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 Third Quarter Progress Report is a product of the International Irrigation Management Institute and the reporting period was July-September 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 have shared 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 data analyses carried out during this quarter. The ARTI team responsible for the large sample survey (land settlement, infrastructure and socio-economic conditions) and additional sub-sample studies (nutrition and health status of KOISP beneficiaries) has investigated the data and the draft final report has essentially been completed. Largely according to their workplans IIMI and Ruhunu have conducted analyses of their respective components. On the basis of the outcome of all study components, the Cost-Benefit Analysis will be carried out. This will include an attempt to incorporate the indirect costs and benefits as well.

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

At the end of the previous quarter a general meeting with representatives of the study teams was held at IIMI to finalize the arrangements for sharing and exchanging research data during the months ahead. During this third quarter, two more study coordinating committee meetings (on 6 and 27 September) were held in order to keep the members of the study teams informed about the progress of the data analysis. In addition, some of the preliminary findings of the study were shared and discussed.

The draft final reports of all components are due in the final month of the KOISP Impact Evaluation Study, for which the date of October 14 has been set. It is planned to present the results of the impact assessment in two volumes. Volume I will be the main report and will contain the executive summary. In addition, it will present salient features of the KOISP, background to the study, methodological aspects of the study and provide a summary of all research components. Volume I will close with lessons learned and will discuss the major conclusions and findings of the study. Volume II will contain the individual reports of all study components, supplemented with detailed data annexes.

The date for the workshop to discuss the major findings of this study has been set at November 1, 1994. Representatives from the Irrigation Department, Ministry of Policy Planning and Implementation, Ministry of Irrigation, Department of Agriculture, Land Commissioner's Department, Forest Department, Department of Wild Life Conservation, Central Environmental Authority, Provincial Government and IIMI/SLFO will be invited for this meeting.

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 reports the main components selected for detailed impact analysis were described. In the next chapter the progress and some of the preliminary findings 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 and project management;
- cost-benefit analysis.

CHAPTER 2

PROGRESS OF THE STUDY COMPONENTS

2.1 Irrigation System Development, Operation and Maintenance

For the irrigation component of the KOISP impact evaluation study, the following aspects were analyzed during the last three months.

(1) The impact of the water resources planning:

- analysis of long- and short-term rainfall data,
- analysis of estimated reservoir inflow,
- analysis of reservoir release,
- analysis of irrigated area,
- analysis of efficiency of irrigation.

(2) The impact of design assumptions on project performance:

- land preparation period,
- water requirement during land preparation,
- on-farm water use,
- S&P loss comparison,
- efficiency of distribution canals,
- drainage return flow to old Ellegala tanks,
- drainage flow from Ellegala command,
- development of agro-wells in the command,
- overall performance on the project.

(3) Design versus construction:

- main canal,
- dam (measurements).

(4) An analysis of farmers' perception on the construction, maintenance and management of their irrigation system.

(5) Construction quality and implementation.

(6) Design assumptions and reality:

- S&P values,
- rotational distribution.

(7) The inflexibility for cultivation of Other Field Crops (OFCs).

(8) Lessons learned:

- rigorous analysis of hydrological data,
- a holistic approach in proper design (use of surface, ground and drainage return water),
- fixing of water rights,
- the understanding of the behavior of the system (especially if there is an old system already utilizing the water).

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

The main objective of the component on *land development and settlement* is to assess the immediate benefits on land development and settlement under the KOISP on the population in the newly developed area and in the old developed area in particular, and on the people in Sri Lanka in general.

To this purpose, the large-scale sample survey including about 500 farm families in the old and new area has been undertaken. In addition to the large-scale survey, two sub-studies have been conducted. One was a qualitative information gathering technique, which has included a series of discussions with field level officers and farmers. The second sub-study was a mini-sample survey which included about 100 farms. This study was mainly designed to understand the attitude and perceptions of the project beneficiaries on the benefits and services received through the project.

During the last quarter, the following features have been examined:

- the pre-project status of land utilization,
- the objectives of the land settlement program under the KOISP,
- the number of settlers by selection criteria,
- the facilities provided for the settlers,
- the operational problems of settlement,
- settler migration and non-residency,
- reallocation of lands,
- cattle conflicts,
- land clearing problems,
- land fragmentation, and
- resolution of conflicts.

ARTI has submitted the draft final chapter on land development and settlement, which discusses the major findings of this component.

In addition to the irrigation infrastructure, the project has attempted to establish a proper *social and economic infrastructure* for settlers of the KOISP area. The project was to provide them with the basic service infrastructure such as water supply, transport and educational facilities. An assessment has been undertaken to evaluate the accomplishments of the project objectives in terms of:

- service centers constructed by the project,
- established schools,
- literacy and school participation rates,
- school attendance outside the project area,
- changes in and use of the road network,
- public transport,
- maintenance of project roads,
- satisfaction with road facilities,
- co-operative shops,
- produce stores,
- drinking water and bowser program,
- post offices,
- community centers,
- agrarian services centers,
- markets and fairs,
- police stations,
- agricultural research stations,
- extension units, and
- farmer training centers.

The ARTI has assessed the availability and accessibility of the various infrastructure services for the settlers of the KOISP and has documented this in their draft final chapter of this component of the study.

The *socio-economic* component of the KOISP impact evaluation study has analyzed the long-term social and economic changes for the target population after the completion of the project. The following variables have been examined:

- population,
- profiles of households,
- housing and sanitation,
- household durables,
- employment of household members,
- sources of household income,
- household budgets,
- trends in labor migration,
- growth of private enterprises,

- sources of private enterprises,
- employment and income generation.

The draft final report for this component will present the findings on the demography of the project area, educational status, labor force, and household incomes and expenditure, on the basis of which the benefits generated by the project will be assessed. The evaluation will attempt to differentiate between settlers in the old area, new area, youth and women.

Finally, ARTI has given special attention to the following aspects:

1) the nutritional status of pre-school children and pregnant and lactating mothers through an anthropometric survey conducted in July, and
2) the changes in the health conditions in the KOISP area after completion of the project.

2.3 Crop Production

The agriculture/crop production component of the KOISP impact evaluation study has reviewed the crop production of the KOISP area prior to the project, and the land utilization, farming systems and technology adoption were described. An analysis was undertaken of the existing situation of the KOISP, and the following components have been covered:

(1) Crop production:

- rice cultivation,
- cultivation of other field crops,
- crop diversification in rice fields,
- cropping intensity,
- chena cultivation,
- total production.

(2) Farm budget:

- cost of rice cultivation,
- cost of OFC cultivation.

(3) Technology adoption.

(4) Institutional support:

- fertilizers and agro-chemicals,
- agricultural extension and training,

- agricultural research,
- institutional credit and insurance,
- agricultural marketing.

One of the conclusions of this sub-study is that there is no significant yield difference between the old and new area. The average paddy yields of these areas are estimated at 3,706 kg/ha (Ellegala) and 3,649 kg/ha (new area) during the maha season.

At the inception of the project, it was expected to increase the cropping intensity from 140 per cent to 170 per cent in the old area. From the survey it appears that the cropping intensity of the lowlands have increased to 163 per cent, which can be viewed as an achievement. The cropping intensities for the lowlands of the new areas, however, are only 98 per cent and 48 per cent, respectively.

More general conclusions will be formulated and documented in the section on crop production of the draft final report.

2.4 Livestock Development

The livestock component was introduced into the mainstream of the development activities of the KOISP only in the second phase of the project, which was to be implemented over a four year period: 1983 - 1987. The major objectives of the livestock component were:

(1) Development of 1,000 ha for livestock (and agro-forestry) enterprises;

(2) Incremental production of 4.1 million liters of milk annually and saving foreign exchange by import substitution; and

(3) improved living conditions and sustained economic growth of the beneficiaries.

The major emphasis of the KOISP project was on settler-based crop production under irrigation. Thus, approx. 1,800 ha of scrub jungles used by herdsmen as grazing land were cleared and a large number of irrigation tanks that provided drinking water and wallowing sites for cattle and buffalo were levelled and developed.

These activities had an adverse impact on the cattle and buffalo husbandry practiced by herdsmen in the old area. The herdsmen, who used to graze their animals in the scrub jungles which were located in the new area, lost their traditional grazing grounds. Moreover, irrigation facilities provided by the project enabled the farmers to engage in double cropping, reducing the duration of the fallow period. This prevented the herdsmen from keeping the animals in the fallow fields for long periods.

This loss of grazing land to herdsmen in the area with the advent of the KOISP led to a change in the traditional cattle and buffalo raising system. The livestock study has defined four types of management systems adopted by the herdsmen in the Kirindi Oya area: (1) the village-based system, (2) the migration system, (3) the traditional system, and (4) the jungle-based system.

The section on livestock production in the draft final report will further define these systems. In addition, conclusions will be presented on the profits of the livestock raising systems, crop damages, sale of animals for meat, the role of the livestock center and the office of the veterinary surgeon. Obviously, the role of the three Cattle Owners Associations will be examined as well.

2.5 Forestry

The evaluation of the forestry component of KOISP impact study is based on the Preparation Report -KOISP Phase II (ADB), which contains the proposals and targets for the following components: (a) nursery development; (b) woodlot development; (c) homelot development; (d) live fencing; (e) extension services; (f) fuel efficient cook stoves; (g) forests in the project area; (h) elephant relocation.

The social forestry component of the KOISP was launched by the Land Commissioner's Department, with the Forest depart as the executing agency. Social Forestry operations commenced in 1986, but of the above eight components, the fuel efficient cook stoves program has not been implemented in the project area.

The homelot development is an important and interesting development carried out by the Forest Department. The Forest Department has experience in community projects and in forestry extension work. This experience has proven to be very useful in the homelot development. About 4,180 households were identified by the foresters in the command area, in the tracts 1, 2, 5, 6 and 7 in the right bank and tracts 1, 2 and 3 in the left bank - a total of 24 hamlets.

Women and children have been involved in the development of homelots. Foresters had discussions with the families - especially the lady of the house to find out what type of trees is preferred by them. The had opted for varieties such as pomegranates, lime, cadju, divul, siyambala, margosa; jak and halmilla for timber and ehela for ornamental planting. Medicinal tree species and vatives grass also have been planted.

The establishment of medicinal herb gardens was not indicated in the original document, but the Forest Department has introduced this component. The village farmers depend heavily on ayurvedic treatment for common diseases such as influenza, cold, cough, rheumatism, cuts, wounds and snake bites. They require a variety of medical herbs for treatment. The medical herb gardens - each 1 acre in extent - have been located close to

the dwelling places of ayurvedic physicians, community centers and schools. The herb gardens though well established in certain locations have not been maintained.

For all components of the forestry study the impacts were explored. The assessment of the benefits will be documented in the section on forestry in the draft final report.

2.6 Environment

The following four components of the environmental impacts resulting from a) the construction of Lunugamwehera reservoir upstream of the old Ellegala anicut diversion and b) the development of the new irrigated land of 10,00 acres and settlement of farmer families on the right and left banks of the KOISP new irrigation system have been analyzed during this quarter:

(1) Disturbances in lagoon ecology of the natural lagoon systems located in the lower coastal plains resulting from the altered hydrology of inflow from the new irrigation system. This also includes the Bundala bird sanctuary component.

(2) Salinity hazards arising from the leaching of soluble salts from the new irrigation system to the command area of the old Ellegala irrigation system.

(3) Modifications in the hydrology of the lower floodplain areas and the irrigated command areas of the old Ellegala irrigation system.

(4) Soil erosion in the undulating terrain of the newly irrigated lands and the silting of the natural drainage waterways located in the new irrigation system.

For all these components the positive and negative environmental impacts were explored. The assessment of these impacts will be documented in the section on environment in the draft final report.

2.7 Institutional Development and Project Management

The key aspects of the management of the KOISP and the institutional development under the KOISP are the performance of the management mechanisms used to get the project activities accomplished and the creation and strengthening of the organizations needed to effectively and efficiently manage the infrastructure created by the project and to provide some of the services needed by the new settlers.

The KOISP management structure and its change over time has been analyzed. One change was the elimination of the Land Development department in 1980. As a result,

the Land Commissioner's Department (LCD) took over its functions in the project. Another change was giving the ARTI an explicit monitoring and evaluation role.

An assessment of planning the KOISP was conducted and took up two important issues: 1) the decision on the location of the dam, and 2) errors in plans created to deal with the known water shortage. An analysis of how the construction of the KOISP irrigation system was managed indicated that three factors contributed significantly to delays and cost overruns:

(1) the basic survey data about the area turned out to be insufficient for construction planning purposes;
(2) there were significant delays and problems with the procurement processes; and
(3) construction supervision was a problem (the control over the dam contractor).

The analysis of the basic organization and processes of managing the settlement of the new areas has emphasized the specific areas of the advanced alienation policy as applied in Kirindi Oya and its consequences and the major problems of the nonresident allottee. In addition, the supply of drinking water for the settlers and the delays in this activity have been examined and the coordination between the agencies involved.

The new institutions developed for the KOISP are of two kinds: a) local government agencies to manage the infrastructure created and to serve the settlers, and b) farmers organizations to help manage the irrigation system and to represent farmer interests. Two questions are manifest here, one being whether the needed organizations have been created and the second being whether the management responsibilities been transferred to them. This will be documented in the draft final report discussing the role of the local government agencies to manage the new infrastructure and the role of the farmer organizations.

2.8 Cost-Benefit Analysis

Cost benefit analysis will be undertaken to determine whether the project is economically or financially viable under the current circumstances. There were considerable cost as well as time overruns. Water availability was overestimated, while the projected area could not be brought under cultivation. The cropping patterns that were originally conceived for the project never materialized. The environmental or indirect negative/positive impacts of the project were not fully understood at the time of implementation. Therefore an attempt will be made tot take into account the above factors, wherever possible, in estimating the economic benefits under the existing scenario and on projections based on currently available information.

A formal CBA will be undertaken using actual costs as well as direct benefits of the project (actual production, prices and income). Project costs have been recorded in

different formats according to the needs of the user. The annual accounts, which appear to be the most reliable, provides cost data in an accounting format. The data are aggregated by major components and are not ideally suited for economic CBA. Furthermore, the annual accounts for Phase I differ in format from that of Phase II. Expenditure under Phase I has continued up to 1993, but the annual accounts were published only up to 1990. The Phase II annual accounts for 1993 have still not been published.

The next major source of cost data is the quarterly progress report. Although less reliable than the annual report, there is a greater breakdown of costs. Cost figures do not match in the two documents. The figures in the progress report tended to be lower than those in the annual reports. The third source of cost data are the various subject files of the Irrigation Department. Very much more details are available in these files, but they are not available for all the years. It was decided to use the data from the annual accounts for purposes of the CBA, supplemented by data from progress reports. The pre-project situation data are not consistent and vary from report to report. Pre project cost and income data of crop and livestock production are scarce. Current data on COP, income and prices are being obtained from field surveys conducted by the Ruhunu University and ARTI.

Another analysis that will be attempted if data permits is the foreign exchange savings resulting from the project. Data on direct foreign costs are available. However, indirect foreign costs of the project are not available. Foreign costs of the various sectors of the economy have been estimated in the past by the Ministry of Planning. These factors have not been updated in recent times, although there has been a structural transformation of the economy since the adoption of the 1977 open market liberalization policies. It is probable that the foreign exchange factor of the various sub sectors of the national economy has increased since 1977. Foreign exchange cost of inputs and outputs need to be estimated. Estimates of foreign exchange savings of the project will therefore be very approximate.

An attempt will also be made to estimate the indirect impacts of the project, both positive and negative. The positive impacts could come from the general increase in economic activity in the region due to the project. This would include such activities as, rice milling, transport, small businesses, agricultural processing, inland fisheries, banking activities, service facilities for marketing of agricultural produce and repair of machinery, employment in project construction and maintenance, housing etc. The negative impacts include: losses due to salinity, soil losses, reduction of coastal fisheries due to fresh water inflows to the lagoons, higher incidence of health problems due to water borne diseases, pollution of ground water by chemicals, etc. Sub studies have been conducted to determine the impact of some of these factors. This will be presented as separate studies and not incorporated in the CBA as an extended CBA, due to the paucity of good data.