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PROJECT PERFORMANCE REASSESSMENT REPORT

SRI LANKA

THIRD MAHAWELI GANGA DEVELOPMENT PROJECT
(CREDIT 1166-CE)

June 28, 2004

Sector and Thematic Evaluation Group
Operations Evaluation Department

Currency Equivalents (annual averages)

Currency Unit = Sri Lanka Rupee (LKR)

Appraisal Years (1980/81)	US$1.00=LKR17.50
Average 1981-1990	US$1.00=LKR28.20
Completion Years (1990/91)	US$1.00=LKR40.80
January 3, 1995	US$1.00=LKR49.75
January 3, 2000	US$1.00=LKR72.30
January 2, 2004	US$1.00=LKR97.45

Abbreviations and Acronyms

GDP	Gross Domestic Product
ICR	Implementation Completion Report
IDA	International Development Association
IMF	International Monetary Fund
OED	Operations Evaluation Department
LKR	Sri Lanka Rupee
PPRR	Project Performance Reassessment Report

Fiscal Year

Government: January 1 — December 31

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OED Mission: Enhancing development effectiveness through excellence and independence in evaluation.

About this Report

The Operations Evaluation Department assesses the programs and activities of the World Bank for two purposes: first, to ensure the integrity of the Bank's self-evaluation process and to verify that the Bank's work is producing the expected results, and second, to help develop improved directions, policies, and procedures through the dissemination of lessons drawn from experience. As part of this work, OED annually assesses about 25 percent of the Bank's lending operations. In selecting operations for assessment, preference is given to those that are innovative, large, or complex; those that are relevant to upcoming studies or country evaluations; those for which Executive Directors or Bank management have requested assessments; and those that are likely to generate important lessons. The projects, topics, and analytical approaches selected for assessment support larger evaluation studies.

A Project Performance Assessment Report (PPAR) is based on a review of the Implementation Completion Report (a self-evaluation by the responsible Bank department) and fieldwork conducted by OED. To prepare PPARs, OED staff examine project files and other documents, interview operational staff, and in most cases visit the borrowing country for onsite discussions with project staff and beneficiaries. The PPAR thereby seeks to validate and augment the information provided in the ICR, as well as examine issues of special interest to broader OED studies.

Each PPAR is subject to a peer review process and OED management approval. Once cleared internally, the PPAR is reviewed by the responsible Bank department and amended as necessary. The completed PPAR is then sent to the borrower for review; the borrowers' comments are attached to the document that is sent to the Bank's Board of Executive Directors. After an assessment report has been sent to the Board, it is disclosed to the public.

About the OED Rating System

The time-tested evaluation methods used by OED are suited to the broad range of the World Bank's work. The methods offer both rigor and a necessary level of flexibility to adapt to lending instrument, project design, or sectoral approach. OED evaluators all apply the same basic method to arrive at their project ratings. Following is the definition and rating scale used for each evaluation criterion (more information is available on the OED website: http://worldbank.org/oed/eta-mainpage.html).

Relevance of Objectives: The extent to which the project's objectives are consistent with the country's current development priorities and with current Bank country and sectoral assistance strategies and corporate goals (expressed in Poverty Reduction Strategy Papers, Country Assistance Strategies, Sector Strategy Papers, Operational Policies). *Possible ratings:* High, Substantial, Modest, Negligible.

Efficacy: The extent to which the project's objectives were achieved, or expected to be achieved, taking into account their relative importance. *Possible ratings:* High, Substantial, Modest, Negligible.

Efficiency: The extent to which the project achieved, or is expected to achieve, a return higher than the opportunity cost of capital and benefits at least cost compared to alternatives. *Possible ratings:* High, Substantial, Modest, Negligible. This rating is not generally applied to adjustment operations.

Sustainability: The resilience to risk of net benefits flows over time. *Possible ratings:* Highly Likely, Likely, Unlikely, Highly Unlikely, Not Evaluable.

Institutional Development Impact: The extent to which a project improves the ability of a country or region to make more efficient, equitable and sustainable use of its human, financial, and natural resources through: (a) better definition, stability, transparency, enforceability, and predictability of institutional arrangements and/or (b) better alignment of the mission and capacity of an organization with its mandate, which derives from these institutional arrangements. Institutional Development Impact includes both intended and unintended effects of a project. *Possible ratings:* High, Substantial, Modest, Negligible.

Outcome: The extent to which the project's major relevant objectives were achieved, or are expected to be achieved, efficiently. *Possible ratings:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

Bank Performance: The extent to which services provided by the Bank ensured quality at entry and supported implementation through appropriate supervision (including ensuring adequate transition arrangements for regular operation of the project). *Possible ratings:* Highly Satisfactory, Satisfactory, Unsatisfactory, Highly Unsatisfactory.

Borrower Performance: The extent to which the borrower assumed ownership and responsibility to ensure quality of preparation and implementation, and complied with covenants and agreements, towards the achievement of development objectives and sustainability. Possible ratings: Highly Satisfactory, Satisfactory, Unsatisfactory, Highly Unsatisfactory.

Contents

This report was prepared by John R. Heath, Task Manager, who assessed the project in October 2003. The report edited by William Hurlbut and Rose Gachina provided administrative support.

Principal Ratings

	Outcome	*Institutional Development Impact*	*Sustainability*	*Bank Performance*	*Borrower Performance*
PCR (November 1993)	Unsatisfactory	Modest	Uncertain	Not Rated	Not Rated
PAR (December 1994)	Unsatisfactory	Modest	Likely	Satisfactory	Satisfactory
PPRR (June 2004)	Highly Unsatisfactory	Negligible	Unlikely	Unsatisfactory	Unsatisfactory

Key Staff Responsible

Project	*Task Manager/Leader*	*Division Chief/ Sector Director*	*Country Director*
Appraisal	T.H. Yoon	Not Available	Not Available
Completion	J.H. Weatherhogg and A. Tabet (FAO/CP)	Not Available	Not Available

Preface

This is a Project Performance Reassessment Report (PPRR) for the Sri Lanka Third Mahaweli Ganga Development Project, for which Credit No. 1166-CE in the amount of US$90.0 million equivalent was approved on June 23, 1981. The credit closed on December 31, 1991, four years later than expected. A balance of US$16.4 million equivalent was canceled.

The Operations Evaluation Department first sent a mission to assess the project in May 1994, leading to preparation of a Performance Audit Report. The project is one of four from various countries that were selected in FY04 for a trial reassessment to see if OED's original findings and ratings are still applicable.

This Project Performance Reassessment Report presents the findings of an OED mission to Sri Lanka in October 2003. The mission was conducted by Mr. John R. Heath, assisted by Dr. Sarath Bandara Mananwatte and Dr. Ranjith Dissanayake Wanigaratne (consultants). As a follow-up to this mission, in February 2004 Dr. Wanigaratne conducted a survey of 200 farm households in System C of the Mahaweli scheme.

The findings draw on interviews with beneficiaries, officials of the Government of Sri Lanka and Bank staff. The collaboration of these persons is gratefully acknowledged, as is the generous financial support received from a Norwegian Trust Fund, without which the survey work carried out would not have been possible.

Following standard OED procedures, the draft PPRR was sent to the borrower for comments before it was finalized. The Borrower had no comments on the report.

Summary

This is one of four FY04 reports that reassesses a project previously evaluated by the Operations Evaluation Department (OED), to test whether the initial findings and ratings remain valid after a significant lapse of time. This project was first assessed by OED in 1994. In the intervening period there has been no significant change in the project's development results and this reassessment concludes that the previous evaluation understated the unsatisfactory nature of project outcome. A key finding is that, contrary to OED's expectations in 1994, water user groups have failed to emerge as financially self-sustaining entities capable of assuming full responsibility for the operation and maintenance functions that government has assigned to them.

The Sri Lanka Third Mahaweli Ganga Development Project was supported by a credit of US$90.0 million equivalent. The credit was approved in June 1981 and was closed in December 1991, four years later than expected. Between 1970 and 1998 the Bank extended six credits to the Mahaweli program, totaling about US$450 million in 2001 dollars.

The objective of the project was to improve rural livelihoods through a settlement program involving irrigated farming and supporting infrastructure, with a view to boosting incomes and boosting rice production to substitute for imports. The project focused on System C of the Mahaweli irrigation scheme, aiming to serve 24,100 farm families. The project aimed to settle farmers on 1.0 hectare plots, giving priority to persons with previous farming experience.

The findings of this reassessment are based substantially on responses to an OED-sponsored survey of 200 households in System C that was carried out in February 2004.

The reassessment rates the outcome as highly unsatisfactory, based on the modest relevance of the project's development objectives, modest progress in achieving those objectives and negligible efficiency. Relevance was limited by the project's failure to address distortions in the agriculture incentives regime, the lack of consideration given to organizing water users for cost recovery, the failure to provide settlers with secure land rights, and the absence of provisions for sound management of natural resources. Progress towards objectives was limited by the lower than expected growth in farm incomes, which was associated with the lack of diversification out of paddy farming following the sharp post-1980 fall in the world price of rice. This price collapse, coupled with substantial implementation delays and increases in costs, undermined the project's viability. The economic rate of return was re-estimated at 2 percent.

The sustainability of the project's net benefit stream is rated unlikely given the cutbacks in government spending on operation and maintenance, the failure of water user groups to become financially self-sustaining, the lack of diversification into higher-margin crops, land tenure insecurity, and the overall stagnation of incomes.

The project's institutional development impact is rated negligible based on the project's failure to address constraints in the incentive regime and the lack of consideration to strengthening water user groups. There were some early, project-driven attempts to recover operation and maintenance costs from users but this initiative collapsed by the mid-1990s.

The performance of both Bank and borrower is rated unsatisfactory because of the lack of attention during preparation and implementation to containing costs and ensuring the technical and economic viability of the project.

The following lessons may be derived. *First, rushing technical and economic feasibility studies, or paying insufficient attention to the findings is likely to result in an unsatisfactory project outcome.* In this case, the Bank felt pressured to lend in order to build a relationship with government. Consequently, not enough care was taken either to estimate or subsequently to contain the costs of the proposed irrigation schemes. Important environmental considerations bearing on the preservation of biodiversity and the management of conflicts between settlers and wildlife were brushed under the carpet. The long-term fiscal implications were downplayed and the inflationary impact of project funding was not taken seriously enough.

Second, settlement programs that do not select candidates with previous farming experience and which do not provide settlers with full title to their land are not likely to prosper. This project, to date, has failed to deliver security of tenure to farmers. Title was not given to the farmers out of a paternalistic concern that they would speculate with the land rather than farm it. The importance of secure property rights was less widely recognized in 1980 when the project was appraised than it is now. Without title, farmers are not legally able to sell their plots and if they sell illegally are less likely to recoup the value of investments they have made. This discourages less successful farmers from selling up and impedes consolidation of plots that are too small to be viable.

Third, using repeated interviews with a small number of households, supplemented by interviews with local leaders and community groups is an effective low-cost technique for tracking the performance of rural development projects. The work by Scudder and his Sri Lankan colleagues bear this out. If a pre-project benchmark survey had been conducted their findings would probably have carried more weight with decision makers. Nevertheless, with a small expenditure of resources they were able to predict early on that the Mahaweli program would not fulfill its development objectives.

Gregory K. Ingram
Director-General
Operations Evaluation

1. Rationale and Approach

1.1 The present reassessment is part of a set of four undertaken by OED in FY04 to examine the long-term result of operations in four countries (the others being Bangladesh, Laos, and Mauritania), and to judge to what extent evaluation findings may vary according to the length of interval between the date when project implementation was completed and the date when the evaluation was conducted.

1.2 This report reassesses a project to develop part of the area encompassed by Sri Lanka's largest public-sector irrigation initiative, the Mahaweli program. OED's 1986 review of World Bank assistance to Sri Lanka gave substantial coverage to this program. It concluded that it was too early to make a judgment about the program's success, recommending that a full impact evaluation by OED, jointly with cofinanciers, be undertaken at a suitable time in the future. Eighteen years on it is now possible to make a more comprehensive assessment, focusing on Mahaweli III, the largest of six Bank-financed operations in support of the program. However, in the absence of a baseline survey, comprising treatment and matched groups, the current assessment could not aspire to be a formal impact evaluation.

1.3 The purpose of reassessing the project is to test the durability of its results: that is, whether the findings of an evaluation change if the operation is evaluated after a longer interval, in this case in 2004 rather than in 1994. The reassessment focuses on the initial evaluation findings, facts that have emerged since the evaluation, and the current assessment in 2004.

1.4 This reassessment draws on data from the following sources:

- The Staff Appraisal Report (1981);
- OED's Review of the Bank-Sri Lanka Relationship (1986)
- The Project Completion Report (1993);
- OED's first assessment (Performance Audit Report, 1994);
- A OED reassessment mission in October 2003;
- An OED-sponsored survey of 200 farm households in February 2004 (see Annex C for questionnaire); and
- The long-term study by Scudder and others, which examined 19 to 45 Mahaweli households from 1979 to 2001.[1]

1.5 The approach taken was to define quantitative outcome targets based on the Staff Appraisal Report, and to compare these with actual achievements registered in OED's assessments in 1994 and 2004. This part of the analysis focuses heavily on trends in yields, farm output, and household incomes (including income generated outside the farm). Also, the assessment considers changes in the agricultural incentive regime and the

1. The early findings from this study are reported in Krishna Kumar (ed.,) *Rapid Appraisal Methods*, Washington, DC: World Bank, 1993.

development of water-user groups (Farmer Organizations), both of which bear on the evaluation of sustainability and institutional development impact.

2. Background

2.1 In 2000, Sri Lanka had a total irrigated area of 659,000 hectares, or about 35 percent of farmland. More than 75 percent of irrigated land is in the dry zone and is mainly used for highly water-intensive paddy cultivation. The bulk of water demand is met from surface supplies, using an infrastructure that comprises 60 large multi-purpose dams, 260 major irrigation tanks, and about 12,000 minor reservoirs (village tanks). About 85 percent of the water supply is used for irrigated agriculture. Unlike surface water, ground water is a limited resource whose availability has not yet been fully assessed (although it is likely that most of the major aquifers have already been tapped).[2]

2.2 Since the late 1950s, development of the Mahaweli river has been a centerpiece of Sri Lanka's development strategy. During implementation from the late 1970s onwards this was one of the largest river basin development schemes under construction in the world. The program was identified in 1958, a Bank mission made recommendations in 1961, and a master plan was formulated by the government in 1964-68, envisaging the irrigation of 260,000 hectares of undeveloped land, plus fresh investments in 100,000 hectares already under irrigation. Implementation of what was originally intended as a 30-year program began in 1970. In 1977 the government attempted both to speed up implementation and to apply a strategy of integrated rural development. In addition to irrigation works, the Mahaweli Authority became responsible for providing agricultural extension, settler support, roads, schools, police force, and social services.

2.3 Budgets are now more constrained and priorities have shifted. Government outlays on irrigation declined from 80 percent of agriculture sector spending in the early 1980s to about 40 percent in 2000.[3] The share of new construction in irrigation investments declined from the 80 percent plus that prevailed from 1950 to 1985 to less than one-third by the late 1990s (Annex A, Table A4).

2.4 Between 1970 and 1998 the Bank approved six credits in support of the Mahaweli program, totaling the equivalent of US$240 million (US$450 in 2001 dollars). The early credits focused on new construction. Senior engineers whose primary interest was the construction of the major head works wielded disproportionate influence. Insufficient consideration was given to the relationship between the various Mahaweli systems and adjacent towns, neglecting the dimension of regional development. No town and country planning expertise was represented on the Mahaweli Board. Building was completed by the early 1990s. By the end of that decade faith in the Mahaweli development scheme had faded. In 1998, the Bank's most recent (and probably last) contribution to the scheme—

2. World Bank, Sri Lanka: Promoting Agricultural and Rural Non-farm Sector Growth (Report No. 25387), February 26, 2003, p. 29.

3. *Ibid.*, p. 29.

Mahaweli IV—aimed for a radical restructuring, seeking to transform the Mahaweli Authority into a river basin authority. This included reducing staff numbers from 10,918 to 4,968 in exchange for an early retirement package.

2.5 The overall outcome of the heavy investment in irrigation—not just for the Mahaweli—has fallen short of expectations. Trade, marketing, technology, land, and water policies have between them helped to tie most farm households to low-productivity activities—about 90 percent of irrigated land is used to grow paddy. Poor reliability of water delivery and limited access to water by persons at the end of irrigation channels, combined with the inadequate supply of agricultural extension and improved technologies, contribute to low crop yields. In many areas in the dry zone, diversification into higher-value crops is impeded by water delivery schedules that are designed for paddy cultivation—schedules over which farmers exercise little control. Low productivity depresses farmer incomes—and also raises resistance to the introduction of water charges needed to fund maintenance of the irrigation system.

2.6 Nationwide, the percentage share of labor employed in agriculture decreased from 47 percent of total employment in 1990 to 36 percent in 1999; but throughout this decade agricultural productivity per worker stagnated at around SLR 53,000 per year (in constant 1996 prices). In 2000, about 80 percent of the population lived in rural areas but only 23 percent of the mean earnings of rural households came from agriculture. About 45 percent of rural households—with about half of these located in the poorest 40 percent of the income distribution—are dependent on farming (including casual agricultural wage employment).

2.7 Agriculture in Sri Lanka is becoming increasingly polarized between a small, dynamic sector (fruits, vegetables, and spices) and a large, relatively stagnant sector (which includes both paddy production and tree crops). The dynamic sector accounts for a rising share of GDP and is fueled by domestic (particularly tourist) and export demand. The stagnant sector is associated with stable to declining GDP shares. The easing of import restrictions on cereals has reduced the stimulus that these crops receive from domestic demand while their relatively high costs reduce export potential. Much of the irrigated farm area is tied up in paddy; and this sector's share of agricultural GDP declined from 28 percent in 1982-85 to 22 percent in 1996-2000.[4] In the late 1990s, about 5 percent of GDP went to subsidizing rice production, 3 percent (US$250 million per year) in the form of irrigation costs not recovered from users and 2 percent (US$125 million) corresponding to the roughly 10 percent increment over world prices that is paid by the Sri Lankan consumer of rice.

4. *Ibid.*, Executive Summary.

3. Project Objectives and Design

Location

3.1 The project focused on an area of the Mahaweli designated as System C, which is divided into six zones. The project area comprised the northern half of System C (Map), totaling about 66,700 hectares, situated in the east-central section of Sri Lanka, forming part of the dry zone with mean annual rainfall varying from 2,250 millimeters to 1,750 millimeters. System C comprised 24 percent of the area to be irrigated under the Accelerated Mahaweli Program. When the project was prepared, only the southern part of the system had any permanent settlement although areas to the north had been encroached on by shifting cultivators and illicit timber fellers. Only the northwest third of the area remained under relatively dense evergreen forest.

Project Objectives

3.2 When the appraisal report was presented (May 1981) it was not the Bank's standard practice to include a formal statement of development objectives. The report merely describes expected outputs. The project's objectives may be inferred from government's overall program goals, which were to reduce unemployment, substitute for food grain imports, and generate electricity for the development of industry and rural communities.

3.3 In its description of project benefits, the appraisal report addresses the first two of these program goals. Incremental agricultural employment would be 3.1 million workdays per year, added to which an unspecified number of ancillary jobs would be created in the locality based on the marketing and processing of farm produce and the provision of social services.

3.4 By reducing rice imports (which averaged 29 percent of consumption in the 1970s), and increasing exports the project would have a beneficial impact on the balance of trade: in addition to contributing an incremental rice output of 126,300 tons, the project was expected to generate 330 tons each of pepper, cocoa, and coffee; 29,400 tons of fuel wood; and 385 tons of cashew kernels. The annual gross foreign exchange value of the incremental production of tradeables generated through the project was estimated as US$61.2 million at full development, 91 percent of which would be attributable to rice import substitution.

3.5 About 90 percent of direct project beneficiaries would be new settler families most of whom were currently landless or operating holdings that were too small to guarantee a livelihood. Before they entered the project, the annual per capita income of beneficiaries was estimated at US$34, well below the absolute poverty level of US$105 per capita per year, defined by the Bank at the time (1980). After payment of the proposed water and land charges, the average income of the new settlers was expected to increase about 3.5 times from without-project levels.

3.6 The project aimed to settle farm families on 1.0 hectare plots in blocks of about 10-15 farms, supplied by a single farm canal. Following development 31,300 new families would settle in System C, consisting of 24,100 farmer-settlers (of which 18,500 would be in Zones 3 to 6) and 7,200 tradesmen, artisans, and service personnel. The project would provide settlers with adequate health, educational and other facilities to attain living standards comparable to other developed areas in Sri Lanka. Two towns would be established, Giranduru Kotte (Zone 2) and Dehiatte Kandiya (Zone 4).

3.7 In selecting settlers, first priority would be given to persons with previous farm experience who had been displaced from reservoir areas and elsewhere. Other farmer settlers would be expected to meet the following criteria established by the government:

- Currently owning no more than 0.4 hectares of farm land;
- Proven experience in agriculture either as a sharecropper or agricultural laborer; and
- Availability of family labor.

In the absence of an explicit statement in the Staff Appraisal Report, this reassessment "reconstructs" the development objectives of the project to be:

- *Improve rural livelihoods* through a settlement program targeted to poor families with previous experience of farm work, in order to raise farm incomes, stimulate ancillary off-farm employment, and provide supporting social and economic infrastructure; and
- *Strengthen the balance of trade* by boosting production of paddy and other crops, thus reducing dependency on rice imports and stimulating exports.

These are the objectives against which the project will be rated in this reassessment. The project's logical framework is depicted in Annex A, Figure A1.

Project Components

3.8 A detailed description of project inputs and outputs is given in Table A5 (Annex A). Summarizing:

- The project would provide new irrigation capability for about 24,100 hectares and enhanced capability for about 3,620 hectares, comprising in total about 42 percent of the gross area of System C of the Mahaweli Program.
- *For System C as a whole* the project would build a 26-kilometer-long Transbasin Canal, which would convey water from the Mahaweli river at Minipe to the Ulhitiya reservoir; it would also provide technical assistance, a monitoring program, maintenance equipment and workshops, equipment and facilities for a farm machinery hire service; and equipment for a training center and farm.
- *Within Zones 3 to 6 of System C* it would provide irrigation and drainage infrastructure, land clearing and on-farm development, roads, social infrastructure, and settlement assistance; it would also establish fuel wood and cashew plantations.

4. Relevance

OED's 1994 Assessment

4.1 This report included no explicit discussion, or rating, of relevance. But the project was described as soundly conceived at appraisal, which suggests that the verdict on relevance would have been positive. Also, the report notes favorably that a large number of poor farmers were served. The project's unsatisfactory outcome is attributed primarily to the unforeseen—and, in the report's view, unforeseeable—fall in the world price of rice. Although the assessment was made at a time when the Bank was paying much more importance to the openness of the trade regime, OED did not query the relevance of a project that supported the attainment of self-sufficiency in rice.

4.2 The one area where the project's relevance is questioned concerns the failure to protect biodiversity, reflecting the Bank's growing sensitivity to environmental concerns in the early 1990s. This failing is consistent with the overall tenor of the Mahaweli Program, the master plan for which completely ignored environmental impact.[5] A draft environmental impact study of the Mahaweli III project described Zone 4 as a critical habitat for several endangered fauna, recommending that this area be incorporated into a national park. On learning of this during appraisal, the Bank told the government that deletion of this area would require reexamination of the project's economic viability. The final version of the environmental impact report made no reference to a possible dropping of Zone 4 (which remained in the project). Despite concerns expressed by the Bank's Environmental Advisor, Operations went ahead with the project as originally designed, ignoring the concerns about the loss of wildlife habitat.

OED's 2004 Reassessment

4.3 In terms of the current strategy of the government and the Bank the verdict about the project's relevance today is mixed. On the one hand, the government's recent Poverty Reduction Strategy Paper gives central place to one of the goals of the Mahaweli program: combating unemployment.[6] But the approach to tackling this problem has altered. Where previously there was a focus on promoting import-substituting paddy production, now the emphasis, economy-wide, is moving labor from low- to high-productivity employment. In agriculture, this entails removing restrictions on crop diversification and tenure security, restrictions that have impeded investments in more productive technologies, such as drip irrigation and improved seed varieties. The Poverty Reduction Strategy Paper states that it is necessary to reverse the relentless fragmentation of agricultural lands into ever smaller plots, partly through equipping the rural population with the skills and ability to migrate to higher productivity jobs in urban areas. In the Mahaweli area, much emphasis is given to strengthening the water user groups responsible for operations and maintenance of canals,

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5. T. Scudder, Sri Lanka's Mahaweli Development Project, November 21, 2003 (Unpublished ms made available by author).

6. See "Regaining Sri Lanka": the Government's strategy, reproduced in the Joint IDA and IMF Staff Assessment of the Poverty Reduction Strategy Paper, March 7, 2003.

and providing alternatives to paddy production, notably stock rearing. There is also a new approach to water resource management based on transferable water entitlements—which is aimed to allocate water more efficiently between agriculture, industry, and urban uses. This will entail establishing a management authority for the whole river basin.

4.4 With respect to the project's two inferred development objectives (see previous section), this reassessment finds that the *balance of trade objective* is of limited relevance to today's strategy, given that it was framed by a policy of rice self-sufficiency that no longer applies to the current, more open trade environment. The *rural livelihoods objective* is still pertinent, but its contemporary relevance is reduced by:

- The project's failure to address efficiency-impairing distortions in the agriculture incentives regime;
- The absence of attention to the formation of water user groups who would assume partial responsibility for operating and maintaining the irrigation works built by the project;
- The failure *ex ante* to provide settlers with secure land rights; and
- The cursory treatment given to natural resource management, including the likely conflict between settler interests and wildlife conservation—particularly the problem posed by marauding elephants.

4.5 In light of these considerations, OED rates the overall relevance of the project's development objectives as *modest*.

5. Efficacy

5.1 The expected *outputs* were partially delivered, and with considerable delay. There were shortfalls in the size of the command area, the number of farm families settled, the amount of land cleared, the area in plantations and the provision of social infrastructure (Table 1). The high-inflation environment led to a large element of "contingency" spending. The closing date was extended four times—ultimately the project closed in May 1992 rather than December 1987 as originally intended. It is difficult to estimate the extent to which the actual cost exceeded the expected owing to the long implementation period, the depreciation of the exchange rate and the lack of information on the date when costs were incurred. The Project Completion Report (Evaluation Summary) says that, in dollar terms, the actual cost was 30 percent higher than budgeted; but the detailed project cost annex in the same report is not consistent with this estimate if rupees are converted into dollars at the average exchange rate that prevailed during implementation (admittedly, a crude measure)—this estimate suggesting that the total cost of the project was almost exactly double what was expected at appraisal (Table 1).

Table 1. Outputs by Component

Components	*Costs (US$ million)/a*		*Outputs*
	Appraisal Estimate	*Actual/b*	
Transbasin canal	21.0	28.6	26 km canal, complete as expected
Other canals & drains	17.9	101.7	Main and branch canals, 129 kms expected, 62 kms actual;
			Smaller canals, 1,210 kms expected, 1,418 kms actual
			Command area, 18,500 ha expected, 17,683 ha actual
Land preparation	4.0	8.7	Farm families settled (Zones 3 –6), 18,500 expected, 17,195 actual
			Clearing, 31,000 ha expected, 20,609 actual
Social infrastructure	3.6	22.9	Schools built, 303 expected, 87 actual
			Health centers built, 63 expected, 35 actual
			Roads built, 400 km expected, 551 km actual
Plantations	6.1	6.8	Cashew (2,000 ha planted as expected but only 15% of trees survived) and fuel wood (3,000 ha expected, 1,200 actual)
Other/c	76.2	88.6	Numerous items
TOTAL	**128.8**	**257.3**	

Source: Annex A, Table A5

/a Based on an average exchange rate of US$1=LKR28.2 for the implementation period (1981-1990). The exchange rate went from US$1=LKR16.5 in the appraisal year (1980) to US$1=LKR41.4 in the completion year (1991).

/b End of 1991.

/c Equipment and vehicles, settlement assistance, technical assistance, monitoring, training center, O&M during project implementation, and various "contingencies" to allow for high inflation.

5.2 OED's efficacy criterion considers the extent to which objectives were attained, giving priority to *relevant* objectives. Given that the second of the project's inferred development objectives—addressing the balance of trade deficit by pursuing rice self-sufficiency—is of negligible current relevance, the discussion of efficacy will only address how much the objective of improving rural livelihoods was achieved. OED 's 2004 assessment suggests a larger shortfall than that perceived in the earlier assessment. The data comparing the two assessments are presented in Annex A, Tables A1 to A3.

OED's 1994 Assessment

5.3 With respect to the *rural livelihoods* objective, the 1994 report gave a rather incomplete assessment. It stated that a large number of poor families were served (although noting that the number of farm families settled was 16,136, compared to the original estimate of 18,500).[7] OED made no reference to the failure to enforce the agreed settlement selection criteria (politicians gave preference to their clients)—and the likely consequences of this for farming productivity. The project completion report notes that

7. This refers to Zones 3 to 6 only. It is not clear either from the Project Completion Report or OED's assessment what proportion of the system-wide target (24,100 farm families) were actually settled. An EU report says that there were 27,296 farm families settled in System C in 2003.

many of the settlers had little or no experience of farming. The discussion of the shortfall in farm incomes (not actually quantified) focuses mainly on the effect of a halving of the world price of rice, and the failure to establish cashew plantations—which OED attributes to the appraisal's misreading of soil and climate. There is no reference to diversification out of paddy into other crops; slow progress in this area is described as a major cause of concern in the project completion report. There is also no discussion of the likely multiplier effect of the project on non-farm employment. Finally, there is no treatment of the shortfalls in providing schools and health centers; or the weakness of agricultural services. All these factors bear on the project's limited efficacy in improving rural livelihoods.

OED's 2004 Reassessment

5.4 OED's farm survey gathered a series of data that bear on the attainment of the *rural livelihood objective*. First, as of 2004, the income of farm households had increased by only 32 percent over the without-project scenario, compared to the increase of over 400 percent estimated at appraisal (Annex A, Table A3). Second, with respect to that part of income generated from the farm, almost all growth is attributable to paddy: income from all other on-farm sources accounted for only 1 percent of farm income, compared to the appraisal expectation of about one-tenth. The incremental output of paddy is 145,000 tons, or about 78 percent of what was projected. The mean paddy yield over the past three years (4.4 tons per hectare) is lower than the 4.7 tons per hectare that was expected; but the mean number of crops per year was somewhat higher.

5.5 Household income is based on a mono-cropping of paddy (60 percent of the total), supplemented by wage earnings, mainly earned *outside* the locality: important sources were the garment assembly industry, jobs in the home guard and army, and remittances from unmarried females employed as domestic servants in the Middle East (Annex A, Table A6). The relative unimportance of local wage employment (6 percent) demonstrates the project's limited multiplier effect.

5.6 Data from other sources amplify the survey findings. The 2004 survey used an instrument that had been administered in five previous surveys of System C going back to 1989 (Annex A, Table A10). These data show that total *cash* income halved in real terms over the 25-year period. They also show a significant jump between 1996 and 2004 in the share of wage earnings in total income. This is consistent with the findings of recent Bank analytic work concerning the stagnation of incomes from paddy-based agriculture.[8]

5.7 In 2004, average household incomes in System C were about 70 percent below the poverty line, a sad commentary on the project's effect on rural livelihoods.[9]

5.8 Other findings were as follows:

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8. World Bank, *op. cit.*, 2003.

9. In 1996, the poverty line was drawn at LKR 860 per month, equivalent to an annual household income of about LKR 51,600 (or LKR 46,071 in 1995 prices). The 2004 survey shows an average household income in System C of LKR 60,793 (or LKR 31,829 in 1995 prices).

- Key informants interviewed during OED's 2003 mission confirmed that the initial selection of settlers was heavily influenced by political clientelism, with little or no vetting of farming experience;
- Agriculture support services are weak: the reduction in services provided by the Mahaweli Authority has not been offset by the growth of a national research and extension service; productivity growth has stagnated;
- Many years after project implementation ended the number of schools, health centers, post offices and cooperatives in System C remained well below the original target;[10]
- The two towns in System C have stagnated economically over the past quarter century: they have failed to experience the commercial and agro-industrial growth that was initially expected, remaining primarily administrative centers.[11]

5.9 In the light of these findings, *efficacy* is rated modest.

6. Efficiency

OED's 1994 Assessment

6.1 OED endorsed the 4 percent economic rate of return estimated in the Project Completion Report (the appraisal estimate was 18 percent), concluding that in the light of world price changes it would be difficult to design any new investment project that would yield a 10 percent rate of return based on irrigated paddy production. It attributed a major part of the cost overrun to the unexpectedly large amounts of rock encountered during construction of the Trans-basin canal and the lack of fill material. The major delay in implementation also contributed to the doubling of project costs.

OED's 2004 Reassessment

6.2 It is the price of rice that determines the economic viability of this investment, given the absence of significant crop diversification. In 2003, in real terms, the world price of rice was only 38 percent of what it was in 1980 when the project was appraised (Annex A, Figure A2).

6.3 OED re-estimated the economic rate of return by taking the model in the 1993 project completion report and substituting actual rice prices up to the present for the estimated prices originally used; all other aspects of the 1993 model were left unchanged. This gives a rate of return of 2 percent, compared to the 4 percent that was estimated in 1993 (Annex A, Table A11). Subtracting the value of farm income sources other than paddy drives the rate of return down to zero. Removing non-paddy sources is not

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10. A.D.V. de S. Indraratna (ed.,) *A Quarter Century of Mahaweli: Retrospect and Prospect*, Colombo: National Academy of Sciences of Sri Lanka, 2000. Table 3 (p. 89). Data go up to 1996 only.

11. *Ibid.*, p. 165

unreasonable because the 2004 survey demonstrated that a mere 1 percent of *total household* income derived from farm sources other than paddy—compared to the 5-10 percent of *total farm* income assumed in the project completion report.

6.4 This re-estimate is borne out by a recent study by Kikuchi and others which estimated rates of return to investments in new irrigation in Sri Lanka centered on paddy. It concluded that after 1980 the returns fell beneath the opportunity cost of capital, falling to as low as 5 percent by 1997, based on prices and technical parameters prevailing at that time.

6.5 Other indicators also point to the project's low efficiency. Of the 50 new Sri Lankan irrigation construction projects reviewed by Kikuchi and others, the Mahaweli C (Zones 3-6) emerges as the most costly in constant value terms (LKR 710,000 per hectare in 1995 prices—or US$1,405 per hectare).[12] This is high in relation to cross-country comparators for surface irrigation in developing small island states.[13] Moreover, it seems to be only a partial estimate of the actual cost that is recorded in the project completion report. The total cost of the Trans-basin canal, and all other canals and drains down to the field level, divided by the actual command area, gives US$7,368 per hectare (see Table 1 above).[14] More comprehensive cost measures are no more positive. Dividing *total* project costs (including forest clearing, roads, social infrastructure) by the newly-irrigated area yields a figure of US$14,550 per hectare. OED's 1994 assessment made a comparison with Indonesian Transmigration settlement projects which also involved carving farms out of jungle: here the mean cost was US$12,000 per hectare, a figure which the report says had been criticized as excessively expensive.

6.6 Therefore, this reassessment rates efficiency as *negligible*.

7. Outcome

7.1 In 1994, OED rated this project's outcome as unsatisfactory. This reassessment concludes that, based on the evidence of modest relevance, modest efficacy, and negligible efficiency, the project's outcome should be rated *highly unsatisfactory*. One schematic way to derive this result is to consider 19 indicators which bear on the outcome rating. Of these, only three are given a plus rather than a minus: water supply reliability (as assessed by farmers interviewed in 2004; see below); meeting of the appraisal targets for the number of families settled; and increase in cropping intensity (Annex A, Table A2).

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12. M. Kikuchi et al., *Irrigation Sector in Sri Lanka* (Research Report No. 62), International Water Management Institute, Colombo: Sri Lanka, 2002, pp. 39-40.

13. One source (United Nations Environment Program, 2002), based on data from a number of small Pacific islands, suggests that for surface irrigation schemes (of which Mahaweli is an example) the typical cost range of on-farm works is US$100/ha—US1,000/ha.

14. As the footnote to Table 1 indicates, this is based on the average exchange rate during a period of currency instability. The range is roughly US$5,000/ha to US$13,000/ha.

8. Sustainability

OED's 1994 Assessment

8.1 The 1994 report is optimistic about sustainability, proposing a rating of likely; the project completion report had opted to rate it uncertain. OED's optimism in 1994 was based on the evidence of strong government commitment. At the time government was actively promoting and supporting Farmer Organizations that would be responsible for operations and maintenance of distributary and field canals. The report notes that without this vigorous farmer involvement severe degradation of the system would be likely. Farmer Organizations were apparently very willing to mobilize labor for cleaning and small maintenance jobs on distributary and field canals; but farmers were also very unwilling to provide even small amounts of cash for needed hardware. OED concluded that it was reasonable, for income redistribution purposes, to expect tax payers to cover the cash costs of system maintenance.

OED's 2004 Reassessment

8.2 The sustainability of the investment in irrigation depends on the contribution of government and water users to managing and maintaining the system, which in turn depends on the ability of the system to generate a revenue stream large enough to justify a commitment by government and by farmers. Generation of this revenue stream hinges partly on the policy framework, which determines whether or not there is an incentive for farmers to diversify out of paddy.

8.3 As originally conceived, the Accelerated Mahaweli Program soon proved to be fiscally unsustainable. Its share of total public capital expenditures rose from 7 percent in 1977 to 46 percent in 1982. The program's size was a major contributor to three problems: large unfinanced budget deficits; heavy dependence on external financing; and a serious imbalance between current and capital spending. The program was cut back in the mid-1980s. More generally, public funding of irrigation contracted. Government spending on operations and maintenance of irrigation works declined by 35 percent between 1985 (the peak) and 1997; over the same period public spending on rehabilitation also declined somewhat (Annex A, Table A4). Generalized budget tightening has accelerated this decline since 1997. The ongoing project to restructure the Mahaweli Authority aims to cut its claim on the recurrent budget from LKR 1,304 million in 1998 to LKR 552 million by June 2002. It is not clear from the latest status report what progress has been made toward this target—7,000 staff have been laid off but the net saving is reportedly less than the appraisal target owing to salary increases. Nevertheless, the scale of the proposed cutback (58 percent) is indicative of the climate of contraction now bearing on the Sri Lanka irrigation sector.

8.4 To what extent has the handover of management responsibility to water user groups offset the tightening of the Mahaweli Authority's budget? Formal handover means that while the Authority remains responsible for operating and maintaining main and branch canals, main drainage canals, and downstream reservoirs, the Farmers

Organizations are charged with managing distributary and field canals. Farmer Organizations that have signed a legal agreement for handover are empowered to collect operations and maintenance fees and fines, in principle reducing the claim on the public purse. In System C, Zones 3 to 6, there are now 127 Farmer Organizations of which only 8 have been legally handed over. Eighty-two Organizations report that they collect some operation and maintenance fees from users but, since the vast majority of these have not been legally handed over, they cannot enforce collection which, at best, is erratic and mobilizes only small sums. Also, 15-45 percent of water users are present in System C by virtue of informal lease or sale arrangements which means that they are not legal members of Farmers Organizations and tend to have little to do with them. While Organizations are able to mobilize a sufficient amount of members' labor for unpaid weeding, desilting, and bund strengthening, most of the cash outlay for operations and maintenance still comes from the public purse. Part of this outlay is embodied in the 5 percent commission the Organizations receive from government for identifying the local contractors that will take on publicly-financed rehabilitation works.

8.5 In principle, farmers should have the skills to manage the system: for over one thousand years villagers throughout Sri Lanka—including the Dry Zone area where System C is located—managed small tank cascades. However, although ultimately descended from this tradition, many System C settlers did not have recent farm experience when they were selected. Also, the Mahaweli staff were not trained to foster farmer participation in planning and management. There was a strong tradition of paternalism and a focus on overall (paddy) production targets rather than enabling farmers to assume responsibility.

8.6 The data from OED's 2004 survey paint a mixed picture of sustainability prospects. On the one hand, the irrigation works in System C remain viable: maintenance and rehabilitation works are, for the most part, supervised by Mahaweli technical staff, with the Farmer Organizations deferring to them. Averaging across the five zones surveyed, more than three-quarters of farmers responded that they were either satisfied or fairly satisfied with the supply of water received, the design of the irrigation works, and the arrangements for maintenance and rehabilitation (Annex A, Table A7). On balance, respondents were also positive in their assessment of how Farmer Organizations carry out key functions, including arrangements for regular maintenance, dispute resolution, input supply, and facilitating farmer access to credit. The one area where most respondents were dissatisfied (83 percent) was the assistance with paddy marketing (Annex A, Table A8).

8.7 The respondents generally upbeat assessment suggests that irrigation remains viable in System C; but this is more a reflection on the quality of work done by the Mahaweli staff than the Farmers Organizations, since 92 percent of the Organizations are "junior partners" in a joint management relationship. Also, OED's local consultant points out that farmers are reluctant to criticize the Farmer Organizations, not wishing to compromise social and business relations with their peers.

8.8 The land tenure regime is a major constraint on sustainability. Although it is not openly acknowledged by Mahaweli staff between 30 percent and 50 percent of plots in System C belong to absentee claimants. Many of these absentees were the original

settlers, coming from towns and lacking farming experience (e.g. traders). When they failed to prosper they moved back to the town either selling their plots or leasing them to sharecroppers—clandestinely in both cases. The absentees remain prime movers in the local economy. They show up to Farmer Organization meetings. They provide inputs to their tenants in exchange for a crop share. Given that this is an illegal lease arrangement tenants have limited bargaining power over the revenue share they receive, which may help explain the persistence of poverty and the quasi-subsistence nature of the farm economy. Although a 2003 Act makes it possible, in principle, for plot holders to sell land the state can still rescind this right. Also, regularizing tenure relations is complicated by the widespread and longstanding encroachment on System C reserve lands by outsiders. These sources of uncertainty place at risk any benefits that the project might generate, compromising sustainability.

8.9 The real test of sustainability is the economic health of the system. The 2004 survey data depict an overall stagnation of System C. First, there is little indication of diversification into higher margin crops or livestock; only 10 percent of farmers plant field crops other than paddy, and mean income from these alternative crops accounts for only one percent of total household income. Mahaweli staff in System C indicated that farmers are reluctant to diversify: because the markets for alternative crops are less secure; because traders would not be interested in purchasing the very small volumes of other field crops that individual farmers produce; and because the costs of production of other field crops are high.

8.10 Second, under one percent of respondents have installed drip, spray, and pump irrigation (suggesting that water is too cheap to justify these more intensive technologies). Third, none of the farmers hold title to their land, which probably helps to strengthen the impression in their minds that they are dependents of a government scheme rather than individual entrepreneurs. Fourth, for only 6 percent does the income from sale of farm produce exceed income from all other sources. This appears to be a subsistence-oriented monocrop farming system, heavily dependent on off-farm wage earnings. Focusing on paddy production alone—the original rationale of the Mahaweli program—the data do not look so bad. Yields (4.4 tons per hectare), although somewhat below appraisal expectations, are acceptable by regional standards, probably because almost all farmers make extensive use of improved seed; also cropping intensity is adequate, probably reflecting the reported reliability of water supply (Annex A, Table A9). But the overall lack of productivity growth in the economy of System C does not bode well for the future.

8.11 If sustainability is viewed from the narrow perspective of the continued viability of the irrigation works, investment benefits have been sustained. But if a higher standard is taken—the capacity for self-sustaining growth—clearly the investment has failed: farmers are not improving their farms and are heavily dependent on earnings and transfers from outside the irrigation scheme.

8.12 OED therefore rates sustainability as *unlikely*.

9. Institutional Development Impact

OED's 1994 Assessment

9.1 Institutional development was rated modest but there was no substantive discussion of this evaluation criterion. The report does note that one of the unintended consequences of the government's 1977 decision to accelerate the pace of the Mahaweli scheme was to push up inflation.

OED's 2004 Reassessment

9.2 The project did not include any institutional development objectives, either latent or explicit. As noted above, the failure to address constraints in the incentive regime and to make adequate allowance for the formation and strengthening of water user groups reduced the relevance of the project's development objectives. There were no preceding or parallel operations addressing these issues. The sector portfolio in Sri Lanka c.1980 is—with the exception of a 1979 project to support the introduction of a Training and Visit system of agricultural extension—given over to integrated rural development, irrigation, and tree crop diversification, all of which emphasized physical rather than institutional objectives.

9.3 A 1986 OED report on the Bank's assistance to Sri Lanka points to one area where the project had an institutional development impact—by influencing the water pricing policy. In 1981, during the negotiations for the project, extensive discussions on cost recovery took place between the Bank and the government. Water charges were to be collected in the Mahaweli starting in September 1982 at a level equivalent to 22 percent of the expected operation and maintenance costs, rising to 100 percent of those costs by 1991. The government initially stalled but eventually responded because, according to OED, the Bank made it clear that it would not support further investment in irrigation if cost recovery was not addressed. In July 1983, the Cabinet approved the introduction of a nationwide program of water charges, aiming to achieve full cost recovery within five years.

9.4 But the Bank's long-term leverage over cost recovery was limited. In System C specifically, data for 1984-96 from the Mahaweli authority indicate that the collection of operations and maintenance charges from users was very erratic; it peaked in real terms in 1991 falling to a fraction of that by the mid-1990s.[15] Neither Mahaweli staff nor farmers give high priority to maximizing the efficiency of water use, reducing the support for charges. In 1998, the Bank estimated that unrecovered irrigation costs—mainly attributable to large-scale schemes like the Mahaweli—amounted to US$250 million per year, or 3 percent of GDP.

9.5 Did the project have any unintended impacts on institutional development—changes to the policy framework and to organizational capacity that may be attributed to

15. Indraratna *op. cit.*, 2000, p. 170. In 1995 prices, charges collected amounted to LKR 3,562,533 in 1991 but averaged only LKR 86,811 in 1995-96.

the project even if they were not anticipated at appraisal? This is impossible to prove. It could be argued that the government's push to promote Farmer Organizations, which began in 1991 immediately after project implementation was completed, would not have taken place if the irrigation investments had not been made in the first case. But the evidence from key informants and field visits concerning the continuing financial dependence of the Organizations on government hardly points to robust institutional development.

9.6 Alternatively, it could be argued that the very stagnation of the Mahaweli scheme, given its enormous cost and high profile, could have spurred the government to the policy reforms needed to encourage farmers in the Mahaweli and elsewhere to diversify out of paddy into higher margin crops and livestock. But as recent Bank analytic work has demonstrated, reform progress remains limited. Government interventions in agricultural commodity and factor markets and the absence of secure land rights continue to curb productivity growth in agriculture.[16] Steps have been taken to liberalize land markets, but progress in developing a private seed industry has stalled and a draft National Water Policy formulated in 2000 has not been implemented (in policy terms, water remains largely a free good). Also, the agriculture extension service—earlier Bank support notwithstanding—is very patchy. In 1999-2000, only 13 percent of farm households reported having received technical assistance from a government extension agency. Coverage of extension services is particularly bad in the Dry Zone provinces where the various Mahaweli systems are located. Finally, the Bank-supported initiative to scale-back the Mahaweli agency and to create a multi-sector river basin authority (project approved in 1998) has not prospered; the government is stalling and the Bank's latest rating of progress toward project development objectives is unsatisfactory.

9.7 In the light of these considerations, institutional development impact is rated *negligible*.

10. Bank and Borrower Performance

OED's 1994 Assessment

10.1 OED rated Bank and borrower performance as satisfactory arguing that the unsatisfactory project outcome was a consequence of the worldwide fall in rice prices and did nor reflect badly either on project design or implementation. The report states that the four-year implementation delay was probably more the consequence of an overoptimistic guess at appraisal of the time needed, rather than weak performance in the field. It indicates that the project had to be implemented by an already overstretched organization, facing new technical and organizational issues.

10.2 No reference is made to OED's 1986 review of World Bank assistance to Sri Lanka, which made a substantial analysis of the Mahaweli program, including a critical

16. World Bank, Sri Lanka: Promoting agricultural...*op. cit.*, 2003.

evaluation of Bank and borrower performance. (Rating of performance was less central and less explicit in OED's earlier assessments than it is today).

OED's 2004 Reassessment

10.3 Given that 14 years had elapsed since the project closed it was unreasonable to expect either Bank or government staff to be either available for, or capable of, shedding new light on performance during the implementation period. However, there is enough material in the project completion report and OED's 1994 assessment to cast doubt on the satisfactory ratings that these reports give.

10.4 The 1994 rating seems generous given the doubling (in real terms) of project costs, which suggests weak oversight by Bank and borrower at both the design and implementation phase. Also, it is surprising that the Bank and borrower's pushing aside of the environmental issue (paragraph 2.17 above)—a major focus of OED's 1994 report—did not appear to weigh in the rating of either party's performance.

10.5 OED's 1986 report on Bank assistance to Sri Lanka contains important insights on the dynamics of the relationship in the period between government's 1977 decision to accelerate the Mahaweli program and the 1981 approval of the project assessed in this report. It notes that at the time there was unanimity in Sri Lanka and among knowledgeable outsiders that controlling the Mahaweli river for power and irrigation should be a major element of Sri Lankan development. However, there was less unanimity about the wisdom of greatly speeding up implementation, or the Bank's decision to support the accelerated program before the full engineering and economic studies it usually required had become available.

10.6 OED's 1986 report makes it clear that the Bank attached great importance to supporting the radical shift from a planned to market-oriented economy espoused by the administration that took over from its more socialist predecessor in 1977. There were certain tradeoffs in this relationship. If there were to be some tampering with a central aspect of the welfare state (subsidized rice), there had to be an alternative program which caught the imagination of the people: the accelerated Mahaweli was the centerpiece of that alternative vision. The Bank considered that quicker implementation would help ease the major unemployment and foreign exchange problems facing the government. It also judged that its overall relationship with Sri Lanka would be compromised if it did not support the accelerated program. The Bank recognized that major bilateral donors were eager to support the new government and its reforms—they would go ahead even if the Bank demurred.

10.7 But regardless of these possible justifications, OED's 1986 report finds that Bank and borrower should have foreseen four problems that arose with the Mahaweli program. First, the likely escalation in costs associated with large, accelerated programs was underestimated. Costs for a full program were estimated as LKR 11-12 billion in 1977; by 1985 estimates for a *reduced* program had climbed to LKR 40 billion. Rapid inflation explained over half the increases but, even in real terms, costs increased about two-thirds above original estimates, despite cuts in the program.

10.8 Second, the accelerated program placed serious strains on the economy. Transport facilities were especially affected, resulting in increased cost, physical deterioration, and bottlenecks for other projects. The heavy use of imported expertise and inputs wiped out many of the alleged balance of payments benefits of the project. Third, not enough care was taken to eliminate or scale back parts of the program where expected rates of return were estimated to be low: for example, surveys done between 1975 and 1978 showed that several of the areas to be irrigated had soils less suitable for irrigated rice production yet investment went ahead. Finally, Bank and borrower greatly underestimated the length of time for such an ambitious program to generate net benefits. Critics argued that other, more modest interventions would have yielded a quicker payoff and would have eaten up less foreign exchange—rehabilitation of existing irrigation tanks, for example.

10.9 In 1986, OED argued that despite these oversights it was unlikely, in the circumstances of the time, that the Bank could have effectively advocated scaling back and slowing down certain aspects of the program. It concluded that, even with the benefit of hindsight, the decision to support the Mahaweli should not be faulted.

10.10 This is not convincing. With the benefit of even greater hindsight—but based on the evidence adduced in the earlier reports—this reassessment finds that there is sufficient reason to rate Bank and borrower performance *unsatisfactory*.

11. Findings and Lessons

11.1 Thayer Scudder and his associates interviewed a small sample of Mahaweli settlers at repeated intervals between 1979 and 2001. As early as 1984, not long after Mahaweli III began to be implemented, they began to have doubts that the program's potential would be realized:

> *At a time when others were emphasizing the project's ongoing success, we were the first to inform the Minister that the Accelerated Mahaweli Program risked replicating poverty within the Mahaweli systems...As his unofficial advisers we had to inform him of our belief that the settlement component of the country's largest ever project was failing. A shocked silence followed—the Minister's initial reaction being that if such was the case he would have to resign. Since then our negative assessment intensified and Vimaladharma and Wanigaratne's recent [2001] survey has further documented settler poverty and lack of multiplier effects.*[17]

11.2 The reports by Scudder and his associates were apparently not considered by OED's 1994 assessment, although they are mentioned in OED's 1986 review of Bank assistance to Sri Lanka. The 2004 reassessment essentially reiterates findings that were made by Scudder and his Sri Lankan colleagues 20 years ago. To summarize, OED finds:

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17. Scudder, *op. cit.*, 2003. Professor Scudder's colleague, Dr. Wanigaratne led OED's 2004 survey, using the same instrument they had employed previously.

- The development effectiveness of the Bank's overall support to the Mahaweli program—credits and loans approved between 1970 and 1998 totaling one-half of US$1 billion in real terms—has been extremely limited;
- The incomes of farm families settled in System C have declined in real terms over the two decades or so since they were relocated; and the mean income level is now below the absolute poverty line; partly for this reason there was much lower than expected creation of ancillary off-farm employment;
- The primary rationale for the program—rice import substitution—ceased to be tenable shortly after Mahaweli III was approved (1981) owing to the halving of world rice prices; restoring the economic viability of the Third Mahaweli project hinged on diversifying out of paddy—but neither the mindset of the Mahaweli Authority nor the broader policy environment were conducive to diversification, a circumstance that remains largely true today; and
- Although government sought to devolve part of the responsibility for operation and maintenance on Farmer Organizations, these groups remain government clients and are not financially self-sustaining.

11.3 Many lessons may be drawn from the Bank's protracted involvement with the Mahaweli program. Many of these lessons have been taken into account in the design of more-recently prepared Bank projects. For example, there is widespread recognition today that investments in infrastructure need to be accompanied by measures to reform the policy environment and to strengthen institutions. Water needs to be priced to reflect the growing (cross-sector) competition for supplies; and irrigation operation and maintenance costs need to be recovered from users if public schemes are not to be an excessive burden on the recurrent budget.

11.4 The following more specific lessons may be derived from the Third Mahaweli Project. *First, rushing technical and economic feasibility studies, or paying insufficient attention to the findings is likely to result in an unsatisfactory project outcome.* In this case, the Bank felt pressured to lend in order to build a relationship with a promising new government. Consequently, not enough care was taken either to estimate or subsequently to contain the costs of the proposed irrigation schemes. Important environmental considerations bearing on the preservation of biodiversity and the management of conflicts between settlers and wildlife were brushed under the carpet. The long-term fiscal implications were downplayed and the inflationary impact of project funding was not taken seriously enough.

11.5 *Second, settlement programs that do not select candidates with previous farming experience and which do not provide settlers with full title to their land are not likely to prosper.* This project, to date, has failed to deliver security of tenure to farmers. Title was not given to the farmers out of a paternalistic concern that they would speculate with the land rather than farm it. The importance of secure property rights was less widely recognized in 1980 when the project was appraised than it is now. Without title, farmers are not legally able to sell their plots and, if they sell illegally, are less likely to recoup the value of investments they have made. This discourages less successful farmers from selling up and impedes consolidation of plots that are too small to be viable.

11.6 *Third, using repeated interviews with a small number of households, supplemented by interviews with local leaders and community groups is an effective low-cost technique for tracking the performance of rural development projects.* The work by Scudder and his Sri Lankan colleagues bear this out. Early on Scudder's approach was described as "controversial" by Bank evaluation experts because the small initial sample was opportunistic not random (based on who was available for interview—subject to certain screening criteria), and was maintained almost without rotation over several years. The Bank suggested that this approach was appropriate for highlighting problems to be further explored, but could not be used to draw reliable conclusions about an entire population. It was also suggested that the researchers' familiarity with the respondents—and the possibility that respondents would expect to receive help in exchange for information—might encourage respondents to underreport their incomes.[18] Nevertheless, at a cost of only US$20,000-US$40,000 per survey Scudder and his colleagues were able to predict early on that the Mahaweli program would not fulfill its development objectives.

18. Kumar, op. cit., 1993, p. 24.

Annex A. Tables

Table A1. Summary Assessment of Key Indicators In Successive Evaluation Reports

	Evaluation Report (Year)		
Indicators	***PCR (1993)***	***PAR (1994)***	***PPRR (2004)***
(1) Construction timely?	No	No	No
(2) Construction cost effective?	No	No	No
(3) Irrigated area target met?	No	No	No
(4) Road/social infrastructure target met?	Yes	Yes	No
(5) Water supply reliable?	N/A	N/A	Yes
(6) Settler selection criteria sound?	No	N/A	No
(7) Settler target met?	No	No	Yes
(8) Settlers given land title?	N/A	N/A	No
(9) Farmers well organized?	N/A	No	No
(10) O&M adequate?	No	No	No
(11) Ag. services adequate?	No	N/A	No
(12) Paddy yield target met?	Yes	No	No
(13) Cropping intensity target met?	No	N/A	Yes
(14) Better NRM?	No	No	No
(15) World prices supportive?	No	No	No
(16) Govt. policy supportive?	No	N/A	No
(17) Paddy output target met?	No	No	No
(18) Non-paddy farm target met?	Yes	Yes	No
(19) Farm income target met?	No	N/A	No

N/A Not available or not assessed.

* But see Table for qualification.

PCR Project Completion Report.

PAR Performance Audit Report (OED).

PPRR Project Performance Reassessment Report (OED).

O&M Operation and maintenance of irrigation works.

NRM Natural resource management.

Figure A1. Logical Framework

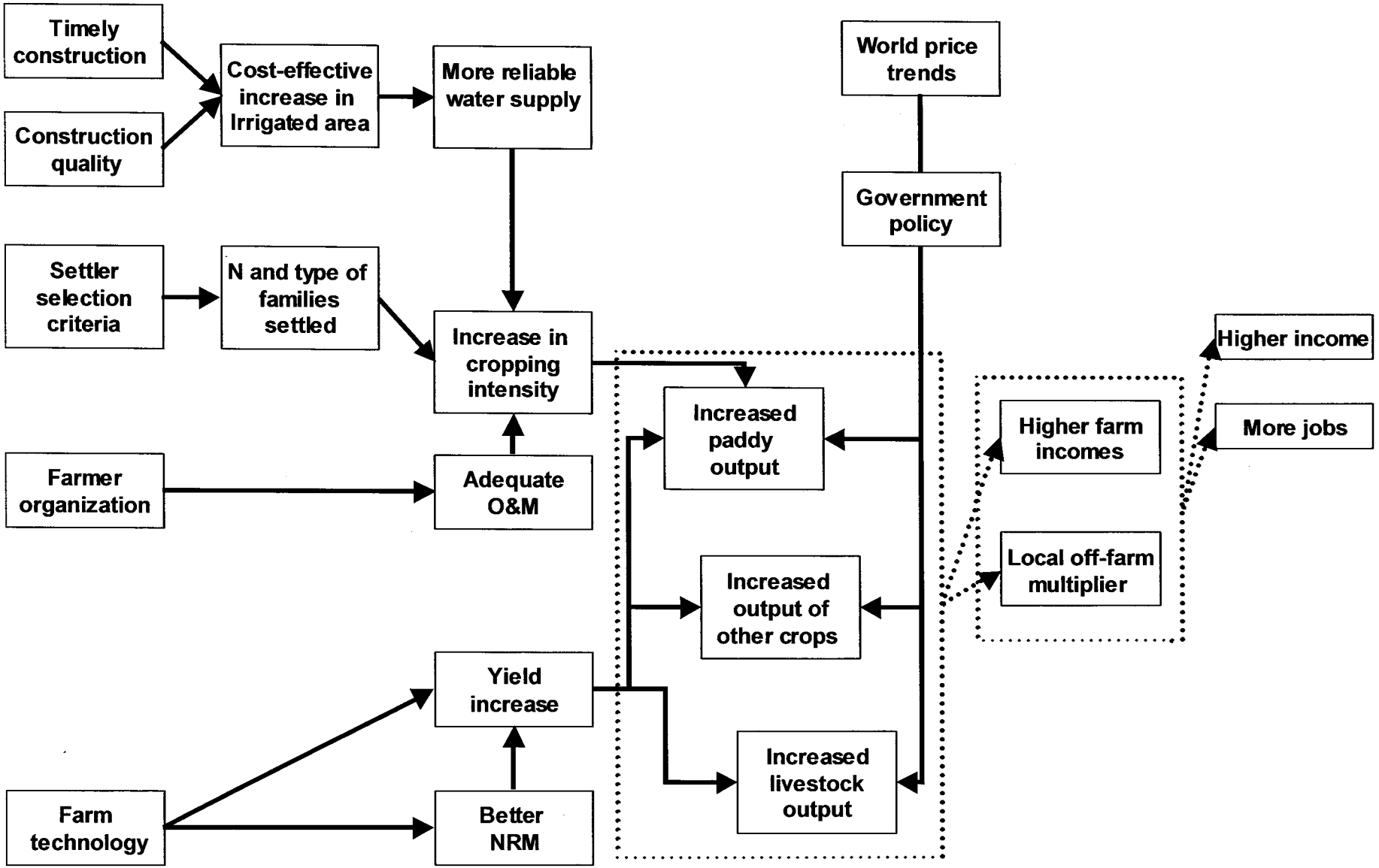


Table A2. Bearing of Indicators on Main Evaluation Criteria (2004 Reassessment)

	Evaluation Criteria		
Indicators	***Outcome***	***Sustainability***	***Institutional Development Impact***
(1) Construction timely?	(-)		
(2) Construction quality adequate?	(-)	(-)	
(3) Irrigated area target met?	(-)		
(4) Road/social infrastructure target met?	(-)		
(5) Water supply reliable?	(+)	(+)	
(6) Settler selection criteria sound?	(-)	(-)	
(7) Settler target met?	(+)		
(8) Settlers given land title?	(-)	(-)	(-)
(9) Farmers well organized?	(-)	(-)	(-)
(10) O&M adequate?	(-)	(-)	(-)
(11) Ag. services adequate?	(-)	(-)	(-)
(12) Paddy yield target met?	(-)		
(13) Cropping intensity target met?	(+)	(+)	
(14) Better NRM?	(-)	(-)	
(15) World prices supportive?	(-)	(-)	
(16) Govt. policy supportive?	(-)	(-)	(-)
(17) Paddy output target met?	(-)		
(18) Non-paddy farm target met?	(-)		
(19) Farm income target met?	(-)	(-)	
Overall Rating	**Highly Unsatisfactory**	**Unlikely**	**Negligible**

O&M Operation and maintenance of irrigation works.

NRM Natural resource management

Table A3. Project Performance in Relation to Appraisal Targets

Targets	*Appraisal Expectation SAR (1981)*	*Actual Result By Evaluation Report (Year)*		
		PCR (1993)	*PAR (1994)*	*PPRR (2004)*
New irrigated area (ha)	18,500	17,683	17,683	17,683
Cropping intensity/b	180	199	N/a	187
Paddy yield (Maha) (t/ha)	Mean 4.7	5.2	Mean 4.0	Mean 4.4/e
Paddy yield (Yala) (t/ha)		4.8		
Incremental paddy output (t)	185,800/f	132,762/g	145,000	157,000/h
Farm families settled/a	18,500	17,195	16,136	18,026/i
Farm income increase (%)/c	+429	+95-143/g	N/a	+32
Non-paddy farm income (%)/d	9	11	10	1
Farm jobs created (m workdays)	3.1 p.a.	3.6 p.a.	N/a	N/a
Fuel wood plantations (ha)	3,000	1,200	N/a	N/a
Cashew plantations (ha)	2,000	300	N/a	N/a

N/a Not available or not assessed.

SAR Staff Appraisal Report.

PCR Project Completion Report.

PAR Performance Audit Report (OED).

PPRR Project Performance Reassessment Report (OED).

/a Zones 3 to 6 of System C only; system-wide, the SAR expected 24,100 farmer families to be settled.

/b Area cultivated in paddy (Maha plus Yala seasons)/Irrigated area x 100.

/c Refers to new settlers, applying "non-mechanized broadcast" model of paddy farming—the most widely-diffused model (SAR, Annex 4, Table 3). The appraisal estimate was compared to findings from farm surveys in 1991 (see PCR, p. 46) and 2004 (OED). Thus:

Net Benefits Before Financing at Full Development	*Current prices LKR/family/year*	*Constant prices 1995 LKR/family/year*
SAR (1981)		
(1) Without project	5,073	24,157
(2) With project	26,850	127,857
(3) % Increase (2) over (1)		+429
PCR Survey (1991)		
(4) With project	31,973	**45,676**
(5) % Increase (4) over (1)		+89
PPRR Survey (2004)		
(6) With project	60,793	**31,829**
(7) % Increase (6) over (1)		+32

/d Income from crops other than paddy as a proportion of total farm income at full development (1995): refers to other annuals, perennials, fuel wood, cashews and output from homestead plots (see Annex 4, Table 8, SAR). PAR estimate added income from dairying (p. 59).

/e The yield per season based on an average of the past three years. There is no significant difference between yields for each of the two seasons (*maha* and *yala*).

/f Based on Annex 3, Table 3 of SAR. The SAR says that at full development incremental output would be 185,00 t of paddy, equivalent to 126,300 t of rice (p. 35). (PCR and PAR mistakenly give 153,000 t incremental tons of paddy as the appraisal target).

/g PCR, Part III, Section 6A ("Direct Benefits"), p. 42.

/h For Zones 3-6, total paddy output averaged 169,000 tons in 2001-03. *Less* "without project" paddy output (12,200 t, according to SAR, Annex 3, Table 3) this gives a figure of about 157,000 tons.

/i This is the number of registered farmers in Zones 3 to 6 in 2003.

Table A4. Irrigation Investments in Sri Lanka, 1950-1997

	Investment : SLR billion in 1995 prices (Percent of Total)/a				
	Public investment				
	New construction	*Rehabilitation*	*Operations and maintenance*	*Private investment/b*	*Total*
1950	2.47 (96)	-	0.09 (4)	-	2.56 (100)
1955	2.36 (96)	-	0.11 (4)	-	2.46 (100)
1960	1.54 (83)	-	0.32 (17)	-	1.86 (100)
1965	1.59 (91)	-	0.16 (9)	-	1.75 (100)
1970	2.55 (93)	-	0.20 (7)	-	2.75 (100)
1975	2.86 (89)	0.01 (0)	0.33 (10)	0.02 (1)	3.22 (100)
1980	7.76 (89)	0.58 (7)	0.35 (4)	0.03 (0)	8.71 (100)
1985	7.11 (81)	1.16 (13)	0.40 (5)	0.08 (1)	8.74 (100)
1990	1,73 (63)	0.52 (19)	0.27 (10)	0.23 (8)	2.74 (100)
1995	0.69 (35)	0.61 (31)	0.28 (14)	0.37 (19)	1.96 (100)
1997	0.62 (28)	0.92 (41)	0.26 (11)	0.44 (19)	2.23 (100)

Source : M. Kikuchi et. al., Irrigation Sector in Sri Lanka, (Research Report No. 62), International Water Management Institute, Colombo, Sri Lanka, 2002, Table 1, p. 5.

/a Five-year averages centering on the years shown. /b Investments in agro-wells and irrigation pumps by farmers.

Table A5. Sri Lanka Third Mahaweli Ganga Development Project (C1166)—Detailed Features

Specific Objectives Components (Geographic scope)	*Actions/Targets Envisaged at Appraisal (SAR)*	*Significant Inputs and Outputs (PCR)*
(1) Build Minipe Transbasin Canal (System-wide)	26 kms of canal, concrete-lined, extending from Minipe to Ulhitiya Reservoir.	Estimated cost 593 m. rupees, Actual cost 807 m. rupees Fully completed, 36% over budget.
(2) Build other canals and field drains, including Main Canal No. 2 (Zones 3-6)	Main Canal No. 2 (24 kms); Branch canals (105 kms); D&F canals (1,210 kms); Drains (815 kms), Command area of 18,500 ha Development plan to be based on a 1,000 ha representative area.	Estimated cost 506 m. rupees, Actual cost 2,868 m rupees Main Canal No. 2 (17 kms) Branch canals (45 kms) D&F canals (1,418 kms) Drains (540 kms) Command area of 17,683 ha Partially completed, 467% over budget
(3) Prepare land for farming (Zones 3-6)	31,000 has to be cleared; 1,000 ha conserved as forest	Estimated cost 113m rupees, Actual cost 246m rupees 20,609 has cleared Partially completed, 118% over budget
(4) Build social infrastructure (Zones 3-6 plus Zone 2)	303 schools 63 medical/public health buildings 400 km of roads Settle 24,100 farm families.	Estimated cost 102 m. rupees. Actual cost, 645 m. rupees 87 schools built 35 medical/public health buildings 551 km of roads 17,195 farm families settled Partially completed, 532% over budget
(5) Establish cashew and fuelwood plantations (Zones 3-6)	2,000 ha of cashew 3,000 ha of fuelwood	Estimated cost, 171 m. rupees Actual cost, 191 m. rupees 2,000 ha of cashew planted; but only 15% of trees survived. 1,200 ha of fuelwood planted Partially completed, 12% over budget
(6) Giranduru Kotte training center and farm (located in Zone 2 but serving whole System)	Classrooms, laboratories and accommodation for 100 farmer participants	Project provided equipment only (Buildings financed by EU) Estimated cost of center equipment 8.1 m rupees Actual cost, nil
(7) Farm machinery hire and agricultural support services (System-wide)	150 tractors plus implements, Central Store at Dehiatte Kandiya	Machinery: Estimated cost 81.2 m rupees; Actual cost 152 m rupees Services: Cost not specified at appraisal; Actual cost 57 m rupees Draft animals and dairy cows supplied to settlers (MEA initiative, outside project)
(8) Monitoring program (System-wide)	Agro-economic surveys to assess project impact. Study of irrigation delivery and system losses.	Agro-economic surveys and irrigation Study partially completed. No actual cost available.

Source: SAR & PCR

SAR Staff Appraisal Report.
PCR Project Completion Report.
D&F Distributary & Field (Canals).
FO Farmers Organization.
MEA Mahaweli Economic Agency.
O&M Operation and maintenance of irrigation works.

Table A6. Household Income: Sampled Households in Mahaweli System C

Irrigation scheme	*Annual Net Income per Farm Family in Current Rupees (Percentage of total)*				
(N of farmers interviewed)	*Total*	*On-Farm*	*Off-Farm*	*Non-Farm*	*Paddy*
Zone 1	79,363	46,078	2,725	30,560	46,078
(N=40)	(100.0)	(58.1)	(3.4)	(38.5)	(58.1)
Zone 3	60,476	41,626	4,650	14,200	39,451
(N=40)	(100.0)	(68.8)	(7.7)	(23.5)	(65.2)
Zone 4	56,351	35,981	5,145	15,225	35,981
(N=60)	(100.0)	(63.9)	(9.1)	(27.0)	(63.9)
Zone 5	76,911	36,805	2,707	37,400	36,805
(N=30)	(100.0)	(47.9)	(3.5)	(48.6)	(47.9)
Zone 6	29,223	19,123	1,733	8,367	19,123
(N=30)	(100.0)	(65.4)	(5.9)	(28.6)	(65.4)
ALL	**60,793**	**36,724**	**3,685**	**20,384**	**36,289**
US$*	**625**	**377**	**38**	**209**	**373**
(N=200)	**(100.0)**	**(60.4)**	**(6.1)**	**(33.5)**	**(59.7)**

Source: OED Farm Survey, 2004.

On-farm	Paddy and other crops.
Off-farm	Wages from working as a farm laborer in locality.
Non-farm	All other income sources, including wages earned outside agriculture.
*	Exchange rate, February 2, 2004: US$1.00 = 97.33 LKR.

Table A7. Irrigation Assessment, Mahaweli System C

	Percent Responding "Satisfied" (S), "Fairly Satisfied" (FS), or "Not Satisfied" (NS)					
Irrigation scheme (N of farmers interviewed)	***1.How satisfied are you with the supply of water you receive from the irrigation system?***	***2.How satisfied are you with the overall design of the irrigation system?****	***3.How satisfied are you with the way that irrigation water is shared between farmers in the system?***	***4.How satisfied are you with the arrangements for maintaining the headworks and canals?***	***5.How satisfied are you with the arrangements for maintaining distributary and field canals?***	***6.How satisfied are you with the rehabilitation works that have been carried out in the past five years?***
Zone 1	83 (S)	10 (S)	38 (S)	5 (S)	18 (S)	-- (S)
(N=40)	18 (FS)	80 (FS)	55 (FS)	50 (FS)	35 (FS)	10 (FS)
	-- (NS)	10 (NS)	8 (NS)	45 (NS)	48 (NS)	90 (NS)
Zone 3	100 (S)	95 (S)	90 (S)	88 (S)	90 (S)	85 (S)
(N=40)	--(FS)	5 (FS)	10 (FS)	13(FS)	10 (FS)	15 (FS)
	--(NS)	--(NS)	--(NS)	--(NS)	--(NS)	--(NS)
Zone 4	55 (S)	62 (S)	53 (S)	45 (S)	52 (S)	75 (S)
(N=60)	27 (FS)	30 (FS)	35 (FS)	52 (FS)	43 (FS)	20 (FS)
	17 (NS)	8 (NS)	12 (NS)	3 (NS)	5 (NS)	5 (NS)
	**2					
Zone 5	53 (S)	43 (S)	70 (S)	37 (S)	57 (S)	67 (S)
(N=30)	33 (FS)	50 (FS)	23 (FS)	57 (FS)	37 (FS)	27 (FS)
	13 (NS)	7 (NS)	7 (NS)	7 (NS)	7 (NS)	7 (NS)
Zone 6	53 (S)	50 (S)	53 (S)	33 (S)	50 (S)	53 (S)
(N=30)	30 (FS)	43 (FS)	40 (FS)	63 (FS)	50 (FS)	43 (FS)
	17 (NS)	7 (NS)	7 (NS)	-- (NS)	-- (NS)	3 (NS)
				**3		
ALL	**69 (S)**	**54 (S)**	**60 (S)**	**42 (S)**	**53 (S)**	**58 (S)**
(N=200)	**21 (FS)**	**40 (FS)**	**33 (FS)**	**46 (FS)**	**35 (FS)**	**22 (FS)**
	10 (NS)	**7 (NS)**	**7 (NS)**	**11 (NS)**	**12 (NS)**	**21 (NS)**
	**1			**1		

Source: OED Farm Survey, 2004

* Headworks, main canal, distributary and field canals.

** Percent that did not respond to the question.

Table A8. Farmer Organization Assessment, Mahaweli System C

Zone	*Zone 1*	*Zone 3*	*Zone 4*	*Zone 5*	*Zone 6*	*ALL*
(N of farmers interviewed)	*(N=40)*	*(N=40)*	*(N=60)*	*(N=30)*	*(N=30)*	*(N=200)*
Handed Over? (No/Yes)	*(No)*	*(No)*	*(No)*	*(Yes)*	*(No)*	
	Percent Responding "Satisfied" (S), "Fairly Satisfied" (FS), or "Not Satisfied" (NS)					
1.How satisfied are you with the job done by the FO in organizing rehabilitation of the irrigation system?	15 (S)	88 (S)	55 (S)	53 (S)	33 (S)	50 (S)
	53 (FS)	13 (FS)	45 (FS)	40 (FS)	37 (FS)	38 (FS)
	30 (NS)	--(NS)	--(NS)	7 (NS)	-- (NS)	7 (S)
	**2				**30	**5
2.How satisfied are you with the job done by the FO in organizing regular maintenance work?	45 (S)	90 (S)	50 (S)	50 (S)	37 (S)	55 (S)
	33 (FS)	10 (FS)	45 (FS)	43 (FS)	33 (FS)	34 (FS)
	23 (NS)	--(NS)	5 (NS)	7 (NS)	-- (NS)	7 (NS)
					**30	**5
3.How satisfied are you with the assistance that the FO provides in supplying farm inputs (e.g. fertilizer, seed)?	33 (S)	73 (S)	42 (S)	10 (S)	33 (S)	40 (S)
	45 (FS)	10 (FS)	38 (FS)	10 (FS)	20 (FS)	27 (FS)
	20 (NS)	17 (NS)	18 (NS)	67 (NS)	17 (NS)	25 (NS)
	**3		**2	**13	**30	**7
4.How satisfied are you with the assistance that the FO provides in marketing paddy?	3 (S)	-- (S)	3 (S)	7 (S)	-- (S)	3 (S)
	8 (FS)	--(FS)	7 (FS)	10 (FS)	--(FS)	5 (FS)
	80 (NS)	100 (NS)	88 (NS)	63 (NS)	70 (NS)	83 (NS)
	**10		**2	**20	**30	**10
5.How satisfied are you with the assistance that the FO provides in helping its members get access to credit?	15 (S)	73 (S)	43 (S)	17 (S)	30 (S)	38 (S)
	50 (FS)	15 (FS)	43 (FS)	43 (FS)	23 (FS)	36 (FS)
	35 (NS)	12 (NS)	10 (NS)	40 (NS)	17 (NS)	21 (NS)
			**3		**30	**5
6.How satisfied are you with the information that the FO provides about the use of funds at its disposal?	28 (S)	78 (S)	48 (S)	47 (S)	20 (S)	46 (S)
	53 (FS)	20 (FS)	50 (FS)	43 (FS)	47 (FS)	43 (FS)
	20 (NS)	-- (NS)	2 (NS)	10 (NS)	3 (NS)	7 (NS)
		**3			**30	**5
7.How satisfied are you with the FO's ability to help settle disputes between members (e.g. over access to water)?	48 (S)	55 (S)	47 (S)	14 (S)	33 (S)	47 (S)
	23 (FS)	23 (FS)	42 (FS)	37 (FS)	33 (FS)	32 (FS)
	25 (NS)	-- (NS)	10 (NS)	17 (NS)	3 (NS)	11 (NS)
		**23	**2		**30	**11

Source: OED Farm Survey, 2004.

** Percent not responding to the question.

Table A9. Changes in Farm Economy Over Past Five Years, Mahaweli System C

	Now (Five Years Ago)					
	% of farmers unless otherwise indicated					
	Zone 1	***Zone 3***	***Zone 4***	***Zone 5***	***Zone 6***	***ALL***
	(N=40)	***(N=40)***	***(N=60)***	***(N=30)***	***(N=30)***	***(N=200)***
Use of drip, spray, pump irrigation	- (-)	3 (3)	- (-)	- (-)	- (-)	<1 (<1)
Use of improved paddy seed/a	100 (98)	98 (78)	92 (85)	93 (97)	100 (97)	96 (90)
Mean annual volume of fertilizer applied to paddy (kg)/b	724 (720)	865 (805)	856 (734)	777 (803)	345 (555)	743 (729)
Mean paddy yield (t/ha)/c	3.95 (3.84)	4.59 (3.76)	4.46 (4.31)	4.49 (4.28)	4.36 (4.30)	4.38 (4.10)
Cropping intensity/d	193 (193)	196 (197)	196 (209)	185 (200)	155 (192)	187 (201)
With formal title to land	**No farmers hold title (no change in past five years)**					
Mean area farmed (irrigated) (ha)/e	1.02 (0.94)	1.12 (0.98)	1.34 (1.06)	1.14 (0.97)	1.19 (1.04)	1.18 (1.00)
Planting other field crops	10 (10)	5 (8)	7 (8)	- (-)	30 (20)	10 (9)
Renting out tractor/plow	18 (5)	18 (8)	25 (7)	13 (3)	13 (7)	19 (6)
With family members in wage work >3 mo/yr (living at home)	3 (5)	3 (-)	8 (5)	7 (-)	17 (10)	7 (4)
With family members in wage work (living at a distance from home)	3 (-)	8 (3)	5 (5)	- (-)	23 (10)	7 (4)
With income from sale of farm produce exceeding income from all other sources	10 (3)	3 (-)	3 (2)	- (-)	13 (-)	6 (1)

Source: OED Farm Survey, 2004.

/a Percent of farmers for whom improved paddy seed accounts for more than half total volume of seed used.

/b Total per farm, two seasons, all types of fertilizer.

/c Main season (*maha*), average for three consecutive seasons.

/d Area planted in paddy (maha plus yala season)/Area farmed under irrigation (=/e) x 100

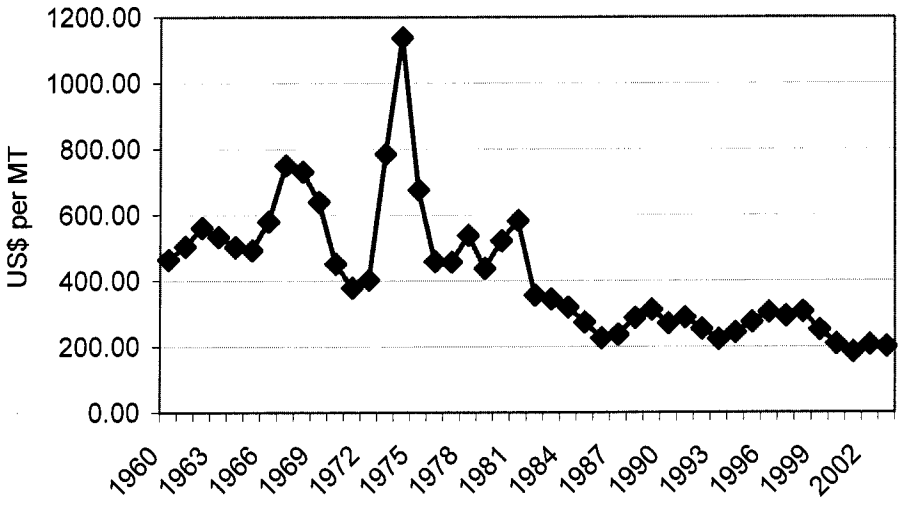
/e Refers to all irrigated land directly operated by the farmer, whether owned, rented in or otherwise received.

Table A10. Trends in Annual Cash Income, Settler Households in System C

Survey Period	*Total Cash Income Per Household Per Year*	*Total Cash IncomePer Household Per Year*	*Percentage Share from*		
			On-farm	*Off-farm*	*Non-farm*
	Current LKRs	*Constant 1995 LKRs*			
1989-90/a	31,164	58,800	76.9	5.3	17.8
1992-93/a	64,966	84,371	83.3	4.2	12.5
1994-95/a	71,890	78,141	80.5	1.8	17.7
1994-95/a	73,940	80,369	79.2	4.3	16.5
1996-97/a	54,648	48,792	82.3	3.4	14.3
2000-01/a	71,208	48,441	43.0	11.8	45.2
2003-04/b	57,707	30,213	58.3	6.4	35.3

Source: /a R. D. Wanigaratna with K.P. Wimaladharma, The Ninth Field Report on The Mahaweli Programme of Sri Lanka, Colombo, June 23, 2001, Table 11, p.63.
/b OED Farm Survey, 2004.

Figure A2. World Rice Price in Constant Dollars (Thai, 5% broken in 1990 US$ per metric ton)



Source: World Bank

Table A11. Economic Cash Flow (LKR million)

	Costs	Benefits			Total Net Benefits		Economic Price of Rice at Farm-gate (LKR/tonne)	
	(A)	B(i) Paddy (PCR)	B(ii) Paddy (PPRR)	B(iii) Other benefits	PCR =[B(i) + B(iii)]-(A)	PPAR =[B(ii) + B(iii)]-(A)	PCR	PPRR**
1982	226.0	--	--	--	-226.0	-226		3,254
1983	705.6	3.3	0.8	1.8	-700.5	-703	14,330	3,556
1984	599.3	32.3	9.0	7.3	-559.7	-583	13,378	3,681
1985	1,033.5	84.5	24.5	13.5	-935.6	-995.5	11,515	3,392
1986	906.2	209.4	69.1	20.8	-676.0	-816.3	9,652	3,220
1987	1401.4	295.5	118.2	25.2	-1080.7	-1258	9,610	3,797
1988	1224.8	497.4	213.8	45.9	-681.5	-965.1	11,556	4,937
1989	1448.5	596.4	317.1	66.6	-783.5	-1062.7	12,301	6,478
1990	760.2	612.0	355.0	63.4	-84.8	-341.8	10,563	6,171
1991	841.1	751.0	413.0	84.8	-5.3	-343.3	11,266	6,228
1992	789.1	729.4	452.5	107.2	47.5	-229.7	10,356	6,373
1993	767.4	772.1	548.2	114.6	119.3	-104.6	9,569	6,775
1994	653.6	841.8	782.9	117.1	305.4	246.4	9,486	8,844
1995	637.6	913.4	767.2	119.0	394.8	248.6	9,652	8,078
1996	635.9	886.0	824.0	120.0	370.1	308.1	9,652	9,107
1997	635.6	904.4	841.1	120.8	389.6	323.3	9,652	8,425
1998	635.6	904.4	841.1	121.6	390.4	327.1	9,652	9,226
1999	635.6	922.8	858.2	128.0	415.2	350.6	9,652	8,284
2000-04	635.6	922.8	885	128.0	415.3	377.5	9,362	
2005-31	635.6	869.3	835	128.6	362.3	327.5	8,824	
ERR					4%	2%		

Source: Project Completion Report, Annex 1, Tables 3 and 8; M. Kikuchi et al., Irrigation Sector in Sri Lanka (Research Report, No. 62), International Water Management Institute, Colombo, 2002, Annex Table a-1, pp. 33-34.

"Costs" comprise capital costs, recurrent costs, crop production costs and net benefits foregone ("without project" scenario).
"Other Benefits" comprise other field crops, fuelwood, cashew, income from homestead plot and dairying.
"Economic price of rice at the farmgate": the PPRR series is taken from Kikuchi et al. This series is based on the price of Thai rice, 25% broken, converted to rough rice at the farm-gate in Sri Lanka.

Annex B. Basic Data Sheet

THIRD MAHAWELI GANGA DEVELOPMENT PROJECT (CREDIT 1166-CE)

Key Project Data *(amounts in US$ million)*

	Appraisal estimate	*Actual or current estimate*	*Actual as % of appraisal estimate*
IDA Credit	90.0	82.8	92
Cofinancing	84.7	84.7	100
Government	25.3	25.3	100
Total project costs	200.0	192.7	96

Cumulative Estimated and Actual Disbursements *(US$ million)*

	FY82	FY83	FY84	FY85	FY86	FY87	FY88	FY89	FY90	FY91	FY92
Appraisal estimate	20.5	44.0	55.5	65.5	75.5	85.5	90.0	-	-	-	-
Actual	13.10	21.77	30.79	39.29	40.23	42.89	47.43	50.74	55.51	61.95	68.48
Actual as % of estimate	63.9	49.5	55.5	60.0	53.3	50.2	52.7	56.4	61.7	68.8	76.1
Date of final disbursement: May 12, 1992											

Project Dates

	Original	*Actual*
Identification	1965-1968	1965-1968
Preparation	December 1979	December 1979
Appraisal	March 1980	March/April 1980
Negotiation	April 28-May 6, 1981	April 28-May 6, 1981
Approval	December 16, 1980	June 23, 1981
Effectiveness	February 8, 1982	February 8, 1982
Credit closing	December 31, 1987	May 12, 1992

Staff Inputs *(staff weeks)*

	Actual Weeks
Preappraisal	96.0
Appraisal	183.2
Negotiations	17.7
Supervision	122.2
Completion	19.9
Total	439.9

Mission Data

	Date (month/year)	*No. of persons*	*Specializations represented*	*Performance rating*	
				Implementation status	Development objectives
Supervision 1	April 1982	1	E	1	2
Supervision 2	December 1982	2	E, AE	1	2
Supervision 3	January 1984	1	E	2	1
Supervision 4	February 1985	2	A, AE	2	1
Supervision 5	November 1985	3	E, AE, FC	2	1
Supervision 6	July 1986	2	AE, AC	2	1
Supervision 7	January 1987	2	AE, E	2	1
Supervision 8	October 1987	2	AE, E	2	1
Supervision 9	June 1988	3	AE, E(2)	2	1
Supervision 10 (MTR)	March 1989	3	AE, E(2)	2	1
Supervision 11	March 1990	2	AE, E	2	2
Supervision 12	October 1990	2	AE, E	2	2
Supervision 13	June 1991	4	AE, E(2), EC	3	2
Supervision 14	November 1991	2	AE, E	3	2

Specializations represented: AE: Agricultural Economist; EC: Economist; E: Engineer; AC: Agronomist Consultant; FC: Financial Consultant.

Performance ratings: 1: Improving; 2: Stationary; 3: Outstanding.

Other Project Data

Borrower/Executing Agency:

FOLLOW-ON OPERATIONS

Operation	***Credit no.***	***Amount (US$ million)***	***Board date***
Sri Lanka – Mahaweli Ganga Development Project	1970-CE	29.0	December 30, 1969
Sri Lanka – Mahaweli Ganga Development II	1977-CE	19.0	March 31, 1977
Sri Lanka – Mahaweli Ganga Technical Assistance	1980-CE	3.0	January 10, 1980
Sri Lanka – Mahaweli Ganga Development III	1981-CE	90.0	May 26, 1981
Sri Lanka – Mahaweli Ganga Development IV	1494-CE	42.1	May 4, 1984
Sri Lanka – Mahaweli Restructuring and Rehabilitation Project	3058-CE	57.0	February 23, 1998

Annex C. OED Farm Survey Questionnaire

Note. This instrument should only be applied to households that have been in existence for at least five years. The "household" refers to any persons sleeping together under the same roof and eating from the same pot; it may include persons who are temporarily residing elsewhere (but who are expected to return).

0. Identifiers	
Questionnaire No.	
District	
Village	
Name of Irrigation Scheme	
Date of Interview	
Name of Interviewer	

I. Information about Household Head *(HH)*	
1. Age	
2. Sex	
3. Number of years living on this home lot	
4. How did the HH obtain this home lot? (1=Original settler; 2=Inherited; 3=Purchased; 4=Other)	

II. Household Composition *(Refers only to persons who have lived in the household for at least 9 of the past 12 months)*		
	N of Males	N of Females
Indicate number of persons in each sex/age group		
Below 5 years		
6- 15 Years		
16- 40 Years		
41- 60 Years		
Over 60 Years		
Incapacitated: All ages		
Literate (All those aged 16 years and above)		
Employed (All those aged 16 years and above)		

III. Location of All Children of Household Head not Now Resident *(Refers to persons who have not lived in the household for more than 3 of the past 12 months)*		
	Location of Males	Location of Females
Child 1		
Child 2		
Child 3		
Child 4		
Child 5		
Child 6		

IV. Household Wealth Index	
Category	***Mark with "x" all that apply***
A. Housing	
1. Tile or other improved roofing ***plus*** more than four rooms	
2. Tile or other improved roofing, four or less rooms	
3. Thatch or *cadjan* roofing	
B. House Facilities	
1. Refrigerator	
2. Pedestal/Table Fan	
3. Video Deck	
4. TV	
B. Means of Transport	
1. Four-wheel tractor ***and/or*** truck	
2. Two-wheel tractor	
3. Motorcycle	
4. Bicycle	
D. Livestock	
1. Team of two trained buffalo or oxen	
2. Two or more dairy cows	

V. Trends in the Household Economy		
	Now	**Five Years Ago**
1. Does the household have a formal title to any of the land that it farms ***(i.e. one that allows for the household to legally sell this land)***? (Yes/No)		
2. How much land is owned by this household? (ha)		
3. How much land rented in or otherwise received? (ha)		
4. Taking together all the land that is owned, rented in or otherwise received, what is the area under irrigation? (ha)		
5. How much land is land rented out or otherwise given to others? (ha)		
6. What area is planted in paddy during the *maha* season? (ha)		
7. What is the *average* paddy yield (over three *maha* seasons)? (kg/ha)		
8. What area is planted in paddy during the *yala* season? (ha)		
9. What is the *average* paddy yield (over three *yala* seasons)? (kg/ha)		
10. What is the total area planted in other field crops, taking together the *maha* ***plus*** the *yala* seasons? (ha)		

V. (continued)	**Now**	**Five Years Ago**
11. If livestock are reared, are the milk or any other livestock products produced by the household *sold?* (Yes/No)		
12. How many cows are owned by the household? (N)		
13. Does the household graze the cows it owns on land belonging to other households? (Yes/No)		
14. Does the household use its land to graze cattle belonging to other households? (Yes/No)		
15. Does the household trade in products it does not produce (that is, *buying to sell*)? (Yes/No)		
16. Does the household receive an income from tank-based fishing or aquaculture? (Yes/No)		
17. Does the household receive an income renting out tractors and/or plow teams that it owns (Yes/No)		
18. Do *any* household members spend more than 3 months per year working for a wage in the locality (still residing at home)? (Yes/No)		
19. Do *any* household members spend time working for a wage outside the locality (residing away from the household)? (Yes/No)		
20. Is the income that the household receives from selling the farm products it produces ***larger*** than the income from all other sources (wages, trading etc.)? (Yes/No)		
21. Is fuel for cooking derived ***mainly*** from collecting firewood from common land? (Yes/No)		
22. Has this household experienced crop damage as a result of elephants trampling planted areas? (Yes/No)		

VI. Farm Technology Level*		
	Now	**Five Years Ago***
1. Is the land farmed by the household equipped with ***any*** of the following: drip irrigation; spray irrigation; irrigation pump? (Yes/No)		
2. Does the household have a well on its land? (Yes/No)		
3. What ***proportion*** of the paddy seed used each year (maha ***plus*** yala) is improved? (1=More than 50%; 2=50% or less)		
4. Is the paddy mechanically transplanted/row seeded? (Yes/No)		
5. What is the total volume of fertilizer (all types) applied to paddy cultivation each year (maha ***plus*** yala)? (Kgs)		
6. Are herbicides and/or pesticides applied to paddy cultivation? (Yes/No)		
7. In what percentage of the cultivated area is straw applied as a fertilizer each year (maha **plus** yala) (%)		
8. Are bird roosts installed in the land farmed by household? (Yes/No)		

VII. Assessment of Irrigation			
	Satisfied	**Fairly Satisfied**	**Not Satisfied**
1. How satisfied are you with the supply of water you receive from the irrigation system?			
2. How satisfied are you with the overall design of the irrigation system (headworks, main canal, distributary and field canals)? *			
3. How satisfied are you with the way that irrigation water is shared between farmers in the system?			
4. How satisfied are you with the arrangements for maintaining the headworks and main canals?			
5. How satisfied are you with the arrangements for maintaining distributary and field canals? *			
6. How satisfied are you with the rehabilitation works that have been carried out in the past five years? ***(Leave blank if no such work was done)***			

VIII. Assessment of the Farmer Organization*			
1. Name of Farmer Organization ***(FO)***			
2. Year that FO was legally constituted			
3. Status (1=Handed Over; 2=Not Handed Over)			
	Satisfied	**Fairly Satisfied**	**Not Satisfied**
4. How satisfied are you with the job done by the FO in organizing rehabilitation of the irrigation system? ***(Leave blank if no such work has been conducted over the past five years)***			
5. How satisfied are you with the job done by the FO in organizing regular maintenance work? ***(Leave blank if FO does perform this function)***			
6. How satisfied are you with the assistance that the FO provides in supplying farm inputs (e.g. fertilizer, seed)? ***(Leave blank if FO does not perform this function)***			
7. How satisfied are you with the assistance that the FO provides in marketing paddy? ***(Leave blank if FO does not perform this function)***			
8. How satisfied are you with the assistance that the FO provides in helping its members get access to credit? ***(Leave blank if FO does not perform this function)***			
9. How satisfied are you with the information that the FO provides about the use of funds at its disposal?			
10. How satisfied are you with the FO's ability to help settle disputes between members (e.g. over access to water)?			

IX (i) Incomes (On Farm)			
	Paddy	**OFCs**	**Livestock**
1. Cultivated Area (Ha./ 2-Season)			
2. Production (Bu. /Kilos./ 2-Season)			
3. Amount Sold (kg. /2-Season)			
4. Gross Income (Rs./ 2-Season)			
5. Gross Cash Income (Rs./ 2-Season)			
8. Total Input cost* (Rs./ 2- Season)			
9. Net Income (Rs./ 2-Season)			

IX (ii) Incomes (Off- Farm)	**(Rs./2-Season)**
1. Rentals (from hiring out tractor, thresher, sprayer, buffalo, and leasing out land)	
2. Hiring out labor (farm work)	
3. Other	
4. Costs of repair and maintenance	
5. Other Costs	
5. Gross Cash Income	
6. Net Cash Income	

VI (iii) Incomes (Non- Farm)	**(Rs./Month)**	**(Rs/ 2-Season)**
1.Government Sector employments: Civilian		
2. Government Sector employments: Armed Forces		
3.. Organised Private sector employments		
- Factory Workers		
- Others		
4. Wage work		
5. Self employment		
6. Employment abroad		
7. Other:		
8. Gross Cash Income		
9. Costs		
10.Net Cash Income		