Sri Lanka

Minipe and Nagadeepa Irrigation Rehabilitation Project

Report Date: March 2001
Field Survey: September 2000

1. Project Profile and Japan's ODA Loan

Project Site Map

Rice Paddies in Minipe

(1) Background

In 1986, Sri Lanka's agricultural production reached 44,000 million Rupees (¥228.8 billion), accounting for 27% of GDP in that year. The two million people employed in agriculture were 45% of the total working population. Exports of agricultural produce were worth 15,800 million Rupees, which was 46% of the country's total export value. Thus agriculture had an important place in the Sri Lankan economy, in terms of GDP, foreign currency earnings and employment.

In Sri Lanka, irrigated agriculture is the key to agricultural development in the arid and semi-arid zones, which cover two thirds of the country's land area, and enormous funds have been invested over many years in new irrigation projects. At the time, the maintenance and management system of existing irrigation facilities was poor and these facilities were becoming extremely dilapidated, because the Sri Lankan government had been emphasizing new irrigation projects.

The Minipe and Nagadeepa area is in a semi-arid zone, which makes it very difficult to develop agriculturally without irrigation facilities. The Mahaveri development area, adjacent to the Minipe and Nagadeepa area, was being steadily developed with irrigation improvements, while the existing facilities in the project area were becoming dilapidated. Water leakage from the canals, and inadequate water management had pushed unit rice yields in the area down to 80% of the national average, approximately 60% of the yields in Mahaveri. The situation made it urgent to rehabilitate the irrigation facilities in the Minipe and Nagadeepa area and draw up a plan for proper water management.

(2) Objectives

The project aimed to raise agricultural productivity in the Minipe and Nagadeepa area and stabilize the base for agricultural production in order to correct disparities in agricultural productivity between this area and its surroundings by rehabilitating the irrigation facilities to prevent leakage from canals, optimizing the use

of upstream and downstream water resources in tandem with the General Management Plan for Large-scale Irrigation (INMAS)*, which was being implemented by the Sri Lanka government, and supplementing the policies such as diversification of crop plant.

** Refer to "2. Results and Evaluation (1) and (5)" for details of the content of INMAS.*

(3) Project Scope

The project comprised the following:

[1] Rehabilitation of irrigation facilities (rehabilitation of main canals and related maintenance access roads etc.)
[2] Procurement of vehicles for use in operation and maintenance work (jeeps, trucks, tractors etc.)
[3] Facilities for the promotion of INMAS (construction of offices, construction of facilities for the education of farmers, purchase of equipment etc.).
[4] Consulting services (detailed design, preparation of bid documents, supervision, etc.).

The ODA loan covered the whole of the foreign currency portion and a part of the local currency portion.

(4) Borrower/Executing Agency

Domestic Socialist Republic of Sri Lanka / Irrigation Department, Ministry of Irrigation and Electric Power

(5) Outline of Loan Agreement

Loan Amount/Loan Disbursed Amount	¥1,850 million / ¥1,709 million
Exchange of Notes/Loan Agreement	March 1988 / July 1988
Terms and Conditions	Interest rate: 2.7%, Repayment period: 30 years (10 years for grace period), General Untied
Final Disbursement Date	June 1998

2. Results and Evaluation

(1) Relevance

The overall plan of the project was the Integrated Management of Major Irrigation Schemes (INMAS), which governs large-scale irrigation areas. This was drawn up jointly by the Irrigation Management Department and the Irrigation Department, and it aimed to encourage the rational use of irrigation facilities and water supplied in order to improve agricultural productivity.

The project targeted the Minipe and Nagadeepa area, which had been selected as an INMAS project area, so that it was an appropriate plan at the time of the appraisal, and agreed with the country's policies. The relevance of the project is retained because the INMAS plan is still being promoted today.

(2) Efficiency

Under the plan at the time of the appraisal, the project was to be completed by October 1994, but in fact it was completed in September 1998, 47 months delay. The reasons for the delay were:

[1] The peace problemin Sri Lanka in the latter half of the ‘80s forced the interruption of field surveys and detailed design work on severaltimes, delaying the start of construction.
[2] Some bidders for parts of the construction work failed to satisfy standards, necessitating repeated bidding.

At the time of the appraisal the total planned project cost was ¥2,233 million, and the total actual cost was ¥2,099 million, largely as planned.

(3) Effectiveness

1) Increase in irrigated area and cropped area

The rehabilitation of irrigation facilities under the project was mainly intended to increase unit yields, and as such it did not produce a major increase in the area of irrigation, but in the Minipe area the rehabilitation of canals increased the volume of water supplied, which allowed a slight increase in the area under irrigation (see Table 1).

Table 1: Irrigated Area and Cropped Area in Both Areas

(Unit: ha)

			1995	1996	1997	1998	1999	2000
Minipe	Irrigated area		7,480	7,508	7,508	7,508	7,528	7,528
	Cropped area	Maya season	7,480 (100%)	7,508 (100%)	7,508 (100%)	7,508 (100%)	7,528 (100%)	7,528 (100%)
		Yara season	6,161 (82%)	6,440 (86%)	6,370 (85%)	6,542 (87%)	6,550 (87%)	6,550 (87%)
Nagadeepa	Irrigated area		1,710	1,710	1,710	1,716	1,716	1,716
	Cropped area	Maya season	1,710 (100%)	N.A. (N.A)	1,706 (100%)	1,716 (100%)	1,716 (100%)	1,716 (100%)
		Yara season	1,416 (83%)	1,649 (96%)	1,005 (59%)	1,402 (82%)	N.A. (N.A)	1,716 (100%)

Source: Irrigation Department documents

* Yara season: The southwestern monsoon season from May to September (almost no rain falls in this area). Maha season: The northeastern monsoon season from October to March.
* Figures in ( ) are cropping rates = cropped area/ irrigated area.

Turning to cropped area, the figures show that all the arable land in both areas was under cropping in the maha season, which was the rainy season. In the Minipe area there was also stable cropping in the yara season, which was the dry season, with a cropping rate of over 80%. In the Nagadeepa area the yara season cropping rate varies from year to year, being 59% in 1997. We have not yet obtained data for 1999, but the rate was known to be less than 70%.

In the Minipe area, these figures are possible because the Victoria and Randenigara power stations are at upstream. The area is able to use the water discharged after passing through the generators, which gives it a relatively stable supply of water for irrigation, even in dry years.

2) Increased agricultural production

Table 2, Figures 1 and 2 show movements in the level of rice production in both areas. Production in the Minipe area far exceeds the volume planned at the time of the appraisal, and yield goes on rising year after

year. 4.2% that is the average annual rate of production volume increase over the last five years far exceeds the national average of 2.6%.

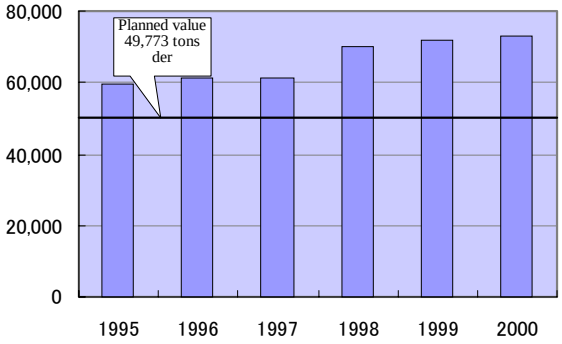

Figure 1 Movements in Rice Yield in the Minipe Area

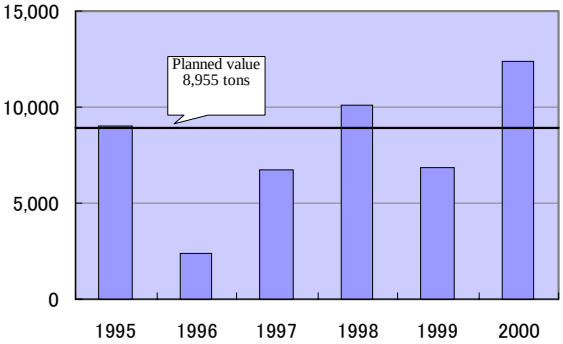

Figure 2 Movements in Rice Yield in the Nagadeepa Area

Table 2: Movements in Rice Yield

The figures in the ( ) are comparison of planned values. (Unit: tons)

	Planned value	1995	1996	1997	1998	1999	2000*
Minipe	49,773	59,840 (120%)	61,564 (124%)	61,540 (124%)	69,824 (140%)	71,816 (144%)	73,020 (147%)
Nagadeepa	8,955	9,050 (101%)	2,366 (26%)	6,732 (75%)	10,062 (112%)	6,864 (77%)	12,350 (138%)
Nationwide	-	2,809,890	2,061,520	2,239,370	2,692,335	2,856,120	

Source: Irrigation Department for Minipe and Nagadeepa, Food and Agriculture Organization (FAO) for nationwide figures.

* Values for 2000 includes forecast values for July ~ December.

The Nagadeepa area recorded production volumes above the planned level in 1995, 1998 and 2000, however, in other years the volume fell far short compared with the plan. The variation between years is large. That appears to happen because Nagadeepa does not have access to the same kind of stable water source as Minipe, leaving it unable to get enough irrigation water in years of low rainfall.

Therefore while the Minipe area is able to raise two crops of rice a year on almost all land, in the Nagadeepa area rice is grown in the rainy season and chili peppers, soy beans, maize, red onions and other crops besides rice are grown in the dry season.

3) Increase in unit yields

The irrigation facilities in the project area were severely dilapidated before the implementation of the project. In particular, leakage from the canals combined with lax water management left insufficient water to supply the rice paddies. Canal rehabilitation under the project proceeded in order from the main canals to distribution canals, and finally to the field canals, which were the terminal canals. This rehabilitation process resulted in more water reaching the paddy fields, causing a jump in unit yields in 1998, the year the project was completed, as seen in Figure 3.

Agricultural productivity was low in the project area at the time of the appraisal. In the Nagadeepa area, in particular, productivity was only 80% compared with the national average and 60% compared with the plan of the adjacent Mahaveri area, however, as rehabilitation proceeded, unit rice yields rose to levels considerably higher than the national average, pulling approximately level with Mahaveri.

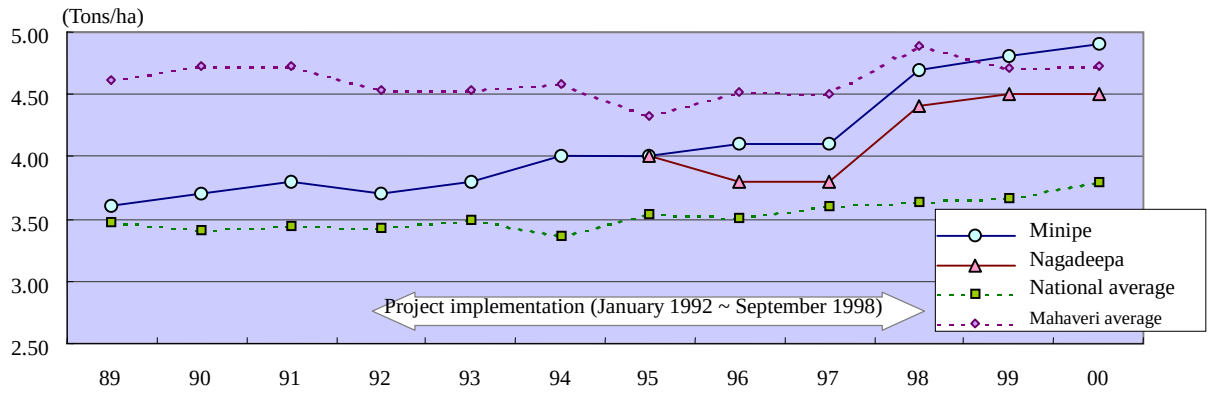

Figure 3: Comparison of Unit Rice Yields with Other Regions

* Data for 1989~1994 for Nagadeepa is unknown. In 1987 the unit yield in the area was 2.8t/ha.

4) Recalculation of Economic Internal Rate of Reform (EIRR)

EIRR was recalculated in the project completion report submitted by the consultant after the completion of the project on the basis of the same assumptions employed in the feasibility study (F/S). The result was 23.8%, which exceeded the planned value of 17.1% from the F/S. The reasons were:

[1] Compared to the total project cost when converted to rupees and referred to the same price year (1985), the actual cost was reduced by 28% from the cost planned at the time of the F/S.

[2] Under the F/S it was assumed that the construction works would be carried out in the dry season, making it impossible to raise dry season crops for the five years of the construction period, but in fact it was possible to keep water supplies running despite the works, with the exception of one dry season in each area.

(4) Impact

1) Assistance for the farmers' self-help efforts through consignment of the construction works

At the implementation stage of the project, most of the work of rehabilitating field canals was consigned to farmers' organizations in the project areas. Rehabilitation costs of 67.8 million Rupees were paid for the refurbishment of the field canals, and that was guaranteed in the form of cash income to cover the reduction in crop yields during the project implementation period. That influx of money made a contribution to the rural society of both areas with the objective of giving a short-term economic boost. In the process of rehabilitating the canals that have a direct impact on their incomes, the farmers gained a stronger sense of ownership of the canals and learned more about how to maintain them.

2) Impact on environment

The project was a rehabilitation project of the existing irrigation facilities, and therefore had little impact on the environment beyond the construction period. In Sri Lanka farmers are encouraged to use organic

fertilizers such as rice straw in order to reduce the usage of chemical fertilizers which adversely affect the soil and the quality of river water. Farmers are using organic fertilizer for their crops on 240ha of land in the Nagadeepa area and on 260ha in the Minipe area. This type of farming is still continuing, and the use of chemical fertilizer is declining.

(5) Sustainability

1) Participatory irrigation policy and farmers' organizations

In the project area, the first step was the formation of Field-Canal Groups (FCGs) of, on average, ten members, with each responsible for one field canal. These groups were intended to promote maintenance of the facilities and mutual help between farmers. Since the mid-'90s there has been an ongoing effort to organize the FCGs as the basis of Distribution Canal Organizations (DCOs) with the aim of transferring the operation and maintenance of distribution canals to the DCOs.

By June 2000 there were 711 DCOs nationwide, of which 689 (97%) have been registered with the Department of Agrarian Service and formally approved.

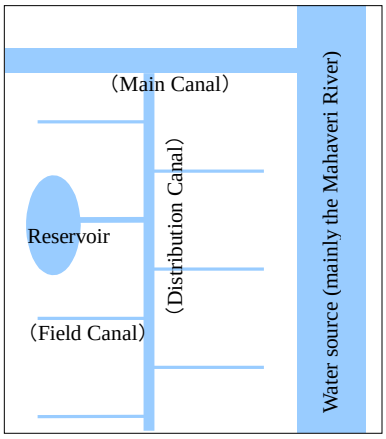

Figure 4: Configuration of Irrigation Canals

In the area covered by the project, there are 60 DCOs in the Minipe area (averaging 100~200 people each) and 21 in the Nagadeepa area (averaging 300 people), all of which have been approved by the Department of Agrarian Service. Project Management Committees (PMCs) have been set up in the INMAS project area, which includes the area covered by the project. They allocate irrigation water and serve as forums for resolving irrigation-related disputes. The PMC comprises representatives of farmers' organizations and government staff involved in agriculture and irrigation *. The PMC in the Minipe area has 25 members and the one in the Nagadeepa area has 35 members.

* The Irrigation Act stipulates that a majority of the members of PMCs must be farmers' representatives.

2) Transfer of operation and maintenance to farmers' organizations

The operation of main and distribution canals was initially managed by the Irrigation Department, while the government worked on transferring the maintenance of distribution canals to DCOs. These transfers were of two kinds, formal transfers in which the range of responsibilities is clearly defined in writing, and informal transfers agreed through oral agreements between the parties.

In the Nagadeepa area, the operation and maintenance of all 23 distribution canals has been formally transferred to DCOs. In the Minipe area the transfer of all 155 canals has been completed on an informal basis, however apparently the formal transfers will take some time to complete.

Table 3: Operation Management Before and After Transfer to Farmers' Organizations

		Before transfer	After transfer
Plan	Irrigation plan	Planned by Irrigation Dept. and approved by Irrigation Conference	Planned by PMC
Operation	Main canal	Irrigation Dept. District Office	Irrigation Dept. District Office
	Distribution canal	Irrigation Dept. District Office	Farmers' organization（DCO）
	Field canal	Irrigation Dept. District Office	Farmers' organization (FCG)
Maintenance	Head works, main canal	Irrigation Dept. District Office	Carried out by the Irrigation Department on the basis of plans determined by the PMC
	Distribution canal	Irrigation Dept. District Office	Farmers' organization（DCO）
	Field canal	Farmers operated canals individually, or in an organization under the direction of the Department of Agrarian Service	Farmers' organization (FCG)

Note: Prepared from results of interviews at the time of field survey

There are 1,170 distribution channels within major irrigation schemes in the whole of Sri Lanka, of which the operation and maintenance has been formally transferred for 77%, and once informal transfers are included, 96% have been transferred. Transfer means that the farmers take on the maintenance of distribution canals and smaller canals, and in return they are exempted by the government from paying water usage charges.

The actual maintenance work undertaken by the farmers mainly consists of removing weeds along the canals and removing sediments from inside the canals. Earthmoving for embankments is carried out jointly between the farmers and district offices.

The water source facilities and main canals are operated by the district offices of the Irrigation Department. The district office for the Minipe area only has jurisdiction over that area, and has a staff of 46 people. For the Nagadeepa area, the Mapakadawewa district office has jurisdiction over the Nagadeepa area and another five adjacent areas in a medium scale irrigation scheme totaling 4,048ha. That district office has a staff of 56, of whom 14 are solely responsible for the Nagadeepa area. In addition to their duties in the rehabilitation and maintenance of the facilities, the district offices provide farmers with technical guidance.

3) Maintenance condition

Immediately before the start of the cultivation season, the Irrigation Department conducts an inspection of the state of the canals. If any are in poor condition the Department recommends the farmers at the Kanna Conference*, which is the meeting held before the start of the cultivation season, to take remedial action. If there is no improvement after the recommendation, stronger measures such as stopping water supplies may be taken. The canals rehabilitated under the project are currently well managed.

The Kanna Conference determines water allocation policy, and after that there are meetings at the PMC on every Thursday morning of the cultivation season. According to the executing agency, disputes and dissatisfaction between farmers over water allocations have been greatly decreased since the implementation of the project.

* Kanna (season) Conference is held twice a year before each cultivation season to agree on points such as the land area and zones under cultivation, the dates when irrigation starts and stops, the rules for operating reservoir gates, and the methods of rotating irrigation from each distribution canal. The conference is chaired by the district governor or the head of the district, and terminal administrators, banks, the Irrigation District Office, the Irrigation Department, the Agriculture Department, the Agricultural Support Department, the Land Management Department, farmers' representatives and others attend.

4) Sustainability of effectiveness

Besides rehabilitating the canals and other facilities, the project largely succeeded in building organizations and systems by establishing farmers' organizations, providing education in farming techniques and allocating water according to agreements between the Irrigation Department and farmers. These systems are operating properly. The transfer of maintenance work to farmers' organizations is almost complete, and those organizations are working reliably on their maintenance tasks. Therefore there are no problems threatening the sustainability of the project.

Comparison of Original and Actual Scope

Item	Plan	Actual
①Project Scope	Rehabilitation of irrigation facilities Rehabilitation of main canals and related O/M access roads etc. ・ Minipe area 55.3km ・ Nagadeepa area 18km ・ Total 73.3km Rehabilitation of distribution and field canals, related O/M access roads etc. ・ Minipe area 70km ・ Nagadeepa area 20km ・ Total 90km Improvement of intake and headrace channel - Minipe area 1 point (2km) Rehabilitation of irrigation reservoir - Nagadeepa area 1 point Procurement of O/M vehicles - Jeeps, trucks, tractors etc. Facilities for planning and promotion of INMAS ・ INMAS office ・ Training place ・ Facilities for training of agricultural technology Consulting service	Rehabilitation of irrigation facilities Same as left Procurement of O/M vehicles Same as left Facilities for planning and promotion of INMAS Same as left Consulting service
②Implementation Schedule	Nov. 1989 ~ Oct. 1994 （60 months）	Apr. 1992 ~ Sep. 1998 （78 months）
③Project Cost Foreign currency Local currency Total ODA Loan portion Exchange rate	 ¥1,294 million 181 million Rp ¥2,233 million ¥1,850 million 1.0Rp= ¥5.2（1987）	 ¥1,288 million 810 million Rp ¥2,099 million ¥1,709 million 1.0Rp= ¥2.52 (Annual average for 1990-98)