Lands	(100)
DRPM (Agriculture)	1
Agriculture Officers	10
Field Assistants	53
Marketing Officers	6
Lands Officers	12
Lands laborors	8
Forests & Environment	10
Community Services	16
TOTAL	778

SOURCE: MEA, 1987 System B Staffing Pattern, 4/87.

An equally critical issue concerns the recurrent costs associated with agricultural extension, road maintenance, social services, and overall administration. The total System H recurrent budget for 1987 is Rs.112.5 million. If System B, Left Bank costs eventually rise to this level, these two systems alone will have recurrent costs equal to one half of the existing Department of Agriculture current budget. It is unrealistic to expect that this level of expenditure can be sustained over the long run. For this reason, a key objective of the MARD project should be to assure that whatever agricultural support services (research, extension, marketing) are initiated or strengthened, they be designed to gradually reduce the recurrent costs of the overall MEA program in System B. This, of course, is part of a much broader fiscal policy issue that is beyond the scope of this project. It makes little sense for donors to keep financing projects if these projects generate steadily increasing recurrent costs that the GSL cannot possibly sustain.

B. Actions to be Taken

The actions to be taken in the context of MARD and MDS to address the recurrent cost issue are the following:

- a. Under MARD, the Water Management Component will be strengthening farmer organizations to improve water management at the farmer level and to assume more responsibility for the maintenance of D canals. A preliminary end-of-project target for this activity will be to reduce the maintenance costs of D canal O & M by 25 percent. This target will be subject to revision during the first year of the project based on a better understanding of which maintenance activities can be assumed by farmer organizations and what the cost savings would be.
- b. Early in the MDS project, MEA will provide USAID with a report on user fee collections in Zones 1 and 5. The report will explain shortfalls in collections and indicate what steps are being taken to increase collections to 100 percent in these two zones, and when this target is likely to be achieved.
- c. MEA will prepare a detailed irrigation O & M budget for the Left Bank of System B broken-out by type of activity (gate repairs, dredging, etc.) and type of canal. This budget will be completed by June of 1988 and will be used as the basis for discussions on how the gap between O & M costs and user fee collections can be reduced.
- b. Under the MDS project, MASL and USAID will jointly manage a study of MEA recurrent costs. The study will analyze the following costs: administration at the System, Block, and Unit levels; water management; agricultural extension; community development; social services; and the maintenance of social and public infrastructure, including roads. The objectives of the study, which should be carried out by a specialist in public finance, will be to: 1) identify and classify all MEA costs at the System level; 2) recommend measures to reduce costs; 3) recommend ways of increasing beneficiary contributions, and 4) explore issues related to the transfer of responsibilities from MEA to line ministries.

D. Social Soundness Analysis:

1. Settlement Issues

a. Types of Settlers

Under the Accelerated Mahaweli Program (AMP), families settled so far can be grouped into three separate categories: prior residents, evacuees and electorate selectees. Prior residents are those who lived in the areas which have now been incorporated into the Mahaweli settlements. Evacuees are those who were forced to leave the Mahaweli construction sites, such as headworks, canals and roads. Electorate selectees are those selected from among landless applicants for land who live outside the Mahaweli areas.

Prior residents vary considerably in economic status, some having controlled some land or having other assets, others having been landless laborers; many were "encroachers" on public land, having no legal or traditional claim to it. Prior residents all start as Mahaweli settlers with the same amount of irrigated land, but they vary in the other resources which enable them to exploit their new situation. In contrast to prior residents who remain in familiar settings, evacuees have been involuntarily uprooted from their homes. Though moving to the Mahaweli settlement places them in a setting quite different from their prior home, it is a location they have chosen from options available to them. Because of the compensation they received for their lost property, some of the evacuees come with more monetary resources than other settlers.

In contrast to other two categories, electorate selectees are virtually all poor, because of the initial screening criteria. Most come with neither monetary assets nor familiarity with the new area, putting them at a some disadvantage compared to the other two types of settlers. The project faces a considerable challenge in seeking to benefit the selectee settlers who have very limited resources. Therefore, innovative approaches to raising farm incomes and living standards need to be tried to meet their particular needs. On the positive side, electorate selectees are almost all by definition highly motivated, voluntary settlers who accept the hardships of settlement because they see a chance to improve their economic condition; many husbands and wives have some high school education.

With selectee settlers coming from different areas, there could be some risk of hamlets being composed of people with few strong ties and shared social traditions, making it difficult to develop social cohesion. To deal with this, the practice has been established of settling people together from the same area, and even the same electorate, as much as possible.

Though they may be from different villages in an electorate, there are often prior acquaintances or even relatives among their fellow settlers. .

b. Settler Orientation

To orient new settlers, the practice is for the Mahaweli authorities to visit the homes of selectees and give general, lecture-type information on the type of subsidies they will receive, the type of farming they will have to do and the environment in which they will live. They introduce the management organization (MEA) which will influence much of their lives in the coming months and years. This orientation meeting is particularly important and has been improved with experience in resettlement. With the changes to be brought about in agricultural technology under this project and the MARD project (i.e., especially the introduction of more diversified cropping systems under irrigation, the controlled use of drainage in irrigation in Zone 4A to permit diversified cropping, etc.), further modifications may be desirable. The orientation could be used to build the expectation that settlers will need to be open adopting some unfamiliar technologies and organizations, that agriculture will be different than the irrigated farming with which they are familiar.

c. Settlement Timing

Settlers are brought to the land several months prior to the issuance of irrigation water. As they arrive they are first shown the homelots which they then layout and prepare themselves. A well is dug and a latrine built, followed by a semi-permanent house constructed on a mutual self-help basis; they are encouraged to prepare the land for fruit trees or other homestead crops. Thereafter they are shown their farm lots at which time they receive a cash payment to help them undertake on-farm land preparation for irrigated farming for the coming season. From the time of arrival to the first irrigated harvest, calculated to last 15 months, they are provided World Food Program rations.

Proper implementation of this program of land alienation calls for very close coordination among the settler selection, settler transferring, land clearing and leveling, and the water delivery authorities, that is, among Government Agents, MEA and MECA. In the past, this coordination has occasionally broken down and the time schedule for proper settlement greatly exceeded, in some instances by as much as 18 months. Causes of schedule overruns included construction delays and bad weather, as well as the urgent need to settle evacuees from upstream construction sites. Such delays imposed hardships on settlers; though they could not yet begin farming, their WFP rations were

terminated, and contract labor opportunities exhausted. WFP rations were later extended until the time of first harvest. Nonetheless, major deviations in schedule can put settlers (particularly those in the electorate selectee category) in a very vulnerable position, with insufficient resources to invest in agricultural inputs. The danger is that this could start a process of impoverishment which only becomes apparent later when the settler is forced to lease or mortgage out their land. This threatens their ability to become economically viable farmers and can even result in their becoming tenants on the land they have been allotted.

d. Land Tenure

Under the AMP, State lands (formerly called "Crown Lands") lands are "alienated" or transferred to settlers under the Land Development Ordinance of 1935 and its subsequent amendments. Under the provisions of the Ordinance the settler receives his allotment under a permit with the understanding that the settler will develop his land systematically and reside on the land. Once these conditions have been met (and not before three years), the settler can become eligible for a grant which enables him to use the land in various ways. The intent of the law is to keep the settler on his land but provision is made, under certain conditions acceptable to the government, for the settler to sell or otherwise divest himself of his land. For example, the settler can use his allotment as collateral to a recognized bank, or, with the permission of the government agent (GA), he can sell it to a person approved by the Government Agent. In general, the intent of the Ordinance is that land have only one "owner" and that it is difficult to legally subdivide it.

A second important objective of the Ordinance is to regulate succession of holdings with land passing to only one successor. A grant holder is permitted to nominate one successor. In the absence of a nomination the Ordinance provides a schedule which stipulates the order in which heirs are designated successors to the land. Normally, the first nominee is the surviving spouse, whether wife or husband, followed by sons and after them daughters. If there are no children then brothers followed by sisters are successors. The principle followed is kin proximity starting with the closest relatives and moving to those farther away.

Since the Ordinance provides for only one owner, there is no joint ownership by husband and wife. The permit or grant is in the name of only one of them; though the land is for a family unit and the lifetime interest of a living spouse in the use of the land is recognized, however the surviving spouse cannot alter the designated successor. In the case of electorate settlers, virtually all allottees are males. However, in the case of evacuees and prior residents, it is not

unusual for the wife, rather than the husband, to qualify as the allottee. (For evacuees, a woman who owned land in the evacuated area is eligible for an allotment. For prior residents, if a wife had been resident in the System B area prior to 1978 and her husband had not, she would be designated as the allottee, not her husband.)

Both because of a covenant in an earlier World Bank loan related to System H, and a legal requirement in a 1981 Amendment to the Land Development Ordinance, an allottee's permit is only changed to a grant after the land development costs have been repaid. This practically appears to prevent full land ownership in most cases because of the high cost of land development. Few allotments in the older System H have been transferred to grants. This is an issue the USAID Mission has designated for further study, discussion, and policy review under this project.

2. Ethnic/Minority Distribution

Under the Accelerated Mahaweli Program, the GSL has long been committed to settlement according to national ethnic ratios. Settlement under the AMP was also not to substantially disturb the ethnic ratios of the existing population in individual Mahaweli settlement areas. These two settlement criteria are not always fully compatible, as pointed out in 1983 in the Social Analysis for Mahaweli Basin Development, Phase II (383-0073). Specifically, since the systems constructed first were in areas with predominantly Sinhala populations and the evacuees were primarily from predominantly Sinhala areas, it has not been possible to achieve the national minority representation (26%) on a system by system basis. Now that development is beginning to reach into the furthest downstream areas, which have substantial Tamil-speaking populations, the settlement of ethnic minorities is just beginning. While the data indicates that when Systems B, A and D completed, the targetted national ratio can be achieved, it will not be known for many years whether that ratio is achieved.

In the Mahaweli irrigation systems settled prior to System B, few Tamils and Muslims were settled. In the large System H, only 869 of a total of approximately 23,600 allotments went to minority settler families (3.7%). A large portion of System H settlers were prior residents, virtually all Sinhala, who had first preference for allotments; there were relatively few electorate selectees. And in System C, where settlement is about half completed, only 1389 of approximately 12,000 settlers (11%) in mid-1986 were minorities, again because of the predominantly Sinhala population in the area and the need to resettle mostly Sinhala evacuees from upstream headworks construction; though this is a larger minority percent than System H, it still does not approach the

percentage of minorities in the national population. System B is the first system where there is expected to be a large percentage of minority settlers, in part because of the number of existing Tamils and Muslims already living in the project area who have first priority in being resettled.

Ethnic projections for System B are particularly complicated and sensitive because System B includes both an area with a strong Sinhala speaking majority and an area with a strong Tamil-speaking (Muslim and ethnic Tamil) majority. This can be seen in the population data for the two main districts in which the system falls:

<u>District</u>	<u>Total Population</u>	<u>Percent Sinhala</u>	<u>Percent Tamil</u>	<u>Percent Muslim</u>	<u>Percent Other</u>
Polonnaruwa	262,753	90.88%	2.30%	6.50%	0.32%
Batticaloa	330,889	3.21%	71.99%	23.97%	0.81%

The Left Bank of System B is mostly in Polonnaruwa District, except for a large part of Zone 4A. Zone 4A, which will be the focus of considerable expenditure under this project, is about one-third in Polonnaruwa District and two-thirds in Batticaloa District. The Right Bank of System B is in Batticaloa District, except for a very small portion in Ampara District.

There are no definitive projections on the ethnic ratios which will eventually exist in the different zones of the Left Bank of System B. However, the broad picture is fairly well understood, and we can examine the settlement which has occurred to date. The expectation at the time of the approval of the Mahaweli Basin Development Phase I project (383-0056) still holds. (See the Social Analysis in that Project Paper.) In general it is expected that the Left Bank will have predominantly Sinhala settlers with a substantial Tamil and Muslim minority, and that the Right Bank will consist of a strong Tamil-speaking majority (ethnic Tamils and Muslims), with a small Sinhala minority. Within the Left Bank, Tamil and Muslim settlers will be found primarily in the areas near or north of the railroad which passes through the system (Zone 1, Dimbulagala Block; Zones 2, 3, & 4A).

In mid-1986, the GSL made several specific public commitments about ethnic ratios in Mahaweli settlements, that involve System B. These were published in widely distributed policy papers which were a part of the negotiations for a settlement of the ethnic conflict and the discussions about establishing a system of Provincial Councils. (Refs: "Statement of His Excellency the President J.R. Jayawardane to the Political Parties Conference on January 25, 1986" and "Proposals sent to the Government of India by the Government of Sri Lanka based on discussions with the Indian delegation led by Hon. P. Chidambaram, Minister of State, July 9, 1986.")

The principles to which the GSL is now publicly committed include the following:

(1) The Mahaweli special areas will be settled according to the national ethnic proportions in the 1981 Census. Thus, when all planned systems (A, B, C, D, G and H) are settled, the total number of settler families should be distributed approximately according to the following ethnic proportions: 74% Sinhalese, 18% Tamil (including both Sri Lankan and Indian Tamils), 7% Muslim and 1% other.

(2) The ethnic ratios in the predominantly Tamil-speaking northeastern districts of Batticaloa and Trincomalee will not substantially be altered or diluted by Mahaweli settlements in those districts.

(3) The documents acknowledged a specific "entitlement" of Tamil speaking minorities for 25,979 allotments in all Mahaweli systems; these include 12,787 for Sri Lankan Tamils, 7,509 for Muslims, and 5,683 for Indian Tamils. (Comment: settlement to date is just beginning to meet this entitlement, since earlier settlements were in areas with predominantly Sinhala population.)

(4) Of this entitlement, a total of 14,051 allotments in Batticaloa District will be given to Tamil-speaking settlers. (Comment: This entitlement must be met from System B; the only Mahaweli areas in Batticaloa District are the Right Bank and a large portion of Zone 4A on the Left Bank.)

With these specific targets for the Batticaloa parts of System B, and given the recently renewed foreign donor commitment to funding construction of the Right Bank, it appears realistically possible for System B as a whole to make its planned contribution to the minority entitlements for the Mahaweli. Between the parts of Zone 4A in Batticaloa District (at least 3500 allotments) and the whole of the Right Bank (approximately 14,000 allotments), there will be at least 17,500 allotments, of which 14,051 (80%) will be for Tamil-speaking families. (Note: Because of the redesign work planned for Zone 4A and other land use decisions still to be made there, the division of land allotments between the Batticaloa and Polonnaruwa parts of Zone 4A is only a rough estimate; there is also a probability that the number of allotments in Zone 4A, will change due to the proposed increase in homestead allotment size.)

Since the GSL commitment to minority settlement focuses primarily on the parts of System B in Batticaloa District with a predominantly Tamil-speaking existing population, estimates are not as firm for the eventual minority proportions on the Left Bank or the parts which fall in Polonnaruwa District. In the table on the following page, data on the settlement by ethnic groups up to the end of 1986 is presented. As

settlement has progressed from the upstream (southern) end of the Left Bank toward the areas near or north of the railroad, it has already gotten into the areas where there is a larger

SETTLEMENT OF FAMILIES IN MAHAWELI SYSTEM B
BY ZONE/BLOCK AND ETHNIC GROUP
December 1986

ZONE/BLOCK	PLANNED TOTAL ALLOTMENTS	TOTAL FAMILIES SETTLED	SINHALA	TAMIL	MUSLIM
<u>ZONE 1</u>	4901				
Wijayabapur		1597	1597 (100%)	0	0
Dammina		1308	1305 (99.8%)	3 (0.2%)	0
<u>ZONE 5</u>	4162				
Ellewewa		1989	1985 (99.8%)	0	4 (0.2%)
Dimbulagala		2197	1901 (86.5%)	281 (12.8%)	15 (0.7%)
<u>ZONE 2</u>	5056				
Sevampitiya		1836	1337 (72.8%)	387 (21.1%)	112 (6.1%)
Senapura		993	514 (51.8%)	66 (6.6%)	413 (41.6%)
<u>ZONE 3:</u>	2419	0	-	-	0
<u>ZONE 4A:</u>	6439	0	-	-	0
TOTALS	22977	9920	8639 (87.1%)	737 (7.4%)	544 (5.5%)

*Based on a report prepared by the System B Project Control Officer, Mahaweli Economic Agency, October 1986. Since there was little further settlement in 1986 after the preparation of this report, it represents the settlement position at the end of 1986.

**There is a minor unresolved inconsistency between the data on planned allotments and families already settled in Zone 5, possibly because of a recent change in the zone boundary for administrative purposes.

existing minority population who have first priority for allotments as Mahaweli settlers. By the end of 1986, of the 9920 families settled on the Left Bank, 7.4% were Tamil and 5.5% were Muslim. Virtually all were in Zone 2 and in the Dimbulagala block of Zone 5.

Remaining settlement on the Left Bank will be focused on Zones 2, 3, & 4A. Zones 2 & 3 have existing minority populations to be resettled. Though Zone 4A has only a small existing population, a part of the commitment to Tamil-speaking settler allotments for Batticaloa District must be met there.

Based on the actual settlement to date and zone-by-zone projections for allotments remaining to be settled, USAID estimates that the total proportion of allotments to Tamil-speaking minorities (both Tamil and Muslim) for the Left Bank will fall in the range of 18% to 25%. It is important to repeat that the GSL has not made a commitment to a specific percentage on the Left Bank, but that this projection is a consequence of the well established practice of giving priority to resettling existing residents and the commitment to predominantly Tamil settlement of selectees in the Batticaloa portion of the system (which includes much of Zone 4A). The major reason for such a wide range in the projection is the uncertainty about the number of Tamil-speaking allotments for Batticaloa District which will met in Zone 4A, which could be as few as 2200 or as much as 4000.

Regarding the larger question ethnic ratios in the whole AMP, it is much more difficult to predict when and if the full minority entitlement of allotments can be met. Meeting them depends on the completion of both the Right Bank of System B, which seems highly probable, and the construction of System D in Polonnaruwa and Trincomalee District and on System A in Trincomalee District. Though there is a strong possibility of constructing System A with Soviet funding, there is no known donor interest in System D. In any case, construction of all remaining settlements will not be completed for a number of years.

3. Gender Analysis

Women have traditionally played a wide and active role in the farm household. In addition, to their responsibility for the children, the cooking and the household itself, they are involved with homestead activities, particularly gardening and looking after the family's farm animals. Sri Lankan women have also traditionally been involved with most stages of paddy production, as well as taking food and water when men are working in the fields. As one woman remarked during a field visit, "We do everything but the ploughing (or other heavy work)." Many settler women seem to be actively involved with their husbands in decisions about farming and family finances. Some studies have also identified a small percentage of women who are the primary

managers for their farm, even when the husband is living. When this does happen, there seems to be no cultural bar to their active participation in cultivation meetings or turnout organizations. As most of the women of electorate settler families have some high school education, they are generally articulate and not hesitant in expressing themselves.

With the increased emphasis on diversified cropping and new technologies, it is uncertain what cultural divisions of labor by gender will occur for non-rice crops. It is also not so clear what will be the effect of different ethnic traditions related to gender. This is an issue which may be of importance in areas like Zone 4A, where a large number of minority settlers are expected and where some of the more intense efforts at crop diversification will be made under the MARD project.

Because of women's usually important role in making use of homestead resources, the issue of its size is closely related to women's capacity to produce for the farm family. During field investigations, members of farm families -- both men and women -- usually said they felt the homestead size of .2 ha was too small. They felt this was not enough area to undertake the various activities (homestead gardening, livestock rearing, well and latrine facilities) that they are encouraged to do. Under the redesign of the irrigation system and settlement pattern in Zone 4A, a larger homestead size of 0.4 ha. is expected. It is common among Sinhala women in some parts of the country to be involved in homestead gardening, and this is often found in Mahaweli settlements. Though there is often shared decision making and shared labor among husband, wife, and children, in a majority of families the primary responsibility lies with the wife for the household garden.

Under the MARD project, there will be an effort to help settlers maximize the use and return from their resources--including the homestead plot. It clearly will not be the major source of income for the family, but it has the potential for making a difference in living standards for a family. It is not usually used to its potential to supplement family food and income.

There are a couple gender issues related to land tenure, particularly for electorate settlers. Under the Land Development Ordinance, there is no joint "ownership" of husband and wife, leaving the untitled spouse no secure rights in the land. Among evacuees and prior residents, perhaps one-fourth of the allotments are in the name of women. Among the electorate selectees, however, virtually all permits are in the husbands name. Though the continuing right of a surviving spouse to use the land is recognized, having the allotment only in the name of the husband has the important practical effect of making the wife ineligible for bank loans, say for starting a business. (Bank

loans are made only to the permit or grant holder.) Furthermore, though there is traditionally equal treatment of sons and daughters in land inheritance in Sinhala society, the restriction of legal subdivision of the land and the preferences for sons in the default succession priorities in the Ordinance has created a degree male bias in succession in Mahaweli and other settlement schemes.

4. The "Second Generation" Problem

In Sri Lankan settlement schemes (which have a 40 year history) there is a perennial "second generation problem". That is, minimal sufficient land is distributed for a nuclear family. However, when the children come of age, only one can (legally) inherit the land, and there is usually no further land available for allotment in the same scheme. The second generation problem then is, how will the children who do not inherit land support themselves? One option is that extra-legal subdivision (i.e., non-registered) of the irrigated fields and household plot may occur. Another is to seek employment outside the area. The Mahaweli Authority plans to help develop the non-farm dimensions of the system economy to provide employment for the second generation; this effort will be assisted under the USAID REDS (Rural Enterprise Development Sector) project planned to be signed in 1988. Relatively little has been done to date, however.

In System B, the second generation problem may not become as serious as quickly as was the case in System H, because of the higher expected percentage of electorate settlers. Electorate settlers are usually younger couples with young children. By contrast, prior residents are of all ages and have children of all ages. The more prior residents that are settled, the sooner the second generation problem becomes serious.

5. Security Concerns

Because of the incidents which occurred in 1985, and the resulting reluctance of small contractors to commit their equipment to completing lower level canals during much of 1986, it is important to continue to monitor possible security impacts on project implementation. At this point the Mission assessment is that implementation is feasible. The impasse with the small contractors seems to have been resolved and settlement is back on track. Settlers have not evacuated, except for several very localized short-term evacuations in April 1985. Mahaweli staff and Aralaganwila Research Station staff are in place, and foreign contractors and their local staff have continued to be able to work. Mission staff generally keep close touch with the security situation if travelling in the extreme northeast of the Left Bank, but travel routinely to other parts of the system.

E. ENVIRONMENTAL ANALYSIS SUMMARY

Annex H presents the Environmental Analysis for MARD and MDS, completed by E.R. Loken, Mission Environmental Officer, dated May 28, 1987. The analysis certifies that the potential environmental consequences of both projects have been properly assessed and mitigated, to an acceptable extent, in accordance with the requirements of AID Environmental Regulations (22 CFR 216).

The analysis documents substantial improvements from the GSL in addressing previously identified environmental degradation resulting from rapidly bringing jungle and forest land under cultivation. The analysis presents an update of the amended Environmental Assessment (EA) and Action Plan and has determined that satisfactory progress has been made by the GSL in implementing the plan. The sole Covenant required by the analysis will be to establish fuelwood lots, to prepare for the greatly increased demand for firewood from Mahaweli settlers. The fuelwood lots would help preserve the forest watershed and natural cover in the areas of Mahaweli restricted from settlement or cultivation. A covenant to this effect is included under the MARD Project.

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TO AMEMBASSY COLOMBO 7926
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UNCLAS SECTION 01 OF 03 STATE 069805

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I.O. 12345: N/A

TAGS:

SUBJECT: ANPAC MEETING ON MARD PROJECT (383-0086) AND
MDS PROJECT (383-0103)

REFS: A) COLUMBO 01415; B) STATE 22045;
C) COLOMBO 0814; D) MORIN/EALDWIN MEMO DTD 2/9/87

1. ANPAC WAS CONVENED TO REVIEW SUBJECT PIDS ON FRIDAY,
2/13/1987 WITH ANE/PD DIRECTOR PETER BLOOM CHAIRING.
REPRESENTATIVES OF THE FOLLOWING AID/W OFFICES
ATTENDED: ANE/PD/SA, ANE/PD/PE, ANE/SA, ANE/TR/ARD,
ANE/DP, ST/AGR AND GC/ANE. USAID WAS REPRESENTED BY
DEPUTY DIRECTOR GARY NELSON.

OFFICE	ACT	INFO
DIR		✓
DD		✓
BLA		
HSG		
PRM		✓
EXO		
CONT		✓
PD.P		✓
ARD	✓	✓
HPHR		
MWRD		✓
C & R		
DUE DATE		3/19
ACT. TAKEN		
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2. SUMMARY OF ANPAC ACTION: ANPAC APPROVED MISSION
REQUEST TO PROCEED WITH PP DEVELOPMENT AND AUTHORIZED
REDELEGATION OF PROJECT APPROVAL TO THE FIELD. THE
POINTS DISCUSSED BELOW CONSTITUTE SUMMARY OF DISCUSSION
AND GUIDANCE TO THE MISSION WITH REGARD TO ISSUES
DISCUSSED AT ANPAC. ANPAC ALSO REQUESTS THAT MISSION
CONSIDER SEARING WITH AID/W AT AN APPROPRIATE TIME, FOR
INFORMATIONAL PURPOSES ONLY, THE PP ECONOMIC ANALYSIS
AND UPDATE OF THE MAHAWELI ENVIRONMENTAL ASSESSMENT.
END SUMMARY.

3. ISSUES DISCUSSED:

A. PROJECT LINKAGES TO POLICY PERFORMANCE: SOME ANPAC
MEMBERS EXPRESSED CONCERN THAT MDS WAS INTENDED TO CARRY
FULL WEIGHT OF POLICY LEVERAGE FOR THE TWO PROJECTS, YET
MDS PACE WILL BE REACHED THREE YEARS BEFORE MARD PACD.
MISSION REP EXPLAINED THAT OTHER POLICY MECHANISMS, MOST
NOTABLY MDS PROJECT, WOULD BE IN PLACE WELL BEFORE MDS
PACD AND WOULD BE ABLE TO CARRY ON WITH POLICY WORK
INITIATED UNDER MDS, WHICH IS SEEN AS DOOR-OPENER.
DISBURSEMENT UNDER POLICY CONDITIONALITY WAS SEEN AS
MORE APPROPRIATE FOR MDS THAN FOR MDS, WHICH WILL BE
DISBURSED THROUGH PAR PROCEDURES LINKED TO PROGRESS IN
CONSTRUCTION OF IRRIGATION CANALS AND RELATED
INFRASTRUCTURE. HOWEVER, ANPAC UNDERSTANDS THAT ANNUAL
IMPLEMENTATION PLANS FOR CONSTRUCTION AND POLICY
COMPONENTS OF MDS WILL BE IMPORTANT VEHICLE FOR
ENCOURAGING POLICY REFORM.

IN THE SPECIFIC AREA OF AGRICULTURE PRODUCTION AND MARKETING POLICIES, ANPAC NOTED THAT IBRD, WHICH PLANS TO NEGOTIATE AN AGRICULTURE SECTOR CREDIT WITH GSL IN 1988 OR 1989, IS PREPARED TO WORK WITH USAID ON AGRICULTURAL POLICY ISSUES. ANPAC WISHED TO ENCOURAGE MAXIMUM POSSIBLE DONOR COORDINATION ON MAHAWELI POLICY ISSUES, RECOGNIZING THAT IT HAS BEEN SOMEWHAT LIMITED TO DATE.

B. PRIVATE SECTOR PARTICIPATION: ANPAC SOUGHT CLARIFICATION ON MATTER OF PUBLIC VS. PRIVATE ENTITIES TO PROVIDE AGRICULTURAL INPUTS AND SUPPORTING SERVICES FOR MAHAWELI, SINCE MDS PID DISCUSSES (AMONG OTHER POLICY AGENDA ITEMS) POSSIBLE RESTRICTIONS VS. GOVERNMENT ENTITIES PROVIDING SUCH SERVICES, WHILE MARD PID INDICATES THAT AT LEAST INITIALLY, IT MAY BE NECESSARY FOR PUBLIC ENTITIES TO PROVIDE THESE SERVICES BECAUSE OF THE RISKS THAT ARE LIKELY TO DETER PRIVATE ENTREPRENEURS.

RECOGNIZING THAT PRIVATE-SECTOR ISSUES WILL BE EXTENSIVELY ANALYZED DURING PROJECT DESIGN, AND THAT THEY WILL BE ADDRESSED IN PROJECT COVENANTS AND/OR CONDITIONS PRECEDENT, ANPAC STRONGLY RECOMMENDED THAT DIALOGUE WITH GSL ESTABLISH POSITION THAT PUBLIC ENTITIES WILL BE SUPPLIERS OF LAST RESORT, THAT THEY NOT OPERATE AS MONOPOLIES, THAT THEY CONTRACT FOR DELIVERY THROUGH PRIVATE ENTITIES (PREFERABLY ON A NON-EXCLUSIVE BASIS), THAT THEY SUPPLY SERVICES AND INPUTS AT MARKET

PRICES, AND THAT THEY BE DESIGNATED FROM THE START AS TEMPORARY PUBLIC ENTITIES TO BE PRIVATIZED OR SUPERCEDED BY PRIVATE ORGANIZATIONS AT THE EARLIEST POSSIBLE DATE.

C. ECONOMIC RETURN FROM MARD AND MDS PROJECTS: ANPAC QUESTIONED WHETHER MISSION WAS CONFIDENT OF POSITIVE RETURN ON MARD AND MDS INVESTMENTS, AND ON PREVIOUS MAHAWELI INVESTMENTS (WHICH ARE GENERALLY TREATED IN PIDS AS SUM COSTS IN JUSTIFYING ADDITIONAL PROJECT INVESTMENTS), GIVEN POSSIBILITY OF OVERLY-OPTIMISTIC ASSUMPTIONS ABOUT RATES OF TECHNOLOGICAL INNOVATION, INCREASES IN AGRICULTURAL PRODUCTIVITY, AND ADOPTION OF IMPROVED POLICIES. MISSION REP INDICATED THAT WORLD BANK'S MOST RECENT RECALCULATION OF IRRS ON OVERALL AMP AND SPECIFICALLY ON SYSTEM B YIELDED VERY POSITIVE

RESULTS, AND THAT COST OF SECONDARY AND TERTIARY CANALS WOULD BE LOW RELATIVE TO BENEFITS FROM INCREASED RICE YIELDS DERIVED FROM DOUBLE-CROPPING. SHIFT TO HIGHER-VALUE CROPS WOULD FURTHER IMPROVE COST-BENEFIT RATIO.

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ANPAC ALSO QUESTIONED WHETHER THE FARMERS COULD BECOME ECONOMICALLY VIABLE ON ONE-HECTARE OF IRRIGATED LAND AND ONE-HALF ACRE OF UPLAND HOMESTEAD. MEMBERS NOTED THAT SHIFT TO NON-RICE CROPS, COMBINED WITH FULL USE OF IRRIGATED HALF-ACRE HOMESTEAD PLOTS, WOULD PROBABLY REQUIRE TO EXCEED SUBSISTENCE LEVEL, AND THAT OBSERVATIONS TO DATE INDICATE THAT HOMESTEAD PLOTS ARE PRESENTLY SERIOUSLY UNDER-UTILIZED. ANPAC RECOMMENDS THAT PP ANALYSIS INCLUDE EXAMINATION OF THIS ISSUE.

D. CREDIT REQUIREMENTS: ANPAC NOTED THAT CREDIT ISSUES SUCH AS INTEREST RATES, VIABILITY OF INFORMAL AND FORMAL CREDIT ARRANGEMENTS IN REGION, ETC. WOULD BE ANALYZED DURING PROJECT DESIGN. ANPAC UNDERSTOOD THAT AS CURRENTLY PLANNED NO PROJECT RESOURCES WOULD BE USED FOR PROVISION OF CREDIT, SINCE PL-480 LOCAL CURRENCY IS EXPECTED TO BE AVAILABLE FOR THIS PURPOSE. IN THE EVENT THAT THIS CHANGES AND PROJECT RESOURCES ARE SLATED FOR CREDIT USE, AID/W WOULD WISE TO REVIEW PORTION OF PP DEALING WITH CREDIT RESOURCES.

E. PROGRAM MORTGAGE: ALTHOUGH TOTAL MORTGAGE EMBODIED IN NEW FY 87-88 PROJECT PORTFOLIO WAS VIEWED BY ANPAC AS LARGE, IT WAS NOT VIEWED AS NECESSARY OR APPROPRIATE AT THIS TIME TO RESERVE PROGRAM FUNDS FOR CONTINGENCY OF SUCCESSFUL SETTLEMENT OF ETHNIC CONFLICT.

F. ENVIRONMENT: ANPAC WELCOMED MISSION'S DECISION TO PREPARE AMENDED MAHAWELI ENVIRONMENTAL ASSESSMENT AND ACTION PLAN. PER DISCUSSIONS BETWEEN ANE/PD/ENV AND MISSION REPRESENTATIVES, THIS IS NOT VIEWED AS LARGE-SCALE UNDERTAKING AND WOULD NOT REQUIRE PUBLIC OR INTER-AGENCY REVIEW. PLANNED USE OF TAMS AS CONTRACTOR UNDER IQC WORK ORDER, USE OF DR. SOBczAN AS PRINCIPAL INVESTIGATOR AND PROPOSED LEVEL OF EFFORT AS OUTLINED IN REF A IS FULLY ACCEPTABLE TO ANE/PD/ENV. ANE/PD/ENV WILL EXPEDITE PROCESSING OF PIO/T WHEN RECEIVED IN AID/W.

IN ORDER TO BENEFIT FULLY FROM DETAILED MISSION KNOWLEDGE OF ENVIRONMENTAL CONDITIONS IN THE PROPOSED PROJECT AREA, ANE/PD/ENV, STEPHEN F. LINTNER,

ENVIRONMENTAL COORDINATOR DELEGATES TO USAID/COLOMBO,
MIC LOAEN, MISSION ENVIRONMENTAL OFFICER AUTHORITY TO
ISSUE THE ENVIRONMENTAL CLEARANCES FOR PROPOSED PROJECTS
SUBJECT TO THE ENVIRONMENTAL ASSESSMENT REQUIREMENT.
LOAEN SHOULD REVIEW AMENDED ENVIRONMENTAL ASSESSMENT AND
ACTION PLAN TO DETERMINE THEIR COMPLIANCE WITH THE
REQUIREMENTS OF 22 CFR 216 AND ASSURE THAT THEIR
FINDINGS ARE PROPERLY INTEGRATED INTO PROJECT DESIGN. A
COPY OF HIS CLEARANCE MEMORANDUM AND SUPPORTING
DOCUMENTS SHOULD BE FORWARDED TO ANE/PD/ENV FOR
INCLUSION IN AID/W PERMANENT FILES. THIS DELEGATION OF
AUTHORITY IS NOT TRANSFERABLE TO ANOTHER INDIVIDUAL
UNLESS AUTHORIZED IN WRITING BY THE BUREAU ENVIRONMENTAL
COORDINATOR.

AID/W WOULD APPRECIATE OPPORTUNITY TO REVIEW AMENDED
ENVIRONMENTAL ASSESSMENT AND ACTION PLAN FOLLOWING THEIR
COMPLETION, AS AMP OFFERS ONE OF EARLIEST AND BEST
EXAMPLES OF EXTENSIVE PRE-PROJECT ASSESSMENT AND AN
EXCELLENT OPPORTUNITY TO EVALUATE ACTUAL IMPACTS AGAINST
PRE-PROJECT BASELINE. GIVEN SIGNIFICANT RECENT
INCREASE IN SENSITIVITY TO IMPACTS OF DEVELOPMENT
PROJECTS WITHIN WORLD BANK, AND ENHANCED USG ROLE IN
REVIEWING ENVIRONMENTAL ASPECTS OF DEVELOPMENT BANK
PROJECTS, TIMELY REVIEW OF MAHAWELI INFORMATION WOULD BE
MOST HELPFUL TO PARTIES INVOLVED IN THE LARGER ISSUE.
APPRECIATE MISSION'S COOPERATION.

G. ADEQUACY OF PD AND S FUNDS: SOME ANPAC MEMBERS WERE
CONCERNED THAT LEVEL OF EFFORT AND TIMEFRAME CONTAINED
IN PIO/T FOR JOINT PROJECT DEVELOPMENT TEAM MIGHT BE
INADEQUATE. SINCE DAI IS CURRENTLY DEVELOPING BUDGET
AND PROPOSAL, ANPAC TOOK NO POSITION ON THIS ISSUE.

H. CONTRACTING MECHANISMS: ANPAC DISCUSSED POSSIBLE
CONTRACTING MECHANISMS FOR MARD PROJECT, INCLUDING
OPPORTUNITIES FOR GRAY AMENDMENT ENTITIES AND
APPROPRIATE ROLE, IF ANY, FOR TITLE XII INSTITUTIONS.
MISSION SHOULD ADDRESS THIS QUESTION IN PP.

I. WOMEN IN DEVELOPMENT: ANPAC REQUESTED THAT MARD PP
(AND, IF APPROPRIATE, POLICY COMPONENT OF MDS PP)
INCLUDE ANALYSIS OF IMPLICATIONS OF CROP DIVERSIFICATION.

J. THE MISSION SHOULD CONSIDER QUOTE BUY-INS END QUOTE
TO CENTRALLY FUNDED PROJECTS WHICH MAY BE RELEVANT TO
MARD NEEDS.

4. OTHER GUIDANCE: ADDITIONAL GUIDANCE CONTAINED IN A
NUMBER OF AID/W MEMORANDA WHICH WERE NOT DISCUSSED IN
ANPAC WAS CARRIED TO FIELD BY ANE/PD BAC STOP PAMELA
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SECTIONAL MESSAGE

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BAIDWIN, ON TDY. PACKAGE INCLUDES MEMO DESCRIBING THREE ST/AGR PROJECTS RELEVANT TO MARD AND MDS FOR MISSION'S CONSIDERATION OF POSSIBLE COLLABORATION OR BUY-INS, IF APPROPRIATE. SOME OF THE POINTS ARE CITED BELOW:

(1) REFERENCE TO THE CROP DIVERSIFICATION ACTION PLAN NOT BEEN INCLUDED. ARE RESOURCES UNDER THE TITLE I PROGRAM ADEQUATE FOR THE MISSION TO USE AS LEVERAGE IN ENCOURAGING DEVELOPMENT AND IMPLEMENTATION OF THE ACTION PLAN? TO THE EXTENT THAT A PLAN IS TO BE IMPLEMENTED, IT MAY BE USEFUL TO REFER TO THIS IN THE MARD PP SINCE IT WILL HAVE A DIRECT BEARING ON THE PROJECT.

(2) 16% P.M. OF SHORT-TERM TRAINING SEEMS INADEQUATE FOR AN EIGHT YEAR PROJECT COVERING AS MANY TOPIC AREAS AS MARI.

(3) THE MISSION AND GSL MAY WANT TO GIVE EMPHASIS TO LOW-INPUT (LOW COST) AGRICULTURE TECHNOLOGY IN THE NEAR TERM AS THE SETTLERS HAVE EXTREMELY LIMITED RESOURCES.

(4) A CAREFUL ANALYSIS OF THE ARALAGANWILA RESEARCH STATION IS ESSENTIAL SINCE IT IS TO PLAY A MAJOR ROLE IN THE PROJECT. WHAT IS THE CAPABILITY OF THE STATION? PERSONNEL? WHAT CAN IT DO FOR MARD CONSIDERING DEMANDS PUT ON THE STATION BY OTHER DONORS AND OTHER GOVERNMENT PROGRAMS?

(5) WHO IS TO PROVIDE FARMERS WITH MARKET INFORMATION? THIS LINKAGE IS IMPORTANT AND SHOULD BE LOOKED AT DURING PP DEVELOPMENT.

(6) PP SHOULD BE REALISTIC ABOUT TARGETS. THE PROJECT DOES HAVE DEFINITE QUOTE TRIAL UNQUOTE OR QUOTE PILOT UNQUOTE CHARACTERISTICS, AND IT IS HEAVILY DEPENDENT ON MDS AND MDS FOR ACHIEVING FULL IMPACT. THIS SHOULD BE CLEARLY ACKNOWLEDGED, AND PROJECT OBJECTIVES PRESENTED ACCORDINGLY.

(7) PP SHOULD DESCRIBE IN SOME DETAIL HOW THE PROJECT'S IMPACTS ON SETTLERS, ESPECIALLY THEIR AGRICULTURAL PRODUCTION AND INCOME, WILL BE MONITORED AND EVALUATED. SHULTZ

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 Annex B

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 DEPARTMENT OF EXTERNAL RESOURCES
 Ministry of Finance and Planning

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 Inland Revenue Building (15th Floor)
 ක. ස. 277, කොළඹ 2.
 ප. ස. ලි. 277, කොළඹ 2.
 P. O. Box 277, Colombo 2

July, 1987.

Mr. Gary Nelson,
 Acting Director
 USAID.

OFFICIAL FILE COPY

Dear Mr. Nelson,

Mahaweli Downstream Support (MDS)

On behalf of the Government of Sri Lanka, we wish to make a formal request for USAID assistance for implementing a Mahaweli Downstream Support Development Project. This project is designed to complement the proposed USAID assisted Mahaweli Agriculture & Rural Development (MARD) Project.

OFFICE	ACT	INFO
DIR		✓
DD		✓
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The MDS Project will finance construction which completes the tertiary irrigation and settlement infrastructure in Zone 4A, and to the extent possible, seek to provide essential facilities elsewhere on the Left Bank of System B. The development goal of this project is to obtain the maximum possible economic benefits from the land and water resources available to settler families on the Left Bank of System B. The infrastructure to be constructed in Zone 4A will include the tertiary irrigation system; the clearing and development of irrigated plots; market and hamlet roads; settlement areas; and social and administrative infrastructure.

Whilst the total cost of this project is yet to be finalized USAID Assistance in a sum of US\$ 15.1 Million is requested initially for the implementation of this project.

We shall be grateful if you would obtain the formal concurrence of your authorities for the initial USAID support requested for the project.

Yours sincerely,

REFERENCE NO. 97/1470
 DATE RECEIVED JUL 15 1987
 ACTION.....

(Handwritten signature)

(M.A. Mohamed)
 Director of External Resources

ANNEX C

MDS LOGICAL FRAMEWORK

Quantifiable Indicators

Assumptions

Goal to which this project contributes:

Maximize the economic returns to the land and water resources on the left bank of System B.

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Increased agricultural production 2. Increased farmer incomes 3. Increased non-farm incomes | <ol style="list-style-type: none"> 1. The agronomic and water management technologies are available to grow diversified crops in Zone 4A. 2. Domestic and/or export markets will be available for the crops that can be grown in Zone 4A. 3. The recurrent costs of operating and maintaining the irrigation system will be fully met by the beneficiaries of the GSL. |
|--|---|

Purpose

End of Project Status

- | | | |
|--|--|--|
| <ol style="list-style-type: none"> 1. Tertiary irrigation system 2. Drainage system 3. Road network | <ol style="list-style-type: none"> 1. a) 143 km of D canals
b) 311 km of F canals 2. a) 415 km of turnout drains
b) 370 km of farm drains 3. a) 54.5 km of market roads
b) 207 km of hamlet roads | <ol style="list-style-type: none"> 1. Proper coordination between MECA and MLLD to assure adequate and timely surveys. 2. Coordination between MECA and MEA to assure that all infrastructure functions properly. 3. Proper supervision of contractors by MECA. 4. Adequate and timely funding by GSL of non-AID funded portion of the construction. |
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MDS LOGICAL FRAMEWORK

Quantifiable Indicators		Assumptions
4. Land clearing and on-farm development of irrigated land	4. a) 5,768 ha of land cleared b) 4,516 ha of developed irrigated farm plots	
5. Village and hamlets	5. a) 2 area centers b) 2 village centers c) 15 hamlets	all with electricity, plumbing, sewerage, and public buildings

Inputs: See Annex B, Detailed Budget Tables.

**Table I. DETAILED COST ESTIMATE
(Construction & Settlement)**

ITEM	Unit	Amount	Rate	Total	1988	1989	1990	1991	1992
					Rs.	Rs.M	Rs.M	Rs.M	Rs.M
CONSTRUCTION									
A. Tertiary Irrigation System									
1. Distributary Canals	km.	143	0.613	87.7	18.19	35.75	27.11	6.61	-
2. Field Channels	km.	311	0.194	60.3	12.52	24.61	18.66	4.55	-
3. Village Tanks									
(a) Existing Tanks	No.	8	1.5	12.0	2.49	4.89	3.71	0.90	-
(b) New Tanks	No.	7	3.9	27.3	5.66	11.13	8.44	2.06	-
BASE COST				187.3	38.86	76.38	57.93	14.12	0.00
				\$6,572	\$1,364	\$2,680	\$2,033	\$496	\$0
B. Drainage and Flood									
1. Drainage Channels									
(a) Outlet Improvement	Sum	1	15.0	15.0	-	5.59	6.65	2.76	-
(b) Turnout Drains	km.	415	0.05	20.8	-	7.73	9.20	3.82	-
(c) Farm Drains	km.	370	0.05	18.5	-	6.89	8.20	3.40	-
(d) Drainage Test	Ha	90	0.03	2.57	0.77	1.28	0.51	-	-
(e) Flood Plain	Sum	1	27.65	27.7	-	-	9.22	9.22	9.22
BASE COST				84.47	0.77	21.50	33.79	19.20	9.22
				\$2,964	\$27	\$754	\$1,186	\$674	\$323
C. Road Network									
1. Market Roads									
(a) Type 1	km.	27.75	1.25	34.7	5.17	13.91	11.78	3.83	-
(b) Type 2	km.	36.75	0.94	34.5	5.15	13.85	11.73	3.81	-
2. Hamlet Roads	km.	207	0.30	62.1	9.25	24.90	21.10	6.86	-
3. Access roads	ha.	5476	0.001	5.48	0.82	2.20	1.86	0.60	-
BASE COST				136.81	20.38	54.86	46.47	15.10	0.00
				\$4,800	\$715	\$1,925	\$1,631	\$530	\$0
D. Land Clearing and On-Farm Development									
1. Jungle Clearing Rough Leveling									
1. Jungle Clearing Rough Leveling	ha.	5768	0.0088	50.76	18.90	22.51	9.34	-	-
2. On-Farm Development									
2. On-Farm Development	ha.	4516	0.0025	11.29	-	4.21	5.00	2.08	-
BASE COST				62.05	18.90	26.72	14.34	2.08	0.00
				\$2,177	\$663	\$938	\$503	\$73	\$0

Table 2
DETAILED COST ESTIMATE
BUILDINGS --- SOCIAL AND ADMINISTRATIVE INFRASTRUCTURE

ITEM	Unit	Amount	Rate	Total	1988	1989	1990	1991	1992
					1	Rs.M			
School & Teacher Housing									
1. Primary School Complex									
a) Type 3	No.	18	1.17	21.1	3.92	8.59	6.61	1.94	
b) Qtrs. Gr. 4	No.	54	0.225	12.2	2.26	4.96	3.81	1.12	
	No.	18	0.25	4.5	0.84	1.84	1.41	0.41	
2. Jr. Secondary School Complex									
a) Type 2	No.	2	1.33	2.7	0.49	1.08	0.83	0.24	
b) Qtrs. Gr. 4	No.	2	0.40	0.8	0.15	0.33	0.25	0.07	
c) Qtrs. Gr. 3	No.	4	0.23	0.9	0.17	0.37	0.28	0.08	
d) Dormitory	No.	8	0.25	2.0	0.37	0.82	0.63	0.18	
3. Sr. Secondary School Complex									
a) Type 1C	No.	2	5.27	10.54	1.96	4.30	3.31	0.97	
b) Qtrs. Gr. 4	No.	2	0.40	0.80	0.15	0.33	0.25	0.07	
c) Qtrs. Gr. 3	No.	6	0.23	1.35	0.25	0.55	0.42	0.12	
d) Dormitory	No.	12	0.25	3.00	0.56	1.22	0.94	0.28	
4. Sr. Secondary School Complex									
a) Type 1A	No.	1	8.22	8.22	1.53	3.35	2.58	0.76	
b) Qtrs. Gr. 4	No.	1	0.40	0.40	0.07	0.16	0.13	0.04	
c) Qtrs. Gr. 3	No.	4	0.23	0.90	0.17	0.37	0.28	0.08	
d) Dormitory	No.	8	0.25	2.00	0.37	0.82	0.63	0.18	
Subtotal				71.28	13.28	29.08	22.36	6.56	
				\$2,501	\$466	\$1,020	\$785	\$230	
Health Facilities									
1. Gramodaya Health Center cum Qtrs.									
a) Gr. 2	No.	9	0.16	1.46	0.27	0.59	0.46	0.13	
2. Subdivisional Health Center									
a) Qtrs. Gr. 4	No.	2	0.85	1.70	0.32	0.69	0.53	0.16	
b) Qtrs. Gr. 3	No.	2	0.40	0.80	0.15	0.33	0.25	0.07	
c) Qtrs. Gr. 2	No.	2	0.23	0.45	0.08	0.18	0.14	0.04	
d) Qtrs. Gr. 2	No.	4	0.16	0.65	0.12	0.26	0.20	0.06	
3. Div. Health Center									
a) 4 wd-60 Beds	No.	1	5.61	5.61	1.05	2.29	1.76	0.52	
b) Qtrs. Gr. 5	No.	1	0.41	0.41	0.08	0.17	0.13	0.04	
c) Qtrs. Gr. 4	No.	1	0.40	0.40	0.07	0.16	0.13	0.04	
d) Qtrs. Gr. 3	No.	4	0.23	0.90	0.17	0.37	0.28	0.08	
e) Qtrs. Gr. 2	No.	5	0.16	0.81	0.15	0.33	0.25	0.07	
Subtotal				13.19	2.46	5.38	4.14	1.21	
				\$463	\$86	\$189	\$145	\$43	

Table 3

DETAILED COST ESTIMATE

BUILDINGS --- SOCIAL AND ADMINISTRATIVE INFRASTRUCTURE (CONTINUED)

ITEM	Unit	Amount	Rate	Total.	1988	1989	1990	1991	19
					Rs.M				
3. Postal Facilities									
1. Post Office									
a) Post Office	No.	1	1.04	1.041	0.19	0.42	0.33	0.10	-
b) Qrts. Gr. 3	No.	1	0.23	0.23	0.04	0.09	0.07	0.02	-
c) Qrts. Gr. 2	No.	1	0.16	0.16	0.03	0.07	0.05	0.01	-
2. Sub Post Office cum Quarters									
	No.	4	0.30	1.20	0.22	0.49	0.38	0.11	-
3. Post Boxes									
	No.	15	0.001	0.01	.00	.00	.00	.00	-
Subtotal				2.64	0.49	1.08	0.83	0.24	-
				\$93	\$17	\$38	\$29	\$9	\$
1. Other Public Buildings and Facilities									
1. Cooperatives									
a) Small Scale	No.	15	0.28	4.24	0.79	1.73	1.33	0.39	-
b) Large Scale	No.	4	0.33	1.32	0.25	0.54	0.42	0.12	-
c) Branch	No.	1	1.19	1.19	0.22	0.48	0.37	0.11	-
2. Police Station Complex									
	No.	1	2.70	2.70	0.50	1.10	0.85	0.25	-
3. Agricultural Training Ctr.									
	No.	1	0.82	0.82	0.15	0.33	0.26	0.08	-
4. Electricity Installations and Water Supply -Water Borne									
	Sum	1	10.27	10.27	1.91	4.19	3.22	0.94	-
Subtotal				20.54	3.83	8.38	6.44	1.89	-
				\$721	\$134	\$294	\$226	\$66	\$
BASE COST				107.64	20.05	43.92	33.77	9.90	0.0
				\$3,777	\$704	\$1,541	\$1,185	\$347	\$

Table 4

Annex D

DETAILED COST ESTIMATE

ITEM	Unit	Amount	Rate	Total	1988	1989	1990	1991	1992
					Rs.M				
Project Buildings									
1. Unit Management Centers									
a) Unit Service Centers	No.	20	0.25	4.92	0.92	2.01	1.54	0.45	-
b) Qtrs. Gr. 3	No.	20	0.23	4.50	0.84	1.84	1.41	0.41	-
c) Qtrs. Gr. 2	No.	20	0.16	3.24	0.60	1.32	1.02	0.30	-
d) Stores, WFP	No.	20	0.22	4.48	0.83	1.83	1.41	0.41	-
e) Tube Well	No.	20	0.06	1.20	0.22	0.49	0.38	0.11	-
2. Block Management Centers									
a) B M Offices	No.	2	0.48	0.96	0.18	0.39	0.30	0.09	-
b) Qtrs. Gr. 4	No.	10	0.40	4.00	0.75	1.63	1.25	0.37	-
c) Qtrs. Gr. 3	No.	12	0.23	2.70	0.50	1.10	0.85	0.25	-
d) Qtrs. Gr. 2	No.	16	0.16	2.59	0.48	1.06	0.81	0.24	-
e) Dormitory	No.	2	0.25	0.50	0.09	0.20	0.16	0.05	-
f) Stores, Misc	No.	2	0.22	0.45	0.08	0.18	0.14	0.04	-
g) Fertilizer Stores	No.	2	0.33	0.66	0.12	0.27	0.21	0.06	-
h) WFP Stores	No.	2	0.22	0.45	0.08	0.18	0.14	0.04	-
i) Electricity Installation	No.	2	1.14	2.28	0.42	0.93	0.72	0.21	-
j) Water Serv. Pipe Borne	No.	2	2.85	5.70	1.06	2.33	1.79	0.52	-
BASE COST				38.63	7.20	15.76	12.12	3.55	0.0
				\$1,355	\$252	\$553	\$425	\$125	\$
Settlement Assistance									
1. Initial Costs									
a) Selection, Orient., Etc.	No.	4516	0.0002	0.90	-	0.336	0.400	0.166	-
b) Transport	No.	4516	0.0004	1.81	-	0.673	0.801	0.333	-
c) Camps	No.	7	0.05	0.35	-	0.130	0.155	0.064	-
d) Wells	No.	40	0.02	0.80	-	0.298	0.355	0.147	-
e) Latrines	No.	40	0.01	0.40	-	0.149	0.177	0.074	-
2. Assistance									
a) Housing -- Core Grant	No.	4516	0.0018	7.90	-	2.944	3.504	1.455	-
b) Latrines	No.	4516	0.0004	1.81	-	0.673	0.801	0.333	-
c) Wells	No.	4516	0.0028	12.42	-	4.626	5.507	2.286	-
d) Agric. Tools	No.	4516	0.0004	1.58	-	0.589	0.701	0.291	-
e) Homestead Planting	No.	4516	0.0002	0.90	-	0.336	0.400	0.166	-
f) Seed	No.	4516	0.0005	2.26	-	0.841	1.001	0.416	-
g) Paddy Plot	No.	4516	0.0025	11.29	-	4.206	5.006	2.078	-
BASE COST				42.42	0.00	15.801	18.809	7.809	0.01
				\$1,488	\$0	\$554	\$660	\$274	\$1

IMPLEMENTATION SCHEDULE
Calendar Year

Item	Responsible Agents	1987	1988	1989	1990	1991	1992
I. Project Development							
A. Project Paper Authorization	AID	X					
B. Project Agreement Activities	GSL, AID	X					
II. Pre-Implementation Activities							
A. Initial Conditions Precedent Met	GSL	X					
B. Complete Surveys & Topo Maps for LUD	MLLD						
C. Revise Land Use Plan	MASL (B/I)	XXXX					
III. Technical Assistance Procurement							
A. Prepare RFP	AID	X					
B. Prepare PIO/T	AID	X					
C. Advertise in CBD	AID	X					
D. Review Proposals	AID, ACO 1/	X					
E. Call for Best & Finals	AID, ACO	X					
F. Interview Finalist	AID, ACO	X					
G. Negotiate & Sign Contract	ACO, TAC 2/	X					
H. Irrigation Engineer Services	TAC		X		X		
I. Local Engineer Services							
1. Civil Engineer	TAC		X				
2. Irrigation Engineer	TAC			X			X
3. Drainage Engineer	TAC		X				X
IV. Annual Workplans							
A. Construction Workplan							
1. Complete Surveys & Topo Maps for F Channels for Construction Next Year	MLLD						
2. Agree on Budgets	MASL, AID	X	X	X	X	X	X
3. Prepare Workplan	MECA, TAC	X	X	X	X	X	X
4. Approve Workplan	AID	X	X	X	X	X	X
5. Prepare PIL	AID	X	X	X	X	X	X
B. Policy Initiative Schedule							
1. Develop Long-Range Plan	MMD, AID	X					
2. Prepare Annual Schedule	MMD	X	X	X	X	X	X
3. Approve Schedule	AID	X	X	X	X	X	X
4. Prepare PIL	AID	X	X	X	X	X	X

106x

Item	Responsible Agents	1987	1988	1989	1990	1991	1992
V. Construction							
A. Distributory Canals							
1. Make Strip Survey of D Canal Trace	'MLLD	'111111 3/	222222 4/	333333 5/			
2. Make Final Alignment and Setting Out	'MECA	'1111 11	222222	333333			
3. Prepare Design & Tender Documents	'MECA	'1111 1111	2222222	222 3333333 333			
4. Construct D Canals	'LC 6/		111111	'111111222222	'22222333333	'333333	
B. Farm Development							
1. Clear Jungle & Do Rough Leveling	'LC		111111111	222222222	333333333		
2. Field Channels							
a. Make Detailed Surveys	'MLLD	'1111	222222	333333			
b. Prepare F Channel Trace and Farm BOP 7/	'MECA	'111111	222222	333333			
c. Make Final Alignment and Setting Out	'MECA		'111111111111	222222222222	'333333333333		
d. Prepare Design and Tender Documents	'MECA		1111111111	2222222222	3333333333		
e. Construct F Channels	'LC 'LC 'LC		1111111111	111111 2222222222	222222 3333333333	333333	
3. Farm Allotment							
a. Stake Out Farm Allotment	'MECA		111111111	2222222222	3333333333		
b. Do Final Land Clearing	'LC		111111111	2222222222	3333333333		
c. Do Permanent Land Marking	'MLLD			11111	111 2222	222 3333	333
4. Drainage Channels							
a. Conduct Field Trials	'MECA, TAC						
b. Design System	'MECA, TAC		xxx xxx				
c. Construct System	'LC			xxxx'xxxxx			
C. Flood Control Measures							
1. Conduct Studies	'MECA, TAC			111111111	222222222	333333333	
2. Design Measures	'MECA, TAC			xxx'xxxxxx	xxx'x		
3. Construct Measures	'LC				xxxxxxxxxxx		
D. Homestead Development							
1. Prepare BOP for Homesteads	'MECA	111 111111	222 222222	333 333333			
2. Stake out Homesteads	'MECA		111111111	222222222	333333333		
3. Do Permanent Land Marking	'MLLD			111111	222222	333333	
E. Bring In Settlers	'MEA			1111	222	3333	
F. Provide First Water Issue	'MEA						
G. Settlement Centers Development							
1. Prepare Layout Plans	'MECA	'111111	'111111222222	'22222333333	'333333		
2. Open Access Roads	'LC	'1111	'11111122	'222222222	'333333333	'33333	
3. Prepare Designs & Tender Documents for Buildings	'MECA	'111111	'111111222222	'22222333333	'333333		
4. Construct Buildings	'LC 'LC 'LC		111111111	111111111	222222222	22222222	
5. Provide Water Supply and Electricity	'MECA		1111	111 2222	222 3333	33333333	333

Item	Responsible Agents	1987	1988	1989	1990	1991	1992
H. Roads							
1. Market Roads							
a. Make Strip Surveys	'MLLD						
b. Prepare Design and Tender Documents	'MECA	1111	2222	3333			
c. Construct	'LC	1111	2222	3333			
2. Hamlet Roads							
a. Prepare Design and Tender Documents	'LC		11111111	11111111			
b. Construct	'LC			22222222	22222222	33333333	
1. Village Tanks							
1. Investigate, Design and Prepare Tender Documents	'MECA	111	111	222	222	333	333
2. Construct	'LC		11111111	11111111			
	'LC			22222222	22222222	33333333	
	'LC				33333333	33333333	
	'MFC	1111	11111111	2222	22222222	3333	3333
	'LC		11111111	11111111			
	'LC			22222222	22222222	33333333	
	'LC				33333333	33333333	
VI. Commodity Procurement							
A. Prepare Commodity List	'MECA, TAC		X				
B. Develop Specifications and Tender Documents	'NASL	X	X				
C. Review and Approve	'AID	X	X				
D. Proceed with Procurement	'NASL, TAC	X	XX				
E. Receive Commodities	'NASL, TAC		XX	X	X		
VII. Training							
A. Overseas							
1. Develop Training Program	'MECA, TAC, AID		X				
2. Select Participants	'MECA, TAC			X			
3. Review and Approve	'AID			X	X		
4. Arrange Training Courses	'NASL		X	X	X	X	X
B. In-Country							
1. Develop Training Program	'MECA, TAC, AID		X				
2. Select Participants	'MECA, TAC			X	X		
3. Arrange and Conduct Courses	'NASL, TAC		X	X	X	X	X
VIII. Evaluation							
	'AID				X		

- 1/ Area Contracting Officer
- 2/ Technical Assistance Contractor
- 3/ Phase 1 - Blocks 401, part of 402, 05 above main road
- 4/ Phase 2 - rest of Block 402, 403, and 404 above main road
- 5/ Phase 3 - Blocks 404 and 405 below main road
- 6/ Local Contractor
- 7/ Blocking Out Plan

108

PROCUREMENT PLAN

A. Procurement Responsibilities: All commodity procurement under the project, except for the four vehicles for the Technical Assistance Contractor (TAC), will be the responsibility of MASL except for selected items to be procured by the TAC. The TAC will work closely with MASL to determine specifications and to develop the required tender documents. Assistance in procurement activities may be obtained from the USAID commodity procurement specialist and the Regional Commodity Management Office (RCMO) in Bangkok. All procurement will be reviewed by USAID and MASL for conformity with approved project budgets and all relevant USAID and GSL regulations.

B. Source of Procurement: The authorized sources for AID grant funded procurements is Code 000 (the United States) and, for local currency, Sri Lanka. Right-hand drive vehicles which are obtained from a Code 935 country must meet the requirements for AID's blanket vehicle waiver to be eligible for AID financing. The waiver is effective until March 6, 1988.

C. Payment: Payment terms for all imported goods will be on the basis of CIF/Colombo. Air freight shipments will be approved in advance by USAID. Responsibility for payments will be with the Controller, USAID/Colombo. The Controller will periodically establish Direct Letters of Commitment through which all U.S. purchases will be paid. Payment for all non-U.S. purchases will be made by the Controller as follows:

1. In the case of local shelf-item procurement, directly by AID upon presentation of seller's invoice, showing items, price and origin, with acknowledgement of receipt in fully functioning good order and relevant stock book number signed by the TAC.
2. In the case of other non-U.S. procurement, upon presentation of the following documentation to the Controller/USAID:
 - pre-paid on-board bill of lading;
 - copy of packing list;
 - copy of supplier's invoice;
 - certificate of source and origin;
 - insurance certificate;
 - supplier's certificate and agreement with A.I.D. for project commodities (Form AID 1450-4);
 - voucher (Standard Form 1034); and,
 - warranty certification as required in the IFB.

D. Shipment, Receipt and Utilization: MASL will be responsible for monitoring shipment, payment of all duties, taxes and commissions, and clearing from Customs all imported commodities with the exception of vehicles, which the local dealer will deliver to MASL and for which MASL will be responsible for dealer's local handling charges.

E. Marking: MASL is aware of AID's marking requirements and will enforce them in all procurement actions.

F. Procurement Schedule:

1. Vehicles: Twelve four-wheel drive (4WD) vehicles will be procured under the project by MASL. Four of these vehicles will be reserved for the use of the Technical Assistance team during the life of the project. At the end of the project these vehicles will be returned to MASL. AID's blanket Geographic Code 935 vehicle source/origin waiver is expected to cover all project vehicles.
2. Computers: Micro computer and peripheral equipment and software purchases will be procured for the TA team through the TA contract. Only computer equipment which can be locally serviced and maintained at low cost will be procured. This will be purchased the first year of the project and may be purchased locally from a reputable dealer who can provide reliable service.
3. Technical Equipment: This will be primarily testing equipment for checking the quality of construction for use by the TA team and will be procured through the TA contract. A detailed list will be prepared by the TAC, in conjunction with MECA, and approved by USAID. This procurement will be spaced over a two-year period beginning in year one of the project.
4. Office Equipment and Furnishings: This will include basic office furnishings (desks, chairs, cabinets), calculators, typewriters, fans, airconditioners, photocopiers and other miscellaneous office equipment, all of which will be procured locally through the TA contract. Procurement will be spread over two years, beginning in Year one of the project.

G. Method of Procurement: Procurement will be effected in accordance with AID regulations and good commercial practices. As a matter of procedure, the following will be observed:

All AID-funded commodity procurement is subject to prior USAID agreement, usually by means of Project Implementation Letters, and relevant AID procurement regulations per AID Handbook 11, Chapter 3.

To the extent permitted by applicable AID Handbook 11 requirements, informal competitive procurement procedures will be employed.

When required, advertising of anticipated procurements will be handled by the TAC, in accordance with AID and GSL regulations.

MASL will be responsible for proper receipt, port clearances, inland transport, and expeditious recording and utilization or storage of items purchased.

H. Title: MASL will have title to all commodities, with the exception of office equipment, computer equipment and peripherals, household furnishings and appliances for the TA team, title to which shall be retained by USAID for use in other, mutually approved development projects.

ECONOMIC ANALYSIS TABLES
MARD Crop Data

Annex G

COSTS AND RETURNS OF CROP PRODUCTION: TABLE 1

CROP: MAHA PADDY

	DOA	MI Res.	MARD Design	
	Dry Zone Averages	Station Recomm'ds	Assumptions Initial	LOP
Yield (kg/ha)	3,881		4,500	6,000
Price (Rs/Kg)	3.08		3.35	3.10
Gross Returns	11,953	0	15,075	18,600
<u>Cash Production Costs</u>				
Hired Labor	2,270		1,500	2,000
Custom Plow: 4WD	746		750	0
: 2WD	346		0	750
: Buff	220		0	0
Buff Harrow&Level	131		150	200
Seed	662		600	750
Fertilizer	1,104		800	1,200
Pest. & Herb.	580		500	500
Thresh & Winnow	494		500	500
Transport	99		100	100
TOTAL/HECTARE	6,652	0	4,900	6,000
NET RETURN/HA	5,301	0	10,175	12,600

MARD Crop Data

COSTS AND RETURNS OF CROP PRODUCTION: TABLE 2

CROP: YALA PADDY

	DOA Dry Zone Averages	MI Res. Station Recomm'ds	MARD Design Assumptions	
			Initial	LOP
Yield (kg/ha)	3,519		3,500	4,800
Price (Rs/Kg)	3.36		3.50	3.25
Gross Returns	11,824	0	12,250	15,600
<u>Cash Production Costs</u>				
Hired Labor	1,983		1,000	1,500
Custom Plow: 4WD	726		750	0
: 2WD	311		0	750
: Buff	217		0	0
Buff Harrow&Level	126		125	150
Seed	689		600	700
Fertilizer	1,186		800	1,200
Pest. & Herb.	835		750	750
Thresh & Winnow	464		400	500
Transport	86		80	100
TOTAL/HECTARE	6,623	0	4,505	5,650
NET RETURN/HA	5,201	0	7,745	9,950

MARD Crop Data

COSTS AND RETURNS OF CROP PRODUCTION: TABLE 3

CROP: CHILLIES

	DOA	MI Res.	MARD Design	
	Dry Zone Averages	Station Recomm'ds	Assumptions Initial	LOP
Yield (kg/ha)	1,279	3,500	1,000	2,000
Price (Rs/Kg)	34.00	26.00	25.00	30.00
Gross Returns	43,486	91,000	25,000	60,000
<u>Cash Production Costs</u>				
Hired Labor	5,985	10,300	5,000	10,000
Custom Plow: 4WD	561	1,550	1,500	1,500
: 2WD	0	0		0
: Buff	289	0		0
Buff Harrow&Level	0	0		300
Seed	0	180	150	200
Fertilizer	1,991	3,581	1,500	3,500
Pest. & Herb.	2,181	5,250	2,000	3,000
Irrigation	1,018	0	1,000	2,000
Other	358	0	200	300
TOTAL/HECTARE	12,383	20,861	11,350	20,800
NET RETURN/HA	31,103	70,139	13,650	39,200

MARD Crop Data

COSTS AND RETURNS TO CROP PRODUCTION: TABLE 4

CROP: SOY

	DOA Cost of Production		MI Res. Station Recomm'ds	MARD Design Assumptions	
	ANURAD.	KALAWEWA		Initial	LOP
Yield (kg/ha)	1,494	1,583	2,200	1,100	1,800
Price (Rs./kg)	8.22	7.98	7.50	8.00	8.00
Gross Returns	12,283	12,635	16,500	8,800	14,400
<u>Cash Production Costs</u>					
Land Prep.	815	1,136	1,200	1,000	1,200
Seed	803	667	1,020	700	900
Fertilizer	850	277	750	400	750
Pest. & Herb.	627	462	1,020	500	750
Hired Labor	1,541	1,583	1,456	1,500	1,500
Other	0	69	150	100	100
TOTAL PER HECTARE	4,636	4,194	5,596	4,200	5,200
NET RETURNS (RS./HA)	7,646	8,441	10,904	4,600	9,200

CROP: COW PEA

Yield (kg/ha)	304	845	2,000	700	1,400
Price (Rs./kg)	8.58	10.80	10.00	10.00	10.00
Gross Returns	6,898	9,126	20,000	7,000	14,000
<u>Cash Product. Costs</u>					
Land Prep.	0	1,008	2,471	500	1,200
Seed	326	225	450	300	400
Fertilizer	0	0	840	400	800
Pest. & Herb.	395	605	1,080	500	500
Hired Labor	472	454	1,920	400	1,500
Other	0	0	0	0	0
TOTAL PER HECTARE	1,193	2,292	6,761	2,100	4,400
NET RETURNS (RS./HA)	5,705	6,834	13,239	4,900	9,600

MARD Crop Data

COSTS AND RETURNS TO CROP PRODUCTION: TABLE 5

CROP: BLACK GRAM

	DOA Cost of Production		MI Res. Station Recomm'ds	MARD Design Assumptions	
	ANURAD.	KALAWEWA		Initial	LOP
Yield (kg/ha)	807	853	1,200	600	1,230
Price (Rs./kg)	9.48	14.76	10.00	10.00	12.00
Gross Returns	7,650	12,590	12,000	6,000	14,760
<u>Cash Product. Costs</u>					
Land Prep.	852	813	2,471	700	1,500
Seed	558	375	300	400	400
Fertilizer	0	0	840	300	800
Pest. & Herb.	0	0	1,080	800	800
Hired Labor	889	1,099	1,600	800	1,500
Other	77	49	500	100	150
TOTAL PER HECTARE	2,376	2,336	6,791	3,100	5,150
NET RETURNS (RS./HA)	5,274	10,254	5,209	2,900	9,610

CROP: GREEN GRAM (MUNG BEAN)

	DOA Cost of Production			MI RES. STAT. Recomm'ds	MARD Design Assumptions	
	ANURAD.	KALAWEWA	POLONN.		Initial	LOP
Yield (kg/ha)	858	805	1,012	1,700	600	1,230
Price (Rs./kg)	18.77	16.68	17.35	12.00	12.00	15.00
Gross Returns	16,105	13,427	17,558	20,400	7,200	18,450
<u>Cash Production Costs</u>						
Land Prep.	0	432	724	2,471	1,000	1,500
Seed	492	341	501	360	300	400
Fertilizer	0	0	314	840	200	800
Pest. & Herb.	857	635	837	1,080	500	500
Hired Labor	412	556	2,547	1,920	500	1,500
Other	0	0	0	0	100	100
TOTAL PER HECTARE	1,761	1,964	4,923	6,671	2,600	4,800
NET RETURNS (RS./HA)	14,344	11,463	12,635	13,729	4,600	13,650

MARD Crop Data

COSTS AND RETURNS TO CROP PRODUCTION: TABLE 6

CROP: GROUNDNUT

	<u>DOA Cost of Production</u>	MI Res. Station Recomm'ds	MARD Design Assumptions	
	POLONNARUWA		Initial	LOP
Yield (kg/ha)	2,009	2,000	1,000	2,000
Price (Rs./kg)	10.83	10.00	10.00	10.00
Gross Returns	21,757	20,000	10,000	20,000
<u>Cash Production Costs</u>				
Land Prep.	711	2,471	500	1,500
Seed	2,443	1,000	800	1,000
Fertilizer	170	840	300	800
Pest. & Herb.	291	900	300	400
Hired Labor	3,300	1,800	700	1,500
Other	0	0	0	0
TOTAL PER HECTARE	6,915	7,011	2,600	5,200
NET RETURNS (RS./HA)	14,842	12,989	7,400	14,800

CROP: POTATOES

	<u>DOA Cost of Prod.</u>	MI Res. Station Recomm'ds	MARD Design Assumptions	
	BADULLA		Initial	LOP
Yield (kg/ha)	13748	12,500	5,000	12,000
Price (Rs./kg)	9.82	10.00	10.00	10.00
Gross Returns	135,005	125,000	50,000	120,000
<u>Cash Production Costs</u>				
Land Prep.	0	1,625	1,500	1,750
Seed	39,214	30,000	20,000	30,000
Fertilizer	8,214	1,200	1,000	1,500
Pest. & Herb.	2,428	1,300	1,000	1,000
Hired Labor	8,158	5,818	3,000	5,000
Other	1,359	0	500	500
TOTAL PER HECTARE	59,373	39,943	27,000	39,750
NET RETURNS (RS./HA)	75,632	85,057	23,000	80,250

MARD Crop Data

COSTS AND RETURNS TO CROP PRODUCTION: TABLE 7

CROP: RED ONIONS

	<u>DOA Cost of Production</u>		MI Res. Station Recomm'ds	MARD Design Assumptions	
	JAFFNA	BATTICAL		Initial	LOP
Yield (kg/ha)	12,353	9,026	20,000	8,000	15,000
Price (Rs./kg)	6.72	8.39	11.00	11.00	11.00
Gross Returns	83,012	75,728	220,000	88,000	165,000
<u>Cash Production Costs</u>					
Land Prep.	2,463	0	1,500	1,500	1,500
Seed	33,555	13,118	26,250	20,000	25,000
Fertilizer	8,124	4,466	1,136	1,500	2,000
Pest. & Herb.	4,387	3,414	1,840	1,500	1,800
Hired Labor	12,664	18,024	19,200	12,000	18,000
Irrig. Hand Pump	4905	0	0	0	5,000
Other	190	462	0	200	500
TOTAL PER HECTARE	66,288	39,484	49,926	36,700	53,800
NET RETURNS (RS./HA)	16,724	36,244	170,074	51,300	111,200

CROP: BOMBAY ONIONS

	<u>DOA Cost of Production</u>		MI Res. Station Recomm'ds	MARD Design Assumptions	
	Matale			Initial	LOP
Yield (kg/ha)	5667		20,000	8,000	15,000
Price (Rs./kg)	11.18		11.00	11.00	11.00
Gross Returns	63,357		220,000	88,000	165,000
<u>Cash Product. Costs</u>					
Land Prep.	0		1,550	1,200	1,500
Seed	669		11,050	10,000	10,000
Fertilizer	1,902		1,209	1,000	1,500
Pest. & Herb.	951		1,915	1,000	1,000
Hired Labor	2,890		25,280	10,000	20,000
Pump Irrigation	6,133		0	0	5,000
TOTAL PER HECTARE	12,545		41,004	23,200	39,000
NET RETURNS (RS./HA)	50,812		178,996	64,800	126,000

MARD Crop Data

COSTS AND RETURNS TO CROP PRODUCTION: TABLE 8

CROP: COARSE GRAINS

	MI Recommendations		MAIZE MARD Design Assumptions		NOTES:
	MAIZE	MILLET*	Initial	LDP	
	Yield (kg/ha)	2,000	2,000	1,500	
Price (Rs./kg)	4.00	2.50	3.00	4.00	
Gross Returns	8,000	5,000	4,500	12,000	
<u>Cash Product Costs</u>					* Kurakkan
Land Prep.	0	0	1,500	1,500	** 40% of Labor charged
Seed	70	20	100	200	
Fertilizer	900	0	500	1,000	
Pest. & Herb.	150	0	200	200	
Hired Labor**	1,312	1,200	1,000	1,500	
Other	0	400	100	300	
TOTAL PER HECTARE	2,432	1,620	3,400	4,700	
NET RETURNS (RS./HA)	5,568	3,380	1,100	7,300	

CROP: OIL CROPS (Irrigated or Production on Homestead)

	MI Station Recommendations			
	Castor	Sesame	Mustard	Sunflower
Yield (kg/ha)	1500	1,000	1,000	1,100
Price (Rs./kg)	10.00	15.00	60.00	
Gross Returns	15,000	15,000	60,000	
<u>Cash Production Costs</u>				
Land Prep.	1,875	2,500	1,250	1,875
Seed	50	75	480	???
Fertilizer	764	764	728	1,029
Pest. & Herb.	350	369	378	330
Hired Labor	1,760	2,360	3,000	1,100
TOTAL PER HECTARE	4,799	6,068	5,836	4,334
NET RETURNS (RS./HA)	10,201	8,932	54,164	

MARD and MDS Economic Analysis

Economic Analysis, Table 9

Evolution of the Cropping System With and Without MARD, in hectares

CROP	YEARS							
	1	2	3	4	5	6	7	8-30
Maha Paddy without	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
with	1.00	1.00	0.95	0.95	0.90	0.90	0.85	0.85
Yala Paddy without	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70
with	0.85	0.75	0.65	0.55	0.45	0.35	0.25	0.15
Chilli without	0.00	0.00	0.05	0.10	0.15	0.05	0.05	0.05
with	0.05	0.10	0.10	0.05	0.05	0.05	0.05	0.05
Mung Bean without	0.00	0.00	0.00	0.00	0.00	0.05	0.10	0.10
with	0.05	0.05	0.10	0.10	0.10	0.10	0.10	0.10
Black Gram without	0.00	0.00	0.00	0.00	0.00	0.05	0.10	0.10
with	0.05	0.05	0.05	0.10	0.10	0.10	0.10	0.10
Cow Pea without	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05
with	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05
<u>Crops Only with Project</u>								
Groundnuts	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05
Potatoes	0.00	0.00	0.00	0.00	0.05	0.10	0.15	0.20
Soy	0.00	0.00	0.00	0.05	0.05	0.10	0.15	0.20
Red Onions	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05
Bombay Onions	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05
Maize	0.00	0.00	0.00	0.05	0.05	0.05	0.05	0.05
Castor Beans	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05
Sesame	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05

6/8/87

MARD and MDS Economic Analysis

Economic Analysis, Table 10

Yields (kilograms per hectare)

CROP	YEARS							
	1	2	3	4	5	6	7	8-30
Maha Paddy without	4,500	4,500	4,500	4,600	4,700	4,800	4,900	5,000
with	4,500	4,500	4,750	5,000	5,250	5,500	5,750	6,000
Yala Paddy without	3,500	3,500	3,500	3,600	3,700	3,800	3,900	4,000
with	3,500	3,500	3,750	4,000	4,200	4,400	4,600	4,800
Chilli without	1,000	1,070	1,140	1,210	1,280	1,350	1,420	1,490
with	1,000	1,140	1,280	1,420	1,560	1,700	1,840	2,000
Mung Bean without	600	640	680	720	760	800	840	880
with	600	690	780	870	960	1,050	1,140	1,230
Black Gram without	600	640	680	720	760	800	840	880
with	600	690	780	870	960	1,050	1,140	1,230
Cow Pea without	700	740	780	820	860	900	940	980
with	700	800	900	1,000	1,100	1,200	1,300	1,400
<u>Crops Only with Project</u>								
Groundnuts	1,000	1,143	1,286	1,429	1,571	1,714	1,857	2,000
Potatoes	5,000	6,000	7,000	8,000	9,000	10,000	11,000	12,000
Soy	1,100	1,200	1,300	1,400	1,500	1,600	1,700	1,800
Red Onions	8,000	9,000	10,000	11,000	12,000	13,000	14,000	15,000
Bombay Onions	8,000	9,000	10,000	11,000	12,000	13,000	14,000	15,000
Maize	1,500	1,714	1,929	2,143	2,357	2,571	2,786	3,000
Castor Beans	800	900	1,000	1,100	1,200	1,300	1,400	1,500
Sesame	650	700	750	800	850	900	950	1,000

6/8/87

Economic Analysis: Table 11

Total Production in kilograms

CROP	YEARS							
	1	2	3	4	5	6	7	8-30
Maha Paddy without	4,500	4,500	4,500	4,600	4,700	4,800	4,900	5,000
with	4,500	4,500	4,513	4,750	4,725	4,950	4,888	5,100
Yala Paddy without	3,500	3,500	3,325	3,240	3,145	3,040	2,925	2,800
with	2,975	2,625	2,438	2,200	1,890	1,540	1,150	720
Chilli without	0	0	57	121	192	68	71	75
with	50	114	128	71	78	85	92	100
Mung Bean without	0	0	0	0	0	40	84	88
with	30	35	78	87	96	105	114	123
Black Gram without	0	0	0	0	0	40	84	88
with	30	35	39	87	96	105	114	123
Cow Pea without	0	0	0	0	0	45	47	49
with	0	40	45	50	55	60	65	70
<u>Crops Only with Project</u>								
Groundnuts	0	0	64	71	79	86	93	100
Potatoes	0	0	0	0	450	1,000	1,650	2,400
Soy	0	0	0	70	75	160	255	360
Red Onions	0	0	500	550	600	650	700	750
Bombay Onions	0	0	0	0	600	650	700	750
Maize	0	0	0	107	118	129	139	150
Castor Beans	0	0	0	0	60	65	70	75
Sesame	0	0	0	0	0	0	48	50

6/8/87

Economic Analysis: Table 12

Prices (Rupees per kilogram)

CROP	YEARS							
	1	2	3	4	5	6	7	8-30
Maha Paddy without	3.35	3.31	3.28	3.24	3.21	3.17	3.14	3.10
with	3.35	3.31	3.28	3.24	3.21	3.17	3.14	3.10
Yala Paddy without	3.50	3.46	3.43	3.39	3.36	3.32	3.29	3.25
with	3.50	3.46	3.45	3.39	3.36	3.32	3.29	3.25
Chilli without	25.00	25.71	26.43	27.14	27.86	28.57	29.29	30.00
with	25.00	25.71	26.43	27.14	27.86	28.57	29.29	30.00
Mung Bean without	12.00	12.43	12.86	13.29	13.71	14.14	14.57	15.00
with	12.00	12.43	12.86	13.29	13.71	14.14	14.57	15.00
Black Gram without	10.00	10.29	10.57	10.86	11.14	11.43	11.71	12.00
with	10.00	10.29	10.57	10.86	11.14	11.43	11.71	12.00
Cow Pea without	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
with	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
<u>Crops Only with Projec</u>								
Groundnuts	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Potatoes	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Soy	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Red Onions	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
Bombay Onions	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
Maize	3.00	3.14	3.29	3.43	3.57	3.71	3.86	4.00
Castor Beans	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Sesame	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00

6/8/87

Economic Analysis: Table 13

Gross Revenue (in rupees per crop)

CROP	YEARS							
	1	2	3	4	5	6	7	8-30
Maha Paddy without	15,075	14,914	14,754	14,917	15,074	15,223	15,365	15,500
with	15,075	14,914	14,795	15,404	15,154	15,699	15,326	15,810
Yala Paddy without	12,250	12,125	11,400	10,993	10,558	10,097	9,611	9,100
with	10,413	9,094	8,357	7,464	6,345	5,115	3,779	2,340
Chilli without	0	0	1,506	3,284	5,349	1,929	2,079	2,235
with	1,250	2,931	3,383	1,927	2,173	2,429	2,694	3,000
Mung Bean without	0	0	0	0	0	566	1,224	1,320
with	360	429	1,003	1,156	1,317	1,485	1,661	1,845
Black Gram without	0	0	0	0	0	457	964	1,056
with	300	355	412	945	1,070	1,200	1,335	1,476
Cow Pea without	0	0	0	0	0	450	470	490
with	0	400	450	500	550	600	650	700
<u>Crops Only with Projec</u>								
Groundnuts	0	0	643	714	786	857	929	1,000
Potatoes	0	0	0	0	4,500	10,000	16,500	24,000
Soy	0	0	0	560	600	1,280	2,040	2,880
Red Onions	0	0	5,500	6,050	6,600	7,150	7,700	8,250
Bombay Onions	0	0	0	0	6,600	7,150	7,700	8,250
Maize	0	0	0	367	421	478	537	600
Castor Beans	0	0	0	0	600	650	700	750
Sesame	0	0	0	0	0	0	713	750

6/8/87

124x

MARD and MDS Economic Analysis

Economic Analysis: Table 14

Cost of Production (Rupees per hectare)

CROP	YEARS							
	1	2	3	4	5	6	7	8-30
Maha Paddy without	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900
with	4,900	5,057	5,214	5,371	5,529	5,686	5,843	6,000
Yala Paddy without	4,505	4,505	4,505	4,505	4,505	4,505	4,505	4,505
with	4,505	4,669	4,832	4,996	5,159	5,323	5,486	5,650
Chilli without	11,350	11,350	11,350	11,350	11,350	11,350	11,350	11,350
with	11,350	12,700	14,050	15,400	16,750	18,100	19,450	20,800
Mung Bean without	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600
with	2,600	2,914	3,229	3,543	3,857	4,171	4,486	4,800
Black Gram without	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100
with	3,100	3,393	3,686	3,979	4,271	4,564	4,857	5,150
Cow Pea without	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100
with	2,100	2,429	2,757	3,086	3,414	3,743	4,071	4,400
<u>Crops Only with Proje:</u>								
Groundnuts	2,600	2,971	3,343	3,714	4,086	4,457	4,829	5,200
Potatoes	27,000	28,821	30,643	32,464	34,286	36,107	37,929	39,750
Soy	4,200	4,343	4,486	4,629	4,771	4,914	5,057	5,200
Red Onions	36,700	39,143	41,586	44,029	46,471	48,914	51,357	53,800
Bombay Onions	23,200	25,457	27,714	29,971	32,229	34,486	36,743	39,000
Maize	3,400	3,586	3,771	3,957	4,143	4,329	4,514	4,700
Castor Beans	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800
Sesame	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000

MARD and MDS Economic Analysis

Economic Analysis: Table 15

Total Cost of Production (rupees per crop)

CROP	YEARS							
	1	2	3	4	5	6	7	8-30
Maha Paddy without	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900
with	4,900	5,057	4,954	5,103	4,976	5,117	4,966	5,100
Yala Paddy without	4,505	4,505	4,280	4,055	3,829	3,604	3,379	3,154
with	3,829	3,501	3,141	2,748	2,322	1,863	1,372	848
Chilli without	0	0	568	1,135	1,703	568	568	568
with	568	1,270	1,405	770	838	905	973	1,040
Mung Bean without	0	0	0	0	0	130	260	260
with	130	146	323	354	386	417	449	480
Black Gram without	0	0	0	0	0	155	310	310
with	155	170	184	398	427	456	486	515
Cow Pea without	0	0	0	0	0	105	105	105
with	0	121	138	154	171	187	204	220
<u>Crops Only with Project</u>								
Groundnuts	0	0	167	186	204	223	241	260
Potatoes	0	0	0	0	1,714	3,611	5,689	7,950
Soy	0	0	0	231	239	491	759	1,040
Red Onions	0	0	2,079	2,201	2,324	2,446	2,568	2,690
Bombay Onions	0	0	0	0	1,611	1,724	1,837	1,950
Maize	0	0	0	198	207	216	226	235
Castor Beans	0	0	0	0	240	240	240	240
Sesame	0	0	0	0	0	0	300	300

Economic Analysis: Table 16

Net Returns (rupees per crop)

CROP	YEARS							
	1	2	3	4	5	6	7	8-30
Maha Paddy without	10,175	10,014	9,854	10,017	10,174	10,323	10,465	10,600
with	10,175	9,857	9,841	10,301	10,178	10,581	10,559	10,710
Yala Paddy without	7,745	7,620	7,120	6,938	6,729	6,493	6,232	5,947
with	6,583	5,592	5,216	4,717	4,023	3,252	2,407	1,493
Chilli without	0	0	939	2,149	3,646	1,361	1,512	1,668
with	683	1,661	1,978	1,157	1,335	1,524	1,722	1,960
Mung Bean without	0	0	0	0	0	436	964	1,060
with	230	283	680	802	931	1,068	1,213	1,365
Black Gram without	0	0	0	0	0	302	674	746
with	145	185	228	547	643	744	850	961
Cow Pea without	0	0	0	0	0	345	365	385
with	0	279	312	346	379	413	446	480
<u>Crops Only with Project</u>								
Groundnuts	0	0	476	529	581	634	687	740
Potatoes	0	0	0	0	2,786	6,569	10,811	16,050
Soy	0	0	0	329	361	789	1,281	1,840
Red Onions	0	0	3,421	3,849	4,276	4,704	5,132	5,560
Bombay Onions	0	0	0	0	4,989	5,426	5,863	6,300
Maize	0	0	0	169	214	261	312	365
Castor Beans	0	0	0	0	360	410	460	510
Sesame	0	0	0	0	0	0	413	450

MAPD and MDS Economic Analysis

Economic Analysis: Table 17

Net Returns (rupees per hectare per crop)

CROP	YEARS							
	1	2	3	4	5	6	7	8-30
Maha Paddy without	10,175	10,014	9,854	10,017	10,174	10,323	10,465	10,600
with	10,175	9,857	10,359	10,843	11,309	11,757	12,188	12,600
Yala Paddy without	7,745	7,620	7,495	7,709	7,916	8,116	8,309	8,495
with	7,745	7,456	8,025	8,576	8,941	9,291	9,628	9,950
Chilli without			18,779	21,493	24,307	27,221	30,236	33,350
with	13,650	16,614	19,779	23,143	26,707	30,471	34,436	39,200
Mung Bean without						8,714	9,640	10,600
with	4,600	5,661	6,800	8,016	9,309	10,679	12,126	13,650
Black Gram without						6,043	6,740	7,460
with	2,900	3,704	4,560	5,467	6,426	7,436	8,497	9,610
Cow Pea without						6,900	7,300	7,700
with		5,571	6,243	6,914	7,586	8,257	8,929	9,600
<u>Crops Only with Project</u>								
Groundnuts			9,514	10,571	11,629	12,686	13,743	14,800
Potatoes					55,714	63,893	72,071	80,250
Soy				6,571	7,229	7,886	8,543	9,200
Red Onions			68,414	76,971	85,529	94,086	102,643	111,200
Bombay Onions					99,771	108,514	117,257	126,000
Maize				3,390	4,276	5,222	6,231	7,300
Castor Beans					7,200	8,200	9,200	10,200
Sesame							8,250	9,000

6/8/87

128x

TABLE 18

ECONOMICS OF ONE-HALF ACRE HOMESTEAD WITHOUT PROJECT

I. Cost of Production	
A. Cost of seed pieces	
1. Banana, 12 suckers at Rs.5/ sucker	-Rs. 60
2. Papaya, 10 seedlings at Rs.1/ seedling	- 10
3. Pineapple, 400 suckers at Rs.1/ sucker	- 400
4. Pepper (bell), 686 seedlings at Rs.1/seedling	- 686

Sub- total	Rs.1,156
B. Fertilizers and chemicals	500
C. Labor	1,077

Total Expenses	Rs.2,733
II. Gross Income	
A. Banana, 12 bunches x Rs.60/bunch	- Rs. 720
B. Papaya, 10 plants x 10 furits/plant x Rs.2/fruit	- 200
C. Pineapple, 400 fruits x Rs.5/fruit	- 2,000
D. Pepper, 686 plants x 0.5 kg fruit/plant x Rs.6/kg	- 2,058

Gross Income	Rs. 4,978
III. Net Income	Rs 2,245

ANNEX G

TABLE 19

ECONOMICS OF ONE-HALF ACRE HOMESTEAD WITH PROJECT

I. Cost of Production

A. Cost of seedpieces

1. Banana, 24 suckers at Rs.5/sucker	- Rs.	120
2. Papaya, 20 seedlings at Rs.1/seedling	-	20
3. Pineapple, 961 suckers at Rs.1/sucker	-	961
4. Pepper (bell), 961 seedlings at Rs.1/seedling	-	961

Sub- total - Rs.2,062

B. Fertilizers and chemicals 500

C. Labor 1,500

Total Expenses - Rs.4,062

II. Gross Income

A. Banana, 24 bunches at Rs.60/bunch - Rs.1,440

B. Papaya, 20 plants x 10 fruits/plant x Rs.fruit- 400

C. Pineapple, 961 fruits x Rs.5/fruit - 4,805

D. Pepper, 961 plants x 0.5 kg fruit/plant
x Rs.6/kg - 2,883

Gross Income - Rs.9,528

III. Net Income - Rs.5,466

ANNEX G

TABLE 20

ECONOMICS OF ONE ACRE HOMESTEAD WITHOUT PROJECT

I. Cost of production

A. Cost of seedpieces

1. Banana, 24 suckers at Rs.5/sucker	- Rs. 120
2. Papaya, 35 plants at Rs.1/seedling	- 35
3. Pineapple, 1,000 suckers at Rs.1/sucker	- 1,000
4. Pepper, 1,666 seedlings at Rs.1/seedling-	2,777

Sub-total - Rs.3,932

B. Fertilizers and Chemicals 1,500

C. Labor 4,500

Total Expenses - Rs.9.932

II. Gross Income

A. Banana, 24 bunches at Rs.60/bunch - Rs.1,440.

B. Papaya, 35 plants x 10 fruits/plant
x Rs.2/fruit - 700

C. Pineapple, 1,000 fruits x Rs.5/fruit - 5,000

D. Pepper, 2,777 plants x 0.5 kg/plant x Rs.6/kg - 8,331

Gross Income Rs.15,471

III. Net Income

Rs. 5,539

ECONOMICS OF ONE ACRE HOMESTEAD WITH PROJECT

I. Cost of production

A. Cost of seedpieces

1. Banana, 83 suckers at Rs.5/sucker	- Rs. 415
2. Papaya, 70 seedlings at Rs.1/seedling	- 70
3. Pineapple, 2,780 suckers at Rs.1/sucker	- 2,780
4. Pepper (bell), 4,150 at Rs.1/seedling	- 4,150

Sub-total - Rs.7,415

B. Fertilizers and Chemicals - 1,500

C. Labor - 4,500

Total Expenses - Rs.13,415

II. Gross Income

A. Banana, 83 bunches at Rs.60/bunch - Rs. 4,980

B. Papaya, 70 trees x 10 fruits/tree x Rs.2/fruit- 1,400

C. Pineapple, 2,780 fruits x Rs.5/fruit - 13,900

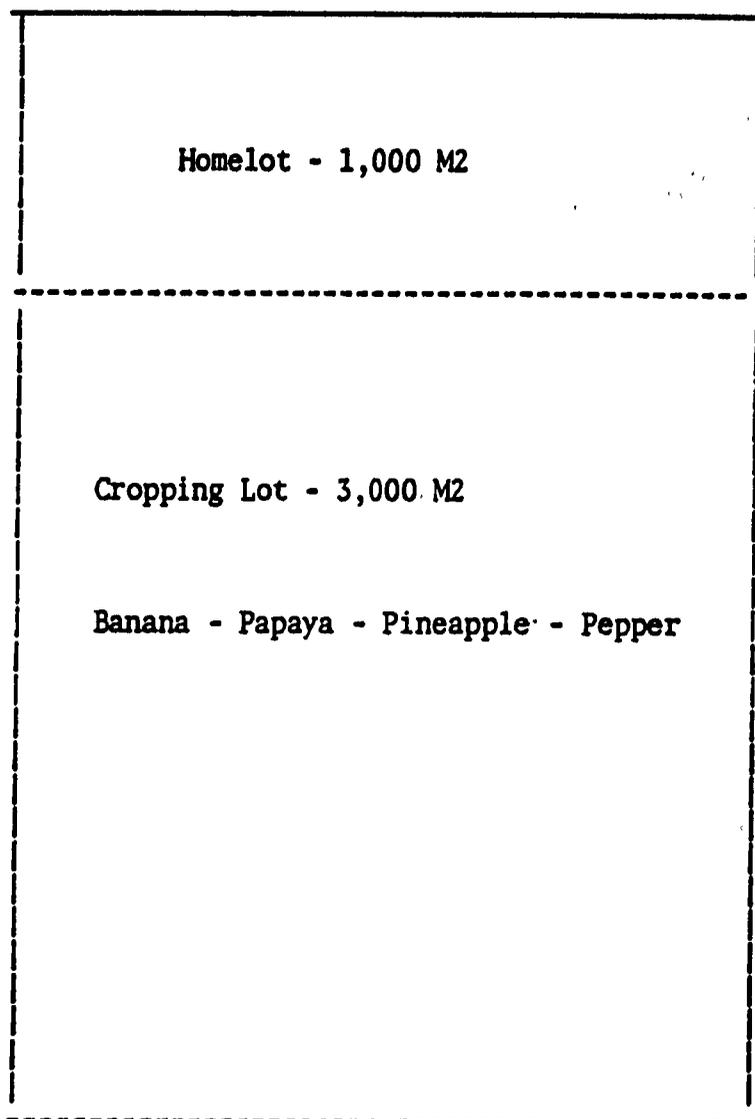
D. Pepper, 4,150 plants x 0.5 kg fruit/plant
x Rs.6/kg - 12,450

Gross Income -Rs.32,730

III. Net Income

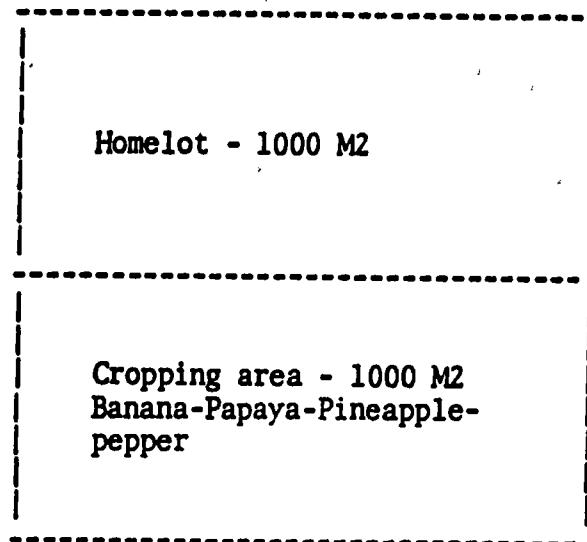
Rs.19,315

FIGURE 1.

HOMESTEAD, ONE-ACRE WITH PROJECT

Gross Income	: Rs.32,730
Expenses	: Rs.13,415
Net Income	: Rs.19,315

FIGURE 2.

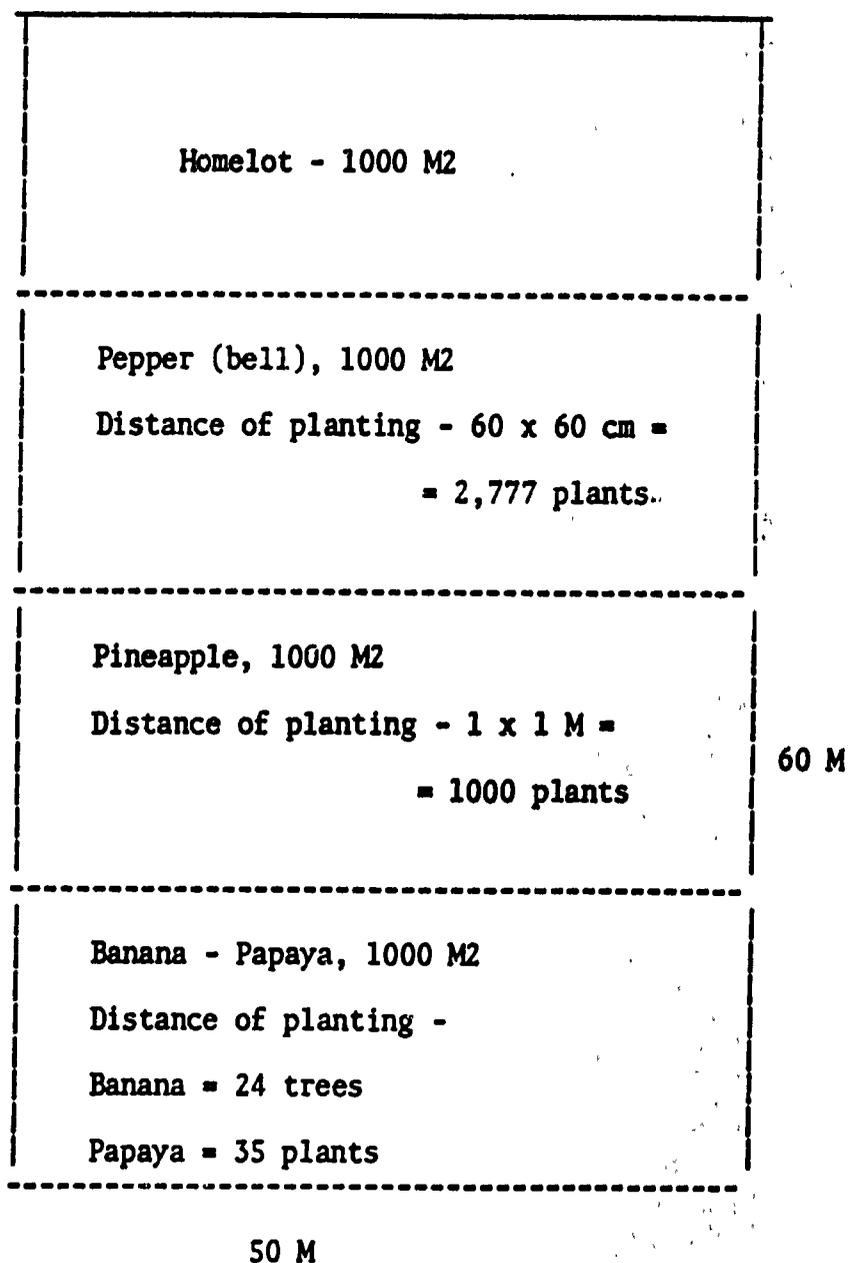
HOMESTEAD, ONE HALF ACRE WITH PROJECT

Lot 1, 1000 M2

Banana	= 24 bunches x Rs.60/bunch	-	Rs.1,440
Papaya	= 20 plants x 10 fruits/plant x Rs.2/fruit	-	400
Pineapple	= 961 fruits x Rs.5/fruit	-	4,805
Pepper	= 961 plants x 0.5 kg/plant x Rs.6/kg	-	2,883

	Gross Income with project	-	Rs.9,528
	Expenses	-	Rs.4,057
	Net Income	-	Rs.5,371

FIGURE 3.

VARIATION OF ONE-ACRE HOMESTEAD WITH PROJECT

ENVIRONMENTAL ANALYSISBackground Information

Agriculture plays a major role in the Sri Lankan economy, accounting in 1985 for about 26% of the total GDP, over 50% of total employment and 47% of export earnings. In addition, currently some 90% of the island's rural population and 70% of its total population are either directly or indirectly dependent on agriculture as their major source of livelihood. Largely in recognition of these facts, in 1968, the Government of Sri Lanka (GSL) decided to implement the Mahaweli Development Program.

Originally proposed as a 30-year development effort, in 1978 the GSL decided that it was both feasible and desirable to accelerate completion of a portion of the Mahaweli Development Program to within a six-year period. This revised program has subsequently become known as the Accelerated Mahaweli Development Program (AMP). As presently proposed and being implemented, the AMP consists of the construction of four major dams and headworks (Kotmale, Victoria, Randenigala and Maduru Oya) with an annual hydro-electric power generation capacity of some 470 megawatts with provision for future additional capacity of 275 megawatts; tunnels; diversion, main and branch irrigation canals; and the development of downstream areas including some 102,000 hectares (245,000 acres) of irrigable land to be opened up for agriculture in the dry zone of the country. This includes the development of new irrigated lands in System "H" (23,000 hectares), System "A" (15,000 hectares), System "B" (37,000 hectares), System "C" (22,000 hectares) and System "G" (5,000 hectares) of the Program area (see Figure 1). When completed, the AMP will: (a) increase food production by about 550,000 metric tons annually; (b) create significant employment through construction work, farming activities on newly irrigated and non-irrigated lands, non-farm activities required to support construction and agriculture activities, and secondary job creation in related sectors of the economy; (c) more than double the country's total generating capacity meeting electric power requirements of the country into the 1990's; and (d) provide sufficient water storage capacity to irrigate an additional 143,000 hectares of land at a later date.

During the design of the many development activities associated with the AMP, several initial assessments were made of the environmental consequences associated with the construction of the various individual development systems of the overall program (see above cites). Through these studies, it became readily apparent that: (1) the proposed AMP would have significant environmental effects on Sri Lankan natural resources, and (2) in order to assess these effects accurately, the AMP had to be studied as a whole rather than as the sum of its multi-faceted component parts.

To assist the GSL in further examining this aspect of the AMP, USAID contracted with the firm Tippetts-Abbett-McCarthy and Stratton (TAMS) to perform a comprehensive environmental assessment (EA) of the entire AMP to identify potentially significant environmental impacts associated with the Program and recommend mitigative actions to ameliorate those impacts. The 18-month study involved over 75 person months of effort by a team of technical specialists in the fields of land use and conservation, wildlife biology, aquatic ecology/fisheries biology, forestry, water resources management, economic planning and social science. In general, the EA findings indicated that the AMP would result in significant environmental impacts for Sri Lanka and recommended a broad range of technical areas where appropriate mitigative actions should be taken to address those impacts.

Upon completion, the four-volume TAMS assessment findings were subsequently incorporated into an Environmental Plan of Action requested by the GSL to further delineate how the report's mitigative recommendations could be effectively translated into environmental actions. The Action Plan established project implementation priorities and identified action programs in eight general development areas: (1) wildlife conservation; (2) watershed management; (3) forestry planning and management; (4) water resources research and monitoring; (5) fisheries development; (6) health care and sanitation planning; (7) water and soil management; and (8) land use planning.

Since work began in 1978, the AMP has met many of its goals. The four major dams have been completed and over 46,000 hectares of land are now being irrigated. It is expected that approximately 73,000 hectares will be fully developed and settled by 1990. In addition, by 1987, the AMP will be providing over 466 megawatts of hydropower to the national electrical grid, giving Sri Lanka self-sufficiency in power production through the year 1992. As of October 1986, approximately 46,150 families, mostly landless tenant farmers and families displaced by new reservoirs, had been settled on newly irrigated lands. The AMP has also provided other infrastructure including roads, schools, post offices, health centers, banks, administrative offices, etc. in creating productive farming communities from previous wildlands areas. The settlers have made a significant contribution to the dramatic increase in national rice production over the last few years.

In System B (Figure 2), the largest single area in the AMP and the site of AID's major investment, significant development has taken place. Out of the planned total of 37,000 hectares of newly irrigated land, 24,900 hectares are under development and 9,900 farmer families have been settled on one hectare irrigated allotments. To date, AID has invested roughly U.S.\$ 115 million in the design and construction of the 138 kilometers of canals required to complete main and branch canal network in the left bank of System B, and, in addition, has provided approximately \$9 million out of the \$50 million total Mahaweli Sector Support Project (383-0078) funding for downstream activities in System B. The total estimated expenditures to date for System B development, including main and branch canals of the left bank of System B are \$172 million, with the total cost of the development of the priority zones estimated at \$250 million. The GSL has obtained donor assistance for work in zones 1, 2, 3, and 5, but an estimated \$35 million, consisting primarily of work in Zone 4A of System B, has remained unfunded.

Environmental Analysis

As it has now been some six years since completion of the original AMP Assessment and Action Plan during which time substantial progress has been achieved in implementing the AMP (see above), the Mission decided it was both timely and useful to review the status of implementation of the recommended environmental/mitigative aspects of the Program and, based on this review, provide an updated listing of priority areas for environmental action which have not received adequate attention subsequent to and as specified in the original AMP Assessment/Action Plan recommendations. This activity was considered to be especially appropriate in view of the substantial new USAID investments in the AMP under consideration in the present and other project(s) currently in development at the Mission.

To address this need, the Mission recently assisted the GSL in the completion of a comprehensive Mahaweli Environmental Update report (May 1987). The Update provides a careful review of GSL and other-donor assisted activities currently underway or planned which serve to address one or more aspects of the original Assessment/Action Plan recommendations. Based on this review information, the Update provides a comparative analysis of the status of implementation of each of the major categories of environmental recommendations stipulated in the original AMP Assessment/Action Plan. The results of this analysis are presented in tabular form in Table 1 (attached). An examination of this information clearly indicates that substantial progress has been achieved in all areas of AMP environmental concern, as delineated in the original AMP Assessment/Action Plan. Although the Update recommends renewed efforts in certain environmental areas, overall, it concludes that ...

"Nearly all of the original key EA recommendations are being carried out. Clearly, the GSL, along with the donor agencies, are being exceptionally responsive to the environmental needs of the AMP. It is evident that the GSL, through its executing agencies, has made a strong commitment to maintaining environmental soundness in the development of the AMP. (p.60)"

Noteworthy in this regard is that USAID's ongoing Mahaweli Environment (383-0075), Reforestation and Watershed Management (383-0055), PVO Co-Financing (383-0060) and Malaria Control (383-0043) Projects have been instrumental in achieving this general environmental success. Priority environmental areas where additional emphasis needs to be placed in the future are identified as fuelwood development, upper catchment area development planning/coordination, park encroachment enforcement efforts, river basin modelling, and elephant management/control.

Conclusions and Recommendations

The Mahaweli Downstream Support Project proposes to complete the originally planned development of essential physical infrastructure for System B of the AMP. As a result, all of the project's potential environmental impacts have already been identified and assessed in the TAMS environmental assessment and, to an acceptable extent, mitigated through one or more of the resultant follow-on activities noted above. Accordingly, this project is environmentally approved for implementation pursuant to Section 216.3(a)(6)(ii) of the revised Agency Environmental Procedures.

To ensure that the relative environmental success demonstrated in AMP implementation to date continues, it is recommended that the following covenants be agreed to and duly incorporated into the design and subsequent implementation of this project:

1. All project construction activities be designed and conducted in accordance with environmentally sound practices and procedures so as to cause minimal disturbance/degradation to the natural environment.
2. Within a reasonable time period, the GSL will prepare a comprehensive fuelwood development plan, with a timetable for implementation, for meeting future fuelwood needs for settlers within System B of the AMP. Upon said plan completion, the GSL will provide, or cause to be provided, sufficient funds for plan implementation.

Figure 1

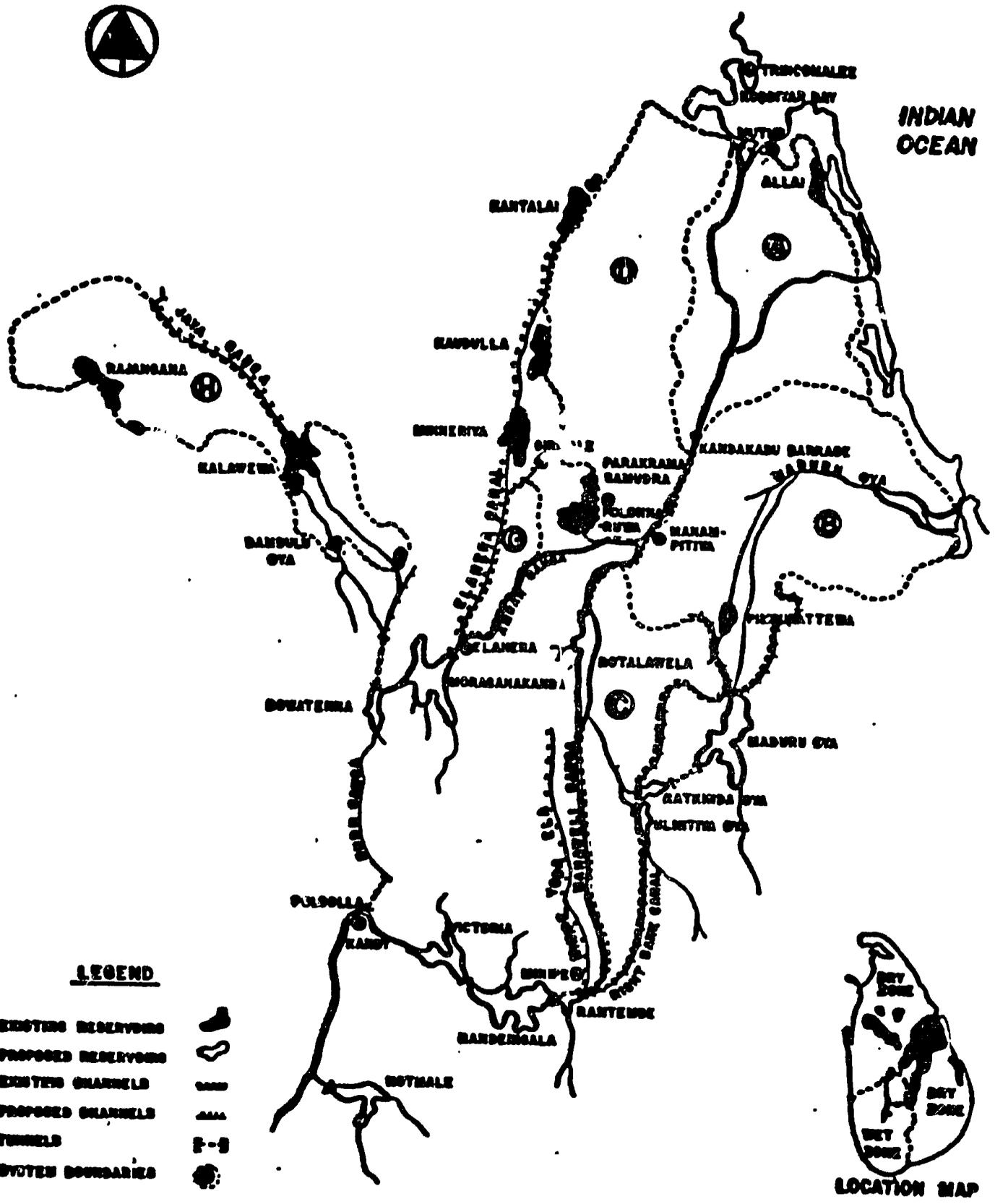
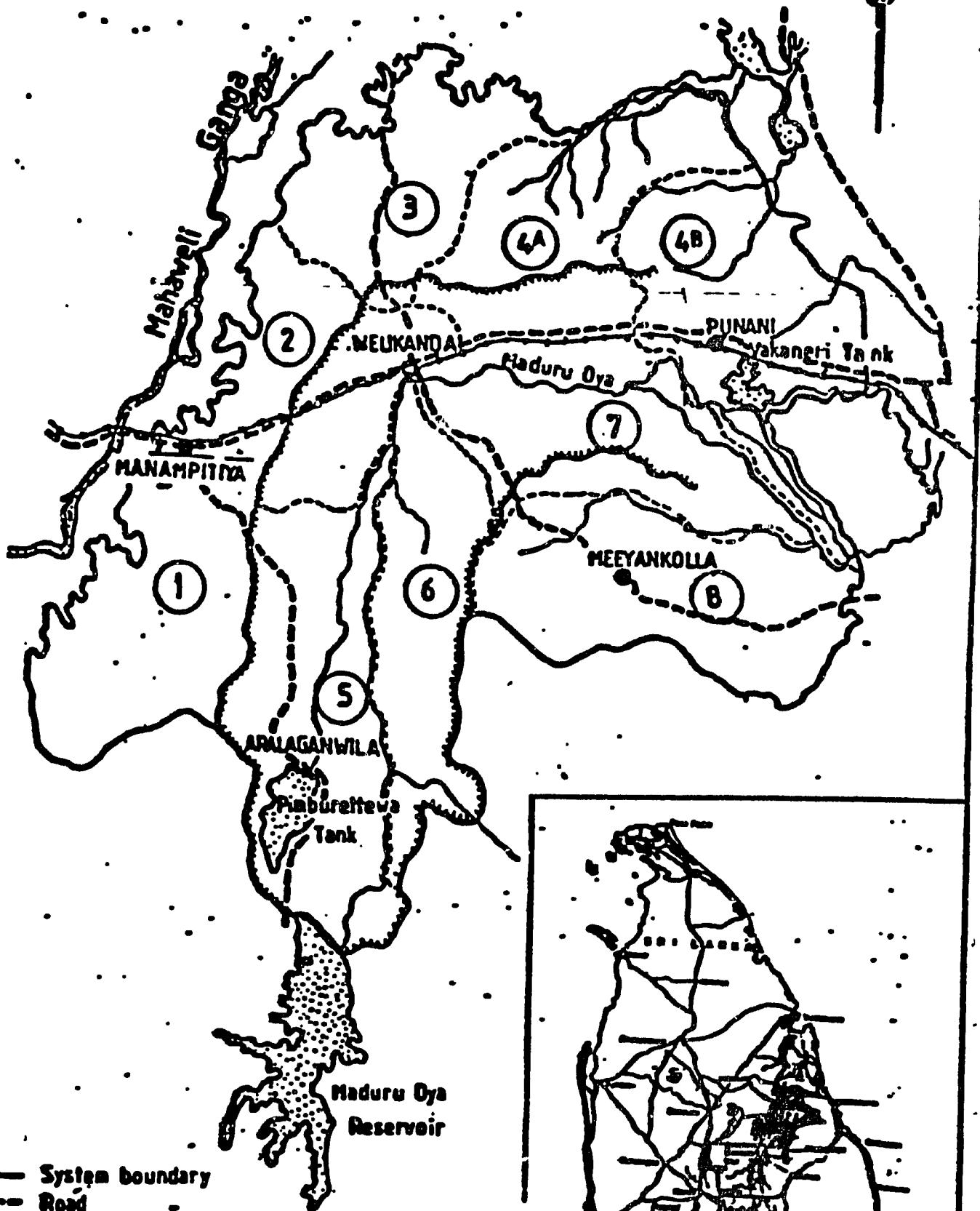


Figure 2

SYSTEM - B GENERAL LAYOUT



- System boundary
- - - Road
- Railway
- Main canal
- - - Zone boundary



TABLE 1

SUMMARY COMPARATIVE ANALYSIS

EA RECOMMENDATIONS vs. IMPLEMENTED/PLANNED ACTIONS

EA RECOMMENDATIONS

IMPLEMENTED/PLANNED ACTIONS

**CO-ORDINATING AGENCY
FOR NATURAL RESOURCES**

* Establish environmental protection authority to formulate policy and standards at national level.

*The Central Environmental Authority (CEA) was created in 1980 and promulgates safeguards and standards.

WILDLIFE CONSERVATION

* Establish large, contiguous wildlife reserves in and around AMP.

*Under USAID's Mahaweli Environment Project (MEP), over 230,000 hectares of protected wildlife areas associated with the AMP have been or will be legally declared:

- Maduru Oya National Park
- Wasgomuwa National Park
- Somawathiya National Park
- Flood Plains National Park
- Tirikonamadu Nature Reserve
- Giritale-Minneriya Nature Reserve
- Victoria-Randenigala-Rantambe Sanctuary

* Develop infrastructure for new parks and reserves in AMP.

*MEP includes boundary surveys and development of buffer zones, roads, buildings and sign boards.

* Conduct AMP parks design planning study including research surveys & conflict analysis.

*Under MEP, Park Systems Plan and three of four Management/Development Plans for new Parks are complete. Relocation activities carried out by DWLC. Elephant conflict studies completed under MEP, MASL and FAO. Flora and fauna research surveys conducted by MASL, Universities, DWLC and WWF/IUCN.

or replanted annually.

- Agriculture Department sub-catchment studies (Nanu Oya & Hanguranketha Oya)
- Irrigation Department studies of critical areas of major reservoir catchments
- Ceylon Tobacco Company conservation and fuelwood plantings
- Estate sector plantings
- USAID Reforestation Project
- ADB community forest project
- IBRD plantation reforestation
- Integrated Rural Development Projects
- Tea Small Holders Authority planting
- Lower Uva Planning Study (CIDA)
- NADSA tree crop diversification.
- FAO tree crop pilot project
- Leanwila catchment study
- Bamboo/Rattan Research project

Proposed projects include mapping and forestry projects at Victoria by ODA & at Kotmale by CIDA.

Optimistic estimate is that 1000 - 2000 hectares annually have been rehabilitated over the last 5 or 6 years. No engineering works have been installed.

FORESTRY PLANNING

* Control unnecessary forest clearing in systems & settlements

*Developed slowly at first, but now clearing is under control. Clearing is restricted to proposed paddy lands only. Clearing prohibited in Systems A and D.

* Establish fuelwood plantations near all new settled areas

*In System H, fuelwood supplies are questionable. In System C, only 350 hectares planted to date in Zone 2, but 1200 hectares planned for Zones 3 - 6 by World Bank. There may be a shortfall in Zone 2. In System B, about 550 hectares planted to date by USAID and EEC. EEC will continue to sponsor Zones 2 and 3 and World Bank zones 6 - 8 which will have 1680 hectares. May also be a shortfall.

* Establish timber and conservation plantings

*General conservation plantings carried out by USAID reforestation project, STC, MASL and PVO project to protect Minipe Canal.

- * Expand and strengthen capabilities of DWLC & construct national training centre.
- * Under MEP, DWLC staff will be expanded by 225. Wildlife Training Centre about to be constructed. Conservation awareness education programs underway.
- * Develop national wildlife programs for conservation policy and management. Implement national park planning team & master plan for reserves.
- * DWLC has a committee for developing policy. Park planning team created under MEP but no complete national master plan has been prepared.

WATERSHED MANAGEMENT

- * Establish a Mahaweli Catchment Redevelopment Corporation to manage & co-ordinate catchment activities.
- * Co-ordination and direction for the many catchment projects has been lacking. However, MASL has just established a Watershed Protection and Development Office in Kandy to assume these functions. Development of this institution will be assisted by West Germany.
- * Enact a Mahaweli catchment redevelopment law to take precedent over existing laws related to soil conservation & land use.
- * Concepts have been discussed but no new law formulated. GTZ project will prepare rules/regulations for resource conservation.
- * Prepare a Master Plan for catchment development.
- * Master plan has not been prepared, national land use planning project (UNDP/FAO and in 1988 ADB) plus recent aerial photography survey of catchment by ODA can provide basis for such a plan and GTZ activity plans.
- * Establish conservation measures to minimize soil losses, protect forests & agriculture productivity. Measures include reforestation with timber & fuelwood plantings, crop diversification & engineering works. These should be implemented in accordance with Master Plan. About 7,000 hectares should be rehabilitated
- * The following projects and studies have been completed or are ongoing in the Mahaweli upper catchment:
 - Reforestation by MASL of major reservoir catchments
 - Victoria soil/water conservation study
 - Victoria peripheral development plan
 - Randenigala catchment survey
 - Kotmale catchment survey
 - Polgolla sedimentation study
 - Forest Department plantings on barren lands

* Develop National Master Plan, training centre and enhance capabilities of Forest Department.

*National Master Plan completed with World Bank funding. USAID supporting institutional strengthening of Forest Department and new training centre.

WATER RESOURCES

* Establish water quality monitoring programs throughout AMP.

*Monthly sampling programs ongoing in systems by MASL and Universities. Proposed study of upstream reservoirs by Austria. Proposed 5 year program for System B by World Bank.

* Conduct salinity intrusion studies at mouths of Maduru Oya & Mahaweli Ganga.

*Maduru Oya study proposed by World Bank. No study for Mahaweli Ganga.

* Conservation of villus by parks declaration & water regulation.

*Villus placed in new National Park System. However, severe encroachment due to overgrazing & development. Initial water balance study of single large villu complete, but no other studies.

* Control aquatic weeds and reuse.

*Biological control (weevil) pilot underway by Australia for Salvinia. No re-use studies undertaken.

FISHERIES DEVELOPMENT

* Develop new reservoir fisheries with subsidy and settlements for fishermen. Provide hatcheries, stocking & extension services.

*New reservoir fisheries underway especially at Maduru Oya and Ulhitiya Oya. 90% subsidies provided to fishermen for boats and gear and settlements planned. Stocked all new reservoirs but fingerling supply a constraint. New Hatchery/breeding station completed at Dambulla Oya with UNICEF support. New stations planned by CIDA at Maduru Oya & ODA at Victoria Reservoir. Expansion of breeding stations & extension service to be implemented under new ADB project.

* Conduct fish farming demonstration.

*At System H, Ministry of Fisheries implemented 25 - 30 ponds. Plans for 100 in H, B & C. Cage, culture pilot by ODA planned.

* Promote seasonal tank culture program

*Suitable tanks being surveyed. Some stocking has taken place.

HEALTH CARE/SANITATION

- * Provision of health care facilities to all new settlement areas.
- * Early settlement stage assistance provided by MEA with on-site mobile unit and medical officer.
- * A three-tiered system of services being implemented involving Divisional Health Centres, Sub-Divisional Health Centres and /Gramodaya Health Centres. System H facilities in place. Systems C, B & G facilities have very advanced progress and much is in operation. All facilities supported by MASL, World Bank, EEC, CIDA, UNICEF, Japan, Kuwait and Saudi Arabia.
- * Extend Anti-Malaria Campaign and provide support for it to the AMP. Conduct vector research.
- * Campaign is underway with a Sub-Divisional Centre established. Spraying program recently assisted by MASL and has improved coverage in newly settled areas. Transport, equipment support being provided by MASL. Research and survey programs have been carried out regarding vector spread in AMP.
- * Provision of adequate water supplies (wells) and latrines to all settlers.
- * MASL is providing good quality water with wells for each family. Standpipe supplies being provided for town activities. Floor plates provided but many latrines not constructed.

WATER/SOIL MANAGEMENT

- * Implement appropriate water management and soil conservation practices.
- * Agricultural research & extension completed in all systems. Guidelines provided for erosion control.

LAND USE PLANNING

- * Integrate environmental plans with system land use plans.
- * MASL Environmental Officer provides direct input to Physical Planning Unit in land use plan formulation for systems.
- * Develop standardised land classification systems.
- * Standard systems being implemented by new LUPPD of MLLD under current UNDP/FAO project & will be continued under ADB support.

Annex I

Annual Construction Workplan (Sample Only)

Tertiary System Construction - Zone 4A

Subject No.	Description Distributory Canals	Quantity (km)	Designs & Specs.	Unit Cost (Rs/Km)	Total Cost (Rs. Million)	Funding GSL (26%)	(Rs. Million) AID Reimb. (74%)
TS 1-88	D-16	3.45	2 (sheet 14)	950	3.28	0.85	2.43
	D-17	1.72	1	780	1.34	0.35	0.99
	D-22	5.81	1	950	5.52	1.44	4.08
	D-37	2.29	2 (sheet 12)	870	1.99	0.52	1.47
		<u>13.27</u>			<u>12.13</u>	<u>3.16</u>	<u>8.98</u>

Land Clearing - Zone 4A

Subproject No.	Description	Quantity (Hectares)	Unit Cost (Rs/ha)	Total Cost (Rs. Million)	GSL (100%)	AID (0%)
LC 1-88	Block 401 (see map)	115	60,000	6.90	6.90	-
	Block 402	209	"	12.54	12.54	-
	Block 405	187	"	11.22	11.22	-
		<u>511</u>		<u>30.66</u>	<u>30.66</u>	

1. Standard designs and specifications
2. Special designs and/or specs (refer to sheet number for details)

Note: This should also contain a section describing the progress made toward meeting the previous year's workplan targets

Annual Policy Workplan (Sample Only)

Participatory Irrigator Organizations

Long Range Goals:

1. Every irrigator a member of Turnout Group.
2. Turnout Groups electing/choosing own leadership.
3. Turnout Groups a member of and represented on a Distributory Canal Irrigator Organization.
4. Each Distributory group a member of and represented on the highest level irrigator organization which is involved with the top level officials in making the decisions about water sharing, scheduling, operations and maintenance, fee collections, etc.
5. Turnout Groups providing the labor necessary to do most of the maintenance of their field and drainage channels.
6. Turnout Groups collecting fees sufficient to pay for operation and additional required maintenance of their field channels plus their share of the O&M of the D-canals and possibly higher level canals.
7. Turnout Groups entering into contracts for providing labor for maintenance of Distributory, Branch and Main Canals.

Targets for 1988 (Numbers refer to Goals above)

1. Policy already in effect.
2. MASL to publish a directive to this effect.
3. MASL to establish (several) Distributory Canal Irrigator Organizations on experimental basis.
4. MASL to contract for research to study and recommend, in 1988, on the best approach to bring about.
5. Later initiative.
6. MASL to conduct an analysis of legal and administrative steps necessary to put into effect. Contract for research to determine and report, in 1988, accurate costs of O&M.
7. Later initiative.

Note: This should also contain a section describing the progress made toward meeting the previous year's workplan targets.

5C(2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A includes criteria applicable to all projects. Part B applies to projects funded from specific sources only: B(1) applies to all projects funded with Development Assistance; B(2) applies to projects funded from Development Assistance loans; and B(3) applies to projects funded from ESF.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT? Yes

A. GENERAL CRITERIA FOR PROJECT

1. FY 1987 Continuing Resolution Sec. 523; FAA Sec. 634A. Describe how authorization and appropriations committees of Senate and House have been or will be notified concerning the project. By Congressional Notification
2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$500,000, will there be (a) engineering, financial or other plans necessary to carry out the assistance, and (b) a reasonably firm estimate of the cost to the U.S. of the assistance? a) Yes
b) Yes
3. FAA Sec. 611(a)(2). If legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance? N/A
4. FAA Sec. 611(b); FY 1987 Continuing Resolution Sec. 501. If project is for water or water-related land resource construction, have benefits and costs been computed to the extent practicable in accordance with the principles, standards, and procedures established pursuant to the Water Resources Planning Act (42 U.S.C. 1962, et seq.)? (See A.I.D. Handbook 3 for guidelines.) Yes

- 2 -

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and total U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project? Yes
6. FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. No
7. FAA Sec. 601(a). Information and conclusions on whether projects will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions. Improved technical efficiency of agricultural production will be achieved through the construction of an efficient irrigation system.
8. FAA Sec. 601(b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise). US Contractors will provide technical assistance, training and commodities.
9. FAA Secs. 612(b), 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars. Host country is providing local currencies for recurrent cost expenditures plus support for the technical assistance and training.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release? No

11. FY 1987 Continuing Resolution Sec. 521.
If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?
- Commodities for export will be produced only after careful market research has concluded that they will not be in surplus on world market and will not cause substantial injury to US producers.
12. FY 1987 Continuing Resolution Sec. 558
(as interpreted by conference report).
If assistance is for agricultural development activities (specifically, any testing or breeding feasibility study, variety improvement or introduction, consultancy, publication, conference, or training), are such activities (a) specifically and principally designed to increase agricultural exports by the host country to a country other than the United States, where the export would lead to direct competition in that third country with exports of a similar commodity grown or produced in the United States, and can the activities reasonably be expected to cause substantial injury to U.S. exporters of a similar agricultural commodity; or (b) in support of research that is intended primarily to benefit U.S. producers?
- Exports are not expected to cause substantial injury to U.S. exporters of similar commodities.
13. FY 1987 Continuing Resolution Sec. 559.
Will the assistance (except for programs in Caribbean Basin Initiative countries under U.S. Tariff Schedule "Section 807," which allows reduced tariffs on articles assembled abroad from U.S.-made components) be used directly to procure feasibility studies, prefeasibility studies, or project profiles of potential investment in, or to assist the establishment of facilities specifically designed for, the manufacture for export to the United States or to third country markets in direct competition with U.S. exports, of textiles, apparel, footwear, handbags, flat goods (such as wallets or coin purses worn on the person), work gloves or leather wearing apparel?
- No

14. FAA Sec. 118(c). Does the assistance comply with the environmental procedures set forth in A.I.D. Regulation 16? Does the assistance place a high priority on conservation and sustainable management of tropical forests? Specifically, does the assistance, to the fullest extent feasible: (a) stress the importance of conserving and sustainably managing forest resources; (b) support activities which offer employment and income alternatives to those who otherwise would cause destruction and loss of forests, and help countries identify and implement alternatives to colonizing forested areas; (c) support training programs, educational efforts, and the establishment or strengthening of institutions to improve forest management; (d) help end destructive slash-and-burn agriculture by supporting stable and productive farming practices; (e) help conserve forests which have not yet been degraded, by helping to increase production on lands already cleared or degraded; (f) conserve forested watersheds and rehabilitate those which have been deforested; (g) support training, research, and other actions which lead to sustainable and more environmentally sound practices for timber harvesting, removal, and processing; (h) support research to expand knowledge of tropical forests and identify alternatives which will prevent forest destruction, loss, or degradation; (i) conserve biological diversity in forest areas by supporting efforts to identify, establish, and maintain a representative network of protected tropical forest ecosystems on a worldwide basis, by making the establishment of protected areas a condition of support for activities involving forest clearance or degradation, and by helping to identify tropical forest ecosystems and species in need of protection and establish and maintain appropriate protected areas; (j) seek to increase the awareness of

Yes. See environmental assessment.

- 5 -

U.S. government agencies and other donors of the immediate and long-term value of tropical forests; and (k) utilize the resources and abilities of all relevant U.S. government agencies?

15. FAA Sec. 119(q)(4)-(6). Will the assistance (a) support training and education efforts which improve the capacity of recipient countries to prevent loss of biological diversity; (b) be provided under a long-term agreement in which the recipient country agrees to protect ecosystems or other wildlife habitats; (c) support efforts to identify and survey ecosystems in recipient countries worthy of protection; or (d) by any direct or indirect means significantly degrade national parks or similar protected areas or introduce exotic plants or animals into such areas? No
16. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (either dollars or local currency generated therefrom)? N/A
17. FY 1987 Continuing Resolution Sec. 532. Is disbursement of the assistance conditioned solely on the basis of the policies of any multilateral institution? No

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

- a. FAA Secs. 102(b), 111, 113, 281(a). Describe extent to which activity will (a) effectively involve the poor in development by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, dispersing investment from cities to small towns and rural areas, and a) Landless agricultural workers will be provided with irrigated lands.

- 6 -

insuring wide participation of the poor in the benefits of development on a sustained basis, using appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries.

b. Farmer organizations will assume role for irrigation management and marketing.

c. Project directly supports major host country development program.

d. Women are direct beneficiaries of extension program.

e. N/A

- b. FAA Secs. 103, 103A, 104, 105, 106, 120-21. Does the project fit the criteria for the source of funds (functional account) being used? Yes
- c. FAA Sec. 107. Is emphasis placed on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)? Yes
- d. FAA Secs. 110, 124(d). Will the recipient country provide at least 25 percent of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)? Yes
- e. FAA Sec. 128(b). If the activity attempts to increase the institutional capabilities of private organizations or the government of the country, or if it attempts to stimulate scientific and technological research, has it been designed and will it be monitored to ensure that the ultimate beneficiaries are the poor majority? Yes

- 7 -

- f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government. Provides landless rural poor with irrigated land. Local farmers to be trained in self reliance and management.
- g. FY 1987 Continuing Resolution Sec. 540. Are any of the funds to be used for the performance of abortions as a method of family planning or to motivate or coerce any person to practice abortions? No
- Are any of the funds to be used to pay for the performance of involuntary sterilization as a method of family planning or to coerce or provide any financial incentive to any person to undergo sterilizations? No
- Are any of the funds to be used to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions or involuntary sterilization as a means of family planning? No
- h. FY 1987 Continuing Resolution. Is the assistance being made available to any organization or program which has been determined to support or participate in the management of a program of coercive abortion or involuntary sterilization? No
- If assistance is from the population functional account, are any of the funds to be made available to voluntary family planning projects which do not offer, either directly or through referral to or information about access to, a broad range of family planning methods and services? N/A
- i. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? Yes

- j. FY 1987 Continuing Resolution. How much of the funds will be available only for activities of economically and socially disadvantaged enterprises, historically black colleges and universities, and private and voluntary organizations which are controlled by individuals who are black Americans, Hispanic Americans, or Native Americans, or who are economically or socially disadvantaged (including women)?
- Mission anticipates opportunities for minority firms in subcontracting and in short-term TA.
- k. FAA Sec. 118(c)(13). If the assistance will support a program or project significantly affecting tropical forests (including projects involving the planting of exotic plant species), will the program or project (a) be based upon careful analysis of the alternatives available to achieve the best sustainable use of the land, and (b) take full account of the environmental impacts of the proposed activities on biological diversity?
- a) Yes
- b) Yes
- l. FAA Sec. 118(c)(14). Will assistance be used for (a) the procurement or use of logging equipment, unless an environmental assessment indicates that all timber harvesting operations involved will be conducted in an environmentally sound manner and that the proposed activity will produce positive economic benefits and sustainable forest management systems; or (b) actions which significantly degrade national parks or similar protected areas which contain tropical forests, or introduce exotic plants or animals into such areas?
- No
- m. FAA Sec. 118(c)(15). Will assistance be used for (a) activities which would result in the conversion of forest lands to the rearing of livestock; (b) the construction, upgrading, or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undegraded forest lands; (c) the colonization of forest lands; or (d) the construction of dams or other water
- a) No
- b) Yes but permitted by EA for Mahaweli projects.
- c) Yes, but permitted by EA for Mahaweli projects.
- d) Yes, but permitted by EA for Mahaweli projects.

control structures which flood relatively undegraded forest lands, unless with respect to each such activity an environmental assessment indicates that the activity will contribute significantly and directly to improving the livelihood of the rural poor and will be conducted in an environmentally sound manner which supports sustainable development?

2. Development Assistance Project Criteria
(Loans Only)

- | | | |
|----|--|---|
| a. | <u>FAA Sec. 122(b)</u> . Information and conclusion on capacity of the country to repay the loan at a reasonable rate of interest. | Sri Lanka will be able to repay the loan. |
| b. | <u>FAA Sec. 620(d)</u> . If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20 percent of the enterprise's annual production during the life of the loan, or has the requirement to enter into such an agreement been waived by the President because of a national security interest? | N/A |
| c. | <u>FY 1987 Continuing Resolution</u> . If for a loan to a private sector institution from funds made available to carry out the provisions of FAA Sections 103 through 106, will loan be provided, to the maximum extent practicable, at or near the prevailing interest rate paid on Treasury obligations of similar maturity at the time of obligating such funds? | N/A |
| d. | <u>FAA Sec. 122(b)</u> . Does the activity give reasonable promise of assisting long-range plans and programs designed to develop economic resources and increase productive capacities? | Yes |

3. Economic Support Fund Project Criteria

N/A

- a. FAA Sec. 531(a). Will this assistance promote economic and political stability? To the maximum extent feasible, is this assistance consistent with the policy directions, purposes, and programs of Part I of the FAA?
- b. FAA Sec. 531(e). Will this assistance be used for military or paramilitary purposes?
- c. ISDCA of 1985 Sec. 207. Will ESF funds be used to finance the construction, operation or maintenance of, or the supplying of fuel for, a nuclear facility? If so, has the President certified that such country is a party to the Treaty on the Non-Proliferation of Nuclear Weapons or the Treaty for the Prohibition of Nuclear Weapons in Latin America (the "Treaty of Tlatelolco"), cooperates fully with the IAEA, and pursues nonproliferation policies consistent with those of the United States?
- d. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?

5C(3) - STANDARD ITEM CHECKLIST

Listed below are the statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by imposing limits on certain uses of funds.

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. PROCUREMENT

- | | |
|---|---|
| 1. <u>FAA Sec. 602(a)</u> . Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed? | Mission anticipates one large contract, with opportunities for small business in providing short-term technical assistance. |
| 2. <u>FAA Sec. 604(a)</u> . Will all procurement be from the U.S. except as otherwise determined by the President or under delegation from him? | Yes |
| 3. <u>FAA Sec. 604(d)</u> . If the cooperating country discriminates against marine insurance companies authorized to do business in the U.S., will commodities be insured in the United States against marine risk with such a company? | N/A |
| 4. <u>FAA Sec. 604(e); ISDCA of 1980 Sec. 705(a)</u> . If non-U.S. procurement of agricultural commodity or product thereof is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? (Exception where commodity financed could not reasonably be procured in U.S.) | N/A |
| 5. <u>FAA Sec. 604(g)</u> . Will construction or engineering services be procured from firms of advanced developing countries which are otherwise eligible under Code 941 and which have attained a competitive capability in international markets in one of these areas? (Exception for those | No |

countries which receive direct economic assistance under the FAA and permit United States firms to compete for construction or engineering services financed from assistance programs of these countries.)

6. FAA Sec. 603. Is the shipping excluded from compliance with the requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 percent of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent such vessels are available at fair and reasonable rates? No. Cargo preference is part of agreement.
7. FAA Sec. 621(a). If technical assistance is financed, will such assistance be furnished by private enterprise on a contract basis to the fullest extent practicable? will the facilities and resources of other Federal agencies be utilized, when they are particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs? a) Yes
b) No
8. International Air Transportation Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will U.S. carriers be used to the extent such service is available? Yes
9. FY 1987 Continuing Resolution Sec 504. If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States? Yes
10. FY 1987 Continuing Resolution Sec. 524. If assistance is for consulting service through procurement contract pursuant to 5 U.S.C. 3109, are contract expenditures a matter of public record and available for public inspection (unless otherwise provided by law or Executive order)? Yes

B. CONSTRUCTION

- | | |
|---|-----|
| 1. <u>FAA Sec. 601(d)</u> . If capital (e.g., construction) project, will U.S. engineering and professional services be used? | Yes |
| 2. <u>FAA Sec. 611(c)</u> . If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable? | Yes |
| 3. <u>FAA Sec. 620(k)</u> . If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million (except for productive enterprises in Egypt that were described in the CP), or does assistance have the express approval of Congress? | No |

C. OTHER RESTRICTIONS

- | | |
|--|-----|
| 1. <u>FAA Sec. 122(b)</u> . If development loan repayable in dollars, is interest rate at least 2 percent per annum during a grace period which is not to exceed ten years, and at least 3 percent per annum thereafter? | Yes |
| 2. <u>FAA Sec. 301(d)</u> . If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights? | N/A |
| 3. <u>FAA Sec. 620(h)</u> . Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries? | Yes |

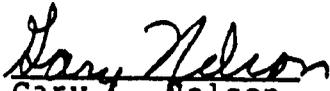
4. Will arrangements preclude use of financing: Yes, all will be precluded.
- a. FAA Sec. 104(f); FY 1987 Continuing Resolution Secs. 525, 540. (1) To pay for performance of abortions as a method of family planning or to motivate or coerce persons to practice abortions; (2) to pay for performance of involuntary sterilization as method of family planning, or to coerce or provide financial incentive to any person to undergo sterilization; (3) to pay for any biomedical research which relates, in whole or part, to methods or the performance of abortions or involuntary sterilizations as a means of family planning; or (4) to lobby for abortion?
 - b. FAA Sec. 483. To make reimbursements, in the form of cash payments, to persons whose illicit drug crops are eradicated?
 - c. FAA Sec. 620(q). To compensate owners for expropriated or nationalized property, except to compensate foreign nationals in accordance with a land reform program certified by the President?
 - d. FAA Sec. 660. To provide training, advice, or any financial support for police, prisons, or other law enforcement forces, except for narcotics programs?
 - e. FAA Sec. 662. For CIA activities?
 - f. FAA Sec. 636(i). For purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained?
 - g. FY 1987 Continuing Resolution Sec. 503. To pay pensions, annuities, retirement pay, or adjusted service compensation for military personnel?

- h. FY 1987 Continuing Resolution Sec. 505.
To pay U.N. assessments, arrearages or dues?
- i. FY 1987 Continuing Resolution Sec. 506.
To carry out provisions of FAA section 209(d) (transfer of FAA funds to multilateral organizations for lending)?
- j. FY 1987 Continuing Resolution Sec. 510.
To finance the export of nuclear equipment, fuel, or technology?
- k. FY 1987 Continuing Resolution Sec. 511.
For the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights?
- l. FY 1986 Continuing Resolution Sec. 516.
To be used for publicity or propaganda purposes within U.S. not authorized by Congress?

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

I, Gary L. Nelson, Acting Director of the Agency for International Development in Sri Lanka, having taken into account among other things, the capacity of the Sri Lanka Government and its agencies to properly utilize and maintain the facilities to be constructed and the commodities to be imported under this project as well as the technical assistance and training to be funded, do hereby certify that, in my judgement, Sri Lanka has both the financial capability and adequate human resources to effectively utilize the inputs provided by this project.

The judgement is based upon the project analyses presented in the Mahaweli Downstream Support Project Paper and is subject to the conditions imposed therein.


Gary L. Nelson
Acting Director

Date: July 17, 1982