

PD-AB-980
72496

A.I.D. EVALUATION SUMMARY - PART I

1. BEFORE FILLING OUT THIS FORM, READ THE ATTACHED INSTRUCTIONS
2. USE LETTER QUALITY TYPE, NOT "DOT MATRIX" TYPE

IDENTIFICATION DATA

A. Reporting A.I.D. Unit: Mission or AID/W Office <u>USAID/Sri Lanka</u> (ES# _____)	B. Was Evaluation Scheduled in Current FY Annual Evaluation Plan? Yes <input checked="" type="checkbox"/> Slipped <input type="checkbox"/> Ad Hoc <input type="checkbox"/> Evaluation Plan Submission Date: FY <u>Q</u>	C. Evaluation Timing Interim <input checked="" type="checkbox"/> Final <input type="checkbox"/> Ex Post <input type="checkbox"/> Other <input type="checkbox"/>
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D. Activity or Activities Evaluated (List the following information for project(s) or program(s) evaluated; if not applicable, list title and date of the evaluation report.)

Project No.	Project /Program Title	First PROAG or Equivalent (FY)	Most Recent PACD (Mo/Yr)	Planned LOP Cost (000)	Amount Obligated to Date (000)
383-0086	Mahaweli Agriculture and Rural Development Project	FY 1987	8/95	\$24,200 (\$14,000-AID)	\$14,000

ACTIONS

E. Action Decisions Approved By Mission or AID/W Office Director

Action(s) Required	Name of Officer Responsible for Action	Date Action to be Completed
1. PIO/T to continue FSR/E team thru 1992	G.Alex	5/91
2. Merge MARD and MDS project	G.Anders	10/91
3. Letter to DAI on development of a common vision for project	G.Alex/ G.Anders	5/91
4. Letter to DAI on expanded work on drainage	G.Alex/ G.Anders/ ENG	6/91
5. Prepare an action plan to introduce storage facilities for farmer organizations	DAI	10/91
6. Prepare an action plan to introduce mechanical threshers on a pilot basis	DAI	10/91
7. Prepare an action plan for pilot program to provide transport (tractor/trucks) to farmer organizations	DAI	10/91

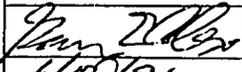
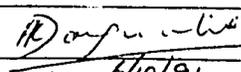
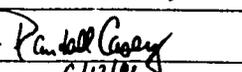
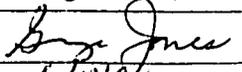
(See Attachment)

(Attach extra sheet if necessary)

APPROVALS

F. Date Of Mission Or AID/W Office Review Of Evaluation: _____ (Month) _____ (Day) _____ (Year)

G. Approvals of Evaluation Summary And Action Decisions:

Name (Typed)	Project/Program Officer	Representative of Borrower/Grantee	Evaluation Officer	Mission or AID/W Office Director
	Gary E. Alex	P.H.K. Dayaratne	Randall Casey	George Jones, A/DIR
Signature				
Date	6/10/91	6/10/91	6/12/91	6/13/91

ABSTRACT

H. Evaluation Abstract (Do not exceed the space provided)

This is the first interim evaluation of the Mahaweli Agriculture & Rural Development (MARD) Project, which aims to help the Government of Sri Lanka to substantially increase settler income in the Mahaweli system 'B' irrigation area. The project is being implemented by the Mahaweli Economic Agency with implementation support from a technical assistance contractor. This evaluation (4/91) was conducted by a team of seven consultants on the basis of review of documents, a visit to the project site and interviews with project staff, USAID and GSL officials, Sri Lankan business people and System 'B' settlers. The purpose was to provide an in-depth assessment of project implementation and progress to date and to recommend any modifications to improve the likelihood of achieving the project purposes.

The evaluation found that, although the project is very complex containing both area based agricultural and rural development goals and agribusiness-led commercial development goals, it has been well managed and has achieved some remarkable successes despite slow startup due to security problems at the field site.

Most End of Project Status (EOPS) objectives should be attained by the PACD if farmer organization activity is strengthened and water management activities are concentrated on D and F-canal levels during the remainder of project life. Water management activities should be concentrated on solving turnout level problems for the remainder of the project.

Project activities are directed toward production of traditional high value crops for sale in domestic markets and non traditional high value crops for sale in export markets. Lack of a post harvest cold chain has severely hampered development of the export marketing program. Singapore and the Gulf States are more appropriate export markets than Europe or Japan. MARD should adopt the goal of establishing five fully operational commercial nucleus export operations by the end of 1993.

The major lesson learned was that major small scale outgrower participation in an export oriented commercial development program will generally occur only after larger farmers have established viable production and marketing strategies. This may take from three to five years but once established, smallholder participation can expand rapidly.

COSTS

I. Evaluation Costs

1. Evaluation Team		Contract Number OR TDY Person Days	Contract Cost OR TDY Cost (U.S. \$)	Source of Funds
Name	Affiliation			Project
K. Athukorale	ADRC	30 days	\$ 2,980	"
E. C. de Silva	ADC	30 days	\$ 2,980	"
S. de Silva	Chemonics	12 days	-0-	"
C.F. Fritsch	"	45 days)	"
E.R. Guise	"	30 days) \$90,214	"
M.R. Menegay	"	30 days)	"
M. Walter	"	21 days)	"
M.U.M. Tarique	Ernst & Young	15 days) \$ 2,250	"
M.Z. Zaheed	"	15 days)	"
			<u>\$98,424</u>	
2. Mission/Office Professional Staff Person-Days (Estimate) <u>36 days</u>		3. Borrower/Grantee Professional Staff Person-Days (Estimate) <u>48 days</u>		

B

Attachment

- | | | |
|---|----------------------|-------|
| 8. Prepare implementation plan for homestead extension activities, including a survey of well irrigation capabilities | DAI | 8/9 |
| 9. Recommend use of local consultants to establish legal and institutional basis for farmer organizations | N.Jayasuriya | 6/91 |
| 10. Letter to MEA on assignment of counterparts | N.Jayasuriya | 6/91 |
| 11. Recruit Integrated Pest Management Consultant | DAI | 7/91 |
| 12. Begin a program of testing for pesticide residue | DAI | 10/91 |
| 13. Increase training on gender issues and reaching women with extension messages | DAI | 8/91 |
| 14. Meeting with MARD and MED contractors to clarify basis of cooperation and coordination | G.Alex/
S.Hadley | 6/91 |
| 15. Make representation to MEA on simplifying approvals for training | G.Alex | 6/91 |
| 16. Request DAI to certify all cost estimates before procurement | G.Alex | 6/91 |
| 17. Verify and up-date project inventories | N.Jayasuriya/
PRJ | 8/91 |
| 18. Request MEA to provide details on GSL contribution for 1990 | N.Jayasuriya | 6/91 |
| 19. Request DAI to review SOW's for support staff | N.Jayasuriya | 6/91 |

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A.I.D. EVALUATION SUMMARY - PART II

SUMMARY

J. Summary of Evaluation Findings, Conclusions and Recommendations (Try not to exceed the three (3) pages provided)

Address the following items:

- | | |
|--|--|
| <ul style="list-style-type: none"> • Purpose of evaluation and methodology used • Purpose of activity(ies) evaluated • Findings and conclusions (relate to questions) | <ul style="list-style-type: none"> • Principal recommendations • Lessons learned |
|--|--|

Mission or Office: USAID/Sri Lanka	Date This Summary Prepared: 4/26/91	Title And Date Of Full Evaluation Report: First Interim Evaluation of the Mahaweli Agriculture & Rural Development Project (4/26/91)
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A. Evaluation Purpose and Procedure

1. Purpose

This is the first interim evaluation of MARD. The primary purpose is to provide USAID/Sri Lanka and the Mahaweli Economic Agency (MEA) with an in-depth assessment of project implementation and progress to date and to recommend any modifications to improve the likelihood of achieving the project's primary and secondary purposes. Important aspects assessed include: delivery of AID and GSL project inputs, progress toward achieving project purposes, impact of project activities to date and validity of the original project design assumptions and strategies. Planned inputs for the remainder of the project were reviewed and recommendations made.

2. Procedure

Methodology employed included interviews with USAID and GSL officials, contractor expatriate and local staff, MEA field project staff, DARP and MED contractor staff, local farmers, traders and agribusiness personnel; review of pertinent documents; and three debriefing sessions including one with the field team, one with MEA officials and one with USAID officials.

B. Findings and Conclusions

1. The project is very complex containing both area based agricultural and rural development goals and agribusiness led commercial development goals. The project has been well managed and has achieved some remarkable successes despite slow startup due to security problems at the field site. The MASL continues to provide strong policy and implementation support. Most end of project objectives (EOPS) should be attained by the PACD if farmer organization activity is strengthened and water management activities are concentrated on D and F canal levels during the remainder of project life.

2. The original project development strategy was to expand production of traditional high value crops for sale in world export markets. Shortly after project startup new analysis indicated that this was not a viable strategy and emphasis was redirected to producing non-traditional crops for export.

3. Project implementation is now directed toward production of traditional high value crops for sale in domestic markets and non-traditional high value crops for sale in export markets. Chillies, big onion, butternut squash, okra and cabbage can yield net returns in excess of paddy when sold in domestic markets. Initial success was obtained with commercial gherkin production by settler outgrowers associated with a nucleus commercial entrepreneur. Okra and sweet corn have also been identified as having export potential from System B.

4. Lack of a post harvest cold chain has severely hampered development of an export marketing trials program. Lack of storage facilities for pulses, chillies and onions for domestic markets has hampered development of these crops as well.

5. Singapore and the Gulf States are more appropriate export markets than Europe or Japan.

6. The basis for a sustainable commercially oriented R & D program of crop production and marketing trials sensitive to market requirements is now in place. The ability to continue such a commercially based program is essential to sustainability after withdrawing project resources.

7. The water management component has emphasized main and branch level activities. However, the engineering design at the field turnout level requires close farmer cooperation to achieve proper water management for diversified crop production. Poor field drainage remains a serious problem in System B.

8. Unit level boundaries in System B are mostly coterminous with D- level boundaries, providing the basis for achieving social, economic and water management objectives through formal Unit Level Farmer Organizations (ULFO).

9. Identifying farmer organization activities as a subset of the water management component provides a very limited implementation vision for the broader social and economic activities required of FOs. These include organizing input and product marketing, resolving land disputes, making or providing guarantees for farmer production loans and providing a legitimate community social stabilization institution. A clear and uniform approach has not yet been articulated for organizing ULFOs.

10. Targeting homesteads for expanded commercial development can materially increase farm family income. Diverse activities, including poultry, dairy and other livestock production, can be developed on these upland areas along with vegetables and perennial tree crops. A program targeting women during the Maha season has the best potential for success.

11. A functioning monitoring system was not yet in place at the time of this evaluation, but efforts are being directed to this end.

C. Recommendations

1. Water management activities be concentrated on solving turnout level problems for the remainder of the project. Addressing existing drainage problems should be a priority activity. Merging MDS with MARD will promote this objective.

2. For the next two years, all area based development activities should be organized around the seventeen intensive demonstration extension units (IDEU). Women should be targeted as part of this intensive campaign which should include increasing value of commercial sales from homestead lands. MEA is scheduled to begin implementing the IDEU strategy during Yala 1991. MEA should take the lead in carrying out the field demonstration program with MARD providing technical support.

3. MARD adopt the goal of establishing five fully operational commercial nucleus export operations by the end of 1993, each with an average of 200 outgrowers, to help meet the agribusiness commercial export project goal.

D. Lessons Learned

1. A systematic and continuous program of variety observations, replicated field production trials, whole farm and turnout group demonstrations and marketing trials is essential for developing a sustainable area based or nucleus farm/outgrower development strategy.

2. Major small scale outgrower participation in an export oriented commercial development program will generally occur only after larger farmers with greater risk tolerance have established marketing strategies and viable crop production technologies. This will take from three to five years. Once established, however, smallholder participation can expand rapidly.

3. Sustainable area based development strategies are dependent on attaining effective participatory farmer organizations able to address producer needs by providing production loans or guarantees, meet group input supply and product marketing needs, resolve land disputes and serve as a community social stabilization institution.

ATTACHMENTS

K. Attachments (List attachments submitted with this Evaluation Summary; always attach copy of full evaluation report, even if one was submitted earlier; attach studies, surveys, etc., from "on-going" evaluation, if relevant to the evaluation report.)

1. "First Interim Evaluation of the Mahaweli Agriculture and Rural Development Project"
2. "Review of Financial Systems"

COMMENTS

L. Comments By Mission, AID/W Office and Borrower/Grantee On Full Report

The technical evaluation team and the financial systems review together provided an unusually comprehensive review of project strategy, implementation processes, and status. This comprehensive review took considerable time for the USAID Mission and technical assistance team to coordinate and assist. The USAID Mission has considered the project to be making very good progress and at the forefront in helping define a new agricultural development strategy for the USAID program and the GSL. The evaluation basically appears to confirm the validity of this strategy and approach, while providing useful guidance for fine-tuning implementation and recommendations on consolidating Mahaweli activities through to the PACD.

The evaluation team experienced difficulty at first understanding all activities of the project, their inter-relationships and strategic basis. Future project work plans need to include a better over-all "vision statement" for the project to provide the context for all activities and make them more understandable to outside reviewers. The team did eventually come to a comprehensive understanding of the mix of project activities, but this delay plus some strong disagreements on the team based on differing philosophies and prior experiences meant that the evaluation team needed a considerable amount of time to come to a consensus on all of the project's elements.

USAID/Sri Lanka feels that the evaluation findings are generally valid and useful. The team, unfortunately, included an inordinate number (79) of recommendations in the report, with many of these amounting simply to recommending continuation of current activities and approaches. Had these numerous recommendations been better aggregated, reduced and better prioritized, it would have facilitated Mission action with the GSL to address the major findings and conclusions from the evaluation.

XID-ABC-980-A

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FIRST INTERIM EVALUATION

MAHAWELI AGRICULTURAL AND RURAL DEVELOPMENT PROJECT (MARD)

SRI LANKA

(No. 383-0086)

April 26, 1991

PART I

FIRST INTERIM EVALUATION

MAHAWELI AGRICULTURAL AND RURAL DEVELOPMENT PROJECT (MARD)

SRI LANKA

(No. 383-0086)

April 26, 1991

This report presents the independent findings and recommendations of an external evaluation team. It does not necessarily represent the official views of the Government of Sri Lanka or the United States Agency for International Development.

Submitted to: USAID/Sri Lanka
Colombo

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PROJECT IDENTIFICATION SHEET

1. Country : Sri Lanka
2. Project Titles: Mahaweli Agriculture and Rural Development Project
3. Project Number: 38-3-0086
4. Project Dates :
 - a. First Project Agreement: 8/28/87
 - b. Final Obligation Date: 1/20/89
 - c. Most Recent Project Assistance Completion Date (PACD): 8/31/95
5. Project Funding:
 - a. A.I.D. Bilateral Funding
 - (i) Grant US\$ 10,200,000
 - (ii) Loan US\$ 3,800,000
 - b. Host Country Counterpart Funds US\$ 10,200,000
 - Total: US\$ 24,200,000
6. Mode of Implementation: USAID direct contract with DAI
7. Project Designers: Government of Sri Lanka, USAID/Colombo, DAI
8. Responsible Mission Officials:
 - a. Mission Directors: Bloom, P.J. 8/87 - 10/89
Jones, G. (act) 10/89 - 7/90
Brown, R. 8/90 - present
 - b. Project Officer: Strickland, C.L. 8/87 - 8/88
Brown, A.A. 8/88 - 9/90
Alex, G. 9/90 - present
Jayasuriya, N.H. 7/88 - present
9. Previous Evaluation : None

ACKNOWLEDGEMENTS

The evaluation team received excellent cooperation, support and assistance from many people during the course of the evaluation. Special thanks and appreciation are extended to the following persons who were instrumental in providing project background, making initial contacts and sharing information from their close and long term association with the project:

Mr. Gary Alex, USAID Agricultural Project Officer and
Mr. Nimal Jayasuriya, Agricultural Specialist
Dr. Max Goldensohn, Chief of Party, MARD
Mr. P.H.K. Dayaratna, Project Coordinator, System B

Many other persons from USAID, the MARD field team and the Mahaweli Authority staff, both in Colombo and in System B assisted in making arrangements, scheduling interviews and willingly sharing their thoughts and ideas with the evaluation team members. Their comments and open discussions enabled the team to gain many useful insights into project operations. Their contributions made this report possible.

We also express our thanks to the MARD staff members for their gracious hospitality during the period the team was in residence at Pimburettewa.

Ms. Susan Schubert, MARD Office Manager at the Pimburettewa Camp coordinated travel and other logistics while we were at the field site in a seemingly effortless way. We greatly appreciate her assistance.

Finally, we wish to thank Ms. Khanti Alles who spent many hours typing the report.

LIST OF ACRONYMS

AMP	-	Accelerated Mahaweli Project
AO	-	Agricultural Officer
ARTI	-	Agricultural Research & Training Institute
ATG&D	-	Agricultural Technology General & Dissemination
BTF	-	Block Task Force
CCAA	-	Cost Centre Activity Accounting
CDO	-	Community Development Officer
COP	-	Chief of Party
CP	-	Conditions Precedent
DAI	-	Development Alternatives, Inc.
DARF	-	Diversified Agricultural Research Project
DCS	-	Department of Census and Statistics
DOA	-	Department of Agriculture
DRFM (Ag)	-	Deputy Resident Project Manager (Agriculture)
DRFM (WM)	-	Deputy Resident Project Manager (Water Management)
EIED	-	Employment Investment and Enterprise Development
EOFS	-	End of Project Status
ETP	-	Evapotranspiration Potential
CF	-	Commercial Fund
FA	-	Field Assistant
FIF	-	Farmer Investment Fund
FO	-	Farm Organization
FSE	-	Farming Systems Extensionist
FSR/E	-	Farming Systems Research/Extension
FSS	-	Farmer Support Services
GSL	-	Government of Sri Lanka
ICO	-	Irrigation Community Organizer
IDEU	-	Intensive Demonstration Extension Unit
IIMI	-	International Irrigation Management Institute
IRR	-	International Rate of Return
ISMP	-	Irrigation Systems Management Project
LDC	-	Less Developed Country
LP	-	Linear Programming
LTTA	-	Long Term Technical Assistance
MARD	-	Mahaweli Agricultural & Rural Development
MASL	-	Mahaweli Authority of Sri Lanka
MDS	-	Mahaweli Downstream Support
M&E	-	Monitoring & Evaluation
MEA	-	Mahaweli Economic Agency
MECA	-	Mahaweli Engineering and Construction Agency
MED	-	Mahaweli Enterprise Development Project
MP	-	Minister of Parliament
MRTC	-	Mahaweli Regional Training Centre
NGO	-	Non Governmental Organization
NHVC	-	Non Traditional High Value Crops
O&M	-	Operations and Maintenance
OFC	-	Other Field Crops
OJT	-	On-The-Job Training
PACD	-	Project Activity Completion Date
PCC	-	Project Coordinating Committee

LIST OF ACRONYMS (CONT)

PIL	-	Project Implementation Letter
PMU	-	Planning & Monitoring Unit
POC	-	Project Operation Committee
PP	-	Project Paper
PRC	-	Project Review Committee
PRB	-	Project Review Board
KARC/A	-	Regional Agricultural Research Centre/ Aralanganwila
R/E	-	Research/Extension
RO	-	Research Officer
RPM	-	Resident Project Manager
RTF	-	Research Task Force
RTWG	-	Regional technical Working Group
SOW	-	Scope of Work
STTA	-	Short Term Technical Assistance
TA	-	Technical Assistance
TAC	-	Technical Assistance Contractor
THVC	-	Traditional High Value Crops
TOG	-	Turn Out Groups
TOR	-	Terms of Reference
ULFO	-	Unit Level Farm Organization
UM	-	Unit Manager
US	-	United States
USAID	-	United States Agency for International Development
WM	-	Water Management
WUA	-	Water Users Association

EXECUTIVE SUMMARY

A. Background

This First Interim Evaluation was initiated according to the evaluation plan in the Project Paper. The evaluation report is titled First Interim Evaluation, Mahaweli Agricultural and Rural Development Project (MARD), Sri Lanka (No. 383-0086). The report is dated April 26, 1991.

The project commenced in September, 1988. PACD is August 1995. The project goal is to obtain the maximum possible economic benefits from land and water resources available to families on the left bank of System B.

B. Evaluation Purpose and Procedure

1. Purpose

This is the first interim evaluation of MARD. The primary purpose is to provide USAID/Sri Lanka and the Mahaweli Economic Agency (MEA) with an in-depth assessment of project implementation and progress to date and to recommend any modifications to improve the likelihood of achieving the project's primary and secondary purposes. Important aspects assessed include: delivery of AID and GSL project inputs, progress toward achieving project purposes, impact of project activities to date and validity of the original project design assumptions and strategies. Planned inputs for the remainder of the project were reviewed and recommendations made.

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C. Findings and Conclusions

1. The project is very complex containing both area based agricultural and rural development goals and agribusiness led commercial development goals. The project has been well managed and has achieved some remarkable successes despite slow startup due to security problems at the field site. The MASL continues to provide strong policy and implementation support. Most EOPS should be attained by PACD if farmer organization activity is strengthened and water management activities are concentrated on D and F-canal levels during the remainder of project life.

2. The original project development strategy was to expand production of traditional high value crops for sale in world export markets. Shortly after project startup new analysis indicated that this was not a viable strategy and emphasis was redirected to producing non traditional crops for export.

3. Project implementation is now directed toward production of traditional high value crops for sale in domestic markets and non traditional high value crops for sale in export markets. Chillies, big onion, butternut squash, okra and cabbage can yield net returns in excess of paddy when sold in domestic markets. Initial success was obtained with commercial gherkin production by settler outgrowers associated with a nucleus commercial entrepreneur. Okra and sweet corn have also been identified as having export potential from System B.

4. Lack of a post harvest cold chain has severely hampered development of an export marketings trials program. Lack of storage facilities for pulses, chillies and onions for domestic markets has hampered development of these crops as well.

5. Singapore and the Gulf States are more appropriate export markets than Europe or Japan.

6. The basis for a sustainable commercially oriented R & D program of crop production and marketing trials sensitive to market requirements is now in place. The ability to continue such a commercially based program is essential to sustainability after withdrawing project resources.

7. The water management component, has emphasized main and branch level activities. However, the engineering design at the field turnout level requires close farmer cooperation to achieve proper water management for diversified crop production. Poor field drainage remains a serious problem in System B.

8. Unit level boundaries in System B are mostly coterminous with D-level boundaries, providing the basis for achieving social, economic and water management objectives through formal Unit Level Farmer Organizations.

9. Identifying farmer organization activities as a subset of the water management component provides a very limited implementation vision for the broader social and economic activities required of FOs. These include organizing input and product marketing, resolving land disputes, making or providing guarantees for farmer production loans and providing a legitimate community social stabilization institution. A clear and uniform approach has not yet been articulated for organizing ULFOs.

10. Targeting homesteads for expanded commercial development can materially increase farm family income. Diverse

activities, including poultry, dairy and other livestock production, can be developed on these upland areas along with vegetables and perennial tree crops. A program targeting women during the Mala season has the best potential for success.

11. A functioning monitoring system was not yet in place at the time of this evaluation, but efforts are being directed to this end.

D. Recommendations

1. Water management activities be concentrated on solving turnout level problems for the remainder of the project. Addressing existing drainage problems should be a priority activity. Merging MDS with MARD will promote this objective.

2. For the next two years, all area based development activities should be organized around the seventeen intensive demonstration extension units (IDEU). Women should be targeted as part of this intensive campaign which should include increasing value of commercial sales from homestead lands. MEA is scheduled to begin implementing the IDEU strategy during Yala 1991. MEA should take the lead in carrying out the field demonstration program with MARD providing technical support.

3. MARD adopt the goal of establishing five fully operational commercial nucleus export operations by the end of 1993, each with an average of 200 outgrowers, to help meet the agribusiness commercial export project goal.

E. Lessons Learned

1. A systematic and continuous program of variety observations, replicated field production trials, whole farm and turnout group demonstrations and marketing trials is essential for developing a sustainable area based or nucleus farm/outgrower development strategy.

2. Major small scale outgrower participation in an export oriented commercial development program will generally occur only after larger farmers with greater risk tolerance have established marketing strategies and viable crop production technologies. This will take from three to five years. Once established, however, smallholder participation can expand rapidly.

3. Sustainable area based development strategies are dependent on attaining effective participatory farmer organizations able to address producer needs by providing production loans or guarantees, meet group input supply and product marketing needs, resolve land disputes and serve as a community social stabilization institution.

SECTION I INTRODUCTION

Two linked projects, the Mahaweli Agriculture and Rural Development Project (MARD) and the Mahaweli Downstream Support Project (MDS) are the latest USAID support contributions to the Government of Sri Lanka Accelerated Mahaweli Program (AMP). The AMP is, by far, the largest program ever undertaken by the Sri Lankan government to transform agricultural production and improve farmer incomes.

This report provides team findings, conclusions and recommendations from an evaluation of the MARD/MDS project conducted during the period March 12, 1991 through April 26, 1991.

A. Background, Setting and Initial Constraints

Development of the Mahaweli River Basin includes three major systems denoted as H, C, and B. System B, the last major initiative, was originally planned to develop 34,836 hectares of irrigated land. Continuing security problems related to political unrest in the area make it likely that the 20,000 hectares on the left bank will be the extent of potential settler development during the MARD Project life. At the time of this evaluation some 12,000 farm families had been resettled on the left bank of System B. Terrorist activities introduced a severe constraint on Project activities during 1988-89, the first year of Project life, but have been less of a factor since then.

USAID has made a major commitment to the development of System B and has invested \$170 million in Mahaweli development. Most has been for the left bank of System B which is now largely settled. The project being evaluated is designed to bring the left bank of System B to full production potential. MARD is designed to introduce more profitable diversified cash crops to settlers whose primary agricultural cropping experiences have been growing paddy rice. This is not a trivial task as system B contains significant amounts of poorly or imperfectly drained soils. The fact that original land leveling and plot layouts were designed for paddy cultivation introduces a further constraint to rapid adoption of diversified cropping programs.

Farm families in System B can be roughly allocated into three groups. The first are settlers already in the area when AMP was initiated. They had been resettled under previous government resettlement programs. The second group are evacuees from upstream areas flooded by construction of the Mahaweli system of dams and headworks. The third group of settlers are formerly landless residents in other areas recommended for resettlement by local MPs.

Agricultural skills brought by each of these distinct groups are not equal. Some misapplication of resettlement criteria has resulted in land allocations to individuals who still retain family

land in their original residential areas. Others have shown little interest in farming, preferring wage employment on commercial farms, other settler farms or in the limited non-farm activities now emerging. The diverse attitudes and farming skills of the various settler groups constrains uniform development across System B of diversified crop production activities.

MDS, the companion project to MARD, is financing construction to complete the tertiary irrigation and settlement infrastructure in Zone 4A. Zone 4A is at the perimeter of the area subject to political unrest. Consequently, construction proceeded more slowly than originally planned. However, greater attention is provided, in section 4A to land layout and levelling activities more conducive to support diversified crop production.

B. Project Description

Sri Lanka is now approaching self-sufficiency in paddy rice. Since there is a limited export market for varieties grown, domestic consumption requirements set the limit for future production expansion. To maintain and expand farm incomes in the face of limited land resources farmers need to diversify into crops with higher market value than rice. Research results conducted in System B suggests that net per hectare returns could double for some farmers by shifting into other crops, including those for export out of Sri Lanka either as fresh or processed produce.

MARD is designed to introduce a program of integrated and adaptive research and extension able to accelerate adoption of new cropping varieties, advanced technologies and development of appropriate domestic and export marketing channels. It provides long and short term expatriate and local TA. The Mahaweli Economic Agency, which is responsible for the agricultural and economic development of System B, and for MARD project implementation, is the counterpart agency to the contractor team supplied by Development Alternatives Inc.

Primary project beneficiaries include farmers and farm families in System B who have received one hectare irrigated settler allotments and one half acre homestead allotments, and individuals and corporate groups who have received up to 20 hectare "commercial" allotments for intensive production and marketing of high value diversified crops for domestic or export markets.

1. Project Goal and Purpose

The MARD Project goal is to obtain the maximum possible economic benefits from land and water resources available to settler families on the left bank of System B.

The project purpose is to:

- a. **substantially increase settler income through:**
 - o heightened resource productivity
 - o improved terms of trade with input suppliers and produce buyers
 - o linkages into commercial production channels
- b. **develop models for all Mahaweli systems which demonstrate improved methods of utilizing land and water resources through:**
 - o improved agricultural technology
 - o improved extension services
 - o improved agricultural supporting services
- c. **develop farmer organizations to provide improved water management and related services which:**
 - o support use of high-yielding agricultural technology
 - o help relieve recurrent cost burdens of the Mahaweli

Authority

2. Project Components

MARD contains three components, each with specific project outputs as listed below.

Agricultural Technology Generation and Dissemination Component

Stated Project outputs are:

1. deliver farm management recommendations for cropping systems taking account of domestic and international demand and markets and the local productive resource base;
2. train and develop a cadre to provide farm management extension;
3. link research station priorities to technological requirements of Mahaweli farmers in System B;
4. routinely field test agricultural innovations on farmer's lands;
5. diversify cropping patterns from the present paddy-paddy rotation;
6. introduce and analyze farm records to obtain rapid definition of high yielding and low cost farm level technology; and,

7. commercialize homestead production to provide cash income for settlers

Improved Water Management and Create Farmer Organizations Component

Stated Project outputs are:

1. train and develop a cadre to support effective farmer organizations
2. field test engineering (drainage) innovations on farmer's land
3. institutionalize main system operations and management which does not decapitalize the infrastructure while being responsive to changing agricultural requirements.

Agricultural Support Services and Farmer Support Systems Component

Stated Project outputs are:

1. ensure availability of agricultural supporting services (plant material, fertilizer, chemicals, etc.) which allow farmer selection of cropping systems which maximize output value under changing market conditions;
2. link settler output to domestic and international commercial marketing or processing channels for high value crops;
3. support increasing competition among private organizations and individuals which supply to and buy from settlers;
4. assist new settlers to obtain resources which allow utilization of more advanced production technology; and,
4. test and develop crop handling and storage procedures which increase overall crop value, and allow farmers to capture a larger market share.

3. Project Resources

The MARD Project provides U.S \$10.2 million in grant funds and \$3.8 million in loan funds to support expatriate and local hire technical assistance, local, U.S. and third country training for host country counterpart staff, limited construction of facilities to support project objectives, a farmer investment fund for initial capitalization of qualifying commercial farmer and marketing initiatives, and for special research studies. Government of Sri Lanka (SL) provides the Rupee equivalent of U.S. \$10.2 million, valued at the time of Project inception, in counterpart contribution.

a. Technical Assistance

The original expatriate LTTA team included a Chief of Party, an Agricultural Research Specialist, a main system O&M water engineer, a farmer organization specialist and a marketing specialist. In addition, Sri Lankan LTTA were provided: one FSR/E specialist, one farmer organization specialist, one irrigation engineer and one marketing specialist. A local training coordinator, and a grape specialist have also been hired since Project startup.

The design anticipated that a Research Task Force (RTF) would be organized, drawing existing research staff with the Department of Agriculture. The envisioned RTF did not materialize as the DOA was unable to provide the required economist and horticulturalist. Subsequently two additional LT TA expatriate staff were added in October 1989, a horticulturalist and an agricultural economist.

b. Training

The Project has allocated U.S. \$390,000 for U.S, third country and local training of Sri Lankan counterpart staff. No provision for long term training is incorporated into the Project design as it does not have a primary institution building objective. Training funds can be used for local and third country field trips which include local farmers and businessmen, in addition to counterpart staff in the Mahaweli Economic Agency.

c. Commodities

Commodities are procured by MASL under host country contracting procedures. A total of \$755,000 was originally budgeted for commodity procurement. This was later increased to \$1,185,00 after shifting funds from the contingency line item. Since 1989, the GSL has had difficulty meeting its planned expenditures because of unforeseen budget and management constraints. Consequently, USAID/Sri Lanka, with the concurrence of the GSL agreed to shift some of funds under commodities to the TA contract. Except for major items other commodities are being procured by the contractor as agreed upon by USAID and the GSL in the annual workplan.

d. Other

Other activities supported by MARD include support for special industry feasibility studies (U.S. \$230,000), a commercial fund (CF) to share risk of innovative new investment undertakings, and a farmer investment fund (FIF) of U.S. \$1.1 million. The FIF was to be used for grants to farmers in Zone 4A, but delays in settlement of this area led to reassessment of using direct grants for the designated purpose. Consequently, the FIF

has not been implemented and funds are being reprogrammed. The CF can also be used to support introduction of new crops and varieties for farmers with "commercial" allotments.

C. Evaluation Methodology

The seven person evaluation team included:

- o an expatriate agribusiness technology specialist with many years of practical field experience in tropical countries;
- o an expatriate marketing specialist with extensive experience in assessing and developing domestic and export marketing systems in Asia;
- o a water management specialist with experience in the Mahaweli System;
- o a WID specialist raised in Sri Lanka but now residing in the U.S.;
- o a Sri Lankan sociologist with extensive experience with farmer organizational issues faced in the Mahaweli Authority Project area;
- o a Sri Lankan agricultural economist with extensive experience in commercial farm management, agricultural planning and project monitoring and evaluation.
- o evaluation team leader with extensive policy, planning and organizational development experience in several LDCs and as COP on a USAID funded Agricultural Policy and Planning Project.

In conducting the evaluation, team members:

- o reviewed all relevant project documents, including workplans and progress reports, USAID CDSS and various GSL policy papers;
- o interviewed more than 100 key project related personnel, including USAID and GSL officials, MARD, MED, DARF, APAP and MDS project staff, numerous private sector traders, agribusiness leaders and many System B farm members;
- o extensively reviewed activities during a ten day on-site visit. Several team members returned to conduct greater in-depth interviews and consultations with project staff, farmers and agribusiness leaders.

Three formal debriefing sessions were held:

- o with the MARD/MEA field team at the Pimburettewa Project site;
- o with MASL/MEA officials at Colombo MASL headquarters;
- o with USAID/MARD officials at Colombo USAID headquarters.

An interim report, distributed April 8, provided the basis for discussions with MEA and USAID officials. All three meetings were useful to the evaluation team in further refining perceptions,

conclusions and recommendations in this report. The final report was submitted to USAID prior to departure of the team leader from Colombo.

A financial systems review by a local accountancy firm provided additional information on project financing and implementation procedures.

SECTION II PROJECT COMPONENT ASSESSMENT

In this section findings, conclusions and recommendations are presented for each Project component. Farmer organization is identified as a separate component, in keeping with the way it has been defined by the contractor team. We believe this is to be preferred over treating it as a sub component of the Water Management component.

A. Farmer Organization Component

The GSL has recently adopted, by amendment to the Agrarian Services Act of 1958, policy measures to register farmer organizations with legal status at the Village unit level. Regulations to implement the amendment are now in process. This policy shift recognizes the importance of ULFOs in achieving socioeconomic and cultural objectives. These ULFOs are an integral part of the strategy for achieving project objectives identified in the PP. They meet the USAID interest in promoting democratic pluralism at local levels by fostering the organization and growth of participatory local level leadership institutions. Annex D provides a comprehensive discussion of the evaluation team findings regarding farmer organizations.

From discussions with project staff the evaluation team concludes that the importance of participatory ULFOs to accelerated economic and social development in System B is well recognized by MARD and MEA. But, a strategy to implement this broader vision for ULFOs has not yet been adequately articulated.

It was recognized at the outset of the project that, regardless of the effort expended, effective ULFOs will not be in place throughout System B by MARD PACD. This is because settlers to System B come from very diverse backgrounds and lack necessary social cohesiveness required for achieving desired community participatory activities. Instead, we suggest that project objectives be more modestly interpreted as introducing a process which will be sustainable after project inputs are withdrawn. This long-term social change process should be undertaken within the context that the individualistic approach to farmer problems, which appears to be the current default implementation strategy, is not viable and sustainable within socioeconomic realities of System B.

The above conclusions are based on lessons learned from the ISMP farmer organization model and the earlier experiences at Gal Oya. This two tiered approach recognized that the formal FO was at the D-canal level. Formal legal and administrative authority resides at this level and farmer membership and organizational accountability is maintained. For System B this is roughly analogous to the ULFO. In the ISMP model Institutional

Organizers play a major catalyst role in initial FO formation and operation. This role was recognized in the PP which projected a maximum of 104 Irrigation Community Organizers (ICO) employed on a temporary basis by the fifth year of the project. While this staffing level can probably not be obtained due to existing budget constraints the evaluation team is pleased to note that the MEA has hired over 40 ICOs and has adopted a plan to place two ICOs in each unit targeted for the intensive development extension unit effort (IDEU).

The "MARD 1990 Annual Report and 1991 Annual Work Plan" indicates that 54 ULFOs have been formed. This means that all System B units have been contacted. Of these, 26 are registered with MEA. However, the evaluation team found very few ULFOs functioning according to expectations of the Project design. The same report noted that "none of these can be considered viable yet". The evaluation team concludes that a major reason for this limited progress include lack of common vision by MARD and MEA staff on the role of ULFO's in achieving the project goal. In part this is because MASL has not yet articulated a clear development strategy for ULFOs. Several different approaches have been introduced in System B over the past five years. However, with passage of the amendments to the Agrarian Services Act, it is hoped that an implementation strategy can soon be developed.

While only a few ULFOs are functioning, those that are have shown the capability for undertaking the community wide social, economic and water management activities carried out by similar organizations in the more mature systems of the AMP. This conclusion provides the basis for recommending that:

1. MARD operate as a catalyst in organizing ULFO's with broader socioeconomic objectives in addition to water management objectives;
 - a. FO's enact constitutions specifying use of shramadana labor sharing approaches and require fee payments from all farmers within the Unit jurisdiction in lieu of labor contribution,
 - b. introduce a clear MEA policy and systematic implementation mechanism to get farmer contribution to maintain water systems at the TOB and Unit levels by shramadana and collection of water user fee by cash or by paddy.
 - c. FO's promote expansion of the kattimaru turnout level land sharing approach as part of an outreach program to farmer members,

- d. FO's take the lead as the authoritative village level people's organization to help resolve input supply, marketing, and credit problems as well as serving as the umbrella organization to promote women and youth income generating activities and address other recreational and socioeconomic needs.
2. MARD and MEA staff must develop a common vision that the progress toward the Project goal can be sustainable only if development of the FO system is recognized as the central process component;
 - a. MARD/MEA staff evaluate the better functioning ULFOs (eg. Sevenapitiya, Damminna etc.) as the basis for developing a set of common ULFO objectives and an implementation strategy,
 - b. after analysis of successful ULFO's, organize a workshop for MEA and MARD officers to develop a suitable action plan to integrate all project activities within a common FO framework.

The existing level of local and expatriate MARD FO resources seems sufficient. But they need to be better mobilized to achieve maximum output. To this end the evaluation team recommends that:

3. All technical specialists coordinate their work with a common vision to develop functioning ULFOs with informal groups operating at the TOB level;
4. school community and women's groups be mobilized especially for the development of homestead activities via ULFOs.
5. the project prepare a video film for FO promotional activities, featuring homestead and irrigated plot development extension activities featuring the role of FOs in crop diversification.

The evaluation team strongly supports the MEA/MARD plan to identify seventeen Intensive Demonstration Extension Areas (IDEA) to target scarce MARD/MEA resources to selected Units to achieve accelerated and sustainable balanced growth and development. This issue is addressed under the ATG&D component discussion.

B. Water Management Component

The authors of the MARD Project appropriately recognized that if non-paddy crops become the major crops grown, the system of water distribution will have to change from the original design. Irrigation of non paddy crops is more complex and difficult than irrigation of paddy because they typically require

intermittent irrigation with more careful control of water quantity.

To date, Project O&M activities have concentrated heavily on management and maintenance activities at the main and branch canal levels as called for in the PP. These activities are exemplary of the technical competence of both expatriate and Sri Lankan staff engineers. Most have been carried out successfully. This is particularly noteworthy given the newness of System B, the inherent structural and agronomic soil problems and the continuing political unrest.

The resident MARD Main System Management (MSM) engineer has provided technical assistance including training and development of pragmatic guideline to help MEA establish O&M procedures. The Cost Center Activity Accountancy (CCAA) was a major component of Project activity during the period under review. It is a good initial step toward reducing MEA recurrent costs as required under a Project output for this component. The evaluation team is highly impressed with the CCAA development work to date. We concur with the Project team assessment that the CCAA can materially reduce MEA recurrent costs if properly incorporated into the MEA management structure. The CCAA provides the basis for institutionalizing main system operations and management called for in the project output for this component. We conclude that MEA efforts to continue this work be increased with MARD providing training as needed.

There is growing interest in operating the main irrigation system year round to promote diversified crop production. The issue is being addressed by MARD and MEA and also by the DRPM personally. Concern has been expressed that the "traditional" practices of dewatering for annual or semi annual maintenance may be a deterrent to diversified crop production. The evaluation team supports the MARD STTA study now underway on this issue.

While the main and branch canal systems appear to be in relatively good condition, the D and F-canals generally are not. Many of the concrete structures have become ineffective and canals often have major seepage losses. Our brief tour of several D canals suggests that the reason for tailenders receiving inadequate and unreliable water supplies is a result primarily of seepage losses and lack of water control in the D and F-canals. MARD has proposed to provide the short term services of an "earth stability" specialist to deal with canal stability problems. The evaluation team concurs that this is a high priority activity.

A major activity proposed for the coming year is development and application of an irrigation delivery simulation model for main and branch canals of System B. Such a model would be useful

in the event that water supply becomes the limiting factor. But, this is not likely to happen during the expected life of MARD. Consequently, the evaluation team recommends that:

1. development of the proposed computer simulation model for System B not be taken as a high priority during the currently projected project life.

MARD water management activities as developed in the PF have been grouped under two general themes; a) reduced recurrent cost, and b) reduced water use in system B. These themes are more narrowly defined than the wide ranging goals, purposes, objectives and activities discussed in that document. The basic concern with simply reducing recurrent costs does not recognize that MARD has actually been attempting to reduce costs while maintaining or improving related services. Moreover, we are not clear why reduced water use became one of the water management themes.

Development of the right bank of System B is now on hold and is not likely to be completed in the near future. Consequently, water "saved" has currently no apparent high value for other uses. Incentives to save water are therefore more likely to result from adverse effects of too much water at the wrong times.

The problems related to "over irrigation" and "under irrigation" come together at the field level. Initial solutions should start there where farmers at the turnout level can control water use. Additional emphasis on resolving farm level drainage problems is required to address the Project output associated with "field testing engineering (drainage) innovations for implementation on farmer's land". Consequently, we recommend that MARD:

2. concentrate its primary activity focus on distributory (D-level) and farmer turnouts (F-level) for the remainder of the Project

The Sevanapitiya Block in Zone 2 covering a paddy area of 3,312 hectares offers a successful model for organizing settlers from the turnout level through the unit and up to the block. It's replication in the next phase of MARD is a sine qua non for successful on-farm water management through out the system, provided that defective tertiary irrigation structures are repaired. Implementation of these successful farmer organization activities will address the Project output to "train and develop a cadre to support effective farmer organizations".

The successful MARD on-farm pilot demonstration activity now underway in the Medagama zone in the Vijabapura Block provides a basis for expanding technical turnout level activity to other

units. With these successful activities in mind the evaluation team recommends that MARD;

3. consolidate, as needed, gains made in improved main system O&M assistance by giving training, as needed, to assure that new or inexperienced MEA staff be upgraded;
4. provide short term technical assistance, as may be needed from time to time, to fill the remaining gaps to make the CCAA functional;
5. deemphasize reducing overall water use in System B and increase emphasis on more effective water management for non paddy crop production;
6. address techniques for water control of diversified crops at the field level with a bottom-up focus rather than trying to alter the irrigation system procedures to fit needs of non paddy crops;
7. develop and implement an applied research and demonstration plan directed at turnout level water management technologies for diversified crops appropriate to the special production constraints (e.g. abundant water, coarse shallow soils) of System B and that relate closely to the crop management practices being promoted. Particular emphasis is needed to alleviate poor drainage which now constrains production of diversified crops.

One of the more promising approaches for improving on-farm water management for non paddy crops is reorienting each one hectare farm plot so as to maximize slope up to one percent. This strategy will allow more rapid runoff of excess rainfall and cause the ground water table to drop more quickly, especially if interceptor drains are used. This is currently being implemented in Zone 4A. While providing potential for improving cultivation of diversified crops it may have disadvantages for paddy cultivation. To promote appropriate adoption of this promising technology we recommend that MARD/MEA:

8. conduct comparative field tests of the traditional and new design for plot orientation to determine advantages or disadvantages of each for both paddy and non paddy crops;
9. conduct a rapid field reconnaissance survey of subsurface water movement to assist in drainage design for improved diversified crop production and to minimize environmental damage;
10. implement in the rest of System B, at the turnout level traditional kattimaru land sharing patterns to promote turnout group cooperation in growing diversified crops on

irrigated land with minimum need to carry out expensive new engineering activities.

Additional water management issues as they relate to expanding crop diversification activities are discussed under G below.

D. Agricultural Technology Development and Generation Component

MARD ATD&G activities relate closely to traditional applied research and extension activities. Project staff are to work closely with MEA and DOA to foster an accelerated, but systematic, program of variety screening, replicated trials, and farmer demonstrations leading to rapid adoption of Traditional High Value Crops (THVC) and non traditional high value crops (NHVC). (As used here THVC are a subset of Other Field Crops (OFC.) and include crops such as chillies, okra, big onions, cabbage, brinjals, etc.) The project was slow in addressing developing a sustainable program of scientific trial, in part because the planned Research Task Force did not materialize. As a result, the accelerated aspect of this component has yet to be realized. Yet, the basic building blocks are now in place to realize major accomplishments in Project outputs associated with this component.

Addition of a commercially oriented horticulturalist and agricultural economist in September 1989 expanded the capability of the FRS team. The range of crops for which technical production knowledge was resident in the team expanded to include NHVC. The Mahaweli System B Task Force on Development and Settlement recommended, in 1984, the introduction of a linear programming crop selection optimization model, but it was not implemented prior to MARD. Within the past year a simplified, yet useful, LP model has been successfully introduced by the agricultural economist, without sacrificing basic economic principles. This makes it replicable to other Mahaweli systems and therefore is sustainable after MARD PACD.

A systematic farm record keeping program is in place to rapidly define cost and return aspects of high yielding farm level technologies. It also provides data for LP analysis. Field and TOG level farmer demonstrations are being introduced in various Blocks to "routinely test agricultural innovations on farmer's fields" and to promote adoption of diversified cropping patterns from the present paddy-paddy rotation. New agricultural innovations are "being routinely tested on farmer's fields". Systematic "farm management recommendations for cropping systems taking account of domestic and international demand and markets and the local productive resource base" are being incorporated into the on-farm and TOG level demonstrations.

Most of the above activities were first introduced in Yala

1989, one year after Project startup. This is a very acceptable performance level for a project with the scope and complexity of MARD. With the present FSR/E team now functioning at optimum levels these activities appear sustainable with continuation of the existing positions through PACD. Sustainability beyond PACD is contingent on MEA identifying suitable counterpart staff and MARD providing necessary short term and on-the-job training. With the above considerations in mind, the evaluation team recommends that:

1. the well functioning MARD FSR/E team composed of a research and extension agronomist, a horticulturalist and an agricultural economist should remain in place through 1993;
2. MEA should assign at least two counterpart staff to work with each MARD technician. This will provide opportunity for on-the-job training to enable continuation of these important technology development and dissemination activities beyond PACD;
3. other activities to achieve full FSR/E team potential include actions to:
 - a. establish and revise work plans for trial work every six months taking into consideration results achieved to date,
 - b. regularly publish data from R & D production and marketing trials on a "results obtained to date" basis to make the most current information available for use by extension staff and private sector commercial growers,
 - c. develop a preventive pesticide control program for economically viable THVC and NHVC crops which can be grown in System B by including pesticide dosage and treatments within the crop trial program,
 - d. introduce a program of residue testing for final product, especially for crops destined for export markets.
4. as a matter of urgency, test new varieties of NHVC under an accelerated program of adaptive research at the DOA Aralanganwila Research Station simultaneously with on-farm trials to eliminate existing R & D constraints to expanding commercial production.

The major responsibility for disseminating agronomic information falls on the MEA Field Assistant (FA) located at the Unit level. The recent merger of newly hired FSEs with the FA unit level cadre was a positive move to improve overall

coordination and improved performance of the farmer level extension staff. MEA plans to introduce an Intensive Development Extension (IDEU) approach in the near future to target scarce resources in units best able to use them.

In spite of severe budget constraints, MEA has now on staff more than 40 ICOs called for in the Project Paper. It plans to assign two to each of seventeen selected IDEA areas, with the remainder assigned to other Units. Operating in the manner pioneered by ISMP the ICO's will assist the Unit manager and the Field Assistant in disseminating new farm technology and organizing and strengthening ULFOs. The evaluation team supports the MEA strategy as a feasible way to optimize use of scarce resources.

Based on interviews and review of available literature, the evaluation team believes that an extension strategy targeted to TOGs is the lynch pin to achieve accelerated development and sustainability of diversified production and on-farm water management. As noted in the PP the turnout area is the end user in the irrigation system. It is at this level where economic benefits are generated for the farm, the project and ultimately the country. As economic development occurs, cooperative linkages forged at the turnout level will develop under ULFOs operating with legal status.

The project design anticipated that MARD technology dissemination activities be coordinated within the MEA strategy and provide technical assistance to accelerate the technology adaptation process. The Project is now introducing year round cropping activities on both homesteads and paddy. Lack of well water during Yala limits complete adoption of this strategy, but initial tests of year round irrigated cropping on paddy lands has been by and large successful. After some initial reluctance water management staff are making water available for year round cropping on a pilot basis. The evaluation team further recommends that:

5. selected IDEUs be located in areas having suitable soil and water availability and with farmers best able to adapt to cultural and financial requirements of diversified cropping patterns. This will maximize the farmer demonstration effect;
6. MARD continue to expand it's year round cropping activities on irrigated paddy to promote increased farmer income;
7. MARD and MEA promote turnout level group adaptation of THVC and NHVC to accelerate expansion of commercial diversification activities;

8. ICD's report administratively to Unit Managers and work as a team with FA's assigned to the Unit. In addition,
 - a. MARD assistance should be targeted to these teams,
 - b. ICD's should also assist Unit Managers in achieving ULFO organization and homestead development objectives;
 - c. MEA expand the number of ICDs so that all Units have these technical services.

The project paper called for MARD to develop THVC and NHVC for export markets. The design was based on the assumption that domestic markets for high value OFCs were limited and therefore identifying export markets was essential to achieve successful diversification. However, domestic markets for fresh produce have remained dynamic. Unrest in the northern part of the country has reduced domestic produce flowing to major urban markets and natural population growth in the greater Mahaweli area is also gradually expanding domestic demand for high value crops. The country continues to import large quantities of chillies and onions indicating that a domestic market for these crops exists.

MARD research has shown that cabbage, butternut squash, okra, chillies, and onions can yield net returns per hectare in excess of those available from paddy. Based on this evidence, the evaluation team recommends that:

9. MEA, with MARD training and technical assistance, motivate extension staff to encourage settler production of profitable THVCs for local markets, with assistance targeted especially to selected IDEUs on a turnout basis.

In addition to these traditional crops, NHVC's such as gherkins and zucchini have generated returns above paddy. Recent experiences with gherkin production for export in brine indicate both the possibilities and the pitfalls of growing high value crops for export. The evaluation team remains positive about the long run potential for this crop as a part of the rotation for settler farmers planting on an outgrower basis. In general, once markets have been secured and technology developed for these new crops, the potential for rapid adoption by settlers is possible. With the exception of gherkins other potential export crops still require an initial period of variety screening and replicated trials before rapid adoption is possible. For gherkins, continued experimentation with new varieties as they become available, either in Sri Lanka or from overseas sources, is required. MARD expertise in agronomy, horticulture and agricultural economics can be put to best use in accelerating this important R&D process. To more fully utilize this expertise the evaluation team recommends that:

10. MARD install post harvest handling facilities for diversified crops sold in export and domestic markets and conduct systematic product preparation studies as well as test market sampling for both local and export markets;
11. post harvest handling and test market sampling activities be integrated within the scope of the FSR/E R&D team;
12. MARD conduct a study to determine the feasibility of introducing mechanical rice threshing to release labor for higher value employment in commercial crop production or employment for wages on "commercial" farms.

D. Farmer Support Services and Marketing Component

The evaluation team concludes that lack of transport to carry produce to established local markets and lack of credit for diversified crops pose the major constraints to more rapid expansion of THVC's by settlers for domestic markets. The lack of post harvest handling facilities and proper cold storage continues to hamper expansion of NHVC's for exports. Moreover, there is no regular domestic marketing information available on a daily basis to apprise System B farmers of national price trends. Alleviating these constraints is part of MARD's scope of work.

When devising and implementing production and marketing action plans for previously untested high value crops, unrealistic expectations may lead to initial bursts of activity with but limited long term sustainability. As developed in Annex G the expected adoption curve for THVC such as chillies, and B onions should be quite rapid in System B. Technology and seed are available and domestic demand exists. Transport and storage constraints pose the major bottlenecks to rapid expansion of these crops.

NHVC for export, such as melons, zucchini and sweet corn can be expected to have a slower initial adoption rate as more extensive startup R & D activities are required. However, once startup activities have demonstrated export viability, very rapid expansion can and should be expected.

MARD marketing activities are reviewed and recommendations made within the context of this differential market adoption process.

MARD is conducting domestic marketing trials for selected NHVCs such as okra, zucchini and sweet corn. In support of these activities, the Export Marketing/Investment Promotion Specialist located in Colombo, has identified several second tier export markets including Singapore, and the Gulf States as the most likely markets for Sri Lankan exports in the near future. Once experience is gained in these markets it is appropriate to target

the more sophisticated European and Japanese markets. The evaluation team supports this export marketing strategy as an effective way to meet the Project output "to link settler output to domestic and international commercial marketing or processing channels for high value crops".

To support development of System B produce for export sales, MARD has conducted some post harvest handling and marketing trials. To date, these do not seem to be systematic nor do they appear to be integrated into a scientifically based program of production and marketing trials as developed in our previous discussion of the ATG&D component (See also Annex F). To improve project capability to more adequately conduct marketing trials and ultimately commercial export production, USAID has recently initiated a competitive bidding procedure to enable installation of a private sector owned and operated cold storage in System B. This should go a long way to alleviate the rapid spoilage of perishable produce now responsible for most post harvest losses occurring past the farm gate.

In addition to cold storage for highly perishable produce, System B farmers require storage for THVCs such as pulses, chillies, onions, etc. Storage facilities for these crops can materially extend marketing periods to improve farmer income. This would directly address Project output requirements. To address this issue the evaluation team recommends that:

1. MARD and MEA local marketing specialists, in conjunction with MARD farmer organization specialists and unit level ICOs, promote construction of Block level storage facilities, owned jointly by ULFO's within the block. To accomplish this;
 - a. Project funds can be used for purchase or construct storage facilities to be purchased by FOs,
 - b. MARD specialists can take the lead in establishing appropriate legal and institutional arrangements to ensure effective control and management by farmer organizations operating under charters recognized by Sri Lankan law. Arrangements such as those under which the Draft Animal and Dairy Development Producers Associations (DADDPA) are organized would seem appropriate,
 - c. the project can retain local consultants with experience in organizing and operating producer societies under Sri Lankan Company and Cooperative Societies Acts to assist in this endeavor.

The Project has not yet established private sector trading channels for THVC's. The previous specialist established unit

level representatives at local polas (fairs) to organize produce sales for farmers in their units. In addition he organized direct sales of specialty commodities to Colombo using personal contacts. The lack of cold storage resulted in high losses in several cases.

The project has not yet devised a strategy for meeting the project output to "increase competition among private organizations and individuals which... buy from settlers". Moreover, a strategy to meet the project output to "test and develop crop handling and storage procedures which increase overall crop values" has not yet been effectively implemented.

MARD anticipates hiring two local marketing specialists. One would remain in Colombo to assist the expatriate specialist in locating Colombo outlets for System B produce. The second would be located in system B to address local marketing issues including post harvest handling.

The implied strategy to develop long haul transportation capability for getting local produce to distant domestic markets, appears to the evaluation team, as not the most appropriate for meeting the project output. It bypasses traders already operating in local markets and operates more in the direct assistance mode rather than as a catalyst for sparking greater private sector involvement. Locating the second local marketing specialist at System B to support development of post harvest handling techniques is appropriate. To more adequately address the Project output to "link settler output to domestic and international commercial marketing or processing channels", the evaluation team recommends that:

2. MARD actively seek private traders operating in the larger polas or the market at Dambulla to make regular trips to System B farmers for the purpose of buying or transporting vegetables for sale locally or in larger urban markets. If necessary, MARD should initially cover part of the transportation cost if full loads are not available;
3. MARD provide low interest loans from its commercial development fund, to active ULFO's and small scale settler traders, to purchase ELF type vehicles (1 to 5 mt capacity) to transport vegetables from farmer members to nearby markets for sale or trans-shipment to urban markets;

Programs to provide producer credit are available to settlers for paddy production. Similar programs are not available to support credit needs for rapid diversification into NHVC's and THVC's. In other Mahaweli systems private sector banks have introduced innovative credit programs, operated on a commercial basis, to provide farmers with a greater choice in meeting production credit needs. The evaluation team supports

the work now underway by the MARD team to develop a private sector banking presence in System B. Such a program can assist in meeting project outputs to "increase competition among private sector organizations and individuals which supply to and buy from settlers" and to "assist settlers to obtain resources which allow utilization of more advanced production technology". To reemphasize the importance of developing private sector banking linkages for farmers and farm organizations, the evaluation team recommends that:

4. MARD/MEA seek entry of a private sector bank into System B to actively promote development of credit facilities for farmers, farm organizations and agribusinesses engaged in commercial production and marketing of diversified crops.

During the field interviews the team ascertained that supporting services providing inputs such as fertilizers and farm chemicals were adequate to meet the Project output "to assure the availability of supporting services which allow farmer selection of cropping systems which maximize output." However, difficulties are experienced in clearing seed through Customs for new cropping varieties. In reviewing this issue with officials of the Seed Quarantine Unit of the DOA we were told that up to 70 percent of all seed imports inspected by Customs officials at Colombo airport lacked an appropriate import permit or phytosanitary certificate. If documents are not produced within a week, it is Customs policy to destroy the confiscated seeds.

The evaluation team became aware of a recent attempt to import commercial quantities of onion seed by a private sector grower for which appropriate documentation was not provided. However, after obtaining the required phytosanitary certificate, the shipment remained in custody apparently because the quantity of seed is too large and the particular variety had not been previously imported.

It is understood that the Seed Quarantine Unit and the Seed Certification Unit may soon be merged into a single Seed Certification and Quarantine Division with regulatory powers reporting to a DOA Deputy Director. This may help resolve the current problems as the Seed Quarantine Unit now operates primarily as a research unit rather than an expediting agency. Discussions with MASL officials confirmed that rather arbitrary actions have restricted importation of seeds needed to support GSL policy to expand production of NHVC's for export markets. To meet required Project outputs the evaluation team recommends that:

5. DOA, with MARD and DARP collaboration, review its policies regarding importation of commercial quantities of new seed varieties to promote more rapid expansion of non-traditional high value crops and prepare, for widespread distribution,

an extension bulletin to describe policy and procedures governing seed importation.

To support active development of demand driven commercial production and marketing of high value crops for domestic and export markets appropriate information systems are needed. Information systems meet two general needs. Individuals involved in day to day selling require rapid feedback systems providing data on a real time basis. Government and the private sector also need historically consistent data to assess total market demand and to plan marketing strategies. These systems do not yet exist in Sri Lanka with precision to materially assist System B farmers to make the most rational possible decisions.

For export markets product specific information is now being gathered by MARD marketing specialists. Export markets are very specialized. Quoted price and transportation costs are usually subject to quantity and quality adjustments made to individual traders on a contractual basis. Most of this information is of a proprietary nature. Consequently, formal market information systems cannot provide the market clearing type of information of assistance to small scale commercial producers.

Formal marketing information systems are useful to individual farmers and traders selling on domestic market. Currently, several organizations are directly involved in gathering and disseminating market information. The Agrarian Research and Training Institute (ARTI), the Central Bank of Sri Lanka, and the Department of Census and Statistics collect various types of market data at various intervals. However, none has a comprehensive market information system useful to System B farmers and traders interested in producing for demand existing outside local polas.

At this time it is not possible to make a definitive recommendation regarding which of these agencies is best suited to develop the needed comprehensive marketing information system. Indeed, perhaps the Planning Division of the MASL may be in a better position to gather national marketing information suitable for use by System B farmers and traders. Consequently, the evaluation team recommends that:

6. MARD coordinate with agencies now collecting, or with the capability to collect, marketing information on a national level for the purpose of developing a marketing information system suitable to the needs of Mahaweli System farmers and traders selling diversified produce in domestic markets.

SECTION III CROSSCUTTING AND OTHER ISSUES

MARD is a complex project, incorporating area based agricultural and rural development goals with those of targeted agribusiness led commercial development. Most agricultural projects contain only one of these two major development goals. For this reason, MARD is unique and can well be considered as a potential model for similar comprehensive commercial agricultural development projects with small scale farmers as principal beneficiaries.

The evaluation team is impressed by the way that USAID, the MASL and the contractor team, have met the challenges facing them. Most implementation targets are on schedule, a few have already been met and strategies to address the remainder have been, for the most part, developed or are in process.

In this section we discuss issues related across several components and others specifically identified by the evaluation team's scope of work.

A. Project Sustainability

Achieving sustainability after withdrawal of project resources is the ultimate measure of success. Findings and conclusions regarding project sustainability are discussed here.

1. Project Goals

The EOPS primarily reflect the area based development goal and refer to expanding economic and social wellbeing of the 12,000 farm family settlers residing in System B. Only two, (providing non traditional commercial opportunities and promoting export opportunities) address the targeted agro-industry development goal. This initial scope reflected the policy assumption that a subset of OFCs, (we have earlier identified these as traditional high value crops (THVC)), whose cultivation requirements are known to many farmers, could be grown for rapid absorption into export markets.

Initial project experience, supported by MARD production and marketing research, has shown that non traditional high value export crops (NHVC) must also be developed to gain the full impact of the project's commercial export development thrust. Consequently, project implementation activities were reoriented to support introduction of selected NHVCs for export to a subset of the more advanced farmers while continuing to promote THVCs for sale primarily to domestic markets as an area wide strategy.

This reorientation conforms to stated USAID development objectives and also to recent policy initiatives articulated by the GSL. It is therefore a desirable and necessary modification.

1. Policy Conditions for Sustainability

In the course of analyzing data obtained during the project review phase the evaluation team identified a set of policy conditions necessary to achieve sustainable and balanced economic growth in System B after withdrawal of project resources. These policy conditions are not considered substitutes for the End of Project Status (EOPS) targets against which project accomplishments are directly measured. Instead, they provide a set of general principles incorporating broad, area based socioeconomic objectives, with those of the more targeted agro-industry led commercial nucleus and outgrower development strategy. The latter were not as clearly defined at project conception.

If, indeed, all these conditions can be attained, the project is assured of meeting EOPS conditions by Project Activity Completion Date (PACD). Specific review of project EOPS and progress toward their achievement by PACD is discussed in the Section IV of this report.

Policy conditions identified by the evaluation team as necessary to achieve sustainability after withdrawal of project resources are:

1. A production and marketing research program at the Aralanganwila Research Station able to adapt existing and new crop varieties for domestic and export markets to System B soil and climatic conditions;
2. A strengthened MEA extension system to promote diversified crop production, targeting limited resources to settler farmers best able to provide a replicable demonstration effect for other settlers;
3. A private sector banking system providing loans to farmers, traders and agribusinesses for producing diversified crops to provide permanent linkages between farmers and domestic markets;
4. A strong and stable group of technically competent "commercial" farmers with access to credit and export markets to provide permanent linkages between outgrower settler farmers and export markets;
5. Resolution of existing main and turnout level drainage and land leveling problems to provide physical agronomic conditions required for growing diversified crops;
6. Introduction of flexible land tenure practices to enable efficient settlers to expand production on additional

irrigated plots and also be eligible to receive "commercial" sized allotments;

7. Creation of appropriate social institutions, maintained at unit level villages by viable FOs, able to effectively channel the natural energy, productivity and cooperative spirit of the System B settlers toward sustainable socioeconomic growth and development; and
8. A systematic monitoring and evaluation system built around the data collection and analysis capability of the Project Monitoring Unit of the MASL.

2. A Strategy for Sustainability

Sustainability for area based development projects requires long term mechanisms for extending production and marketing information activities. The MEA, or another agency with an extension capability, would be expected to continue the development process after MARD resources are withdrawn. But, farmer organization and water management activities need to be fully integrated into the FSR/E approach to fully develop the potential economic benefits from THVC on both irrigated and homestead plots. Traders need to be mobilized to purchase THVCs and homestead products. Both short and long term success is dependent on effective mobilization of local resources.

The commercially led export market growth strategy complements the area based domestic market growth strategy. The new focus on NHVC involves more risk to the exporter and the farmer than a policy limited only to THVC. But, potential returns are also higher for those who succeed. Moreover, an export led policy provides Sri Lanka with valuable foreign exchange. Crops are grown to meet specific commercial quantity and quality standards. Experienced private sector technicians supported by a MARD applied R & D advisory capability are expected to jump start the entrepreneur led system which provides the engine of growth.

Under both goals, long run sustainability is in the hands of Sri Lankan people and institutions. The role of MARD, as defined in the Project Paper is to be a catalyst, quickly mobilizing specialized technical and financial support targeted to meet the requirements of each goal. This role is well understood by MARD team members and MASL counterpart staff.

A FSR/E production and marketing R & D capability is a common factor in meeting the TA needs of both goals. (See discussion in Annex F.) The R & D process now in place (with sufficient emphasis on development) can support expanded THVC and NHVC for domestic and export markets by providing cropping and marketing advice and motivation to:

- o settlers operating in an area based mode; and
- o entrepreneurial commercial farmers operating in the nucleus/outgrower mode;

a. Settlers Operating in an area Based Mode

The evaluation team strongly supports steps taken to date by USAID, MASL and the contractor team to identify seventeen System B units as intensive demonstration extension units (IDEU). Providing each unit with two ICOs responsible to the Unit Manager, results in a farmer extension worker ratio of about one to eighty. This is, indeed a very favorable ratio. Targeting assistance through an integrated FSR/E water management, production, and marketing strategy can accelerate production of THVCs for domestic markets.

Targeting these seventeen units for full commercial attainment of diversified crop production activities, expanded homestead economic activities and functioning unit and TOG level farmer organization provides the demonstrable model for sustainable economic growth to the majority of System B farmers producing for domestic markets. It is recommended that:

1. MEA adopt the goal that all EOPS targets related to area based development be met by 1993 in the seventeen IDEUs.

Achieving this target by 1993 enables the MARD staff to assist with startup of the next set of units identified for intensive development.

b. Entrepreneurial Commercial Farmers Operating in the Nucleus/Outgrower Mode

Targeting production and marketing research and technical assistance to nucleus farmers with "commercial" allotments can rapidly develop expertise among this group to manage an accelerated, export-led economic growth process. At first, the more agriculturally adept settlers with higher risk profiles will be attracted. (Some may qualify as nucleus farmers). As demand and familiarity with cultivation procedures grow, more farmers will be added. Sustainability is based on successfully identifying a small number of entrepreneurs, providing them with startup resources and then letting them develop supply ties with the more capable small farmers. Ultimately, they will completely manage the production and marketing processes. To provide the sense of urgency to meet the export led commercial policy now jointly pursued by USAID and the GSL we recommend that:

2. **MARD adopt the goal of establishing five fully operational commercial nucleus export operations by the end of 1993, each with an average of 200 outgrowers.**

B. Targeting Female Household Heads

Although MARD was not designed with an explicit "womens component", women are project participants and beneficiaries. According to the Mahaweli Basic PMU Survey of 1989 an average of 19.2 percent of households in System B are headed by women. In some units, such as Karapola (Sevanapitiya Block) and Medagama (Vijayabapura Block) over 30 percent of households are reported to be female headed. These areas include many second generation youth.

Studies have shown that women contribute up to 65 percent of household income when working in both paddy and highland production. Moreover, women make up the largest percentage of workers employed by gherkin processors in the area.

A major constraint to women's productivity and household income is access to productive resources. Research has established that projects delivering resources and services to women with an understanding of their role in the farming system are more likely to succeed in reaching their goals than projects lacking such an understanding. The relatively high ratio of women household heads in many System B blocks, the lack of employment opportunities for second generation women (and youth in general) and demonstrated interest by women in developing new family income producing activities suggests that some specific MARD/MEA outreach activities should be targeted to women as sole and contributing members of farm family income.

To address constraints to more accelerated development of women headed households and women farmers and workers the evaluation team recommends that:

1. **MEA initiate a highly focused and visible extension program, targeted to women and youth, to promote commercial production of THVC on homesteads and uplands, which make up over half of available land area in System B;**
2. **this targeted program be initially carried out during Mala in the identified IDEUs as lack of water during the Yala dry season reduces the potential for diversified homestead and upland production of annual crops during this period;**
3. **work of the homestead development advisor be coordinated through the extension agronomists to ensure development of a technically sound outreach program;**

4. one of the ICOs hired for each of the seventeen IDEUs be a woman who would work closely with farm wives and female household heads to promote agricultural and nonagricultural income generating activities;
5. both male and female MARD extension workers receive training on gender issues and strategies for reaching women with extension information.

C. Homestead Development

In discussions with MARD and MEA staff and with farmers in Section B the evaluation team determined that MARD has focused virtually all attention on the irrigated allotments with but limited attention to homestead development and welfare of family. This gap in development activities is recognized by project leadership. To address this issue an intensive effort is now underway to devise a viable homestead development strategy. Continuation of this activity through successful conclusion is encouraged.

The project goal is to achieve the best utilization of all economic resources to increase settler family incomes and welfare. The irrigated lot is a detached economic resource of a family and not an integral part of the home and family. Based on field interviews the evaluation team concludes that the almost exclusive focus on the irrigated plot is, in part, responsible for limited mobilization of anticipated participatory response from settlers, to forge farmer associations and undertake other activities.

Results of the Socio-Economic Sample Survey of Yala 1989 and Maha 1989/90 conducted by PMU covering 370 households in six Blocks shows that in the Maha income from labor wages was very high in relation to income from the irrigated allotment and homestead although only about a third of labor units were employed in wage earnings as against the labor input into agriculture.

Homesteads yielded about 23 percent of the income generated from the irrigated allotment in Maha and 18 percent in Yala. Income from livestock was five times higher than from crops in the homestead with a relatively very small input of labor resources. These data strongly indicate the importance of the homestead and family as vital elements of the development process.

A strategy for homestead development would focus on the agro-economic potential of the homestead allotments and the socio-economic status of settler families.

There is in the country a large under utilized and sometimes even wasted resource in day old male chicks from layer chicken hatcheries. SL dietary habits generate demand for curry chicken at a price about 15% less than broiler price. No sophisticated provender feed is required to raise curry chicken and therefore it is highly profitable. In System B and all provincial urban areas a very good market exists. Other livestock activities common to other Mahaweli systems include goats (which can be grazed in underdeveloped uplands), dairy cows and buffaloes for draft and kurds). Persons with experience in systems C and H could be looked for assistance.

To achieve greater balance in the overall System B development strategy the evaluation team recommends that:

1. **Attention be given to development of livestock farming in the homestead which envisages a transfer of some family labor for this purpose;**

Vegetables and OFCs grown on homesteads have two major constraints for an expanded program. One is the water constraint. Cultivation is generally confined to the latter half of the Maha season after the intensive paddy work ends. Marketing is the second constraint. If the marketing constraint is remedied as previously recommended, (section II D) it is conceivable that settlers would transfer some of the wage earning labor outside the farm to cultivate more intensively vegetables and traditional high value season crops during the whole of the Maha season. If wells are developed which hold good in Yala, extension of arable crops into Yala has good potential. It is therefore recommended that:

2. **MEA with MARD assistance target IDEU homesteads for intensive THVC production during Mala based on the homestead development program now being developed.**
3. **an assessment of homestead soil suitability and Maha/Yala well yields be conducted. If results are positive appropriate technology could be developed to support expansion of THVC on homestead lands.**

Horticultural tree crops are constrained by the long-term maturity time frame and seasonality of production in the bimodal climatic environment. Exceptions are perhaps papaya and lime. As an encouragement, MARD needs to propagate varieties acceptable to settlers and which bear relatively early and are suited to the environment. To establish a firm basis for developing a meaningful nursery program it is recommended that:

4. **a sample survey of a cross-section of homesteads be undertaken by fielding a simple questionnaire of a half page**

during the normal rounds of the extension staff and the demand for plants ascertained.

D. Linkage With Other USAID Projects

The MARD PP indicates that cooperating linkages be developed with other USAID funded projects, MED and DARF. Moreover, the MARD contractor also manages the Mahaweli Downstream Systems Project (MDS) whose activities are aimed at new canal construction to Zone 4A. Since Project inception there has been discussion of formally merging MDS with MARD.

MDS has introduced important innovations in Zone 4A that will greatly affect system operation. In addition, MDS has an on-going program to monitor water table levels. Most current and proposed innovative MDS activities will directly influence the O&M of System B and thus impact the water management component of MARD. With more formal association MDS may be able to provide valuable assistance in rehabilitating D-canals and improving drainage in zones other than 4A. The evaluation team recommends that:

1. MARD and MDS be formally merged at a time mutually agreeable to USAID and MASL to;
 - a. strengthen MARD's technical assistance capability, particularly on-farm water engineering,
 - b. assure that new designs are compatible with recommended farming practices,
 - c. provide resources to deal with system wide problems such as those of D-canal deterioration, minor tank stability, road maintenance and drainage.
2. the complexity of lateral movement of shallow groundwater suggests that this aspect of MDS be redesigned and coordinated with MARD to gain a better understanding of subsurface water movements.

MARD and MED have been forging cooperative development arrangements over the past year to promote commercial production and marketing of high value export crops. The evaluation team supports these efforts as each project has resources beneficial to the other. MARD has a comparative advantage in carrying out a sustainable program of applied production and marketing research and trials to support commercial introduction, and maintain long run competitiveness of high value crops for domestic and export markets. MARD has also developed expertise in identifying and working with export market promotion.

MED has a comparative advantage in providing technical assistance to commercial entrepreneurs able to accumulate sufficient capital and technical know how, assume risk and provide the production base for maintaining specialty export markets. They also have expertise in post harvest handling techniques. MARD with MEA collaboration, can provide technical assistance to outgrowers producing under contract for growers with "commercial" allocations.

However, during discussions with commercial growers, the evaluation team discovered that some growers appear able to access development grants from both MARD and MED. Further review of this potential overlap in use of resources available to both projects is warranted.

The fusion of complementary activities between MED and MARD is well underway and is supported by the evaluation team. To foster improved coordination between these USAID projects in developing applied research and commercial production of diversified crops for domestic and export markets, the evaluation team recommends that:

3. MARD, with MED cooperation, conduct variety observations and product and market trials to identify suitable NHVC for export and develop cultivation and marketing recommendations as part of a joint MARD/MED commercial development effort;
4. MARD/MEA coordinate efforts to identify outgrower farmers to contract with System B commercial farmers and provide extension assistance;
5. MARD and MED investigate ways by which commercial farmers can provide technical field agent assistance to outgrowers, especially during the introduction of NHVC;
6. MARD retain leadership for identifying, developing and maintaining marketing channels for traditional high value OFCs and non-traditional high value crops for domestic markets;
7. MED take on primary responsibility for developing post harvest handling activities to assist MARD with products destined for domestic and export markets;
8. MARD coordinate export marketing through the Export Marketing/Investment Promotion Specialist for both MED and MARD export activities;

DARF is a research oriented project designed to assist the DOA Research Division to accelerate variety introduction and on-station trials. Some on-the-ground coordinating linkages have developed between MARD and DARF. However, greater integration of

the Regional Agricultural Research Centre at Aralanganwila (RARC/A) is necessary over the long run to achieve sustained agricultural development in System B. A recent proposal by DOA officials to provide auxiliary housing at Kandy for families of RARC/A professional staff is viewed by the evaluation team as a positive step in strengthening on-station research capabilities there. To further strengthen MARD ties with DARP and the DOA the evaluation team recommends that:

1. MARD and DARP continue to work closely with the RARC/A to improve its capacity to conduct research trials supportive of government policy to expand production of NHVC.

E. Project Training Activities

MARD conducts two types of training. The first is aimed at farmers and farm leaders in System B and is coordinated with the Mahaweli Resource Training Centre (MRTC) at Welikanda. The second concerns U.S and third country training of MEA professional staff. Each is discussed separately.

1. Local Training and Field Trips for Farmers and MEA Staff

MARD coordinates farmer and farm leader training activities with the MRTC which is part of the MASL Central Training and Coordinating Unit (CTCU). The CTCU offers a wide range of training courses for MASL professional staff and for farmers and farm leaders. However, few teaching staff are located at the MRTC. This limits the actual offerings provided at the system B site. Training plans are prepared by the MARD training coordinator for each Maha and Yala season. These formal courses are offered at Block and Unit levels. Block level courses are targeted to farmer representatives. Trainers are MEA and MARD project level subject matter specialists. Farmer training is conducted at the Unit level. Trainers include FAs, TOs and block level staff. Topics covered include farmer leadership training, water management, specialized field crop production, including pest management and fertilizer use and post harvest activities including marketing and savings. Farmer study tours, which included both farmers and MASL staff, have also been organized to Thailand, Malaysia, Indonesia and the Philippines.

MRTC class rooms appeared adequate for the type of courses presented. A cold room is presently being renovated by MARD and can provide a practical laboratory to demonstrate the value of storing high value crops prior to sale.

A review of Annual Work Plans reveals sufficient attention to providing farmer training opportunities by MARD staff. These show that workshops and training takes place within all Project components. Actually evaluating results other than providing

numbers of courses by subject and number of participants is quite difficult. Overall, the training program provided by MARD for farmers and farm leaders appears to be adequate. Within the general concept that future MARD activities need to be focused on practical, results oriented field level activities the evaluation team recommends that:

1. MARD training for farmers and farm leaders combine formal training courses with practical in-the-field extension demonstrations;
 2. field days organized around successful TOG diversification results can provide effective farmer training experiences;
 3. MED and MARD study the potential for improving MRTC facilities and using them to demonstrate small scale enterprises including crop processing, post harvest handling and marketing techniques, using a learn-by-doing approach.
2. Third Country Formal Training for MEA Professional Staff

Since MARD does not have formal institution building objectives there is no provision for long term staff training. The evaluation team considers this appropriate. As of December, 1990 the Project had completed about half of its projected life through June 1993. But, training expenditures were only 25 percent of the budgeted amount. This appears to be far short of the expected level for this stage of project implementation. While the complaint was heard that MEA staff are more likely to leave for other positions after receiving third country training this cannot be considered a good reason for the level of underspending which has occurred. To the contrary, the few MEA staff that have actually received specialized short term U.S or third country training have demonstrated new confidence and enthusiasm on their return resulting in improved on-the-job performance.

When reviewing this subject the team determined that existing MEA procedures, designed more specifically for staff training within the CTCU, are not very efficient in processing training requests from donor supported projects. Delays of half year or more, and changes in persons selected for training can be made without the knowledge of the immediate supervisor who originally made the reservation. With this in mind, the evaluation team recommends that:

1. long term training is not appropriate for the MARD project as the major needs are for targeted in-service training in technical subject matter areas and extension methodologies to improve on-the-job performance of MEA extension staff;

2. MARD participant training focus on younger staff at the unit level (D-canal) and below, Flexibility should be maintained so that newly developed technologies and MARD interdisciplinary thrusts can be incorporated into the training;
3. priority be given to three to four month U.S. based courses on extension methods for qualified FA's and UMs, to upgrade skills in group dynamics and informal teaching methods;
4. MASL consider streamlining approval procedures associated with training supported by donor projects such as MARD. Suggested modifications could include;
 - a. substantive selections for staff training be made by the RPM in consultation with the Project COP and the BM;
 - b. concurrence, based on technical considerations, be obtained from the System B Project Director;
 - c. clearances beyond the System B Director be based only on well established objective administrative considerations.

F. Monitoring to Improve Project Management

A set of monitoring targets and indicators useful to USAID, MASL, the COP and the RPM to improve their project oversight and management responsibilities is nearing finality. Difficulty in arriving at a common set of targets and indicators is due, in part, because mid stream reorientation of the project focus toward an export led nucleus farmer/outgrower strategy required additional monitoring targets and benchmarks not earlier identified.

Many of the eleven targets (mistakenly called indicators on the evaluation team's SOW) developed for purposes of project monitoring closely follow EOPS targets and are therefore valid. Moreover, modifications of some already clear and valid targets introduced greater obfuscation rather than achieving greater clarity. For example, changing the EOPS target from "raising the average value of production per settler 1.5 times the value of paddy-paddy crop" to raising "the average net family income to 50 percent over income from paddy crops" introduces a concept different from that in the EOPS. However, the monitoring benchmark indicator was then defined as gross value of paddy which relates quite directly to the original EOPS target.

There are other examples of needless complication of what is already a most difficult task. These issues are more fully assessed by the evaluation team in Annex I where specific

recommendations are made. As a result of this analysis the evaluation team concludes that a simple, yet valid set of targets and indicators for their measurement is not yet in place. The recent set of targets developed by USAID correctly introduces needed measures of commercial and outgrower activity corresponding to the recent strategy redirection. They correspond to several indicators recommended by the evaluation team.

Major data reporting lapses in the MEA field monitoring system result in MEA field officers having to fill out three different monitoring reporting forms. This problem has been recognized by MARD and by the MASL. MARD is assisting the PMU to rectify past methodological lapses in data collection and analysis activities. The evaluation team commends these new approaches and the cooperation demonstrated in bringing about long needed improvements. We conclude that this development work should continue.

Because of the complexity of this subject the full set of technical recommendations appearing in Annex I are not repeated here. Charts I and II of this Annex provide a point of departure for monitoring EOPS targets. In summary, the evaluation team recommends that:

1. MEA, USAID and in-country MARD staff continue to coordinate with the PMU to agree on measurable indicators to be used to assess progress toward mutually acceptable goals and outputs as contained in the PP;
2. PMU needs to be recognized as the focal point for on-going M&E activities in AMPS. MARD Project staff should not collect survey data for monitoring purposes. This system of monitoring accountability provides the basis for sustainability after withdrawal of MARD resources;
3. MEA/MARD needs to relate tangible outputs/targets to EOPS criteria and other agreed upon outputs contained in the PP in a realistic manner.
4. the baseline socioeconomic sample survey of 1989/90 conducted at the request of MARD to bridge the gap in socioeconomic and income data, including homesteads, should be repeated annually to build up a time series data base to monitor the final goal of settlers income growth linked forward and backward with production growth and the appraisal of economic benefits from the project;
 - a. tabulations from this survey should be used to reveal gender distributions to promote monitoring of benefits accruing to women,

- b. the survey should become the basis for all future MARD monitoring activities.

G. Project Management

Both USAID and the MASL remain strongly committed to achieving the project goal and purpose. Project management actions have successfully attained project startup and met many initial performance targets under very difficult circumstances. Overall, project team morale has been good given the lack of amenities normally available to professional staff working on similar projects. However, it is noted that there has been a high turnover of professional staff in the past year.

Continuing good rapport between project and MEA counterpart personnel provides the basis for potential high team performance in the future. This is commendable in any situation, but more so given the difficult working conditions and recurrent security problems present in System B. Host country and expatriate project staff efforts to promote development of System B and to increase farmer income are highly regarded by the evaluation team.

During the startup phase there was little information available on which to base development strategies and plans. Consequently, MARD mounted many short term consultancies to obtain necessary technical information and acquire institutional knowledge. The project was heavily committed to research related activities requiring close coordination by project management.

Having successfully completed the startup phase, with its heavy commitment to information gathering, budget development and commodity procurement, management considerations now need to be refocused on actions to achieve sustainability based on field oriented activities to increase local staff and settler farmer capabilities. To this end, the evaluation team recommends that:

1. the high level of short term consultancies to develop institutional knowledge be scaled back. When short term consultancies are required, first priority should be given to qualified local technicians;
2. the role of the COP should gradually move from directing the thrust and focus of technical activities to one of providing guidance and support to professional staff with a view toward final handover of responsibilities to local staff;
3. designating a Deputy COP can redistribute some of the heavy administrative and technical responsibilities now assumed by the COP in this very complex project as priorities move from startup knowledge acquisition to field operational activities.

Administrative and clerical staff now provide capable support services to MARD, MEA and MDS professional staff working at the Pimburettewa Camp site. Based on our interviews and review of the interim report by the recent Financial Systems Evaluation team we note that some staff do not appear to have specific Scopes of Work and others are assigned tasks well beyond their SOW's. Consequently, we conclude that increased staff efficiency and effectiveness is possible with improved designation and understanding of job responsibilities.

Although the Project is now well into it's third year, rustic frontier camp conditions still prevail. A security threat remains in the area, but fencing around the camp perimeter is poor and security personnel monitoring the entrance to the camp are all but non existent. The evaluation team was surprised that no provision for radio contact between residences or between the camp and Welikanda were in place. Moreover, no formal recreation and sports facilities exist, and there is no staff coffee room or canteen.

The need for improved security, communications and normal community social and recreational amenities was voiced by most staff interviewed.

Finally, storage of seeds and chemicals in the conference room, as is now the case, could lead to possible theft and detracts from the original function for which that room was designed. To address these issues the evaluation team recommends that:

4. administrative and clerical support staff be provided with operational SOWs to improve work output and quality;
5. additional high speed letter quality dot matrix printers be acquired for professional staff with heavy report writing responsibilities to reduce congestion around the two computers in the main administrative work area and improve administrative and professional staff functioning;
6. a Social Amenities Committee be formed, made up of MEA and MARD staff resident at the Pimburettewa Camp. The purpose of this committee is to discuss and recommend, to USAID, MEA and the Contractor, steps needed to resolve existing security and communications issues and to improve recreational and social amenities at the Pimburettewa camp; and
7. the three cooperating implementation agencies allocate funds to implement SAC recommendations.

H. Other Issues

The evaluation team's SOW identified several issues that could not be covered in the preceding sections. They are discussed here.

1. Project Cost Effectiveness

In general, the project is making satisfactory progress toward its stated objectives. Unanticipated GSL budget problems have slowed ability to hire necessary ICOs who are viewed as being crucial to achieving accelerated production of THVC on irrigated paddy land. This problem is now being addressed. The strategy to concentrate MARD and MEA resources on seventeen intensive development extension units is an effective means for targeting scarce resources to achieve maximum impact. Targeting FSR/E resources on a small number of commercial nucleus farmers with high potential for success will also maximize effectiveness in achieving MARD export objectives within existing resource constraints.

Many short term consultants have been brought to Sri Lanka under MARD. While most have contributed needed services, concern was raised in several quarters that improved targeting and screening is required in the future. There are really two issues here. First, short term consultants, with specialized knowledge are a necessary part of the project strategy. Such people should continue to be used. Secondly, there is a rich pool of local professional expertise which may often provide more relevant expertise than expatriate consultants. Resource effectiveness will be promoted if such people are used whenever possible.

2. Project Efficiency

A real IRR of 16.7 percent was calculated during the project planning phase. Critical assumptions included success in securing export markets for THVC principally onions and potatoes. The proviso was added that if the export target could not be reached the economic viability would become very marginal. Project management has paid close attention to developing export markets. It was determined early on during implementation that higher priced export markets for targeted THVCs were not sufficient to sustain expected economic viability. Based on this assessment, some project activities have been reoriented to achieve greater concentration on NHVC for marketable exports suitable for System B soil and climatic conditions. While it is too early to state definitively that expected economic efficiency will be attained we conclude that the elements to achieve this objective are in place and implementation is proceeding well along the revised path.

3. Relevance of Logframe Assumptions

Project management does an excellent job of updating the logframe assumption matrix as part of the annual reporting process. The evaluation team is very impressed with this activity and encourages the continuation of this annual evaluation. The team concurs with the assessment made by the contractor team.

4. Technical Assistance Levels

Technical assistance levels are about right for this stage of the project life. To maintain resource effectiveness within the overall project objectives the following guidelines seem appropriate:

a. The expatriate LTTA research agronomist, horticulturalist and agricultural economist positions remain at least through 1993. The local LTTA extension agronomist position should be retained through PACD. MEA should provide two counterpart staff to work with each team members.

b. The LTTA export marketing position should be continued through to PACD. There is limited local professional capability in this area. This LTTA can be supplemented by two local LTTA to address domestic marketing needs.

c. A LTTA plant pathologist is not needed now. STTA to develop a handbook of preventive pest management based on already known management procedures would be useful.

d. Local LTTA is the most appropriate for developing FODs after the term of the incumbent expatriate expires. Local LTTA should work closely with the FSR/E team and IDEU field staff to accelerate ULFO and TOG FODs. Recurring expatriate STTA may be useful to conduct staff motivational training from time to time.

e. Merging MARD and MDS can improve overall project farm level water management activities. The MARD LTTA expatriate position need not be renewed after the term of the current incumbent has been completed in recognition of the changed project focus to farm level water management activities. Local staff should fill all long term positions with expatriate staff providing technical backstopping only for special purposes. This is an area where Sri Lanka has a rich source of qualified professional staff which should be tapped.

f. Once ongoing homestead extension development work has been completed local LTTA can be used to implement this field program. Local STTA should be considered to provide specialized assistance to introduce livestock activities based on successful experiences in more mature AMP locations.

5. Environmental Impacts

The environmental analysis conducted during the project planning phase noted that "the potential environmental consequences of both projects have been properly assessed and mitigated... in accordance with the requirements of AID Environmental Regulations". Establishing and implementing a comprehensive fuelwood is included as a project covenant. Progress is discussed under (7) below.

6. Compliance with Project Covenants and Conditions Precedent

a. Conditions Precedent

A special Condition Precedent requires preparation of an annual work plan covering all components, prior to disbursement of funds for any activities other than technical services, and that adequate budgetary resources are made available for the calendar year.

To the best of our knowledge based on documents provided, this Condition is being met.

b. Project Covenants

Eight special Covenants exist, in addition to standard covenants on evaluation and payment of duties.

- (1) GSL will adopt a system to ensure that participatory farmer organizations are formed**

The MEA is committed to introducing participatory farmer organizations in System B. The recent amendment to the Agrarian Services Act promotes this ideal as national government policy.

- (2) A cadre of irrigation community organizers will be made available on a contractual basis.**

Budget constraints have slowed implementation of this activity. MEA now has 42 temporary staff employed as ICOs.

- (3) GSL will assure sustainable recurrent costs for supporting Mahaweli System development**

The overall Mahaweli budget is gradually being reduced. However, to date, appropriations for System B have not been scaled back to a degree experienced in other systems. Mechanisms to categorize and monitor transfer of

irrigation system O&M activities and costs to farmer organizations are not yet in place.

- (4) **GSL to establish a strong field-oriented adaptive and applied research system in the left bank**

Progress in meeting this covenant has been slow as the DOA was unable to provide all necessary personnel to adequately staff the envisioned research positions. Consequently, two additional positions were funded by contractor TA. Cooperative linkages continue to be strengthened between MEA, DOA and MARD.

- (5) **GSL assure that Mahaweli settlers have sufficient and secure land and water rights**

There have been no substantive modifications to land tenure laws and regulations since project startup. Most farmers continue to hold land under temporary permits authorized by the Mahaweli Authority.

- (6) **The GSL will ensure that the private sector has ample opportunity to invest and freely operate in the special Mahaweli areas.**

Removal of subsidies on inputs sold by state trading organizations eliminated a previous constraint to private sector development. The requirement that all commercial allottees submit workplans, to be approved by government officials, before modifying cropping activities still operate to constrain free private sector development.

- (7) **Develop and implement a comprehensive fuelwood plan**

The 1991 Policy Initiative Statement indicated that Rs 1.5 million had been earmarked for Mahaweli reforestation activities in the current fiscal year.

- (8) **AID be provided with a semi-annual report on all borrower/grantee funds budgeted and expended in support of the project**

This covenant is being met.

7. Effectiveness of Annual Policy Initiative Statements

Annual policy initiative statements do not seem to have materially affected implementation of the project. However, they provide very useful summaries of previous year's achievements and planned targets for the coming year. Moreover, recent policy

statements emanating from the Office of the President confirm Sri Lankan commitment to the goal of developing an export led agricultural development program.

SECTION IV PROGRESS TOWARD MEETING EOPS BY PACD

In this section EOPS targets are identified for each component and progress to date in achieving EOPS is assessed. Conclusions reached from the preceding sections form the basis for discussion and recommendations in this section.

A. Agricultural Technology Generation and Dissemination

The ATG&D component supports the project purpose associated with developing replicable technology to improve land use through improved agricultural technology and extension services.

1. Diversify Production From Fifty Percent of System B Irrigated Land Originally Planted to Rice

Progress toward meeting this indicator has been minimal. Available data suggest that from 3.5 to 7 percent of all System B irrigated land was in diversified crops during Yala 1990. Planned implementation of the IDEU extension approach in Yala 1991 can provide the basis for accelerated adoption over the next few years, if the now smoothly functioning FSR/E production and marketing team remains intact. The IDEU unit strategy targeted at achieving rapid new technology adoption at the TOG level provides an effective ratio of one extension agent to 80 farmers in selected demonstration units.

As more fully developed in Annex I the evaluation team believes the target of 50 percent adoption by EOPS is too high. Only about 15 percent of System B land is suitable for diversified crop production unless drainage is improved. However, up to 85 percent is suitable during the dry Yala season. Given the low base the evaluation team recommends that:

the EOPS target be modified to read: "diversify production from twenty-five percent of System B irrigated land originally planted to rice".

With adoption of the IDEU approach it is conceivable that EOPS targets can be exceeded by PACD in targeted units. Consequently, project management may want to consider applying the original EOPS target to the seventeen units identified for intensive assistance, to be met by 1993.

2. Raise Average Value of Production per Settler to One and One-Half Times the Value Obtained From Paddy-Paddy Cropping System

MARD research has shown that this target can be easily met by farmers who diversify based on MARD LP diversification recommendations if EOPS is attained. However, it is not

realistic to expect that the average income of all farmers in system B will increase by one and one half times based on the added income received by those who diversify their cropping patterns. For example, if 25 percent of all farmers adopt diversified crops their income would have to increase by a factor of six to raise the average of all farmers by 50 percent. Consequently, the evaluation team recommends that:

this EOPS be clarified by adding the proviso that the target income increase be calculated for that portion of the settler population that actually diversifies away from paddy.

3. Receive Thirty Percent of the Value of Diversified Crop Production From Export Markets

Existing data suggest that MARD direct participants achieved 17 percent export percentage in 1990, primarily on the strength of outgrower relationships with commercial farms in the production of gherkins. The target is attainable by FACD provided that strong commercial nucleus farm/outgrower relationships are forged and maintained. Annex I suggests indicators which can be adopted to measure progress toward achieving this target.

4. Create a Farm Management Perspective Among Settlers Promoting Rapid Production Responses to Changes in Market Demands

This EOPS can be measured by implication using farmer adoption of the LP model recommendations. The purpose of these recommendations is to provide farmers with the optimum cropping mix given existing input and product price cost and return relationships relative to yield and labor resource constraints. Because these recommendations are based on objective economic decision criteria, farmer adoption is indicative of acquiring a farm management perspective.

5. Develop, at Aralanganwila, an Agricultural Research Capacity Responsive to Priorities and Requirements of the System B Mahaweli Agro-Ecological Environment

The RARC/A currently does not have the capacity to meet this target by EOPS. MARD is providing funds to physically upgrade existing facilities. The RARC/A Director is keenly interested in expanding research capacity but is limited by poor facilities and lack of incentives to keep experienced professional staff at the station. The addition of an agricultural economist, as requested by the station director would greatly improve the probability that this EOPS can be met.

6. Provide Non-Traditional Commercial Production Opportunities For Twenty-Five Percent of Settler Homesteads

As developed in section III C, there is a great potential to increase farm family income by targeting extension efforts to homesteads. Diversified crop production during Maha and poultry and livestock production year round offer the best opportunities to expand commercial income on homestead areas. Although limited effort has been spent to date on promoting commercial homestead production the payoff from such an effort is likely to be large. Consequently, this EOPS can most likely be met.

B. Improve Water Management and Create Farmer Organizations

The water management and farmer organization creation component supports the project purpose associated with developing farmer organizations to improve water delivery at the farm level through introduction of farmer controlled management and maintenance systems. If successful, it is anticipated that public outlays now used for this purpose can be reduced.

Four EOPS targets are identified for the water management and farmer organization component.

1. Strengthen 250 Turnout Farmer Groups With Independent Capacity to Manage Turnout Agricultural Production and Related Water Control and Distribution Issues

Although 525 TQG's have been organized or reorganized since project startup the 1990 MARD Annual Report indicated that none can be considered fully functional because boards needed to regulate water flow on the rotational water use system incorporated into System B design are not in place. This is not an insurmountable obstacle and the adoption of the IDEU extension approach in Yala 1991 should enable MEA extension staff with MARD assistance to specifically target 170 TQG's in short order if MARD uses its resources to make water control boards available and farmers begin to use them to achieve the planned for rotation schedules. Consequently, we believe the target to be attainable by PACD.

2. Form 25 Federated Farmer Groups at the D-Canal Level Which Can Contract for and Perform Periodic Maintenance, Collect Water User Fees, and Support Professional Extension Services Under Contract to the Farmer Group

The analysis for the EOP addressing TQG development holds in this case as well. As noted in the Section II Part B, unit level boundaries are mostly conterminous with D-level feeder

areas. Thus, the target requires that 25 UFLOs be functioning by PACD. With the IDEU strategy in place the target should be easily achievable by PACD.

3. Revise Main and Tertiary System Water Management to Ensure Effective Maintenance and Allow Maximum Agricultural Output From Combinations of Diversified and Paddy Crops

This qualitative target supports the overall theme of improving water management at all levels of canal operations. As discussed in Section II, Part B, and in Annex E, the evaluation team believes that water management at the main and branch canal systems is not the major problem at this time. Emphasis should be placed on improving water management at D and F-canal levels. If project resources are redirected as recommended by the evaluation team the project should be on track to developing a replicable strategy for achieving this EOPS.

4. Lower Recurrent Costs of the Irrigation System Borne by the GSL through Collection of Water User Fees and Farmer Organization Provision of Management Services

This EOPS addresses the second major theme of the water management component. As developed in Section II Part B, and in Annex I, reduction of recurrent costs, by itself, is not a good indicator of improved water management. It is more likely to be an indicator of macro economic events as they affect the MASL budget. Consequently, only the second part of this target seems relevant to the desired outcome of improving farmer participation in F and D-level canal maintenance. To meet this target, MARD and MEA water management resources must be redirected from main and branch canal activities to turnout level activities as recommended elsewhere by the evaluation team.

C. Agricultural Support Services and Farmer Support Systems

The agricultural support services and farmer support systems component relates to the project purpose to increase settler incomes through increased productivity, commercial farmer response to market signals and improved market linkages with input suppliers and produce marketing channels.

Five EOPS criteria are identified for the water management and farmer organization component.

1. Linking Farmers With Multiple Sources of Agricultural Inputs and Product Buyers

Currently, lack of transport and credit are the major constraints to rapid adoption of diversified crops in System B. In both cases, alleviating these constraints can be expected to

improve conditions for sustainable adoption of THVC and NHVC. The Project team is addressing both of these issues. There is no reason to believe that this EOPS will not be met by PACD.

2. Reducing Post Harvest Losses of Price Down Grades for Dirty Products to Ten Percent of Crop Value

It is not possible to develop an accurate benchmark for this EOPS. Consequently, it can be addressed only in a qualitative fashion. The evaluation team recommends that this EOPS be restated positively, for example:

"A given number of post harvest handling facilities be in place to reduce downgrades for perishable and semi-perishable diversified crops for domestic and export markets".

Such a target can be easily measured. Since there are currently no major post harvest handling facilities in System B for products to be sold on domestic or export markets the benchmark is assumed to be zero. Also, since MARD is now in the process of installing such facilities progress is measurable.

Consequently, the revised EOPS is both measurable and attainable by PACD.

3. Promoting Export Possibilities by Testing International Markets for Mahaweli Produce

The MARD Marketing Specialist/Export Promotion Advisor has successfully tested export markets for several products including okra and zucchini. Markets have also been identified for other crops, but production potential is still being determined.

Consequently, the EOPS is measurable and significant progress is being achieved by the Project.

4. Examining the Potential for Expanded Rural Production Credit

The Project is currently working with the private sector to promote entry of a private sector bank to System B to provide effective competition with the two government banks who have not developed credit programs for farmers growing diversified crops. The evaluation team concludes that:

satisfactory progress is being made toward achievement of this EOPS by PACD.

5. Providing Equitable Distribution of Project Benefits to Poor Settlers, Women and Ethnic Minorities

This EOPS is measurable, but to date, data have not been collected to establish a benchmark from which progress can be calculated. The evaluation team has recommended that such data be made available on an annual recurring basis and the Project Monitoring Unit of the MASL has agreed to desegregate its annual System B monitoring survey to obtain gender and ethnic minority breakouts. The IDEU unit implementation strategy with its very favorable extension farmer ratio provides the means by which women household heads in targeted units can receive project benefits based on their representation in these units.

ANNEXES A, B, C

(ANNEXES D through I are found in Report Part II

**ANNEX A
EVALUATION SCOPE OF WORK**

1. Activity to be Evaluated

Title: Mahaweli Agriculture & Rural Development
(MARD) Project No. 383-0086.
LOP Funding: \$14.0 million (Loan - \$3.8 million,
grant - \$10.2 million)
Date of Project Authorized: 7/17/87
Date Project Agreement Signed: 8/28/87
PACD: 8/31/95

II. Purpose of Evaluation

This will be the first interim evaluation of the Mahaweli Agricultural & Rural Development (MARD) Project. The primary purpose is to provide USAID/Sri Lanka and the Mahaweli Economic Agency (MEA) with an in-depth assessment of project implemented and progress to date and to recommend any modification to improve the likelihood of achieving the project's primary and secondary purposes. The evaluation will assess the delivery of AID and GSL project inputs, progress towards achieving the project purposes, impact of project activities to date, and the validity of initial design assumption and strategies. The evaluation will also examine planned inputs for the remainder of the project and recommend any changes needed to achieve the project purposes. Particular attention should be given to technical assistance.

III. Statement of Work

The specialist team will conduct the evaluation and prepare an evaluation report which addresses the major issues and specific questions listed below. The report need not be specific questions listed below. The report need not be organized according to these issues and questions but should address them all.

1. Relevance: Is the project approach or "model" consistent with the current development strategies supported by AID and espoused by the GSL? Are problems being addressed by the project of national importance.

- Is the project helping to address the major constraints to Mahaweli sectors increasing their production and income ?
- Is the project likely to provide a replicable model for addressing national level problems and for stimulating economic developments ?

2. Effectiveness: Is the project making satisfactory progress towards its stated objectives? At this stage in the project, special focus on accomplishing outputs may be appropriate.

- Are outputs being produced as planned or are any major delays evident ?
- Are inputs being provided on a timely manner and adequate quantity and quality ?
- Are work plans appropriate and useful to project implementation ?

3. Efficiency: Are the effects of the project produced at an acceptable cost compared with alternate approaches to accomplishing the same objectives ?

- Is the focus of the project in System B, rather than other parts in Sri Lanka, an efficient strategy for Sri Lanka's agricultural development ?
- Is the economic return to the project likely to meet or exceed that projected in the Project Paper ?
- Are cost savings or other economies possible in any part of the project ?

4. Impact: What positive and negative effects are resulting from the project?

- What, if any, unexpected results are occurring due to the project ?
- Are there any discernable impacts on farm incomes ?

5. Sustainability: Will effects of the project continue after AID funding has stopped ?

- Will settlers and private firms be able to continue production activities started under the project, after the end of the project ?
- Can lessons learned and technology generated in System B be transferred elsewhere in the Mahaweli, or the country as a whole ?

Specific Questions

1. How does progress on each of the planned outputs compare with initial projections and desirable progress ?
2. Has the GSL provided counterpart effort and funding as planned and complied with all project covenants and conditions ?
3. Are the assumption noted during project design in the logical framework still valid? What has been the impact of these assumption, when valid or not?
4. To what extent do project benefits accrue equally to men and women and to members of various ethnic groups? Can project

benefits be desegregated and measured by gender and by ethnic group?

5. Does the project foster democratic pluralism and an open market/open society oriented? Does the project increase individual and/or community participation in decision making, in control and ownership of factors of production, and in benefits and profits?

6. Is the project monitoring system appropriate and useful?

7. The project has shifted focus somewhat from production of SFC's (Subsidiary Field Crops) to high value horticulture crops and marketing. Is the shift in emphasis appropriate?

8. Are current strategies and approaches to organizing farmer groups effective?

- Are the groups sustainable?
- Are they compatible with farm organizations in other areas?
- Are the organizations viable, developing their own leadership, and accomplishing objectives benefitting the members?

9. Is planned technical assistance for the balance of the project appropriate?

- Has technical assistance been effective?
- Is additional time needed for the farming systems agronomist, agricultural economist, horticulturist, farmer organization specialist or water management specialist ?
- Is a plant pathologist required ?

10. Are there any unanticipated/adverse environmental impacts of the project? If so, identify and describe problems and possible remedies.

11. Has there been compliance with all project covenants and conditions precedent?

12. How effective have the Policy Initiative Statements been in facilitating policy implementation?

In any of the above areas, or others identified by the evaluation team, special attention should be focused on identifying any aspect of the project. Where implementation is substantially behind schedule and on suggesting practical means of overcoming implementation problems.

In the evaluation report, the evaluation team will distinguish clearly between their finding (i.e. the evidence), their conclusions (i.e., interpretations and judgments about the findings), and their recommendations. Clearly indicate that agency or unit responsible for implementing recommendations.

After completing the evaluation report the Team Leader will complete a draft Project Evaluation Summary and abstract for use by USAID/Sri Lanka.

IV. Methods and Procedures

A. In conducting the evaluation, the evaluators will:

1. review all relevant project documents;
2. interview as many key project personnel as possible, particularly including those from the Ministry of Lands, Irrigation and Mahaweli Development, Mahaweli Authority of Sri Lanka, Mahaweli Economic Agency, Mahaweli Employment Investment and Enterprises Development, Department of Agriculture, USAID and the technical assistance contractors;
3. interview randomly selected farmers and other relevant private sector firms (i.e. fertilizer sales persons, agribusiness etc.) and
4. visit and inspect System B.

B. All project files will be available to the evaluation in the office of the Project Manager, Food and Agriculture Development Officer USAID/Colombo. A review of the following background documents is essential:

- Project Paper
- Project Logical Framework (Logframe)
- Grant and Loan Agreements
- Updated L.O.P. Workplan
- DAI contract and Scope of Work
- Quarterly and Consultants Reports
- The GSL National Agriculture, Food and Nutrition Strategy paper and supporting task force papers written in formulation of the strategy.
- Draft USAID Country Development Strategy Statement.

C. Key persons to be interviewed by the team will include the following: the USAID Project Officers, GSL Project Manager, Resident Project Manager for System B, Mahaweli Economic Agency staff at System B, farmers, traders, DAI Chief-of-Party, DAI Team Members, DOA Regional Agricultural Research Center and Secretary of the Ministry of Lands, Irrigation & Mahaweli Development.

V. Logistic Support

The Team Leader will use funds provided in the budget to arrange for car rental, micro-computer rental, office materials, report reproduction, local secretarial support, office space, and any other miscellaneous expenses.

VI. Level of Effort

Services of the evaluation team member will be required for 30 working days. A six-day work week is authorized in-country. The Team Leader will be required for an extra six days. The Team Leader should stay at least four days after the rest of the team completes their assignment. He/she may also arrive 1-2 days before other team members.

VII. Reports

The team leader shall be responsible for submitting a draft evaluation report no later than 20 working days after the evaluation team has begun work. Review comments will be given to the evaluation team within four working days of submission of the draft. Fifty copies of the first printed report shall be submitted to the USAID project officer prior to the departure of the team leader from Sri Lanka. The report shall address all questions contained in the Scope of Work and shall include but not be limited to the following sections:

1. Title Page
2. Table of Contents
3. A Basic Project Identification Data Sheet (outline attached, attachment 5)
4. An executive summary (see attachment 5). (This section will be used for the agency/s computerized record of evaluations, and must be able to stand alone as a separate document. It is limited to 3 pages, single spaced, and should contain all elements required on page 25 of the ANE Bureau Evaluation Guidelines available in USAID/Sri Lanka).
5. List of Acronyms
6. The body of the report which discusses findings (limited to approximately 30 pages with any especially lengthy analysis or listing of data placed in the Appendices).
7. Conclusions and Recommendations.

All copies of the draft report shall clearly be labelled "DRAFT". The title page of the final report shall include the following disclaimer: "This report presents the independent findings and recommendations of an evaluation team. It does not necessarily represent the official views of the Government of Sri Lanka or the Agency for International Development".

A debriefing will be scheduled at USAID shortly after the submission of the draft report. A similar debriefing should also be scheduled for Mahaweli Economic Agency.

VIII. Relationships and Responsibilities

The evaluation team will report to the USAID MARD Project Officer and Chief of the USAID Office of Food and Agriculture and is responsible to him for completing of the evaluation activities.

IX. Evaluation Team

The contractor shall provide a four person team to conduct the evaluation. The team will include experienced specialists in the following disciplines.

- Agricultural Technology
- Agricultural Marketing
- Irrigation Management
- Farmer Organizations

The contractor will designate one of the specialists as team leader.

Each of the specialists should have academic training related to their specialty. They should have extensive practical experience, preferably in developing country agriculture in Asia. The Agricultural Technology Specialist should have training in agronomy or horticulture and experience with research and extension programs. Experience with farming systems based work is highly desirable. The Agricultural Marketing Specialist should be a qualified economist with knowledge and experience in developing country domestic and export marketing systems for agricultural produce. The Irrigation Management Specialist should have experience with irrigation management by small farmers in Asia. The Farmer Organizations specialist may be a Rural Sociologist, Anthropologist or Economist. The team must include considerable expertise in small farmer organizations, farmer budgets, marketing systems and horticultural production.

The team shall work with two Sri Lankan specialists to be contracted for separately by USAID/Sri Lanka. The Sri Lankan team members will include one agricultural economist and one rural sociologist. They will serve as full members of the team.

ANNEX B
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FIRST INTERIM EVALUATION

MAHAWELI AGRICULTURAL AND RURAL DEVELOPMENT PROJECT (MARD)

SRI LANKA

(No. 383-0086)

April 26, 1991

PART II

TECHNICAL ANNEXES

PROJECT IDENTIFICATION SHEET

1. Country : Sri Lanka
2. Project Titles: Mahaweli Agriculture and Rural Development Project
3. Project Number: 38-3-0086
4. Project Dates :
 - a. First Project Agreement: 8/28/87
 - b. Final Obligation Date: 1/20/89
 - c. Most Recent Project Assistance Completion Date (PACD): 8/31/95
5. Project Funding:
 - a. A.I.D. Bilateral Funding
 - (i) Grant US\$ 10,200,000
 - (ii) Loan US\$ 3,800,000
 - b. Host Country Counterpart Funds US\$ 10,200,000
 - Total: US\$ 24,200,000
6. Mode of Implementation: USAID direct contract with DAI
7. Project Designers: Government of Sri Lanka, USAID/Colombo, DAI
8. Responsible Mission Officials:
 - a. Mission Directors: Bloom, P.J. 8/87 - 10/89
Jones, G. (act) 10/89 - 7/90
Brown, R. 8/90 - present
 - b. Project Officer: Strickland, C.L. 8/87 - 8/88
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Alex, G. 9/90 - present
Jayasuriya, N.H. 7/88 - present
9. Previous Evaluation : None

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Mr. Nimal Jayasuriya, Agricultural Specialist
Dr. Max Goldensohn, Chief of Party, MARD
Mr. P.H.K. Dayaratna, Project Coordinator, System B

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Finally, we wish to thank Ms. Khanti Alles who spent many hours typing the report.

LIST OF ACRONYMS

AMP	--	Accelerated Mahaweli Project
AO	-	Agricultural Officer
ARTI	-	Agricultural Research & Training Institute
ATG&D	-	Agricultural Technology General & Dissemination
BTF	-	Block Task Force
CCAA	-	Cost Centre Activity Accounting
CDO	-	Community Development Officer
COP	-	Chief of Party
CP	-	Conditions Precedent
DAI	-	Development Alternatives, Inc.
DARF	-	Diversified Agricultural Research Project
DCS	-	Department of Census and Statistics
DOA	-	Department of Agriculture
DRPM (Ag)	--	Deputy Resident Project Manager (Agriculture)
DRPM (WM)	--	Deputy Resident Project Manager (Water Management)
EIEL	-	Employment Investment and Enterprise Development
EOFS	-	End of Project Status
ETP	-	Evapotranspiration Potential
CF	-	Commercial Fund
FA	-	Field Assistant
FIF	-	Farmer Investment Fund
FO	-	Farm Organization
FSE	-	Farming Systems Extensionist
FSR/E	-	Farming Systems Research/Extension
FSS	-	Farmer Support Services
GSL	-	Government of Sri Lanka
ICO	-	Irrigation Community Organizer
IDEU	-	Intensive Demonstration Extension Unit
IIMI	-	International Irrigation Management Institute
IRR	-	International Rate of Return
ISMF	-	Irrigation Systems Management Project
LDC	-	Less Developed Country
LP	-	Linear Programming
LTTA	-	Long Term Technical Assistance
MARD	-	Mahaweli Agricultural & Rural Development
MASL	-	Mahaweli Authority of Sri Lanka
MDS	-	Mahaweli Downstream Support
M&E	-	Monitoring & Evaluation
MEA	-	Mahaweli Economic Agency
MECA	-	Mahaweli Engineering and Construction Agency
MED	-	Mahaweli Enterprise Development Project
MP	-	Minister of Parliament
MRTC	-	Mahaweli Regional Training Centre
NGO	-	Non Governmental Organization
NHVC	-	Non Traditional High Value Crops
O&M	-	Operations and Maintenance
OFC	-	Other Field Crops
OJT	-	On-The-Job Training
PACD	-	Project Activity Completion Date
PCC	-	Project Coordinating Committee

LIST OF ACRONYMS (CONT)

PIL	-	Project Implementation Letter
PMU	-	Planning & Monitoring Unit
PDC	-	Project Operation Committee
PP	-	Project Paper
PRC	-	Project Review Committee
PRB	-	Project Review Board
RARC/A	-	Regional Agricultural Research Centre/ Aralanganwila
R/E	-	Research/Extension
RO	-	Research Officer
RPM	-	Resident Project Manager
RTF	-	Research Task Force
RTWG	-	Regional technical Working Group
SOW	-	Scope of Work
STTA	-	Short Term Technical Assistance
TA	-	Technical Assistance
TAC	-	Technical Assistance Contractor
THVC	-	Traditional High Value Crops
TOG	-	Turn Out Groups
TOR	-	Terms of Reference
ULFO	-	Unit Level Farm Organization
UM	-	Unit Manager
US	-	United States
USAID	-	United States Agency for International Development
WM	-	Water Management
WUA	-	Water Users Association

ANNEX D FARMER ORGANIZATION

A. Introduction

The hydraulic civilization of the Dry Zone of Sri Lanka dates back to several centuries. The water supply for rice cultivation in the Dry Zone was based on a highly developed network of irrigation systems. These systems were destroyed due to external and internal political struggles. Dry Zone agriculture was badly neglected during the colonial period.

1. Introduction of Settlement Schemes

During the recent post-Independence era, the state introduced to settlement schemes in the Dry Zone by rehabilitating the abandoned tank network and reclaiming the lands over grown by the jungle. Three goals were pursued: increasing agricultural production; decentralizing the dense Wet Zone population to the Dry Zone; and providing employment opportunities for the growing population of the country.

With these goals in mind, starting from 1930s, every successive government, tested from time to time, various models aimed at solving problems which were becoming apparent in the earlier colonization schemes - the issue of second and third generation settlers, limited service facilities, poor operation and maintenance of the irrigation system, system deterioration resulting in inadequate water supply and tailend syndrome, unhealthy farmer/farmer and farmer/officer relationships, social conflict, etc.

Management of irrigation systems has long been seen as the purview of technical personnel. The farmer as user, had very little say in water distribution. Thus water, an already scarce commodity, also became the resource input which is significant as the only input which is not controlled by the farmer (Panapitiya, 1987).

2. Participatory Approach

As various irrigation models were introduced, it was seen that there were technical deficiencies which could be solved by organizing the farmer community. Thus, the state attempted to provide avenues to organize farmers by introducing various formal governmental organizations, like Paladawardena Saba (production committees). But, these government-sponsored formal organizations have not demonstrated satisfactory results. Farmer participation in decision-making processes was limited. The growing international opinion in favor of participatory

management in 1970s seems to have prompted Sri Lankan state officers to attempt to provide an alternative solution to this problem.

In the 1980s, experimentation in participatory (farmer participation in decision-making process) water management was carried out in different parts of the Dry Zone. Attention was given to the possibility of evolving a network of water user organizations at secondary (D-canal) and tertiary (F-canal) levels. Experimental models were tested in Niripe, Tambuttegama and Kimbulwana. One of the best known experiments in participatory water management is Gal Oya where the setting up of farmer organizations was facilitated by state sponsored catalysts.

Academics assisted indirectly in these water management activities by studying the projects introduced. Joint efforts by these groups brought the importance of participatory water management to the notice of relevant policy-making bodies in Sri Lanka.

3. Coordination Among Technical Personnel, Academics and Policy Makers

A systematic sharing of information and experiences among technical persons, academics and policy-makers was observed to be poor at the early stages when activities were carried out separately. The newly established Irrigation Management Division (IMD) (under Ministry of Lands, Irrigation and Mahaweli Development) was able to provide a forum. The IMD took the positive step of establishing farmer organizations (FOs). These were aimed at solving problems of irrigation systems maintained by Irrigation Department under the Integrated Management of Major Irrigation Systems (INMAS) program. A similar concept was then introduced to the Mahaweli system as well.

Several national and international non-governmental (NGO) organizations as well as donor agencies were interested in the FO concept. Thus the FO component became a central issue in projects carried out in irrigation systems of Sri Lanka.

B. Need for Farmer Organizations

A major cause of problems in many irrigation schemes or settlements is settling farmer families from various parts of the country.¹² They generally lack the social cohesion of traditional villages and are atomized at the time of settling in the new scheme. These settlements lack infrastructure facilitating intra-scheme social intercourse, they lack support from family and extended kin groups, there is often little opportunity for organized social activities, and lacked group incentives or common goals to organize themselves.

1. FOs for Building Social Structure

Rights and duties attached to status and roles of nuclear family members are identified (since this was the only social unit functioning when they are resettled in settlement schemes) but rights and duties attached to status and roles of the other members of settlement areas are not defined nor mutually understood. Some sort of organization is necessary to bring primary social units (families) together to construct a community.

2. Irrigation Physical Structure Demanding Organized Activities

In addition to the need for organizing farmers, the physical structure of irrigation systems require and demand an organized body for their operation and maintenance work. In this regard, the irrigation models which exist in the country need to be briefly mentioned.

a. Ancient Model

The most effective model, especially in relation to water management was in the ancient irrigation systems where all the farmers had land in both the head and the tail end of the canal or the system. Also, it was common practice, that all farmers during Yala (dry season) should be able to cultivate an area in the irrigated head-end paddy land. These models required that farmers be organized and act in cooperation with one another since the system itself was interdependent.

b. Present Models - Under Irrigation Department

The ancient model was later dropped when the colonization systems were set up under the Irrigation Department in 1930s. New models were introduced by modern irrigation engineers. Farmers were provided with water by a distributory canal from headend to tailend of the distributory canal through an equal size diameter outlet. This created a new problem, the tail end dependency syndrome. The head end farmer always gets sufficient water and does not have to depend on the others. But tailend farmers were dependent on the head-end farmers.

As mentioned earlier, farmers brought to the colonization schemes from various locations around the country, had limited social interaction. In addition, the physical system also served to heighten individualism. Thus, many social problems and disputes arose in this isolated individualized social system and physical environment.

It took years to realize that farmers should be organized in order to deliver an equitable water supply. However, the system

structure did not provide a common goal to organize farmers--the head-end farmers to sacrifice and the tail-end farmers to achieve. These contradictory goals became a constraint in forming farmers into functional organized groups. Until the early 1980's, irrigation systems lacked properly organized FO's.

c. Government Intervention

In the 1970's, Paladawardena Committees (Productivity Committee) were set up. They were not successful, in part due to over-politization and lack of farmer participation in the decision-making process. This system was later substituted by a Yaya Niyogitha (Track Representative) system which functioned up to early 1980s. Farmer isolation and frustration during this period due to not having FOs could be observed in Season Cultivation meetings. These were the only common forum for farmers. Sessions were generally extremely stormy with farmers venting pent up anger and frustrations on officers and each other.

d. Present Mahaweli Model

In the Mahaweli systems, a more sophisticated irrigation model has been introduced. It was expected that by introducing this system farmers would depend on each other in the water management activities. By this method two farmers at a time can get water within a period of 12 hours by closing the gate at the middle of the canal and opening the side outlets (to F-canals) to the paddy fields. For the second group to obtain water, the first group has to close their side outlets and open the gates of the other group. If this system of rotation is not followed tailend farmers may not get water.

Though this was a modified model head-end farmers still could get any amount of water without depending on the cooperation of other farmers. But with this system too, it seems difficult to organize farmers using only water distribution as the common objective.

It is clear that in neither case (first model of Irrigation Department nor the Mahaweli model) was there a common goal to organize all farmers towards efficient water management. Lacking was/is a discipline among the farmer community. But such a discipline difficult to obtain from an atomized farmer community. Further, modern communities are more complex so that mechanisms are needed to organize them.

C. Comparison of FO Models

Two major FO models can be clearly identified - the model created under Irrigation Systems Management Schemes (ISMP) and the model introduced in Mahaweli Systems. In addition MEA/NBA

model introduced in Vijayabapura in System B seems a combination of the two because the model introduced in a system under Irrigation Department (ID) was duplicated in System B under MEA.

1. ISMP Model and Lessons from this Model

Developing the FO component is an integral part of ISMP. The basic objectives of FOs under ISMP is achieving effective farmer participation on O&M work, and improved communications between farmers and irrigation systems personnel. Though the ISMP FO program was initially guided by experience at Gal Oya, the program has been further developed and strengthened through experience gathered from new project areas. The ISPAN (Report no 34) describes lessons learned which are included in Guiding Principles on Farmer Organizations in Major Irrigation Schemes.

- o the need to follow hydrological boundaries in establishing FOs;
- o the desirability of using secret ballot in electing farmer leaders¹;
- o the advisability of recruiting IOs from the local area;
- o the importance of making all farmers voting members of both F and D canal groups; and
- o the need to federate farmer organizations at the project level to provide them with greater independence and influence.

The ISMP model is a three-tier model: the F-canal informal group, D- canal FO and Project Level FOs. Under the ISMP model the real FO is observed to be at the D-canal level. In organizing and establishing FOs under ISMP, the Institutional Organizers played the catalyst role.

2. The NBA Model and Lessons Learned From This Model

Nation Builders Association (NBA) with Irrigation Management Division (IMD) tested a FO model first at Nagadeepa-Mahawewa - a system under Irrigation Department (ID). This project came under Integrated Management Of Major Irrigation Systems. The model design for systems under ID settlements was later introduced to System B where System B (Vijayabapura Block) is completely different from systems under ID. The NBA/IMD project was carried out from 1986-1988 and in System B this was carried out from 1987-1989.

The NBA model mainly focused on water management using a four-tier FO network. Boundaries of each level were demarcated purely on hydraulic grounds. At the turn out level is an informal organization (F Canal Group). The Distributory Canal Organization is the real FO organization which has legal status, an organizable number of farmers, FO account and farmers of one

distributory canal. Therefore, this network was easily created, political interference was minimal or not at all. A Sub-Project Committee was the forum created for farmer representatives to present their problems before the officers. The Project Committee is the highest level of FO in NBA system.

The NBA encouraged farmers to select their leaders by unanimous consent. This was to minimize possible farmer fragmentation into competing groups. However, fragmentation did occur.

The driving force for organizing farmers in the NBA model was the over emphasis on the existent farmer/officer antagonisms. Catalysts, the NBA field officers, used the strategy of accusing state officers of not providing necessary facilities for the farmer community. Corruptions within the officer community were brought to the notice of the farmer community. Farmers recognized the catalyst as working for them and against the officers. Due to this short-sighted strategy of antagonizing the officers, this system was not particularly successful or sustainable.

NBA training programs, motivational and educational seminars and workshops were carried out by the catalyst with no input from the state sector officials. It was observed that training programs were carried out by both MEA and catalyst. However, as separate organizations they operated as two parallel institutions.

The detailed post project ADRC study on NBA farmer organization recommended a number of practical solutions to create a sustainable FO system. Some of these recommendations should be of importance in developing a sustainable and replicable FO model. They include:

a. Using the School Community for FO Activities

The school community (teachers and school children) of the project area can be affiliated to the FO system for knowledge dissemination and for a sustainable farming community. This can help develop an interest and a sense of responsibility in the functioning of their affiliated FOs. This link can be further improved by introducing something similar to the school 'house system' through which competitions (most effective shramadana, best home garden, young farmers contests, etc.) can be organized involving the school and the affiliated FO.

b. FO Strengthening Week

One week per year can be declared as devoted to strengthening of FO system. All available resources of

organizations can be mobilized towards this purpose. The support of the community and religious leaders must be sought. The activities within this week must be planned jointly by farmers and officers.

c. Introducing Non-formal Education Techniques

Using non-formal training methods to provide a training format for farmers not accustomed to lecture type one way communication.

d. Using Radio

Appropriate radio programs can provide the farmer community with humor while acting as a social stabilization technique. A radio drama series based on life in an irrigation settlement could be a good technique. The farmer community can write scripts. The ones selected can be produced through radio programs. There are a number of similar programs which can be introduced "to instruct and entertain" (street drama by the farmer community, revival of village theatre, traditional verse Kavi kola competitions, cultural activities).

Perhaps what is needed is to attract the farmer using more innovative technique. The Giranduru Kotte Community Radio Station catering for the farmer community in System C launched a radio program called Kela Pattaraya (Scandal Sheet) - a forum for farmer problems. Listeners are asked to write in with issues regarding problem areas concerning farmers and officers. A program officer edits broad casts them without mentioning names and tries to give the correct solution if possible.

e. Opening Farmer Community to Existing GOs and NGOs

There are number of GOs and NGOs serving communities. While they have varying goals there is a wide area for cooperation in achieving community goals. For instance, National Youth Service Council, Sport Ministry, Health Ministry and Sarvodaya are organizations from which services can be provided for the farmer community. This would also help them integrate better with the larger community.

f. Utilizing Other Resource Persons in the Area

The health aspects of people cannot be overlooked. Improving health and nutrition can be the basis to promote home garden cultivation.

g. Using Audio-Visual Equipment in Farmer Education and Motivation

h. Introducing Appropriate Land Sharing Practices

In the traditional irrigation-fed farming culture, practices such as kattimaru (rotation of paddy plots by several farmers), tattumaru (cultivation same land by several farmers in turn) are alternative agricultural methods still known and appreciated by many farmers even if they no longer practice them. Reasons for not following them is mainly due to individualization or atomization of farmers in colonization schemes.

i. FO as a Commercial Unit

The FO, to be a sustainable organization, must also have financial accountability. A major fact of survival of the NBA FO system was the capital earned from what was then termed "checkrolls" or farmer contracts. These financial returns have, in some organizations, played a vital role in promoting organizational sustainability.

In some cases, however, FOs have been functioning only in name in order to get checkroll contracts for the farmers and distribute the returns. However, where monies received from such activities were deposited in a FO account, and farmers carried out the work on a voluntary shramadana, basis a sense of group unity can be developed. At least 10-20% of the total amount received to carry out maintenance work should be deposited in the FO account for use in meeting community objectives such as providing farmer loans or loan guarantees or to support recreational and social events.

j. FOs Solving Land Issues

A major problem of settler families has been mortgaging lands to wealthy traders or farmers with settlers eventually became landless laborers on their own lands. Absentee ownership is also a problem. Both deter formation of strong FO's. If the FO can undertake the responsibility of cultivating lands held by absentee owners the FO can facilitate cultivation on a share basis with the farmer.

In many cases the only economically viable property of the farmer is either paddy or land. For farmers in temporary financial difficulty a strong FO could provide emergency loans which could be paid back gradually.

k. Introducing Mechanisms to Promote Female and Youth Participation and Provide Solution to Their Problems

D. Moving System B Towards a New Economy

The MARD/MEA goal--obtaining maximum possible economic benefits from land and water resources available to settler families on the Left Bank of the system--involves a social process. The objective is to modify the subsistence paddy culture by introducing market oriented high value crops. It is expected the increased income resulting from crop diversification would lead to improvements in living standards of the farmer community in system B. Though the FP does not clearly spell this out, it indicates that increasing income of the farmer community would improve their ability to meet their basic needs which include food requirements, shelter with sanitation facilities, health and educational requirements of school going age children.

1. Constraints Before the Task

In a social change process existing constraints and the framework within which this task can be accomplished need to be identified and changed to provide a favorable status for farmers to implement new cultivation practices. When developing strategies to implement such a process characteristics unique to System B need to be identified:

- o the physical irrigation system is designed to suit paddy cultivation;
- o the extent and way the land holdings are situated (lower than the distributory canal) to suit paddy cultivation militates against cultivation of diversified crops although the amount of land provided farmers is not sufficient to cultivate paddy with adequate profit;
- o the weather patterns, especially heavy Maha rains, encourage farmers to cultivate paddy;
- o subsistence paddy cultivation is convenient for farmers and has a number of economic benefits such as being storable, guaranteeing home consumption for the season and being readily convertible to cash whenever possible;
- o farmers are atomized (isolated groups since they have been brought to the location from various locations) and have not developed traditions of group cooperation.
- o line agencies (banks, co-ops, extension etc.) are geared to provide service only for paddy cultivation;
- o a major portion of the paddy lands are 'water logged' and suitable only for paddy cultivation;
- o present marketing facilities are do not geared for high value crops;
- o at present (and for the duration of MARD) farmers receive plenty of water;

- o continuing terrorist threats create a general climate of instability limiting interest in undertaking new, higher risk agricultural ventures;
- o lack of capital for farmers to cultivate cash crops; and
- o labor shortage even for paddy cultivation.

The most appropriate and sustainable mechanism to achieve long term project goals is to strengthen FOs. While the PP indicates generally that organizing farmers is essential for meeting the above goal actual objectives of Farmer Organizations (FO) are not specifically defined.

2. Activities That Can be Undertaken by Farmers Organizations

On the basis of "Objectives of Farmer Organizations" presented in "Guidelines on Farmer Organizations MARD/MDS Projects-System B"¹⁴, and from discussions held with MARD/MEA officers and activities carried out so far by FOs in System B, the following activities are identified as those appropriate for implementation by FOs.

- o technology dissemination;
- o water management at turn out and distributory levels;
- o input distribution;
- o improve production and marketing efficiencies
- o resolve input, credit and marketing problems;
- o resolve land tenure issues such as absentee land ownership and illegal leasing;
- o provide legitimate social stabilization institutions to stabilize farmer community and intercultural relationships; and
- o provide loan or loan guarantees to absorb farmer credit risk.

The Turn Out group (TOG) is the smallest informal FO. It can have supporting objectives including:

- o farmer cooperation to achieve water management using the System B rotational water distribution approach;
- o collection of water user fees¹⁵ within MEA and ULFO guidelines¹⁶;
- o provide the basic field demonstration level to introduce new agronomic and water technology activities; and
- o introduce kattimaru land sharing activities to maximize adaptation of diversified cropping systems¹⁷.

The Unit Level Farmer Organization is largely coterminous with the village and can have wide scope to carry out multiple activities and operate as a profit making institution for the

benefit of the farmer community. This can be the formal and legal farmer organization. The UFLO can undertake the following responsibilities:

- o take actions to resolve problems forwarded by TOG leaders
- o undertake farmer contracts and distributed them in an equitable basis for farmer groups;
- o select farmers for training and provide a mechanism to disseminate the knowledge to other farmers;
- o improve production by integrating Farmer Organizations with Agricultural Extension Activities and strengthening and mobilizing effectively the Farming Systems Extensionists to promote the introduction of new cropping patterns via FOs;
- o find solutions for land tenure problems which are obstacles to meet project goal¹¹;
- o serve as a mechanism to provide the farmer inputs when necessary; At first FOs can study their input requirements and approach the input supply organization well in advance and at a later stage, when FOs have accumulated money they can act as the input seller;
- o provide a mechanism to get agricultural loans for farmers by acting as the guarantor for individual farmer loans or developing a loan capability through affiliation with a savings and credit society;
- o provide solutions to marketing problems either being a intermediary or marketing agent¹²; and
- o organize socio-cultural activities for recreation and to promote social stabilization.

It was observed that MARD/MEA farmer organization specialists and many other officers both in MARD and MEA recognize the capability of FOs for carrying out the above activities. The task at hand is simply mobilizing existing resources to accelerate FO activities. Organizing women and youth should also be done through FOs. However, the MARD/MEA project has not yet given those organizational process activities high priority in achieving project goals. To date, the major consideration of MARD has been to promote increased income through planting high value cash crops on irrigated paddy land. Agricultural inputs are provided along with limited technical extension services and some help with providing solutions to marketing problems. The broader economic objectives of improving family income through expanded homestead commercial activities and the role of FOs in achieving these and other community socio-economic objectives have not been systematically addressed.

3. Present Status of the FO System

The MARD 1990 Annual Report and 1991 Annual Work Plan indicates that 54 ULFOs have been formed. Of these, 26 are

registered with MEA. However, the evaluation team found very few ULFDs functioning according to expectations of the project design. The major reasons observed include:

- o the divided vision on the FO issue leading to lack of a common MEA strategy;
- o insufficient field staff at unit levels; and
- o inability to mobilize available MARD FO resources at an optimum level.

The model advocated by the FO consultants seemed to be appropriate. The problem is mostly with implementation delays. Further, the MARD/MEA model is also observed to be more sustainable in comparison to other models discussed here due to following reasons

- o it does not use farmer/officer antagonisms as the organizational motivation, but seeks to find common ground. Its driving force is organizing farmers into groups around production of profitable high value cash crops and at being responsive to solving farmer problems;
- o the model caters, in principle, to a far wider range of objectives and is not limited to water management; and
- o actual organizational responsibility rests with MEA; the role of MARD is to provide support and the training.

4. Providing Legal Status for FOs

A major remaining problem is providing a formal legal status for ULFDs. This is essential if they are to play their envisioned role in providing group based solutions to economic issues facing farming communities. With legal status, the rights of members and of leaders is clarified. Accountability of leaders to their members can be maintained within a framework supported by the existing legal system.

A recent amendment to the Agrarian Services Act of 1958 provides the mechanism under which ULFDs can be legally constituted giving them powers to sue and be sued. Regulations are now being written to implement these provisions.

E. Conclusions

1. The PF correctly indicates the important of strengthening FOs in achieving the project goal.
2. Changing cultivation practices is a continuing social process which can not be completed within a short period of time.

3. FOs can provide services to ("village") Unit Level members in dissemination of knowledge, water management activities and collection of O&M, solving marketing problems, provision of input and credit facilities, solving land tenure issues and providing social stabilization.
4. Very few FOs are now functioning in system B but those that are functioning have shown the capability for undertaking the above responsibilities.
5. At present there is not a clear unified vision among MARD/MEA staff regarding the role and organizing strategy for FOs.
6. The activities of Farmer Organization Specialists/ consultants have not been sufficiently coordinated with staff in other MARD components.
7. Some farmers and MEA officials believe that introduction of diversified crops is a top down concept which has not yet been adequately accepted by farmers as being superior to paddy cultivation.
8. The primary production group is at the TOG level because of the design of the F-canal water distribution system.
9. ICOs can be a useful addition to the Unit level MEA extension team if they are given training, and can function within a well defined organizational development strategy and set of implementation plans.
10. MEA has not yet introduced a comprehensive strategy nor has it developed work plans to implement an accelerated FO organizational program.
11. MEA has not yet introduced a systematic mechanism to promote farmer contribution, either as labor in kind or as money payment for O&M activities.

NOTES:

1. e.g. Dimbulagala Block of System "B": the total number of farmer families as of Feb. 1991 was 2,751 of which 2276 were Sinhalese, 463 Tamils and 12 Muslims. These families were originally from more than 10 districts of the country. Data from Block Manager's Reports.
2. "a" and "b" have already been introduced in System B.

MARD used the democratic method of secret ballot in the selection (lessons learnt from ISMF model) of leaders but this has created unexpected problems in the fragmentation of

FOs and grouping of farmers and the entry of politics into the FO system (which is not a very healthy development).

3. The objectives indicated in the report on "Guidelines on Farmer Organizations MARD/MDS-System B are:
 - o Motivate farmers to increase family income through highest agricultural productivity, crop diversification, lowering production costs, efficient water management and improvement of marketing and credit;
 - o Ensure active farmer participation in the operation and management of the irrigation system, efficient water management, prevention of wastage, reduction of irrigation maintenance costs and maintenance of irrigation structures and the canal system;
 - o Foster greater involvement and participation of women and youth in farmer organization, income generation and self-employment activities through the formation of women and youth organizations under the umbrella of the farmer organization; and
 - o Develop self-confidence and self-reliance of the farming community.
4. The ISMF model and ADRC recommendations show that the real and most viable FO is the D-level organization. System B has already formed new FOs at TOG level and also ULFOs. Furthermore, in Vijayabapura Block, the NBA had introduced a system with the D-canal being the FO and then re-introduced the MARD/MEA model with ULFO being the formal FO. These changes, from time to time, confuse both farmers and officers and are seen as detrimental to developing a sustainable organizational effort.
5. The FP indicates that project implementation requires introduction of Irrigation Community Organizers (MEA recruits). They would assist with water management activities, organizing turnout groups, making important consensus F-level canal maintenance decisions and organizing ULFOs to undertake contract maintenance, collecting water use fees and cropping decisions (p3).
6. MEA policy is that field canal maintenance is carried out by farmers. MEA still allocates money for D-level clearance and maintenance work. Until 1987, D-level maintenance contracts were awarded to private contractors. During this period the majority of farmers paid O&M fees. Now the contracts of such activities are given to FOs and MEA expects farmers to participate in O&M activities by undertaking such contracts and carrying out part of work on a shramadana basis. As it is, farmers of properly functioning FOs carry out O&M work on a shramadana basis while farmer leaders of other FOs take

advantage of the situation for their own benefit by taking service fees on contracts let to carry out maintenance work.

At the initial stage of construction and settling farmers in new settlement schemes, the systems are heavily funded. Farmers get unrealistic expectations because they are provided with subsidies (food, loans, settlement payments). Officers' expectations may also be unrealistic because the irrigation network is new and very few O&M problems exist. As time goes, funding for systems activities are reduced and irrigation O&M requirements expanded. Problems arise between officers and farmers and between farmers in different turnout groups as water availability declines. Although officers want to implement the collection of O&M fees farmers resist making payments complaining that unless the system is repaired and until they get sufficient water they will not contribute to O&M work. This creates a vicious cycle; the system deteriorates and farmers refuse to pay O&M fees. This often becomes a political issue and top level policy makers try to get another funding agency to rehabilitate the system. The cycle is then repeated.

7. The Kattimaru, system is the rotation of plots by several farmers in turn and tattumaru is the system where plots are cultivated by several farmers in turn to ensure the maximum production by preventing the land fragmentation. These systems can be reintroduced in an appropriate way through promotional activities, education and training to maximize the agricultural output per land unit in the system B.
8. There is a hidden but a grave problem which negatively affects FO activities i.e., absentee land ownership and leased out or mortgaged lands.

The Sevanapitiya Unit Level FO (one of the most active FOs found) has taken some progressive actions to solve this problem. The FO was formed at end of 1990 and so far has fined three farmers, who are not the real land owners, for nonpayment of canal maintenance fees. In addition, some of the land controlled by absentee owners has been redistributed to landless second generation settlers (who have not been allocated paddy land) to cultivate on condition. These new operators pay the ULFO Rs 200, and distribute 40 bushels of paddy to the land owner.

9. At present, several ULFOs (e.g. Sevanapitiya Unit and Kandegama Unit) are showing capability to solve marketing problems (mainly paddy). These FOs have some savings (in Sevanapitiya Rs 30,000). Providing vehicle loans to these two units would enable them to resolve existing transport shortages and enable them to buy and sell paddy and other crops.

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ANNEX E WATER MANAGEMENT

A. Main System Operation and Maintenance

One of the primary outputs of the MARD water management component is to institutionalize (verbs rationalize and operationalize also used in FP) the main system O&M so as to improve water distribution flexibility for the complex cropping patterns anticipated as crops other than paddy are adopted. The main system includes the minor reservoirs, main canals and branch canals. All or nearly all of the main and branch canals are lined. For purposes of system operation and maintenance the main system also includes the distributory or D-canals. The D-canals are generally unlined except in critical stretches of very sandy soil or rough rock cuts.

The physical infrastructure of the system is designed for paddy cultivation. The design is for continuous flow in the main, branch and distributory canals. The point at which water leaves the D-canal and enters the field canal (F-canal) is called the "turnout". Each F-canal serves about 16 farmers. The design capacity of all F-canal turnouts is 28 l/sec. This design is based on the water duty often accepted as appropriate throughout South Asia of 1 cusec per 40 acres which in metric units is 28 l/sec per 16 hectares. Distribution of water to the turnout level is currently the responsibility of the MEA. Water distribution below the turnout is the farmers' responsibility.

The authors of the MARD project appropriately recognized that if non paddy crops became the major crops grown, the system of water distribution would have to change from the original design. In general, irrigation of non paddy crops is more complex and difficult than irrigation of paddy because non paddy crops are typically irrigated intermittently with more careful control of water quantity. This situation is even further confounded in System B because both paddy and non paddy will be grown concurrently. Therefore the system must be operated and maintained to meet the requirements of both types of crops (also see FO responsibilities in water management in FO component).

1. O&M Manual

One of the important tasks for MARD is to operationalize the O&M manual that had been prepared by engineering consultants prior to the MARD project. We read chapters 1,2, 4 and 9 and skimmed the other six and concluded that the manual is very comprehensive and detailed. It provides an excellent target for system O&M that might be attained after 10 or 20 years of experience and maturing. The immediate tasks are to provide training, guidance, and simplified procedures to make as much use as practical of the O&M manual by the MEA staff

operating the developing Left Bank of System B.

The resident MARD Main System Management (MSM) engineer has provided technical assistance including training and development of pragmatic guidelines to help MEA establish O&M procedures. (He works jointly with the MARD Water Management (WM) engineer. The two have overlapping responsibilities that we have not tried to specifically separate.) His approach has included a particularly effective technique of providing forums for MEA engineers and other technical staff to discuss and share experiences. Because System B is so new and in transition as more land is settled, many of the "experts" on adapting standardized O&M practices to the uniqueness of System B are those engineers and technicians with only three or four years of experience with this scheme. The MSM engineer has recognized the importance of capturing these rich real life experiences and incorporating them into his training efforts. This approach of using the most experienced MEA staff as trainers is consistent with the overall concept of MEA and MARD working as one.

2. Training

The training plan developed for system O&M for MEA staff is comprehensive and based on careful analysis of required tasks and job descriptions. Because most MEA System B staff tend to be young, there are a wide range of courses that would be useful. For this reason it is important that priorities be given to various areas requiring training. The "Training Plan for Water Management Staff of System B" identifies about ten possible subject areas for each staff category. In our view, priority should be given to those areas most closely related to the various job descriptions.

3. Cost Center Activity Accountancy

The MSM engineer has promoted several major thrusts that should enhance system O&M. The Cost Center Activity Accountancy (CCAA) is aimed at improving MEA's financial management. This activity is particularly important for MEA to get a clear picture of its recurrent costs. One of the major O&M activities is to reduce GSL recurrent costs through improved cost effective management, collection of user fees, and turning responsibility for tertiary system O&M to farmer groups. The CCAA is a good initial step toward reducing MEA recurrent costs. The CCAA program has been put on hold temporarily because MEA has had difficulty in recruiting a qualified accountant willing to work in system B. The MSM engineer has tried numerous creative measures and been relentless in his effort to help resolve this problem and has now found a temporary solution. We believe that the MSM engineer is correct in his confidence that if the CCAA is allowed to function long enough MEA administration will see its benefit and give priority to filling the gaps as

needed to make it work. The first phase of the CCAA is to establish the system with its required trained staff and equipment. Verification that the data input to CCAA is accurate and the effective use of this system will be the responsibility of MEA.

4. Year Round Operation

There is growing interest in operating the main irrigation system year round. Since water is in abundant supply as is labor during the "off season" we believe this is an opportunity that should be pursued. Other than lack of water there seems to be no over whelming reason why crops could not be grown year round. This issue is being addressed not only by MARD but also by MEA and personally by the DRPM (WM). It will be important to coordinate the various studies of this issue. Concern has been expressed that the "traditional" practices of dewatering canals for annual or semi annual maintenance may be a constraint. Cost effective solution to this problem need to be found. MARD, therefore, will provide TA to MEA to study this issue. The ability of farmer organizations to provide appropriate and timely maintenance will be essential if the system is operational year-round and should be included as a topic for study. We believe some attention should also be given the social, political and environmental consequences of adopting 12-month irrigation in System B. Careful study should be made of the impact of this proposed system operation on paddy cultivation, which is currently the predominant crop grown in System B. It is likely to remain the predominant system well into the future. Is it possible that with 12-month irrigation three crops of paddy on two long season activities could be grown, thus achieving a 50 percent increase in income from the irrigated area?

5. Simulation Model

One of the major TA activities proposed for the coming year is the development and application of an irrigation delivery network simulation model for the main canals of System B. Such a model might assist the system operators to manage water distribution according to demand based in part on crop water requirements, particularly non paddy crops. If water supply to System B becomes a limiting resource or there is widespread adoption of non paddy crops, we believe a computer simulation model of the sort proposed would be very useful for system management. In our view, however, this proposed activity is premature and thus not a high priority at this time. Reasons for postponing it to a later time are given below.

First, every aspect of System B is new, inexperienced, and in transition. The system has not yet stabilized. The staff is gaining experience, new management tools such as the CCAA are

being introduced, many farmers are just learning the fundamentals of agriculture and struggling to comprehend the husbandry of paddy as well as non paddy crops, and new settlements are being added to the system each year.

Second, the system has water in abundance and in all likelihood this condition will persist for some time into the future. The debate as to whether or not System B will be water short has gone on for years. Certainly there is no shortage of water at present and very likely there will be none at least until The Right Bank Canal is developed. Construction of the Right Bank Canal is currently on hold and will not take place for sometime, certainly not within the current life of MARD.

Third, the system is designed for continuous flow to the F-canals, but, even this relatively simple operation has proven difficult to perform because of the general lack of water control capability.

Fourth, the field data requirements for the model would put an even greater demand on the already overloaded MEA staff. Furthermore, it is a little hard to see how a model sensitive to crop water demands will be useful in a system where seepage is so uncertain and techniques for water application to diversified crops still under development.

One might argue that a simulation model should be developed now so that it is ready for use when careful main system water control is achievable. This argument would have to be set against several disadvantages. First, more accurate field information will be available once the system stabilizes. Second, it would add to already heavy staff pressures during this start-up phase of System B. Third, the inability of using rapidly emerging computer technologies, (particularly those related to GIS) that will be available in the future. Perhaps a simpler, less data intensive steady state model developed locally in partnership with the engineers who would be using it would be useful and less of a burden to the limited TA resources.

B. Tertiary Level Development, Operation and Maintenance

The tertiary components of the water distribution system include the D and F-canals. The D-canals are currently operated by MEA although this responsibility is expected to be turned over to the farmer organizations. Maintenance of D-canals is funded by MEA but farmer organizations often are contracted to do the work. The particular issues related to devolution of tertiary responsibility are covered in the discussion of Farmer Organizations later in this report. In this section we discuss physical condition of the D and F-canals and their operation and maintenance for non paddy crops.

1. D and F-canal Structural Stability

While main and branch canals appear to be in relatively good condition, the D and F-canals are generally not. Many of the concrete structures have become ineffective and canals often have major seepage losses. Our brief tour of several D-canals suggests that the reason for tailenders receiving inadequate and unreliable water supplies is a result primarily of seepage losses and lack of water control in the D and F-canals.

The primary factor leading to seepage problems in the unlined tertiary canals is the sandy soils used for the canal embankments. Not only does the sand, because of its coarse texture, have a very high rate of water conductivity but it is also highly erosive. It is this erosivity that causes structural failure, canal breaches, and development of "piping" or macro pores in canal banks. There are also the problems associated with damage done to unlined canals by domestic and wild animals (boars to crabs) and the lack of local organizational strength, capability, and responsibility to maintain these canals.

The MSM and WM engineers have proposed that assistance be provided in the form of an "earth stability" specialist to help deal with the canal stability problems. (This specialist would also advise on road construction and maintenance). We agree that this TA activity should be given high priority by MEA and MARD. The MARD/MEA pilot D-canal required "75 percent rehabilitation" as essential structural improvements (ESI) before water could be controlled at that level. Since the original canal construction in the pilot area was completed in 1986, it is obvious that deterioration has occurred rapidly. The situation relative to canal deterioration of the pilot area seems typical of much of System B, but even if this is an extreme case the situation elsewhere is serious. Alternative solutions to the problem of very poor soils for use as structural materials are not obvious and probably will not be easily identified. Solutions will likely include combinations of more appropriate design of structures (e.g. longer seepage walls and aprons), improved canal design (e.g. wider banks, use of clay, soil cement, or other low cost linings) and greatly improved local institutional capacity to make timely repairs. Short-term technical assistance by a soil mechanics expert alone will likely not result in a satisfactory solution to the critical problem of deterioration of the earthen canals. Longer term field testing of the various technical and institutional options will be needed.

An assessment needs to be made of the magnitude of the ESI that are needed to provide water control at the D and F-canal levels. If the pilot area is indeed representative of the rehabilitation needs, either major new inputs will be required to upgrade these areas or expectations of water control at the tertiary level reduced.

2. Field Canal Activities

The WM engineer together with the MEA staff and staff of the agricultural research station have undertaken an array of studies and activities related to water distribution at the F-canal level. These studies and activities relate to equity, reliability and amount of water delivery to the unit farms; methods for distributing water between farms; water scheduling; relocation of turnouts; "clustering" at the F-canal level (methods for coordinating crops in fields to simplify water delivery); and coordinating cropping patterns. These activities will likely result in valuable new information and better understanding of water transfer at the turnout level but they are also catalysts for farmer ideas of methods for better local water control. We believe that this approach to the trial and error action field studies is appropriate.

C. On Farm Water Management

There are any number of activities underway or planned that relate to water management on the farm. These include training in soil-water-plant relationships, estimation of crop water requirements, water application techniques, use of raised beds, and introduction of interception drains. In spite of all the activity in this topical area we believe there is a lot yet to do. The coordination of MARO on-farm water management activities with other MARO activities was not obvious to us.

1. Need for New Technologies

Much of what needs to be done is applied research and development oriented. Throughout Asia a considerable amount of research has already been done for diversifying crops in rice-based schemes. But, most was done in rice-based systems with the typical heavy clay soils characteristic of much of South and Southeast Asian paddy land. The soils of System B tend to be light sandy soils with very different moisture properties than the heavy clays. Consequently there is a lot yet unknown about appropriate water management technologies on these shallow sandy soils.

One of the more promising approaches to improving on farm water management for non paddy crops is the reorientation of each one-hectare farm plot so as to maximize slope up to one percent. This strategy will allow more rapid runoff of excess rainfall and cause the ground water table to drop more quickly, especially if interceptor drains are used. This is the design approach currently used in Zone 4A. If successful, the practice could also be used in a modified form in the undeveloped portions of the other zones.

The traditional approach to farm layout used in zones other than 4A is to orient the plot so that it is as level as possible.

We feel keenly, however, that this yet untested practice should be field tested by doing some comparative studies. We are concerned that the new approach to farm layout as promising as it seems may have disadvantages especially for paddy cultivation when compared with the more traditional layouts used in the other zones.

Current guidelines for use of raised beds with non rice crops is certainly a major improvement over no recommendation but the guidelines need to be refined for specific raised bed design based on criteria farmers can quantify. Are beds the only appropriate technology? Since shallow sandy soils can be very droughty, should farmers try to maintain a parched water table? How can water applications as low as the recommended 15 to 35 mm be made on these soils using raised beds? Can dug wells be effectively used to provide water to establish diversified crops planted on raised beds? Are there methods such as use of rice-straw mulch to conserve moisture in these sandy soils? How much water is actually used when non paddy crops are grown on irrigated raised beds? There is a whole host of issues related to inter-relationships between water management and fertilizer, pesticides, crop types, crop growth stages and the like that need to be investigated. We believe that the on-farm water management activities must to be closely linked with other cropping practices not just to "provide" water management but also to improve understanding and thus technologies of water management for diversified crops in System B.

Clearly there is a great deal of appropriate on-farm water management training that is being conducted now, but a major effort is needed to improve the technical material used in this training.

2. Bottom-up Approach

The development of on-farm water management technologies for non paddy crops in System B probably has less to do with water use efficiency than it does with providing the proper soil moisture environment for crops, efficient use of fertilizer, protection of water quality, labor efficiency and reliability. On-farm water management must be seen in a farming system context. The problems of System B related to "over irrigation" and "poor drainage" come together at the field level. Initial solutions should start there, where farmers can control the water. Comprehensive solutions requiring group and agency cooperation, commitment and capability will be more difficult to find and should logically come later. Farmer organizations must play a major role in fostering cooperation as water control is extended beyond the turnout group level.

We believe that the Cauley report, as well as others before it, point to an effective low risk strategy for water management

for non paddy crops in System B. One concept is to bring the whole irrigation system O&M up to a level of water control that encourages raising of non paddy crops. This approach is extremely difficult in the short run, especially given the relatively low percentage of land in non paddy crops. An optional approach suggested by the Cauley report is to let the irrigation system function more or less as designed and control water at the farm level with the aid of on-farm drainage practices. The Cauley report indicates that even in Maha 15 percent of the area is suitable for non paddy crops without any drainage improvements and with only on-farm drainage practices as much as 50 percent. Since farmers themselves are going to determine whether to adopt non paddy crops, why not concentrate water management efforts in helping them control water as well? Cooperation in water management will logically spread from neighbors in the F-canal to the D-canals if, as we expect, non paddy crops prove to be profitable.

3. System Drainage

Under any scenario, paddy, non-paddy or mixed cropping, a regional drainage network must be developed. The average annual rainfall in System B is roughly 1.8 meters which is about equal to the potential evaporation of that area. The MEA target duty for operating the irrigation system is 3.3 meters for Yala and Maha combined. Even if the entire command area were planted to paddy during both seasons, the evapotranspiration (ET) from the fields would not be a great deal more than the potential evaporation. Therefore, much of the over 5 meters of water entering the command area must either be draining out of the watershed or collecting somewhere in its lowlands, many of which are still undeveloped. Since the natural drainage network evolved for a much different water regime than now exists in System B, we might anticipate drainage problems beyond those on the farms that are associated with shallow soil. In System B, drainage and not irrigation is the priority water management issue. Clearly good water management includes both but in this system drainage has been the more neglected.

The drainage network below the farm level is discussed further in the section on MARD/MDS linkage. MARD should however, consider a study of the lateral movement of water. As indicated above, water loss to seepage for paddy, and likely non paddy crops as well, is far greater than that which is transpired. Unfortunately predictions of seepage are not nearly as precise as those we have for ET. Measurements of seepage reported in MARD reports for System B ranged from minus 2 to well over 20 centimeters per day hour with a standard deviation greater than the mean. Because of the shallow, parched water table, measurement of one dimensional seepage is not too useful. Analysis of drainage flow has not been done regionally but should be done both to guide drainage technology recommendations and to

avoid unanticipated environmental problems such as water logging. The analysis should not be overly detailed or complex because needed input data would not be easily collected. Rather, the analysis should rely on field reconnaissance and on simple observation of water table dynamics on farmer fields.

4. Meteorological Stations

Assistance has been provided through MARD to develop several fairly complete weather stations. In addition, training has been provided in the use of meteorological data. The equipment and instrumentation has been ordered and training will be provided for installation and proper use of these. Even though we don't see a pressing need for estimation of crop water use coefficients at this time a historical record is generally required to make good statistical use of weather data so we recommend that this activity move ahead as planned. MARD's ability to attract an internationally recognized expert for this activity will enhance the projects overall prestige.

D. MARD/MDS Linkage

MDS is associated with the Mahaweli Engineering and Construction Agency (MECA), not MEA. It's activities are aimed at new construction particularly in Zone 4A. Progress to date has been much slower than planned because of destabilizing political activity but momentum seems to be picking up this year with over 1,000 hectares of newly developed land expected to be settled.

Although MDS is focused on design and construction, it has introduced important innovations that will greatly affect system operation. Two activities of special note in this regard are the high intensity surveys (aimed in part at resolving very significant problems that have resulted from incorrectly located canals and turnout structures) and the new farm orientation to promote easier cultivation of non paddy crops. MDS has also introduced computer-assisted design techniques and has made proposals to deal with the rapidly growing drainage problems in zones already settled. MDS has provided TA for construction quality control on roads and minor tanks.

1. Canal Roads

Road construction and maintenance is becoming a greater concern. Due to the security and other related problems the roads are often used by vehicles heavier than expected. The cost of road maintenance has more than doubled since 1988 but it is still a relatively small portion of the maintenance budget. The problem of deteriorating roads is serious enough to warrant a study to quantify the problem and if needed offer alternative design and/or maintenance solutions.

2. Minor Tanks

Minor tanks throughout system B create both problems and opportunities. Many of the tanks were originally built as "level crossings" which provide a relatively low cost solution for both road and canal crossing of valleys and lowland swampy areas. We were told, (and shown two specific situations) that these level crossings are not properly designed as earth dams. Consequently, seep areas are developing that threaten integrity of the embankments. Generally, downfacing side slopes are too steep and no provisions are made to control seepage through the embankments. The opportunity offered by these tanks is to use them to increase system operational flexibility. In order to do this the dams should be raised slightly to provide some active storage since currently there is none. In some cases the inflowing canal may need to be relocated. Flexibility would result from improving minor tanks: accessible storage would be closer to farmer's fields, main canals can run without wasting water to drains, effective use of rainfall can be improved, modest increases in total water supply achieved, and perhaps improve the ability to operate from minor tanks during periods when the main canal is closed. The minor tanks deserve a comprehensive study to determine the magnitude of the threat of failure and the benefit and costs if upgraded to include active storage.

3. Drainage Activities

Proper design and construction of outlet and turnout boundary drains is a MDS component essential to MARD's efforts to provide water management for extensive diversified cropping. Without significant improvement in system wide drainage, we believe efforts to promote non paddy crops will an increasingly uphill battle for MARD.

MDS has had an ongoing program to monitor water table levels. The complexity of the lateral movement of the shallow groundwater suggests that this aspect of MDS should be redesigned and coordinated with MARD with expanded field data collection so that a much better understanding is developed of subsurface water movement at the field, turnout and regional levels. This information is necessary to effectively design drainage up to the field level.

4. Earthen Canal Construction

As mentioned earlier, much of the D-canal infrastructure has deteriorated. Rehabilitation of these D-canals require a careful analysis of the design, construction and maintenance procedures used. Technical assistance from a soil mechanics engineers or structural engineers experienced in use of sandy soils for earthen embankment structures should be sought.

Most of current and proposed innovative activities of MDS will directly influence the O&M of System B and thus impact the water management component of MARD. Close coordination of MARD and MDS is essential for effective and efficient activity programming. In addition MDS may be able to provide valuable assistance in rehabilitating D-canals and providing drainage in zones other than 4A.

E. Water Management Program Themes

MARD activities directly related to water management have been grouped under two general themes; a) reduced recurrent cost and b) reduced water use in System B. These themes are certainly far more narrowly defined than the wide ranging goals, purposes, objectives and activity themes discussed in the PP. The two themes may not do justice to the broad based innovative activities that have and are being carried out by MARD and may, in fact, incorrectly define the true MARD water management focus.

1. Reduced Water Use in System B

Concern expressed in the PP that the GSL reduce the burden of recurrent costs associated with irrigation development should be reflected in MARD. Actually the MARD activities have been directed at reducing GSL recurrent costs while maintaining or improving related services. We feel confident that MEA staff training and institution of management tools such as the CCAA will improve MEA efficiency and effectiveness. Whether or not these result in a net reduction in GSL recurrent costs is difficult to know. We expect recurrent costs might not be reduced since annual budgets are heavily influenced by available funds as well as need. Even in those instances where recurrent cost items such as tertiary O&M are assumed by farmers, the net benefit may not only be the reduction in recurrent cost to GSL but also the improved service that almost universally studies have shown occurs with local control.

2. Reduced Water Loss in System B

We are not at all clear why reduced water use in System B became one of only two major water management themes for MARD. It may have come from the Logical Frame Work for the project given in Annex H of the PP. In the Logframe a stated project purpose is that "farm portion of irrigation system operates at 70 percent efficiency." Wherever the theme of reduced water use came from, we believe it may not be the most appropriate for the remainder of the project.

At the time of PP development there was considerable debate as to whether or not System B would be water short when fully developed. That debate still goes on, but no one expects the

Right Bank of System B to be completed by 1995 and likely portions of the Left Bank will remain unsettled as well. Therefore, System B for the duration of MARD will be a water surplus system.

It is now a well accepted axiom that water can be substituted for management, at least for paddy cultivation. Therefore, because water "saved" has no apparent high value for other use, incentives to reduce water use for irrigation will have to result from adverse impacts of too much water (eg. water logging, poor environment for upland crops, environmental and health problems, etc.). The adverse impacts are usually not uniformly felt by those who are using abundant water supplies and system operators would probably prefer to first see how well drainage works before increasing "recurrent" management costs to reduce water use.

3. Training

We believe training and other activities aimed at reducing water use should be deemphasized. Less emphasis should be given to determining or using crop use co-efficient or techniques for applying precise quantities of water. Even training for water rotation at the D-canal level or above will probably not be useful in System B for the duration of MARD. Training,

development of water management tools and the like aimed at conserving water for use in System B sometime in the future, after MARD is over, would likely not be sustained.

F. Specific Water Management TA Issues Raised

1. What assistance is needed in water flow measurement?

Calibration of the main and branch canals is important. This is the heart of the hydraulic system and water control in the main should be a reasonably attainable target. The sharp and broad crested weirs at the D-canal seem in good shape and appropriate for flow estimates at the D-canal level without calibration. Since there are varying views on the need for calibration of these structures, we recommend a simple comparative study be done on several selected weirs. A survey should be made of those structures felt to have extraordinary turbulence upstream or effected by backwater downstream. Water control at the D-canal level is problematic in many areas so precise measurements in the D-canal or at turnout points will probably not be too useful.

2. Is technical assistance needed for selecting proper vegetation on main and branch canal banks?

We did not observe this problem in the field, it was not given priority in the reports we read and MEA people did seem to view it as a major problem. If MARD proceeds with this TA activity we recommend local range experts be used. The director of the Agricultural Research Station is one such expert.

3. Is further TA in engineering economics needed?

The most convincing argument heard in favor of continuing this activity is that it is an important engineering subject not taught in Sri Lankan colleges and universities. The subject is not necessarily uniquely needed in System B. We were not able to determine how important the second phase of this activity was to the effectiveness of the earlier training that was done. Although the fundamentals of soil mechanics and drainage are taught to Sri Lankan engineers we believe the level of education in these topics is probably insufficient for engineers assigned to System B. These might be options to the planned training in engineering economics.

4. Is additional overseas training needed?

The feeling about short term overseas water management training that has been given is almost all positive. The reason given more often than others for wanting to continue the overseas training is that it is an incentive to keep good staff in System B. Overseas trainees have returned more motivated and with more ideas. We are not sure what priority should be given overseas training given the limited resources remaining in the project. However, if overseas training is continued we feel engineers might benefit most by focussing on drainage.

5. Is there critical need for additional system maintenance equipment?

MEA staff and officers did not produce a long list of equipment needs but one item was mentioned by all of them. They feel they need backhoes. This need will become even greater as people recognize the importance of keeping drainways clear of silt. One other interesting recommendation was for two-wheeled tractors at each Block to help assure timely minor repairs be made.

6. Is the remaining TA in MARD sufficient?

We believe the priority for TA should be given the topical area of drainage: design, construction and maintenance of D and F-canals; and related structures and techniques for on-field water management. The present MDS staff can provide considerable assistance on the topic of drainage. Short-term TA, however, may also be included. TA can be used, on a continuing basis, if possible, to help design and conduct demonstration,

training and other activities related to water management in the context of a total farming systems.

7. Is assistance needed in homestead water management?

We were not able to deal with this issue in detail but in general there seems to be tremendous opportunity for the production of non-paddy crops in homestead areas and quite clearly availability of water is a major constraint. Consideration should be given to this issue with the possibility of making it the primary focus during the Maha season. Consideration of optimizing use of both irrigated and homestead areas through improved water management would better fit the farming system model and whole farm approaches now being used.

6. Conclusions for Water Management

1. O&M of the main conveyance system has reached a good plateau as compared to other rice-based irrigation systems of similar size and age. Diversified cropping can be expanded with the system as operated. No major new thrusts should be needed at this time to assist main system O&M.
2. Too much, not too little water is the primary water related constraint to expanded production of non paddy crops in System B.
3. Studies of System B soil resources suggest considerable opportunity for water control at the field level when water supply is adequate. More sophisticated water control through change in the irrigation system operation specifically for non paddy crops will be extremely difficult before the FACD.
4. Water supply to System B will be abundant for at least the next five to ten years. The shallow sandy soils of the area are somewhat unique for Asian rice-based systems and pose special constraints to use of many conventional water management technologies.
5. The water management training has been well done both in format and substance and a comprehensive plan for future training has been prepared.
6. A relatively major change in farm plot orientation is being used in Zone 4A for the purpose of improving drainage for diversified crop production.
7. Far more water is input to System B than is used by crops or evaporated. The dynamics and fate of the "unused" water are largely unknown.
8. Reduction in recurrent costs to the GSL as a result of MARD

activities will be extremely difficult to quantify. To date very few user fees are collected and only very modest turnover of tertiary responsibilities to farm organizations by MEA. The targets related to fee collection and devolution of responsibility to farmers are achievable by the FACD in the opinion of the evaluation team. Tangible evidence of this, however, is hard to find.

9. The working relationship between MARO and MDS is good and the effectiveness of both would likely increase with a formal linkage.
10. Homestead areas offer exciting opportunity for production of diversified crops, especially during Maha season. Availability of adequate water is a major constraint to cultivation of homestead areas.
11. The existing themes of reduced recurrent cost and reduced water use are much more narrowly defined than the wide ranging goals, purposes objectives and activities discussed in the FP and being undertaken by the Project.

ANNEX F PRODUCTION AND MARKETING TRIALS FOR COMMERCIAL PRODUCTION

A technically sound program of production and marketing trials is essential for successful introduction of market driven commercial crop production and marketing activities. This Annex discusses a production and marketing trials approach based on successful experience with similar programs in other developing countries. Such a program can be introduced by the MARD Project to provide a systematic commercially oriented R & D program to introduce new cropping varieties for commercial sale in identified export markets.

The approach is first presented in outline form. An example of the approach using sweet corn is described in Appendix A. The agribusiness member of the evaluation team also conducted an informal quality test using other evaluation and MARD project team members as a "product development group". Results are presented in Appendix B. Appendix C discusses the export expansion potential for Sri Lanka gherkins either in brine or as a fully processed product and identifies R & D work required to achieve sustainability.

A. A Market Oriented Agricultural Research and Development Program Adaptable to MARD and System B

The R&D cycle to introduce and maintain product quality for commercial markets includes the following components:

- o variety observation trials;
- o replicated (randomized block) trials to establish cultural capabilities;
- o demonstration plantings incorporating field trial results to establish costs for commercial plantings;
- o test market preparation and shipping of samples for local or export markets; and,
- o full scale production, post harvest handling, transportation and marketing;

After initial variety observations trials have identified new varieties thought to have promise for commercial development, replicated field trials should be initiated at four to six week intervals. Detailed records of agronomic and economic performance of all replications are maintained and analyzed for use in designing subsequent trials. Data generated at this stage is voluminous and complex. Consequently, the activities are best performed on a research station under well controlled conditions. When initial variety selections have been made for further on-farm development and performance results have stabilized, the variety replications can continue at less frequent intervals,

bringing in new varieties as they become available.

Once basic agronomic and economic data from on-station trials are available the better performing varieties are introduced to farmers fields on a demonstration basis. At this point, R & D leadership passes from the research to the extension specialists for crops targeted for settler development on irrigated paddy land.

After basic agronomic trials indicate potential commercial success of a particular variety, experimental post harvest handling and marketing activities are introduced. As climatic conditions in System B are conducive to year round planting and harvesting of certain crops continuous planting experiments should be undertaken to provide steady product flow to market. Successful testing of the production/post harvest handling/marketing chain provides the basis for widespread promotion to farmers. Table __ illustrates elapsed time required from inception of variety trials to completion of marketing trials for crops believed to have high probabilities for success in System B.

Within MARD Project conditions, the suggested program of production trials and demonstrations and marketing trials require the integrated commitment of the lead and supporting horticulturalists (or research agronomists), the extension agronomists, the agricultural economists and the marketing managers. The research agronomists/horticulturalists are responsible for developing variety screening trials and replicated on-station and on-farm production trials. The extension agronomist is responsible for planning and implementing whole farm and turnout demonstrations. The agricultural economist is involved at all stages of the trial and demonstration planning process and is responsible for collecting production cost of production data and conducting cost analyses.

The marketing managers, in conjunction with the agronomist/horticulturalists and the agricultural economists plan marketing trials on a crop by crop basis. Again, the agricultural economists take responsibility for conducting the economic analysis.

B. General Facts Concerning On-Station and On-Farm Trials

In conducting on-farm and on-station trials the following activities are essential to ensure accurate data and meaningful test results:

- o each experiment must be planted in its entirety the same day;
- o all experiments must receive normal and common maintenance of weeding and irrigation;

- o plants should not be allowed to come under moisture stress;
- o insects should be controlled on a preventative program applying only registered chemicals accepted on international markets;
- o the researcher should make weekly observations noting, at minimum, the following items:
 - days for emergence
 - date pesticide application
 - number of weedings
 - plant height each week
 - general appearance--vigor
 - disease and insect incidence
 - other observations
 - date of harvest
 - yield data (note abnormalities etc.)

In addition, researchers:

- o convert yield data to kgs/acre and when applicable, units/acre and avg. weight/acre
- o harvest entire experiment (all plots per trial) on the same day
- o prepare samples for test market and post harvest handling procedures

After trials are harvested agronomic and economic data are analyzed. The randomized block allows calculation of LSD to the 5 percent and 3 percent levels.

C. Initial Marketing Trials

Samples must be taken at harvest time. The product is prepared as it will be sold to determine actual marketable yields. Quality tests using a consumer product group can be made at this time (See Appendix 1). The export marketing manager is present to guide the researcher in his evaluation of salable product. The marketing manager must develop standards as demanded by the market or purchaser.

At this point the researcher must use ingenuity and common sense. On completion of these experiments the results are developed from general cross-cutting and fact finding work to design and develop new trials to further investigate cultural practices and the economics of growing the crop on a continual basis. The next step is putting out demonstrations in farmers fields to:

- o develop field level cultural practices and procedures;
- o develop on-farm economics of producing and selling product;

- o develop operational post harvest handling techniques and procedures; and,
- o develop transportation procedures for actual product selling.

At this point, the first step of variety observational trials has been completed. The next steps are to introduce and assess cultural procedures and economics of producing and marketing the crop under farm and actual market conditions.

Records kept during field trials provide cost estimates for profitability analysis. Actual yields of marketable product per acre provide the basis for estimating all input costs up to the farm gate. The marketing manager is responsible for developing and supervising post harvest handling, transportation and marketing procedures and costs, and product selling prices. A simple summary cost and return format is sufficient at this stage to determine initial crop profitability. Overhead costs can be factored into these out of pocket cost estimates.

**APPENDIX I
SWEET CORN
THE R & D CYCLE IN MAHAWELI SYSTEM B**

Sweet corn is a crop identified by MARD and supported by the evaluation team as having high potential for commercial production in System B. It can be developed as an export crop and also supply a niche market in Colombo. It can potentially be grown almost year round.

A. Variety Trials and Randomized Block Trials

Replicated field trials for sweet corn in Mahaweli System B can include the following four procedures:

1. Interaction of Major Fertilizer Elements

Establish a randomized block trial with the following treatments:

	<u>Treatment</u>	<u>Plot Numbers</u>				
		<u>Rep1</u>	<u>Rep2</u>	<u>Rep3</u>	<u>Rep4</u>	<u>Rep5</u>
a.	Check: no fertilizer					
b.	NPK 1-2-1 ratio					
c.	NK 1-0-1 ratio					
d.	NP 1-2-0					
e.	PK 0-2-1					

Note: Each plot should have 4 rows of plants trimmed to a 30' length for collecting yield data.

Plant in 30" rows with a plant density of 8" between plants. Apply fertilizer at the rate of 750 lbs. per acre in a band one inch to the side of the seed and a depth of 2 inches.

Harvest only 2 center rows for yield data. Convert yield to kgs/acre and number of ears per plot. Avg weight/ear.

2. Plant Density Study or Treatment (row width)

	<u>Treatment</u>	<u>Plot Numbers</u>				
		<u>Rep1</u>	<u>Rep2</u>	<u>Rep3</u>	<u>Rep4</u>	<u>Rep5</u>
a.	20" rows (check)					
b.	30" rows					
c.	36" rows					
d.	40" rows					

Note: Seed should be planted at a rate one seed per 8" in row. All plots should be fertilized with 750 lbs/acre rate of a 1-2-1 ratio placed one inch to the side of the seed and at a depth of 2 inches below soil surface.

Each plot should consist of 4 rows. Harvest 2 center rows of each plot for yield data. Convert yield to lbs/acre and number of ears per plot. Determine average weight/ear. Trim each plot to 30' length for collecting yield data.

3. Fertilizer Rate Study

<u>Treatment</u>	<u>Plot Numbers</u>				
	<u>Rep1</u>	<u>Rep2</u>	<u>Rep3</u>	<u>Rep4</u>	<u>Rep5</u>
a. Check					
b. 250lbs/acre (1-2-1 ratio)					
c. 500lbs/acre (1-2-1 ratio)					
d. 750lbs/acre (1-2-1 ratio)					
e. 1000lbs/acre(1-2-1 ratio)					

Note: Plant density should be 8" between seeds in the row, with a row distance of 30" between rows. Repeat for each fertilizer interaction trial.

Apply fertilizer in a band one inch to the side of the seed and a depth of 2 inches.

All plots should be trimmed to a 30' length for collecting yield data.

Harvest only two center rows for yield data. Convert yield data into kgs/acre and number of ears per plot and avg. weight/ear.

4. Side Dress Study - Nitrogen Levels

<u>Treatment</u>	<u>Plot Numbers</u>				
	<u>Rep1</u>	<u>Rep2</u>	<u>Rep3</u>	<u>Rep4</u>	<u>Rep5</u>
a. 750 lb fert. only					
b. 750 lb fert.+ 100 lb urea					
c. 750 lb fert.+ 200 lb urea					
d. 750 lb fert.+ 300 lb urea					
e. 750 lb fert.+ 400 lb urea					

Note: Each plot should have 4 rows of plants trimmed to a 30' length for collecting yield data.

Harvest only 2 center rows of each plot for yield data. Convert yield to kgs/acre and number of ears per plot and avg. weight/ear.

Plant in 30" rows with distance of 8" between each seed in the row.

Apply complete fertilizer of a 1-2-1 ratio in a band one inch to the side of each seed and a depth of 2 inches below the surface.

Apply side dress urea in a band appropriately 2 inches to the side of plant base incorporating into the soil to a depth of approximately 2 to 3 inches. Timing should be about 30 days after emergence or when corn plant is knee high or slightly above the knee.

Total elapsed time for completion of the R&D production cycle:

a.	Variety Observation Trials	-	3 months
b.	First round of randomized block trials	-	3 months

	Total time elapsed	-	6 months

5. Post Harvest Handling, Transportation and Marketing Trials

At this point the post harvest handling specialist and the marketing manager have had sufficient product to initially test transport to packing shed, grading and preparation procedure of sweet corn, pre-cooling procedures, packaging, storage techniques, transportation to airport, actual shipping of small sample lots and finally buyer acceptance. Post harvest and marketing R&D activities will greatly expand when field demonstrations are underway and will require extensive attention by the marketing specialist.

When results from initial shipments (to export or domestic markets) are obtained the R&D team needs to carefully chart strategy for the next six months. Based on market demand estimates the agronomist/horticulturalist will have information to make general recommendations for 1/2 to 1 acre demonstration plantings spaced at 10 day intervals. These plantings will yield more refined cost and return data thereby permitting yet further refining of yield, cost of production and return expectations throughout the growing period.

The farmer demonstration plots serve to provide a break into the market and refine post harvest handling techniques, transport and marketing strategies. The agronomist/horticulturalist

continues with more refined replicated trials with the agricultural economist providing economic analysis.

At the end of a nine month demonstration period the R & D team is in a position to make more specific recommendations for continued demonstration plantings and feed back from trial shipments, and provide additional information about short and long term potential for expanding exports. Assuming these are positive the program can move into a small scale commercial operation.

By the end of month twelve the agronomist/horticulturalist/agricultural economist team will have further refined and identified the most successful varieties and agronomic practices based on continuing field trials modified by market information supplied by the marketing manager. The trial commercial R & D production, marketing and analysis program should continue through month fifteen.

While the program continues through month fifteen the team has a full year's data to assess. This provides the basis for determining feasibility for launching a full fledged commercial operation. With a full year of data in hand many clear, definite facts have been established. The lead research and extension people will have had time to train necessary research and extension assistants or field supervisors to begin managing commercial operations. Similarly, the post harvest handling specialist will have started to train counterparts able to handle packing shed requirements and the marketing manager should be well aware of marketing conditions, including specific demand and quality and phyto-sanitary requirements.

6. Achieving Sustainability

From month twelve and onward, the production R & D team continues testing new varieties and refines cultural practices, the extension/field agents manage and expand the commercial operation and the export marketing team carries on with it's work.

While the market is the driving force for determining what and how much is needed, and the extension agronomist is responsible for introducing turnout level demonstrations, the commercial operation depends always on existing and new results from the on-station and on-farm production trials team. Without continual testing of new varieties and new growing procedures the competitive position can easily erode, and potential disease and pesticide related problems can result in market loss.

Sweet corn also has potential for export in frozen form either as corn on the cob or as cut kernels. It can also be marketed as heat processed cut or cream style canned corn.

Development of these products for commercial market proceeds from application of systematic R&D procedures as discussed above.

7. Crops for Which R & D Programs are Recommended in System B

The evaluation team recommends that the following crops be studied and researched in System B using the above production and marketing R & D approach.

a. Traditional High Value Crops

The sub category of higher value Other Field Crops (OFC's) recommended for further research using the commercial production and marketing trials approach include:

- o chilies
- o red onions
- o white (big) onions
- o potatoes
- o cabbage
- o okra

b. New High Value Crops

New high value crops recommended for further research using the commercial production and marketing trials approach include:

- o sweet corn
- o carrots
- o asparagus
- o leek
- o cocktail onion
- o tomato
- o mini vegetables
- o selected spices and herbs
- o gherkins
- o baby corn

c. Fruit

Fruit, for production primarily on homestead lands, recommended for commercial R & D development work include:

- o papaya
- o pineapple
- o melon
- o cashew
- o grapes
- o passion fruit

APPENDIX II MAHAWELI SWEET CORN CONSUMER PREFERENCE TEST

During the on-site visit, the agribusiness specialist on the MARD evaluation team conducted an informal quality check on sweet corn harvested from trial plots managed by the Project horticulturalist. A "product preference group" made up of evaluation team and Project team members provided "consumer" reaction.

Thirty two ears of freshly harvested sweet corn were purchased for the test from part of the crop just picked. The sample was divided into two lots of sixteen ears each. One lot was husked, blanched for ten minutes, and frozen as corn on the cob. The other lot was cooked in a water bath for twenty minutes, checked for quality and eaten as corn on the cob. The second sample was reconstituted, checked for quality and eaten as corn on the cob.

The MARD export marketing manager indicated the export client requested that sweet corn ears be side peeled, (window kernel exposure) packed in flat trays, and cello wrapped. Based on this requirement a quality check was made. Results are summarized below.

Before Husking

General appearance of ear	- very good
Length of ear	- will meet market requirements
Evidence of worm damage	- low
Character of husk cover	- tight

After Husking

Length of ear	- can meet market standards
Worm damage	- restricted to tip, only small number damaged
General appearance	- good color, attractive to the eye
Ear diameter	- normal, meets market standards
Rows of kernels/ear	- avg 16 - standard market acceptance
Tip fill	- 90% or better adequately filled, will trim out to meet client standard
Starch content earlier	- better if picked 2 days
Kernel formation	- very good
Kernel depth	- excellent

After Cooking

Flavor	- excellent
Sugars	- excellent
Pericarp	- low
Cob-after flavors	- practically non existent
Opinions of people who tested	- excellent favor, repeat sales

Frozen Sample Evaluation Reconstituted Corn on Cob

appearance	- satisfactory to good
Quality deterioration	- very little
Pericarp	- low
Sugars	- excellent
General flavor	- good to very good
Potential for frozen corn on cob	- very good
Potential for frozen cut corn	- very good
Opinion of people who tested corn	- would repeat purchase

APPENDIX III EXPORT MARKET POTENTIAL FOR GHERKINS IN SRI LANKA

Based on available information, the evaluation team considers gherkins to have a major potential as an Sri Lankan export crop. Seeds were first introduced in 1985 by a single grower and grown in the Uda Walawe project area. Gherkins were exported in brine to markets including Australia, Europe and elsewhere for final processing. By 1988, Sri Lanka had rapidly expanded market share replacing traditional suppliers including Turkey, Mexico, Spain and Portugal in European and Australian markets. Lower production costs gave Sri Lanka this immediate competitive advantage. In 1989, some 400 outgrowers from System B produced gherkins for sale to a grower/processor in the area who operated from a "commercial" land allocation.

The rapid export expansion of brined gherkins from Sri Lanka resulted in market adjustments in late 1990 as traditional suppliers lowered prices to recapture part of their lost markets. The resulting price instability temporarily reduced local production for export. Reports that some export lots had excessive pesticide residues compounded this production downturn. By April 1991 prices had sufficiently recovered so that Sri Lankan producers are again planning to resume shipments to world markets. A commercial grower in System B has indicated that production potential for up to 200 outgrowers, each with one half acre, exists for the remainder of 1991.

A. Expanding the Market for Sri Lankan Gherkins

The full extent of the gherkin market can not be realized only with brined export products. Installation of processing facilities to export final product may make available to Sri Lanka world demand requiring up to 18,000 acres annually over a nine month period. For System B alone this could result in up to 7,200 half acre outgrower plots. Expanding production to this level could result in export of some 25,000 cases of processed gherkins weekly. By comparison, only one firm in one of the largest exporting countries produces more than 500,000 cases per day just for the United States market.

Technology is well developed for gherkin production in tropical zones. Most is already in the public domain. Sri Lanka can easily take advantage of the available genetic materials, cultural practices, product handling and marketing knowledge to rapidly expand production for export. To put the industry on a solid base, it is essential that a continuous applied R & D program as discussed in this Annex be developed for gherkins.

B. Research and Development to Attain Market Potentials

As identified by local industry leaders the following production and post harvest elements are required for R & D work on gherkins:

Field Research

- o continuing variety trials to assess disease resistance, quality, and other specific characteristics of newly released varieties
- o optimum plant density
- o crop rotation to control soil borne diseases
- o fertility trials--timing, quantities, formulas, foliar applications
- o pesticide use--timing, application forms, dosage testing, new product and residue testing
- o irrigation--application and quantity schedules, soil management procedures to optimize water use

Post Harvest Handling

- o containers for transporting from field to packing house
- o product grading techniques
- o product brining techniques
- o containers for moving brined product to markets
- o transportation to Sri Lankan ports

APPENDIX IV EFFECTIVE PESTICIDE APPLICATION

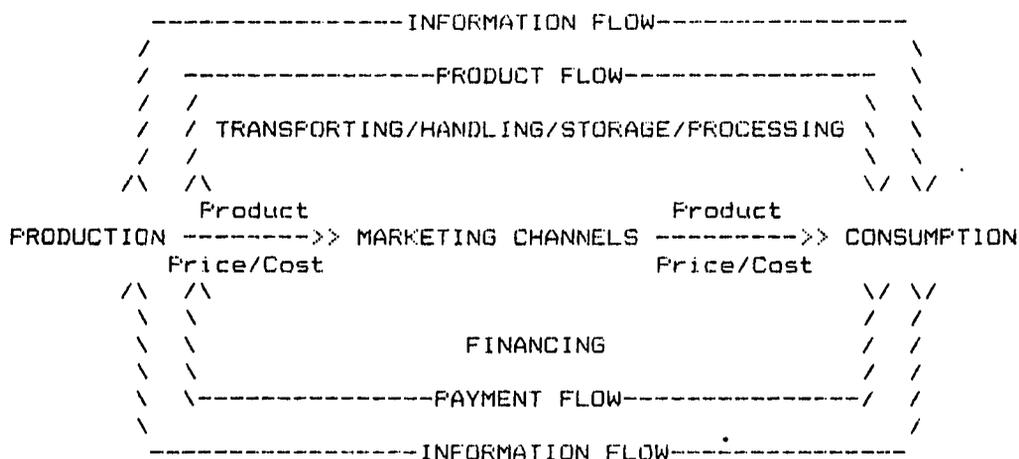
Pesticide residues must be maintained within acceptable levels to successfully compete on world export markets. Although local pesticide residue regulations are not well developed in Sri Lanka the commercial grower must be mindful of the continuing need to supply residue free produce for local markets as well as for export markets.

The pesticide program for control of insects, bacteria and fungi was reviewed by the evaluation team while on-site in system B. Farms inspected included homesteads, youth farms, commercial farms and irrigated paddy. The current program consists of applying pesticides when problems appear rather than on a preventive basis before physical signs of damage exist. Consequently, many plantings showed product and plant damage resulting in lowered yields and reduction of final product quality.

There appears to be adequate quantities of appropriate pesticides available in section B to control the majority of pests and insects present. An improved preventive pesticide control program should be introduced to alleviate the current severe problems caused by ineffective application strategies based on application only when actual damage begins to appear.

ANNEX G
MARKETING for MARD

"Agricultural marketing is the performance of all activities involved in getting agricultural products from the farm where they are produced to the final consumer." In its most basic elements:



(Schermerhorn, R.W. & Edgardo Perez, Marketing Agricultural Products, "Marketing Training Bulletin Series" No. 1, 1990)

Just because today someone can profitably sell a commodity does not mean that it necessarily has a good "market". The market demand may drop the next day or it may be "thin", such that triple that amount of sales causes prices to fall or no one will buy the additional quantities. Or someone in another location is willing to sell that commodity for a much lower price and take away your profitability. All of these examples and many other cases have actually harmed the small farmers in Asia and the rest of the world.

Whenever asking questions about the markets for or the "marketability" of any commodity proposed for System B, one must be knowledgeable about and understand the workings of both the relevant input markets and output markets for those commodities. This is particularly crucial whenever a commodity system is dependent on imported seeds which are vulnerable to import procedures or regulations.

This report covers insights or observations regarding Sri Lanka's commodity markets, strategies for MARD's market-led

orientation, a plan for action and technical assistance requirements.

A. Observations

As part of the TOR for the marketing specialist in the evaluation team, the marketing systems for OFCs were observed in an effort to determine whether certain commodities showed particular promise for MARD. It is assumed that the macro information on supply and price trends from the available publications and reports are already well known by the relevant MARD staff. Thus, special attention was given micro points observed or reported by marketing participants. During the field activities, the following observations were made:

1. Colombo is The Major Trading Center for Vegetables in the Country

Colombo is not only the main consumption center but a transshipment point for regular amounts of highland vegetables to cities to the South, such as Galle, or irregular amounts in several directions whenever excesses arrive on any particular day. The main wholesale market for vegetables is well located in terms of proximity to other markets, bus stands, and railway station. However, it is overcrowded, congested and in generally in poor repair. Plans to change the site to a less accessible place have not been agreeable to the traders, thus the poor condition persists.

Given the physical condition and layout of the market place together with the irregular patterns of shipments, it is difficult for any outsider to understand the big picture in terms of major trading patterns and the price formation process. However, without such information, one can not recommend realistic improvements, even when marketing changes are evidently warranted.

To improve farmer's income through sale of high valued crops, marketing improvements are necessary both in terms of market places and price transparency, as demonstrated in the Taiwan and Korean cases. This is particularly true given the common "commission" method of selling vegetables. With this method retailer payments to commission agents determine "the price" from which transportation and commission costs as well as losses are then deducted before the residual is sent backward through the other traders or transporters to the farm level. This system is common whenever there is extreme and unpredictable daily price and volume volatility. The greatest risks of losses are shifted back to the growers. The least risk is carried by the brokers.

2. Dambulla is an Emerging Trading Center

Dambulla in the 1970s was a small cross-road town with only a few traders in grains and vegetables. After System H became active in the mid-1980s, the commercial sector grew rapidly until today one can find over 80 traders with approximately 20 operating one or more trucks. At a crossroad with roads going North to Anuradhapura, Northeast to Trincomalee, East to Batticaloa, South to Kandy and Southwest to Colombo, Dambulla is ideally situated as a collection and shipment point for vegetables and grains grown in the neighboring local production areas. It also serves as a transshipment site for highland vegetables coming down from Nuwara Eliya and distributed to small and large town to the north and northeast.

In that area, many traders entered business by providing production and/or consumption loans to farmers growing vegetables as a method of competing with the older established traders. However, as the number of vehicles increased, other buyers with vehicles went directly to the farm gate and paid higher prices to debtor farmers. Thus, defaults increased and fewer traders prospered. This suggests that not only capital but also vehicles are key to the competitiveness of traders.

Another implication is that System B should take advantage of Dambulla's strong trading position by encouraging Farmers Organisations to ship and sell OFCs there and/or inviting some of their experienced smaller traders to move to System B or become active in its Polas.

3. Price Setting for Vegetables

According to large wholesalers in Kandy and Dambulla as well as several roadside vegetable stall owners, the daily price level of green beans is indicative of vegetable price levels in general. Whenever a shortage of green beans occurred, its higher price allowed the retailer to increase prices of other vegetables. Conversely, whenever there was an abundance of green beans and a lower price, people would not pay much for other vegetables, thus their prices would fall. Brinjal played a somewhat similar role but not as effectively as green beans. Exceptions might exist on any particular day but the pattern is said to persist in those markets. It is not clear whether this is a local or national phenomenon.

The explanations for this phenomena varied somewhat but basically centered on that area's strong consumer preference for green beans. In other words, first preference for green beans affected the relative amount of the consumer's budget remaining for purchases of other vegetables. If this phenomenon is proven to be wide-spread, it is important for the future national

marketing information system to provide the previous day's price of green beans to growers and consumers in order for them to make better sales and purchase decisions.

4. Market Power

Vegetable growers in the Jaffna area are major players in supplying a wide range of vegetables, especially during the January to April period. Given the present instability and violence in that area, supplies of several lowland vegetables are reportedly lower and prices higher than normal. Today's situation of high priced vegetables should not be interpreted as a trend but a result of that situation.

One of the implications is that growers in other lowland areas should be cautious of converting much land into vegetables and expecting high prices once that situation is resolved. At that time the markets could easily become glutted.

Nuwara Eliya growers remain major suppliers of high quality highland vegetables and are earning premium prices for their vegetables which are sent directly to Colombo or to Kandy depending on their relative prices and transportation costs. In the Kandy wholesale/retail market, carrots, cabbage, beetroot and the like from that highland area were larger and higher priced than comparable commodities grown in lower elevations. However, except for the smaller size, the overall appearance and texture of similar lowland varieties was comparable.

One implication of a future potential shift of Nuwara Eliya growers away from their current vegetables to higher valued, exportable specialty commodities would be increased opportunities for lowland vegetable growers together with more revenue for those highland growers.

5. Income Potential From Traditional High Value Crops

Recently, there have been examples of rapid and wide spread production and acceptance of new crops and commodities, such as butternut squash and gherkin pickles in brine. Although several references have been made to the benefits of these "models" for increasing small farmers' income, there is inadequate, factual information regarding how and why these cases occurred or in what ways they should be replicated. Lessons learned from both cases are urgently needed to avoid wasting time and resources chasing "ideal" exports while other opportunities may be at hand.

6. Constraints to Establishing a Fruit and Vegetables Processing Industry

Interviews with processors of fruits and vegetables indicated that timely procurement of adequate, affordable raw materials was a very serious and persistent problem. Even if one could solve shortcomings of the inferior quality of glass bottles, unreliable supply of quality tin cans, primitive equipment in some factories, limited capital for large scale purchases of raw materials or inability to lay-off skilled labor during the slack periods, the lack of raw material would be overwhelming.

The processors seemed very dependent on trader/assemblers rather than taking a systems perspective, i.e., farm input to factory outputs, for resolving the raw material supply problems. Although they declared a willingness to contract with farmers for the supply of raw materials, few operational cases (other than for gherkins) could be cited.

7. Conclusions

Although various research efforts have referred to the complex nature of one of the most volatile commodity markets in Sri Lanka, namely the market for fruits and vegetables, few provide sufficient insights into its operations and strategies for its improvement. Even when some reports have explained the basic situation, little action within Mahaweli or Sri Lanka has followed. For example, conclusions in the consultancy report of Chung Chan-kil on the project TCP/SRL/4511 for FAO and Sri Lankan Government in summer, 1986 was quite clear but no significant, identifiable action has resulted. Even one of the basic pre-condition for substantive improvements, i.e., a nation-wide marketing information system for vegetables, is lacking.

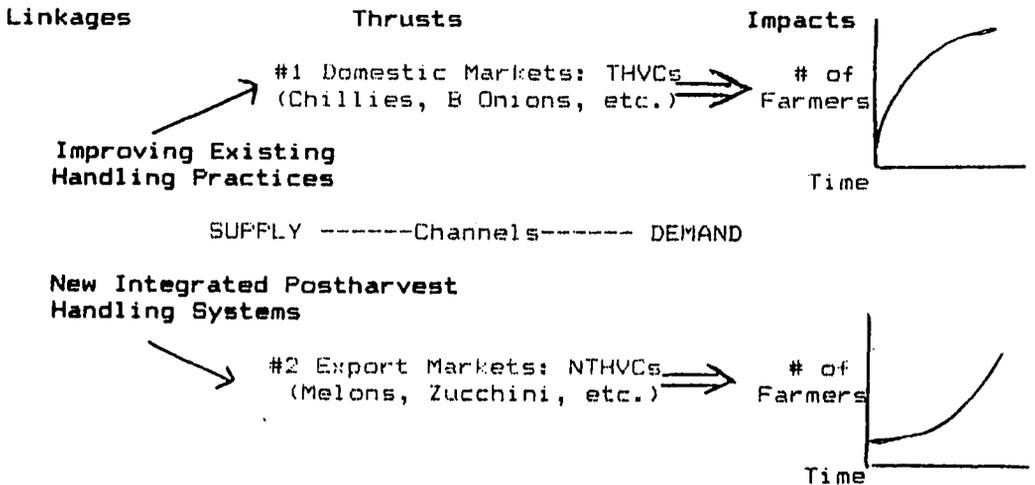
Until careful investigations provide insights into the how and why the market behaves as it does and adequate price information becomes available for reliable price estimations, vegetable production recommendations should be treated with caution. That means MARD/MEA in System B should be cautious regarding how, when, where and to what extent (maximum amount of a farmer's land area per vegetable crop) a particular crop is recommended. However, the more storable and less perishable types of commodities, such as chili and onions can be given more attention in terms of land planted, at least until the necessary insights into or improvements for the vegetable marketing system occur.

B. Strategies

The marketing dimension of MARD suggests two main thrusts;
1) immediate promotion of Traditional High Value Crops (THVC) for

the domestic market and 2) longer term development and testing of Non-Traditional High Value Crops (NTHVC) for the export market.

This can be illustrated in the following manner:



Thrust #1 is to quickly maximize the beneficial impacts of non-paddy crops on a large number of today's farmers while improving those already proven crops, technologies and postharvest practices in place. Thus, a comparatively large number of farmers will be benefitted within a relatively short period of time.

Whereas thrust #2 requires a comparatively longer gestation period to benefit large numbers of farmers due to the increased complexity and difficulties involved. These include the acquiring, testing and promoting of new crops and technologies and, more importantly, developing, testing and establishing the "integrated postharvest and marketing systems". Such systems are required to access and maintain export markets in competition with several other exporting countries which already have such systems.

Likewise, such systems must account for domestic demand competing for these high quality commodities while absorbing the lower quality, non-exportable part of each harvest. In other words, this may involve "managing" the domestic market condition.

The more progressive, risk-taking and larger farmers are usually among the first to be integrated into such a system and later serve as examples or "demonstration farmers" for the smaller, more risk averse farmers. Some of these larger farmers will lose money, while others gain! The inclusion of many

smaller farmers as individuals or farmers' groups occurs once the systems have proven successful and fairly stable. Thus, although relatively few farmers will initially benefit, at the later stage large numbers will benefit as demand for the exports is translated back to the farm level.

1. Ideas for a Local Marketing Strategy

For System B, farmers growing non-paddy crops need the presence of more locally accessible traders who are very important not only for purchasing the harvests but also for providing transportation and production inputs and/or consumer goods on credit. While the crops are growing, the farmers still have household expenses but few ways to pay them.

From the MEA/MARD perspective, several approaches to accelerated market formation can be tested, by an experienced marketing specialist. However, there are many potential pitfalls and critical relationships to first understand. One important example is the relationship between the type of crop harvested, availability of transportation, and capacity of the assembly market. Since farm level, short haul transportation is a major constraint in System B, the orchestration of plantings is especially critical. For example, light weight crops with multiple, small volume harvests, such as chillies, will fill a few bags with each picking and can be taken to a nearby assembly point on the back of a bicycle. The more farmers who do that in a particular location on a given day and time, the larger the number of traders who can come to the assembly point and bid up the buying price, if they are informed.

On the other hand, a bulky crop with a few harvests but of large volume, such as cabbage, requires a trailer, cart or truck for hauling the harvest from the field to that same assembly point and a much larger size or number of trucks for the assembled buyers to handle several purchases. If the same number of farmers, as in the chili case, harvest and deliver at the same time and day, the prices can easily drop due to inadequate transportation. Consequently, those encouraging vegetable production must carefully orchestrate harvests for maximum prices within a given Demand/Supply market condition and with adequate advanced information given to prospective buyers.

2. Insights for an Export Development Strategy

Generally the exports of fresh or processed fruits and vegetables in Asia evolve due to seasonal surpluses in the domestic market, as another commodity within the current export mix of high value commodities to established markets, or occasionally, through special well-developed, vertically integrated production/marketing systems by large scale agro-enterprises. Since the Sri Lankan situation does not correspond

to the first two conditions, the last is being promoted along with the nucleus estate organization of outgrowers.

Given the lack of several pre-conditions for rapidly establishing a market share in foreign markets for any particular fruit or vegetable commodities, an effective strategy would be to focus on entry into a market with the following characteristics:

- a. readily accessible - no formal or informal restrictions to entry and adequate availability and low costs of transportation;
- b. flexible, yet reliable in terms of payment procedures; and
- c. not overly stringent in terms of quality specifications, preferably with a wide range of consumer quality preferences for any particular commodity.

Relative to Sri Lanka, the international markets with those characteristics and located within 4-5 hours by air or 4-5 days by sea include Singapore and the Gulf States. Since Singapore produces very little of its own substantial fruit and vegetable requirements and is the transshipment point to many prosperous, densely populated countries in the Far East, it would be the sound priority market for the current strategies being proposed for Sri Lanka.

The following considerations should be kept in mind when testing a comprehensive export strategy:

- a. proven supply-side capability to produce high quality, to sustain commercial volumes for adjacent small farmers, and to harvest in a proper/appropriate manner;
- b. tested and proven marketing channels capable of proper handling and post harvest practices; reliable, timely and safe transport on a regular basis; and reliable payment system for all involved; and,
- c. complete satisfaction of domestic market requirements so that exports are not side-tracked but rather the domestic market absorbs inexpensive rejects which still suit local requirements.

C. A Plan for Action

A proposed plan for the marketing component of the Development Team should encompass at least two levels, namely Level I as "System B" site-related and Level II as "national and regional" in scope.

Since markets are not land-based or restricted to a specific location, as crops tend to be, the marketing activities should also not be too narrowly defined. And since marketing is a "value-adding process" rather than a "cost to be reduced", one must carefully examine all aspects. A balance between these two is one way to approach this marketing component.

1. Level 1 - Site Related

a. Design of Market Development Strategies

A careful design of "Market Development Strategies" involves a research or investigation base for understanding and finding ways to create viable marketing channels to major Sri Lankan market places, especially for traditional high value crops (THVC), such as chillies, onions and potatoes. The formation of realistic strategies requires in depth information on handling, trading and pricing practices per priority commodity, understanding of how assembly markets evolve and link to demand areas, awareness of the seasonality of marketing patterns and insights into acceptable ways to accelerate the growth of assembly markets. Dambulla, the rapidly growing trading center in System H, is an appropriate site worth such practical field research and pilot testing of marketing strategies.

Emphasis should be on sustainability and least risks in the early stages. At a later stage when supply increases and diversifies, one can inform itinerant traders of prospects to compete in this area, coordinate and arrange contracts with processors, provide additional post harvest services to growers, and explain the multiple channels through which individual farmers and farmers organizations can earn better competitive prices.

b. Transportation Considerations

In the meantime, MARB should hire a small truck only as a "stop-gap measure" to ensure sales from on-farm trials of commodities not commonly sold or consumed in the local area. However, this case would require special care that farmers recognize the types of risk associated with this kind of commodity (especially very perishable versus less perishable commodities), the degree of price fluctuations (market risks) expected for this commodity, the implications of quality differences and the real costs involved in marketing. The information gained when using this truck should be documented because it is an informal test of alternative types of marketing practices.

The normal case will be the active participation of local trader/ transporters and payments through commonly accepted

methods in order to not create false expectations for farmers. One example is the delayed payments for perishable vegetables as based on a "trust" system (commission sales) rather than "cash on deliver" payments.

c. Marketing Trials

The creation of new markets where none previously existed or the conduct of systematic marketing trials will come at a later stage. Such trials often begin at the demand side. One example is the servicing of five star hotels and supermarkets with a variety of high quality new commodities, such as zucchinis, instead of the normal practice of a wholesaler with informal contracts with each individual hotel. Again this will involve more than just the delivery of one product to a large trader. It involves actual commitments and shared risks between the growers, traders and end-users. Likewise, it means careful feedback of information from the traders or five star hotels to the growers regarding quality, timing of delivery, mix of commodities, etc.

If the market looks promising, there should be guarantees of steady supplies for a wider choice of such high value, new commodities. This in turn means orchestration with and integration of production at the farm and assembly level in System B to respond to the new market's demands for quantity, timing, and quality.

2. Level II - National and Regional in Scope

a. Marketing Information System

ARTI or another relevant institution should be supported in the establishment and institutionalization of a responsive marketing information system at the national level. This information system should service two important clientele, namely the government planners and policymakers and the private sector farmers, traders and agribusinesses.

This information system should provide farmers with daily Market News on wholesale and retail prices at each major demand center and trading center. Daily radio broadcasts would be the main dissemination strategy, especially for farmers in System B. For Sri Lanka this information system can reduce a major source of risk for farmers, i.e., selling lower than what other buyers would pay, and for traders, i.e., buying high and selling low.

It directly benefits the farmers in System B by making sure that most of their priority commodities are covered by this information system and that broadcast frequency and time correspond to farmers' listening habits. Also this activity strengthens NARD's contribution to the agricultural community of the country beyond the narrow confines of System B.

When that price data used for the Market News is properly processed, aggregated and disseminated in written form, it becomes part of a "Price Monitoring System" which will enable officials and planners to make timely and informed decisions. The merits and uses of this type of statistical are well recognized by all sectors, including the academic research community.

Recently the AMIS project, in collaboration with the public and private sectors, has developed a Strategy and Action Plan for a Farmer-Oriented, Marketing Information System in the Philippines. Currently the implementation process is well underway. It is time for Sri Lanka to develop and implement such a strategy and action plan.

(Note: a proposal for such an information system is already being circulated from ARTI. MARD's comparative advantage in supporting such an effort is the expertise of its marketing consultants, field conditions in which to test and refine the content and responsiveness of the system, and in-house expertise to correctly specify the physical, biological characteristics of the commodity whose price will be measured.)

b. Priority Domestic Commodity Systems

Investigations into priority domestic commodity systems will result in a plan of action for: prioritizing new crops for extension to System B farmers, locating the best markets on a commodity basis, and identifying farm and channel problems which inhibit increased volume and better prices for farmers.

In collaboration with DARF, AFAP, and MED, MARD could lead the effort to estimate the domestic market's absorptive capacity/month for major commodities, especially those most promising for System B and to determine the nature and extent of their main types of substitutes. Since this information is critical for future plans for an effective and sustainable campaign for Sri Lankan exports of high value commodities, MARD should take responsibility for it while MED focuses on the export demand side of the market.

c. Trial Testing of Export Markets

Trial testing of export markets of NTHVC should first target the most accessible foreign markets, not only in terms of distance and transportation facilities but also in terms of less stringent quality requirements and flexibility in delivery. This strategy has been well articulated by the marketing export specialist for MARD and is currently being planned. However, caution should be taken to integrate the more progressive farmers and not to exceed the volume which can be

readily handled, especially given the proposed, untested postharvest handling system.

It is suggested that some of the commodities promoted through the MED export efforts, especially from Uda Walawe, be added to the MARD shipment in order to test the flexibility of this strategy given different supply areas and increased the volumes handled and shipped. This would not only reduce transportation costs, but also reflect the exports of "Sri Lankan" NTHVC commodities.

3. Across all Levels

a. Practical Training for Farmers

Design, testing and implementation of "hands-on" training for farmers, managers of farmers' organizations, marketing officers of MEA, young traders, and "marketing researchers" should be a high priority for both MARD and all other components of MEA. Training should be integrated into activities at each level.

MARD's "market immersion" training of farmers, i.e., observation trips to the Colombo market and lectures by traders or MEA officers, should be continued but it needs to incorporate more feedback from the farmers and be more action-oriented content.

b. Postharvest Handling Extension Program

A series of "how to" extension materials on postharvest and marketing practices for priority commodities could be worked out with DARF. Likewise, the development and use of local case study materials based on the experiences and insights of MARD's marketing activities would be highly recommended for System B and all of Mahaweli.

ANNEX H MARD AND WOMEN'S PRODUCTIVITY IN SYSTEM B OPPORTUNITIES AND CONSTRAINTS

Although the MARD project was not designed with an explicit "women's component", women are participants, targets and beneficiaries of the project. Potential female beneficiaries of MARD in System B can be divided into three categories: female heads of household, female members of farm households, and the second generation daughters of System B settlers. All three groups of women are impacted upon by the larger policies of the Accelerated Mahaweli Programme (AMP) and the specific efforts of the MARD project.

This paper uses gender analysis to examine the MARD project and evaluate the distribution of project benefits to women and girls. Gender analysis is defined in the USAID Gender Manual Series on Women in Agriculture and Natural Resource Management as "the analysis of the intersection of male and female roles and responsibilities with project goals, strategies and outcomes". (Russo, 1989)

Women make up over half the agricultural labor force in Sri Lanka (Perera, 1991). In the Mahaweli System B, there are diverse demands on women's labor resources: as unpaid family labor for field crops, and household resupply and maintenance, and as the primary labor for homestead plots and commercial/processing enterprises. Some studies have shown that women contribute to up to 65 percent of household income when they work in both paddy and highland production (Perera, 1991).

According to the Mahaweli Basic Data Survey of December 1989, an average of 19.2 percent of households in System B are headed by women. In some units, such as Karapola (Sevanapitiya block) and Medagama (Vijayabapura block) over 30 percent of households are female-headed. During the evaluation team's visit to one successful commercial farming operation, the manager reported that almost 90 percent of labor utilized in the gherkin production and brining operation was female. This data indicates that women's labor is an essential productive resource in System B, and that efforts to increase the productivity of women can have a direct impact on the larger MARD project goal of raising settler incomes in System B.

The following section discusses some of the constraints on women's access to productive resources and information, with particular attention to their access to MARD project benefits.

A. Access to Productive Resources

A major constraint to women's productivity and household income contributions is access to productive resources. Research

has established that projects which deliver resources to women with an understanding of their role in the farming system are more likely to succeed in reaching project goals than projects that don't (U.N., 1989). Therefore, the gender analysis method identifies an understanding of women's differential access to resources as a prerequisite to ensuring the equitable distribution of project benefits to women and to achieving overall project success.

1. Access to Land

The method used by the Mahaweli Authority to identify settler families and lease land to them appears to involve a combination of bureaucratic procedure and political patronage. Although both these aspects would seem to favor selection of male household heads the relatively high percentages of female household heads is surprising. Household headship can be "de jure" headship, where the woman is the legal head, (usually in the absence of a man) or "de facto", headship where the woman is head due to male migrations for employment outside the area, or in any case where the woman is the primary decision-maker and income earner, despite the presence of a man. Headship is an important indicator because 1) worldwide studies have shown that the majority of poorest farm households are usually female-headed and 2) female headed households are often not adequately represented in formal organizations or sufficiently targeted by extension personnel. Additional verification of the percentage of women farming as heads of household is needed along with reasons for female headship and whether they are receiving equitable extension and other services. This information is needed so that their representation in farm organizations, and targeting by MARD and MEA extension personnel can be monitored and improved, if necessary.

Inheritance practices favoring the nomination of eldest sons as beneficiaries of land title denies access to land for daughters (and younger sons). If the MASL actually cannot provide land to these second generation settlers in System B, access to other productive resources, and a program to generate employment opportunities should be specially targeted at this population.

2. Access to Inputs

The first category of system B women, women farmers, have the same requirements for seed, plant material and fertilizer as other system B farmers. At present, MARD staff do not seem to have an awareness of the number of women farmers in units they are working in, and therefore are not making a special effort to ensure that women farmers have equal access to inputs provided through the project and through MEA. If accurate information is obtained on the number and percentage of women

farmers, MARD should make sure that these farmers are represented as target farmers and in on-farm trials and whole farm trials, especially where they receive inputs or improved terms for the purchase of inputs. The full membership of women in farmer organizations and their adequate representation will also ensure that women farmers have equal access to inputs at the same cost as other farmers.

The primary input requirements of female members of male-headed farm households are for homestead cultivation. Of the small sample of homesteads visited for the evaluations, some women homestead cultivators were obtaining inputs (seeds) from the NEA, and others were receiving no assistance at all. Several homestead cultivators reported a scarcity of cow dung, and had not received extension advice on chemical fertilizer application. The most often reported constraint was in access to water for homestead cultivation. Households with wells were constrained by lack of mechanized pumping capacity and low water levels during Yala. Many households we visited had been unsuccessful in digging wells, or had no well and relied on communal tube wells or irrigation ditches to obtain water for homestead cultivation. Water management issues related to the non-irrigated highland plot appear to be unresolved in System B and have not been addressed by MARD.

3. Access to Credit

The credit requirements of women farmers in System B would seem to be the same or greater than other resource poor farmers, given the greater demand by female-headed households for hired labor during planting and harvesting. Given the limited availability of credit generally, women farmers' access to credit would be best improved through their membership in farmers' organizations pursuing group loans and improved terms of trade with input suppliers. The Ginidamana farmer organization in Sevanapitiya reported a female membership rate of 30.7 percent (although much lower rate of female attendance at the FO meeting was observed). This 30 percent membership rate would appear to be especially high given that the Mahaweli Basic Data Survey/Census reports the rate female headed households in that unit at 15.6 percent. To ensure that women have equal access to credit obtained through the FO, administrative and procedural systems would have to be written into the FO by laws. Detailed information on women's access to credit in System B is unavailable as gender disaggregated data does not exist on the number of women farmers able to obtain loans individually, or the number benefiting from group loans obtained through an organization.

First and second generation women in farm households require credit for the start-up of non-agricultural homestead activities and other self-employment enterprises. Members of the Bogaswewa

women's organization reported that they were interested in starting the following types of income generating activities: livestock and dairy production, poultry rearing, homestead farming, rice processing, sewing/embroidery, batik making, small handicraft production. Although the women had plenty of enthusiasm and motivation, they themselves identified the need for a "helping hand" to assist them in developing their enterprises. Credit to purchase livestock, sewing machines and other equipment would be an essential element in helping them to achieve increased incomes.

3. Access to Extension Services and Information

a. Extension for Field/Homestead Crops

Interviews with women farmers and MARD and MEA personnel reveal that women have insufficient access to extension services provided by both MARD and the MEA. Extension advice provided by MARD on crop diversification and improved farming practices for the paddy allotment are generally delivered to the male head, who is considered the sole farmer in the household. Data collected by the MARD project shows that contributions of family labor on the paddy allotment are significant, and increase as the farmer successfully diversifies into other field crops. Research in this area has found that male farmers often do not transmit information learned from extension agents on new techniques to their wives. Women, therefore, continue to perform tasks according to old practices because they have received no or imperfect information. Projects which have targeted women directly to receive extension advice, especially related to tasks for which they are primarily responsible, have found a significant increase in the successful adoption of new practices.

Women homestead farmers who were interviewed consistently expressed the desire for more extension advice related to homestead crops. The special problems related to homestead production, i.e. lack of an irrigated water supply, improper drainage, low quality soil, diseases and lack of knowledge about pesticide use require a specially designed and targeted program. At present, a small group of women homestead farmers are getting ad hoc extension advice from the Homestead Development Specialist, due to the lack of any other extension service available to them.

b. Access to Information

As discussed above, a small number of women in System B are getting limited extension information through the MARD homestead program, and through the weekly radio broadcast on agricultural issues. Market information has been made available to System B settlers through vehicles such as the fortnightly market information newsletter "badada pola", though it is not

clear that women and homestead production have been specifically targeted.

As women's organizations begin to function, they will become a primary source of information for all types of women settlers. At the present time, in the absence of women's organizations in most units and given the lack of information targeted by MEA/MARD specifically at women, they remain in need of information on:

- o agronomic practices related to field and homestead production;
- o markets for homestead crops, processed foods and other products from livestock enterprises;
- o better water management practices and methods of transport for water on the homestead;
- o employment opportunities in agricultural and food processing on commercial farms;
- o terms and availability of credit, including alternative credit, such as revolving loan funds.

4. Access to Employment Opportunities

Increasing access to employment opportunities is an important strategy employed by the MARD project to attain the goal of increasing settler incomes. For the three categories of women discussed above, (women farmers, heads of household and farm wives) are candidates for increased employment in diversified agriculture and commercial farming. Second generation girls and women make up a large proportion of job seekers and are candidates for small household enterprise development and employment in commercial agricultural ventures.

a. Labor Constraints and Diversified Agriculture

There is conflicting evidence with regard to labor shortages in System B. The MARD agricultural economics report number 10 documents a 75 percent increase in labor requirements resulting from diversifying 22 percent of a paddy allotment into other field crops. The vast majority of the increased labor days in this case came from "family labor", which increased to 29 days per month/per hectare as opposed to 16 days per month for paddy production.

Since the measurement of "family labor" is not presented in a desegregated fashion, the labor contributions of women, children and other family members are unknown. Therefore, there is little understanding of the opportunity cost of women's time, which can be a deciding factor in the decision to adopt new agricultural practices or engage in homestead enterprise development.

No time allocation study has been done to provide information to the project on the distribution of women's labor time spent on agricultural work in the field/homestead, gathering fuel and water, performing processing, transport and marketing tasks and in child care and other household activities. Understanding the competing demands for women's time will allow MARD to more effectively target women for extension training, homestead development or participation in women's organizations. Creative approaches to increasing labor time spent on homestead production, such as attam (labor sharing) by women, should be promoted by MARD.

The seasonality of female labor demand in System B is not well understood nor is it integrated into MARD component strategies. A gender desegregated analysis of seasonal labor demands for paddy, diversified cash crops, homestead farming and commercial crops would provide valuable information on the fluctuations in demand for labor in System B. This would allow MARD to better coordinate its efforts to increase employment and productivity in all of these areas.

b. Commercial farming

Observations were made of two commercial farming operations in System B. One was a private commercial farm, engaged in the production of Big onions and the other was a gherkin farm and brining operation run by a private sector company. At the private commercial farm, about 60 percent of the agricultural workers observed tilling, weeding and watering the B onions, were women. Female hired laborers in System B reportedly earn approximately Rs. 65 per day, or 86 percent of male hired wage labor rates. At this time, labor requirements for B onion cultivation coincided with the paddy season, and labor was being imported from surrounding areas.

A commercial gherkin farm and brining operation reported a 80-90 percent female labor force, about 80 percent of whom are second generation settlers. The manager estimated that in 1989, about 500 workers had been employed by the operation. The labor force is divided into four categories: laborers and field assistants (recruited in System B), supervisors (requires diploma in agriculture) and managers. Laborers perform field tasks such as gherkin picking, siphon irrigation and pesticide spraying. The farm manager estimated the daily wage for a laborer picking gherkins at Rs. 55-110, although women interviewed in the fields reported a daily wage of Rs. 40-50. The farm had previously employed women to hand sort gherkins into different size grades, but were able to cut labor requirements by installing a mechanized sorting operation. The farm also cut labor costs by shifting from daily wage rates to a piece work system where workers are paid by the kilo. The manager estimated that since this change had been made, the labor force was cut in half. The

problem of labor requirements coinciding with the paddy harvest had been overcome by scheduling women farmers to do grading in the evening, after harvesting their own fields.

Commercial operations such as this provide good employment opportunities for women, especially second generation women and girls. The expansion of the number of jobs created by these operations will probably be slow and fluctuate according to the ability of the firm to successfully access markets, and its tendency to employ cost-cutting measures.

c. Self Employment

Both first and second generation women within farm households can potentially be involved in self-employment activities, depending on their available labor time. Girls present at a unit level youth organization meeting made up over half of the group and were the majority of job-seekers. Their motivation for joining the youth organization reportedly was to gain economic benefits and access to income earning opportunities.

Members of the Bogaswewa women's organization were similarly interested in starting the following types of income generating activities: livestock and dairy production, poultry rearing, homestead farming, rice processing, sewing/embroidery, batik making, small handicraft production. Women's and youth organizations appear to be the best vehicle for generating self-employment opportunities, and providing information to interested and motivated individuals. The MARO draft Guidelines on Farmer Organizations cites the focus of Women's organizations as on: "health, social welfare, food production, food processing and marketing, and self-employment activities." Previous studies of training provided to women in the Mahaweli region reveal a strong social welfare and home economics bias. MARO should monitor the development of women's organizations to make sure that women's need for training, information and credit related to increasing their productivity and incomes is being met, and that social welfare activities do not become the sole purpose of the women's organizations.

There is significant potential for cooperation between the activities of the Homestead Development Specialist and the Farmer Organization Specialist in the development of self-employment and small enterprise activities for women. Self employment and homestead activities would be effectively presented as an integrated program, through women's organizations. This approach would ensure the targeting of women through to components of the project, and create a sustainable organizational model for introducing information on new income-generating activities to women.

B. Training

Training provided by the MARD project that could potentially benefit women falls into three categories: training of female project and MEA staff, training of project and MEA staff in gender issues, and training of women in farm households.

An informal survey of the Dimbulagala Block office revealed that female staff made up 9 percent of total staff, and were represented only in the categories of Irrigation Community Organizer (ICO) and clerical staff. Given the constraints on adding to staff at the ICO-FSE level, MARD should encourage MEA to hire more female FA's and conduct practical training on gender issues for both male and female extension staff. The MARD Induction Training Program for ICUs did include a section on Women in Development, which mostly introduced macro-level information on women's status. MARD and MEA extension personnel should be trained in issues more closely relevant to women's agricultural work: the gender division of labor, agronomic issues related to homestead crops, and the particular constraints faced by women farmers. Research in other countries has shown that training extension staff on how to reach women with the information that they need, is often more effective than merely increasing the representation of women in the extension cadre, with no changes in training content.

Women in farm households need training related to cultivation on both field and homestead allotments, farm management, marketing, and in specific skills related to small enterprise production. Efforts should be made to ensure women's participation in market tours and seminars, and to provide them with equal access to this information. Training has been provided on an ad hoc basis to women in processing and small enterprise activities. An example of this is training provided to women on gherkin pickling, and information on steam rice processing given in the "Badada Fola" market information bulletin. A more systematic approach to training women and girls in small enterprise skills should be developed by MARD, and implemented through women's, youth and farmer organizations.

C. Monitoring Gender Equity

Although the equitable distribution of MARD project benefits to women, is cited as a goal in both the Project Paper and Evaluation Scope of work, insufficient data exists to make any conclusions in this area. Two WID reviews of the MARD project have been conducted since its inception, both as part of portfolio reviews of the USAID/Sri Lanka program (McGowan and Bruns, 1989 and Perera, 1991). Both reports have suggested criteria for monitoring gender-related impacts and the accrual of benefits to women.

The MARGA report done by Ferera especially emphasizes the collection of data regarding on women in System B. Since MARD is not a research or data-collecting project, it is felt that these recommendations are unrealistic given current project resources, and the mid-term status of the project. Rather, monitoring of benefits to women, and the collection of gender dis-aggregated data where data is already being collected are more "do-able" goals, within the current capacity and focus of MARD.

The monitoring points suggested below are grouped by project component;

Component 1: ATG&D

1. the percentage of female headed households included in on-farm and whole farm trials;
2. the number of women trained in farm record keeping;
3. the number and percentage of homesteads receiving regular extension advice;
4. the percentage of MARD/MEA extension personnel receiving gender issues training;
5. data on land ownership in System B dis-aggregated by gender.

Component 2: Farmer Organization and Water Management

1. percentage of women actively participating in farmer organizations;
2. the number of women's organizations formed, and percentage of total women in the population who are members;
3. the number and percentage of women who obtain credit, or improved access to inputs through farmer organizations.

Component 3: Farmer Support Services

1. number of women assisted by MARD to start small household enterprises, who have been assisted by MARD;
2. number and percent of women participating in market information tours and seminars.

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**ANNEX I
MONITORING AND EVALUATION**

A. Overall Findings of the Evaluation Team

The M & E System put in place in MARD commenced in Yala 1989 and was completed at the end of Maha 1990/91 in March 1991. An expatriate consultant was engaged. Exhaustive studies have been undertaken. Five reports have been prepared. MARD reporting on in respect of research trials and on farmer organizations has been fulfilled. A special socio-economic baseline sample survey of homesteads in 1989/90 (Report of September 1990) was also done by PMU. This data is presented in the final M & E System Report of the MARD Consultant dated March 1991. This report also sets out formal institutional credit disbursements recorded by PMU and physical progress reports by MDS.

1. Shortcomings of the Present M & E System Report

a. It is assumed the OFC production figures are that of the LP Model crop management record keeping farms. The crop production income figures are only representative of the 41 record keeping research farms and is only a record of research programs. The number of farms is not disclosed. It is not statistically significant for the whole project. The results are only a barometer of future prospects, not of System B results.

b. The MEA progress reports on agricultural production in System B Yala 1990 lacks baseline benchmarks to measure progress. The cultivation census data do not indicate as to which of the three different formats filled in by the Block Agricultural Officers for the same season, have been the source, and methodology in data collection are not disclosed. Hence these reports cannot be taken as credible.

c. The progress report on MEA System B OFC hectares cultivated in irrigated plots in Yala 1990 are far removed from the census data mentioned above. For example, page 13 of the March 1991 M&E report indicates that 488 hectares of OFCs were cultivated in 1988, 631 hectares in 1989, but only 47.2 in 1990.

d. Many tables and histograms do not reveal the source of information and therefore creates doubt as to credibility. Identification of source is fundamental to a M & E system.

e. For some un-explained reason, Maha 88/89 and 89/90 data cultivation and production do not seem to have been recorded. Only Yala information is divulged.

2. M & E Systems Conclusions

a. In Yala 1990 as against the previous two seasons, gherkin cultivation regressed significantly in all indicators - per hectare gross (22 percent) and net income (20 percent) as against the previous Yala and Cost of production increased 30 percent as against the previous Yala (page 14).

b. The end of project (1995) target of 25 percent of homesteads production having sales over Rs. 1000 has been achieved in the base year 1988/89, (pages 22 & 23).

c. B onions and vegetables in Yala 1990 indicate no export potential. Gherkin on the other hand had 100% exports (page 30).

d. The credit scenario presented from FMU data collection and 1988/89 - 89/90 baseline sample survey offer a useful study (pages 34-41). The most encouraging is the indicator of performance of settlers organized cooperative societies at Ellewewa and Dimbulagala. Recovery rates of all cooperatives are good although credit disbursements are relatively small. The bank recoveries need to be improved, but are not too low when compared to performance elsewhere in the country.

e. It is remarkable that the end of project targets (1995) for TOGs and ULFOs have been exceeded by Yala 1990 in contrast to the total failure to register any organized group and collect irrigation fees, and, carry out some other activities which would benefit turnout members (pages 53 to 59). Although 827 TOG's are claimed to be organized recording 1990 progress of 331 percent above target, the Annual Report 1990 says that 625 were not properly organized and 54 ULFOs were not viable.

f. The progress reports on the 'MCU Provision of Water to Meet Aggregate Demand' (pages 64 and 65) and 'Progress Report for MDS Completion of the Settlement Infrastructure in Zone 4A' (page 74) are models for M & E reporting of progress.

We conclude that FMU, MEA, MARD and AID have as yet not been able to coordinate and design a data collection and monitoring system applicable to the whole project and all its major aspects and components over the entirety of System B left bank. A system is not yet operational within the staff cadres and budget and reporting to the several levels of management between MEA/RPM and the MASL Review Board at set periods. Besides, representative and readily measurable indicators for all expected outputs and baseline benchmarks for these have not been established. And therefore, a M & E system covering the whole project and sustainable after MARD is yet to be designed.

B. Data Collection, Recording and Reporting

Conceptually, PMU was established to record progress of physical development of land and infrastructure relative to budgeted expenditure and monitor performance for MASL management policy formulation and administrative decision making and budgeting. Recording and feed back of cultivation and production data and progress of the settlement programme was a subsequent development in the post-development phase in all systems.

Information, both numerical and qualitative, are collected by the field staff in a routine administrative operation and goes up through the Unit Managers to the Block Managers and then to the RFM. Various information are recorded monthly, seasonally and annually and reported to the MASL/PMU, the final data base collection point. Here the Annual Report of Performance is prepared based on the corresponding Annual Report of MEA- and MARD-COF. The MARD COF in turn reports performance to USAID based on the MARD/AID system for M & E.

It is evident that baseline benchmark indicators for goals and outputs against which performance could be periodically measured have been lacking, although considerable effort has gone into the subject of M & E. It is a vital prerequisite for management at all levels, at project levels to monitor implementation performance and revise programs, and at high levels in MASL to review progress towards predetermined goals and outputs and revise activities and budgets and take policy decisions anew when needed.

We also found a glaring anomaly in the MEA monitoring system where the Block Agricultural Officer compiles for the same season three sets of forms in respect of agricultural production - one the reporting form to PMU, the other a reporting form to MEA and a third which is a format relative to the seasons cultivation program. Hence there were variations in the same indicative figures.

To remedy this, PMU is taking steps to standardize one form for implementation in Maha 1991/92. The crop cutting surveys on seasonal paddy production also appeared to be short of coverage. PMU is looking into this. PMU activities are centered on a macro perspective of performance by systems. It would address desegregation vertically by blocks or even units when an objective assessment of specific indicative performance might be required.

MARD has mounted, quite successfully, a crop production cost data collection program. Three seasons have been completed. In Yala 1990, the number of farms included was 41. The required accuracy was obtained for the purpose of researched linear programming of production functions to compile optimum crop

combinations. Continuation of this program is essential to successfully implement the LP optimization activities.

This type of special production record keeping program cannot, however, be a substitute for routine macro scale data collection and recording over the whole of System B. Moreover, it can not be viewed as indicative of the whole population as criteria other than that used by standard statistical surveys are used to select the record keeping sample. A less exacting and simple data collection matrix (but one more representative of the population) will have to be designed to collect diversified crop information by turnouts. Only in this way will this priority status project component be monitored to track performance relative to the three major output objectives in the PP. This could be achieved and, in fact, more accurate data on paddy could also be obtained if the strategy recommended by the evaluation team to focus development and production activities on the basis of whole turnouts is implemented.

C. Special Surveys and Record Keeping Activities

1. Physical Features Survey of Turnouts by MEA

In pursuance of the ATG & D outputs, the PP envisaged a survey by turnouts conducted by field staff to map out soil and drainage characteristics of each allotment which would yield a topical land use classification map in conjunction with the soil surveys and topographical maps already completed. Unfortunately, this has not yet been undertaken. And therefore, the outputs and targets and corresponding indicators for M & E for ATG & D diversification with OFC's have, after nearly 2 1/2 years, resulted primarily in the repeated rephrasing of the same outputs without any bench-mark indicators agreed upon among MARD/MEA and MEA/USAID.

Now, therefore, this survey is most urgent. It cannot be done in depth as envisaged in the PP without additional resources of the staff and budget provision before the end of TA, in 1993. A simpler and achievable survey can be done within existing resources. Since every settler and ICO and FA/FSE are, we expect, now fully aware of the fields, (about 12 or so in a turnout) which have shown drainage/irrigation/soils problems as against the fields which could readily accept OFC and exercise management of water and cultural practices, these could readily be identified by turnouts and aggregated into unit scenarios in a very short time during the routine visits of the staff to turnouts. Addressing this issue as part of the IDEU units provides an achievable management target.

Since the turnout is the lynch-pin of the irrigation/irrigated field crops into which all efforts of water management, agricultural extension of OFC's and paddy, farmers organizations,

credit and production inputs, marketing and post-harvest technology should be predominantly directed, the proposed survey will yield the vital data base of a first approximation as close to reality as possible in the short-term, which is now lacking. Not only would it provide the statistical base for programming each and every development and production activity at the field level, but will also make it possible for the first time to set out realistic bench-mark indicators and EOP targets representing project goal and outputs and periodically measure performance and benefits by the management at project level.

2. Socio-Economic Sample Survey of PMU, Yala 1989 and Maha 1989/90

The conceptual framework of PMU identified before has had no need to recall qualitative information in respect of settlers' livelihood. However, the final goal of the project is a 50% increase in farm income by EOP. Consequently, a baseline benchmark had to be determined as at the beginning of the project. PMU therefore at the request of MARD launched a Socio-Economic Sample Survey of settlers in Maha 89/90 to bridge the gap.

Apart from farm production and income, this survey records homestead activity and other income, such as from labor wages earned outside the settlers holding. Unfortunately, the results of this survey have not entered MARD's baseline indicators.

Since increase in farm income is the final goal of the project and all the physical and technological development and research activities are geared to achieve this goal, specially the LP models. It is logical to track more closely changes in total farm production and income. Therefore, the Socio-Economic and Income Survey must be conducted every year till EOP in order to track production and income change over the wider framework of irrigated allotments plus homesteads. Apart from tracking the totality of benefits, other than from the irrigated allotments, any mid-term evaluation of returns on investments require the monitoring of total benefits using indicators which can be transferred to cash flows. At present, assessment of benefits is obscure, since the several key aspects of the project are yet inconclusive, and no baseline bench-marks have been established to monitor projects outputs and measure effects as of now.

3. Farm Management Crop Production Record Keeping Farms

Timely, precise and reliably kept production records seasonally, are essential for evolving LP Models, which are still being perfected. An on farm crop production cost record keeping exercise has therefore been put in place together with OFC plot measurements. These outputs are also sent to PMU. At the end of MARD-PACD, if the LP Models will require annual if not seasonal

revision as recommendations are valid only if current prices and production data are updated. MEA will have to develop the capability to take over this function. These results are a research barometer of future prospects and should not be confused as a norm for the whole project.

4. Homestead Sample Survey, December 1990

A special survey had been conducted by MARD over a four (4) week period, Nov-Dec. 1990. The sample comprised 250 households in five (5) units each in five (5) blocks. Ten (10) households per unit had been selected purposively. Certain shortcomings in survey design and timing appears to have narrowed the usefulness of the survey.

a. Purposive sample selection criteria has not been defined. It seems the Block and Unit Managers have selected households with known activity and those to which planting material and OFC's had been distributed.

Secondly, the units and blocks have also been selected from the earlier, more established settlers, which accounts for the distribution of perennial such as coconut, mango, lime, breadfruit etc.

Therefore, the survey is not representative of the System and can be expected to overstate the actual level of economic activity.

b. The timing of the survey in November-December of Maha 1990/91 missed out on the homestead cultivation which usually takes place towards the tail end of the heavy rains and paddy cultivation is over. For some reason the Yala 1990 cultivation figures are not presented, although observations have been made and whole range of Yala crops are identified. The data presented are confusing since many of these crops cannot be grown in a water restricted and dry Yala.

c. The MARD definition of commercial production as sales of crops over Rs. 1,000 has been used without accounting for price variation over the Maha and Yala in an unstable price economy and severe marketing constraints. It also does not impute values for large family home consumption, which is an important farm income component. It is difficult to develop an objective commercial indicator when it is known that a high proportion of total produce is consumed at home where it has a greater value than if it were sold at the market.

d. Insights Gained from the Special Survey

(1) The undeveloped marketing infrastructure is a discouragement to crop development.

(2) Over 33 percent of the sample own buffaloes which are an income generating asset, 23.5 percent own cattle and 12.4 percent raise poultry.

(3) About two thirds of sampled households have access to well water.

Note: the attractive figures presented in (2) and (3) above are not representative of system B because of the purposive nature of the sample.

(4) Over 80 percent of cultivated crops in Maha are based on rainfall. Only 19 percent of the sampled homesteads cultivated seasonal crops in Yala, being constrained by lack of water. Therefore, the scope to introduce next generation improved technology is constrained by the lack of appropriate agro-ecological conditions.

(5) Agro-chemical use is minimal on the homestead. Use of organic fertilizers predominate.

(6) Household size average 4.84 units with the largest family size being 11 units.

5. Perimeter Square Root Ratio Land Measure

The Perimeter Square Root Ratio method was introduced by MARD for measuring plot sizes of OFC's in on-farm trials, on the premise that the estimates obtained earlier were inaccurate. Interviews disclosed that there had been a 100% difference in accuracy. Indeed, accuracy in data collection is a sine qua non for research. The value of the perimeter square ratio is if field plots have irregular shapes.

However, in the general practice of data collection of cultivation over the whole project of System B left bank this sort of research precision is not necessary except in the most rare instances when plot sizes are not measurable as 'length x breadth'. OFC's are largely grown on raised plots with drainage/irrigation drains in between plots. The practice is therefore to have long plots with equidistant width of 4-5 ft which facilitates planting in straight rows and intercultivation between rows. Tape measurement is quick and convenient. If reporting has not been accurate, it was, most likely, a failure to do so on the part of the staff at field level.

D. Need for Revising the M & E System

The many shortcomings in the M & E System Final Report of March 1991 is indicative of corresponding difficulties in the System per se. These appear to relate to a narrow subset of functional objectives which lose sight of the vision the project

is a part of the larger AMP program which is very adequately represented in the EOPS. Perhaps the idea is to modify the project focus. If so, it would be better to do directly rather than by indirect modification of EOPS targets. It is attempted therefore to address issue in the sections ahead, to provide guidelines for the Project managers. Conclusions and recommended modifications to EOPS targets, relevant indicators and benchmarks are provided in charts I and II.

CHART I - "Project Paper End of Project Goals and Targets Related to MARD/AID. Eleven (11) Indicators to Monitor and Measure Progress and Their Validity"

CHART II- "Recommended Targets - M & E Indicators-Data Sources"

1. **CHART I - "Project Paper End of Project Goals and Targets Related to MARD/AID. Eleven (11) Indicators to Monitor and Measure Progress and Their Validity"**

CHART I summarizes the situation of the MARD M & E System in which many complicated and ambiguous parameters and indefensible criteria such as A (1), B (1) and D (2) are identified. Targets are confused with indicators and baseline benchmarks are not set down, against which to measure and monitor progress. These shortcomings are demonstrated in the M & E System Report of March 1991. As a result, a number of disparities have arisen between the FP goals and EOP targets. For example, in A (2) it was unnecessary to confuse the straight forward EOPS of "raising the average value of production per settler to 1.5 times the value of a paddy-paddy double rotation", to a net family income criterion, and then compound the confusion further by relating the gross value of annual paddy production as the baseline measure for the net farmer family indicator which is something quite different. Most times net farm family income is one of the most difficult indicators to measure accurately.

Then again, the FP Settler Organization and Water Management EOP targets and Objectives have been transformed into two of the eleven MARD indicators, which according to the M & E System Report of March 1991 have already been surpassed many times over. This conclusion, however, is challenged by the previously cited conclusion in the 1990 MARD Annual Report.

2. **CHART II "Recommended Targets - M & E Indicators-Data Sources"**

Chart II demonstrates realistic End of Project Objectives/Targets for ATG&D, Farmer Organizations and Water

Management, and Agricultural Support Services, by revising and simplifying End of Project Status in the PF and also by adding new targets in order to achieve PF expectations. Changes in certain original targets are inevitable because the outputs/targets dichotomy on the one hand, and targets/indicators dichotomy on the other are unclear and bemused.

In CHART 11 it is attempted to forge the forward and backward linkage interface between output/targets and targets/indicators.

A set of targets have been added for commercial farmers and recognition of Homestead Development which were previously excluded. Corresponding benchmarks are identified and given. Precise, measurable and valid indicators are also given which can be set out in simple time series tabulations in order that progress monitoring will be easily comprehensible at all levels of management. It is intended to build up a sustainable M & E System, starting now with MEA/MARD/PMU resources. After 2 1/2 years from project start-up it is too late to rustle up baseline benchmarks. Therefore, for many baseline indicators, a 'zero' benchmark is assumed.

PROJECT PAPER END OF PROJECT GOALS AND TARGETS RELATED TO NARD/AID

ELEVEN(11) INDICATORS TO MONITOR & MEASURE PROGRESS & THEIR VALIDITY

(1)	(2)	(3)
End Project Status/Targets ref.PP	Eleven (11) Indicators (M & E Final Report Jan.1991)	Validity/Justification
A. <u>Diversify with CFC's in 1 Ha Irrig.Holdings/ATG & D</u>		
1. <u>50% of irrig.land to be diversified with CFC's</u>	15% Maha crop area & 85% of Yala area to be cultivated with CFC's on at least 1/8 acre of irrig.lot.	<p><u>Not Valid</u></p> <p>(a) Assumed 50% of settled area = say 6000 Ha. At 1/8th ac.per 1 Ha lot, 6000 lots will have 750 acs = 303 Ha.</p> <p>(b) 85% of Yala = about 10,200 Ha.</p>
<u>ASSUMPTION</u> - settlers 1 Ha lots.	<u>OBSERVATION</u>	The 2 extremes of this target & indicator are obvious. The indicator is oblivious of the PP target.
<u>RECOMMENDATION</u>	This is an end of project target, not an indicator. No basis is given nor justification made for choice of 1/8th acre.	
(a) Reduce to 25% = about 3000 Ha. That is 12,000 settlers could cultivate an average of 0.25 Ha each, which is about double the extent required to be grown with THVC to increase income by more than 50% by diversifying the irrig.lot.		
This recommendation is based on the consensus of NEA - RIN/DRIM, Dir.PMU and MARD local staff and consultants.		
<u>Additional New Target</u>		
(b) 50% of settlers adopt LP model in cultivating CFC's	No of farmers as an indicator is supported in M & E Final Report Jan.91	Adoption of the LP model is a valid criteria because in Yala 1990, a large number (no firm figure) of settlers including 350 outgrowers cultivated CFC's, but total area was only 3.6%
2. <u>Raise av.value of production per settler 1.5 times the value of paddy- paddy double crop.</u>	Av.net farmer family income to be increased by 50% over income from paddy	The validity of changing the production indicator in the PP to a 'net family income' is not justified.
<u>OBSERVATIONS</u> (next page)	<u>OBSERVATIONS</u> (next page)	

* THVC : Traditional high value crops also known as subsidiary crops.

NHVC : New high value crops for export.

(1)

- (a) cultivation records are taken by extension staff seasonally and production on irrig. lots is ascertained by crop cutting survey by PMU.
- (b) 2 indicators of value can be obtained - on current av. price and constant base year av. price.
- (c) Targets (1) & (2) are inter-related.
- (d) Evaluation Team strategy of 'whole turnout development planning' and increasing coverage of c.o. survey, will improve accuracy of recorded data.

30% value of diversified crop production to be exported

REVISED TARGET

30% value of diversified crop production on settlers irrig. lots to be exported.

On a zero benchmark, the measure of progress could be (a) sales to commercial farmers.

(b) sales to intended commercial cold chain.

Creating a farm management perspective among settlers to allow rapid production reactions to changes in market demand

(2)

- (a) Family income is not the same as the PP target. It encompasses all income from homestead and other activities including hired labour wages, which in a cross section of settlers is the highest source of income.
- (b) Net family income is most difficult to measure. Only a guestimate by sample survey can be obtained.

System B will export 30% of the value of diversified crops each year.

OBSERVATION

(a) The M & E Report recognises the extreme difficulty to measure accurately the exports from NARD.

(b) The assumption that "the percentage of a crop grown and exported from SL accurately reflects the value of produce grown and exported from NARD", seems a highly pre-sumption and over-rated methodology. There are a such larger number of arable crops exporters in S.L. (ref. Customs returns)

(c) If such a measure were to be adopted, NARD exports could be compared with S.L. exports in SDR terms, adopting a base year benchmark on the assumption ceteris paribus 'no growth elsewhere in SL'.

(excluded)

(3)

The PP target should remain

It will be more realistic to differentiate between commercial farmers and settlers' crop diversification. A new recommendation for commercial farmers is given in CHART II. It will be nearer the truth to assume that commercial farmers will be secretive in disclosing exports, specially earnings.

Not a measurable & tangible target. However, performance on targets (1) & (3) will reflect such a perception.

(1)

5. Developing an agricultural research capacity at Aralagawila which responds to the priorities and requirements of the System B Mahaweli agro-ecological environment.

B. HOVESTAD DEVELOPMENT

1. Providing non-traditional commercial production opportunities from homesteads for 25% of settlers.

REVISED TARGET

Double gross annual production from homestead from crops and livestock, av. per homestead.

New Targets in GIART-II

C. Manage Water in the Main System and On-Farm by-

1. Strengthening 250 turnout farmer groups with independent capacity to manage turnout agricultural production and related water control and distribution issues.

2. Forming 25 federated farmer groups at the level of the D canal which can contract for and perform periodic maintenance, collect water user fees, and support professional extension services under contract to the farmer group;

As above too many unmeasurable variables, being objectives which can only be qualitatively assessed.

(2)

(excluded)

29% of farmer households in System 'B' will engage in commercial production on the homestead. Criteria for commercial production is defined as sales over Rs.1000 - a year (M & E Report)

Settler Organisations

250 turnout groups will manage Agric. production & water distribution.

OBSERVATION

The M & E Report of March '91 claims to an achievement of 827 TOO's which is 331% above end of project target, but the listed functions are not being undertaken. The MARD/MRA Annual Report 1990 says that 625 are not properly organised.

Twenty-five unit level farmer organisations will be collecting fees and handling operation and maintenance work and serving as the main channel for farm credit, agricultural technology and marketing assistance.

Ref.M & E Report March 1991, the MARD target for end of project has been exceeded by 220% in 1990 cumulative progress reporting.

(3)

progress can be assessed from records & reporting.

M & E Report assumption are not valid. Commercial production is ill-defined without a proper basis.

M & E Report March 91 page 24 reports 28.4% of homesteads over Rs.1000/- from crops.(1988/89 PKU baseline S.E.S.Survey). PKU disaggregated data on total household income av.Rs. 1230/year,

Only a qualitative assessment of effective operations can be made, but will be subject to reporting accuracy or bias by extension staff.

In GIART-II a new set of measurable indicative objectives are proposed.

The new set of measurable indicative objectives proposed provide a method to measure these activities in a more straightforward manner without ambiguity.

The criteria adopted is to have a few simple measurable indicators of viable operations, implying that viable FO's will carry out the expected functions.

(1)

C 2. conti.

3. Revising main and tertiary system water management to ensure effective maintenance and allow maximum agricultural output from combinations of diversified and paddy crops.

4. Lowering recurrent costs of the irrigation system borne by the GCL through collection of water user fees and farmer organisation provision of management services.

RECOMMEND - exclude

While FCs managing water efficiently will reduce cost, the sum of water - users fees is not a cost effective measure of such management. It is no more than a MASL/GCSL income.

5. Not in PP.

D. Deliver Agricultural Services by -

1. Linking farmers with multiple sources of agricultural inputs and product buyers.

(2)

The performance reported of many activities is impressive. 55 ULPO associations have been established. But the MARD/MKA Annual Report 1990 identifies 54 ULPO's as not viable. The Evaluation Team found 3 Block Level Societies performing well.

(excluded)

Recurrent costs of the irrigation system borne by GCSL will be reduced by 25%

KCU provision of water to a block as measured at their branch canal will be adequate to within 20 percent of the aggregated downstream requirements as calculated by MKA.

Since the unit level is coterminous with the 'D' canal, flow measurement and equitable distribution could be readily achieved.

Farmers will be linked with multiple sellers of agricultural inputs.

(3)

Adequately covered above.

1988 recurrent costs to be the baseline. Ref. M & E Report March 91 page 70- Re. 55,275,000. Reduction of operational costs is a management issue, surplus water also results in inefficient water use costs. Exercising control add to costs.

This item is not a valid indicator of development and is excluded. The annual financial report is the correct place for it.

M & E Report March '91 pages 64 & 65 sets out a target and performance by blocks for 3 seasons starting with Yala 1986 (baseline). Every season there is excess water being very high in Maha. However the flow measuring equipment is not yet in place.

In the short to medium term by 1995 a significant increase in sources of input supplies is difficult to comprehend according to historical trends in the country.

(1)

REVISED INDICATOR proposed

Increase inputs for CPC's corresponding to increase in area under CPC's. A target to be estimated by FMO/MEA/MARD.

2. Examine the potential for expanded rural production credit.

REVISED GOALS

Please see CHART II

3. Reduce post harvest losses or price downgrades for dirty products to 10% of crop value.
4. Promote export possibilities by testing the international markets for Mahaweli products.
5. Providing equitable distribution of project benefits to poor settlers, women and ethnic minorities.

(2)

50% of farmers will regularly receive production credit when needed with an average repayment rate of 90%.

(excluded in M & E System)

(excluded in M & E System)

(excluded in M & E System)

(3)

Ref. M & E Report March '91, 83 to 100 percent of all inputs for paddy except seeds are delivered by the Cooperatives. As PCs get stronger input supplies will surely be shared by them and cooperatives.

Now private sources are supplying the bulk of inputs for CPC's. A large component of this is commercial farm supply to outgrowers. Other settlers use of agro-chemicals & fertiliser is less than 6%. In course of time PO's and co-operatives will take over from exploitative private sources.

Consensus of staff interviewed considered criteria unrealistic.

- (1) Assumption that 50% settlers will not need credit.
- (2) The target is only in respect of those repaying 90% of loans.
- (3) The efficiency of lending institutions is not considered.

A baseline position needs to be established to ascertain whether or not a change for the better could be monitored.

Covered at A (3) Above. This is an activity. Not a target.

Development strategies have viewed settlers as a uniform entity. Separate strategies for minor and vulnerable groups are not feasible unless staff, financial and other resources are mobilised separately for this purpose. Of course, special extension staff could be recruited for this specific purposes and special programs can be prepared. This is a policy matter to be considered at the highest levels of MASL and the GCSL.

Ref. CHART I - RECOMMENDED TARGETS - K & E INDICATORS - DATA SOURCES

(1) End Project Objectives/Targets 1995	(2) Revised New Goal	(3) RO RG	(3) Indicators	(4) Benchmarks 1988/89	(5) Data Source/Reporting
A. ATC & D - Diversify with CPC's in 1 Ha Irrig. Holdings					
1. 2% of irrig. land area to be diversified with CPC's.		RO	irrigated land area diversified with CPC	3.5% Ref. K & E Report March '91	Routine data recording. MEA - DRFM/YARD/PMU
2. 50% of settlers adopt LP model in cultivating CPC's		NO	number of farmers	Zero	- do -
3. Raise av. value of production per settler 1.5 times the value of 2 seasons paddy crop in respect of settlers who diversify with CPC.		PP	av. value of production	Rs. 25,228 - Progress Report PMU av. Maha & Yala	- do -
4. 30% value of diversified crop production on settlers irrig. lots to be exported		RO	CPC's value of production exported	zero	MEA - DRFM/YARD Production recording to track (1) Sales to commercial firms. (2) Sales to commercial cold chain exporters.
<u>New High Value Crops (NHVC) for Export (MARD/MEES set target)</u>					
1. No. of commercial farmers cultivating NHVC for export in System 'B' left bank		NO	No. of farms	1988 assumed zero	MARD/MEES
2. By 1995 annual quantity of NHVC exported		NO	Quantity exported	1988 assumed zero	-
3. By 1995 number of outgrowers cultivating NHVC for commercial farmers		NO	No. of outgrowers	1988 assumed zero	MEA-DRFM/YARD
B. Homestead Development					
1. By 1995 double gross annual value of production from homesteads from crops and livestock (Averaged per homestead)		RO	Gross av. annual value of production	Rs. 1989/90 PMU Baseline Sample Survey (Yala & Maha)	Annual Socio-Econ Sample Survey PMU/DRFM.

Contd... Homestead D...

(1)	(2)	(3)	(4)	(5)
2. 75% of households sell GPC's and live-stock produce	RG	Percentage No.of homesteads	23% (MARD Homesteads Production & Commercialisation Report.Jan.91	Routine data collection DRPK/MARD.
3. 50% of households engaged in processing or other cottage industry	RG	Percentage No.of homesteads	1988 assumed zero.	" "
4. A portable water source in Yala to be established in all homesteads (percentage).	RG	Percentage No.of homesteads	16% (MARD Homesteads Production & Commercialisation Report.Jan.91	
<u>C. Settler's Group Organisations & Water Management</u>				
1. By 1995 all ULPO's to be registered and granted legal status.	RG	No. ULPO's	1988 assumed zero	DRPK/CDO records.
2. 50% of TOOs having settlers cooperating to apply LP Model for crops by whole TO's and manage water. (see linkage with A2)	RG	Percentage No.of TOO's	1988 assumed zero	MKA-DRPK/MARD
3. 50% TOOs collect water management fees	RG	Percentage No.of TOO's	1988 assumed zero	MKA-DRPK/CDO
4. All Block Level PO selling farm produce out of System 'B' and annual turnover by weight or volume (Target - annual increment)	RG	No.Block Level PO	1988 assumed zero	MKA-DRPK/CDO records.
5. No.of cultivation/farm production loans given to settler members by ULPOs.	RG	No.of loans	1988 assumed zero	" "
6. 100% adequacy of water by Blocks seasonally as per requirement for cultivated area	RG	Excess or deficit	1988/89 Maha 92% excess. (M & E Report March'91)	MKA - DRPK
7. All farmers in the 17 IDEU units to have water control blocks in place by 1995.	RG	Percentage No.of farmers	zero	" "

(1)	(2)	(3)	(4)	(5)
D. Deliver Agricultural Services and Forest Credit				
1. Percentage annual increase in production inputs for CPC's corresponding to increase in irrigated area under CPC's by settlers.	NO	Percentage annual increase	CPC seed-6.3% Agro-chem-6.2% Fertiliser-1.7% (Yala & Maha P.W.U Baseline Sample Survey 1988/89)	MEA/P.W.U
2. (a) 90% of seasonal applications for production loans from settlers paid by banks, cooperatives and thrift societies.	NO	Percentage No. applications paid	(P.W.U establish benchmark from 1988/89 survey)	MEA/P.W.U
(b) In 1995 number defaulters in 1994 reduced to 10% (as per (a) above)	NO	Percentage No. defaulters	- do -	" "
3. No of Post harvest handling facilities to be in place to reduce downgrades for perishable and semi-perishable diversified crops for domestic and export markets. <u>/c</u>	NO	Number	Zero	WARD/MS

/ P.H.H.P refers to cold chain, transport trucks, sorting and processing and packing.