

DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
COMMISSION OF THE EUROPEAN COMMUNITIES  
MINISTRY OF IRRIGATION, POWER AND ENERGY  
IRRIGATION DEPARTMENT

SH.MARK.....
.....i/Ml.....
.....6.31.7.7.....
.....6.7.44.....
.....TIME.....
.....
AC.NO.H.12874.....

National Irrigation Rehabilitation Project  
ALA/91/07  
Technical Assistance to the  
Irrigation Research Management Unit  
Contract No. 669/91/73000/102/141-01

## ANNUAL REPORT 1994

INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE  
SRI LANKA FIELD OPERATIONS

## Contents

<b>Executive Summary</b> .....	v
<b>Technical Assistance to Irrigation Research Management Unit</b> .....	1
Introduction .....	1
Irrigation Research Management Unit (IRMU) .....	1
Objectives of Technical Assistance .....	2
Activities under Technical Assistance .....	2
Project Funding .....	3
Inputs Planned and Provided During the Reporting Period .....	3
Personnel Provided by Counterpart (Irrigation Department) and CEC (Technical Assistance through IIMI) .....	3
Supply of Materials and Operation and Maintenance Costs Pertaining to Infrastructure Development .....	4
Financial Contribution .....	4
Presentation and Assessment of Outputs Achieved During the Reporting Period .....	4
Analysis of Outputs and Activities Planned and Carried Out .....	4
Training and Technology Transfer .....	15
Reports and Publications .....	18
Annual Report .....	18
Quarterly Reports .....	18
Workshop Proceedings .....	18
Abstracts of Monthly Seminars .....	18
IRMU Research Highlights .....	18
Preparation of the 1995 Workplan and Budget .....	18
Project Constraints .....	20
Lack of Adequate Staff .....	20
Lack of Interest in Fellowships .....	20
Inadequate Financial Performance by IRMU .....	21
<b>Appendix 2.1</b> Staffing Schedule—ID/IRMU .....	23
<b>Appendix 2.2</b> Staffing Schedule—Consulting Services .....	24

<b>Appendix 2.3</b>	Summary of Staff Mobilization and Inputs— (August 1992 to December 1994) .....	25
<b>Appendix 3.1</b>	Logical Framework—Irrigation Research Management Unit .....	26
<b>Appendix 3.2</b>	1994 Workplan .....	28
<b>Appendix 3.3</b>	Summary of Research Program for 1995 .....	29
<b>Appendix 3.4</b>	Irrigation Research Management Unit Workplan and Budget for 1995 ...	35
<b>Appendix 3.5</b>	Workplan—Life of Project .....	48
<b>Appendix 3.6</b>	IRMU Monthly Seminars—1994 .....	49
<b>Acronyms</b> .....		50

## **Executive Summary**

### **INTRODUCTION**

This is the second Annual Report of the project, Technical Assistance to Irrigation Research Management Unit (IRMU), and covers the period from January to December 1994.

### **INPUTS PLANNED AND PROVIDED**

IRMU continues to be seriously understaffed. During the third year new staff were assigned to IRMU but four staff members left IRMU for better jobs or higher studies. This left IRMU with only two staff members including the Deputy Director who is also assigned on a part-time basis.

The Technical Assistance (TA) Project has provided more staff months than planned (extra person-months were provided by the International Irrigation Management Institute (IIMI) at no additional cost to the project). This was done to offset to some extent, IRMU staff shortage, for implementation of the IRMU Workplan as per schedule.

### **SUPPLY OF MATERIALS**

To date, IRMU has not received any equipment or vehicles. IIMI has provided one four-wheel drive vehicle and two computer systems to facilitate IRMU work at no extra cost. This is in addition to the two four-wheel drive vehicles and three computer systems purchased out of the project funds in 1992-93.

### **ASSESSMENT OF OUTPUT ACHIEVED**

#### **Establishment and Strengthening of IRMU**

Progress in this area was far from satisfactory due primarily to shortage of IRMU staff. Determined efforts are being made to improve the situation in 1995.

The establishment of the research library has, however, made significant progress. Air conditioners have been installed and a photocopier and computer system have been procured. Specifications for shelves have also been prepared.

#### **Research and Development**

Research needs and priorities for 1994 were determined through a Program Planning Workshop held on 29 October 1993. Ten research studies were undertaken during the year, including those carried over

from 1993. Two studies have been completed and another was dropped due to the site-specific nature of the problem.

### **Training and Technology Transfer**

A training course on Rapid Appraisal for Irrigation Systems was conducted with 17 participants from various agencies. The course on research methodology was canceled due to shortage of IRMU staff.

Fifty more literature items related to irrigated agriculture have been summarized bringing the total literature available to 74. Two workshops, out of the planned three, were organized. The third workshop has been rescheduled to be held on 25 February 1995. The IRMU Seminar Series continues to remain popular. Eleven seminars were organized covering various topics related to irrigated agriculture. Out of the planned three, two issues of the IRMU Newsletter were published during the year. Interest in fellowships to pursue higher studies in national universities has significantly declined and only one fellowship was awarded against the planned four.

### **Reports and Publications**

The 1993 Annual Report and all three Quarterly Reports were submitted. The proceedings of the workshop titled "Use of Computer Models as Decision Support Tool in Operation and Maintenance (O&M) of Irrigation Systems," seminar summaries and summaries of 24 selected papers have been published as per schedule. The first draft of the proceedings of the workshop titled "Seasonal Planning Procedures to Improve Irrigation Management Performance: How Kirindi Oya Experience of IIMI/ID can be Transferred to NIRP Schemes," and the Completion Report of Rapid Appraisal Training have been prepared. A training module for Rapid Appraisal Training has also been developed.

## **Technical Assistance to Irrigation Research Management Unit**

### **INTRODUCTION**

IT IS WIDELY recognized that the benefits derived from irrigation schemes have not been proportional to the investments made. It is also recognized that the benefits could be increased by minimizing the various constraints impeding the productivity of irrigated agriculture. One of the major constraints to achieving higher productivity has been identified as the lack of research input in improving irrigation management and the slow adoption of innovations. It is, therefore, essential to establish a strong research program to improve the performance of irrigated agriculture.

A comprehensive research program requires identification and continuation of research, supporting institutions, reporting and dissemination of research findings and incorporation of research findings in the implementation of irrigation activities to achieve improvements in planning, design, operation and management of irrigation schemes.

### **Irrigation Research Management Unit (IRMU)**

The Irrigation Research Management Unit is being established in the Irrigation Department (ID) as a research-based service unit to address the above-mentioned weaknesses. The main objective of IRMU is to strengthen the institutional capacity of ID in carrying out research to increase productivity, profitability, sustainability and social equity. The other objectives are to:

1. Identify research needs, carry out or contract for research, evaluate research and adapt them for implementation.
2. Initiate and implement a research program which yields results of immediate interest to the irrigated agriculture sector.
3. Contribute to the quality of planning and implementation of the National Irrigation Rehabilitation Project (NIRP).

For the establishment and operation of IRMU during the initial stage, necessary assistance is being provided by the International Irrigation Management Institute (IIMI), through a four-year Technical Assistance Program.

### **Objectives of Technical Assistance**

The main objective of the Technical Assistance Program is to establish and support IRMU in its initial stage. This objective is expected to be achieved through a series of well-defined activities.

### **Activities under Technical Assistance**

During the project period of four years the following activities have been assigned under the Technical Assistance Program:

1. Develop the mandate, strategic plan, organizational structure and staffing policy together with the ID staff, within the first year of assignment.
2. Assist IRMU with the preparation of research procedures, policies, annual workplans and related budgets.
3. Develop methodology and assist in the training of IRMU staff:
  - (a) undertake rapid assessments, particularly to obtain preliminary data for research selection and to train IRMU staff;
  - (b) carry out adaptive research to test technical and institutional innovations;
  - (c) monitor and evaluate a number of schemes being rehabilitated under NIRP, to ascertain how improvements are being implemented, and their acceptance, benefits and costs, and long-term sustainability;
  - (d) measure the cost-effectiveness of innovations identified in the Research Programs as required; and
  - (e) record and analyze lessons learned in establishing IRMU and its early operations.
4. Provide support to IRMU to develop their conceptual, administrative and research activities.
5. Assist IRMU in conducting a series of workshops to disseminate research findings and solicit inputs to the program.
6. Provide inputs to NIRP from IIMI's in-country and international research findings and international programs.

## Project Funding

The total support from the Commission of European Communities (CEC) for the project is estimated to be ECU 843,840 and SLRs 21,684,000.<sup>1</sup> The breakdown of cost (of main items) is given below:

<b>Foreign Exchange Cost</b>		<b>Amount (ECU)</b>
a. Fees for services of international staff	=	734,448
b. Refundable expenses	=	109,392
		-----
Total	=	843,840
		=====

<b>Local Cost</b>		<b>Amount (SLRs)</b>
a. Fees for services of national staff	=	7,444,800
b. Direct expenses	=	13,260,000
c. Refundable expenses	=	980,000
		-----
Total	=	21,684,800
		=====

## INPUTS PLANNED AND PROVIDED DURING THE REPORTING PERIOD

**Personnel Provided by Counterpart (Irrigation Department) and CEC (Technical Assistance through IIMI)**

### *Personnel Provided by Counterpart (Irrigation Department)*

The staffing schedule of IRMU is presented in Appendix 2.1. Mr. B.M.S. Samarasekera continues to be the Deputy Director, IRMU. This is in addition to his responsibility as Deputy Director, Contracts and Procurement.

As per staffing schedule, twelve research staff members were to be recruited by the end of 1994. This number is inclusive of the four recruitments planned in 1993. A total of five research staff were recruited (2 in 1993 and 3 in 1994) of which four who were recruited on contract basis have already left. Two obtained permanent jobs and the other two went abroad for higher studies. IRMU, therefore, continues to remain seriously understaffed.

---

<sup>1</sup>ECU = European currency.  
SLRs = Sri Lankan rupees.



### ***Personnel Provided by CEC***

The staffing schedule of the Technical Assistance Services is presented in Appendix 2.2. The Technical Advisor has provided 8 man-months (MM) of service during 1994. This brings the total MM of service provided by the Technical Advisor to 22.7 MM from the inception of the project in August 1992. The Research Associates and the Research Officers have provided 10.75 MM and 24 MM of services, respectively. Four short-term specialists representing the disciplines of agricultural economics, civil engineering, social science and agronomy have together provided 7 MM of services during the year bringing the total to 17.25 MM. A summary of staff mobilization is provided in Appendix 2.3.

Recognizing the staffing constraints of IRMU, IIMI has provided from its own resources one additional Research Officer with effect from October 1994. This became necessary to implement the 1994 Workplan as well as to assist with the development and implementation of the 1995 Workplan.

### **Supply of Materials and Operation and Maintenance Costs Pertaining to Infrastructure Development**

As IRMU has received no vehicles, IIMI has made available one four-wheel drive vehicle from its vehicle pool. This is in addition to the two four-wheel drive vehicles procured under the CEC grant. IIMI has also made available two extra computer sets, one for the third research officer recruited for the TA team and one for IRMU staff.

### **Financial Contribution**

Four more invoices (claims) were submitted during the year bringing the total to eight from the inception of the project. Payment of seven invoices has been received, which included four submitted in 1993.

## **PRESENTATION AND ASSESSMENT OF OUTPUTS ACHIEVED DURING THE REPORTING PERIOD**

### **Analysis of Outputs and Activities Planned and Carried Out**

The logical framework of IRMU is given in Appendix 3.1. The progress is reported in relation to the targets indicated in the Annual Workplan of 1994 (Appendix 3.2). The progress of activities during the year is reported under four main output categories, namely: (i) establishment and strengthening of IRMU, (ii) research and development, (iii) training and technology transfer, and (iv) reports and publications.

### ***Establishment and Strengthening of IRMU***

***Staff Recruitment and Training.*** Three more research staff members were added to IRMU, two on contract employment and one on secondment from the Irrigation Department. This raised the IRMU staff strength to five. But unfortunately, all four recruited on contract left IRMU, two for more secure jobs and the other two—who were trained by the TA team and were slowly getting into the rhythm of research—for

higher studies abroad. Their departure has been a big loss and a fresh attempt shall have to be made again to recruit and train new staff.

The organigram and staffing policy prepared for IRMU back in late 1992, still awaits ID action for forwarding it to the competent authority for approval. Without the approval of this document, cadres for non-engineering staff cannot be created and IRMU in contrast to its intention will continue to remain a mono-disciplinary unit.

**Establishment of Research Library and Review of Past and Present Research.** Installation of an airconditioner in the library is almost complete. A photocopier and a computer have also been procured, and specifications for racks have been finalized. The procurement process for racks has been initiated by the Project Director, NIRP. Dialogue with the Sri Lanka Library Association has been initiated for the installation of software. Another 50 reports/papers/studies related to Sri Lankan irrigated agriculture have been summarized, and this brings the total number of reports/papers/studies to 74.

### Research and Development

Research needs and priorities for 1994 were determined through the Program Planning Workshop held on 29 October 1993. The 1994 IRMU Workplan and Budget is presented in Appendix 3.4. The Workplan for the life of the project is given in Appendix 3.5.

Ten research studies were undertaken during the year including those carried over from 1993. The list of studies is presented in Appendix 3.4. Two studies, "Performance Monitoring of Automatic flow and Water Level Downstream Control Structures" and "Macro Catchment Modeling and Management Studies," carried over from the Major Irrigation Rehabilitation Project, Sri Lanka (MIRP) have been completed. A study on "Aquatic Weed Control" has been dropped due to the site-specific nature of the problem. A brief progress report on each study is given below.

#### Output 1. Establishment and strengthening of IRMU.

Activity		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
i. Staff recruitment*	Planned	x						x					
	Carried out				x			x					
ii. Establishment of research library and review of past and present literature	Planned	x	x	x	x	x	x	x	x	x	x	x	x
	Carried out	x	x	x	x	x	x	x	x	x	x	x	x

\* Out of the planned 8, only 2 staff members were recruited.

**Output 2. Research and development.**

Activity		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
i. Finalization of research needs and priorities for 1994	Planned	x	x										
	Carried out	x	x										
ii. Implementation of research studies	Planned	x	x	x	x	x	x	x	x	x	x	x	x
	Carried out	x	x	x	x	x	x	x	x	x	x	x	x
iii. Recording and analysis of lessons learned in IRMU establishment	Planned	x	x	x	x	x	x	x	x	x	x	x	x
	Carried out	x	x	x	x	x	x	x	x	x	x	x	x
iv. Preparation of research needs and priorities for 1995	Planned										x	x	x
	Carried out										x	x	x

**Output 3. Training and technology transfer.**

Activity		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
i. Training on rapid appraisal	Planned						x						
	Carried out						x						
ii. Training on research methodology	Planned										x		
	Carried out												
iii. Holding of workshops	Planned					x				x			x
	Carried out					x					x		
iv. Holding of seminars	Planned	x	x	x	x	x	x	x	x	x	x	x	x
	Carried out	x	x	x	x	x	x	x	x	x	x	x	x
v. Award of research fellowships*	Planned			x	x	x				x	x	x	
	Carried out											x	
vi. Newsletter	Planned			x				x					x
	Carried out			x						x			

\* One fellowship was awarded.

**Monitoring Farmer Involvement in NIRP Rehabilitation Phases I and II.** The report of the Phase I of this study, a rapid appraisal of five schemes under NIRP, was finalized in June 1994. Based on the findings of Phase I, a more comprehensive study covering a larger sample was carried out. The objectives of the study remain the same as stated in Phase I. The overall goal of the study is to review NIRP practices with respect to the development of sustainable Farmer Organizations (FOs), and suggest suitable alternative options wherever applicable for their effective participation in the Rehabilitation Program and taking over of the responsibility of O&M after rehabilitation. The specific objectives of this study are to: (i) evaluate the strength and preparedness of FOs; (ii) assess farmer involvement in rehabilitation, planning and implementation; (iii) evaluate the contributions of farmer participation in rehabilitation to prepare FOs for the taking over of O&M responsibilities after rehabilitation with regard to: (a) organizational management abilities, (b) technical knowledge concerning O&M, and (c) financial standing and management abilities; and (iv) determine constraints to effective farmer participation in rehabilitation in the sample schemes.

A questionnaire survey was designed to collect more information on areas which needed indepth analysis as indicated in the results of Phase I. Five different questionnaires were designed to collect information from Institutional Development Officers (Divisional Officers of the Department of Agrarian Services), Irrigation Officers (Technical Assistants of the Irrigation Department), Institutional Organizers, Office Bearers of the FOs and ordinary farmers. The sample consisted of 20 schemes (15 minor and 5 medium schemes) spread over 10 districts. These schemes were selected randomly from a list of 157 minor schemes where the rehabilitation process had commenced by mid-1994, and from a list of 42 major/medium schemes where the rehabilitation process had commenced or which had been identified for rehabilitation by mid-1994. The sample of ordinary farmers in each scheme was decided on the basis of the number of farmer families in the schemes. The criteria for selecting the number was as follows. As the maximum number of farmer families in the sample schemes was around 100, 10 farmers were selected if the number of farmer families was below 33, 15 were selected if the number of farmer families was between 33 to 66, and 20 farmers were selected if the number of farmer families was above 66. The total sample size of ordinary farmers is 430.

Data collection was begun in late July 1994. A team of IRMU Research Officers started interviewing agency officers and office bearers of the FOs. Three casual investigators were deployed in the field to interview ordinary farmers by October 1994, and data collection was completed by the end of December 1994, except for a few agency officials who could not be contacted as they were otherwise occupied. Data entry into the computer, and processing and analysis of data are presently in progress. The Draft Report is expected to be completed by June 1995.

The results of the Phase I study were presented at a workshop and at a seminar held at the Irrigation Department in October and November 1994, respectively. The results of the Phase II study will be published after mid-1995.

**Assessment of Turnover Process in NIRP Schemes.** IRMU approached the Agrarian Training and Research Institute (AR&TI) in June 1994, in order to explore the possibility of contracting out the study to them. Although AR&TI had voiced their willingness to accept the study by July 1994, it was purposely delayed because the number of schemes that had been handed over to the farmer organizations was very few at the time and hence was inadequate for the selection of a better sample. In the meantime, several rounds of discussions were held with experts from IIMI and AR&TI to determine what exactly needed to be done. A Terms of Reference (TOR) was drafted incorporating the ideas that emerged from

these discussions. The TOR has now been revised and finalized based on the comments received from the Project Director (PD), NIRP.

The objective of the study is to provide information and guidance to the implementing agencies of NIRP about how best to make the turnover effective and sustainable. The specific objectives of the study have been set out as follows: (i) to document the operation and maintenance performance of FOs in sample schemes that have been rehabilitated by NIRP and turned over to farmers; (ii) to evaluate the performance of FOs in turned over schemes with regard to (a) equity and reliability of water distribution, (b) quality of maintenance, (c) resource mobilization for maintenance; (iii) to evaluate the strength and viability of the FO, including the allegiance of the farmers to it and its ability to mobilize the farmers for various purposes; (iv) where it appears that the FO is not capable of managing the system in a sustainable manner, to determine the causes of weakness of the organization; (v) to determine what short-term or long-term support, if any, is needed by the FOs to enable them to manage the system sustainably (this might include legal support, resources, advice, etc.); (vi) to recommend changes in NIRP procedures or principles that will improve the long-term sustainability of the water management improvements introduced by the project; (vii) to prepare an interim guideline for NIRP turnover, reviewing the current procedures and practices at the end of Phase I which will lead to the preparation of final guidelines at the end of the study.

This study will be implemented in two phases and will cover two seasons for each phase. An interim guideline will be prepared at the end of Phase I and will be field tested for another two seasons before preparing the final guidelines to improve the effectiveness of the turnover process. The contract agreement between ID and AR&TI will be signed so that AR&TI can initiate the study in mid-1995.

***Evaluation of Maintenance Performance by Farmer Organizations in Handed-Over Distributary Channels.*** The study was initiated at the request of the Ministry of Irrigation Power and Energy in September 1994. Preliminary discussions and brainstorming sessions went on till the end of October 1994. A number of meetings were held by the IRMU research staff (inclusive of the TA team) with IIMI research staff (both from Headquarters and Sri Lanka Field Operations Office) in order to reach a consensus on the conceptual and methodological problems related to the study.

The research proposal for the study was finalized during the second week of November. The basic hypothesis of the proposal is that the structures and other aspects of distributary channels which have been handed over to FOs for maintenance are deteriorating at a faster rate than expected.

To field test the interview guidelines prepared earlier, a team of researchers (including two IIMI international staff members) visited the Rajangana Irrigation Scheme on 21 December 1994. A preliminary discussion was also held with the Irrigation Engineer (IE), Rajangana, and his field staff in order to determine the data collection approach in terms of irrigation-related field offices.

The sample for the study was selected from the turned over distributary channels (DCs) of four major schemes under the Irrigation System Management Project (ISMP). Samples include the Parakrama Samudraya Scheme, Polonnaruwa (Aluthwewa Distributary Channel Organization [DCO], Sinharajapura DCO, Mahasen DCO, Weerapura DCO, Palugasdamana DCO, Sinhapura DCO); the Kaudulla Scheme, (Mahindapura DCO, Sama DCO, Nagarapura DCO, Kalinga DCO, D.S. Senanayake DCO, Weerakeppetipola DCO); the Gal Oya Left Bank, (LB2 DCO, LB6 DCO, UB1 DCO, UB9 DCO, LB22 DCO, G10 DCO); and the Ridi Bendi Ela, Nikaweratiya, (Magallegama DCO, Ibbawala DCO, Kebellewa

DCO, Taranagolla DCO). Six distributary channels were to be selected from each irrigation scheme: three handed over under the USAID agreement and, wherever possible, three that were not handed over. The DCs were selected as to represent the head, middle, and tail of the command area.

The purpose of selecting two types of distributary channels was to compare the physical deterioration of selected DCs with the degree of turnover of maintenance responsibilities to the FOs responsible for those DCs. But after operationalizing the field work it was found, particularly in Polonnaruwa, that every Distributary Channel Organization receives O&M funds from the ID irrespective of the official turnover. However, the team focussed on four aspects: (i) preparation of an inventory of damage to and deterioration of various structures gates, drop structures, etc., and physical status of the canals such as breaches, siltation and scouring; (ii) determination of when, how and why the observed damages and deterioration occurred from detailed interviews with farmers and Irrigation Department officers responsible, primarily the Work Supervisors and the *Jala Palakas* (Water Tenders); (iii) determination of the degree of handover of maintenance responsibility and period of farmer organization responsibility from records and interviews with farmers and ID officers; and (iv) estimation of investment in maintenance by both the ID and FO over the period since rehabilitation, from records and interviews. During the last quarter of 1994, IRMU was able to accomplish the following: (i) preparation and finalization of the research proposal; (ii) field testing the interview guidelines; (iii) translation of the interview guidelines into Sinhala with a WordPerfect (WP) version; and (iv) finalization of the study sites and preparation of the field visit schedule which is to begin from January 1995.

***Performance Monitoring of Automatic Water Level Downstream Control Structures.*** This study initiated under MIRP in the *yala* season of 1992 in the Rajangana Scheme was transferred to IRMU in July 1993 after MIRP was completed. The primary objective of the study was to test the adaptability of Neyrtec downstream control technology for improving irrigation management under local conditions. The Irrigation Training Institute (ITI), Galgamuwa was the implementing agency. The command area of LB Tract 2 - D1 of Rajangana served as a pilot area for the study. The methodology consisted of the installation of Neyrtec baffle distributors together with head control Neyrtec orifice-type automatic gates at the distributary channel offtake from the main canal, and installation of Neyrtec baffle distributors with duckbill weirs or inclined weirs for head control at field canal offtakes from the distributary channel. The conventional device was installed in the control area, namely, in LB Tract 2 - D2. The study was continued for four seasons up to the end of 1994 starting from *yala* 1992. The data collected included daily water levels in the LB main canal upstream of Tract 2 - D1 Offtake and water levels downstream of the automatic gate, seasonal water issues in the pilot area and control area over *yala* and *maha* seasons, seasonal irrigation duty in the pilot area and control area, and recorded instances of tampering.

It was found that the automatic control gate adapts easily to water level changes in the main canal compared to the conventional system, within practical limits. Also, under similar management conditions, the degree of equity attained in water distribution in the pilot area was remarkably high while the disparity in water distribution was high in the control area. The operation of the orifice-type automatic gate was generally interfered with by farmers attempting to obtain increased discharge. It was understood that the double deflector type baffle distributor is more effective than the single deflector type in such situations. During installation of automatic devices, it is preferable to have a higher level of supervision as precision is essential. It is recommended that all second stage concrete should be of a higher grade with a smaller aggregate size. Local fabrication of baffle distributors was found to be promising at a cost considerably less than the imported ones. The adaptability of these baffle distributors by farmer organizations at the system level is yet to be tested.

**Estimation of Tank Yields and Review of Spill Design Formulae for Minor Tanks.** The present method of yield estimation for small catchments depends on the "iso-yield curves" of the ID. These curves are based on historical observations of river causing data of major rivers which consist of a large catchment area and a significant base flow component. As a result of this yield, estimates often overestimate the actual yield for minor tanks. In small catchments the base flow is practically nonexistent. This is probably one of the main reasons for inadequate replenishment of existing minor tanks.

Similarly, for the design of spillways of minor tanks the commonly used formulae in the ID are Dickens, Rational and Snyder. However, available parameters for the designs are again based on the results of river gauging as well as data generated during the colonial period. Therefore, there is a need to examine the appropriateness of these parameters for minor tanks by making field observations on actual performance.

In the light of the above, the study proposes to conduct field investigations to: (i) estimate specific water yield from small catchments, and (ii) determine adequacy of spill capacity and parameters for spillway design and inflow hydrographs.

The proposal submitted to the Project Director, NIRP was approved during the fourth quarter of 1994. Preliminary sites have been identified for final selection. Field work will begin in early 1995.

**Evaluation and Use of Computer Models for Improving Irrigation Management.** The study is being implemented in four schemes (one is being independently implemented by the ID and not reported here) with the main objective of applying computerized decision support tools for improved operation and management of irrigation systems. A brief progress report of each is provided below:

**Buttala Anicut Scheme.** This is a diversion scheme located in the Moneragala District, having a command area of 646 hectares (ha). The 5 kilometer (km) long main canal has a carrying capacity of 1.5 cubic meters per second (cumecs). Besides the head regulator there are 10 nos (numbers) offtakes, 6 nos gated regulators and 9 nos drop structures located in the main canal. A preliminary study conducted before the intervention indicated that there was no systematic collection of data nor any record to quantify the water issued at any level.

A total of 44 gauges were installed which includes 10 offtakes (upstream [U/S] and downstream [D/S]), 6 regulators (U/S and D/S), 9 drop structures (U/S), 9 canal gauge posts (D/S of offtakes along main canal), and 1 canal spill (D/S). Of these 8 offtakes, 7 drop structures and 3 nos regulators were calibrated. The main canal could not be calibrated for higher discharges due to low flow. The results of calibration indicated a good correlation between  $\text{LOG}(Q)$  and  $\text{LOG}(h)$  for linear regression for almost all the canal gauges installed downstream of the offtakes. Similar results were also obtained for the drop structures.

The data transmission system is working smoothly. The daily gauge readings are displayed in the Irrigation Engineer's (IE's) offices for selected locations. Preliminary analysis of data indicated a fair amount of oversupply into the canals.

During yala 1994, a computerized database has been established for use of the SIC hydraulic simulation model. The database for the IMIS (Irrigation management Information System) model has

also been established for on-line evaluation of system performance. No on-line evaluation has however been carried out as yet, but is planned for the next season (maha 1994-95). Research Supervisors and Engineers engaged in the study have been trained in the use of the decision support tools.

The principal problem faced by the Buttala Scheme is that the main canal receives drainage water from more than 36 drainage inflow points which makes hydraulic modeling quite complicated. Gauges have been installed to monitor the flow at these points and the estimation of inflows will start from maha 1994-95.

During the maha season, work will involve carrying out detailed studies for the use of available Decision Support Systems (DSS) for on-line evaluation of system performance and to improve operational techniques, and the training of staff through DSS for better understanding of hydraulic behavior of systems under different scenarios. An attempt will also be made to use a scheduling tool to guide the issues to each offtake which will also take into account drainage inflows to the main canal.

*Rajangana Scheme.* Rajangana is a tank scheme located in the Anuradhapura District. The reservoir has a capacity of 76,600 acre-feet (ac-ft) (9,452.47 hectare-meters [ha-m]) which irrigates about 17,600 acres (7,122.48 ha) of rice and high land crops. The 21 km long LB main canal was selected for the first phase of the study.

During yala 1994, a measurement network has been installed upto Track 3 on LB which includes four staff gauges in the main canal and eleven gauges for the eleven offtakes in this reach of 9 km of main canal. Out of these staff gauges only the one near the sluice is fully calibrated while the others are being calibrated.

Ten offtakes out of eleven upto the end of Track 3, were calibrated during the latter part of yala. The offtake for DC1 in Tract 2 is installed with a Neyrtec single deflector baffle distributor of 300 liters per second (l/s) capacity. Under normal conditions the discharge can be directly read.

Even though some work aimed at improving water management in the scheme has been done during MIRP, not much attention had been paid to water management, apparently due to the water abundant situation caused by drainage inflow from the Mahaweli H area. However, the water situation is now changing at least during yala as the Mahaweli H area is being shifted for other food crops resulting in less drainage being available for Rajangana.

The collection of data covering the area upto Tract 3 in LB was commenced only from the beginning of maha 1994/95 employing two gauge readers from the Field Training Division (FTD). Tank water levels and rainfall records are posted daily on a display board in the IE's office while the daily gauge readings are weekly sent to ITI.

*Badagiriya Tank Scheme.* Badagiriya is a tank scheme located in the Hambantota District, having a capacity of 9,050 ac-ft (1,116.77 ha-m) and a command area of 1,850 acres (748.67 ha). The tank has a single main canal 8.45 km (5.25 miles) long having 18 outlet canals in operation with 7 gated regulators. Most of the outlet canals are with 1 cubic feet per second (cusec) (0.0283168 cumecs) or less discharge and only 3 canals may be considered as Distributary Canal Commands (DCCs).



Before the intervention, daily water levels and sluice openings had been recorded in a CR book and transmitted to the Regional Engineer's (RE's) office weekly, while daily rainfall had been recorded and passed on to the RE's office monthly.

Ceramic wall tile type gauges have been established at the downstream side of all the outlet canals and at the front face of all the Gated Regulators (GRR). During the yala season of 1994 the discharge computation methodology was completed, and all the outlets have been calibrated and data transmission has commenced. Data are being collected twice a day and transmitted to the RE's office the following day.

It has been decided to issue a programmed calculator to the TA to maintain a continuous record of discharges at each outlet canal. It has also been decided to maintain a computer database at the RE's office during the maha season of 1994/95.

**Macro-Catchment Modeling and Management Studies.** The erratic and uncertain rainfall conditions and the variable distribution of it both in space and time has been the main reason for the inability to develop a settled rainfall agriculture in the dry zone, without resorting to water conservation systems. Community-based water harvesting systems commonly referred to as "village tanks" have been developed to provide supplementary irrigation for crop production in the dry zone of Sri Lanka. Nearly all these village tanks are located within the catchments of major tanks. With population increases in the region, a conscious effort has been made to improve both major and village irrigation systems so that they would be able to irrigate more land in order to support the increasing population.

The water supply to many major tanks as well as to village tanks depends on their individual catchments. The catchment runoff depends on many factors: namely the catchment characteristics, rainfall intensity and duration, water detention structures in the catchments, antecedent soil moisture content, etc. Out of these characteristics, land use is one factor that is subject to change from season to season and can be controlled and properly managed. The number of village tanks in a major catchment also controls the water supply to major tanks.

This particular study was undertaken to recommend methods to improve the management of tank system catchments. The data from 35 village tanks collected over four maha seasons were analyzed. Further, the runoff plot experiments showed the extent of runoff under four important land uses. The study shows that cleared land or *chena* land produces high runoff (30 to 50 percent of the rainfall), whereas forest and abandoned *chena* with a good weed and scrub produce negligible quantities of runoff, unless the rainfall is high and continuous to produce temporary saturation of the surface soil layers. The other land uses, such as village settlements, or landform units such as rock knob plains, produce intermediate quantities of runoff.

Runoff from micro-catchments increases with increasing cumulative rainfall, and for most micro-catchments it shows an exponential relationship. Catchment runoff starts only when the rainfall is equal to or greater than about 90 millimeters (mm).

Minor tanks with a catchment to capacity at a full supply level ratio of 9 ha per ha-m or less, have a very low frequency of filling. In a minor tank, if the catchment area to full supply capacity of the minor tank is 9 ha or less, such a catchment is not effective as a source area for major tanks, where the minor

tank catchment is part of a major catchment. The density of minor tanks in the major catchments investigated is high enough to reduce the effective catchment area of the major tanks.

Catchment runoff yields could be enhanced by the suitable treatment of selected parts of micro-catchments. The soil compaction increased the runoff by about 60 to 70 percent compared to non-compaction. An increase in drainage density in a catchment showed a severalfold increase in catchment runoff, but with slight increases in the soil erosion rate.

A relationship of runoff or a runoff model in terms of rainfall and catchment land uses provides a suitable basis to predict runoff from a catchment; therefore, such a model would form a basis to select management practices. Efforts have been made to develop such a relationship. Regression analysis to develop a relationship of runoff in terms of rainfall and different land uses has not yielded a viable method.

Attempts have also been made to develop a simulation model. For this, each catchment was divided in to small elements or cells. The runoff from an element for each rainfall event was computed based on the runoff curves developed from runoff plot data.

To predict runoff, experiments were conducted to determine the "in-situ" water balance. The rainfall, runoff, soil moisture storage, and evapotranspiration from vegetation and crops were estimated by monitoring the soil moisture at regular intervals. Data show that forest and scrub consume nearly all the rainfall. The total water consumption by natural vegetation has been about 1,160 mm per annum. The water consumption in chena land has been about 900 mm per annum.

The average rate of evapotranspiration from forest and scrub was 3.2 (mm per day [mm/day]). Moisture loss in chena land was less and was about 2.5 mm/day. Monthly soil moisture depletion is different for the three land use types. The influence of solar radiation, soil moisture availability and the differences in the vegetation are very clear.

Natural forest and scrub jungle have similar hydrologic properties. Both vegetation types produce low runoff compared to cleared or chena land.

Soil erosion from chena land attains critical levels. However, soil loss from forest, scrub and abandoned chena is very small and is not a serious problem.

Water management in the command areas of Nachchaduwa and Huruluwewa was an additional component of this research effort. This was to establish the current status of on-farm water use and develop improved methods of irrigation. In the first phase of the study, the technical problems—particularly on on-farm distribution, waste, etc.—were examined and the socioeconomic conditions of the water users were also assessed.

In the second phase of the Water Management Program, attempts were made to develop alternative methods of on-farm water management, particularly to develop on-farm irrigation for other field crops. Two systems of water application were tested, namely "top down" and "bottom up" methods. Further, possibilities of providing on-farm supply ditches to achieve higher water use efficiency compared to current practices were investigated.

**Irrigation Management for Crop Diversification.** Initially, the Agricultural Research Station at Mahailuppallama was identified for contracting the study. After a few rounds of meetings indicating a heavy work load, it declined to take on the leadership but agreed to help with the technical aspects of the study. Several meetings were held with the Agriculture Department (Director, Agriculture Extension and his field staff), but they too expressed their inability to take on the leadership due to the heavy work load as well as the strict fund disbursement procedure of the Government which was not quite conducive for conducting research. On inquiry, the Faculty of Agriculture, University of Peradeniya has expressed its willingness to coordinate the research and has also agreed to prepare a proposal on the basis of the TOR. The Agricultural Research Station, Mahailuppallama, and the Agriculture Department will provide the necessary technical inputs as well as support for the implementation of the study.

The focus of the study has also been revised from major irrigation to minor irrigation systems considering the emphasis of NIRP on minor system rehabilitation. The study will attempt to find ways to promote cultivation of other field crops during the yala seasons in minor irrigation schemes. It will also attempt to explore the possibility of utilizing groundwater conjunctively for promoting OFC (other field crop) cultivation. The study will be conducted in an action research mode in two selected minor schemes in the Kurunegala and Anuradhapura districts. Implementation of the study will start from the 1995 yala season.

**Assessment of Tank Bed Siltation.** In Sri Lanka there are many small irrigation schemes fed by minor tanks. However, little is known about the siltation of these tanks. What little knowledge that exists is primarily based on visual observations and there have been very few attempts to gain a quantitative understanding of the extent of the problem. On the other hand, quantitative information is vitally important in order to make economically sound decisions regarding desiltation of tanks and the implementation of soil conservation measures in the catchments. During the implementation of the study "Farmer Participation in NIRP Schemes" it was observed that most of the FOs were asking for desiltation of the tanks as a major component of the Rehabilitation Program. But due to lack of quantitative data needed to assess the need for desiltation, it was not possible for the NIRP management to accommodate their request.

The study will be implemented in selected minor schemes with the following objectives:

- i. Monitoring of siltation in selected tanks.
- ii. Quantification of sediment input to the system as far as possible.
- iii. Development of a model for the sediment yield of small catchments.
- iv. Formulation of guidelines for the management of the catchment of small irrigation schemes in order to minimize siltation.

The study has been contracted to the Center for Environmental Studies, University of Peradeniya. The project proposal has been approved by the PD, NIRP, and sites have already been selected to initiate field data collection. Field work, however, could not commence as the formal agreement between the ID and the University has not yet been signed. It is expected that the agreement will be signed in the near future and field work will begin in early 1995.

**Study on Degradation of Micro-Catchments.** Catchment degradation is the loss of the productive value of land due to human activity. This involves depletion of soil fertility, increase in storm runoff and drying of springs. In Sri Lanka, the principal human activity leading to this problem is agriculture including traditional and modern intensive farming systems. Catchment responses to the clearing of natural forests may take the form of soil erosion and associated loss of productivity, and alteration of hydrological processes within the catchment. Reduced infiltration capacity and acceleration of the rate of surface runoff can cause soil erosion, flooding and siltation of channels, reservoirs and lowlying croplands.

The main objective of this study is a diagnosis of causes and consequences of catchment degradation leading to the preparation of a management plan. The secondary objectives are to adopt a multidisciplinary approach to watershed management taking the entire catchment as a single system to develop an ecologically acceptable management strategy with emphasis on the balanced development of land and water.

Initially, it was decided to implement the study in a major catchment and accordingly a proposal was developed and submitted by the Center for Environmental Studies, University of Peradeniya. Considering that a somewhat identical study is being conducted by IIMI under the Shared Control of Natural Resources (SCOR) Project, it has now been decided to conduct the study in selected microcatchments. The proposal is now being revised by the Center. It is expected that the study will be initiated by the second quarter of 1995 after completion of all required formalities.

## **Training and Technology Transfer**

### **Training**

**Training on Rapid Appraisal of Irrigation Systems.** A two-week Rapid Rural Appraisal (RRA) course for determining rehabilitation needs for irrigation schemes and identification of research needs was conducted at the Irrigation Training Institute at Galgamuwa.

The training course was organized by the IRMU with the help of Sri Lanka Field Operations (SLFO), IIMI, and was held from 7 to 17 June 1994. Seventeen participants from ID, IRMU, NIRP and Provincial Councils attended the course. Twelve resource persons—three from ID and nine from IIMI—were involved in the training. The training course was well received by the participants. During the first week, classroom lectures, group discussions and case studies were conducted on the following topics: (i) Introduction to RRA, (ii) RRA Needs for NIRP Schemes, (iii) RRA: A Tool for Identifying Research Needs, (iv) Appraisal Methods for Irrigation Supplies and Drainage, (v) Social and Institutional Aspects, (vi) Farm Management, (vii) RRA Analysis and Presentation Techniques, (viii) Farmer Group Interviews, and (ix) RRA Case Studies.

During the second week, field work was conducted in the Mahasiyambangamuwa Irrigation Scheme where a Rehabilitation Program is being implemented under the Asian Development Bank (ADB) financed North-Western Province Water Resources Development Project. For the field exercise, participants were divided into three groups to cover engineering, socioeconomic and agricultural aspects. About 25 farmers spent two full days with the study groups. In addition, the study teams visited women farmers and agency officials involved in irrigation and agriculture. The first draft of the field reports was

presented to farmers to verify data and solicit their comments for improvements. The final draft of the field reports was presented at the end of the Training Program.

**Training on Research Methodology.** The course on Research Methodology which was specifically designed for IRMU research staff had to be canceled for the second consecutive year due to the shortage of trainees (four out of five IRMU staff members have left the unit).

### **Technology Transfer**

**Review Of Past and Present Research.** IIMI Technical Assistance staff is helping IRMU locate, collect and summarize past and present research conducted within the country in the field of irrigated agriculture. This exercise is expected to lead to better understanding of the problems and help design follow-up research. Over 750 studies/reports have been identified and 74 have so far been summarized with 50 being done in 1994.

### **Holding of Workshops.**

#### **1. Workshop on Seasonal Planning Procedures to Improve Irrigation Management Performance: How the Kirindi Oya Experience of IIMI/ID can be Transferred to NIRP Schemes**

The workshop focused on the study implemented by IIMI at the Kirindi Oya Irrigation and Settlement Project in collaboration with the agencies in charge of the development and management of this project.

The objective of the workshop was to share the experiences of researchers and implementors involved in the study conducted at Kirindi Oya with professionals involved in the NIRP, and explore the possibility of incorporating the Kirindi Oya experiences to NIRP schemes. Eighty seven participants from the ID, NIRP, IRMU, Irrigation Management Division (IMD), universities, Agrarian Services Department, Department of Agriculture, Mahaweli Authority, IIMI, Provincial Councils, and nongovernmental organizations (NGOs) participated.

The methodology adopted for the overall improvement of performance of the scheme is Participatory Action Research in which the system management agencies, including farmers became the implementors of the Research Program.

It was recommended that for the schemes rehabilitated under NIRP, irrespective of the limited number of farmers and small commands, a plan of operation and maintenance be prepared. The participants recognized that the Kirindi Oya experience can contribute to the preparation of operation and maintenance plans for all types of schemes. Given the serious water supply constraints experienced by the Kirindi Oya System, the framework for water issues has become a useful tool to build a strong O&M organization. The workable water issue plan for Kirindi Oya can be replicated in other schemes with some site-specific alterations.

## **2. Workshop on Farmer Participation in Planning, Design, and Rehabilitation of NIRP Schemes: Current Status and Required Improvements**

The workshop generated a very lively discussion as this is an important topic to engineers, social scientists as well as system managers. The workshop was organized to share experiences with others and disseminate the information which was gathered through the research conducted by the IRMU. Thirty nine participants from the ID, NIRP, IIMI, Mahaweli Authority, AR&TI, Department of Agrarian Services, Department of Agriculture, Universities and IRMU attended the workshop.

The main objectives of the workshop were to make the participants aware of the present status of farmer participation in NIRP schemes and identify measures that NIRP should take to maximize effective farmer participation.

To achieve the objectives, two papers were presented, one covering plans and concepts and the other covering the actual field situation relating to farmer participation in NIRP schemes. Each presentation was followed by a discussion of one hour. A set of recommendations were developed to further strengthen farmer participation in NIRP schemes.

***Holding of Seminars.*** As part of its Technology Transfer Program, IRMU has started a Monthly Seminar Series from December 1992. Eleven seminars were held during the year 1994 (see Appendix 3.6). Speakers included professionals and researchers from national and international agencies, nongovernmental organizations, etc. The seminar series has been very well received and has been attended by participants from national and international agencies. For the first time, IRMU research results were presented through two seminars. Other presentations came from the following institutions: Department of Agriculture—1, University of Peradeniya—2, ID—1, Open University of Sri Lanka—1, Field Crop Research and Development Institute—1, IIMI—1, Food and Agriculture Organization Regional Office for Asia and Pacific—1, and an Independent Consultant—1. In addition to serving as a strong component of the Technology Transfer Program, these seminars also provide essential inputs to IRMU's Research Program.

***Publication of Newsletter.*** The Information Dissemination Program has been strengthened by initiating the publication of an IRMU Newsletter from early 1994. Two issues of the Newsletter have been published in 1994.

***Award of Fellowships.*** A strong component of the Professional Development Program is the award of fellowships to ID officials to pursue higher studies leading to postgraduate diplomas/degrees in national universities. This year, only one fellowship has been awarded, against the planned three, to Mr. L.W. Seneviratne of ID, to pursue postgraduate studies in Environmental Engineering and Management at the University of Moratuwa. The principal reasons for the lack of interest in utilizing these fellowships are: (i) officials preferring foreign scholarships over local ones, (ii) non-availability of an adequate number of appropriate courses, (iii) staff availing of these losing their priority for eligibility for foreign fellowships, and (iv) most of the advanced degrees offered by the national universities being not recognized abroad.

## **REPORTS AND PUBLICATIONS**

### **Annual Report**

The first Annual Report covering the period August 1992 to December 1993 was submitted as per schedule in March 1994.

### **Quarterly Reports**

Three Quarterly Progress Reports (January to March, April to June, July to September) were submitted as per schedule.

### **Workshop Proceedings**

The "Proceedings of the Workshop on Computer Models" has been published. The final draft of the "Workshop on Seasonal Planning Procedures to Improve Irrigation Management Performance: How Kirindi Oya Experience of IIMI/ID can be Transferred to NIRP Schemes" has been circulated for comments. There has been some delay in the publication of the "Proceedings of the Workshop on Farmer Participation in Planning, Design, and Rehabilitation of NIRP Schemes: Current Status and Needed Improvements." It is expected to be finalized by the end of March 1995.

### **Abstracts of Monthly Seminars**

Summaries of 12 seminars presented between December 1992 and December 1993 have been published. The first draft of summaries of another 12 seminars presented in 1994 has been prepared and sent for reviewing.

### **IRMU Research Highlights**

The first draft of the highlights of studies implemented by IRMU during 1993 and 1994 has been prepared. The final draft is expected to be ready by the end of March or early April.

## **PREPARATION OF THE 1995 WORKPLAN AND BUDGET**

The 1995 Workplan and Budget was prepared in November in consultation with the IRMU research staff, Deputy Director (DD)—IRMU, Co-PD—NIRP and PD—NIRP, and is presented in Appendix 3.4.

Output 4. Reports and publications.

Activity		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>A. Reports</b>	Planned				x			x			x		
	Carried out					x		x			x		
i. Quarterly Report	Planned												
	Carried out												
ii. Annual Report	Planned	x	x	x									
	Carried out	x	x	x									
<b>B. Publications</b>	Planned												
	Carried out												
iii. Research Publications	Planned												
	Carried out												
iv. Proceedings of Workshop on Computer Models	Planned	x	x	x									
	Carried out	x	x	x									
v. Proceedings of Workshop on Seasonal Planning Procedure	Planned									x			
	Carried out												x
vi. Proceedings of Workshop on Farmer Participation in Planning, Design, and Rehabilitation of NIRP Schemes: Current Status and Needed Improvements	Planned												x
	Carried out												
vii. Report on Rapid Appraisal Training	Planned									x			
	Carried out												x
viii. Abstracts of Monthly Seminars	Planned	x	x	x									
	Carried out	x	x	x									
ix. IRMU Research Progress	Planned	x	x	x									
	Carried out												
x. Summaries of Literature Review	Planned	x	x	x									
	Carried out	x	x	x									



## **PROJECT CONSTRAINTS**

### **Lack of Adequate Staff**

One of the most important activities of the TA Program is to obtain adequate staffing facilities at IRMU and train the staff to carry out the responsibilities assigned to them. This is also the area where minimum progress has been made during the last two and a half years.

At the very inception stage of the project, a multidisciplinary organizational structure, including a staffing policy and coordination mechanism, was developed. The structure proposes the IRMU to be organized into four disciplines (Irrigation and Drainage; Irrigation Agronomy; Socioeconomics, and Environment). When fully staffed, IRMU is expected to have 17 research staff including the Deputy Director (Head of IRMU). The recruitment and training of the staff are to be done in phases, bringing IRMU to full strength at the end of the four-year TA Project in late 1996.

The organizational and staffing plan was to be submitted to the Ministries of Public Administration and Finance for approval as it required the creation of cadres for non-engineering staff. The document is at present with the ID.

To date, six staff members including the Deputy Director (DD) (part time), have been recruited/seconded to IRMU—four on contract appointment and the other two on secondment from the ID. But unfortunately all four recruited on contract have left IRMU: two for more secure jobs and the other two for higher studies abroad. All four were trained by the TA team and their departure has been a big loss.

The major constraint faced by ID in recruiting staff to IRMU is a government ban on recruitment to the regular cadre (over 70 positions lie vacant as a result of this ban). However very recently, the ID has been able to recruit some staff of which one engineer has been assigned to IRMU. The other constraint faced by ID is that staff recruited on contract use IRMU as a launching pad for more secure jobs.

As has been mentioned earlier, the organigram and staffing policy prepared for IRMU back in late 1992 still awaits ID action for forwarding to the competent authority for approval. Without this document being approved, cadres for non-engineering staff cannot be created and IRMU in contrast to its intentions, will continue to remain a monodisciplinary unit.

If an adequate number of staff members are not recruited (at least six by June 1995), IRMU will not be sustainable after the TA Program terminates in mid-1996.

### **Lack of Interest in Fellowships**

Provisions have been made in the Technical Assistance budget to provide eight fellowships to pursue higher studies in national universities. Four fellowships have so far been awarded. In 1994, out of the planned three only one was awarded. The demand for the utilization of fellowships has become very low for the following reasons:

1. These fellowships are in direct competition with fellowships offered for higher degrees in foreign universities.
2. Many of the advanced degrees offered by local universities are not recognized abroad.
3. Staff availing of these fellowships lose their priority for eligibility for foreign fellowships.
4. Nonavailability of an adequate number of appropriate courses in national universities.

Some steps have been taken to improve the situation. These include the use of the fellowships for pursuing postgraduate courses in management and diluting the impact of local fellowships on eligibility for foreign scholarships. These, however, may not be enough and the Fellowship Program needs to be reorganized to enable participants to pursue higher studies in foreign universities.

### **Inadequate Financial Performance by IRMU**

IRMU has been allocated SLRs 50,070,400 for the implementation of its program. From the inception of the project to the end of 1994, only about 10 percent of the allocation has so far been expended. Thus, it is evident that the IRMU expenditure has been seriously lagging behind. Several reasons have been identified for this, which include the following:

1. The ID decision taken not to hire local consultants to the IRMU.
2. Very few professionals were hired on contract. The ID permanent officers seconded to IRMU continue to receive their salary from the Government of Sri Lanka (GOSL) funds.
3. There has been practically no expenditure on support staff, travelling, and supply and services as no support staff were recruited, no transport has yet been procured, and very little expenditure incurred in supply and services.

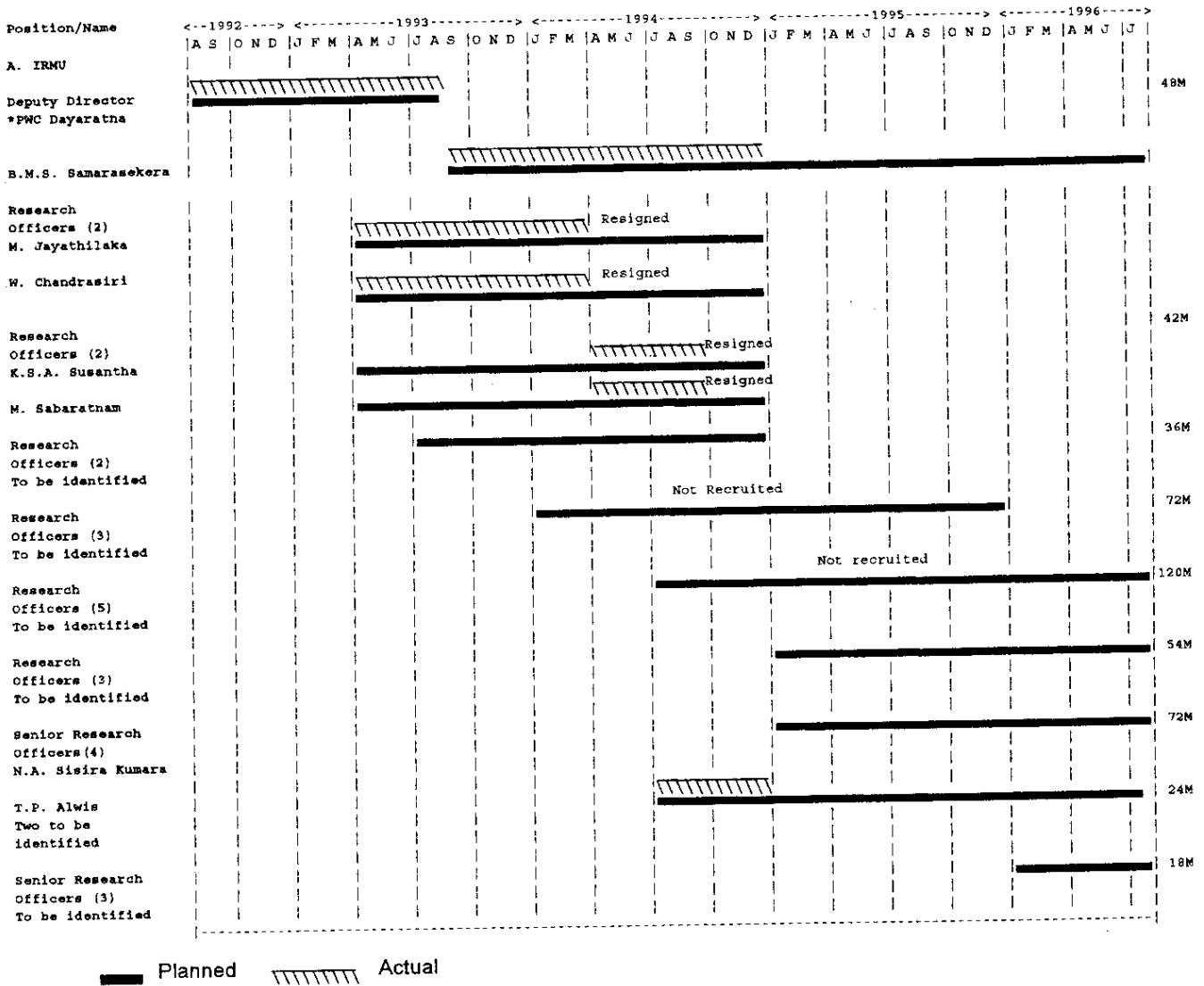
The above needs have nearly entirely been covered from the TA budget.

4. There have been delays in awarding contracts for research. After nearly one year of processing only one contract has been signed and another two are in the advanced stages of processing.
5. Provision for paying honorarium to Research Advisory Committee (RAC) and Research Coordinating Committee (RCC) members has been approved by the Government. But honorarium for ID staff from other divisions implementing IRMU Research and Technology Transfer Programs have not been approved.
6. There is no mechanism for IRMU to spend funds directly and reflect them in the relevant votes. Presently, all vouchers go through the PD, NIRP and no Head Office branch is authorized to disburse funds. This situation has created long delays and inconvenience in settling IRMU bills.

It is therefore essential that disbursement procedures of IRMU funds be made easier.

# Appendix 2.1

## Staffing Schedule—ID/IRMU

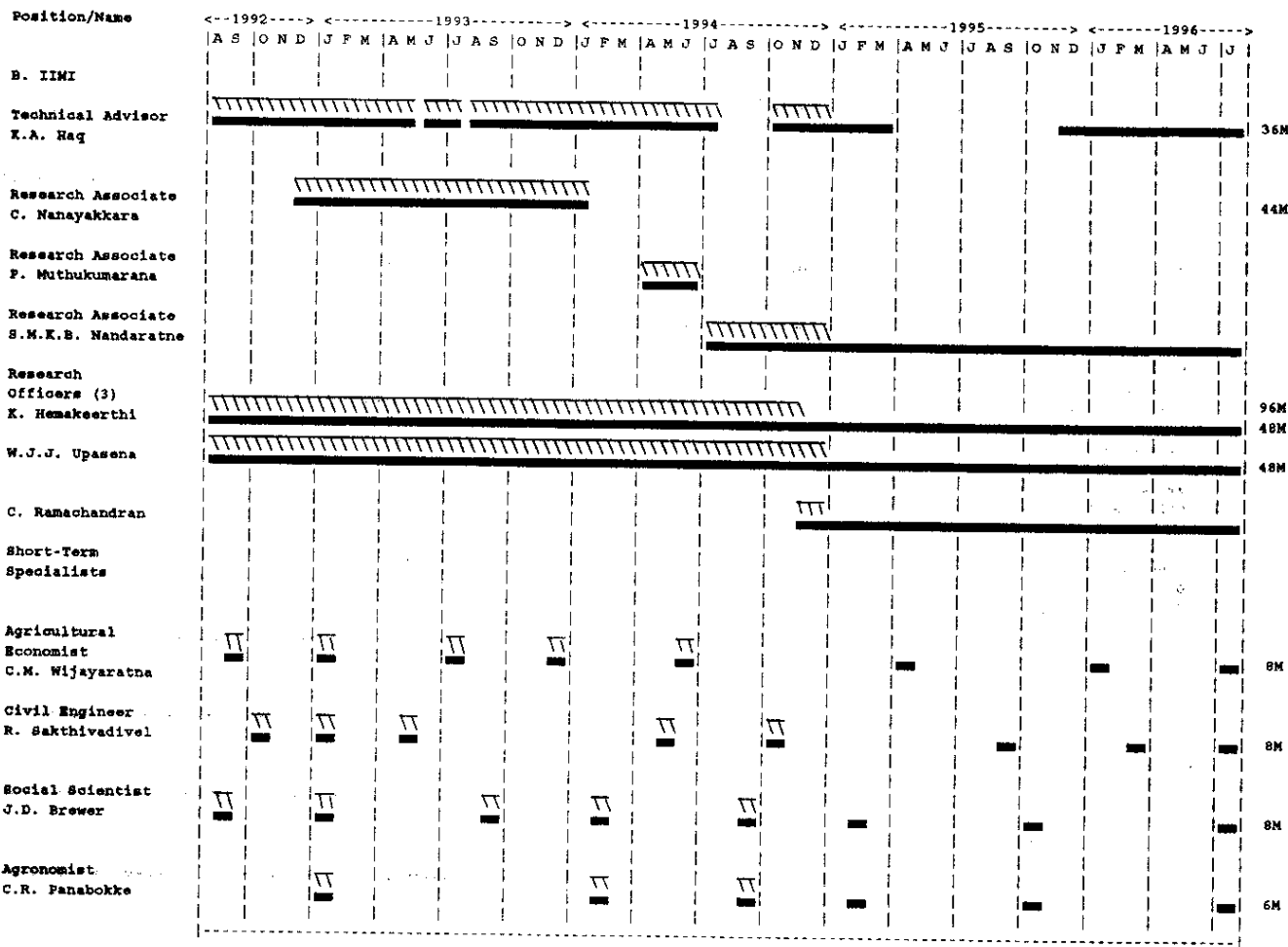


\* Mr. B.M.S. Samarasekera assumed duties from 1 September 1993.

- Notes:
- JFM = January-February-March.
  - AMJ = April-May-June.
  - JAS = July-August-September.
  - OND = October-November-December.

## Appendix 2.2

### Staffing Schedule—Consulting Services



Planned
  Actual

**Notes:** JFM = January-February-March.  
 AMJ = April-May-June.  
 JAS = July-August-September.  
 OND = October-November-December.

## Appendix 2.3

### Summary of Staff Mobilization and Inputs— (August 1992 to December 1994)

Post	Nomination	Approval	Date		Allocation	Man-Month		Balance
			Start	Leave		Utilized upto 31/12/93	Utilized during 1994	
Full-Time Staff								
Technical Advisor	K. Azharul Haq		17/08/92		36	14.7	8.0	13.3
Research Associates	C. Nanayakkara		01/12/92	28/02/94	48	13	2	-
	P. Muthukumarana		01/04/94	30/06/94	-	0	3	-
	S.M.K.B. Nandarathne		11/07/94	-	-	0	5.7	24.3
Research Officers	K. Hemakeerthi		01/08/92	15/11/94	48	17	10.5	20.5
	J. Upasena		01/08/92		48	17	12	19.0
	C. Ramachandran		01/10/94		20.5	0	1.5	19.0
Short-Term Specialists								
Agricultural Economist	C.M. Wijayarathna		01/08/92		8.0	3.75	1.0	3.25
Irrigation Specialist	R. Sakthivadivel		01/08/92		8.0	2.75	2.0	3.25
Agronomist	C.R. Panabokke		01/08/92		6.0	1.0	2.0	3.0
Sociologist	J. Brewer		01/08/92		8.0	2.75	2.0	3.25
Research Supervisors	Prof. D.C.H. Senarath Dr. S. Buvendrarajam Dr. N. Ratnayake		-	-	96	6.0	24	66

## Appendix 3.1

### Logical Framework—Irrigation Research Management Unit

Project structure	Indicators of achievement	Assessment of indicators	Risk/Assumptions
<b>General objectives</b>  * Sustainable increase in agricultural production and income from irrigation investment by research into technical and institutional aspects	* Increased agricultural production  * Increased farmer income	* Benchmark and post-project evaluation  * Mid-term evaluation	There are no significant risks, but would be very difficult to assess individual contributions to increased production and income as other factors are also involved
<b>Immediate objectives</b>  * Produce adaptive research results which will be of immediate interest and applicability to NIRP	* Adoption of innovations	* Progress report of NIRP  * External evaluation report	* There are no significant risks
<b>Outputs</b>  1. Establish a research unit  2. A strategic research plan  3. IRMU direct research projects  4. Contracted out research projects	1. Sustainable IRMU  2. Approved document  3. Number of successful projects  4. Number of successful projects	1. * Progress report of NIRP * External evaluation report  2. Review by RAC, NIRP, CEC and WB  3. Review of research reports by RAC, NIRP, CEC and WB  4. Review of research reports by IRMU, NIRP, RAC, CEC, and WB	1. There are no significant risks  2. There is no risk of failure, but may be delayed due to time lag in obtaining comments from different organizations, officers, etc.  3. There is no specific risk except for time overrun and unavailability of trained personnel with IRMU  4. Availability of competent organization to undertake the work

Continued on p.27.

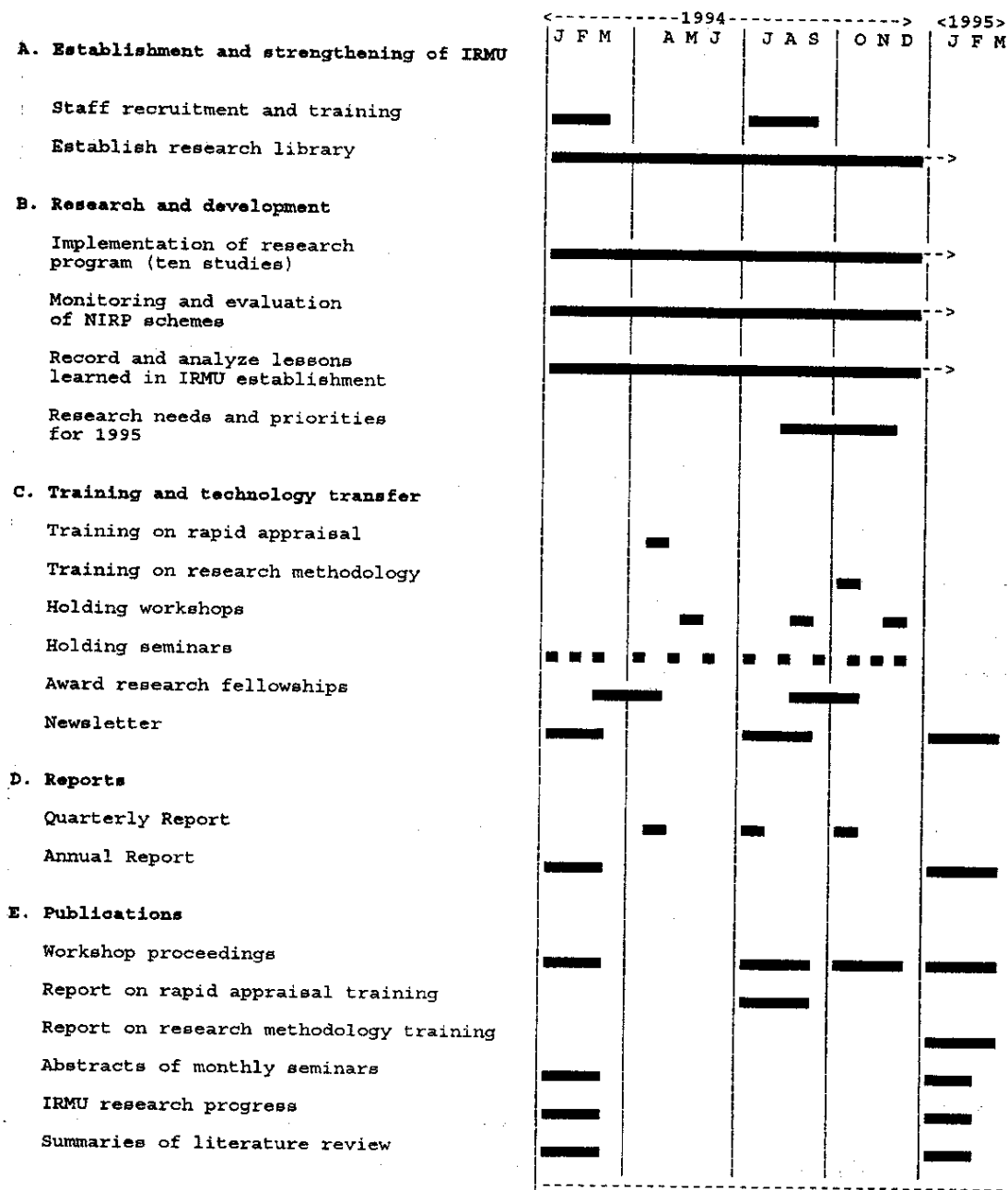
(Logical framework—IRMU, continued from p.26).

5. Disseminated findings	5. * Number of workshops * Number of seminars * Number of newsletters * Number of technical papers * Spread of knowledge	5. Progress reports * Do * Do	5. No specific risks
6. Training	6. Number of training courses conducted and personnel trained	6. Review of completion report of the courses	6. Unclear as to how long it might take for staff to use acquired knowledge in actual field studies
7. Fellowships	7. Number of fellowships awarded	7. Progress report	7. There is no specific risk. But there is an outside chance that some awardees may not successfully complete these studies
8. Improved methods of operation and maintenance of schemes	8. Number of cases of successful adoption	8. * Annual Report * Review by NIRP, RAC, CEC, and WB	8. May not automatically ensure adoption because other factors may influence decision
9. Improved methods of water resources planning and utilization	9. Number of cases of successful adoption	9. Continuous monitoring	9. Conflict of interests and high cost
10. Improved cropping pattern	10. Number of cases of successful adoption	10. * Progress reports * Continuous monitoring and evaluation by CEC and WB	10. Marketing problems may influence adoption
11. Research data for implementation	11. A research data bank of analyzed and evaluated data	11. Progress reports	11. Easy accessibility of data can occasionally be a problem
12. Improved library facilities	12. * Increased number of books, journals, modules, etc.  * Adequate space with matching physical facilities	12. Progress reports	12. No specific risk is involved
13. Improved awareness about the environment	13. Building environment concerns in projects/studies	13. Evaluation by RAC, NIRP and CEC	13. Low response from clients due to cost and other factors

Notes: RAC = Research Advisory Committee.  
NIRP = National irrigation Rehabilitation Project.  
CEC = Commission of European Communities.  
WB = World Bank.

## Appendix 3.2

### 1994 Workplan



Notes: JFM = January-February-March.  
 AMJ = April-May-June.  
 JAS = July-August-September.  
 OND = October-November-December.



## Appendix 3.3

### Summary of Research Program for 1995

#### PROGRAM : LOCAL MANAGEMENT OF IRRIGATION SYSTEMS AND TURNOVER

##### 1. Monitoring farmer involvement in schemes under NIRP

**Research mode** : By IRMU.

**Objective(s)** : To assess: (a) farmer involvement in rehabilitation, planning and design; (b) the efficacy of farmer participation in rehabilitation including a 10 percent contribution to cost of rehabilitation; and (c) the success with regard to the implementation of FO contracts.

**Date of commencement** : January 1993.

**Date of completion** : June 1995.

**Duration** : 2.5 years.

**Field sites** : Wennoruwewa and Kobeigane schemes in Kurunegala District; and Gampolawela, Udagoda Bandaraela and Udawela Mahaela schemes in Kandy District. Another 15 sites have been added during the second phase of the study to be initiated in early 1994.

**Estimated cost** : Rs 150,000.

##### 2. Study on the turnover process of NIRP schemes

**Research mode** : Contract.

**Objective(s)** : To assess the effectiveness of farmer organizations in the operation and maintenance of schemes handed over after rehabilitation, including resource mobilization for O&M.

**Date of commencement** : June 1995.

**Date of completion** : May 1997.

**Duration** : 2 years.

**Field sites** : 2 completed schemes under NIRP.

**Estimated cost** : Rs 700,000.

**3. Evaluation of maintenance performance by farmer organizations in handed-over distributary channels.**

**Research mode** : By IRMU.

**Objective** : To evaluate the structures and other aspects of distributary channels which have been handed over to farmer organizations for maintenance.

**Date of commencement** : November 1994.

**Date of completion** : April 1995.

**Duration** : 6 months.

**Field sites** : Parakrama Samudraya, Kaudulla, Gal Oya Lower Bank and Ridi Bendi Ela irrigation systems.

**Estimated cost** : Rs 60,000.

**4. Strengthening farmer organizations through increased participation of female farmers**

**Research mode** : By IRMU.

**Objectives** : To: (a) assess the degree and nature of women's involvement in FOs; (b) identify the main constraints for women to assume an active role in FOs; and (c) formulate an action plan for the promotion of increased participation of women in FOs.

**Date of commencement** : March 1995.

**Date of completion** : December 1995.

**Duration** : 10 months.

**Field sites** : To be selected from NIRP schemes.

**Estimated cost** : Rs 500,000.

## **PROGRAM : IMPROVING MANAGEMENT OF IRRIGATION SCHEMES**

### **5. Performance monitoring of automatic water level downstream control structures**

**Research mode** : Collaborative with the Sri Lanka Irrigation Training Institute (SLITI).

**Objective(s)** : (a) To evaluate the performance of Neyrtec downstream control systems in terms of water use efficiency and equity of water distribution under scheduled and unscheduled water deliveries.

(b) To evaluate the performance of locally manufactured flow dividers.

**Date of commencement** : 1 July 1993 (this is a carryover project from MIRP).

**Date of completion** : 30 June 1995.

**Duration** : 2 years.

**Field sites** : Rajangana Irrigation Scheme.  
One medium/major scheme under NIRP.

**Estimated cost** : Rs 500,000.

### **6. Action research to enable farmer organizations in selected completed NIRP schemes, to improve O&M as well as increase production**

**Research mode** : IRMU.

**Objective(s)** : To develop an implementation strategy for the aftercare of the rehabilitated scheme.

**Date of commencement** : February 1995.

**Date of completion** : January 1997.

**Duration** : 2 years.

**Field sites** : Dunupotha Wewa in Kurunegala District and Maha Kiri Ibbewa in Anuradhapura District.

**Estimated cost** : Rs 400,000.

**7. Estimation of tank yields and review of spill design formulae for minor tanks**

- Research mode** : Collaborative with Hydrology Division, ID.
- Objective(s)** : To improve yield estimation for small catchments by recalibrating model parameters for flood estimation formulae.
- Date of commencement** : 1 January 1995.
- Date of completion** : 30 June 1997.
- Duration** : 2.5 years.
- Field Site(s)** : Meddeketiya and Wewalawewa schemes in Kurunegala and Kandy ranges, respectively.
- Estimated cost** : Rs 430,000.

**8. Evaluation and use of computer models for improving irrigation management**

- Research mode** : Collaborative with Range Deputy Directors, ID.
- Objective(s)** : Pilot test locally developed/modified computer-assisted models for improved management of irrigation systems.
- Date of commencement** : 1 July 1993.
- Date of completion** : 30 June 1995.
- Duration** : 2.0 years.
- Field sites** : Buttala Anicut Scheme (NIRP), Moneragala District; Kekandura Scheme (NIRP), Matara District; Rajangana Scheme, Anuradhapura District; and Badagiriya Scheme, Hambantota District.
- Estimated cost** : Rs 1,222,000.

**9. Adoption of flow dividers by FOs in O&M of irrigation systems after turnover**

- Research mode** : By IRMU.
- Objective(s)** : (a) To test the adoption of flow dividers in flow regulations by FOs in irrigation systems.

(b) To study and compare the performance of conventional flow regulators and flow dividers in efficiency and economy of water use.

**Date of commencement** : March 1995.

**Date of completion** : June 1997.

**Duration** : 2.0 years.

**Field Site(s)** : A minor/medium irrigation system to be selected in the dry zone, preferably from the Kurunegala District.

**Estimated cost** : Rs 675,000.

#### **PROGRAM : IRRIGATION MANAGEMENT FOR CROP DIVERSIFICATION**

##### **10. Irrigation management for crop diversification in minor schemes**

**Research mode** : Contract.

**Objective(s)** : To identify appropriate water management practices for diversified cropping in NIRP schemes to increase productivity and farmers' income.

**Date of commencement** : April 1995.

**Date of completion** : March 1997.

**Duration** : 2 years.

**Field sites** : To be finalized with the collaborative/contracting agency.

**Estimated cost** : Rs 600,000.

#### **PROGRAM : ENVIRONMENTAL STUDIES**

##### **11. Assessment of tank bed siltation**

**Research mode** : Contract.

**Objective(s)** : To quantify sediment input to the reservoir and its temporal and spatial distribution over two sediment years.

**Date of commencement** : March 1995.  
**Date of completion** : February 1997.  
**Duration** : 2.0 years.  
**Field Site(s)** : 3 sites to be identified from schemes to be rehabilitated under NIRP.  
**Estimated cost** : Rs 1,000,000.

## **12. Study on catchment degradation of minor tanks catchments**

**Research mode** : Contract.  
**Objective(s)** : Systematic identification of process and quantification of catchment degradation, and preparation of a total catchment management plan.  
**Date of commencement** : June 1995.  
**Date of completion** : May 1997.  
**Duration** : 2.0 years.  
**Field site(s)** : Morapola Scheme in Kandy District and two other NIRP schemes (to be identified).  
**Estimated cost** : Rs 1,000,000.

## **13. Archaeological study on ancient irrigation systems**

**Research mode** : Contract.  
**Objective(s)** : To document ancient irrigation technologies and to prevent loss of national cultural heritage through the obliteration of archaeological material during NIRP construction activities.  
**Date of commencement** : April 1995.  
**Date of completion** : March 1997.  
**Duration** : 2.0 years.  
**Field Site(s)** : To be selected.  
**Estimated cost** : Rs 3,750,000.

## **Appendix 3.4**

### **Irrigation Research Management Unit Workplan and Budget for 1995**

#### **PAST PERFORMANCE AND PROGRESS : 1994**

This section describes the progress achieved by IRMU from January to December 1994.

#### **Establishment and Strengthening of IRMU**

##### ***Staff Recruitment and Movement***

During 1994, three research staff members joined IRMU, two on contract service and the third, who happens to be one of the fellowship recipients, on secondment from ID. During the subsequent period, IRMU has lost all four research staff (2 recruited in 1993 and 2 in 1994) employed on contract basis. Two accepted more secure jobs elsewhere and the other two went abroad for higher studies. The Research Associate and one Research Officer of the Technical Assistance Project also left in March and October, respectively. They have been promptly replaced.

During 1994, RCC authorized IRMU to recruit its own research staff (this was previously done by NIRP). The necessary paper work for obtaining government approval has been prepared by ID and is being sent to the respective authorities. The necessary steps have also been taken to create a separate cadre for non-engineering staff, and the required formalities have been completed by the Personnel Section of ID for onward transmission to the Ministry of Policy Planning through the Ministry of Irrigation, Power and Energy, for approval.

##### ***Establishment of Research Library***

A comprehensive proposal for upgrading the library was submitted to the PD, NIRP and has been approved. Bids have been invited for the supply and installation of airconditioners, photocopiers and library furniture and are being finalized. The Sri Lanka Library Association will help with the computerization of the library.

#### **Research and Development**

##### ***Implementation of Research Program***

The following ten studies were continued/undertaken during the reporting period. Two studies were completed and one was dropped.

***Monitoring Farmer Involvement in Schemes under NIRP.*** The preliminary study conducted in five NIRP schemes has been completed and the final report prepared. Five individual case studies and a

summary of emerging issues in all five schemes have been finalized. The findings were discussed in a workshop held in mid-October 1994, and the recommendations that emerged from the workshop have been used to improve the second phase of the study which has already commenced. The first round of data collection for this phase has been completed.

***Study on the Turnover Process of NIRP Schemes.*** The Agrarian Research and Training Institute has been identified for contracting the study. The institute has expressed its willingness to undertake the study and a TOR has been prepared accordingly.

***Performance Monitoring of Automatic Water Level Downstream Control Structures.*** The study has been completed with the collection of data for yala 1994. The final report is now being prepared.

***Estimation of Tank Yields and Review of Spill Design Formulae for Minor Tanks.*** The proposal submitted to the PD, NIRP has been approved during the fourth quarter of the year. Preliminary sites have been identified for final selection. Field work will begin in early 1995.

***Evaluation and Use of Computer Models for Improving Irrigation Management.*** Data collection for yala 1994 has been completed and data collection for the 1994-95 maha season is progressing satisfactorily. A workshop was held on 14-15 November 1994 at ITI, Galgamuwa, to discuss progress to date and the preparation of plans for the maha season.

***Macro Catchment Modeling and Management Studies.*** The study has been completed and the draft final report has been received from the Department of Agriculture.

***Irrigation Management for Crop Diversification.*** The Agricultural Research Station (ARS) at Mahailuppallama was identified for contracting the study. But due to the heavy work load ARS declined to take the leadership but agreed to help with the technical aspects of the study. The Faculty of Agriculture, University of Peradeniya has expressed its willingness to coordinate the research and they have also agreed to prepare a proposal once the TOR is finalized. ARS, Mahailuppallama, will provide technical inputs as and when required.

***Pilot Study on Aquatic Weed Control.*** Not much progress has been made in this regard. As this is a very localized problem it has now been decided to drop the study altogether.

***Assessment of Tank Bed Siltation.*** The study has been contracted to the Engineering Faculty of the University of Peradeniya. The proposal has been developed and the sites are being finalized to initiate field data collection. Field work will begin in early 1995.

***Study on Catchment Degradation.*** The proposal developed by the Center for Environmental Studies, University of Peradeniya, has been submitted to the PD, NIRP. The proposal is being revised based on the comments received from the PD.



## **Training and Technology Transfer**

### **Training**

**Training on Rapid Appraisal.** A two-week Rapid Rural Appraisal course for determining rehabilitation needs for irrigation schemes and identification of research needs was conducted at ITI, Galgamuwa. Seventeen participants from ID, IRMU, ITI, and Provincial Councils successfully completed the course. This is probably the only training course conducted by IIMI where 30 percent of the participants were women.

**Training on Research Methodology.** A second course on research methodology which was designed for the IRMU research staff had to be canceled as four out of five IRMU staff have left the unit.

### **Review of Past and Present Research**

IIMI staff is helping IRMU locate, collect and summarize present and past research conducted within the country in the field of irrigated agriculture. This exercise is expected to lead to better understanding of the problems and help design follow-up research. Seven hundred and fifty studies have so far been identified and 74 have so far been summarized, 24 in 1993 and 50 in 1994.

### **Holding of Workshops**

Two out of three workshops planned for 1994 have been held, the third one has been slated for late December.

**Workshop on Seasonal Planning Procedures to Improve Irrigation Management Performance—How Kirindi Oya Experience of IIMI/ID Can Be Transferred to NIRP Schemes.** The workshop focused on the study implemented by IIMI at the Kirindi Oya Irrigation and Settlement Project in collaboration with the agencies in charge of the development and management of this project.

The objective of the workshop was sharing of experiences of researchers and implementors involved in the study conducted at Kirindi Oya with parties involved in NIRP, and exploring the possibility of incorporating the Kirindi Oya experience to NIRP schemes. Eighty seven participants from the Irrigation Department, NIRP, IRMU, IMD, universities, Agrarian Services Department, Department of Agriculture, Mahaweli Authority, IIMI, Provincial Councils, and NGOs participated.

The methodology adopted was Participatory Action Research, in which the system management agencies including farmers became the implementors of the Research Program.

The senior officials highly commended the role played by IIMI in providing facilities and helping develop skills of the agency staff

It was recommended that for the schemes rehabilitated under NIRP, irrespective of the limited number of farmers and small commands, a plan of operation and maintenance be prepared. The participants recognized that the Kirindi Oya experience can contribute to the preparation of an operation and maintenance plan for all types of schemes. Given the serious water supply constraints experienced by the Kirindi Oya System, the framework for water issues has become a useful tool to build a strong O&M organization. The workable water issue plan for Kirindi Oya can be replicated in other schemes with some site-specific alterations.

**Workshop on Farmer Participation in Planning, Design, and Rehabilitation of NIRP Schemes—Current Status and Needed Improvements.** The workshop was organized in order to share experiences with others and disseminate information gathered through the research conducted by IRMU. Thirty nine participants from ID, NIRP, IIMI, Mahaweli Authority, AR&TI, Department of Agrarian Services, Department of Agriculture, Universities and IRMU attended the workshop.

The main objectives of the workshop were to make the participants aware of the present status of farmer participation in NIRP schemes and to identify measures that NIRP should take to maximize farmer participation.

To achieve these objectives, two papers were presented, one covering plans and concepts and the other covering the actual field situation relating to farmer participation in NIRP schemes. Each presentation was followed by a one hour discussion. A set of recommendations were developed to further strengthen farmer participation in NIRP schemes.

### ***Holding of Seminars***

As part of its Information Dissemination Program, IRMU started a Monthly Seminar Series from December 1992. To date, 24 seminars have been held covering a wide range of topics. Twelve such seminars were held in 1994. The speakers included professionals and researchers from national and international agencies, NGOs, etc. IIMI staff were involved in eight presentations, six independently and two in collaboration with the ID staff. The Seminar Series has been very well received and attended by professionals from national and international agencies.

### ***Publication of Newsletter***

The Information Dissemination Program has been boosted by initiating the publication of the IRMU Newsletter from early 1994. Two issues of the Newsletter have been published during the year.

### ***Award of Fellowships***

A strong component of the Professional Development Program is the award of fellowships to ID officials to pursue higher degrees in national universities. This year, only one fellowship has been awarded against the planned three. The unavailability of appropriate courses was the reason for not being able to achieve the target.

## **Reports and Publications**

### ***Annual Report***

The first Annual Report covering the period August 1992 to December 1993 was submitted as per schedule in March 1994.

### ***Quarterly Reports***

Three Quarterly Reports (January-March, April-June, July-September) were submitted as per schedule.

## **Workshop Proceedings**

The Proceedings of the Workshop on Computer Models has been published. The first draft of the proceedings of the workshop titled "Seasonal Planning Procedures to Improve Irrigation Management Performance: How Kirindi Oya Experience Can Be Transferred to NIRP Schemes" has been completed.

## **Summary of Literature Review**

The first volume of this publication containing 24 summaries of papers/reports, etc., related to the irrigated agriculture of Sri Lanka has been published.

## **Summary of IRMU Seminars**

Summaries of 12 seminar papers presented at the IRMU Seminar Series from December 1992 to December 1993 have been published.

## **IRMU Research Highlights**

The first draft of the highlights of research implemented by IRMU during 1993 and 1994 has been prepared.

## **PROPOSED WORKPLAN FOR 1995**

The overall workplan for the year is presented in Annex I.

## **Establishment and Strengthening of IRMU**

### **Staff Recruitment**

It has been planned to recruit eight Research Officers in 1995. This includes replacements for the four staff members who left IRMU, that were recruited in 1993 and 1994. The process initiated in 1994 to establish a cadre for Non-Engineering Officers will be pursued in earnest. Procedures initiated in 1994, as per decision of the RCC, to enable IRMU to recruit its own officers and staff will also be rigorously followed.

Four support staff (2 drivers, 1 secretary and 1 office aide), planned for recruitment in 1994, will also be recruited in 1995.

### **Establishment of Research Library and Review of Past and Present Literature**

The procurement of books, reports, journals, articles, technical papers will continue. A computerized cataloging system for the library will be developed. Physical facilities for the library will be improved further through refurbishing and remodeling.

## **Research and Development**

### ***Research Implementation***

Out of the 10 studies which were under implementation in 1994, two carried over from MIRP have been completed. The final report of the downstream control structure study will be completed in March 1995. The one on aquatic weed control will be dropped due to the very site-specific nature of the problem. Five new studies for 1995 are proposed which are subjected to approval of the RCC/RAC.

### ***Program : Local Management of Irrigation Systems and Turnover***

***Monitoring Farmer Involvement in Schemes under NIRP.*** The study initiated in 1993 in five schemes has been extended to include 20 more schemes in 1994. The study will be continued in 1995 and the results obtained from the study will be made available for improving the planning, design and rehabilitation of NIRP schemes through more effective participation of FOs. The results from the initial study were discussed in a workshop and the recommendations are being incorporated to improve the detailed study.

***Study on the Turnover Process of the NIRP Schemes.*** The study will document the turnover process as well as monitor how FOs operate and maintain the systems when these are handed over to them after rehabilitation. Recommendations will be developed to help successful turnover as well as O&M on a sustainable basis. Initially, two schemes will be selected for the study.

***Evaluation of Maintenance Performance by Farmer Organizations in Handed-Over Distributary Channels.*** There has been a general complaint that channels handed over to farmers under earlier programs are deteriorating at an unreasonably rapid rate. If the allegation is found to be true there will be a need to discuss and reconsider aspects of the turnover process as this has direct bearing on NIRP which mandates turnover of rehabilitated schemes to farmer organizations.

***Strengthening Farmer Organizations through Increased Participation of Female Farmers.*** The study will assess the present role of female farmers in farmer organizations and identify activities to strengthen FOs with their effective participation in terms of project objectives.

### ***Program : Improving Management of Irrigation Schemes***

***Performance Monitoring of Automatic Flow and Downstream Water Level Control Structures at Rajangana Irrigation Projects.*** This study was initiated under MIRP, and at the conclusion of the MIRP in June 1993 this was included in the IRMU Workplan. The study has been completed in 1994. The final reports will be brought out in early 1995.

***Action Research to Enable Farmer Organizations, in Selected Completed NIRP Schemes, to Improve O&M as well as Increase Agricultural Production.*** The participatory action research will help FOs develop long-term operational and maintenance plans for improved management of the schemes with the ultimate objective of increasing and sustaining agricultural production. Two to three schemes will be selected for the study.

**Estimation of Tank Yields and Review of Spill Design Formulae for Minor Tanks.** The proposal prepared in early 1994 has been approved by the NIRP Project Director. Preliminary selection of sites has been completed and the field research will begin in early 1995. The Hydrology Division of ID is implementing the study.

**Evaluation and Use of Computer Models for Improving Irrigation Management.** This pilot study has already been initiated in four schemes and data collection has begun. A third scheme will be added in 1995.

**Development/Adoption of Appropriate On-Farm Infrastructures (Hydraulic Structures) to Enable Farmer Organizations Effectively Operate and Maintain Systems after Turnover.** The study will help in the design, construction and installation of structures such as farm turnouts to enable FOs to operate and maintain their systems properly after turnover.

#### **Program : Irrigation Management for Crop Diversification**

**Irrigation Management for Crop Diversification in Minor Schemes.** To improve farm productivity and farmer income as well as to maximize production per unit of water, a suitable crop diversification study will be initiated in NIRP schemes. The exact nature of the study will be decided in consultation with the Project Management Committee (PMC). The study was proposed for implementation from 1994. But not much progress was made though a few rounds of discussions were held with scientists from the Mahailuppallama Research Station.

#### **Program : Environmental Studies**

**Assessment of Tank Bed Siltation.** With some delay the study has been contracted to the Peradeniya University with the objective of quantifying, in selected NIRP tanks, temporal and spatial distribution of sediments with a view to reducing sediment inflow and maintenance of required reservoir capacity. Sites for the study have been preliminarily selected and are now being finalized. Data collection will begin in early 1995.

**Study on Catchment Degradation.** This study will, in a systematic way, attempt the identification of processes and the quantification of catchment degradation with a view to preparing comprehensive catchment management plans. The proposal developed by the Center for Environmental Studies, University of Peradeniya is being revised in the light of the comments received from the NIRP Project Director. The implementation of the study will begin in early 1995.

**Archaeological Study on Ancient Irrigation Systems.** The project will aim to gather data on Sri Lankan irrigation technologies and attempt to reconstruct the ancient environment and investigate possible negative environmental impacts. The study will also help preserve the national cultural heritage by recording archaeological sites in the immediate vicinity of the irrigation structures that are being rehabilitated.

## **Training and Technology Transfer**

### **Training**

**Training Course for Trainers in Rapid Appraisal.** This two-week course which was conducted in 1994 and was very well received by the participants will be repeated in 1995 to train a core team of trainers. Participants from IRMU and other ID staff, including those from ITI participating in IRMU Research Programs, will be invited to attend. It is also planned to invite participants from the Department of Agrarian Services, *Sri Lanka* (DAS), Provincial Councils and organizations involved in the implementation of NIRP.

**Training Course in Research Methodology.** This training course specially designed for IRMU research staff could not be conducted in 1994 due to the small number of IRMU staff available. The course will be implemented in 1995 in which a selected number of other ID personnel who are involved in IRMU research will also be invited to participate.

### **Review of Past and Present Research**

Another 51 studies related to irrigated agriculture will be summarized. This will bring the total number of studies to 125.

### **Holding of Workshops**

The following four topics have been tentatively identified for 1995. The first one is a carryover from 1994.

1. Farmer Participation in Planning, Design and Rehabilitation of NIRP Schemes: Farmers' Perspective.
2. Managing Irrigation Systems after Turnover: Lessons from Integrated Management of Major Irrigation Settlement Schemes, *Sri Lanka* (INMAS) and the Mahaweli, and Their Implication on NIRP.
3. Sustainability of Farmer Organizations, Myth or Reality: Dialogue with Farmers and Officials.
4. Crop Diversification Strategies for Minor Irrigation Schemes.

### **Holding of Seminars**

The IRMU Seminar Series will continue with 10 to 12 seminars being organized in 1995.

### **Award of Research Fellowships**

Four more fellowships will be awarded during the year bringing the total to eight.

### ***Publication of Newsletter***

Three issues of the newsletter will be published during the year (January, May, September).

### **Reports and Publications**

#### ***Annual Report***

The Annual Report for 1994 will be submitted for publication in February 1995.

#### ***Monthly/Quarterly/Biannual Progress Reports***

These reports will be submitted as per schedule.

### **Publications**

The following reports/papers/documents will be published.

#### ***Workshop Proceedings***

The proceedings of the following workshops, two conducted in 1994 and one planned for 1995, will be published.

1. Seasonal Planning Procedures to Improve Irrigation Management: How Kirindi Oya Experience Can Be Transferred to NIRP Schemes.
2. Farmer Participation in Planning, Design and Rehabilitation of NIRP Schemes: Current Status and Needed Improvements.
3. Managing Irrigation Schemes after Turnover: Lessons from INMAS and Mahaweli, and Their Implications on NIRP.
4. Farmer Participation in Planning, Design and Rehabilitation of NIRP Schemes: Farmers' Perspective.

A Training Manual on RRA training has been prepared. But preparation of the report has been delayed and will now be completed in January 1995. A report on the second Rapid Appraisal Training Course will be published in December 1995.

Summaries of monthly seminars conducted in 1994 will be published at the end of February 1995. A report on the progress of IRMU research for 1993 and 1994 will be published in March 1995. Summaries of 50 fifty literature reviews will be published in February 1995.

**1995 BUDGET**

**IRMU Budget for 1995 (in SLRs 1,000)**

Item	Total budgeted amount	1995		
		Quantity	Unit rate	Total
1. Local Consultant	3,840.00*	-	-	-
2. ID professional staff	1,920.00	120MM	5.0	600.00
3. Support staff, travelling, office supply and services	4,040.00		SUM	600.00
4. Research	19,040.00	Sub total		<u>1,200.00</u>
4.1 Monitoring farmer involvement in schemes under NIRP	150.00		SUM	
4.2 Study on the turnover process of the NIRP schemes	700.00		SUM	400.00
4.3 Evaluation of maintenance performance by farmer organizations in handed over distributary channels	60.00		SUM	60.00
4.4 Strengthening farmer organizations through increased participation of female farmers	500.00		SUM	300.00
4.5 Performance monitoring of automatic water level downstream control structures	500.00		SUM	10.00
4.6 Action research to enable farmer organizations, in selected completed NIRP schemes, to improve O&M as well as increase agricultural production	400.00		SUM	100.00
4.7 Estimation of tank yields and review of spill design formulae for minor tanks	430.00		SUM	300.00
4.8 Evaluation and use of computer models for improving irrigation management	1,222.00		SUM	500.00

Continued on p.45.



Item	Total budgeted amount	1995		
		Quantity	Unit rate	Total
4.9 Development/adoption of appropriate on-farm infrastructures to enable farmer organizations effectively operate and maintain systems after turnover	400.00		SUM	200.00
4.10 Irrigation Management for crop diversification in minor schemes	600.00		SUM	400.00
4.11 Assessment of tank bed siltation	2,200.00		SUM	(800.00)
4.12 Study on catchment degradation	1,000.00		SUM	(600.00)
4.13 Archaeological study on ancient irrigation	3,750.00		SUM	(1,000.00)
4.14 Research arising out of immediate NIRP needs	500.00		SUM	500.00
		Sub total		<u>2,770.00</u>
5. Honorarium	1,200.00		SUM	100.00
6. Evaluation	400.00		SUM	-
7. Vehicle and equipment				
7.1 Vehicle+	4,400.00	2	-	-
7.2 Library	3,300.00		SUM	2,500.00
7.3 Office equipment+	100.00		SUM	-
8. Seminar	-	12	3.00	36.00
9. Training course				
9.1 Rapid Appraisal	-	1	150.00	150.00
9.2 Research Methodology	-	1	75.00	75.00
10. Contingency	11,630.40			
Total	<u>50,070.40</u>			
		Sub total		<u>2,761.00</u>
		Grand total		<u>6,731.00</u>

- Notes:
- \* ID has decided not to recruit a local consultant.
  - ( ) Studies 4.11, 4.12 and 4.13 will be funded from the Environmental Studies component of the NIRP budget and jointly managed with the Environmental Studies Program of NIRP.
  - + Vehicles and equipment will be procured by NIRP.

### Technical Assistance to IRMU Budget for 1995

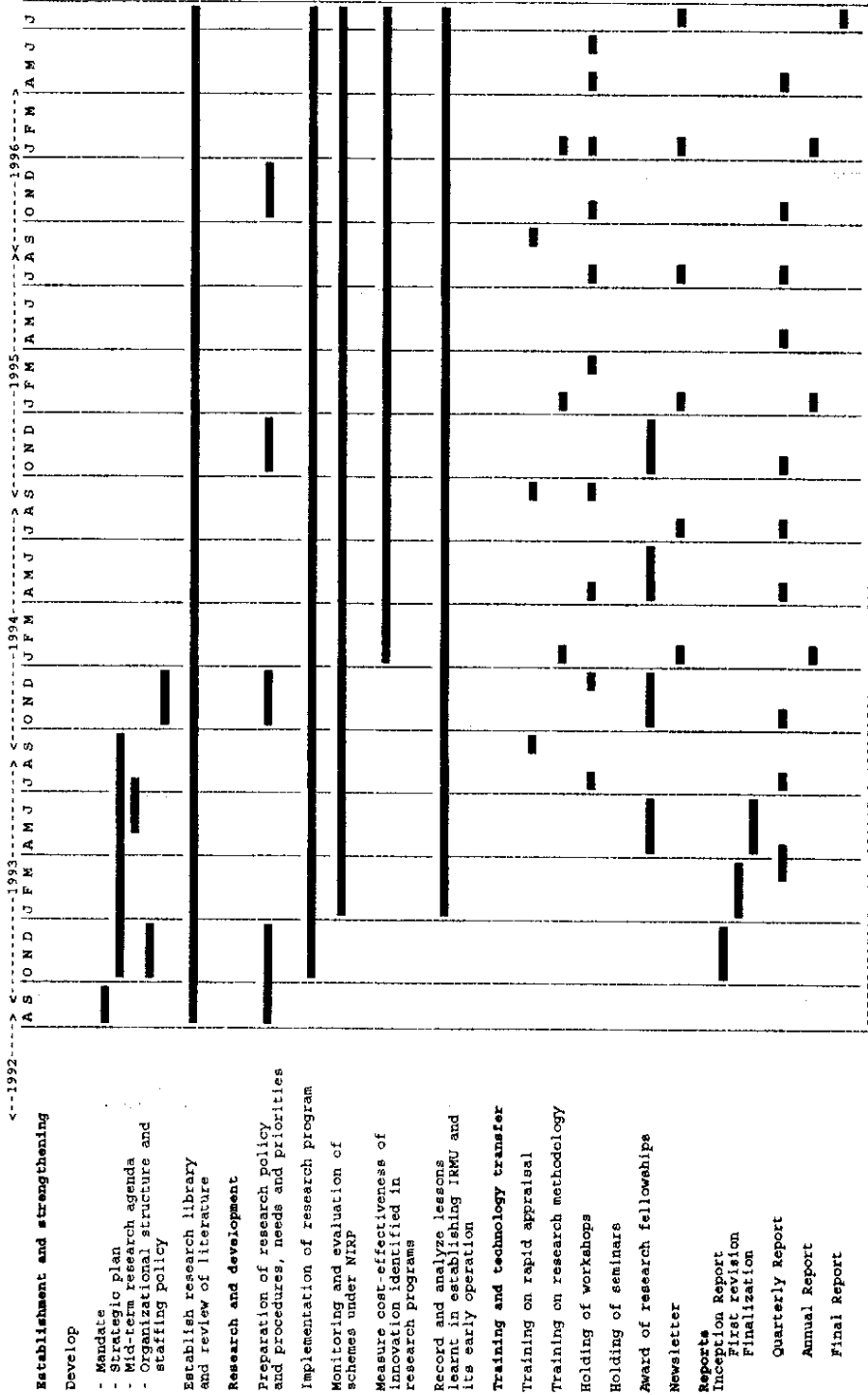
Ref.	Items	Quantity	Unit rate	Amount	
				ECU	SLRs
A.	Fees				
A1	Fees for services of international staff	13MM	11,128	144,664	
	Fees for services of national staff	72MM	28,200		2,030,400
B.	Direct expenses				
B1	Daily allowances	90 days	1,200		108,000
B2	Accommodation	12M	60,000		720,000
B3	Local travel				
B3.1	Motor cycle operation	24M	7,500		180,000
B3.2	Vehicle operation	24M	23,000		552,000
B4	-	-	-		-
B5	Office equipment (branch office)				
B5.1	Office furniture and administrative equipment	12M	20,000		240,000
B6	Running of office	12M	55,000		660,000
B7	Publication expenses	12M	62,000		744,000
B8	Workshops	12M	10,000		120,000
C.	Refundable expenses				
C1	Long distance travel (round trip)	3 visits	1,675	5,025	
C7	Fellowships	3	122,500		367,500
	Total			149,689	5,721,900

**Note:** \* Inclusive of remuneration for Research Supervisors.  
M = Months.  
MM = Man-months.



# Appendix 3.5

## Workplan—Life of Project



## Appendix 3.6

### IRMU Monthly Seminars—1994

DATE	TITLE	Resource Person(s)
24.02.94	Increasing Incomes in Irrigated Settlements	S.L. Amarasiri
31.03.94	Sediment Suspension and Transport by Waves	P.N. Wickramanayake
28.04.94	Natural Environment and Irrigation	Sarath Kotagama
19.05.94	Irrigation Management Transfer: International Issues and Results	Douglas Vermillion
30.06.94	Water Resource Development Planning as Seen in the Ancient Water and Soil Conservation Eco-Systems of Sri Lanka	D.L.O. Mendis
25.07.94	Sedimentation and De-Siltation of Minor Tanks	P.B. Dharmasena
29.08.94	Common Mistakes in Water Resources Designs	G.T. Dharmasena
20.09.94	Tank Cascade Systems in Sri Lanka: Some Thoughts on Their Development Implications	C.M. Madduma Bandara
19.11.94	Participatory Training of Water Users Group: Experiences from the On-Farm Water Management Project Executed by FAO in Indonesia in 1992-1994	Joost Geijer
30.11.94	Farmer Involvement in NIRP Rehabilitation: Some Preliminary Observations	J. Upasena Jeff Brewer and K.A. Haq
19.12.94	Agro-Wells: Their Socioeconomic Profile and Potential for Conjunctive Use with Surface Water	K.A. Haq

## Acronyms

ADB	Asian Development Bank
AR&TI	Agrarian Research and Training Institute
ARS	Agricultural Research Station ( <i>Mahailuppallama</i> )
CEC	Commission of European Communities
DAS	Department of Agrarian Services ( <i>Sri Lanka</i> )
DC	Distributary Channel
DCC	Distributary Canal Command
DCO	Distributary Channel Organization
DD	Deputy Director
D/S	Downstream
DSS	Decision Support System
ECU	European Currency
FOS	Farmer Organizations
FTD	Field Training Division
GOSL	Government of Sri Lanka
GRR	Gated Regulators
ID	Irrigation Department
IE	Irrigation Engineer
IIMI	International Irrigation Management Institute
IMD	Irrigation Management Division
IMIS	Irrigation Management Information System
INMAS	Integrated Management of Major Irrigation Settlement Schemes ( <i>Sri Lanka</i> )
IRMU	Irrigation Research Management Unit
ISMP	Irrigation System Management Project
ITI	Irrigation Training Institute ( <i>Galgamuwa</i> )
LB	Left Bank
M	Months
MIRP	Major Irrigation Rehabilitation Project ( <i>Sri Lanka</i> )
MM	Man-months
NGO	Nongovernmental Organization
NIRP	National Irrigation Rehabilitation Project
O&M	Operation and Maintenance
OFCs	Other Field Crops
PMC	Project Management Committee
RAC	Research Advisory Committee
RCC	Research Coordinating Committee
RE	Regional Engineer
RRA	Rapid Rural Appraisal Schemes ( <i>Sri Lanka</i> )
SCOR	Shared Control of Natural Resources
SLITI	Sri Lanka Irrigation Training Institute

SLRs	Sri Lankan Rupees
TA	Technical Assistance
TOR	Terms of Reference
U/S	Upstream
UB	Upper Bank
USAID	United States Agency for International Development
WB	World Bank
WP	WordPerfect