

India

Upper Kolab Irrigation Project

Field Survey: July 2003

1. Project Profile and Japan's ODA Loan



Site Map



Secondary Waterway Built by Project (near Jamunda)

1.1 Background

In India, expansion and improvement of irrigation facilities has been emphasized as a measure to alleviate repeatedly occurring drought damage, as a part of the country's food self-sufficiency policy. Irrigation facilities are absolutely indispensable in low precipitation regions because the amount of rainfall in India is unpredictable and varies substantially by region, season, and year. Moreover even in heavy precipitation regions, irrigation facilities are extremely important for providing water for agricultural use during the summer season when demand for water is at its peak. The total land area under irrigation in India was scheduled to increase to approximately 57 million hectares by the conclusion of the sixth 5-year plan (March 1985) and to approximately 68 million hectares by the conclusion of the seventh plan (FY 1985- FY 1989).

The Orissa State Government launched the Upper Kolab Multipurpose Project in 1976 to promote the comprehensive development of the region, which tends to suffer from drought. The project was composed of three units, Unit I (dams and reservoirs), Unit II (irrigation), and Unit III (hydroelectric power). The purpose of this project was to construct a dam on the upper Kolab River, a branch of the Godavari River and produce 320 MW (four generators at 80 MW per generators) of hydroelectric power. The water used to generate the hydroelectric power would then be used for irrigation of approximately 48,000 ha. Extension of an ODA loan was requested for a portion of Unit II, and that is the project which is the subject of this report

Furthermore, if small states with populations under three million are excluded, Orissa State has the highest percentage of scheduled castes and scheduled tribes (minority tribes) *¹, and according to

¹ "Scheduled caste" refers to "outcasts" who are not part of the caste system of Brahman (priests), Kshatriya (rulers, warriors, and landowners), Vaishya (merchants, agriculturists), and Shudra (artisans.)

1981 figures, the percentage is 37.1%, which exceeds the national average of 22.8%. Given these conditions, the project is not only a large-scale irrigation project, but it also lays emphasis on agricultural policies that stress improvement in the lives of scheduled tribes.

1.2 Objectives

This project was designed to increase agricultural production and improve productivity by constructing irrigation facilities in Orissa State, where agriculture's reliance on rainwater results in unstable harvests and low productivity, and thereby contribute to the alleviation of poverty by raising the incomes of the scheduled castes and scheduled tribes who suffer social discrimination and extreme poverty, together with raising the state's food self-sufficiency rate.

1.3 Output

■ Irrigation Project Overall (Unit II)

The overall outline of the "Upper Kolab Multipurpose Project (Unit II)" is as follows. Using the water of the Satiguda reverse reservoir already completed below the Kolab dam discharge waterway as the water source, the following two facilities are to be constructed. The beneficiary area is 48,000 ha.

- (A) Construction of left main canal (Jeypore main canal) 58.8 km and construction of distributary and water course field channel
- (B) Construction of right main canal (Padmapur supply waterways) 12.6 km and construction of distributary and water course field channel

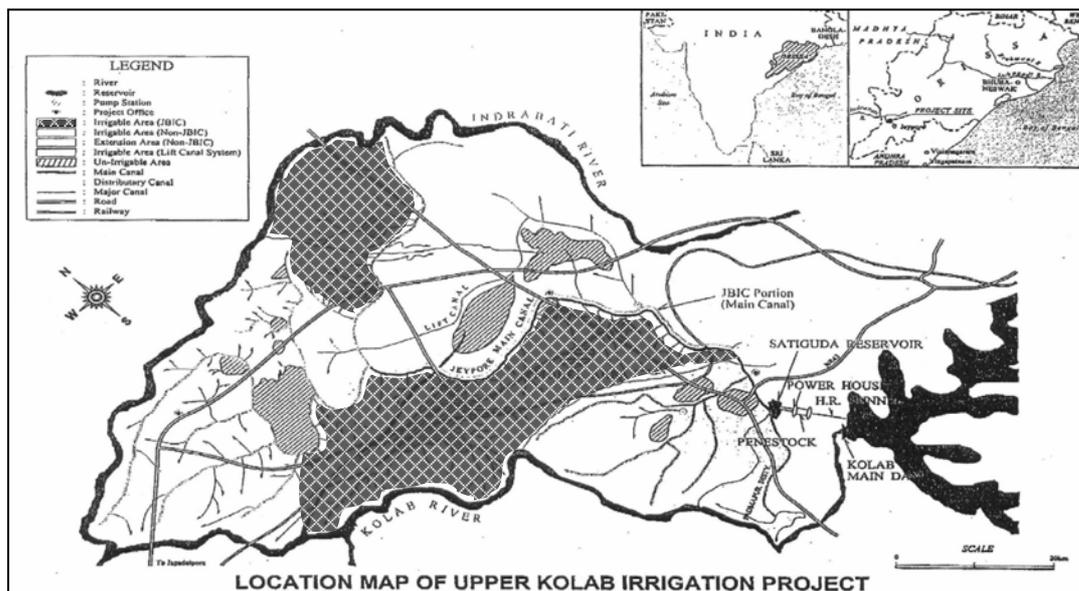
■ ODA Loan Portion

Of the above-described Unit II, this project (ODA loan portion) is composed of a part of "(A) Construction of left main canal (Jeypore main canal) 58.8 km and construction of distributary and water course field channel" In detail, the following engineering works are entailed. The beneficiary area is 21,000 ha.

- (1) Construction of left main canal (Jeypore main canal): 14.00 km point - 41.78 km point
- (2) Construction of distributary and water course field channel for the above

Of the total project cost of 7,537 million yen, the ODA loan portion is 3,769 million yen, the total of the foreign currency portion (795 million yen) and the local currency portion (2,974 million yen). The remaining amount is supplied by the funds of the executing agency.

Unit II Location Map (hatched-line area is ODA loan area)



1.4 Borrower/ Executing Agency

Borrower: President of India

Executing Agency: Department of Water Resources, Government of Orissa*²

1.5 Outline of Loan Agreement

Loan Amount/Loan Disbursed Amount	3,769 million yen / 3,114 million yen
Exchange of Notes/Loan Agreement	January 1988 / December 1988
Terms and Conditions	
-Interest Rate	2.5%
-Repayment Period (Grace Period)	30 years (10 years)
-Procurement	Partially Untied
Final Disbursement Date	July 1998

2. Results and Evaluation

2.1 Relevance

Since the 1970s in India, development of agricultural land has been carried out to expand acreage. With the amount of remaining developable land dwindling, further expansion of acreage is becoming increasingly difficult, and so it is becoming necessary to promote more advanced ways of using the

² The name at the time of appraisal was "Department of Irrigation and Power."

available land, such as multiple cropping and double (semiannual) cropping. Provision of irrigation facilities is essential not only in low precipitation regions but also in heavy precipitation regions to promote more advanced land usage since the amount of rainfall in India varies constantly by large amounts depending on the region, season, and year.

Orissa State, the site of this project, has historically been an area often subject to drought damage. In 1987, a severe drought occurred where rainfall was only 69% of the annual average, and farm production suffered acute harm. In spite of this, the state's irrigation rate is 27.1% (as of 1981), below the national average of 32.1%.

Also, as stated above, Orissa is a state with numerous residents who live in extreme poverty, and the majority of the poor belongs to scheduled castes and scheduled tribes. At the time of appraisal, the population of scheduled castes and scheduled tribes comprised 37.1% of the total, which exceeds the national average (22.8%), and since 90% of them are employed in agriculture and forestry, the quality of agricultural production is a life-or-death issue for scheduled castes and scheduled tribes.

Given such issues, the state's seventh 5-year plan (FY1985-FY1989) had the stated objective of expanding the irrigated land area by 2.5 million ha per year, and in particular, placing priority on implementation of projects that contribute to higher incomes for farmers in regions with a high percentage of scheduled tribes and scheduled castes. Such projects have continued to be implemented as special measures for scheduled castes and scheduled tribes, and irrigation projects are still emphasized in the ninth 5-year plan (FY1997-FY2001) which states "provision of irrigation facilities is the optimal tool for alleviating poverty in agricultural districts." Moreover, as a plan for developing the state's irrigation in addition to the 5-year plans, there is also the "State River Control Policy" drawn up by the Department of Water Resources, which also clearly states the importance of providing irrigation to cope with the increasing population in the state. Consequently, at the current time it can be said that this project is consistent with all development plans, and it maintains its relevance as a project.

2.2 Efficiency

2.2.1 Output

An alteration in the output was made, from the initial cultivatable command area of 21,000 ha to 15,208 ha. This alteration was the result of detailed planning and hydrologic survey. The main output (Main canal, etc.) was implemented as originally planned.

2.2.2 Project Period

This project was completed in July 1998, approximately 5 years behind the original completion date

of March 1993. The main reason for the delay was the time required for approval processes to acquire land for waterway construction and to remove trees.

2.2.3 Project Cost

Due to the fact that the devaluation of local currency exceeded the rate of inflation*³, the actual project cost was 50.2% (3,786 million yen) of the amount originally planned (7,537 million yen).

Furthermore, in local currency terms, the actual project cost was 1,050 million rupees, whereas the originally planned amount was 770 million rupees (an increase of 130%). The main reasons were the rise in prices (particularly labor wages) *⁴ while the project was extended and the increased in materials cost due to the effects of the Gulf War.

Project Cost Comparison(converted to yen)

Item	Original Plan	Actual	% of Original Plan(%)
Engineering Works	4,764	3,114	62.7
Supplies and Materials Cost	204	(incl. above)	
Land Acquisition Cost	787	672	85.4
Price Escalation	1,097	-	-
Reserve Fund	685	-	-
Total	7,537	3,786	50.2
(rupee conversion: million rupees)	770	1,050	136.4

Source: Material from executing agency

2.3 Effectiveness

2.3.1 Cultivable Command Area • Actual Irrigated Land Area

In this project, the cultivatable command area is the main index for measuring the effectiveness of the project. The terminology and numerical data related to irrigation used to verify the effectiveness of this project are as follow.

- (1) Cultivable Command Area (CCA)*⁵ 15,208 ha
- (2) Actual Irrigated Land Area Land area (ha) actually irrigated in a particular fiscal year

Because the only data that the executing agency has collected are the goal levels and the actual

³ The exchange rate was 1 rupee = 9.8 yen at appraisal time, and was 1 rupee = 3.0 yen at the time actual costs were calculated.

⁴ For example, the state's legal minimum wage was raised from 11 rupees to 25 rupees in 1990, and following that to 33 rupees in 1996.

⁵ CCA (Cultivate Command Area) is the land area that would be cultivatable if the irrigation facilities that are provided are fully utilized.

levels for Unit II overall, data was verified using figures calculated as ratios of the cultivatable command area for this project and for Unit II. Also, regarding the difference between the wet season and the dry season⁶ in the land usage plan, the planting ratio in the wet season is 100%, and the planting ratio in the dry season is 80% (producing a yearly total of 180%). The goal level (cultivatable command area) during the wet season and dry season, respectively, for this project (ODA loan beneficiary region) is calculated as follows.

Goal for This Project

Dry Season : 15,208 ha

Wet Season : 12,116 ha (equivalent to 80% of CCA)

Achievement of Actual Irrigated Land Area Actual Area / CCA (ODA loan region)

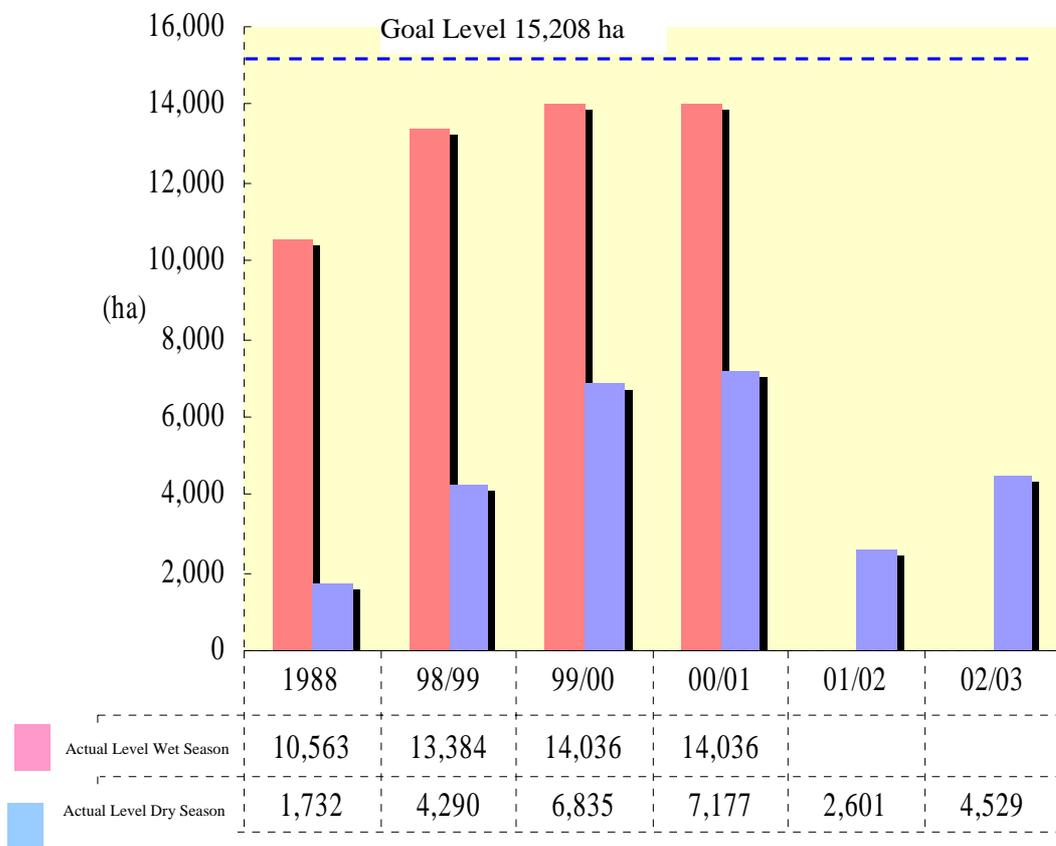
Year	Actual Irrigated Land Area (% of goal level)	
	A: Wet Season	B: Dry Season
Goal Level	15,208 ha	12,116 ha
1988 (at planning)	-	-
1998 (project completed)	13,384 ha (88.0%)	4,290 ha (35.3%)
1999	14,036 ha (92.3%)	6,835 ha (56.2%)
2000	14,036 ha (92.3%)	7,177 ha (59.0%)
2001	—*	2,601 ha (21.4%)
2002	—*	4,529 ha (37.2%)

Source: Material from executing agency

*: Data not received from executing agency

⁶ The wet season (summer) is April through November, and the dry season (winter) is December through March.

Comparison of CCA with Actual Irrigated Land Area (ODA loan region)



Source: Material from executing agency

Note: There are black spaces on the table because data was not received from the executing agency..

The “goal level” on the graph is the goal level for the wet season.

Looking at the achievement level of the actual irrigated land area, the actual irrigated land area (wet season) in the year following completion of the project (1999) is 14,036 ha, which amounts to 92.3% of the CCA. Meanwhile, the actual irrigated land area in the dry season is 6,835 ha, an achievement level of 60.1% of the CCA. However, wet season data was unavailable for the past two years, and actual irrigated land area in the dry season was 2,601 ha in FY2001 and 4,529 ha in FY2002. This represents an achievement level in the dry season of 21.4% and 37.2% for those years, respectively. Regarding the reasons why the actual irrigated area is less than the CCA following the completion of the project in both the wet season and the dry season, the executing agency believes that the following factors are interacting.

(1) Water Consumption Higher than Planned

In the project region, the executing agency calculates the amount of water that will be consumed twice annually (at the beginning of the wet season and the dry season) based on the types of crops,

etc., and draws up a water allocation plan. However, allocation is not always necessarily carried out according to plan, and this sometimes affects the size of the actual irrigated land area. For example, the executing agency may be encouraging production of crops other than rice, but the farmers may tend to favor rice planting because it is a long-standing custom, and rice is easy to store. As a result, since rice cultivation requires more water than other commodity crops, the irrigated land area is decreased.

(2) Water Allocation

Moreover, the size of the actual irrigated land area is affected by the fact that the chosen water allocation plan cannot be implemented due to the behavior of farmers who live upstream (including using excess water and damming the water). According to the executing agency, there is a possibility that, when water is not distributed as planned, the farmers may allow arable land to lie idle (during the dry season), and as a result, the size of the irrigated land area may be smaller than planned.

(3) Severe Drought in 2002

Furthermore, in newly irrigated regions such as this project region where farmers have no experience with irrigated agriculture particularly during the dry season, it is generally difficult to achieve the goal level immediately following project completion (especially in the dry season) and time is necessary to acquire agricultural experience, including how to use irrigation water. During FY1998-FY2001, it appears that the irrigated area is gradually expanding and the results of the irrigation project are gradually becoming apparent.

Detailed rainfall data for the local area and the project area was unobtainable, but for example, there is a report that rainfall in July (during the rainy season) 2002 was 40% of rainfall in an average year*⁷. It is likely that the light rainfall led to a decrease in the water level in the dam reservoir, which is the water source for irrigation, and this had an effect on the size of the irrigated land area.

2.3.2 Planted Acreage of Main Crops/Yield

The acreage of main crops planted and the yields are also important effect indices for this project. Here, data from 1998 will be utilized, which was a year of good harvest and the year the project was completed, to confirm the validity of this project with regard to the acreage of main crops planted and their yields in this project region.

(1) Planted Acreage

Table 1 shows the planned figures*⁸ and actual figures for FY1998 for acreage of main crops planted. In the wet season, the planted acreage was 87.6% of the planned level. By crop, rice achieved a level

⁷ From the official homepage of the Government of Orissa.

⁸ There were no specific figures of the planned level and actual FY 1998 level of the Project.

Thus, the figures were calculated based on those of the overall irrigation project (44.5000ha) and the ODA Loan Portion (15.208ha).

of 87.2%, and vegetables achieved a level of 249.7%. The total for the dry season shows an achievement level of 45.7% of the planned level, and even on an individual crop basis, no crop exceeded the planned level in the dry season. As a reason, the executing agency points out that irrigated acreage is small during the dry season.

Table 1 Planted Acreage – Comparison of Planned Level and Actual FY1998 Level (unit: ha)

	Planned Level		Actual FY1998 Level		% of Planned Level(%)	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Rice	13,482	6,527	11,761	4,103	87.2	62.9
Miscellaneous Grains	-	-	206	83	-	-
Beans	786	1,746	39	410	5.0	23.5
Peanuts	-	858	2	21	-	2.4
Oil Seed	-	-	69	52	-	-
Vegetables	256	690	640	609	249.7	88.2
Potatoes	-	328	-	15	-	4.6
Sugar Cane	-	-	-	16	-	-
Wheat	-	1,470	-	3	-	0.2
Total	14,524	11,620	12,718	5,312	87.6	45.7

Source: Material provided by executing agency

Note: Boxes with no data were either “not planned” (at planning time) or “not planted” (in “Actual FY1998 Level”).

Furthermore, below is a comparison of planted acreage prior to the project with planted acreage in FY1998 (Table 2). An increase is shown of 120.4% in the wet season and 306.6% in the dry season. Particularly worthy of attention is the dramatic increase in planted acreage in the dry season.

Table 2 Planted Acreage – Comparison of Pre-project Level and Actual FY1998 Level (units: ha)

	Prior to Project		Actual FY1998 Level		% of increase	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Rice	6,862	-	11,761	4,103	171.4%	-
Miscellaneous Grains	2,707	-	206	83	7.6%	-
Beans	-	977	39	410	-	41.9%
Peanuts	-	-	2	21	-	-
Oil Seed	413	413	69	52	16.7%	12.6%
Jute	114	-	-	-	-	-
Vegetables	417	342	640	609	153.5%	178.2%
Potatoes	-	-	-	15	-	-
Sugar Cane	49	-	-	16	-	-
Wheat	-	-	-	3	-	-
Total	10,563	1,732	12,718	5,312	120.4%	306.6%

Source and Note: Same as Table 1

(2) Agricultural Yields

On an individual crop basis, vegetables in the wet season displayed remarkable yields (224.7% of

planned level). Meanwhile, in the dry season, the overall achievement level was 62.5% (Table 3).

Table 3 Comparison of Agricultural Yields – Planned Level and Actual FY1998 Level

(units: 1,000 tons)

	Planned Level		FY1998		% of Planned Level (%)	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Rice	53.9	26.1	47.05	18.47	87.2	70.7
Miscellaneous Grains	-	-	0.19	0.17	-	-
Beans	0.7	1.6	0.01	0.10	1.4	6.4
Peanuts	-	1.4	0.00	0.33	-	24.0
Oil Seed	-	-	0.21	0.02	-	-
Vegetables	2.6	6.9	5.76	6.09	224.7	88.2
Potatoes	-	3.3	-	0.01	-	0.3
Sugar Cane	-	-	-	1.14	-	-
Wheat	-	2.9	-	0.01	-	0.3
Total	57.2	42.2	53.22	26.34	93.0	62.5

Source and Note: Same as Table 1.

Furthermore, when the actual levels for FY1998 are compared to the level prior to the project (Table 4), there is dramatic growth of 292.9% in the dry season yield. It can be said that the construction of irrigation facilities has had a large effect particularly on dry season agriculture.

Also, farmers still rely on rice and strongly favor it as much as before. However, irrigation has led to the projection of diverse crops particularly during the dry season (vegetables, potatoes, sugar cane, oil seed, etc.), and so irrigation has been effective to a degree in encouraging crop diversification.

Table 4 Comparison of Agricultural Yields – Pre-project Level and Actual FY1998 Level

(unit: 1,000 tons)

	Prior to Project		Actual 1998 Level		% of increase (%)	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Rice	7,185	<small>Note:2)</small>	11,761	4,103	163.7	-
Miscellaneous Grains	2,834	-	206	83	7.3	-
Beans	-	1,023	39	410	-	40.1
Peanuts	-	-	2	21	-	-
Oil Seed	432	433	69	52	16.0	12.0
Jute	120	-	-	-	-	-
Vegetables	437	358	640	609	146.6	170.2
Potatoes	-	-	-	15	-	-
Sugar Cane	52	-	-	16	-	-
Wheat	-	-	-	3	-	-
Total	11,060	1,814	12,718	5,312	115.0	292.9

Source and Note: Same as Table 1

2.3.3 Internal Rate of Return

Whereas the economic internal rate of return (EIRR) was 6.7% when calculated at the time of appraisal, it was 3.1% when recalculated based on materials provided by the executing agency. The EIRR declined due to increases posted in operating and management expenses, but it can be said that it remains at an appropriate level.

The premises and the figures when the EIRR was calculated are as shown below. Furthermore, with regard to the benefits and costs, the figures are not those of Unit II overall but are those calculated especially for this project (ODA loan portion) using percentages of the figures for Unit II overall.

Item		Appraisal Time	Evaluation Time
Benefits	Increased income from crops	115 million rupees annually	186.1 million rupees annually
Cost	Investment cost (dam part)*	203.5 million rupees	Actual Am't 242.2 million rupees
	Investment cost (irrigation part)	965.4 million rupees	Actual Am't 762.4 million rupees
	Operation and Management Expense	2.1 million rupees annually (100 rupees/1 ha)	9.7 million rupees annually (450 rupees/1 ha)
Project Cycle		50 years ^{*9}	
EIRR		6.7%	3.1%

*Facility share of this irrigation project of the dam construction cost.

2.3.4 Number of Beneficiary Farm Households

The number of farm households benefiting from this irrigation project has been largely increasing. In FY1998, the figure has reached 23,766 households.

2.4. Impact

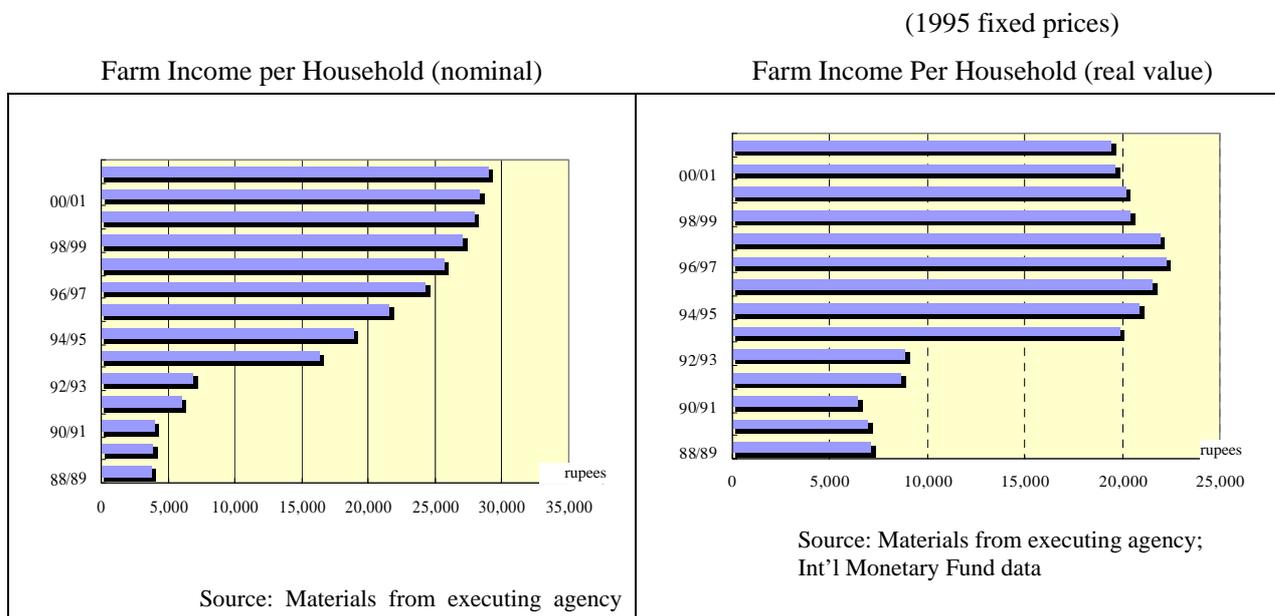
2.4.1 Improvement in Farm Households Incomes

As shown in the figure below, farm households' income is increasing annually. In FY1998, the year the project was completed, income was 27,015 rupees, and it rose gradually to 29,019 rupees in FY2001. However, income remains at 66% of the level planned at the time of the appraisal (43,500 rupees/year).

Furthermore, in real terms income peaked in 1996 and has been in a slight downtrend since then.

⁹ The project life of irrigation projects is ordinarily calculated at 20 to 30 years, but this time it was set at 50 years in keeping with the terms and conditions at the time of appraisal.

The executing agency believes that this is caused by an inflation rate that is rising faster than the growth of nominal income.



2.4.2 Creation of Employment and Permanent Residences for Scheduled Castes and Scheduled Tribes (minority tribes)

According to the executing agency, farm employment opportunities increased particularly during the dry season due to the start of irrigation, and there are more opportunities for tenant farmers and small-scale farmers (the majority of whom are scheduled caste and scheduled tribes) to be hired as agricultural workers. Also, there are now many cases where farmers who, prior to the introduction of irrigation facilities, migrated to find employment in other states mainly during the dry season are finding employment in Orissa State and remaining there. Furthermore, an increasing number of farmers are coming from outside the state to seek work.

Consequently, this project can be considered to be making a certain contribution to employment creation in the project region. Whether scheduled tribes are settling in permanent residences^{*10} is unclear at present.

2.4.3 Improvement of the Food Self-Sufficiency Rate in the State

According to the executing agency, in the state, agricultural yield has increased since irrigation is possible even in the dry season^{*11}, and in recent years, food surpluses have appeared. Data for many

¹⁰ In this project, it was anticipated that small-scale farmers and tenant farmers would acquire employment opportunities as a result of the provision of irrigation facilities. Small-scale farmers in particular traveled to other regions and other states in search of employment opportunities, but it was anticipated that creation of employment in this state will encourage them to settle in permanent residences.

¹¹ Since not only this project but a variety of irrigation projects are being implemented in this state, those other projects are

years could not be obtained, but as shown on the table below, the state has achieved self-sufficiency in rice according to FY2001 figures.

Food Consumption in Orissa State and Amount Procured From Other States (FY 2001)

(unit: tons)

	Annual Consumption Amount	Procurement from Other Provinces
Rice	5,870,105	0
Wheat	310,813	300,000
Sugar	176,381	180,000
Beans	221,089	120,000
Cooking Oil	125,738	100,000
Potatoes	843,701	650,000
Onions	199,940	100,000

Source: Food Supplies and Consumer Welfare

Note: Total population as of FY2001 was 36.7 million people

2.4.4 Environmental Impact

According to the executing agency, no negative impact on the environment was reported.

2.4.5 Other Social and Economic Impact

No movement of residents occurred in this project. Also, in acquiring the land, financial compensation was paid to the land owners based on the national law (i.e. land acquisition law).

Other secondary impact that has been confirmed includes usage by residents of the main canal for drinking water, household water, livestock drinking water, and bathing, etc. Also, when a hearing study was conducted at the irrigation associations, many said that, due to the increase in income accompanying the increased agricultural yield, some farm households can now send their children to school and can buy durable consumer goods (household electric appliances and motorbikes, etc.) that were previously unaffordable.

included here.

2.5 Sustainability

2.5.1 Current Condition of Irrigation Facilities and Operation and Management System

In the JBIC survey conducted in 2001 pointed out the fact that the operation and management of waterways was inadequate. It was confirmed by the survey site inspection (together with a specialist in the local irrigation sector) and by interviews with irrigation association members that, for the main canal and distributary canal from the minor level down, operation and maintenance measures are necessary for 1) damage of discharge outlets, 2) damage and erosion to the levees along the waterways, 3) sand deposits in the waterways, etc. According to the executing agency, although budget limitations present some difficulties, regular operation and management work is being implemented within the limitations of the budget.

Operation and maintenance of the irrigation facilities is the responsibility of the Department of Water Resources and the irrigation associations. The Department of Water Resources is in charge of operation and maintenance of dams and the main canal, and upon its establishment, the irrigation association is put in charge of distributary canal from the minor level down^{*12}. However, in regions where an irrigation association does not exist, the Department of Water Resources continues to handle operation and maintenance of distributary canal from the minor level down.

In the above-mentioned JBIC survey and JBIC's local office survey implemented in 2003, for the realization of the project's effects in a sustainable manner, problems were outlined and detailed measures were advised concerning the organization of the irrigation associations (the beneficiaries), the operation and maintenance system and financial status including the relationship between the irrigation association and the executing agency, and the operation and maintenance status of the facilities^{*13}. Utilizing this advice, progress is being made in strengthening the irrigation associations.

Below, the following matters are verified concerning the Department of Water Resources (Upper Kolab Irrigation Project (UKIP) Office) and the irrigation associations.

2.5.2 Department of Water Resources (Upper Kolab Irrigation Project (UKIP) Office)

(1) Operation and Maintenance System and Technical Capacity

The operation and maintenance of Unit II, including that of this project, is carried out by the UKIP office that was set up in FY2001. The main activities of the operation and maintenance staff are 1) regular maintenance work for the facilities, such as removal of sediment (sand) from the waterways

¹² The scope of the irrigation association's operation and maintenance is based on the Orissa State's "Pani Panchayat Act (1999).

¹³ In the local office survey, bottlenecks (in small-scale infrastructure, marketing, technology, and water management, etc.) were noted based on the social survey, and to solve those, an action plan was produced spanning all stages from preparation and implementation, to monitoring.

¹⁴ Training was advised by the survey implemented by JBIC in 2001.

and repair and management of the watercourse, 2) water management operation, etc., such as head works, operation of the main canal, and flow measurements at major points.

Also, training is implemented by the Water and Land Management Institute (WALMI) for the staff to upgrade their technical knowledge regarding concentrated, diversified irrigation agriculture, etc.^{*14}

(2) Financial Status

■ Operation and Maintenance Cost

For the operation and maintenance cost of the UKIP office, an operation and management budget has been allocated amounting to 450 rupees per 1 ha since FY2001 following the completion of the project. In FY2001 15.3 million rupees, and in FY2002 13.7 million rupees, were apportioned to the UKIP office (of which 70% was applied to personnel costs of operation and maintenance staff and the remaining 30% was applied to the cost of operation and maintenance activities). There is also the problem that budget is not adequately allocated to the Department of Water Resources since this state itself is in financial distress, and the UKIP office states that it cannot fully cover the operation and maintenance activities for irrigation facilities it manages with an operation and maintenance budget of 450 rupees / 1 ha.

The UKIP office is studying plans to resolve the insufficiencies in the operation and maintenance funds, such as supplementing with funds from the Indian Government or selling water from the main waterway to private companies and factories and using the proceeds to cover operation and maintenance costs

		2000	2001	2002
Budget	1. Engineering Works	157.3	-	
	2. Installation	79.2	-	
	3. Operation and Management	0	15.3	13.7
	Total	236.5	15.3	13.7
Expenditures	1. Engineering Works	157.3	-	-
	2. Installation	79.2	-	-
	3. Operation and Management	0	9.7	9.7
	Total	236.5	9.7	9.7

Source: Material from executing agency

Note: The operation and maintenance cost for FY2000 was not budgeted. Also, the engineering works cost and the installation cost were borne locally separate from the ODA loan implemented by UKIP.

¹⁴ Training was advised by the survey implemented by JBIC in 2001

2.5.3 Irrigation Associations

(1) Operation and Maintenance System and Technical Capacity

As stated above, the irrigation associations are responsible for operation and management of distributary canal from minor level down, and they also handle collection of irrigation costs. For the irrigation associations to actually perform operation and management of facilities, after an association is registered, it is necessary for the UKIP office and the irrigation association to exchange a memorandum and to officially hand over to the irrigation association the assets of the distributary from minor level down and the authority for operation and management.

Irrigation associations are classified in one of four categories, “authority transfer complete,” “registration complete,” “registration imminent/registration in progress,” and “unregistered.” In the region covered by UKIP, 15 associations had completed registration as of FY2002 (equivalent to “registration complete”) (Table 9). However, since authority is transferred after the Department of Water Resources completes maintenance of the existing irrigation facilities, at the time of this study, there were no irrigation associations which had completed authority transfer procedures.

According to the UKIP office, the organization of irrigation associations during the past two years has proceeded as a slower pace than expected, and the reasons given were that time is required for farmers to understand the significance and the merits of irrigation associations and time is also required for the staff of the Department of Water Resources (particularly at the field level) to understand the significance of forming irrigation associations and the associations’ role so that they will lend their cooperation. However, according to the Department of Water Resources the support system for registering associations of farmers is taking shape^{*15}.

Table 6 Formation of Irrigation Associations in the UKIP Jurisdiction

	2001	2002
Authority Transfer Complete	0	0
Registration Complete	8	15
Registration in Progress	14	13
Unregistered	16	10
Total	38	38

Furthermore, the government is implementing training for association members to gain the skills and knowledge necessary for irrigation. The technical support system is established, and in addition to training in irrigation, training related to crop diversification and marketing is being implemented.

(2) Financial Status

Irrigation associations receive a maximum of 100 rupees/ha annually from the Department of Water

¹⁵ Advised by the survey implemented by JBIC in 2001.

Resources for operation and management costs, and this is the main source of revenue for the irrigation associations. However, to receive this operation and management financing, a minimum membership rate of 75% must be maintained, and if membership drops below that, associations are disqualified from receiving operation and maintenance financing.

Furthermore, the amount received by associations with a membership rate over 75% varies depending on the membership rate (for example, if the membership rate is 80%, the amount is 80 rupees/ha, if the rate is 90%, the amount is 90 rupees/ha).

■ Irrigation Costs

Since irrigation costs borne by farmers are paid directly to the state government through the state revenue department, irrigation fees are not direct revenue for the Department of Water Resources. Data could not be obtained on the actual irrigation fees collected in 2000 and thereafter, but the actual irrigation costs collected from FY1997 to FY1999 are shown below. The average collection rate is 64% on average.

Table 7 Collection of Irrigation Costs (million rupees)

Year	Appraisal Amount	Collected Amount	Collection Rate
1997	1.35	0.91	68%
1998	5.14	2.94	57%
1999	6.31	4.16	66%

To recapitulate the sustainability of this project, a system was set up following the project completion, including budgetary measures for operation and management and formation of operation and management staff. Continued attention is required for the improvement of the operation and management status of the facilities and for the formation and promotion of irrigation associations.

3. Feedback

3.1 Lessons Learned

In similar projects in the future, the social and economic conditions of the beneficiaries as well as the roles of related parties should be clarified, and an action plan should be created at early stage.

In irrigation projects, active participation by the farmers who are the beneficiaries is indispensable, with irrigation associations as the center of activity. Consequently, in order to strengthen the irrigation associations and promote participation by farmers, first a study should be made of the

social and economic conditions of the beneficiaries, such as tribes, land ownership, and existing residents' organizations, etc., and also problems in markets, technology, and capital, etc., should be specified in detail. Once that is done, an action plan that clarifies the roles of related parties (responsibilities and authority) should be prepared at a stage sufficiently prior to the launch of water supply.

3.2 Recommendations

-for the executing agency

Together with promoting early transfer of operation to irrigation associations, more complete support should be made available to irrigation associations.

According to the JBIC survey conducted in 2001, there was no budget distribution from the state government to the UKIP office, and so repair and proper management were not performed for damaged facilities. However, after receiving the recommendation of the said study, budget distributions have started, and while the scope is limited, repair and proper management are being conducted.

Henceforth, so that repairs can be implemented for damaged facilities in the distributary canal from minor level down by the irrigation associations, efforts should be made to transfer the assets of the said canals to the associations soon. Through that, the burden of the UKIP office, including the financial burden, will be lightened, and moreover, a farmer-led operation and management mechanism for the facilities will be established.

Meanwhile, it is important to provide on-going technological support with the organized irrigation associations in order to promote self-reliance and the realization of sustainability.

Comparison of Original and Actual Scope

Item	Planned	Actual
① Output		
1. Engineering Works		
(1) Irrigation Land Area (Jeypore main canal)	21,000 ha (14 km point - 41.78 km point)	15,208 ha (as planned)
(2) Distributary Canal	RD 28.08 km point RD 33.75 km point RD 35.50 km point RD 41.78 km point	As planned As planned As planned As planned
(3) Supply Waterways, Drain	14.00 km point - 41.78 km point	As planned
2. Material and Supplies Procurement	Construction materials, etc.	As planned
② Project Period		
Engineering Works		
1) Main Canal and Distributary Canal	April 1989-March 1993	April 1989-June 1998
2) Water Course Field Channel	April 1989-March 1993	April 1989-June 1998
3) Drainage Waterway	April 1989-March 1993	April 1989-May 1998
4) Materials and Supplies Procurement	April 1989-March 1993	April 1989-May 1997
5) Land Acquisition	April 1988-March 1992	April 1988-July 1998
Project Cost		
Foreign Currency	795 million yen	unknown
Local Currency	6.742 billion (688 million rupees)	unknown (1,050 million rupees)
Total	7,537 million yen	3,786 million yen
ODA Loan Portion	3,769 million yen	3,114 million yen
Exchange Rate	1 rupee = 9.8 yen	1 rupee = 4.06 yen

Third Party Evaluator's Opinion on Upper Kolab Irrigation Project

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Relevance

The relevance of an irrigation project in Koraput district of Orissa that is characterized by

- high incidence of poverty (85.11% in 1999-2000 lying below a consumption level of 1US\$ a day per capita, compared to 57.24% in the state),
- high dependence on agriculture for livelihood and employment (72.95% of total workers being agricultural labourers as per 2001 census, compared to 64.73% in the state),
- high instability in agricultural production due to frequent drought (coefficient of variation being 15.30 in terms of area under foodgrains during 1978-98, compared to 4.30 for the state),
- high concentration of people belonging to the vulnerable sections of scheduled tribes,
- declining cropping intensity (from 146 in 1985 to 139 in 1998) and
- reported starvation deaths during the last couple of decades

cannot be overemphasized.

Impact

About 35% of the net sown area of the Koraput district has potential for irrigation. 80% of such irrigation potential in the four blocks lying in the command area of Upper Kolab Irrigation Project has been created by the project under review. Thus the potential impact of the project is considerable. Ex-post evaluation report on the project also notes 92.3% of the targeted irrigation potential were achieved during the wet season in 2000, the corresponding figure for the dry season being 59%. Actual area irrigated during dry season, however, has been declining marginally but steadily since 2001 and 2003. It is evident that the planted acreage and yield per hectare received a positive boost from the project. Household income — both in real and nominal terms — has increased considerably compared to that recorded at the beginning of the project, a slight downward slide in real income during the late nineties notwithstanding. Increased in-farm employment opportunities reduced incidence of out-migration during dry season. However, problems exist in terms of

- distribution of water to the fields lying at the tail ends of the canals and
- lack of funds to maintain and repair the existing channels;

Sustainability

Sustainability of a project is conditioned by the capability — both economic and social — of its users in maintaining the assets and thus calls for a sound system for their operation and management. Relevant institutional mechanisms are necessary to ensure the sustainability of the assets generated. The O&M costs, as of now, appear to be a bit too high to be covered from out of the incremental income of the existing users. More funds are necessary to be pumped in from outside towards O&M as a short term measure. Over a longer term perspective, strategies aimed at steady supply of other complementary inputs like credit, fertilizers, extension services, post-harvest storage and marketing facilities are necessary to ensure a higher rate of return on agriculture to the farmers. Adjoining forests also supply complementary inputs to sustain the livelihoods of the potential users. The colour of water flowing through the canals indicate a rapid rate of soil erosion. Unless complementary soil conservation projects are taken up, heavy siltation along the canals may nullify the primary objective of irrigation. Line departments delivering such complementary inputs are to be roped in towards the institution building process. Their participation will help establish

and subsequently, add to the income generation and consequent social capabilities of the “Irrigation Associations” to sustainably manage the assets generated out of project under review.