India

Ex-Post Monitoring of Japanese ODA Loan Project

"Upper Kolab Irrigation Project"

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Field Survey: June 2009

1. Outline of the Project

Site Map

Main Canal developed by the Project

1.1 Project Objective

The objective of this project (hereafter referred to as "the Project") was to increase agricultural production and improve productivity in the upstream area of Kolab River, a branch of the Godavari River in the state of Orissa, by constructing irrigation facilities in rain fed agriculture regions of low productivity, thereby contributing to the reduction of poverty through improving the earnings of scheduled castes and scheduled tribes (minority tribes) whilst increasing the food self-sufficiency of the state.

1.2 Project Outline (Outline of the Loan Agreement)

Approved Amount/Disbursed Amount	3,769 million yen / 3,114 million yen
Loan Agreement Signing Date / Final Disbursement Date	December 1988/July 1998
Ex-Post Evaluation	2003
Executing Agency	Department of Water Resources, Government of Orissa
Main Contract Only more than 1 billion	None

Consultant Contract Only more than 100 million yen or above	None

1.3 Background / Reason for Ex-Post Monitoring

According to the ex-post evaluation conducted in 2003, the area irrigated remained at a level of 21.4%~56.2% of planned level, especially in the dry season, and agricultural output also did not reach planned level. The background to this is a level of water consumption higher than projected and issues with water allocation, which arose due to inconsistencies in the farming programme. These were presumably related to such factors as the delay in the transfer of authority to the irrigation associations, which raised the necessity of promoting the participation of farmers in the maintenance of the farming programme and in the irrigation associations. Consequently, the Project became subject to Ex-Post Monitoring in order to review and verify the maintenance conditions of the irrigated areas from the ex-post evaluation onwards. The Project was reviewed with distinct evaluation criteria based on the results of the recent field survey etc. and a conclusion was derived.

2. Monitoring Results

2.1 Effectiveness (Impact)

2.1.1 Quantitative Effects

2.1.1.1 Operation and Effect Indicators

(1) Irrigated Area

At the time of the ex-post evaluation, the area irrigated did not achieve target levels in either the rainy or dry seasons. In particular, the level in the dry season remained at a maximum of 56.4% (1999) of projected levels. However, the current irrigated area in both the rainy and dry seasons has seen full-scale improvements from the time of the ex-post evaluation. In particular, the level in the dry season reached almost 100% of projected level.

Table 1 Area Irrigated Within the Project Area

(Unit: ha)

	Target	Project Completion	Until Ex-Post Evaluation			Since Ex-Post Evaluation to Present		
	Year	1998	1999	2002	2005	2006	2007	2008
Rainy Season	15,208	13,384	14,036	n.a	17,391	17,391	17,391	17,391
	Achievement	88.0%	92.3%	n.a	114%	114%	114%	114%

	Level							
Dry Season	12,116	4,290	6,835	4,529	12,417	11,655	11,936	11,749
	Achievement Level	35.4%	56.4	37.4%	102.5%	96.2%	98.5%	97.0%

(Source) Department of Water Resources, Government of Orissa

This trend can be attributed to the improvement of the issues raised during ex-post evaluation.

1) Improvement of Water Consumption and Allocation Plan

Due to the results of education by the Department of Water Resources and promotion of awareness-raising relating to water usage by the farmers, the habit of optimum water usage is spreading among the local people. In the beneficiary survey conducted during field survey (see Impact section for details), approximately 50% of farmers responded that they can secure sufficient water quantities at any time, with a little under 70% of the total responding that they can secure sufficient water quantity for a certain period. The beneficiaries confirmed that they realized improvement of conditions relating to water usage is also confirmed by the perception of the beneficiaries. Specifically, the following two main causes are possible.

1. The knowledge relating to appropriate water management and farmer awareness-raising is accumulating, through guidance visits to irrigation associations by Department of Water Resources staff.
2. Experience of using irrigation facilities has been accumulated.
3. Water consumption changed itself through advances in crop diversification such as the increased cultivation of crops of relatively low water consumption
4. Extension of efficient production technology progressed by farming guidance.

Considering the above, problems relating to water usage has been improving compared to the time of the ex-post evaluation.

2) Quantity of water of irrigation canal

With precipitation in the Project area that forms the water source for the irrigation and the average stream flow of the main canal, which are shown as follows, stable water quantity has been maintained in the last few years. The table below shows the annual rainfall for Orissa State for the past six years from the ex-post evaluation in 2002 onwards, precipitation has stabilised and the executing agency confirmed that there has been no

problem with water quantities.

Table 2 Annual Rainfall in Orissa State

(Unit: mm)

Year	2002	2003	2004	2005	2006	2007
Rainfall	1007.8	1663.5	1256.7	1497.7	1682.8	1583.2

(Source) Status of Agriculture in Orissa

Table 3 Flow of the Main Canal in the Project Area

(Unit: m^3/sec)

Year	Average Annual Flow	Rainy Season		Dry Season	
		Maximum	Minimum	Maximum	Minimum
2003-04	20.24	35.26	4.79	46.15	7.73
2004-05	22.96	36.02	4.63	39.73	9.34
2005-06	22.20	30.23	4.63	46.27	4.67
2006-07	23.85	35.48	3.50	38.69	4.57
2007-08	21.68	29.16	4.70	37.11	4.84
2008-09	20.33	34.53	2.45	37.11	9.18

(Source) Department of Water Resources, Government of Orissa (UKIP office)

However, the Satiguda Dam, water sources of the canal is under the control of state electric power corporation, and water use for irrigation is prioritized lower than power generation, which may cause large-scale water shortage for irrigation in the period of water shortage. According to the Department of Water Resources, allotment is decided whilst making suitable adjustments with the electric power corporation. However this is carried out through the interpersonal relationships of managers in the organisations and there is no opportunity for formal adjustments.

3) Improvement of the Farming Environment

In order to maximize the benefit of irrigation facility, activities such as dissemination of education for farmers, development of on-farm infrastructure, have been gradually developed, thereby improving the agricultural production.

1. Development of on-farm infrastructure

In order to distribute irrigation water efficiently, development of on-farm infrastructure such as development and maintenance of drainage facilities is necessary. Development of on-farm infrastructure was commenced by the Department of Water Resources under

government assistance (national and state) from 2005 together with agricultural land consolidation. Outfitting of approximately 25,000 ha (achievement rate 41%) is underway and is projected to be completed in 2011.

2. Various Agricultural Techniques for Crop Diversification and Yield Increase

Training is being conducted at the Department of Water Resources in cooperation with WALMI[1] affiliated with Department of Water Resources.

Table 4 Implementation Status of Land Consolidation and Training for Farmers

	Planned (2011)	Actual (As of March 2009)	Planned/Actual Ratio
Servicing of Outlying Agricultural Areas (Unit: 1,000ha)	59.644	24.584	41%
Training for Farmers (People)	n.a	8,900	n.a
Number of Training Programs	n.a	87	n.a

(Source) Department of Water Resources, Government of Orissa (UKIP office)

According to interviews with the Department of Water Resources and WALMI, these programs have not been connected with any remarkable reform at present since the production of rice is traditionally popular in this locality as identified at the time of the ex-post evaluation and it requires more time to bring about a change in mind-set of farmers who rely on rice production. However, as kinds and share of products continues to improve, progress of the initiatives for farmers inclined towards efficiency is observed through the introduction of industrial science and agricultural machinery etc. Therefore, further improvements can be expected through continuing initiatives.

(2) Planted Area of Main Crops/Yield

Yield in the Project area reached beyond the planned level in both rainy and dry seasons, and in particular that of dry season has drastically improved from approximately 46% at the time of ex-post evaluation to 101%. This can be attributed to the improvement of production environment, such as expansion of the actual irrigated land and development of on-farm infrastructure since the ex-post evaluation. The breakdown of Table 5 shows that

[1] WALMI=Water and Land Management Institute. Implements agricultural guidance and technology training for farmers and the cultivation of test products as an Agriculture Ministry affiliated agency.

vegetable production has drastically increased from a projected 256ha to 1,327ha (rainy season) although rice production still composes more than 80% of the structure. Increases are also seen in other products such as sugar cane, suggesting that product diversification has proceeded to a certain extent compared to the time of the ex-post evaluation.

Product diversification is also promoted with the intention of optimising water usage through increase of crops requiring comparatively low water consumption, such as vegetables. The Department of Water Resources prepares these plans in cooperation with the Agriculture Department, providing education and guidance for farmers based on the plans. According to the executing agency, recent trend of growing diversification is viewed as a result of the above-mentioned education for farmers. The agency also explained that they need to continue gradual improvement through long-term initiatives hereafter since awareness-raising among farmers requires reasonable amount of time.

Table 5 Planted Area – Actual/Percentage of Planned Value(Rainy Season)[2]

(Unit: ha)

	Planned Value (2003)[3]	**At Ex-Post Evaluation (1998)[4]***	**2005**	**2006**	**2007**	**2008**	**% of Planned Value**
Rice	13,482	11,761	14,384	14,693	14,593	15,029	111%
Miscellaneous Grains	-	206	615	620	392	833	
Beans	786	39	172	63	74	-	0%
Peanuts	-	2	86	73	86	-	
Oilseed	-	69	95	112	144	50	
Vegetables	256	640	1,162	962	1,136	1,327	518%
Jute	-	-	-	-	-	-	
Potatoes	-	-	362	376	436	-	
Sugar Cane	-	-	515	492	530	152	
Wheat	-	-	-	-	-	-	
Total	**14,524**	**12,717**	**17,391**	**17,391**	**17,391**	**17,391**	**120%**

(Source) Department of Water Resources, Government of Orissa

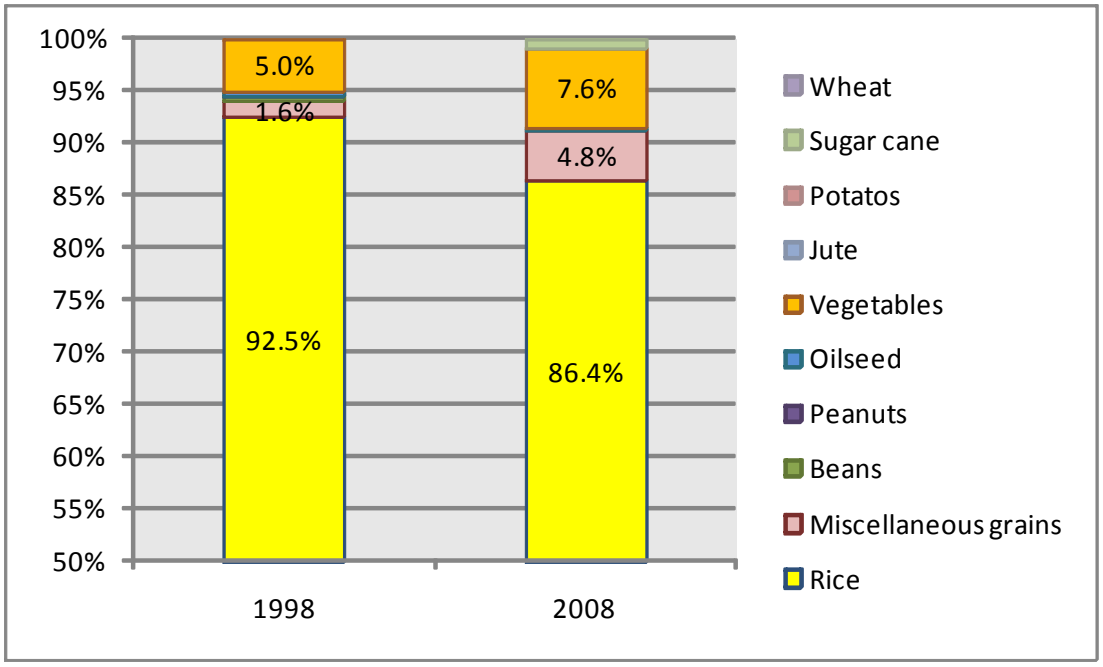
[2] The production schedule is decided by the Department of Water Resources. As the actual crops cultivation is decided by the farmers, the planned and actual values can vary greatly.

[3] As the planned year of the planted area is not noted on the ex-post evaluation report, 2003, which is the planned year of irrigated are, is assumed for the project year of this index.

[4] The ex-post evaluation was performed in 2003 but the evaluation is based on the results for 1998, the year of project completion.

Comparing the data of the 2008 rainy season to that of 1998 in Table 5, the structure that rice production comprises its majority has not changed. It seems that this trend in the fundamental structure will continue; however the production of such items as vegetables is gradually increasing. This can be interpreted as a result of the agricultural education detailed earlier and the diversification of production is expected to proceed further hereafter. According to the interview with WALMI, they believe that it is important to let farmers recognise the achievements and results of diversification and WALMI is carrying out initiatives such as establishment of a demonstration farm for high value sunflowers (for oil manufacturing).

Fig. 1 Composition of Products (Planted Area Base/Rainy Season)



(Source) Department of Water Resources, Government of Orissa

2. Dry Season

Particularly since the ex-post evaluation, production in the dry season has demonstrated remarkable growth, with the planned values generally achieved in the planted areas in the last few years. Similar to the situation in the rainy season, the breakdown in Figure 1 shows that rice comprises the majority of the production. Amongst the other items, production of vegetables is growing as a general trend, although 2008 saw a reduction due to seasonal effects.

Table 6 Planted Area – Actual/Percentage of Planned Value

(Unit: ha)

	Planned Value (2003)	At Ex-Post Evaluation (1998)	2005	2006	2007	2008	% of Planned Value
Rice	6,527	4,103	10,158	9,211	9,530	11,466	176%
Miscellaneous Grains	-	83	392	462	492	81	
Beans	1,746	410	282	382	305	-	0%
Peanuts	858	21	205	125	111	-	0%
Oilseed	-	52	177	117	127	-	
Vegetables	690	609	836	1,012	1,056	185	27%
Jute							
Potatoes	328	15	367	346	315	-	0%
Sugar Cane	-	16				-	
Wheat	1,470	3				17	1%
	11,619	**5,312**	**12,417**	**11,655**	**11,936**	**11,749**	**101%**

(Source) Department of Water Resources, Government of Orissa

Fig. 2 Rice Crop Zone of the Project Area

Fig. 3 Vegetable Cultivation in the Project Area

1) Yield

1. Rainy Season

The yield in the rainy season has not changed greatly since the ex-post evaluation, and the gross yield has remained stable at around the planned value. Production of vegetables in particular has been increasing, and has reached almost 25% of the total production base. It is reasonable to interpret that the effects of initiatives for the diversification of production detailed earlier are gradually realised.

Table 7 Agricultural Yield – Comparison of Planned Value and Actual Level

(Unit: 1,000 tons)

	Planned Value (2003)	At Ex-Post Evaluation (1998)	2005	2006	2007	2008	% of Planned Value
Rice	53.9	47.05	36.1	36.218	37.562	38.174	71%
Miscellaneous Grains	0	0.19	0.325	0.325	0.195	0.438	
Beans	0.7	0.01	1.579	0.622	0.73	0	0%
Peanuts	0	0	0.098	0.085	0.109	0	
Oilseed	0	0.21	0.022	0.029	0.039	0.013	
Vegetables	2.6	5.76	10.667	9.505	11.224	13.6	523%
Jute	0	0	0	0	0	0	
Potatoes	0	0	2.914	3.083	3.575	3.924	
Sugar Cane	0	0	0	0	0	0	
Wheat	0	0	0	0	0	0	
Total	**57.2**	**53.22**	**51.705**	**49.867**	**53.434**	**56.149**	**98%**

(Source) Department of Water Resources, Government of Orissa

2. Dry Season

Production output in the dry season has also improved since the ex-post evaluation, generally reaching planned values in the last few years. Although production output temporarily decreased in 2008 due to seasonal effects, the Department of Water Resources anticipates that it will recover usual level in 2009.

Table 8 Agricultural Yield – Comparison of Planned/Actual Level

(Unit: 1,000 tons)

	Planned Value (2003)	At Ex-Post Evaluation (1998)	2005	2006	2007	2008	% of Planned Value
Rice	26.1	18.47	28.47	24.09	25.50	30.96	118.6%
Miscellaneous Grains	0	0.17	1.37	1.70	2.48	0.42	
Beans	1.6	0.1	2.78	0.39	0.31	0.00	0.0%
Peanuts	1.4	0.33	0.33	0.20	0.18	0.00	0.0%
Oilseed	0	0.02	0.06	0.04	0.04	0.00	
Vegetables	6.9	6.09	8.26	10.37	10.82	0.20	2.9%
Jute	0	0	2.90	2.65	2.84	0.00	
Potatoes	3.3	0.01	0.00	0.00	0.00	0.00	
Sugar Cane	0	1.14	0.00	0.00	0.00	0.00	

Wheat	2.9	0.01	0.00	0.00	0.00	0.03	
Total	42.2	26.34	44.17	39.46	42.17	31.61	74.9%

(Source) Department of Water Resources, Government of Orissa

According to the focus group discussions with the Project's beneficiaries conducted during the field survey, they commented that drastic increases in annual yields were realized due to production of rice crop in dry seasons becoming possible though the usage of irrigation. This additional data also support an improvement in production conditions.

Table 9 Changes in Yield Based on Interviews with Beneficiaries

(Unit: tons/ha/year)

	Pre-Project	Post-Project
Minaguda village	0.6	1.9 -2.5
Jayantigiri village	0.6	2.0-2.5

(Source) interviews during the field survey

Fig. 4 Rice Harvest Operations

Fig. 5 Interview Survey with Beneficiaries

2.1.2 Impact

Questionnaire survey on beneficiaries was conducted to assess the impact of the Project. The survey targeted 150 households selected at random from the scheduled tribes and scheduled castes living within the Project area, and interview style questionnaire surveys and focus group discussions were conducted. The sample of 150 households was composed of scheduled tribes (77%), scheduled castes (15%) and others (8%). More than 90% of the sample was small farmers (Marginal owner farmers with agricultural land of around 0.5 - 1ha). Before the Project, their forms of employment were independent farming and secondary work as day labourers and migrant workers.

(1) Increase of Farmer Income

As shown by 2.1 Effectiveness, agricultural production has been improving since the period of ex-post evaluation and it can be said that this is contributing to improvement of the employment condition of the inhabitants in the beneficiary area. Data at the time of the ex-post evaluation did not take into account other income sources as it was a simple estimation based on the net income from agricultural production. However, this time, the beneficiary survey confirmed the occupation-wise / caste-wise average earnings before and after the Project and it gives the following results. The total amount of real income of all beneficiaries jumped up to 170%~maximum 370%. The particularly high rate of income increase among owner farmers is possibly because the effects from increasing the planted area and yield through progress in utilization of irrigation facilities. At the same time, the expansion of the agricultural land possessed by these farmers is also connected to increase in employment opportunities for day labourers. In fact, income of these farmers has risen to 170 - 230% of that before implementation.

Table 10 Changes in Average Income[5]

(Unit: rupee)

Class/Occupation	Day Labourer			Independent farmer		
	Pre-Project	Present	% of Pre-Project	Pre-Project	Present	% of Pre-Project
Scheduled Castes	7,167	16,063	224%	8,820	32,514	369%
Scheduled Tribes	8,319	19,362	233%	8,481	25,166	297%
Other Backward Classes	6,129	10,474	171%	9,607	27,040	281%
Average	**6,552**	**11,934**	**182%**	**9,706**	**27,400**	**282%**

(Source) Created by an external evaluator based on the beneficiary survey

In addition, approximately 82% of respondents confirmed improvement in their economic environment, and approximately 90% of them explained that it is due to improvement in agricultural production. In the interviews held with beneficiaries at the time of the field survey, many acknowledged the connection between increase in agricultural production and increase in household income. Therefore, it is possible that increase in household income of beneficiaries has been achieved as a consequence of the development of agricultural production since the ex-post evaluation.

(2) Employment Promotion and Settlement of Scheduled Castes and Scheduled Tribes

[5] The figures in the table are real incomes taking into account inflation and using 1998 as a standard. They differ from nominal income amounts.

(Minority Tribes)

The table below is a comparison of the annual number of days employed by different type of farmers. As mentioned in 2.1.2, the majority of sample beneficiaries were part-time farmers. Since project execution, the number of days that for migrant and day labourers employed has decreased whilst the number of days that owner farmers and other workers employed has drastically increased. This is probably because production has increased on the land of beneficiaries who used to be engaged in day labour and migrant work due to the Project, and the number of labour as independent farmer has increased.

Assessment of the direct attribution of the Project on farmer's income increase is difficult as the macro-economic condition of the Project area also influences these changes. However, the changes caused by the Project have probably made a certain contribution as shown by similar opinions in the beneficiary interviews conducted in the area.

Table 11 Annual Working Days by Labour Classification

	Before the Project	Present Time	Ratio
Day Labourers (Including Tenant Farmers	156	137	88%
Farmers (Owner farmer)	127	218	172%
Other (Storekeepers, Security, Rickshaw Drivers etc.)	219	417	190%
Migrant Workers	200	169	85%

(Source) Beneficiary Survey Results (Sample Number 150 Households)

(3) Improvement of Food Self-Sufficiency in the State

There has been no great change in food self-sufficiency since the ex-post evaluation and self-sufficiency for rice has been attained. The increase in agricultural productivity in the Project area during the dry season is probably making a certain contribution to securing stable food supply conditions.

However, supply of other items still depends upon import from other states. The main production in the Project area is rice, and due to geographical conditions, this structure will probably not change.

Table 12 Orissa State Food Consumption and Supply from Other States

(Unit: 1,000 tons)

	2006		
2006	Production	Consumption	Supply from Other States
Rice	6,928	5,905	-

Wheat	24	1,476	1,452
Sugar	226	500	274
Beans	17	150	133
Cooking Oil	600	2,008	1,408
Potatoes	79	1,476	1,397
Onions	260	736	476

(Source: Department of Water Resources, Government of Orissa)

(4) Impact on Environment

According to the Department of Water Resources, no particular problems have been reported. As soil-borne chloride has been confirmed in some parts of the Project area, the Agriculture Department is providing support for farmers through guidance on the usage method of chemical fertilisers.

It was confirmed that there was no significant damage due to chloride. However, a full-scale investigation concerning the chloride situation has not yet been implemented and questions still remain concerning the exact condition.

(5) Other Socio-Economic Impacts

According to the beneficiary survey about socio-economic changes given by the Project, 86% of respondents observed some kind of improvement. Among these opinions, those noting improvement in education of children and housing conditions were particularly common (60%). Upon determining the overall level of satisfaction about these effects after implementation of the Project, 65% responded with “satisfied” and 23% with “reasonably satisfied”, indicating a certain level of satisfaction has been achieved.

Other than the direct benefit from agricultural production, positive opinions about benefit of irrigation facilities were confirmed in the beneficiary interview, such as convenience of transportation due to access roads constructed by the Project and usage of the irrigation canal water for domestic purposes.

From the above results, the improvement of agricultural production has clearly brought about improvement in the income and living environment of the beneficiaries. The situation has been greatly improved since the ex-post evaluation, and the impact initially expected is coming into effect. These impacts will be reinforced with optimum usage of the irrigation facilities through developing on-farm infrastructures and technical assistance.

2.2 Sustainability

2.2.1 Operation and Maintenance

2.2.1.1 Structural aspect of Operation and Maintenance

There has been no great change concerning the fundamental roles and structure of operation and maintenance since the ex-post evaluation. The Department of Water Resources administers dams, the main canal, and also distributary branch canals until establishment of irrigation associations, and the irrigation associations administer the tertiary canals. After establishment of irrigation associations, the operation and maintenance of secondary canals downwards are transferred to the association. However, in practice there found cases which transfer of operation and maintenance duties to the associations has not been completed and the Department of Water Resources still conduct operation and maintenance works.

1) Department of Water Resources (UKIP Office)

No great changes in organisation and functions since the ex-post evaluation are confirmed. Currently the Department of Water Resources includes 145 full-time staff members and a total of 679 when temporary workers are counted. UKIP office commented that the current structure and scale of the office is adequate to maintain the service standard.

2) Irrigation Associations

Definite improvement has been seen in registration and transfer of authority to irrigation associations, which was raised as a recommendation in the ex-post evaluation. The current status of registration is as follows. Within the total of 97 in the Project area, transfer of authority has been completed for 35 and registration has been completed for 56, meaning registration has been completed for approximately 90% in total. However, even for the case that the authority has been transferred to associations, it was pointed out that the Department of Water Resource occasionally conducts operation and maintenance of secondary canals due to lack of actual activities by the associations..

Table 13 Formation of Irrigation Associations in the UKIP Jurisdiction

	2006	2007	2008	2009
Authority Transfer Complete	6	6	27	**35**
Registration Complete	19	55	57	**56**
Registration in Progress	36	36	13	**6**
Unregistered	36	0	0	**0**
Total	97	97	97	**97**

(Source) Department of Water Resources, Government of Orissa

As a measure for activation of irrigation associations, officials from the Department of

Water Resources periodically visit and hold meetings to motivate farmers to join associations' activities. According to the Department of Water Resources, definite improvement in farmer awareness has been seen compared to the time of the ex-post evaluation. One possible reason could be that agricultural production is developing favourably and the benefit of the irrigation facilities is materializing in a visible form. However, some people still believe that the Department of Water Resources should be responsible for maintenance and operations of the irrigation facilities. Thus, irrigation associations will probably require more time until their activities become stable.

2.2.1.2 Technical aspects of Operation and Maintenance

1) Department of Water Resources (UKIP Office)

Currently the Department of Water Resources can manage by themselves since the technical level required for the basic operation and maintenance works such as canal cleaning and repairing works is not particularly high. In addition, the Department, under collaboration with WALMI and other organisations, carry out technical assistance and development of production environment necessary for optimisation of the irrigation facilities. The awareness-raising of local farmers depending on traditional methods is rather difficult and accumulation of good practices will be necessary.

2) Irrigation Associations

The irrigation associations basically have responsibility for operation and maintenance of secondary canals and below. These works is not especially difficult in terms of technical level, and periodical visits are carried out by UKIP staff. Therefore it is fair to say no particular problem exists.

However, there are now few cases where the irrigation associations systematically engage in operation and maintenance activities. In practice, individual beneficiaries are voluntarily cleaning canal at the points connected to their own agricultural land.

2.2.1.3 Financial aspects of Operation and Maintenance

1) Department of Water Resources (UKIP Office)

Costs of operation and maintenance in the UKIP office for the past three years are as follows. It marks increase of 1.5 times from the time of the ex-post evaluation, even taking into account inflation. Just over 60% of this constitutes labour costs and ordinary expenses for the operation and management department, with the rest appropriated for physical works of operation and maintenance.

Table 14 UKIP Office Annual Budget and Expenditures

(Unit: million rupees)

	Before Ex-Post Evaluation				
	2001	2002	2006-07	2007-08	2008-09
Budget	15.3	13.7	17.93	17.49	32.04
Expenditures	9.7	9.7	16.14	16.46	27.10

(Source) Department of Water Resources, Government of Orissa

The UKIP office pointed out a problem of delays in budget contributions from the state government along with budget deficiency. For this reason, actual expenditure is less than the initial budget. The current operation and maintenance budget per hectare is approximately 520 rupees. Although it improved from the 450 rupees at the time of the ex-post evaluation, approximately 800 rupees is estimated as necessary for appropriate operation and maintenance. There is a request-based budget in addition to the annual budget for cases such as emergency support required for damage to the canals etc. However, UKIP office insists that the current budget is insufficient and the necessity of proper allocation and execution of the budget.

Furthermore, the ex-post evaluation reported that funds from the Indian government and the sale of water for private sector may be available to compensate the insufficiency of the budget. However, neither of these initiatives has materialised so far.

2) Irrigation Associations

No changes were confirmed in terms of payment structure for operation and maintenance costs from the time of the ex-post evaluation. The irrigation associations receive an annual maximum of 100 rupees/ha from the Department of Water Resources as operation and maintenance expenses, which forms the main resource for the irrigation associations.[6] The collection rate of irrigation expenses for the last few years is fluctuating around 50% as shown in the table below, falling from a mid-60% at the time of the ex-post evaluation. The following reasons are considered.

1. Weak link between collection of the irrigation fees and the actual operation and maintenance budget

[6] However, it is necessary to maintain at least 75% participation in order to receive this operation and maintenance expense, which is forfeit if participation falls below this level. The irrigation expense borne by the farmer does not directly become the revenue of the Department of Water Resources as it is paid directly to the state government through the State Department of Revenue.

(At the time of the ex-post evaluation, collected irrigation fees were sent to the state Department of Revenue. The structure which the paid fees are not directly used as revenue for the Department and beneficiaries is maintained.

2. The beneficiaries believe that the irrigation facilities are provided by the state and perception of burden/cost sharing has not yet spread among them.
3. There are variations in operation and maintenance conditions in accordance with the increase in the number of irrigation associations (38→97)

Table 15 Collection of Irrigation Costs

(Unit: million rupees)

	1997	1998	1999	2006	2007	2008
Appraisal Amount	1.35	5.14	6.31	7.4	7.57	7.54
Collected Amount	0.91	2.94	4.16	3.4	4.23	4.14
Collection Rate	67%	57%	66%	46%	56%	55%

(Source) Department of Water Resources, Government of Orissa

The Department of Water Resources seeks farmers' understanding concerning the collection of irrigation fees thruogh the staff guidance visits. However, it is not realistic to expect that the collection rate will improve in the short term since reasonable amount of time is required to change the farmers' perception that operation and maintenance of the irrigation facilities is responsibility of the government.

2.2.2 Current status of Operation and Maintenance

The present conditions of the main canals and the main sections of secondary canals are as follows. At present there are no serious problems which may damage the core functionality of irrigation facilities. However, conditions will possibly deteriorate hereafter if small damages are neglected.

Table 16 Status of Principal Irrigation Facilities

Target	Status	Operation and Maintenance Authority	Details
Main Canal	Sections damaged	Department of Water Resources, Government of Orissa	50-80cm silt could be seen. In addition, damage cased by rain in parts of embankment could be seen.

Secondary canal	Sections damaged	Irrigation Associations. However there are many cases where the Department of Water Resources, Government of Orissa is actually managing	As above
Tail-Ends of Canals	Problems	Irrigation Associations	There is silt and progression of embankment damage in many of the canals. Maintenance is necessary

Fig. 6 Damaged Canal

Fig. 6 Damaged Canal

The Department of Water Resources is currently preparing an action plan for maintenance work of these damaged points to submit the state government. In the discussions with the Department, it was confirmed that the plan have already been partially approved and is at the stage of acquiring budgetary provision. By these efforts, at the very least, problems which may damage the basic functionality of the irrigation facilities are probably not impending.

3. Conclusion, Lessons Learned and Recommendations

3.1 Conclusion

The status of agricultural production generally satisfies the initial plan and shows drastic improvement from the time of the ex-post evaluation. Meanwhile problems such as budget deficiency for repair of the facilities and operation and maintenance, and activation of irrigation associations still remain and need to improve.

3.2 Lessons Learned

It took a certain length of time after completion of the Project until the outcome revealed. As nature of the irrigation project, certain time will be required until the optimal status of utilization realized. This is because it requires education of beneficiaries on irrigation system and associations. Had the support for these soft approach been incorporated into the Project scope from the original plan, the outcome of the Project might have been achieved earlier.

3.3 Recommendations for the Executing Agency

1) Concerning the physical damages of the irrigation facilities, financial support from the state government is planned. However, the maintenance budget may be delayed or insufficient. Adjustments at the state government may be necessary to avoid delay or deficiency in budget distribution.

2) The promotion of dry field farming is one possible option to improve the allocation rate of irrigation water. Upon promoting diversification hereafter, it will be necessary to change the mindset of farmers who rely on traditional rice crops. Long-term initiatives will probably be necessary, such as the development of pilot farms by WALMI and raising awareness through increasing successful precedents.

3) Current system of budget allocation, which guarantees stable supply of budget, is presumably appropriate considering the various operational status of irrigation associations and low collection rate of water charge. However, to promote the transfer of authority to irrigation associations in the future, building a system that irrigation associations directly collect and manage irrigation fees for their operation and maintenance activities can be one option to enhance their ownership.

4) Although there is no water shortage now, it may be necessary to adopt a mechanism to

strengthen coordination between the Department of Water Resources and the state electric power corporation as a crisis management measure for risk of future water shortage.

Item	Planned	Actual
① Output		
1. Engineering Works		
(1) Irrigation Land Area	21,000 ha	15,208 ha
(Jeypore main canal)	(14 km point - 41.78 km point)	(as planned)
(2) Secondary Canal	RD 28.08 km point	As planned
	RD 33.75 km point	As planned
	RD 35.50 km point	As planned
	RD 41.78 km point	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		April 1989-June 1998
1) Main Canal and Secondary Canal	April 1989-March 1993	
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
③ Project Cost		
Foreign Currency	795 million yen	unknown
Local Currency	6.742 billion	unknown
	(688 million rupees)	(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