SECOND QUARTER PROGRESS REPORT
Kirindi Oya Irrigation and Settlement Project

PROJECT IMPACT EVALUATION STUDY

June, 1994

International Irrigation Management Institute
Colombo, Sri Lanka

CONTENTS

CHAPTER I

INTRODUCTION

1.1 Context for the Study

As explained in the First Quarter Progress Report[1] (IIMI, 1994) this study of the assessment of the benefits and the evaluation of the impact of the Kirindi Oya Irrigation and Settlement Project (KOISP) is being carried out under two Project Impact Evaluation Study Agreements, dated 29 December 1993, between the Director of Irrigation, Department of Irrigation, Colombo for and on behalf of the Government of the Socialist Republic of Sri Lanka (GSL) and the International Irrigation Management Institute (IIMI), Pelawatte, Colombo.

In para 28 of the Memorandum of Understanding of the KOISP Phase II ADB Review Mission, June 1992, it was agreed to carry out a detailed and comprehensive impact study as an expansion to the originally envisaged post-evaluation study of the KOISP. According to the MOU, the study should assess and quantify the direct and indirect benefits and possible negative effects of the Project. The study should also formulate measures to enhance the benefits of the investments and mitigate or minimize negative effects.

This present Second Quarter Progress Report is a product of the International Irrigation Management Institute and the reporting period was April-June 1994. The Project Impact Evaluation Study is a collaborative effort between IIMI and the Agrarian Research and Training Institute (ARTI) with the former having the overall responsibility. The two institutes share the responsibility of hiring and fielding the experts. Consultants from Ruhunu University have also been engaged by IIMI through a research contract to undertake the crop and livestock component of the study.

The progress of the study reported in this volume is reflected by the substantial number of field-level activities carried out during this quarter. The ARTI fielded its team to implement the large sample survey and the work was completed in April. A focussed sub-sample study to assess the nutritional and health status of KOISP beneficiaries is presently underway. IIMI and Ruhunu conducted their respective components of the impact assessment and fieldwork is proceeding. In addition to the field-level operations a review of secondary data is being implemented complementing the primary data generated by the surveys and interviews with key resource persons. A mid-quarter

[1] First Quarter Progress Report - Kirindi Oya Irrigation and Settlement Project. Project Impact Evaluation Study, IIMI, March 1994.

meeting with representatives of the study teams was held on 18 May to monitor the progress and to make arrangements for sharing and exchanging research data.

1.2 Objectives of the Study

The Impact Evaluation Study aims to assess the overall effects of the interventions as implemented under the KOISP. More specifically, the objectives of the study will be:

1) To identify and measure KOISP output and trends.
2) To measure the project benefits and evaluate the impact of the project.
3) To conduct a benefit-cost analysis of the KOISP.

In the previous progress report the main components selected for detailed impact analysis were described. In the next chapter the progress for each of the following components will be examined:

- irrigation system development, operation and maintenance;
- land development and settlement, infrastructure and socio-economic conditions;
- agriculture and livestock development;
- forestry and environment;
- institutional development, project management and beneficiary participation;
- cost-benefit analysis.

CHAPTER II

PROGRESS OF THE STUDY COMPONENTS

2.1 Irrigation System Development, Operation and Maintenance

This study on irrigation system development, operation and maintenance is implemented by IIMI and draws on earlier research undertaken by IIMI under two technical assistance grants[2] from the Asian Development Bank. The workplan for this component has provided the framework which describes the activities to be undertaken, the selected indicators, the level of analysis and the study methodologies. The major aspects to be covered by this study are:

a) **physical structures** (water storage, water conveyance, water distribution, drainage, supporting structures, land levelling and layout, construction, maintenance);
b) **area cultivated** (cropping intensity);
c) **resource base** (inflow, outflow, reservoir storage, area irrigated);
d) **hydrology and agronomy** (rainfall, evaporation, temperature, S&P losses, canal losses, RBE and LHG soils, water quality, water logging and salinity and flow measurement);
e) **operation and maintenance** (personnel, resource base, managerial aspects, rules, regulations and policy, socio-political aspects and support services);
f) **seasonal allocation** (planning, scheduling, implementation and M&E, communication);
g) **training** (officials, farmers, FRs).

During the last three months information has been compiled from primary and secondary sources. From the Irrigation Department, Water Management Unit, KOISP data has been collected on the cropping intensities in the KOISP from 1986 to 1993/94 Maha season, the Lunugamwehera reservoir inflow and outflow, the water level and storage of the Lunugamwehera reservoir, the area irrigated under the KOISP, and the water quality in the Lunugamwehera and the five ancient tanks (Deberawewa, Tissawewa, Yodawewa, Weerawila Wewa, and Pannegamuwa Wewa) from 1990 to 1993. The rainfall and evaporation data from 1988 to 1994 was collected from the Agricultural Research Station, Weerawila.

Through a field-level survey (see Appendix 1) primary data has been gathered on farmers' perspectives towards the performance of the KOISP. Specific questions were asked on the infrastructure facilities, reservoir operations, irrigation system operations

[2] Technical Assistance Study (TA 846 SRI): Irrigation Management for Crop Diversification (Sri Lanka), 1988-1990 and Technical Assistance Study (ADB TA 1480 Sri): Irrigation Management and Crop Diversification (Sri Lanka) Phase II, 1991-1994.

(main system, distributary canal, field canal, on-farm water management), system maintenance, turnover of operation and maintenance. For the old irrigation system (Ellegala) inquiries were made about the rehabilitation work before 1986 and about the RID (Rectification of Irrigation Difficulties) activities after 1991 to get a better understanding of the situation in this ancient irrigation system.

At the moment the data from the large sample survey for the irrigation component is being processed and stored in a database. Subsequently, the analysis will take place and inferences will be made synthesizing the information which is available to the research team from the multiple sources.

2.2 Land Development and Settlement, Infrastructure and Socio-economic Conditions

This component is implemented by the ARTI and covers the following elements:

a) an assessment of the **immediate benefits of land development and settlement** under the KOISP on settler families, women and youth in the Newly Developed Area; farmer families in the Old Developed Area; employees in the private sector and the people of Sri Lanka;
b) an assessment of the **socio-economic conditions** (both pre- and post-project) of beneficiaries and an evaluation of the long term impact of land and infrastructural development on the agriculture in the area; people of the area, incl. special groups such as women and youth; and the environment.
c) an assessment of **infrastructure development** under the KOISP, including roads, education, health drinking water and other facilities.

For the individual sub-components of this study, indicators and parameters have been developed by the ARTI. These reflect the major areas of concern of this part of the impact assessment study. It goes too far to list all the variables here, but for the sake of accuracy, the questionnaire for this component has been annexed (see Appendix 2) which provides a proper overview of the type of information collected.

The ARTI was responsible for the field organization and the conduct of the large sample survey, which included about 500 farmers' households. In addition to the three studies undertaken by ARTI as formulated above, the survey collected further data pertaining to farmers' perception on irrigation (see above), project management (see below) and crop and livestock production (also below). IIMI and Ruhunu University which are responsible for the final outputs of these components provided enumerators for these respective components and assisted ARTI in the conduct of the large sample survey (e.g. pre-testing of questionnaire, training of enumerators).

The activities of the ARTI can be divided into four stages. **Stage I** included the formulation of a detailed workplan, a review of secondary sources (including much of its own work in monitoring and evaluation of KOISP), collaboration with the other research institutes, development of indicators leading to the questionnaire to be conducted, and the pre-testing and revision of the questionnaire. This activity was mainly carried out in the first quarter of this year. In **Stage II** the large sample survey was completed (mid-April) and most of the coding, data entry and analysis of the land settlement, infrastructure and socio-economic components has been finalized by now. A set of dummy tables has been prepared and was discussed with the research team. The completed questionnaires relating to the institutional and irrigation components have been handed-over to the study coordinators for processing and analysis by the IIMI researchers. ARTI will make available diskettes containing the large sample survey data to IIMI and IIMI will do vice versa with regard to the data on irrigation and project management. **Stage III** is characterized by the implementation of two additional studies. One hundred settler households were selected to collect information on nutrition and health conditions (sub-sample survey). Data collection will have been completed by the end of this quarter. A second study into land settlement, education and health facilities and conditions has been completed during this quarter. All schools in the project area were visited by the ARTI research team. The DMO office of the KOISP and hospital records provided secondary level information on health conditions in the area. The final **Stage IV** will consist of the analysis and reporting of the research findings. ARTI is expecting a draft report for all its components by the end of July/early August.

2.3 Agriculture and Livestock Development

This component is implemented by the Ruhunu University and covers the following elements:

a) **crop production** (rice, OFC's, cropping index, intensity of chena cultivation, development mix, constraints;
b) **livestock production** (neat cattle, buffaloes, pastures and fodder crops, services (extension, constraints)
c) **farms** under the KOISP (resource base, system instruction, farm income)

The activities of this crops and livestock component during this quarter have been the collection of information from secondary sources, informal discussions, participation in ARTI's large sample survey and field studies.

Data form **secondary sources** (published and unpublished reports) was collected from ARTI, IIMI, individual researchers and other officers. The information included cultivated areas, total production figures, type of varieties, support services and so on. In addition, information was obtained on the pre-project situation and the KOISP objectives and goals pertaining to this component.

Informal Discussions were carried out with various officers of the Department of Agriculture, Department of Animal Production and Health, Members of the Project Management Committee, Provincial Secretary, Office Bearers of Farmer organizations, Middleman etc. The exchange of information rendered important knowledge on inter alia the multiple production activities undertaken under the KOISP, the institutional support to these activities and the problems encountered by settlers and officials. Based on the information obtained from secondary sources and these informal discussions, a more structured sample survey was designed.

Questions on crops and livestock production were included in the **large sample survey** implemented under ARTI's supervision. Ruhunu University provided two field investigators to conduct the survey.

A **field-level study** on crop production was completed early June. This stratified random sample survey selected 150 households (both old and new areas) from the ARTI large sample survey and elicited information on extents of paddy and OFCs cultivated, seasonal variations in cropping patterns, use of inputs, cost of production, marketing, and constraints. Tabulation of the data has started. On livestock production in KOISP data is scarce and limited. Since the most important livestock activity in KOISP is cattle/buffalo rearing, attention will be focussed only on this activity. Thus, information will have to be obtained on cattle/buffalo management, livestock support services, milk, meat and curd marketing and so on. A start was made to collect information from the Cattle Farmers Associations (Magampura, Ruhunu and Berelihela) and the Livestock Centre (Mahaweli Farm). A random sample survey of 100 cattle/buffalo farmers was prepared and commenced in the third week of June.

2.4 Forestry and Environment

This component is implemented by IIMI in collaboration with the Forest Department. It covers an assessment of the **forestry** activities under the KOISP and the **environmental impact** of the KOISP. The former activity includes an evaluation of:

a) **project outputs** (nursery development, woodlot development, homelot development, live fencing, extension services, fuel efficient cookstove);
b) **benefits to settlers** (yield of firewood, round poles, timber, reduction of drudgery in gathering fuelwood);
c) **forests** in the project (forest cover, reforestation, illicit clearing and chena cultivation);
d) **Lunugamwehera National Park** (elephant relocation, farmer elephant conflicts).

Data has been collected on project outputs and reveal different levels of success. While line fencing shows only marginal accomplishments, homelot development and roadside planting have good progress. The study on woodlot development indicated that this program had been slow because of delays in signing the long term agreement (81

agreements not signed yet). From forestry data it appears that in this area under the natural forest cover only medium density forest is observed. With the Department of Wildlife arrangements have been made to assess the success of the elephant relocation program, for which field trips have been made in the latter part of June. It is expected that the data collection for most of the forestry component will be completed by early July and data analysis will take place during next quarter.

The activities to study the environmental impact of the KOISP include:

a) **disturbance** in the lagoon ecology;
b) Bundala bird **sanctuary**;
c) soil **erosion and silting** of waterways;
d) modification in **hydrology** of the old EIS;
e) **salinity** hazards.

Field studies to assess the disturbance in the lagoon ecology have been completed and the sources and intensity of the disturbances have been identified. Exploration of the modifications in the hydrology of the Bundala lagoon reveal little or no disturbances. However, major disturbances have occurred in the Embilikala lagoon which in turn in connected to the Malala lagoon. Salinity hazard studies have been completed, interpretations drawn and conclusions documented in several presentations. The locations, source and intensity of the hazards have been reviewed and interpreted.

Major modifications in the EIS hydrology were observed in the lowermost alluvial flood plain bordering the outfall to the see. During the last quarter, field visits were made and the final interpretations and analysis will be made during the next quarter. The soil erosion and silting of waterways component is nearly completed. One more round of field observations will have to be made on benchmark sites at the end of this dry season (July - August).

2.5 Institutional Development, Project Management and Beneficiary Participation

This component of the impact evaluation study includes the aspects of the project management of the KOISP, the institutional development under the KOISP and the beneficiary participation in the management of the KOISP. The responsible research institute is IIMI.

The **project management** of KOISP is being assessed through an evaluation of the major project management mechanisms for coordination between the agencies, monitoring and evaluation of project progress, technical assistance to particular components and the arrangements within the responsible agencies for supervision of the assigned components. To learn lessons, the reasons for certain specific management problems are being explored in some detail. Basic documents are currently under examination.

Institutional development under KOISP consists of formation of government institutions for the new settlers and development of institutions for management of the new infrastructure. The development of the government institutions has been complicated by external factors which has resulted in a deviation from the plans and a change of function of certain agencies. The institutions for management of the infrastructure include institutions within the responsible agencies (e.g. Irrigation Department has made special arrangements for the construction of the dam and the new system) and institutions outside the government agencies (e.g. the farmer organizations). At this time, the major innovations are the farmers organizations and joint management committees. These are being studied through the large scale survey and using data from previous studies.

Beneficiary participation will be evaluated as an integral component of the evaluation of the project management and institutional development under the KOISP as the project beneficiaries can only participate in the KOISP management through the project management arrangements or through the newly developed institutions.

During the last quarter an effort has been made to carefully document the KOISP management agencies (executing agencies, management and coordinating bodies, monitoring and evaluation) and to register their functions according to the project design and whether and how their roles have changed in the course of the project. Important matters among others were to explore how project activities were modified in response to management mechanisms to identify weaknesses and strengths in project management structure. Primary data were collected on project beneficiary participation to assess the farmer organization development in both New Areas and Ellegala Irrigation System (see Appendix 3). In addition, for Ellegala only, the participation of project beneficiaries (e.g. consultation, participation in construction work) in EIS Rehabilitation Planning and Design (pre-1986) and the participation in RID Planning and Design (1992-93) was assessed. During the coming months interviews with selected key resource persons will be held in order to be able to draw conclusions for this component of the impact evaluation study.

2.6 Cost-Benefit Analysis

This assessment of the benefits and costs of KOISP is implemented by IIMI and is envisaged to include direct and indirect benefits, direct employment benefits, direct and indirect costs, foreign exchange savings and an economic and financial evaluation (see Appendix 4 for details).

The Cost Benefit Analysis (CBA) of the KOISP is considered as an important component of the impact evaluation study. The post-project CBA will compare the projected economic and financial benefits (as estimated at the preparation stage), with the realized benefits after project completion. The latter is expected to provide a more realistic

estimate of actual project benefits that may accrue over the life of the project (fifty years). Indirect benefits and costs will be incorporated in the analysis, provided that reliable data necessary for such analysis is available or could be relatively easily obtained.

Considerable inputs were needed to extract the required cost information from available records of the Irrigation Department and other relevant agencies. In the first instance, secondary data from published documents were gathered from the available sources. Published reports, annual accounts and project progress reports were examined at the outset. Subsequently, more detailed information including cost breakdown, was obtained by examining various project documents/files both at the head office and project offices of the Irrigation Department. From the initial analysis it appears that complete cost records with the required breakdown are not available for all the years of project implementation. Cost data for the early years of the project (Phase I), were unfortunately found wanting. In addition, some detailed data of Phase I of the project were lost due to the fire at the Kirindi Oya project office. Accounting for Phase II of the project was undertaken by a private consultant. A more detailed breakdown of costs is available for this phase of the project.

It was further observed that cost figures extracted from progress reports varied considerably with that of the Annual Accounts. As expected, the figures from the progress reports tended to be lower than those in the annual accounts, differing by as much as 30% to 40% in some years. The estimates provided in the Annual Accounts were considered to be more reliable than those in the progress reports. However, the breakdown of project costs in the Annual Accounts was not sufficient for computing shadow prices required for a complete economic analysis. For example, a breakdown of costs by components and by labor, material, machinery etc. is required for this purpose. It is proposed to get over this difficulty by estimating factors for each of these components. For this purpose, a fresh breakdown of the costs will be attempted using an estimate of the actual work done on a sample section of the dam, canals and structures, being currently undertaken by staff of the Irrigation Department at Kirindi Oya.

Local and foreign costs of the project are classified only on the basis of direct imports by the project. The indirect foreign component of the cost elements is not available. It is proposed to use the same factors used by the Department of National Planning to breakdown individual cost components into local and foreign costs. The estimation of benefits of the project will have to await the results of the large scale survey conducted by the ARTI and the special studies undertaken by the Ruhunu University and the IIMI/SLFO research team.

A special study is being undertaken to assess the indirect economic impacts of the KOISP. An exploratory survey was conducted using data obtained in the previous year by the IRD project to identify non-agricultural business activities in the area. This was supplemented with data from the Divisional Secretariat. Approximately 25 business

activities were identified for this survey and a sample of these businesses were selected for further analysis.

In addition the following sub-sectors were also taken up for study:

a) inland fisheries (to assess the number of people involved in this sector and the fish production before and after the project);
b) polas and marketing outlets;
c) transport (to assess the extent of improved services after the project);
d) banks (banking facilities to farmers and other businessmen);
e) capital assets of farmers (from Divisional Secretariat).

Other aspects of this special study include the non-formal financial sectors (e.g. Janasakthi, Sarvodaya, NGOs), development of housing and real estate and the project impact on marine fisheries (especially in the lagoons) for which fishermen and government officials have been interviewed.

CHAPTER III

ARRANGEMENTS FOR THE NEXT QUARTER

3.1 Data Processing and Analysis

The third stage of the impact evaluation study will be characterized by the processing of the data collected in the field. The collaborating research institutes have made arrangements for timely coding, data entry and processing of the information. It is envisaged that the research teams will share their data for cross-tabulations and other analyses of association.

It should be clear, however, that an important part of the analysis will be based on earlier studies and research efforts. This means that the current data collection endeavor will complement and add on to the already available information, both quantitative and qualitative in its kind. For instance, the impact evaluation study is able to draw on several studies implemented by the ARTI in its role as the monitoring and evaluation agency of the KOISP since 1982. IIMI has been involved with the project since 1986 through the ADB funded Irrigation Management and Crop Diversification Project. The challenge is to synthesize the available information with the recently collected data, and to identify in retrospect generic lessons with could be learnt from the KOISP experience which will be useful in planning and implementing future (irrigation and settlement) projects.

3.2 Reporting and Workshop

During the following quarter the respective research institutes will document their findings of the research activities in draft reports. These reports will be reviewed by the research teams and senior staff members from IIMI. The major task will be to derive lessons from the experience in KOISP and translate them into potential actions which could improve the functioning of this project. In addition, guidelines for the design of irrigation and settlement schemes with a more general applicability should emerge. In this respect, the workshop which will be held in Colombo (late September - early October) with senior participants of the implementing and supporting agencies will be extremely constructive. The likelihood of welcoming recommendations to improve the general performance of the KOISP is obviously dependant on the level of concordance from the senior policy makers in Sri Lanka.

It is expected that the first drafts of the respective project components will circulate in September and that in October a Draft Final Report will be submitted to the Irrigation Department and ADB. The final version of the Project Impact Evaluation Study should then be ready in November 1994.

APPENDIX 1
PROJECT IMPACT EVALUATION STUDY:
Questions on Irrigation

A. Infrastructure Facilities

1.1 What is your general idea about construction of following items.

(Tick the answer)

		Very good	Normal	Poor	Very Poor	No idea
(a)	Entire System	A1	B1	C1	D1	E1
(b)	Main canal	A2	B2	C1	D1	E1
(c)	Branch Canal	A3	B3	C3	D3	E3
(d)	Distri. Canals	A4	B4	C4	D4	E4
(e)	Field Canals	A5	B5	C5	D5	E5
(f)	Drainage canals	A6	B6	C6	D6	E6
(g)	Gates	A7	B7	C7	D7	E7
(h)	Regulators	A8	B8	C8	D8	E8
(i)	Farm Turn-out	A9	B9	C9	D9	E9

1.2 Is your field located at

(1) A field canal originating from Main canal
(2) A field canal originating from Branch canal
(3) A filed canal located at the head stretch of Distributer canal
(4) A filed canal located at the middle stretch of Distributer canal
(5) A filed canal located at the Tail stretch of Distributer canal
(6) A tail end Field canal of the Distributer canal

1.3 During cultivation period dose your field canal

(1) get adequate irrigation water
(2) have water difficulties due to un-necessary gate operations
(3) get insufficient water due to problem in construction.

1.4 What additional facilities, do you think that the project should have introduced?

(1) cattle crossing,
(2) bathing steps,
(3) lining of canals at critical points,
(4) cross drainage works (syphon, aqueduct, super passage, etc.)
(5) Bridge across main canal to connect Hamlets and Paddy fields.

B. Reservoir Operations

2.1 Do you think that water received in the reservoir is used efficiently for cultivation ?
(1) Yes (2) No

2.2 What are your proposals for water deficiency in Lunugamwehera reservoir

(1) Use water more efficiently (canal close responding to rain-fall, introducing rotations, Timely cultivation)
(2) Grow OFC's on suitable lands in both seasons.
(3) Use agro-wells
(4) divert water from other rivers
(5) Rotational cultivation of the zones.

C. Irrigation System Operation

3.1. Main system operation

3.1.1 Do you notice water level fluctuations in the main canal

(1) Did not notice
(2) Minor fluctuation take place daily
(3) Fluctuation take place daily
(4) Heavily fluctuate daily
(5) No idea about main canal

3.1.2 Water issuing to the canals originating from main canal

(1) plentiful supply on demand of farmers
(2) Water scarcity prevailing through out the cultivation season due to the control of gates by officers
(3) Water scarcity during critical period in the growth stages.

3.2 Distributory Canal Operation (fill if applicable)

What is your idea about water issue from Distributory canal to Field canal
(1) Adequate
(2) Inadequate through out cultivation period (reason not known)
(3) Inadequate on some critical crop growth periods
(4) Inadequate due to the uneven distribution among field canals
(Farmers in upper most field canals in the distributory canal
use more water)
(5) Tail most field canals do not receive sufficient water due to high conveyance losses in the distributory canal.
(6) Field canal get insufficient water due to unnecessary FC gate operations

3.3 **With-in Field Canal Operation**

What is your idea about water distribution with-in your field canal

(1) No difficulties, Every farmer get enough irrigation water from Field canal

(2) Tail end farmer undergo difficulties because of head-endears take more than their share

(3) Insufficient water issue to FC, Farmers can not share this amount

(4) Head endears manage with due share to FC and Tail endears depend on the other sources (tapping drainage)

4.0 **On Farm Water Management**

4.1 Do you get adequate Irrigation water from the field canal in any season **(tick relevant number)**

	Yes	No
Yala	1	2
Maha	3	4

4.2 If answer is 'No' , at what stage of the cultivation that you face these problem **(tick relevant number)**

	Yala	Maha
Land soaking	1	8
First plowing	2	9
Second plowing	3	10
Puddling	4	11
Wetting Seedling ("Isna" period)	5	12
Early stages of growth	6	13
Above All stages	7	14

4.3 What are the reasons for difficulty

(0) No difficulty
(1) Ground level of the field is higher than field canal FSD level
(2) Field turn out constructed at the bottom boundary of the field
(3) Field canal does not get sufficient water from distributory canal

D. <u>System Maintenance</u>

5.1 Your participation for maintenance at what level

(0) No participation at all
(1) Field canal level only
(2) Distributory canal level only
(3) Both (FC & DC) levels

5.2 What is your idea about contract works of weeding and desilting doing by Farmer Organization (F.O) ?

(1) Can do better than doing by I.D
(2) The work did by F.O's not in quality
(3) No benefit to the farmers by doing this work
(4) Office bearers of the F.O's get the benefit of this contracts
(5) Difficult to do this contract work because of officers not play supportive role

5.3 What kind of maintenance activities (listed below) should be undertaken by the FOs and why?

(1) earth filling (field roads and canal bunds),
(2) desilting AND weeding,
(3) rubble packing,
(4) repairing the control structures,
(5) lining the canal,
(6) All above

5.4 Do you think the money allocated for DC maintenance is used efficiently by F.O by doing contracts
(1) Yes
(2) No
(3) No idea

F. Turnover of Operations and Maintenance

6.1 What is your idea about hand over operation responsibilities to Farmer Organization from I.D.

(1) F.O able to do successfully
(2) F.O unable to do successfully
(3) Unsuccessful because of the favoritism of the office bearers
(4) Unsuccessful because all the farmers not participate or cooperate
(4) One person has to be work on voluntary to distribute water, because of this it will not happen
(5) Unsuccessful, There is no way to Hand over responsibilities and monitoring of the F.O. work

For Ellegala Irrigation System

A. Rehabilitation work Before 1986

(1) Do you Know any rehabilitation work in Ellegala system started with Lunugamwehera construction work before 1986 ?

(1) Yes

(2) No
(3) Not Known

(2) What is your idea about the usefulness of that rehabilitation work

(1) Not Known
(2) Due to the poor construction quality the structure collapse in short period
(3) The structures constructed not in use for water management
(4) Farmers damaged to that structures because they had not any idea about usefulness
(5) Farmers damaged to that structures because that are barrier to share or distribute the water

B. <u>After 1991 Rectification Irrigation Difficulties (RID)</u>

(3) What is your idea about the usefulness of the rehabilitation work done very recently

(1) not known
(2) Rectified the difficulties pointed out by the farmers on walk through.
(3) Now it is easy to manage water due to the rectification work
(4) Identification of difficulties did well though the constructions very poor in quality
(5) Not solve the problems
(6) Office bearers and active members in the Farmer Organization able to solve their problems

C. <u>System Operations</u>

(4) To get a better service to farmers who should controlling the Tank sluice gates
(1) I.D. offices (TAs.WSs)
(2) Farmer Organizations
(3) Both in collaboration

(5) Why is not good like now, doing by the I.D.

(1) Not fulfill the Farmers needs
(2) Lot of water waste due to the poor control
(3) Some farmers get special favourations from the field officers
(4) present system is good
(5) Officers have not good understanding about the complicated system

APPENDIX 2
PROJECT IMPACT EVALUATION STUDY:
Questions on Land Development and Settlement, Infrastructure and Socio-economic Conditions

1. Name of Head of the Household
2. Address
3. Location : Left/Right
4. Tract No.
5. Hamlet No.
6. Highland Lot No.
7. Investigator's Name:
8. Date of Interview:
9. Duration of Interviewing (min.):
10. Checked By:

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1.0 General Information

1.1 GENERAL HOUSEHOLD INFORMATION

1.2 Particulars of Members of Household

1 Serial Number	2 Sex (Code)	3 Age (approximate)	4 Marital Status (Code)	5 Level of education (Code)	6 Education field (Code)	7 Reasons for not attending school (Children aged 5)	8 Activity (Code)	9 Employment status (Code)	10 Place of employment (Code)	11 Employment status (Code)	12 Place (Code)

Codes for question No. 1.2

Sex code

1 - Male
2 - Female

Marital status (Code)

1 - Single
2 - Married
3 - Separated
4 - Widows
5 - Divorced
6 - Living together

Level of Education

01 Primary education (up to year 5)
02 Year 6 - 9
03 Year 9 to GCE(O/L)
04 Passed GCE(O/L)
05 Passed GCE(A/L)
06 Undergraduate
07 Graduate
08 No schooling but not able to read and write
09 No schooling but able to read and write
10 Not eligible for primary education

Educational Field (Code)

01 Ordinary
02 Art
03 Commerce
04 Maths
05 Bio-science
06 Agriculture/Veterinary
07 Medical/Dental
08 Engineering
09 Law
10 Technical
11 Others (specify)

Reasons for not attending school (code)

1. Can't meet basic needs
2. Having household work
3. Physical, mental weakness
4. Lack of enthusiasm
5. Training for an employment
6. Absence of a school close by
7. Others (specify)

Activity (code)

Employed	1 -	Permanent employment, self-employment, unpaid family workers, casual workers, who had worked at least 15 days within last three months.
Students	2 -	Attending formal education
	3 -	Aged 5-14 not attending school but employed.
Unemployed Seeking Employment	4 -	Not engaged in any work
	5 -	Engaged only in household work
Unemployed Employment	6 -	Not engaged in any work
	7 -	Engaged only in household work
Others	8 -	Too old to work, unfit for work, pensioners, children less than 5 yrs. are not eligible to attend school.

Employment status (code)

01 Cultivation
02 Farm helper
03 Govt. employment
04 Private sector employment
05 Self-employment (Business etc.)
06 Skilled employment (Carpentry, masonary, etc.)
07 Agri. Labourer
08 Non agri. labourer
09 Middle-East employment
10 Others (specify)

Place of Employment (code)

1 Within Hamlet
2 Outside the Hamlet but
3. Within project (Old and New)
4. Outside the project but within the district.
5. Outside the district.
6. Abroad.

1.2 From where did you come to the Colony?

1. Village: .....
2. District .....

1.4 Selection criteria for the settlement

1. Open selection
2. Alternative selection
3. Special selection

1.5 Have any of your children attended school outside the project area?

1.6 If 'Yes' reasons for attending school outside the project area.

i. .....
ii. .....
iii. .....

1.7 What is your opinion about the education facilities provided by the KOISP project?

i. Very good .....
ii. Satisfied .....
iii. Poor .....
iv. Very poor .....
v. Cannot say .....

1.8 If your children are attending school in the project area, what are the shortcomings of the school?

i) Lack of Staff
ii) Lack of Accommodation
iii) Lack of Equipments
iv) Others (Specify)

1.9 Closeness of households to various basis service institutions/facilities.

Service Inst.	1.5 km. (1 mile)	3km. (2 ms)	5 km. (3 ms)	9 km. (5 ms)	11 km. (7 ms)	16 km. (10 ms)
School						
Primary						
Secondary						
Science(O/L)						
Science(A/L)						
Bazaar						
Co-operative						
Village fair						
Bus route						
Health centre						
Dispensary						
Hospital						
Post office						
Police station						
Bank						
Ag. Service Centre						
A.G.A. Office						
Temple						

2.0. Land Development & Settlement

2.1 How did you qualify to get the land in KOISP?

1. Open _____
2. Alternative _____
3. Landlessness _____
4. Residence of the given area _____
5. Ethnic basis _____
6. Experience in agriculture _____
7. Political _____
8. Other (specify) _____

What is the size and type of land tenure of your land?

	Low land (Ac)	Highland (AC)	Homestead (AC)	Chena (AC)
Singly owned				
Jointly owned				
Tenant				
Lessee				
Rent				
Thattumaru				
Encroachment				
Reservations				
Permit				
Other				

2.2 Extent cultivated for Yala 1993 .....
Maha 1992 .....

2.3 Reasons for not cultivating?
.....
.....

2.4 Division of your land parcel.

Extent divided among Family Members Ac.	Extent rented Ac.	Extent sold (Rs.)	Total Extent (Ac.)

2.5. If you are a tenant/leased farmer what is your tenancy/ leasing conditions?

.....
.....

2.6 How long you have been worked as a tenant/leased farmer?

.....

2.7 If you are an encroacher, how long have you been in the settlement?

.....

2.8 What was the basis in the allottment of your land?

.....
.....

2.9 Are you satisfied with the alloted land?

Yes ___ No ___

If no, why?

1. Infertile soil
2. Salinity
3. Rocky land
4. Irrigation difficulties
5. Other
6. Distance between homestead and field
7. Improper levelling

2.10 If your land has salinity or other problem, please give the extent under each conditions.

Condition	Extent

2.11 What are the bad impacts of above problems?

.....

.....

2.12 What are the assistance given to you by the Project management during your tenure in the settlement?

	Cash	Materials	Total value
Settling allowance			
Housing			
Agricultural inputs			
Health			
Others			

2.13 Is your land properly demarcated by land marks?

Yes _____ No _____

If yes, are you satisfied with present land marks?

Yes _____ No _____

If no, why?

.....

.....

2.14 Are there any land conflicts? Yes _____ No _____

If yes, please specify.

Boundaries

Ownership

Encroachers

Other

2.15 Who solved these problems?

1. Grama Niladhari

2.Divisional Secretary

3.Police

4.No solution

5.Other

3.0 Migration

3.1 Information of members who have been migrating in, after settlement commenced.

Serial No. !	Relationship to the head of H/1 (Specify) @	Sex (Code) #	Age when migrated in (Years) $	Year migrated %	District where you came from? ^	Reasons for migration &

2.2 Information regarding outward migration:-

Serial No. 1	Relationship to head of the H/L (Specify) 2	Sex (Code) 3	Age when migrated in (Years) 4	Year migrated 5	District where you came from 6	Reasons for migration 7

4.0 Housing Condition

4.1. Floor

1. Clay
2. Cement
3. Others(specify)

4.1.2 Wall

1. Clay
2. Brick
3. Timber
4. Metal sheets
5. Cadjan
6. Others(specify)

4.1.3 Roof

1. Tiles
2. Asbestos
3. Metal sheet
4. Cadjan
5. Iluk/palmyrah leaves/ paddy husk.

4.2 Condition of the House

1. Permanent structure and completed house.
2. Permanent structure, incomplete house (walls are not plastered).
3. Walls made with clay, with permanent roof.
4. Walls made with clay, and temporary roof.

4.3 Cost for building the House

1. Value of subsidies given by the Govt. Rs.
2. Value invested by you Rs.
3. Total Rs.

4.4 Source of Funds obtained

1. Savings done before project commenced
2. Earnings after settling into the project
3. Loans (Institutional)
4. Non-institutional loans
5. Employment from abroad

4.5 Floor area (Sq. ft.)

4.6 No. of Rooms

4.7 Is separated kitchen available 1. Yes .... 2. No .....

4.8 Toilet facilities 1. Yes ..... 2. No .....

4.9 If 'Yes' state the type of facility available

1. Pit ..... 2. Water seal ..... 3. Bucket .....

4.10.1 Main source of energy for cooking

1. Wood
2. Electricity
3. Keoresene
4. L.P. Gas

4.10.2 Main source of energy to obtain light at night

1. Keoresene
2. Electricity
3. Solar power

4.11 Source of water supply for drinking

1. Own well
2. Neighbours' well
3. Tap (Road)
4. Tank
5. Stream/channels/Oya
6. Tube well
7. Project bousers
8. Other sources (specify)

4.12 Distance to the above place (Miles)

1. 0 - 1/8 (Miles)
2. 1/8 - 1/4 (Miles)
3. 1/4 - 1/2 (Miles)
4. 1/2 - 3/4 (Miles)
5. 3/4 - 1 (Miles)
6. 1 - 2 (Miles)
7. More than 2 Miles

4.13 Water for drinking purposes

1. Boiled water
2. Unboiled water

4.14 If you obtained pipe-borne water, are you satisfied about the project water supply scheme?

1. Yes ..... 2. No .....

4.15 If 'No', what are the reasons or shortcomings?

i. .....

ii. .....

iii. .....

4.16 Before obtaining the pipe-borne water, how did you obtain water for drinking? ..... (Refer 4.11 code)

4.17 Distance to above source? .....(Refer 4.12 code)

4.18 Time saved (min.) .....

Only those who have obtained water from project bowsers, please answer question No. 3.19 and 3.20

4.19 If you facilitated water, from project bousers, are you satisfied with distribution?

Yes ..... No.....

4.20 If 'No', what are the shortcomings?

i) .....

ii) .....

iii). .....

4.21 When you compare the place of origin have you obtained any advantage by having a drinking water scheme?

1. Yes ..... 2. No .....

4.22 Do you think the ground water in your area is poluted by pesticide or other chemicals?

Yes ..... No.....

5.0 Health Facilities

5.1 What is your opinior about the Health facilities available in the project area?

Facilities	Good	Fair	Bad	Unable to say (?)
1. Out-door patient treatment				
2. In-door patient treatment				
3. Controlling Malaria				
4. Controlling diseases other than Malaria				
5. Maternity & Gayne Clinic				

5.2 Are you satisfied with health facilities in the project area?

5.3 If 'No' give reasons

i. .....

ii. .....

iii. .....

5.4 If you are an open selection farmer, do you have better health facilities than your previous area?

Yes ..... No.....

5.5 No. of cases of Malaria during the year 1992

Males ..... Females ..... Total = ...

5.6 No. of cases of Malaria during the year 1993

Males ..... Females ..... Total = ...

5.7 When you compare the commencement of the project, what is your opinion about the spread of Malaria?

1. Very low .....
2. Extremely low .....
3. No change .....
4. Extremely high .....
5. Very high .....
6. Unable to report .....

5.8 Did any of your family members contract water-borne diseases during the year 1999?

		Code
1.	Typoid	.....
2.	Diarrhoea	.....
3.	Dysentry	.....
4.	Cholera	.....

5.9 When you compare the commencement of the project, what is your opinion about the spread of the following diseases?

	Disease	Code
1.	Typoid	.....
2.	Diarrhoea	.....
3.	Dysentry	.....
4.	Cholera	.....

Opinion Codes

1. Very Low
2. Extremely low
3. No Change
4. Extremely high
5. Very high
6. Unable to say

5.10 No. of deaths occured since the settlement time.

No. of deaths	Year	Sex	Age at	Type of death
1				
2				
3				
4				
5				
6				

Sex Code

1. Male
2. Female

Type of death (Code)

1. Infant Mortality
2. Maternal mortality
3. Pesticide poisoning (accidently)
4. Pesticide poisoning (sucide)
5. Sucide
6. Due to ageing
7. Others (specify)

5.10.1. If the death occurred due to sucide the method they used for sucide?

.....

5.11 No. of births occured after settled in the area.

No. of births	Year of birth	Age of mother	The birth attended at (code)
1			
2			
3			
4			
5			
6			

Code

1. At the project hospital
2. At home.
3. Outline the project area.

5.11.1 If the project hospital was not used for the birth occurance the reasons for not being used.

	Code
_____	.....
_____	.....
_____	.....
_____	.....

6.0 Transport facilities

6.1 Is your house accessible by a motorable road?

1. Yes ..... 2. No .....

6.2. Have you or any member/members of your family worked in KOISP construction projects.

Yes ..... No .....

6.2.1 If yes, give the details of them.

		Code
1.	Kind of construction	.....
2.	Basis engaged in	.....
3.	Year	.....
4.	Employer	.....
5.	No. of days worked	.....
6.	Wage rate in Rs.	.....
7.	Total earnings in Rs.	.....
9.	The way that money is utilized	.....

Codes

Kind of Construction

1. Dam
2. Road
3. Hamlet
4. Service building
5. Irrigation system

Basis Engaged

1. Hired labour
2. Shramadana
3. Work for food

Employer

1. Irrigation Department
2. Private Contractor
3. Others (Specify)

The Way Utilized the Money

1. Consumption
2. Housing Construction
3. Purchasing household items
4. Cultivation
5. Others (specify)

6.3 Did you participate for maintenance work of roads in KOISP?

Yes ..... No .....

6.4 If 'No' what are the reasons?

i. .....
ii. .....
iii. .....

6.5 Are you satisfied with road facilities provided for Hamlets?

Yes ..... No.....

6.6 If 'No', what are the reasons?

i. .....
ii. .....
iii. .....

6.7 What are the advantages of having improved road facilities under the project?

Advantages	Disadvantages
1.	1. .....
2.	2. .....
3.	3. .....

6.8 Are you satisfied about the quality of the construction of the project?

		Code
1	Dam	
2	Road	
3	Hamlet	
4	Service Building	
5	Irrigation System	

Code
1. Satisfied
2. Dis-satisfied

6.8.1 If dis-satisfy, what are the short-commings you have identified?

1. .....
2. .....
3. .....

7.0 Assets

7.1 Household durable items (please specify no. of items owned)

1. Wrist watch .....
2. other clocks .....
3. Torch .....
4. Patromax lamps .....
5. Radio .....
6. Radio cassettes .....
7. Television set .....
8. Furniture .....

7.2 Transport items

1. Cart ....
2. Bicycle .....
3. Motor cycles .....
4. Car .....
5. Lorry .....
6. Van .....

7.3 Agriculture implements

1. Mammoty .....
2. Plough .....
3. Plough (iron) .....
4. Spray .....
5. Two wheel tractor .....
6. 4 wheel tractor .....
7. Iron rod .....

8.0 Household Expenditure Pattern
Average monthly expenditure

Expenditure Pattern	Rs. Monthly
1. Food[1]	.....
2. Kerosene oil/batteries/fire wood	.....
3. Transport	.....
4. Clothing	.....
5. Education	.....
6. Postal	.....
7. Health	.....
8. Cermonies and Functions	.....
9. Alcohol/cigarettes/betel	.....
10. Others (speify)	.....
T O T A L:	.....

9.0 Employment and Income

Non-farming income activities during 1999. Particulars of employment (if one person is engaged in more than one employment, please give details of each employment separately).
(Salaried employment, agri. and non-agri. labourers, skilled jobs, etc.)
*Please check the code for employment status in question no. 1.2 for coding.

Serial No. (As Qu.1.2.1)	Sex (Code)	Nature of employment (As Qu.1.2.a) [Code]	Condition of employment	Method of employment	Wage rate as the method of payment	Average no. of days worked per month	No. of months worked	Annual income (Rs.)
1	2	3	4	5	6	7	8	9

[1] If used your own food.

Conditions of employment

1. Permanent
2. Temporary
3. Casual

Method of Employment

1. Daily
2. Weekly
3. Monthly
4. Piece rate.

9.2 Income from off-farm, self-employment. (If one person is engaged in more than one employment, provide information for each separately).

Code	M/F	No. of Months	Income	Annual Income
1	2	3	4	5

10.0 Household income for the year 1992

Sources of income	Income (Rs.)
PART A	
1. Paddy	
2. Other crops	
3. Livestock	
4. State sector employment	
5. Private sector employment	
6. Agri-labour	
7. Non-agri. labour	
8. Skilled jobs	
9. Self-employment	
PART B	
1. Hiring Tractor/Buffaloes/Agri. equipments	
2. Pensions, House or land rent	
3. Govt. subsidies	
4. Food stamps	
5. Others (specify)	
T O T A L	

11.0 Banking Habits and Savings

11.1 What are the saving methods adopted by you or any family member?

1. Savings in the Banks
2. Savings in the household.
3. Buying jewelleries
4. Buying furniture
5. Buying other household items
6. Seettu
7. Others (specify)

11.2 No. of accounts having to you or any of your family

members in the Banks or Post office.

Institute	Savings Account	Fixed Deposit	Investment Savings Account	Current Account	Others (specify)
1.Post Office/ National Savings Bank					
2. People's Bank					
3. Bank of Ceylon					
4. Rural Development Bank					
5. Rural Bank					
6. Other (specify)					

APPENDIX 3
PROJECT IMPACT EVALUATION STUDY:
Question on Institutional Development and Beneficiary Participation

A. Farmer Organization Development (both New Areas and Ellegala)

1. Are you a member of the Distributary Channel Farmer Organization where your fields are located?
   a) Yes
   b) No
   c) There is no Farmer Organization
   c) Don't know

2. If you are not a member, why not?
   a) not a legal allottee
   b) costs money
   c) other(s) - specify

3. Who is the Farmer Representative for your field channel?
   a) Name _____
   b) I do not know him.
   c) There is none.

4. How often does the DCO Committee meet?
   a) once a month
   b) other - specify

5. How often does the full membership of the DCO meet?
   a) twice a year
   b) once a year
   c) never
   d) other - specify

6. Does the Farmer Organization do the following?
   a) organize channel cleaning and other maintenance - yes/no
   b) solve irrigation difficulties - yes/no
   c) arrange credit - yes/no
   d) arrange inputs - yes/no
   e) solve other agricultural problems - yes/no
   f) organize community activities - yes/no
   g) other activities - specify

7. Does the Farmer Organization have funds?
   a) yes
   b) no
   c) don't know

8. If yes, are you satisfied with the management of the Farmer Organization funds?
   a) yes
   b) no

9. Who operates the field channel head gates on the distributary channel?
   a) ID through a jalapalaka
   b) one or more FRs
   c) a jalapalaka appointed by the DCO
   d) some one else - specify
   e) don't know

10. Who cleans and maintains the distributary channel?
   a) ID through its own laborers
   b) ID through contractors
   c) the DCO through hired labor
   d) the DCO through assigned sections
   e) the DCO through shramadana
   f) some other way - specify
   g) don't know

11. How often does the Subproject Committee for your area meet?
   a) once a season
   b) once a month
   c) never
   d) don't know
   e) other - specify

12. What does the Subproject Committee for your area discuss?
   a) seasonal plans, including allocations - yes/no
   b) irrigation problems - yes/no
   c) input supplies - yes/no
   d) other agricultural problems - yes/no
   e) other problems - yes/no, please specify
   f) don't know

13. How often does the Project Management Committee meet?
   a) once a month
   b) don't know
   c) other - specify

14. What does the Project Management Committee discuss?
   a) seasonal plans, including allocations - yes/no
   b) irrigation problems - yes/no
   c) input supplies - yes/no
   d) other agricultural problems - yes/no
   e) other problems - yes/no, please specify
   f) don't know

15. Are you satisfied with Subproject Committee and Project Management Committee performance?
    a) yes
    b) no - If not, why not?

B. Participation in EIS Rehabilitation Planning and Design - pre-1986 (Ellegala only)

1. Were you consulted about rehabilitation needs?
    a) yes
    b) no

2. If yes, how were you consulted?
    a) by meeting with the yayanayake
    b) by meeting with ID officers
    c) by walking along the channel with ID officers
    d) some other way - please explain

3. Did you take part in rehabilitation construction work?
    a) yes
    b) no

4. If yes, how was it organized?
    a) by the yayanayakes
    b) through private contractor who hired local labor
    c) through check roll work with ID
    d) some other way - please explain

5. Were you pleased with the results?
    a) yes
    b) no - please explain

C. Participation in RID (EIS) Planning and Design - 1992-93 (Ellegala only)

1. Did you participate in determining the rehabilitation needs for the RID work?
    a) yes
    b) no

2. If yes, how did you participate?
    a) in a meeting with ID officers to discuss the RID work
    b) by walking the channel with ID officers
    c) some other way - specify

3. Did your DCO take one or more rehabilitation contracts?
    a) yes
    b) no

4. If yes, how was the work carried out?
   a) by subcontracting to the DCO officers
   b) by subcontracting to outsiders
   c) by hiring outside labor
   d) by shramadana with proceeds going to the DCO fund
   e) some other way - please explain

5. Are you pleased with the results?
   a) yes
   b) no - If not, please explain.

APPENDIX 4
PROJECT IMPACT EVALUATION STUDY:
Cost-Benefit Analysis

	INVESTMENT OF CAPITAL COSTS OR ONE TIME BENEFITS	RECURRENT COSTS OR BENEFITS
DIRECTS COSTS	Preliminary costs; Construction of Dam and appurtenant structures and channels; Land and forest development; Infrastructure, roads, water supply and sanitary facilities; Settlements and community development; Consultancy, research; Subsidies and credit.	Cultivation costs; Operation and Maintenance; Extension, credit and other agricultural services; maintenance of infrastructure and plantations.
INDIRECT COSTS	Loss of land through submergence settlements; Destruction of forests; Adverse hydrological impacts; Loss of habitat of wildlife and flora; Extinction of flora and flora species; Loss of social cohesiveness and cultural values; Coastal erosion.	Soil erosion; Salinization; Alkalinity, Chemical pollution, Water quality degradation; Reduction in fishery output.
DIRECT BENEFITS	Employment in construction of irrigation works, housing, roads, schools, infrastructure and other construction activities.	Incremental output of paddy, field and permanent crops, mil, eggs, meat, fuelwood, timber and inland fish; Foreign exchange savings; Employment.
INDIRECT BENEFITS	Indirect employment; Improvements to environment; Aesthetic benefits, Improvement to certain aquatic and wild life habitats.	Education, health, water supply, sanitation and transport; Community development and improved management of land and water resources, Employment from supporting services, industries and businesses; Recreation.