Ex-Post Project Evaluation 2011: Package II-6

(Vietnam, Sri Lanka, Indonesia)

November 2012

JAPAN INTERNATIONAL COOPERATION AGENCY

SHINKO Overseas Management Consulting, Inc.

Ernst & Young Sustainability Co., Ltd.

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Preface

Ex-post evaluation of ODA projects has been in place since 1975 and since then the coverage of evaluation has expanded. Japan's ODA charter revised in 2003 shows Japan's commitment to ODA evaluation, clearly stating under the section "Enhancement of Evaluation" that in order to measure, analyze and objectively evaluate the outcome of ODA, third-party evaluations conducted by experts will be enhanced.

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2009, and Technical Cooperation projects and Grant Aid projects, most of which project cost exceeds 1 billion JPY, that were mainly completed in fiscal year 2008. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

The lessons and recommendations drawn from these evaluations will be shared with JICA's stakeholders in order to improve the quality of ODA projects.

Lastly, deep appreciation is given to those who have cooperated and supported the creation of this volume of evaluations.

November 2012

Masato Watanabe
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

This volume of evaluations, the English translation of the original Japanese version, shows the result of objective ex-post evaluations made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA. JICA is not responsible for the accuracy of English translation, and the Japanese version shall prevail in the event of any inconsistency with the English version.

Minor amendments may be made when the contents of this volume is posted on JICA's website.

JICA's comments may be added at the end of each report when the views held by the operations departments do not match those of the external evaluator.

Viet Nam

Ex-Post Evaluation of Japanese ODA Loan

"Small-Scale Pro Poor Infrastructure Development Project"

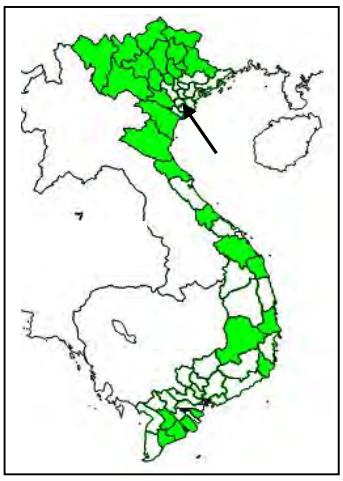
External Evaluator: Masahiro Oseko, Nevka Co., Ltd.

0. Summary

This project has been implemented in 4 sectors, namely roads, electricity, water supply and irrigation, aimed at reducing rural poverty through the improvement of the local economy and the standard of living by constructing 141 small scale infrastructures in 106 districts in 28 provinces in Vietnam. Relevance of the project was high since the project plan was consistent with the Vietnamese national development policies, local development needs and Japanese aid policies. While some issues were still expected to be addressed in the water supply sector, Effectiveness and Impact were evaluated high due to the achievement of poverty reduction through the improvement of access to social services and the strengthening of livelihoods in rural areas. Efficiency of the project was judged as fair because of the schedule overruns in the road sector and water supply sector. Regarding the maintenance and operation of facilities constructed by the project, there were some concerns in the financial aspect of the operation and maintenance management conditions in the road sector, and the technical aspect and financial aspect in water supply sector. Therefore, sustainability of the project was judged as fair.

In light of the above, the project is evaluated to be satisfactory.

1. Project Description



Project Locations (28 provinces out of 63 provinces /municipalities)

A bridge constructed by the project in Phu Tho province (Small boat was the only means of transportation before the project.)

1.1 Background

Vietnam has an area of 329,241km^2 which is about 90% of the area of Japan and a population of 87

million[1]. The country has accelerated efforts toward a market economy and realised remarkable economic growth since introduction of the "Doi Moi" policy in 1986. Meanwhile, the economic disparity between urban and rural areas has widened. While the poverty rate[2] in urban areas has greatly decreased from 25% in 1993 to only 9% in 1998, in rural areas, where about 80% of the entire population lives, remains at 45%, decreased from 66%. Since the majority of poor families are in remote and/or mountainous areas, it has been necessary to increase and stabilize their income through agricultural development and to improve infrastructures for better living conditions. With these conditions in mind, JICA aimed at the improvement of road, electricity, water supply and irrigation infrastructure through the Rehabilitation Loan Program first phase (1997) and second phase (1995), the Rural Infrastructure Development and Living Standard Improvement Project first phase (1996), second phase (1997) and third phase (1999). Collectively these projects comprise the first phase of Small Scale Pro-Poor Infrastructure Development Project with the same objectives of infrastructure development in rural poor areas. The succeeding projects of the second phase (2006) and the third phase (2009) are currently in operation.

1.2 Project Outline

The objective of this project is to improve the socio-economic living conditions of local people through the construction and rehabilitation of small scale pro-poor infrastructure (road, electricity, water supply and irrigation) in rural areas selected based on the criteria of poverty rate and Human Development Index (HDI), thereby contributing to poverty alleviation in Vietnam.

Loan Approved Amount / Disbursed Amount	10,562 million yen / 9,934 million yen
Exchange of Notes Date / Loan Agreement Signing Date	March, 2003 / March, 2003
Terms and Conditions	Interest Rate: 1.8% (road, electricity, irrigation) Interest Rate: 0.75% (water supply) Repayment Period: 30 years (road, electricity, irrigation) Repayment Period: 40 years (water supply) (Grace Period: 10 years) Conditions for Procurement: General untied
Borrower / Executing Agency	Government of Viet Nam / Ministry of Planning and Investment (MPI)
Final Disbursement Date	July, 2009

[1] As of December 2010, Population at the time of project appraisal (2003) was 80 million. (Source: General Statistics Office of Vietnam (http://www.gso.gov.vn))

[2] Poverty rate in Vietnam discussed in this report is the one defined by the General Statistics Office of Vietnam and the World Bank. Poverty line is defined by the VND amount necessary for purchasing food of 2,100 kcal per capita per day (dietary poverty line) plus living cost which is 2/3 of dietary poverty line. Poverty line applied for the period of 2006-2010 provided VND 260,000 in urban area and VND 200,000 in rural area per capita per month. (Source: General Statistics Office of Vietnam (http://www.gso.gov.vn))

Main Contractor (Over 1 billion yen)	N/A
Main Consultant (Over 100 million yen)	Pacific Consultants International (Japan) / Asia Pacific Engineering Consultants (Vietnam) / Ernst & Young Vietnam (Vietnam)
Feasibility Studies, etc.	"Special Assistance for Project Formation (SAPROF)" March - August, 2002
Related Projects (if any)	"Rehabilitation Loan Program (I), (II)" "Rural Infrastructure Development and Living Standard Improvement Project (I), (II), (III)" "Small Scale Pro-Poor Infrastructure Development Project (II), (III)"

2. Outline of the Evaluation Study

2.1 External Evaluator

Masahiro Oseko, Nevka Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: September, 2011 - September, 2012

Duration of the Field Study: March 25 - April 8, June 3 - June 10, 2012

2.3 Constraints during the Evaluation Study

1) Coverage of the project was the entire area of Vietnam, and after selecting poor areas specifically based on the criteria, sub-projects have been implemented in 106 districts[3] in 28 provinces out of the total of 58 provinces and 5 municipalities. Since it was practically impossible to conduct site surveys for all of the sub-projects due to the constraints of time and resources, the evaluation team has carried out field surveys in 5 provinces, namely Thai Nguyen, Phu Tho, Thanh Hoa, Nghe An and Ha Tinh, and a beneficiary survey in 1 province, Phu Tho. Questionnaires have been conducted by MPI on the central government level, by the DPIs[4] of 28 provinces on the provincial level, and by all of the operation and maintenance organizations on the sub-project level.
2) Operation and effect indicators were not established and no quantitative data have been collected for measuring the development effects realized by the project. Therefore, the evaluator has tentatively selected operation and effect indicators after discussion with the MPI and has collected data for them through the questionnaires on all DPIs and operation and maintenance organizations in 28 provinces.

3. Results of the Evaluation (Overall Rating: B[5])

3.1 Relevance (Rating: ③[6])

[3] Vietnamese local administration is structured with the levels of Province, District and Commune.
[4] DPI: Department of Planning and Investment
[5] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

3.1.1 Relevance with the Development Plan of Vietnam

The Vietnamese national development plans at the time of the project appraisal, Socio-Economic Development Strategies 2001-2010 and Five-year Socio-Economic Development Plan 2001-2005, have set out the rectification of regional disparities and poverty alleviation as their basic policies, and have laid out specific goals on high priority issues such as poverty reduction, employment creation, clean water supply, etc. Current national development ten-year strategies (2011-2020) and five-year plans (2011-2015) place economic globalization, international competitiveness and large-scale infrastructure development in front with the background of rapid economic growth and joining the group of middle income developing nations. Because of this, the emphasis on poverty reduction has been toned-down compared with former strategies and plans. Instead, the poverty alleviation, reduction of economic gaps and rural infrastructure development are treated as the basis of socio-cultural development which supports the national economic growth. Meanwhile, "Program 135," promoting infrastructure development for poverty reduction and living standard improvement in remote and mountainous areas has accomplished its first (1998-2005) and second (2006-2010) phases, and the third phase (2011-2015) is currently in progress. As such, from the time of the appraisal to the ex-post evaluation of the project, the Government of Vietnam has consistently placed high priority on infrastructure development in rural areas for the sake of poverty alleviation. Therefore, the purpose of the project, aiming at the reduction of rural poverty through the improvement of small-scale infrastructure, is in line with the direction of the national development policy of Vietnam.

3.1.2 Relevance with the Development Needs of Vietnam

The poverty rate in Vietnam at the time of project appraisal was as stated above in "1.1 Background." The major cause of rural poverty was the restricted production activities due to the limited access to social resources such as education, information, technology, medical care, etc., which resulted from the mountainous and remote geographical factors. Therefore, it was indispensable to develop basic infrastructure in accordance with local realities. Thus, the urgent necessity of the project was high. The poverty rate at the time of the ex-post evaluation[7] is 14% on the national average, 7% in urban and 17% in rural areas. According to the "Programme Document of Program 135 (2010)", the ratios of income of the richest 20% to the poorest 20% is 5 times and 11 times in Northern Mountainous provinces and Central Highlands provinces, respectively. In 2000, at the time of the project appraisal, these ratios were 7 times and 13 times respectively. While the situation has been improved, the economic gap is still big. Limited access to social resources due to insufficient infrastructure remains the major cause of rural poverty, and therefore the development needs of infrastructure in the four sectors targeted by the project are still high at the time of the ex-post evaluation.

Selection of districts was done by the criteria of HDI (Human Development Index) and poverty rate,

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[6] ③: High, ②: Fair, ①: Low

[7] As of December 2010. (Source: General Statistics Office of Vietnam (http://www.gso.gov.vn))

firstly selecting poor provinces and secondly selecting poor districts out of those provinces[8]. According to the project appraisal document (2003), most of the districts selected were located in mountainous or highland areas, and agricultural activities were restricted due to geographical reasons and were vulnerable to natural calamity. Thus the needs for basic infrastructure development were particularly high in all of those areas.

3.1.3 Relevance with Japan's ODA Policy

"Medium-Term Strategy for Overseas Economic Cooperation Operations (2002-2005)" by the Ministry of Foreign Affairs of Japan at the time of project appraisal placed priority, for Vietnam in particular, on the rectification of regional disparities and the improvement of living conditions in rural areas through the development of basic infrastructure, supporting the poverty alleviation policy of the Government of Vietnam. The project, therefore, was aligned with the Japan's ODA policy.

As described above, this project has been highly relevant with the country's development plan, development needs, as well as Japan's ODA policy; therefore its relevance is high.

3.2 Effectiveness[9] (Rating: ③)

3.2.1 Quantitative Effects

3.2.1.1 Operation and Effect Indicators

A total of 141 sub-projects have been implemented in four sectors across 106 districts in 28 provinces out of 63 provinces and municipalities in Vietnam. 59 roads and bridges have been built in the road sector, 31 distribution lines and transformers have been installed in the electric sector, 24 water treatment plants and supply pipes have been constructed in the water supply sector, and 27 irrigation canals, dams and sluice gates have been built in the irrigation sector. The evaluation team has collected operational data and effectiveness indicators through the literature survey on JICA's internal document (2011[10]), reports prepared by the consultants of this project, interviews at sites, and questionnaires to the provincial governments in charge (DPI: Department of Planning and Investment). Only a few data were available, which enable the comparison of situations before-the-project and after-the-project, because the pre-project information were rarely answered in Questionnaires to DPIs.

(1) Roads

Among the 59 road sub-projects, before the project (2002) and after the project (2010), data on traffic volume was obtained from 17 sub-projects. Regarding the annual average daily traffic

[8] Selection criteria for province were (1) HDI was middle or low level, (2) under the coverage of Program 135, (3) poverty rate was over 20% and (4) no similar projects were implemented by the World Bank and/or ADB. Selection criteria for District were (1) poverty rate was over 20% or (2) poverty rate was in the range of 10% to 20% and under the coverage of Program 135.

[9] Sub-rating for Effectiveness is to be put with consideration of Impact.

[10] 2010 survey report on the current status of all sub-projects implemented under the Small-Scale Pro Poor Infrastructure Development Project (Phase I (this project) and Phase II) and the Regional Development & Living Environment Improvement Project (Phase I to III).

volume[11], all 17 cases showed an increase in traffic volume with 8 sub-projects experiencing double the volume, 4 sub-projects with 3 times the volume, and others, ranging from 10 to 60 times the previous volume. Among 25 sub-projects from which data on travel times to key facilities was obtained, there were 11 cases of shortened travel times to medical facilities, 9 cases to markets and 8 cases to schools. Each of these sub-projects resulted in a shortening of about 30 to 90 minutes in travel time.

(2) Electricity

Among 31 electric sub-projects, before the project (2001) and after the project (2010), data on household electrification ratio was obtained from 20 of them. The average electrification ratio of these 20 sub-projects was 75% in 2002 and 92% in 2010. Comparing the values in 2002 and 2010, the electrification rate dropped in 3 out of 20 cases while 7 cases remained unchanged, 6 cases increased by between 1 and 2 times and 4 cases increased by more than double. The reason for the drop in the ratio was due to the increase in the number of households where the electricity was supplied. In many rural communities, electricity distribution lines come to central part of villages without covering periphery of them. When new entrant households settle in those peripheral areas, the number of non-electrified household increases accordingly and the electrification rate of the community drops. For those where electrification rate remained unchanged, they were mainly in areas where the electrification rate had already reached to 100% in 2002 and the project existing old facilities have been done by the project. Although there has been no change in the household electrification rate in these areas, the electrical supply now has become more stable due to the rehabilitation.

(3) Water Supply

Among 24 water supply sub-projects, the data from before the project (2002) were obtained for 3 of them and the data of after the project (2010) were obtained for 17 of them. For the former 3 sub-projects, the water supply rate[12] before and after the projects were also available, which increased by 1.3 times, 1.8 times and 2.1 times, respectively. The operation and effectiveness indicators of the latter 17 sub-projects are shown in Table 1.

Table 1 Operation and Effect Indicators of Water Supply

	Minimum	Maximum	Average	Total
Facility utilization rate[13] (%)	8%	113%	41%	－
Water supply rate (%)	17%	95%	51%	－
Water supplied population	601	21,429	5,668	96,400
Daily water supply per person (ℓ)	57 ℓ	962 ℓ	206 ℓ	－

Source: Questionnaire on the DPIs, JICA's internal document (2011)

[3] Annual average daily traffic volume is calculated based on passenger car units (PCU)
[12] Water Supply Ratio (%) = Actual number of people supplied with water / Supply target population x 100
[13] Facility utilization rate (%) = average daily water supply (m^3/day) / water supply capacity (m^3/day) x 100

Among the other 17 sub-projects, 8 facilities had a facility utilization rate of less than 30% and 6 facilities had a water supply rate of less than 30%. The main reason behind the low facility utilization rate and water supply rate was that target areas of the project were located in poor regions where households found it a heavy financial burden to pay for water connection and usage fees[14]. According to the on-site surveys and interviews with beneficiaries, in regions where there were alternative water sources such as wells, rivers and collected rainfall, there was little motivation in paying for tap water. Although it is supposed to be necessary to conduct a residents' water needs survey and a survey of availability and quality of alternative water sources in the feasibility studies, such studies were not carried out. While in some provinces, the water connection costs were included in the project cost and exempted the residents from paying them, most provinces did not make such an arrangement, and it has resulted in low facility utilization and water supply rates.

(4) Irrigation

The impact of the 27 irrigation sub projects, according to JICA's internal document, is shown in Table 2. It was reported that the number of beneficiary farmers of the project was 269,000 and the increase of the agricultural production was 68,500 tons per year.

Table 2 Operation and Effect Indicators of Irrigation

Year	2003	2008	Increase
Irrigated area (ha)	12,806 ha	17,394 ha	4,588 ha
Planted area (ha/year)	18,348 ha/year	26,908 ha/year	8,560 ha/year
Yield of rice（ton/ha）	3.57 ton/ha	4.98 ton/ha	1.41 ton/ha

Source: JICA's internal document (2008)

Regarding the 7 cases where data have been obtained from the questionnaires to DPI before the project (2002) and after the project (2010), the irrigated area has increased by 1.6 times on average while the irrigation ratio[15] has increased by 1.7 times on average.

3.2.2 Qualitative Effects

To measure the qualitative effects resulting from the project, the evaluation team conducted a beneficiary survey of 152 farmers living in the vicinity of and using these facilities in Phu Tho province. Direct interviews using questionnaires were carried out in geographically and temporally feasible areas. The verified qualitative effects of the project by sector are as follows:

(1) Road

The beneficiary survey for the road sector covered 37 users of the No.312 provincial road in the mountain range in Tam Nong District. 84% of the users replied that their travel time to their work places, such as agricultural fields, has been shortened. Their travel time was shortened by 40 minutes

[14] Water connection fees (cost for connection piping and water meters) are in principle borne by the users in Vietnam.
[15] Irrigation Ratio = Irrigated Area / Gross Planted Area

on average, ranging from 20 minutes to 120 minutes. All respondents also indicated that their travel time to markets, schools and hospitals has been shortened by 30 to 150 minutes and 50 minutes on average.

(2) Electricity

The beneficiary survey for the electricity sector covered 38 electricity users of the 18.6km long distribution line sub-project in Cam Khe District. This was a new construction and this area did not have any electricity before the project. About the frequency of power outages, the majority of replies indicated they occurred 1-2 times a month followed by those who said 1-2 times a week, with a proportion of 50% and 11% respectively. The average duration for each power outage was 1-2 hours. In terms of supply voltage, 29% replied that it was unstable, which can be interpreted as that about one-third of the users expressed dissatisfaction with the voltage stability[16]. According to Electricity of Vietnam (EVN), which is the agency in charge of the operation and maintenance of facilities, the main reason for the voltage fluctuation is due to the aging power generation stations and not caused by the distribution lines and transformers that are within the scope of this project[17].

(3) Water Supply

For the water supply sector, the survey covered 40 households in the area where the service was provided by the newly constructed water treatment plant in Cam Khe District. 23 households (58%) among these 40 households have not received water supply service due to the difficulty in paying for the connection piping cost. These households without water supply rely mainly on well and rain water for their daily living needs. All of 17 households who receive water supply services replied that water is available throughout the year. Water outage happens 1 to 2 times a week for about half a day each time due to the water supply pump shutting off because of power outages. Regarding the water quality, 9 out of the 17 households replied that the water has a chlorine odour.

(4) Irrigation

For the irrigation sector, the beneficiary survey was conducted covering 37 farmers' households using the irrigation facilities in the Tam Nong District. While only 4 households or 12% of the households have expanded their cultivated area, all of the 37 households replied that the water volume has increased in both the dry and wet seasons. The main crop grown in the surveyed area is rice. Because of the increase in water

Irrigation canal constructed by the project and grown rice

[16] Fluctuation of luminosity of electric light and unstable power of electric water pump were reported in the beneficiary survey.

[17] According to EVN, as a counter measure against voltage fluctuation, EVN selects appropriate diameters of distribution lines for new facilities and replaces old distribution lines and transformers for existing facilities.

volume, all households have increased their number of rice harvests. 29 households (78%) reported that the number of harvests has increased from one to two times a year, while 3 households reported increasing their harvest from 1 to 3 times a year, and another 3 households from 2 to 3 times a year each. Yield has also increased for all households with the increase ranging from 20% to 100% and averaging of 55%. All households also replied that the quality of their crops have improved as a result of the increase in water volume. Many farming households have also diversified their crops with 59% of them having introduced new crops such as maize, cassava, peanuts etc. and 51% having introduced high-yield rice varieties.

3.3 Impact

3.3.1 Intended Impacts

In order to assess the cross-sectorial impact of the project on poverty reduction, the evaluation team has collected micro-data at the district level such as poverty rate and gross regional domestic products (GRDP). However, due to the low reliability of the data, coupled with the difficulty of verification of correlation of the micro-data with the small-scale infrastructure construction and rehabilitation undertaken by the project, the team has decided to assess the impact of the project sector-wise using beneficiary surveys and literature surveys.

(1) Road

The beneficiary survey has found that 65% of road users replied that crop selling opportunities at the market have increased and 81% replied having increased employment opportunities in the non-agricultural sector due to the shortened travel time and expanded mobility range resulting from the road improvements. In addition, various cost-saving effects were also reported, for example, savings of transport expenses such as bus fares (84%), lower maintenance costs for motor bikes and bicycles due to the improved road conditions (51%), lower fuel expenses due to shortened travel time (46%). Other positive impacts are such as the rising of land prices (95%), opening of new shops along roads (59%), population increase (46%), and increase in store customers (27%).

As negative impacts, noise and dust (3% each) due to passing vehicles were pointed out. While some documents[18] have reported an increase in traffic accidents due to the increase in traffic volume, it could not be verified through the beneficiary surveys and interviews in this ex-post evaluation. On the contrary, many voices pointed that road accidents have decreased because of the improvement of road conditions. According to MPI, under the provincial and district budgets, counter measures have been taken against traffic accidents constructing traffic signs, traffic lights, guardrails, concrete guard posts etc., however the number and the effects of these have remained limited due to the insufficient funds.

As stated above, a variety of positive impacts have been verified, such as regional development resulting from the population inflow, cost reduction due to shortened travel time, and increased

[18] JICA internal documents (2008) (20011) etc.

economic activities from the expansion of people's mobility. The increase of traffic accidents has been reported in some reports as a negative impact; mitigating measures have been taken by the local governments to the extent possible.

(2) Electricity

According to the beneficiary survey towards 38 households in Cam Khe District, 84% of households surveyed have purchased new electrical appliances such as electric lights, fans and TVs after getting stable electricity by the project. As shown in Figure 1, a wide variety of household electrical appliances are used at home.

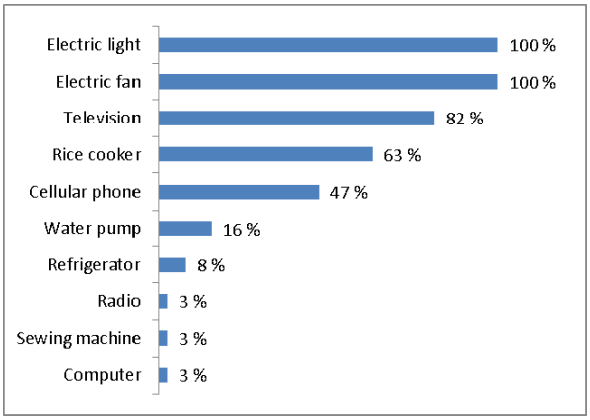


Figure 1: Electric appliances used in a village (multiple answers)

Based on the survey, using these electrical appliances, positive impacts such as shortened time for farming and household works (53%), improvement in working efficiency (39%), increase of access to technical information on farming (37%) etc. have been reported. Furthermore, a majority of the respondents (61%) also cited increase in household income as a result of these positive impacts. The survey has also found other positive impacts such as better sleep at night using electronic fans (100%), access to health and nutrition information through the radio and TV (26%) and improved learning environment for children using electric lighting (89%).

Distribution lines and transformer installed by the project

Additionally, the on-site survey also found that some small-scale businesses relying on electric power have been started such as machine repair shops, photocopy services and sewing.

Improvements of living conditions such as health improvement, promotion of agricultural and commercial productivities resulting from the availability of electric power have thus been verified as stated above. No negative impacts have been identified through literature survey[19], questionnaires and site surveys.

(3) Water Supply

According to the beneficiary survey, the availability of tap water has freed the local people from

[19] Project Completion Report by MPI and JICA's internal documents (2006, 2008, and 2011).

the labour of water drawing from wells and rivers, resulting in the shortening of time for housekeeping chores by 30 minutes to an hour (88%). In families which relied on water pumps to draw water, fuel cost savings have been realized (12%). In addition, reductions in waterborne diseases such as diarrhoea and other skin and eye diseases have also been reported (24%). The site survey also found that some farmers' household income has increased from starting crop processing businesses such as producing cassava powder. While there were a number of respondents voicing discontent over the chorine smell of supplied water (53%), users of the water services including those who complained were largely satisfied with the services provided (94%). Again, negative impacts have not been identified through literature survey[20], questionnaires and site surveys.

(4) Irrigation

According to the beneficiary survey, 95% of survey respondents replied that time required for water drawing labour has been shortened by the improvement of irrigation facilities. Before the project, people had to draw water from the nearby rivers using buckets, and pails, and that was laborious and time-consuming work. Among those who reported a shortening of time required for water drawing, 74% stated a reduction of more than 180 minutes while another 11% cited a reduction of between 150 and 180 minutes. Huge savings of time for labour can thus be seen. In addition, agricultural income in all households surveyed has been increased due to the effects of improving yield, crop quality and crop diversification. The increase ranges from 20% to 100% with an average of 51%. Increases in income have led to further investment in the purchase of fertilizers (97%) and pesticides (49%). Other positive impacts reported include improvements in mobility within and between villages due to the construction of farm roads as part of the irrigation facilities (41%) and diversification in income sources by rearing fish and raising domestic animals such as pigs and chickens (8%). The on-site survey has also verified the benefits such as reduction in flood and drought damages, improvements in children's school enrolment rate and education continuance rate as a result of reinvestment of agricultural income, and improvements in diet due to the increased volume and variety of foods.

Accordingly, the improvement of irrigation facilities has realized a wide variety of positive impacts on living conditions in communities that are not limited to agricultural activities alone. No negative impacts have been observed.

(5) Collaboration with NGOs

Expecting the synergistic effects through the collaboration with NGO activities, the Vietnamese government has established a NGO Collaboration Fund to support NGO activities on a grant basis in the areas where the project was implemented. A part of the budget for consulting services has been allocated in the fund's capital.

Although the participation of several NGOs were anticipated, only one non-profit organization

[20] Project Completion Report by MPI and JICA's internal documents (2006, 2008, and 2011).

called AMDA, based in Okayama Prefecture, Japan and which focuses mainly on the medical, health and hygiene sectors, has applied to the fund. 400 million Vietnamese dong (2.8 million yen) from the NGO Collaboration Fund was granted to the "Surgery Room Functional Enhancement Project" in the Pac Nam District Hospital in Bac Kam Province, supported by AMDA, and the fund was allocated to the purchase of equipment such as anaesthesia tables, operating tables and non-reflecting lights etc. And under AMDA's own budget, training for local medical practitioners was conducted and a Japanese anaesthetist provided technical guidance for the hospital staff.

This support allowed Pac Nam District Hospital to offer surgery services, and seriously ill patients who had to be referred to a higher-level medical facility three hours away could be treated at the hospital. Furthermore, because the hospital has become able to offer surgery service, national health program campaigns which had not been implemented previously could be carried out as well. 13 patients received surgery at the hospital under a cataract surgery campaign. According to the interview with AMDA, the equipment provided by the NGO Collaboration Fund coupled with AMDA's technical guidance only enabled the hospital to offer such treatment services.

As this was the first time for the Vietnamese government to implement such a system, various adjustments and coordination were needed in order to meet NGO-related regulations and rules. The preparation process took two years after the application to the fund until the commencement of the project. Having received the capital from the fund, under Vietnamese law, JICA was to be designated as the Executing Agency of this project, not AMDA. Due to these issues, the scheme of this collaboration fund had made it difficult for NGOs to take part. Adding to this, although the aim of the fund was to exploit the synergistic effects between NGO activities and the project, no sub-projects other than those in the irrigation sector was implemented in Pac Nam District, and thus synergy could not be clearly seen. If the NGO could be involved from the stage of sub-project selection, a more direct and higher level of synergy could have been realized. The succeeding projects (Small-Scale Pro Poor Infrastructure Development Phase II and III) have not applied this NGO Collaboration Fund system.

3.3.2 Other Impacts

(1) Impacts on the natural environment

As the sub-projects of this project were small-scale infrastructure projects, government approval on Environmental Impact Analysis (EIA) was not required under Vietnamese law.

According to the JICA's internal document (2008), some of the sub-projects in the road and electricity sectors required forests to be cleared during construction. However, these were all limited in scale and together with replanting efforts, the impact on the natural environment has been minimal. Based on interviews conducted at site, upon completion of some of the sub-projects in the road sector, more cases of illegal logging by local residents were reported as a result of improved access to the forests. Nonetheless, through the counter measures such as education and raising awareness among local people, this has not escalated into a major problem. Conversely, the power distribution

sub-projects have brought electricity to households and reduced the amount of consumption of wooden fuel for home use, thereby resulting in less deforestation.

(2) Land Acquisition and Resettlement

According to the results of the interviews and questionnaires to relevant sections in the provincial and district offices and the Executing Agency (MPI), land acquisitions have been carried out in the road and water supply sectors but not resettlement. Although it was not possible to acquire specific figures regarding the number and scale of the land acquisitions, the interview results indicated that these were on a small-scale and smoothly executed under the domestic laws. However, the process and negotiations took a time, thereby causing delays in the sub-projects in the two sectors of road and water supply. The beneficiary surveys and resident interviews did not find any cases of land acquisition and resettlement.

Although issues still remained, such as low facility utilization rate and water supply rate in the water supply sector, sub-projects in the other sectors have achieved development effects as planned. Besides, a certain level of benefits could be seen even in the water supply sector. Accordingly, this project has largely achieved its objectives; therefore, its effectiveness is high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

3.4.1.1 Number and scale of sub-projects

The sub-project selection process of this project is as follows.

1) The Executing Agency (MPI) requests submission of feasibility study reports and a list of sub-project requests from the relevant provincial offices (DPIs).
2) DPIs decide on the priority of the sub-projects through discussions with the relevant institutions based on the 5-year development plan of the province before submitting the list of sub-project requests and feasibility study reports to MPI.
3) MPI reviews the documents submitted by the various provinces and selects the final sub-projects for implementation[21].

The above selection process was started upon the conclusion of ODA loan agreement. As JICA approved the list of final sub-projects selected by MPI, the efficiency of the project in this post-ex evaluation was assessed by comparing the plan of the feasibility studies and actual results.

The number of sub-projects, provinces, and districts at the planning phase (at the time of appraisal),

[21] Three to seven selection criteria are defined for sub-projects in each sector e.g. in the road sector, roads must link up the district capitals and be less than 20km long per road with an annual average traffic volume 150 cars per day while in the water supply sector, the water source must be identified with a designed water flow capacity of at least 1,000 tons per day etc. MPI selects the sub-projects by evaluating the suitability of the projects against these criteria.

feasibility study (F/S) phase, and the actual results (at the time of the ex-post evaluation) is given in Table 3.

Table 3 Original and Actual of Output

Sector	Original (Appraisal data)			Original (F/S data)			Actual		
	Number of Provinces	Number of Districts	Number of SPs	Number of Provinces	Number of Districts	Number of SPs	Number of Provinces	Number of Districts	Number of SPs
Road	21	44	36	28	55	59	28	55	59
Electricity	15	32	34	15	30	31	15	30	31
Water Supply	16	24	24	17	24	24	17	24	24
Irrigation	14	27	26	14	27	27	14	27	27
Total	23	91	120	28	106	141	28	106	141

Source: Appraisal document, JICA's internal document (2009), Questionnaire for MPI

SP: Sub-project

Note: Total is not the footing of the table because more than one sub-project have been implemented in a province and a district.

The plan of the feasibility study and actual of the output in each sector is as follows.

Table 4 Original and Actual of Output

Sector		Original (F/S data)	Actual	Actual / Original		
				Overall	Minimum	Maximum
Road		844.766 km	809.398 km	96 %	30 %	103 %
Electricity	MVL	352.118 km	360.175 km	102 %	9 %	354 %
	LVL	762.265 km	773.278 km	101 %	54 %	418 %
	Total Capacity	19,347 kVA	19,060 kVA	99 %	41 %	121 %
Water Supply		48,777 m^3/day	48,698 m^3/day	100 %	55 %	120 %
Irrigation		27,442 ha	27,410 ha	100 %	88 %	100 %

Source: JICA's internal documents (2008, 2009, 2011), Questionnaire for MPI

MVL: medium voltage line

LVL: low voltage distribution line

(1) Variance between the original plans and F/S plans

The variance between the original plan at the time of the appraisal and the plan of feasibility studies was caused by responding to the latest needs at the local level and reflecting surplus budget due to foreign currency transaction gains. According to the interviews with MPI, DPIs and the district offices, this revision has been desirable and appropriate to make the project designs to be more suitable to local conditions and realities. While the consultant's report highlighted the concerns on the reliability of data and recommended improvements in the quality of the F/S, no particular concerns has been expressed on the variance between the original plans and the plans by F/S.

(2) Variance between the F/S and the actual

Comparing the plans of F/S and the actual, the actual number of sub-projects, provinces, and districts was as planned by F/S. The outputs by each sector lies within a range of 96% and 102% of plans of F/S and thus the actual outputs were to be almost equal to the planned value. On the sub-project level, a difference of the length of distribution lines of electricity appears to be large with

the variance ranging from 9% to 418%. This was because the ratio or percentage of difference appeared to be big with the small differences since the absolute value of sub-projects were small, for example, the average of mid-voltage lines is 11km and low-voltage lines is 25km. The variance of sub-projects in water supply sector and road sector was also mostly due to the same reason such as a 1km planned road was changed to be 500m. However, in some cases, changes were found to be necessary during the implementation stage because of the improper demand forecast made in the F/S. For example, a 12km road in Nghe An Province had to be shortened to 4km; a water facility in Tra Binh Province had to be reduced in capacity from 1,300m^3/day to 700m^3/day.

As stated above, revised plans by F/S in all of four sectors were as a whole to be suitable to local conditions and realities. In light of the aim of poverty alleviation, these changes could be assessed to be reasonable revisions.

Although deviations could be seen to a certain extent between the plans of F/S and the actual on sub-project levels, as on the sector level, the most of the expected outputs had been realized as planned.

3.4.1.2 Consulting Services

The consulting services planned in the project were as shown below and mostly carried out by consultants as planned.

- Review of F/S and detail designs of potential sub-projects, and the support of biddings and contracts
- Construction supervision, including environmental monitoring and evaluation
- Organizational capability development for project implementation
- Provision of technical guidance to operation and maintenance organizations
- Operation and management of NGO Collaboration Fund

The contract period for the consulting services was originally scheduled from September 2004 to March 2007 (30 months), but was extended to September 2008 (48 months). This was a reasonable extension in response to the delay of construction period.

3.4.1.3 Quality of F/S

According to the consultant reports and interviews with the consultant, although the quality of the F/S has improved, as experience has been accumulated from the preceding projects, the reliability of the data still remained an issue. In line with the administrative decentralization in Vietnam, the implementation and management of sub-projects has been shifted from provincial governments to district governments[22]. The experience and know-how that have been accumulated at the provincial

[22] For the sub-projects managed by the district government, the F/S is outsourced to a local consultant by the district government. The provincial government then vets the completed F/S report before submitting it to MPI.

level have not necessarily been transferred to district governments. In particular, in the water supply sector, design changes due to the poor quality of the F/S, such as changing the water source after construction work has begun, resulted in delays in construction. Insufficient studies on the availability of alternative water sources and the residents' needs also led to low facility utilization rate and water supply rate. In the road sector, due to the inadequate estimation of future demand arising from increases in population and traffic volume, damages on the road surface resulting from overloading and increased traffic volume could be widely seen. According to the consultant reports and interview results, the consultants had only gotten involved in the work after the sub-projects had been selected. Consequently, they could neither contribute to the selection of sub-projects nor provide sufficient review over the preparation of the F/S reports.

3.4.1.4 MIS: Management Information System

In order to efficiently manage the many sub-projects in many regions, a Management Information System (MIS) to support and strengthen the overall management capability of MPI and DPIs was planned to be introduced as part of the consulting services of this project. Although a survey was carried out by the project consultant in 2005, it was deemed too early for such a system to be introduced due to insufficient infrastructure such as personal computers and communication networks. The study thus ended up producing a concept paper for MIS only. Subsequently, a MIS was installed in the succeeding project of the Small-Scale Pro Poor Infrastructure Development Project (Phase 2) and training has been conducted for officers of MPI, DPIs and district offices. Considering the fact that it was installed in the succeeding project, it could be highly evaluated that such a concept was conceived in this project. However, as far as the interviews and on-site surveys in this ex-post evaluation observed, the MIS does not seem to be actively utilized whether at the central, provincial or district levels. The reason for this could be partly due to the difficult-to-use interface as pointed out by some officers, however, according to the interviews with MPI and DPIs, the lack of recognition of the necessity of a comprehensive and centralized project information management, particularly of the information about operation and effects after the completion of sub-projects, was thought to be a more essential factor.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The actual amount of total project costs was 13,923 million yen, or 103% of the 13,498 million yen initially estimated at the time of project appraisal and thus largely in line with the plan. As F/S data on the sub-project costs of the water supply sector and the consulting service fees could not be obtained, a comparison between the plan of F/S and the actual has not been performed. The planned and actual expenditure of the project is shown in Table 5.

Comparing the plan of project appraisal and the actual, the costs in the road, water and irrigation sectors have exceeded the budgeted amounts. This was due to an increase in the number (for road) and scope (for water supply and irrigation) of sub-projects, on top of design changes in the middle of

construction (for water supply), changes in means of transportation due to poor accessibility to construction sites in remote and mountainous areas.

As stated above, although some of the sub-project costs have exceed the budgeted amount for the individual sector, the overall project cost has been mostly as planned.

Table 5 Original and Actual of Project Cost

(Unit: million yen)

Sector & Items	Original (appraisal data)	Original (F/S data)	Actual		Original / Actual
			Total	Loan portion	
Road	5,816	8,553	8,260	6,314	142 %
Electricity	1,128	1,145	1,082	830	96 %
Water Supply	1,687	—	2,008	1,040	119 %
Irrigation	1,727	1,909	2,264	1,438	131 %
Consulting Service	877	—	309	309	35 %
Others (contingency, etc.)	2,262	—	0	0	—
Total	13,498	—	13,923	9,934	103 %

Source: JICA's internal documents (2008, 2009)

3.4.2.2 Project Period

The planned project period of the project appraisal was from Mar 2003 to Sep 2007 (55 months). The final loan disbursement date was Jul 2009, and the construction completion dates for sub-projects are as shown in Table 6. While the electricity and irrigation sub-projects were mostly completed within the project period, about one-quarter of the sub-projects of road sector exceeded the project period and a few even exceeded it by 150% or more. In the water supply sector, about three-quarters of sub-projects exceeded the project period and the exceeded period was 8.4 months on average.

Table 6 Original and Actual of Project Period

Sector	Number of SP	Number of SP provided project period data	Actual / Original		
			under 100%	over 100% and under 150%	over 150%
Road	59	48	36	8	4
Electricity	31	26	26	0	0
Water Supply	24	24	6	18	0
Irrigation	27	20	20	0	0

Source: JICA internal documents (2008, 2009, 2011), Questionnaire for operation and maintenance organizations
SP: Sub-project

Delays in the road sector were mostly caused by land acquisition issues. Besides this, changes of plan due to inflation-led escalating costs of construction materials, poor access to construction sites and landslides due to bad weather in the mountains could also be cited as reasons for the delays. "Poor access to construction sites" means the difficulties of carrying of construction vehicles and materials to the sited due to the rough roads which connect cities and construction sites in rural areas. JICA internal documents (2006 and 2008) report the 8 cases of poor access to construction sites and 18 cases of land slides, falling rocks and scouring out of 59 sub-projects.

The reasons for the delays in the water supply sector were similar to those in the road sector such

as delays in land acquisition and changes of plan due to rising construction material costs. The complexity of the facilities themselves was also a major contributing factor. These sub-projects of the water supply sector include the laying of water pipes in addition to the construction of the water purification plant. The water purification plant itself is made up various facilities such as the sedimentation basin, intake pump, chemical mixing tank, filter basin, chorine feeding facility and water supply pump among others. The procurement, construction and acceptance validations of these facilities take up a lot of time. Laying distribution and service pipes, land acquisition, and construction approval from other ministries and agencies takes time, too. However, these are ordinary parts and processes of water supply projects and naturally should have been taken into consideration in the project planning.

Construction delays in the road and water sectors have been pointed out in ex-post evaluations of three preceding projects (Rural Infrastructure Development and Living Standard Improvement Project phase I, II and III) but improvements have not been observed.

Other key reasons for exceeding the project period were as follows.

1) After the completion of the F/S until the commencement of construction works, finalization of project details and administrative procedures took one to two years. In the meantime, local conditions have changed and material costs escalated due to inflation, resulting in design changes (road sector and water supply sector).
2) The quality of the F/S was insufficient and design changes were required after construction work had started (water supply sector).

3.4.3 Results of Calculations of Internal Rates of Return (IRR)

Due to the nature of the project and the fact that data needed for quantitative analysis was not available, a quantitative analysis of the internal rate of return was not possible.

As stated above, the overall project costs have been contained within the planned budget, sub-project costs in individual sector have exceeded plans, and that there were delays in the road and water supply sectors. Accordingly, although the project cost was within the plan, the project period was exceeded; therefore efficiency of the project is fair.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

The Executing Agency (MPI) was in charge of the overall project management and coordination while the Departments of Planning and Investment of provinces (DPIs) were responsible for the execution of sub-projects. O&M of the facilities upon completion of the project have been delegated to provincial authorities responsible for that sector or to related private companies. O&M organizations vary depending on the province and sector but they can be broadly categorized as follows:

1) Road

The parties responsible for O&M in road sector are: The Department of Transport (DOT) or the Department of Agriculture and Rural Development (DARD) of the province; the People's Committee of the district, town or village; and companies funded by the regional governments. For community roads and some of the district roads, the people living in the vicinity also check the road surface conditions and provide labor and funds for repair works when necessary.

2) Electricity

Before February 2009, Provincial Power Companies (PPCs) belonging to the Electricity of Vietnam (EVN) were responsible for the O&M of facilities, which came under the direct control of EVN, while the Electricity Cooperatives of communities were responsible for those under the control of provincial governments. After February 2009, all the facilities have been transferred to the management of EVN, and O&M has been outsourced to either PPCs or District Power Supply Cooperatives.

3) Water Supply

O&M of facilities are undertaken by Water Supply Corporations under the supervision of provinces or private water supply companies operated by the People's Committees of districts or towns.

Filter basin in a treatment plant constructed by the project

4) Irrigation

O&M of main facilities (dams, dikes, pumping stations, and main canals) is carried out by either the Department of Agriculture and Rural Development (DARD); the Irrigation Management Company (IMC) supervised by the province and People's Committee of the district, town or village; or a private enterprise funded by the local government. O&M of secondary facilities such as tail canals is undertaken by farmers' organizations.

O&M of all the facilities in the four sectors is performed by local organizations to suit actual operating conditions under the supervision of the provincial government. No organizational problems have been raised in the interviews and various reports.

5) Operation and maintenance by the Executing Agency (MPI)

Under the Decree No.131/2006 in 2006, the Vietnamese government has directed that all ODA projects be centrally managed by the MPI. Responding to this Decree, MPI has issued its own

Guideline No.09/2009/TT-BKH for the Sector Program Loan (SPL)[23] projects, in which the implementation progress and O&M of SPL projects are supposed to be centrally monitored by MPI using the MIS.[24] However, as described in Section 3.4.1.4, the MIS has been hardly used, and the O&M situations of facilities and the beneficiary effects of the project have therefore not being centrally monitored by MPI.

3.5.2 Technical Aspects of Operation and Maintenance

(1) Road

Most of the O&M organizations have their own annual O&M plan and policy. The questionnaires and interviews did not find any technical problems in the execution of these plans. Any technical problems were not observed at the on-site surveys, either. According to the questionnaires, about half of the organizations conduct regular O&M training. It was also found from the interviews that the Vietnamese Ministry of Transport (MOT) created a road management manual in 2003, under the support of the World Bank, in which the frequency and procedures for regular inspections were defined. Although the manual has been distributed to the relevant provincial and district O&M organizations, few of them actually have carried out the regular inspections as described in the manual due to a lack of funds and equipment. As a result, maintenance work is not a preventive maintenance but a corrective maintenance in nature conducting repair works after problems occur.

(2) Electricity

As stated above, O&M is under the responsibility of Provincial Power Companies (PPC) under the EVN group or the District Power Supply Cooperatives. In both cases, EVN directly or indirectly provides technical supervision and guidance. Being the enterprise responsible for the planning, construction and O&M of all power plants, transmission and distribution in the entire area of Vietnam, the technical level of EVN is quite high. Prior to the transfer of all O&M activities to EVN in 2009, problems such as rusting on transformers and power distribution loss have been observed in facilities managed by local governments. These problems have largely been resolved since EVN took over. Although it has been reported in the beneficiary surveys that power outages and voltage fluctuation are common problems, as mentioned in Section 3.2.2 (2), these are caused by the aging of power generation systems; they are not due to the O&M of facilities installed by the project.

(3) Water Supply

While the technical level of Water Supply Corporations under the supervision of Department of Construction (DOC) of the province has been maintained at certain level, the technical competencies

[23] Regional Development and Living Environment Improvement Plan is SPL1 while this project is SPL4. Subsequent projects are being executed as SPL 5 (2006) and SPL 6(2009).

[24] Decree No.131 stipulates MPI acting as the focal point agency to take the leading role in the management of ODA projects from their formulation through evaluation. And Guideline No.09 directs PMUs including MPI to monitor the implementation of projects using MIS while POs (Project Owners) to be responsible for O&M of facilities.

of water supply companies under the management of People's Committee of district or town have some issues to be addressed. In particular, newly-built facilities by the project have employed staff from the towns and villages nearby, and those young employees have little knowledge and experience. As a counter measure, DOC conducts technical training regularly, however, according to interviews, the frequency of the training is about once a year which is not enough to improve the technical level of staff.

Most facilities do not have laboratories to test water quality. While basic checks such as residual chlorine and turbidity are carried out, all other quality tests have to be conducted by either the provincial health centers or the head offices of water supply companies. The reason for not having their own laboratories is that even if one is available, it is difficult to manage them technically and financially. Moreover, it is cheaper to outsource the water quality check to an external specialized authority or the head offices. However, according to the interviews, it takes about one to two weeks for the test results to arrive from health centers.

(4) Irrigation

Concerning the Irrigation Management Corporations (IMCs) and regional government levels, their staff is rich in experience and has high technical skills as they tend to serve for many years in the organizations. Most O&M organizations also have their own annual maintenance plans and retain a certain level of technical skills for their executions. O&M training has been conducted on regular basis, and in addition to those conducted by the provincial government, some training courses are also outsourced to IMCs and vocational schools. Farmers' organizations do not require high level technical skills since they are only engaged in basic daily maintenance work such as cleaning and visual checks.

3.5.3 Financial Aspects of Operation and Maintenance

(1) Road

The annual O&M budget is provided from the Ministry of Transport (MOT) for provincial roads and from the District People's Committees for district and community roads. However, the budget is mostly used for smaller-scale but urgent repairs caused by heavy rains, overloaded vehicles and increased traffic volume, resulting in a shortfall in both the provincial and district budgets. In the questionnaires, all the respondents answered complained about the insufficient budget. As a result, few have the resources to carry out regular inspections as recommended by the MOT manual. When there is a need for major repairs, a supplementary budget is supposed to be provided from the province.

(2) Electricity

O&M for distribution lines and transformers comes under the budget of Provincial Power Companies (PPCs) or District Power Supply Cooperatives, and these budgets are approved by the

regional EVN power companies supervising the PPCs and Cooperatives. According to the interviews, no particular issue regarding the budget has been cited, and major and urgent repair works are supposed to be done by the supplementary budget provided by the regional EVN power companies.

(3) Water Supply

With unaccounted-for water rate staying at a high level of about 20%, coupled with the low facility utilization rate, the water supply facilities have financial issues to be addressed. While water leakage has been cited as a reason for the high unaccounted-for water rate in the interviews, according to the JICA's internal document (2011), issues with the accuracy of the measurements at the supply side and receiving side, such as the accuracy of water meters and measurement errors, have also been pointed out as contributory factors in addition to water leakage. The collection rate of water charges is reported to be almost 100% in the various reports and questionnaires. However, since water charges have been set at a low level[25], few organizations expect to fund their O&M expenses using water revenue alone and the most of them rely on subsidies from the provincial governments.

(4) Irrigation

Under the Decree 115/2008/CP issued in 2008 for further promotion of the agricultural activities, collection of irrigation water fees were abolished and all the O&M expenses for irrigation facilities are currently provided by the subsidy from the central government. According to the questionnaires sand interviews, while the subsidy cannot be said to be generous, it is still able to meet most requirements. Because a stable budget is currently available, longer term O&M plans can be developed and thus the financial and institutional sustainability of O&M organizations has been improving. For emergency and urgent repair works due to natural disasters and other reasons, financial assistance is supposed to be provided by the provincial government.

3.5.4 Current Status of Operation and Maintenance

(1) Road

An asset survey for SPL facilities conducted by JICA in 2010 assessed the current conditions and level of damages of roads constructed by the five of preceding, current and succeeding projects. According to this survey, it has been verified that all of fifty nine (59) roads constructed by the project remain in good conditions with 8 roads ranked A for no damage, 50 roads ranked B for minor damages and one road ranked C with moderate damages. As stated above, periodic inspection is not

[25] Water charges in Vietnam are set by the regional governments but the upper and lower limits are determined by the Ministry of Finance. The average rate is about 3,500dong/m^3 (20 yen /m^3), which covers only about 3/4 of the operation costs. While prohibiting the increases of water charges due to the financial crisis in 2008, the Vietnamese government also directed that water businesses be managed using revenue from water charges (ref: 2008 Working Report on the International Promotion of Water Resources by Ministry of Labour, Health and Welfare). Generally, prices for industrial and commercial use are set at a high level while residential water is stayed at an inexpensive rate. However, there are few industrial and commercial enterprises in rural poor areas, and most of the water supplied is for residential use. Thus the in rural poor areas, it is difficult to manage the business with revenue only derived from water levies.

preventive but corrective maintenance in nature conducting repair works only after problems arise. Nonetheless, the overall maintenance situation is considered satisfactory and no particular visible damage was observed during the on-site survey, either.


District road constructed by the project

Road damages due to the overloaded vehicles have been reported in various reports[26] and the interviews conducted at sites also found the same problems for most of the roads except the small district and community roads. While the enforcement of traffic regulations have been tightened by the police and local governments, this has not been sufficiently effective.

(2) Electricity

The ex-post evaluation of the preceding project reported problems such as inadequate rustproof treatment, inappropriate calibration of KWh meters, and lack of technical support for the installation of leading wires to households. Since O&M has been transferred exclusively to EVN in 2009, there have been improvements in the financial and technical aspects and such problems have not been reported in this project. The on-site survey did not find any problem in particular, either.

(3) Water Supply

Regarding the hardware of facilities, few problems have been reported in particular and neither did the on-site survey reveal any major issue in this matter. However, in addition to the technical and financial problems stated above, there are problems in operations such as the quantity and quality of water. This is mainly due to the insufficient feasibility studies about residents' water needs and the availability of alternative water sources.

(4) Irrigation

According to the interviews, management of irrigation facilities by the province, district, IMCs and private companies are satisfactory in general, while some of the small facilities managed by the Community People's Committees or farmers' organizations have not been well maintained with insufficiently cleaned canals and/or overgrown weeds and bushes. As far as the on-site survey observed, the canals seemed to be cleaned well and the main facilities also look well-maintained. Cooperation with farmers has been maintained well, and coupled with the O&M subsidy from the central government, the facilities are all generally kept in good condition.

[26] JICA internal documents (2008, 2009, 2011)

Accordingly, some problems have been observed in terms of current status of O&M and financial problems in the road sector as well as technical, financial and current status of O&M in the water supply sector, therefore sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project has been implemented in four (4) sectors, namely road, electricity, water supply and irrigation, aiming at reducing rural poverty through the improvement of local economy and the standard of living by constructing a hundred forty one (141) small scale infrastructures in a hundred six (106) districts in twenty eight (28) provinces in Vietnam. Relevance of the project was high since the project plan was consistent with the Vietnamese national development policies, local development needs and Japanese aid policies. While some issues were still expected to be addressed in water supply sector, Effectiveness and Impact were evaluated high due to the achievement of poverty reduction through the improvement of access to social services and the strengthening of livelihoods in rural areas. Efficiency of the project was judged as fair because of the schedule overrun of road sector and water supply sector. Regarding the maintenance and operation of facilities constructed by the project, there were some concerns in financial aspect and operation and maintenance management conditions in road sector, and technical aspect and financial aspect in water supply sector. Therefore, sustainability of the project was judged as fair.

In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Overall management by the Executing Agency

Information on the implementation progress of sub-projects, O&M situations and beneficial effects for local residents of this project is supposed to be collected by the provincial and district project management units (PMU) and reported to MPI, where they are centrally integrated and managed. However, in reality, the project progress monitoring was carried out by the consultants,[27] and data about benefits such as the operation and effectiveness indicators have not been collected. The Management Information System (MIS) has been introduced in order to support this management structure and the SPL database[28] that has been developed in the asset survey for SPL facilities conducted by JICA has remained largely unused. This is believed to be caused mainly by a lack of recognition by MPI of the need to integrate and centrally manage all project information. "All project information" here signifies the overall PDCA information of sub-projects including the commencement, progress, completion, operation, maintenance and beneficial effects for local residents. In order to promote comprehensive management by MPI, it is necessary, for instance, to

[27] According to JICA internal documents (2008), the progress status of each sub-project is not centrally observed by MPI, and it was reported that consultants had to visit each sub-project site to verify the completion of construction.

[28] It is a database that has been created using survey results of all the roads, power distribution, water supply and irrigation facilities built with SPL 1-5. It is desired to be used with MIS.

strengthen the organizational motivation and enhance the system by making it mandatory[29] to include specific recommendations for improvement that have been identified in preceding projects into the plans of succeeding projects.

(2) Improvement in the F/S quality

Although the quality of the F/S has improved with the accumulation of experiences of provincial governments, the execution and management of sub-projects has been shifted from the provincial to the district governments in line with administrative decentralization policies. Due partly to this reason, data quality and future forecasts remain unreliable. This has led to problems such as construction delays resulting from changes of plans, low facility utilization rate and water supply rate in the water supply sector and increased traffic volume that exceeds initial forecast in the road sector. As the provincial governments have accumulated sufficient technical capabilities[30], it is expected for them to check and support the district governments in making F/S and detailed designs, and for MPI to play supervisory and coordinating roles in these activities.

(3) Counter measures against schedule overrun

As stated above in section 3.4.2.2, the schedule overrun in the road and water supply sectors were reported in three preceding projects, and the causes were common such as delay of land acquisition, change of plans, bad weather and poor access to the construction sites. The fact that no improvement has been made even though the causes were identified indicates the difficulties of this issue. But it is still expected to work out any counter measures. For uncontrollable external factors such as land acquisition, bad weather, and poor access, estimation of sufficient time margin in schedule could be one of the management counter measures[31]. The improvement in the F/S quality mentioned above could be one of the counter measures against change of plans.

(4) Sustainability in water supply and road sectors

Regarding the sustainability of this project, as stated above in section 3.5, there are some issues to be addressed in the water supply sector and in the road sector. Specifically, there are some concerns in technical level, financial aspect and current status of operation and maintenance in the water supply sector, and in financial aspect and current status of operation and maintenance in the road sector. As for the water supply sector, as stated above in (2), it is expected to improve the financial status by raising facility utilization rate and water supply rate. Through the improvement of financial status, rehabilitation and repair of facilities would be possible, and the improvement of facilities would reduce the unaccounted-for water and lead the water sector eventually to better financial status, thus a virtuous cycle could be formulated in future. Also, the betterment of financial status will enable the improvement of technical level through sufficient training and implementation of water quality test.

[29] In the case of JICA project, it is required to make use of the lessons learned from past similar projects.
[30] Based on JICA internal documents (2008)
[31] This type of time margin is called “contingency reserve.” The reserve time should be estimated based on the past experience.

As for the road sector, since it isn't an income generation business, the improvement of financial status largely depends on the budgetary support from central and local governments. With regard to overloaded vehicles which cause the damages of road surface, administrative actions are expected to be executed, such as strengthening of penalties to drivers and business owners, installation of height and width limiting facilities, and collection of road maintenance tax according to a payload.

4.2.2 Recommendations to JICA

(1) Monitoring Support

To promote the monitoring of operation and effectiveness indicators and project progress as mentioned in 4.2.1(1) above, technical guidance and support for using the MIS and SPL database is expected to be provided by JICA to MPI and the PMUs in the provinces and districts.

(2) F/S and detailed design support in water supply sector

In the water supply sector of this project, the low quality of F/S and the detailed designs have resulted in a variety of issues such as construction delays, the low facility utilization rate and water supply rate, poor water quality management and un-accounted for water. Moreover, these issues have been highlighted in the preceding projects and there is a concern that it may be repeated in the succeeding projects. A follow-up, such as survey of the current situations in the water supply sector using resources such as the Special Assistance Facility (SAF), is desirable.

4.3 Lessons Learned

(1) Comprehensive management of small-scale scattered projects

Operation and effectiveness indictors have not been defined in this project and data on the development effects has not been collated either. The MIS and SPL database introduced by JICA to enhance monitoring of the projects have remained largely unused and various information have scattered around the local governments as described above. This is not desirable for the management of small-scale scattered projects.

Multiple small-scale projects spread across different sectors in a large area of the country can be named as a small-scale scattered project. The characteristics of this type of project can be given as follows:

1) Overall project management and individual sub-project management are required.
2) A central project management unit oversees the comprehensive project management and individual sub-project management unit for managing individual sub-project are required.
3) The central project management unit needs to manage the project horizontally across all sectors while adopting a vertical perspective in managing the local situations in the centre.
4) During the project implementation period, as sub-projects are completed and start operating, O&M and ex-post monitoring of those sub-projects should be conducted and feedback the lessons for other sub-projects' still in execution stages. If necessary, the project implementation needs to

be amended.

Accordingly, operation and effectiveness indicators ought to be set up early, and monitoring of the effects, including a baseline survey, should be conducted in such project. To do this, the roles and responsibilities of the central management unit and the individual local project management units need to be clearly defined. It is also necessary to build a system where the latter monitors the actual situation on the ground, and the former consolidates the information from the various sources accurately. Furthermore, by making it mandatory to incorporate the experience and information accumulated in earlier projects into the planning for subsequent projects, it is necessary to maintain the user's motivation in continuing to use the system.

(2) Small-scale scattered project in the water supply sector

For small-scale scattered project in the water supply sector, there are broadly 2 two types of projects. One involves community-based projects such as installing water tanks and wells while the other type involves the provision of water services including the construction of water purification facilities. This project evaluated in this report belongs to the second category. In this case, the construction is very time-consuming due to the interplay of various complex factors, including obtaining construction permissions from other ministries and agencies and acquiring land for laying pipes for installing distribution pipes and supply pipes; and the procurement, construction, and acceptance of various facilities which make up the water purification plant. Furthermore, it also requires the close and thorough study of social considerations, such as the ability of the users to pay for the services and the expected water demand in the targeted area. In other words, there is a need to ensure that a bare minimum of these factors are satisfied even in small-scale projects. To achieve this, an experienced project manager and close technical supervision are required to build up the capabilities of the relevant parties. Measures are also required concerning the system to standardize the format of F/S and detailed designs to ensure that the necessary items are not left out in the planning process.

BOX 1 Management of Small-Scattered Type Project

This project belongs to a "Small-Scattered Type Project" which is characterized by a complex of large number of small-scale sub-projects scattered throughout a vast area of a country. Different from a "Large Single-Type Project," like a large-scale power plant, irrigation system etc., which is situated in a single location or area, the project management of such type requires particular points as follows.

(1) In addition to individual project management for each "sub-project," total management of the "project" as their aggregate is separately needed.
(2) An overall structure involving both a "vertical project management system" from central through the local project locations and a "horizontal project management system" encompassing different sectors has to be prepared and effectively operated.

(3) Since each sub-project enters into operation one after another during the "project" implementation, the project management should involve continual effect and impact monitoring and timely review of the project contents and way of implementation based on the monitoring results on the way.

(4) Procurement and progress management constitutes the central part of the project management of "Large Single-type Projects." On the other hand, smooth implementation progress does not necessarily assure favourable project implementation performance.

(5) In addition to designing, procurement support, construction supervision and other kinds of technical services, such management-oriented consulting services as grass-root assistance to support participatory sub-project implementation and operational assistance for the vertical and horizontal project management system are also required.

(6) Involvement of auditing could play a more important role as a function to assure effective operation of the vertical and horizontal project management systems, implementation of a large number of procurement transactions and sub-project evaluations.

Comparison of the Original and Actual Scope of the Project

Item	Original (F/S data)	Actual
1. Project Outputs	1) Construction / rehabilitation of provincial and rural roads Number of sub-project: 59 Total length: 845 km 2) Construction / rehabilitation of medium and low voltage lines Number of sub-project: 31 Total length: 1,114 km Total capacity: 19,347 kVA 3) Construction / improvement of water supply systems Number of sub-project: 24 Total capacity: 48,777 m^3/day 4) Construction / rehabilitation of irrigation facilities Number of sub-project: 27 Irrigated area: 27,442 ha 5) Consulting services	1) Construction / rehabilitation of provincial and rural roads Number of sub-project: 59 Total length: 809 km 2) Construction / rehabilitation of medium and low voltage lines Number of sub-project: 31 Total length: 1,170 km Total capacity: 19,060 kVA 3) Construction / improvement of water supply systems Number of sub-project: 24 Total capacity: 48,698 m^3/day 4) Construction / rehabilitation of irrigation facilities Number of sub-project: 27 Irrigated area: 27,410 ha 5) As planned except the installation of MIS (Management Information System)
2. Project Period	March 2003 - September 2007 (55 months)	March 2003 - June 2009 (76 months)
3. Project Cost Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	 3,522 million yen 9,976 million yen (1,265,990 million VND) 13,498 million yen 10,562 million yen 1 VND = 0.00788 yen (As of February 2003)	 13,923 million yen 9,934 million yen 1 VND = 0.00699 yen (Calculated from disbursed amount (yen) and actual construction cost (VND))

VND: Vietnam Dong

Sri Lanka

Ex-Post Evaluation of Japanese ODA Loan

"Pro-Poor Rural Development Project"

External Evaluator: Hisae Takahashi

Ernst &Young Sustainability Co., Ltd.

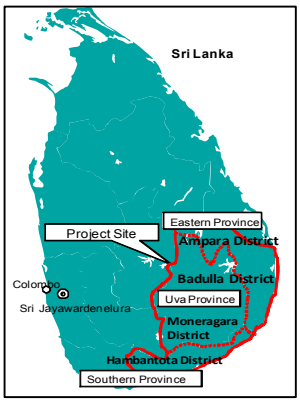
0. Summary

This project aims at reducing rural poverty and mitigating regional inequality by enhancing the accessibility to economic and social services through the improvement of roads in rural areas of Sri Lanka.

The project is consistent with Sri Lanka's development policy as well as Japan's aid policy. Also given the growing development needs, relevance of the project is high. The primary indicators of operating effectiveness have met the planned target values, producing valuable effects in a practical manner. It is therefore concluded that the target Impacts of the project were also largely achieved. Effectiveness of the project is also rated as high because the project cost was as planned and the project period was extended only due to an increase of outputs. Although there were no significant issues related to technical capacity for operation and maintenance management conditions, there were concerns in terms of institutional aspects such as understaffing and financial aspects such as under-budgeting, which hinders the continuation of appropriate maintenance and management. Therefore, sustainability is rated as fair.

In light of the above, the project is evaluated to be highly satisfactory.

1. Project Description



Project Locations

Rural Road in Badulla District

1.1 Background

Poverty reduction has been one of the key issues in Sri Lanka for a long time. Various policy programs have been implemented for alleviating poverty, which have led to reducing the average

nationwide poverty rate. However, the gap between urban and rural areas has widened and a measure to resolve this situation was urgently needed. 2002 statistics on the poverty rate in Sri Lanka show a national average of 23% (decreased by 3% from 1990), 8% in urban areas (decreased by 8% from 1990), 25% in rural areas (decreased by 4% from 1990) and 30% in plantation areas (increased by 9% from 1990). In contrast to urban areas where the poverty rate was improved to less than 10%, it remained high in both rural and plantation areas.[1] Furthermore, in addition to the effects of the tsunami disaster in February 2004, destroyed social infrastructure during the civil conflict has impeded national development.

Moreover, there is a conspicuous gap in social infrastructure between urban and rural areas, which is one factor causing widening income disparities. As for the road sector, while Western Province has a relatively higher income level resulting in a road density of about 1.6 km/km^2, Southern and Uva Provinces have high poverty rates with road densities of 0.5 km/km^2 and of 0.2 km/km^2 respectively. From this aspect, improving road infrastructure and accessibility to economic and social services is imperative for poverty reduction in rural areas through the improvement of income and living standards.

1.2 Project Outline

The objective of this project is to improve the accessibility to economic and social service by improving road (Central road and Rural road) [2] in Sri Lanka's rural area of Badulla district and Moneragala district in Uva province, Hambanthota district in Southern province and Ampara district in Eastern province, thereby contributing to the poverty reduction in rural area and the mitigation of regional inequality.

Loan Approved Amount/ Disbursed Amount	4,085 million yen / 4,049 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March, 2007 / March, 2007
Terms and Conditions	Interest Rate: 1.5% Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: Tied aid
Borrower / Executing Agency	The government of the Democratic Socialist Republic of Sri Lanka/National Planning Department, Ministry of Finance & Planning
Final Disbursement Date	March, 2010
Main Contractor (Over 1 billion yen)	N/A

[1] "Urban area", "Plantation area," and "Rural area" are statistical classifications used in official documents such as "Poverty Assessment" published by World Bank. "Plantation area" indicates plantations for tea, rubber, and coconut where more than 10 live-in laborers work on land of more than 20 acres. "Rural area" is categorized as residential quarters which belong to neither "Urban area" nor "Plantation area."

[2] This project improved road by paving existing road and rehabilitating dilapidated road.

Main Consultant (Over 100 million yen)	N/A
Feasibility Studies, etc.	"Special Assistance for Project Formation" (May- August, 2006, August– December, 2006)
Related Projects (if any)	"Project on Rural Livelihood Improvement in Hambantota District" (March 2007– March 2011)

2. Outline of the Evaluation Study

2.1 External Evaluator

Hisae Takahashi, Ernst & Young Sustainability Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: September, 2011 – October, 2012

Duration of the Field Study: January 7 – February 7, 2012, April 22 – May 7, 2012

2.3 Constraints during the Evaluation Study

N/A

3. Results of the Evaluation (Overall Rating: A[3])

3.1 Relevance (Rating: ③[4])

3.1.1 Relevance with the Development Plan of Sri Lanka

At the time of appraisal, the development policy of the Government of Sri Lanka (GOSL), "Mahinda Chintana (2006 – 2016)," indicated a development goal of reducing the national poverty rate to 13% by 2015. GOSL has made particular efforts to narrow the regional gap and to reduce poverty reduction through rural development. Under that policy, various programs have been implemented and expanded. For instance, the rural development program "Gama Neguma" focused on poverty reduction through rural development that included improvement of infrastructure such as agricultural roads, based on the needs of local residents.

In 2010, although "Mahinda Chintana" was modified for 2010 through 2016, no changes were made in the direction of narrowing the regional gap and poverty reduction. "Gama Neguma" is also ongoing. In addition, the "National Road Master Plan (2007-2017)" formulated in 2007 focuses on the development of a road network linking strongholds of economic growth throughout Sri Lanka.

As mentioned above, the development policy of Sri Lanka set a goal of reducing poverty and narrowing the regional gap through rural development at the time of both appraisal and ex-post evaluation, and focuses on rural road infrastructure, which is conducive to rural development.

[3] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[4] ③High, ②Fair, ①Low

3.1.2 Relevance with the Development Needs of Sri Lanka

At the time of appraisal, the poverty rate of rural areas in Sri Lanka was high, as shown in Table 1, and a delay in the development of rural infrastructure was pointed out as one of the causes of the gap. In particular, as shown in Table 2 for road conditions, while Western Province has a relatively higher income level resulting in a road density of about 1.6 km/km^2, Southern and Uva Provinces have high poverty rates with road densities of 0.5 km/km^2 and of 0.2km/km^2 respectively. From this aspect, insufficient basic infrastructure in rural areas has caused a bottleneck in efforts to reduce poverty. Therefore, improving road infrastructure and accessibility to economic and social services is necessary for poverty reduction along with improving income and living standards in rural areas.

Table 1 Poverty rate in Sri Lanka

	Urban	Rural	Plantation
Before project (2002)	8%	25%	30%
After project (2010)	5%	10%	12%

Source: Census and Statistics of GOSL, "*Poverty Indicators (2011)*"

Table 2 Road Density Rate in Sri Lanka

	Western	Southern	Uva
Before project (2002)	1.6km/km^2	0.5km/km^2	0.2km/km^2
After project (2010)	3.8km/km^2	2.3km/km^2	1.0km/km^2

Source: Data provided by Road Development Authority (RDA)

Although the poverty rate improved compared to pre-implementation of the project, the poverty rate in rural and plantation areas is still higher than that of urban areas (see Table 1). Therefore, the importance of conducting development activities in rural areas is continuously high. Also road maintenance rates in Southern and Uva Provinces, the targeted areas in this project, are low compared to Western Province where the income level is high. In particular, the inadequate rural road infrastructure prevents access to economic and social services. In addition, the necessity of maintaining a road network linking strongholds of economic growth throughout Sri Lanka is described in the "National Road Master Plan." Hence, from the aspect of promoting rural development, the need for rural road development is still high.

3.1.3 Relevance with Japan's ODA Policy

The 2004 Country Assistance Policy by the Ministry of Foreign Affairs of Japan at the time of appraisal aimed to support the poverty program over the next 5 years. Also, the "Medium-Term Strategy for Overseas Economic Cooperation Operations (2005-2007)" placed priority on "infrastructure development toward sustainable growth." For Sri Lanka in particular, "supporting economic growth for poverty mitigation" and "correcting gaps among ethnic groups and regions" were set as primary focuses. Furthermore, in Country-specific Programs (2007), project formation targeting Uva, Southern, Northern, and Eastern Provinces were being proactively

considered.

As described above, the policy of support for Sri Lanka at the time of appraisal emphasized the importance of dealing with poverty reduction, and also showed positive support for Uva, Southern, Northern, and Eastern Provinces — all areas with a high proportion of people living in poverty.

Thus, this project has been highly relevant with the Sri Lanka's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Effectiveness[5] (Rating: ③)

This project performed maintenance on central and rural roads in the targeted areas.[6] The effectiveness of central roads was measured by traffic volume and driving comfort indicators. On the other hand, the targeted zones of each rural road sub-project (SP) were short, which caused difficulties of measuring the effectiveness based on traffic volume. In addition, the original objective of developing rural roads was not to increase traffic volume or driving comfort, but to improve the accessibility of economic and social services. Therefore, the effectiveness of rural roads was determined based on a qualitative approach.

3.2.1 Quantitative Effects (Operation and Effect Indicators)

①International Roughness Index (IRI) [7]

The original and planned IRI of the whole target area and the actual IRI of each section of the target area are shown in Tables 3 and 4 respectively.[8]

At the time of planning, the IRI of whole target section of central road was expected to improve to between 2.0 and 4.0. The data that was available from RDA shows a great improvement of the IRI in most of the target section, and it was confirmed that in nearly 80% of the section, the IRI reached target figures.[9] Furthermore, appraisal documents indicated the original IRI as 4.8-8.0, but in reality, the IRI of the target section at the time of appraisal showed 9 or even 10, thus confirming the high level of effectiveness. Though some of the target section did not reach the planned figure (4.0), the IRI of all target sections have been improved compared to before the project. In addition, serious damage needing urgent repairs

[5] Sub-rating for Effectiveness is to be put with consideration of Impact

[6] As described below in "3.4 Efficiency," 28 sections of central road (241 km) and 83 sections of rural road (224 km) were improved under this project.

[7] The International Roughness Index (IRI) is a general indicator to show the roughness of a road. It indicates the roughness of a certain area of road in the subject area. A smaller value indicates a flatter and improved road condition.

[8] Since original and planned figures for each section were not set at the time of appraisal, the original figure in Table 4 was collected at the time of ex-post evaluation from RDA. These figures do not cover the entire section, thus the average of the original figures in Table 4 and Table 3 do not match.

[9] The numbers for Sub-projects for central road in each district are: 4 in Badulla district, 3 in Moneragala district, 13 in Hambantota district, and 8 in Ampara district.

was not found when the evaluation team actually drove the section where the IRI was shown as 7.0. Since the IRI is an indicator that shows the comfort of the road, the effect of the project can be ascertained in terms of smoothness of driving due to project implementation.

Table 3 Original and Planned IRI

	Original IRI (2006)	Planned (Project Completion)
Target Road (Central Road)	4.8 – 8.0	2.0 – 4.0

Source: Appraisal documents

Table 4 Original and Actual IRI

Section	Before project	After project
Badulla district (Uva Province)	2007	2010
Badulla - Karametiya – Andaupotha (42-48km)	8.3	7.3
Wellawaya – Ella – Kumbalwela (14-24.5 km)	9.3	3.5
Roehampton – Diyatalawa – Bandarawela(0-10.1km)	8.5	3.7
Moneragala district (Uva Province)	2007	2010
Passara - Monaragala (27-33.75 km)	7.3	7.0
Wellawaya – Ella – Kumbalwela (0-14 km)	6.3	2.9
Bibile - Medagama - Nakkala (15-33 km)	8.3	5.8
Hambantota district (Southern Province)	2007	2012
Pelmadulla - Madampe - Nonagama (69.2-85.8 km)	N.A.	3.6[Note 1]
Walasmulla - Weeraketiya (0-8.2 km)	6.3	3.3
Walasmulla - Katuwana (10-12 km)	8.7	3.1
Walasmulla - Katuwana - Middeniya (0-10 km)	10.5	3.1
Walasmulla - Katuwana - Middeniya (12-23.6 km)	7.9	3.2
Weeraketiya - Middeniya (0-8 km)	7.6	3.5
Weeraketiya - Middeniya (8-12.9 km)	10.1	3.2
Beliatta - Walasmulla (0-15.7 km)	8.0	3.2
Tangalle - Weeraketiya (B410) (0-13.8 km)	3.2	3.0
Ranna - Udayala - Weeraketiya (0-15.7 km)	9.8	3.0
Ranna – Angunukolapalassa - Wetiya (0-16.1 km)	9.6	3.0
Udukiriwela- Weeraketiya - Middeniya (0-12.9km)	8.4	3.4
Ampara district (Eastern Province)	2007	2011
Akkaraipattu - Warapathanchenai (0–19 km)	7.7	5.0
Samanturai – Malcumpiddy – Deegavapi (0-9km)	10.9	6.4

Note 1: Data of 2010.
Source: Data provided by RDA

②Annual Average Daily Traffic (AADT)

Since the target figures for traffic volume to indicate effectiveness were not set at the time of appraisal, it was not possible to show the degree of the attainment in terms of traffic volume. However, an attempt was made to collect information regarding traffic volume for references purposes with the support of RDA to the greatest extent possible. Though the collected data

was not entirely sufficient, available AADT information at target sections provided by RDA shows an increase compared to the level prior to the project. This result indicates that the flow of people and products has become more active than before through the implementation of this project.

Table 5 Original and Actual AADT

(Unit: Vehicle/Day)

Section	Before project	After project
Badulla district (Uva Province)	2007	2010
Badulla - Karametiya – Andaupotha	N.A.	1,282
Wellawaya – Ella – Kumbalwela	3,710	N.A.
Roehampton – Diyatalawa – Bandarawela	1,419	2,293
Moneragala district (Uva Province)	2007	2010
Passara – Monaragala	905	1,406
Bibile - Medagama - Nakkala	N.A.	2,251
Hambantota district (Southern Province)	2007	2012
Pelmadulla - Madampe - Nonagama	2,033	3,414
Walasmulla – Weeraketiya	3,269	N.A.
Walasmulla - Katuwana - Middeniya	1,212	2,415
Weeraketiya – Middeniya	2,165	2,727
Beliatta – Walasmulla	3,790	N.A.
Tangalle - Weeraketiya (B410)	1,638	2,611
Ranna - Udayala – Weeraketiya	1,073	1,530
Ranna – Angunukolapalassa - Wetiya	3,589	3,849
Ampara district (Eastern Province)	2007	2011
Peradeniya - Badulla - Chenkalady	1,474	1,934

Source: Data provided by RDA

3.2.2 Qualitative Effects

In order to understand the qualitative effects, a beneficiary survey was conducted alongside the target road. 227 drivers of cars, trucks, and three-wheelers,[10] as well as merchants and residents, etc. responded and the following points were confirmed as a result of this survey.

①Transportation or Travelling Time

According to the results of the beneficiary survey, almost of all respondents (99%) answered that their transportation and travelling time was reduced after the improvement of the road. When confirming this with respondents using rural roads, the average time for transportation to market and social services had been reduced approximately 42% on average.[11] This was due to

[10] Three-wheelers are one of the major means of transportation for people in Sri Lanka.

[11] Though respondents' sections were different, the changes in average transportation or travelling time to major roads and destination are as follows. 32 minutes →15 minutes (central road) and 33 minutes →13 minutes (rural road) in Badulla district, 126 minutes →84 minutes (central road) and 29 minutes → 12 minutes (rural road) in Moneragala district, 27 minutes → 13 minutes (central road) and 23 minutes → 11 minutes (rural road) in Hambantota district, 25

the fact that the services of three- wheelers and buses became available on roads where walking or using cows had previously been the only means of transportation due to poor road conditions. Though quantitative data showing correlation was not available, it would appear that the shortening of transportation or travelling time indirectly contributed to the stimulation of commodity distribution in the target area.

②Accessibility of Major Cities and Social Services

In terms of accessibility to major cities and social services, 77% and 22% of survey respondents from the central road answered "improved greatly" and "improved" respectively. This indicates that 99% of the respondents believe that the improvement of accessibility is a result of the project. All beneficiaries of rural roads also replied that access to a major road and destinations such as schools, hospitals, shops, and markets, etc. has "improved greatly" or "improved." In particular, the improvement of rural roads where even three-wheeler or bicycle passage was difficult made not only the passage of bicycles possible, but also buses. This resulted in more people realizing the improvement of accessibility.[12]

③Reduction of Transportation Costs

The cost of transportation and travelling was also reduced due to the road improvement. Beneficiary survey results show that 34% and 64% of the respondents replied that their costs were "largely reduced" and "reduced" respectively. This indicates that more than 90% of the respondents answered that their costs for transportation or travelling were reduced. Many respondents explained that transportation costs for cultivated crops were lowered since trucks now drive around the area to collect crops. However, in the past, farmers had to hire workers to transport their crops to markets or processing factories, as trucks were not able to drive on the roads before the project.

minutes →5 minutes (central road) and 32 minutes → 10 minutes (rural road) in Ampara district.

[12]Roads that connect villages and major roads, markets, banks, communication facilities, and shops, etc. are included as part of the selection criteria for sub-projects.

Box 1 Qualitative effects

Example of ②improvement of accessibility to Major Cities and Social Services

One of the target roads called Pahamurutota Uma Oya road in Badulla is a rural road in a village which mainly produces tea leaf and is located 6 km away from the major city of Pahamurutota Village. Before the project, the road was not paved, thus buses, cars, three-wheelers, etc. were not able to pass over the road. Therefore, people in this village had various difficulties. For example, students had to walk more than 45 minutes to go to the nearest school and harvested tea leaves were not sent to market in a timely manner.

Truck sent by tea collecting centre

After improving the road, buses were able to pass over the road and students could commute to school easily using three-wheelers or buses within 10 minutes. Before the project, the only means of transporting tea leaves was walking or using cows, but now farmers can transport tea leaves in a timely manner on trucks sent by the tea collecting centres or by using three-wheelers. Hence, farmers can now send high-quality tea leaves to collecting centres. Currently, 70% of tea leaf harvested in this area qualifies as high quality despite that it had previously been categorized as low. Before the project, more than half of harvested vegetables (cabbage, tomato, and aubergine) were discarded since they could not be sent to market while still fresh. However, this amount has now decreased to less than 10%. Such changes contributed to the people in this village being more informed.

3.3 Impact

3.3.1 Intended Impacts

At the time of appraisal, it was expected that the living standard and the income of the poor in the target area was improved due to the road improvement as an impact of the project. In Sri Lanka, macro-level data including the district-level Gross Domestic Product and poverty rates were not available; changes in living environment and income were confirmed through the beneficiary survey and analyzed.

① Improvement of Living Standards

In the beneficiary survey, 80% of respondents replied that their living conditions improved after the project. In particular, since accessibility to hospitals and clinics was improved, patients could easily be transported by car. In addition, it also became easier for children to commute to school.[13]

[13] Beneficiary surveys that were conducted by the project management unit during project implementation also show that 96% of respondents indicated an improvement in student education levels and 97% of respondents said that health condition in the area improved.

② Enhancement of Economic Activities and Income

Many beneficiaries said that economic activities were expanded and that income also increased after improvement of the road (see Figure 1). According to the beneficiary survey, more than 90% of respondents replied that their business or agricultural activities were largely expanded (53%) or fairly expanded (36%). They indicated the reason for such as the expansion of their customer base and activity area due to the improvement of access to the market and road networks, which had previously been limited to a certain area. In addition, household incomes in each district have increased according to the Census and Statistics survey (see Table 6). In fact, the beneficiary survey shows that 74% of the respondents answered that their income increased after project completion (74% "increased greatly" and 35% "increased") as shown in Figure 2. In particular, beneficiaries of rural road improvement said that the increase in the amount of crops that could be sold due to easy access to markets and the reduction of transportation costs due to road improvement contributed to their increased income.

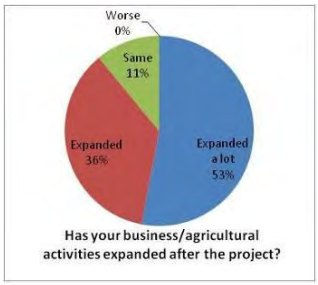


Figure 1 Changes in Economic Activities

Table 6 Household Income before and After the Project

(Unit: Rupee (Rs.))

District	Before project (2006/07)	After project (2009/10)
Badulla	22,035	32,313
Moneragala	20,118	22,161
Hambantota	24,076	36,879
Ampala	20,676	24,721

Source: Census & Statistics (2011), "House Hold Income and Expenditure Survey 2009/2010"

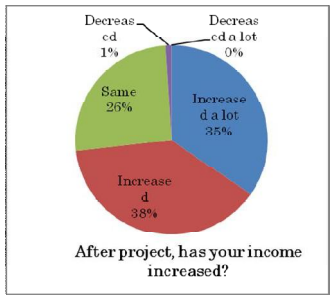


Figure 2 Changes in Household Income

As explained above, the implementation of this project is considered to have contributed to the enhancement of economic activities in the project area.

③ Changes in Poverty Rates

At the time of appraisal of the project, the delay in rural infrastructure development was pointed out as one of the factors for the income gap. Therefore, road improvement was conducted in order to alleviate poverty through increasing incomes and living standards. Since it is assumed that other various factors also contributed to improving the poverty rate, measuring the direct relationship between the road development of this project and the reduction in the poverty rate in this area is difficult. However, when comparing poverty rates before and after the project, improvement has been demonstrated in all areas except the

Ampara District, as shown in Table 7.[14] Therefore, it is thought that the project contributed to alleviating poverty within a certain level by increasing incomes and living standards.

Table 7 Poverty Rate in target Area before and after the Project

District	Before project (2006/07)	After project (2009/10)	District	Before project (2006/07)	After project (2009/10)
Badulla	33.2%	14.5%	Hambantota	12.7%	6.9%
Moneragala	23.7%	13.3%	Ampara	10.9%	11.8%

Source: Census and Statistics of Sri Lanka, "*Poverty Indicators (2011)*"

3.3.2 Other Impacts

(1) Impacts on the Natural Environment

Since the SPs of this project are relatively small in scale, it was not necessary to implement an Initial Environmental Evaluation (IEE) or Environmental Impact Assessment (EIA) in accordance with Sri Lankan guidelines. There were no particular impacts on the environment. For this project, the small impact on the natural and social environment was a factor that was included in the selection criteria for the SP. The absence of a negative impact on the environment was in fact confirmed upon interviews with beneficiaries and employees of implementing organizations.

(2) Land Acquisition and Resettlement

No land was acquired and residents were not resettled under this project.

(3) Unintended Positive/Negative Impact

①Enhancement of Contractor Capacity

For this project, one of the SP selection conditions stipulated that the sub-projects be appropriate scale for domestic tendering to be conducted. Although this was not clearly stated in the documents at the time of appraisal, an additional objective was one of improving the capacity of domestic construction companies by giving them experience in road construction for the sub-projects.[15] By implementing multiple small-scale road constructions for this project, small local contractors with no previous experience in donor aid projects were given an opportunity to gain this experience in this project.[16]

During this project, all of the contractors acquired a broad range of knowledge and experience by

[14]The reason that the poverty rate in Ampara district did not improve is assumed to be because of special circumstances in the eastern area. This area has suffered from damage from the civil conflict until recently.
[15]From interviews with the Project Director during implementation and employees of the implementing organization.
[16]The numbers of small local contractors from which road construction work was ordered for this project are: 11 in Badulla District, 9 in Moneragala, 15 in Ampara, and 19 in Hambantota for a total of 54 companies. These companies have 100 employees or less including laborers, with an average of 4-5 technical staffs per company. In addition, upon interviewing four of these companies, it was found that before this project, they had never had a road construction work order for which concrete paving skills were necessary.

participating in lectures and orientations held by the Consultants or RDA. For example, the Consultants and RDA employees provided contractors with appropriate administrative and technical support for matters such as drawing up tendering documents prior to accepting orders, preparing contracts and statements of account, time management, concrete paving technology, safety management, quality control, and using new equipment. Through this, the contractors gain experience similar to on the job training (OJT). As a result, before project implementation, the number of local contractors that had independent experience in concrete paving work was extremely limited, but since most of the sub-projects involved concrete paving, there were many contractors who were able to acquire skills in this field. Furthermore, local contractors who did not have experience in subcontracting work for donor aid projects will be able to use the experience they gained in this project. Enhancement of their capacity has been ascertained as they are currently working as subcontractors for Asian Development Bank projects and other JICA operations.

② Administrative Management Abilities of the RDA

This project also contributed to the improvement of project management abilities among the employees of the RDA, which was the implementing agency. According to interviews with RDA employees, they have said that "Through the experience of implementing and managing this project, our capacity has been improved in terms of contract operations and management, procurement operations, supervisory/managerial work, and financial administration."

In the past, since the technical level of private companies was insufficient, road maintenance and rehabilitation work was commissioned by RDA to the Road Construction and Development Corporation (herein called RC&DC). Work was further subcontracted by RC&DC to private companies, who performed construction work under the supervision of RC&DC.[17] Therefore, RC&DC was in charge of procurement, supervisory work, and contract work, etc. that are implemented by the Consultant. Subsequently, when the government encouraged the entrance of private companies into the market, it became necessary for RDA to also coordinate operations that had been handled by RC&DC. Prior to this project and the small-scale infrastructure projects[18] that preceded it, large-scale projects were the norm. These larger projects were implemented while receiving support from overseas consultants. However, for this project, the scale of the SP was small and RDA employees had to coordinate work operations for which they had previously been dependant

[17]RC&DC is a public corporation that was formed in the 1980s when the construction department broke off from the RDA as a government-owned company.

[18]This is a small-scale scattered-type project that implemented multiple small sub-projects over a wide area. In Sri Lanka, the Small-scale Infrastructure Rehabilitation and Upgrading Project (SIRUP I, 2003~2007), (SIRUP II, 2004~2008) was implemented after the tsunami subsequent to emergency aid as a small-scale scattered-type project. During implementation of this project, Project Execution Units were set in each region under the supervision of the Project Management Unit, thereby employing systems learned from experience with SIRUP.

on the consultant. For RDA employees, implementing operations and management for this project was similar to experiencing OJT. Also through the implementation of this project, a system/process was created so that a series of work operations including procurement, contract work, project management, and financial administration could be implemented without donor support. This has thereby led to improvement of their capacity as an organization.[19]

③ Measures against Speeding

After some of the central roads were rehabilitated, the number of vehicles driving at high speeds increased, with the number of traffic accidents also increasing. This was ascertained through results of interview surveys. Although it is not a serious problem at this time, it has been observed that there are some locations on central roads where traffic signs have not been placed. So that this situation does not worsen in the future, the local police department has suggested that installing speed limit signs would be effective. Since it will also be necessary to improve awareness and morals of drivers at the same time, local police and schools are expected to conduct awareness activities together with RDA.

From the above, it can be seen that the expected impacts, which are contributing to an increase in income levels and an improvement in the living environments of poor people living in target regions, have been largely achieved.

As indicated above, this project has largely achieved its objectives, therefore its effectiveness is high.

3.4 Efficiency (Rating: ③)

3.4.1 Project Outputs

Table 8 shows output (planned, modified and actual) of the project.

Table 8 Project Output (Planned/Modified/Actual)

Item	Planned	Modified[Note1]	Actual
Central Road			
Number of SP	26	26	28
Length	256 Km	263 Km	241 Km
Rural Road			
Number of SP	100	58	83
Length	383 Km	206 Km	224 Km
Badulla district			
Number of SP	34	17	20

[19] According to RDA employees, prior to implementation of the project these jobs were handled by individuals with no special knowledge. However, the implementation of this project not only improved abilities of individuals, but also allowed for the systemization of a series of operations at RDA. Currently, work continues to progress at RDA following that system.

Length	160 Km	65 Km	53 Km
Moneragala district			
Number of SP	40	15	20
Length	140 Km	45 Km	49 Km
Hambantota district			
Number of SP	11	11	16
Length	81 Km	64 Km	72 Km
Ampara district			
Number of SP	23	15	27
Length	43 Km	32 Km	50 Km
Consulting Service	・Tendering Assistance ・Technical Support ・Project Supervision & Monitoring ・Project Evaluation ・155M/M	・As planned ・157M/M	

Source: Appraisal documents, answer to questionnaire
Note 1: Modified output was designed based on the detailed design study.

This project consists of a number of small-scale sub-projects categorized into central road and rural road rehabilitation. The planned outputs before implementation (at the time of appraisal), modified outputs after project commencement, and actual outputs are each noted above. Major changes are as described below.

(1) Number of SP and length of central road (modified output ⇒ actual outputs)
Due to currency exchange rate fluctuations, there was some leeway in project costs. Thus, in order to utilise the funds effectively, two extra SP were added.

(2) Number of SP and length of rural roads (planned output ⇒ modified outputs)
The planned outputs were provisionally estimated at the initial stages of project formation. When these outputs were reconfirmed during the detailed design study, it was discovered they would not fall within the budget and that there were sections that did not thoroughly reflect the opinions of some of the residents. According to the Project Director, time was limited when conducting the preliminary survey prior to project commencement. It was thus indicated that on-site conditions were not completely reflected and the cost estimate was unrealistic. Therefore, upon receiving results of the detailed design study implemented at project commencement, the outputs were altered to be more realistic. This type of project, where a number of small-scale SP are financed is highly flexible, with high-priority SP appropriately selected in accordance with the objectives. Because of this, making the realistic changes as described above was an appropriate decision.

(3) Number of SP and length of rural roads (modified outputs ⇒ actual outputs)
Utilising the funds generated from currency rate fluctuations, 25 SP were added.

(4) Consulting services

This accompanies the increasing of the outputs (SP), and is relevant because these services are essential to the smooth implementation of the SP.

Sri Wijeyapura Road (Moneragala)

Akkaraipattu - Warapathanchenai (Ampara)

3.4.2 Project Inputs

3.4.2.1 Project Cost

The planned project cost at the time of appraisal[20] was 5,450 million yen (no foreign currency, 5,450 million yen domestic currency), of which 4,085 million yen was the yen-loan portion. The actual cost was 4,696 million yen (all domestic currency), of which 4,049 million yen was the yen-loan portion. Thus, actual cost was lower than planned at 86% of the planned cost. According to the implementing agency, the main reason that the actual cost fell below the planned cost was due to the fluctuating currency exchange rate. At the time of appraisal, the rate was 1 Japanese Yen (JY) = 0.89 Rs., but in 2009 it was 1JPY = 1.27 Rs., creating a difference of approximately 716 million Rs. In order to use these funds effectively, the project period was extended by six months and construction work on rural roads was added. As a result, the difference totalled approximately 36 million JPY.

3.4.2.2 Project Period

At the time of appraisal, the project period[21] was planned from March 2007 to March 2009 for a total of 25 months, but the actual period was 30 months from March 2007 to August 2009, slightly longer than the planned period. However, the planned SP construction work was completed as planned in March 2009, thereby making it necessary to consider the output changes when evaluating the project period. This extension period was used to implement the

[20]When the plan was altered after the detailed design study, only outputs were revised, with no changes made to the planned cost.

[21]The project period is defined as from the signing of the L/A to the completion of SP work. Furthermore, when the plan was altered after the detailed design study, only outputs were revised, with no changes made to the project period.

SP added to utilise the monetary surplus that was generated by the currency exchange rate and was appropriate with the increase in outputs.

3.4.3 Results of Calculations of Internal Rates of Return (IRR)

At the time of project appraisal/PCR, the internal rate of return (IRR) was not calculated and could not be compared to actual results. Calculating the IRR for a large number of small-scale SP is difficult, and due to the nature of the project, a quantitative analysis of the IRR was not possible and was thus not performed.

From the above, it can be seen that the project cost was within the plan. Though the project period was exceeded as the output was increased, this change is appropriate and the efficiency of the project is thus high.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

The Project Management Unit (herein called PMU) that managed the project during its implementation was dissolved after project completion. Currently, the Maintenance Division and Works Division of the RDA are in charge of operations and maintenance for central roads, and the provincial road development authority/department (PRDA/D) at each provincial council is in charge rural roads. Additionally, there are district offices under each PRDA/D where operations and maintenance staff members (senior engineers, technical staff, and supervisors) have been placed to implement operations and maintenance of rural roads.

With some exceptions (PRDA of Hambantota Province), there tends to be a shortage of technical staff when considering the size of the areas covered by each office. For example, according to provincial road authority staff members in the Eastern Province, which has jurisdiction over the three districts of Ampara, Batticaloa, and Trincomalee, there are only ten technical staff members. This is an insufficient number to regularly conduct maintenance and management. This issue is not exclusive to only the RDA or provincial governments, but is one that is shared by all ministries in the country. Yet for rural roads (especially in Uva Province, including Moneragala and Badulla), local resident involvement in operation and maintenance activities have been observed. The Village Monitoring Committee was formed by a group of residents during the implementation of this project. Members of this group frequently conduct clean-up activities and report on damaged segments to contribute to road operation and maintenance.

3.5.2 Technical Aspects of Operation and Maintenance

The RDA and provincial governments/district office road authorities have been performing

road operation and maintenance for their respective covered areas without any particular technical problems. In addition, the RDA has their own training center where employees are given appropriate training. Technical staff members at provincial governments/district office road authorities also have a sufficient level of experience and knowledge. With this, and the fact that roads are well-maintained, it is concluded that there are no technical problems on this level.

3.5.3 Financial Aspects of Operation and Maintenance

The budget for operation and maintenance at the RDA shows a steady upward trend, as shown in Table 9. They have also made budgetary allowances to exceed the inflation rate. However, according to interviews held with RDA employees, in contrast to the actual operation and maintenance demand, a sufficient budget has not been secured. In addition, according to provincial government employees, although the budget in Badulla and Moneragala districts cannot be called sufficient, operation and maintenance is covered within the allotted budget. In contrast, when confirming with operation and maintenance officials for each province, a budget sufficient for appropriate operation and maintenance in Hambantota district and Amapara district has not been secured (see Table 10). In particular, Amapara District has an operation and maintenance budget of 10 million Rs for 418 km of road, which is extremely limited in comparison with other districts. The reason for this is likely because they are at the height of building infrastructure following a civil conflict, with construction projects continuing to take precedence over operation and maintenance.

Table 9 Trend in the Road Operation and Maintenance Budget of RDA

(Unit：Million Rs).

2007	2008	2009	2010	2011	2012
3,410	3,103	3,530	4,200	5,000	5,500

Source：Documents provided by RDA

Table 10 Distance of Road Covered by Operation and Maintenance Budgets for each Office

Office Name	Amount	Road length
Uva Province (Badulla District, Moneragala District)	Rs.80 mil.	550 km
Hambantota District	Rs.60 mil.	345 km
Ampara District	Rs.10 mil.	418 km

Source: Documents provided by each PRDA/D.

Furthermore, according to the Ministry of Ports and Highways, which is the supervisory agency of the RDA, the national road operation and maintenance budget for 2012 has been increased by approximately six times the 2004 budget. This reflects the Sri Lankan awareness of the importance of not only road construction, but also of road operation, management, and maintenance.

3.5.4 Current Status of Operation and Maintenance

In regard to the operation and maintenance conditions of target roads, two years have not yet passed since their completion. However, during on-site observation of a portion of the roads, no areas with significant damage were found. Furthermore, the following operation and maintenance work is being implemented on both central and rural roads.

- Routine maintenance: Approximately 4 times/year. Mainly roadside vegetation trimming, drain cleaning, etc.
- Periodic maintenance: Every 2-3 years depending on road conditions. Concrete repairs, etc.
- Emergency maintenance: After disasters, etc. Implemented as needed.

One concern is that some rural roads between towns, villages and main roads that had not been fully connected were observed. According to residents and provincial government employees, although it was explained to them that provincial governments should rehabilitate the part of the roads that were not covered by the project after project completion, this was not implemented due to subsequent budget shortfalls. As a result, smooth passage on roads will be affected and it is hoped this will be resolved in the future.

Some problems have been observed in terms of institutional and financial aspect, therefore sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aims at reducing rural poverty and mitigating regional inequality by enhancing the accessibility to economic and social services through the improvement of roads in rural areas of Sri Lanka.

The project is consistent with Sri Lanka's development policy as well as Japan's aid policy. Also given the growing development needs, relevance of the project is high. The primary indicators of operating effectiveness have met the planned target values, producing valuable effects in a practical manner. It is therefore concluded that the target Impacts of the project were also largely achieved. Effectiveness of the project is also rated as high because the project cost was as planned and the project period was extended only due to an increase of outputs. Although there were no significant issues related to technical capacity for operation and maintenance management conditions, there were concerns in terms of institutional aspects such as understaffing and financial aspects such as under-budgeting, which hinders the continuation of appropriate maintenance and management. Therefore, sustainability is rated as fair.

In light of the above, the project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

- On some roads that were supported by this project, there were segments where rural roads and main roads were not completely connected. It was planned that these roads would be maintained by provincial governments after completion of the project. However, they have not been maintained due to problems with budget shortfalls. As a result, smooth passage along these roads has been affected and residents have also voiced their demands for the rehabilitation of these segments. In order to use the target roads effectively, the government should allot an appropriate budget to local governments and follow-up should be conducted by provincial governments in the future.
- On some central roads, the installation of traffic signs is incomplete. With a future increase in vehicles, a rise in the risk of traffic accidents is a concern. Although it is not a serious problem at this time, so that conditions do not worsen in the future, it is recommended that the RDA install signs pertaining to traffic rules, especially those regarding speed limits, etc. In addition, since it is also necessary to raise user awareness at the same time, it would be effective for the RDA to work together with local police and schools on awareness activities.

4.3 Lessons Learned

・Appropriateness of project formation survey period

At the time of project commencement, the number of SP and lengths of target rural roads were reduced as the scope of the project was altered considerably. This was because the original estimate was too general since the survey period implemented was shorter than thought necessary. The initial scope was not realistic in terms of time period and budget, nor were the opinions of local residents fully reflected. As a result, another, more detailed design study was conducted at the time of project commencement and a new scope was set. It was necessary to make the plan more realistic and to secure a sufficient on-site survey period.

・Unique properties of small-scale scattered-type projects

This project covered a wide target area (multiple districts) in which small-scale sub-projects were implemented. From the time of project commencement, various efforts were made in capacity-building for local contractors and implementing agency employees. These included setting the SP at a certain size to create domestic competition, holding seminars to coincide with tendering orientations, and implementing administrative and technical support. As a result, the provincial governments in charge of implementing and managing the SP gained experience in conducting multiple projects simultaneously, and were also given an opportunity to develop their project management abilities. In addition, small local contractors who had not

had the opportunity to be involved in large-scale projects were able to improve their administrative management and technical abilities during the implementation of this project.

Using this type of small-scale scattered-type project, it becomes possible to make a large contribution to the capacity-building of regional government agency employees and contractors, who do not often have the opportunity to be involved in large-scale projects. Therefore, it is effective to incorporate innovations and mechanisms into the project, such as those described above that correspond to objectives so that small contractors are also able to participate.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1.Project Outputs	1) Central Road Number of SP: 26 Length: 263 Km	 28 241 Km
	2) Rural Road Number of SP: 580 Length: 206 Km a) Badulla district Number of SP: 17 Length : 65 Km b)Moneragala district Number of SP: 15 Length: 45 Km c)Hambantota district Number of SP: 11 Length: 64 Km d)Ampara district Number of SP: 15 Length: 32 Km	 83 224 Km 20 53 Km 20 49 Km 16 72 Km 27 50 Km
	3) Consulting Service: 155M/M ・Tendering Assistance ・Technical Support ・Project Supervision & Monitoring ・Project Evaluation	157 M/M As planned
2.Project Period	March, 2007 – March, 2009 (25 months)	March, 2007 – August, 2009 (30 months)
3.Project Cost		
Amount paid in Foreign currency	-	-
Amount paid in Local currency	5,450 million yen (4,816 million Rs.)	4,696 million yen (5,050 million Rs.)
Total	5,450 million yen	4,696 million yen
Japanese ODA loan portion	4,085 million yen	4,085 million yen
Exchange rate	1Rs. = 1.12 yen (As of October, 2006)	Rs. = 0.9 yen (Average between April, 2007 and March, 2010)

Sri Lanka

Ex-Post Evaluation of Japanese ODA Loan
"Walawe Left Bank Irrigation Upgrading and Extension Project (E/S)(I)(II)"

External Evaluator: Hisae Takahashi
Ernst & Young Sustainability Co., Ltd.

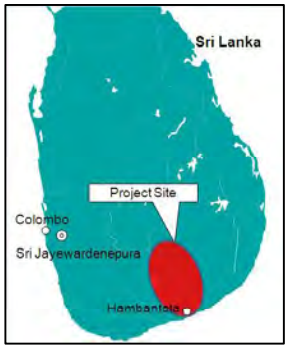
0. Summary

This project aimed to increase agricultural production, promote effective land and water usage as well as settlements in the Walawe left bank by upgrading and extending the irrigation and drainage system, reservoir facilities and social infrastructure, thereby helping improve living standards and boost income and employment opportunities and the regional economy.

The relevance of this project is high, as it is consistent with the priority area of Sri Lanka's development plans and Japan's ODA policy, and it has development needs. The project effectiveness is also high, as developing the irrigation facilities helps farmers obtain sufficient irrigation water efficiently and increase production, not only of paddy but also other food crops (OFC) through crop diversification. Moreover, the impact of the project as mentioned above has also been mostly achieved. The efficiency of the project is fair, as the actual project cost was within budget while the actual project period exceeded the plan. The sustainability of the project is also high as no major problems were observed in terms of institutional aspects, technical capacity, financial status and current O&M conditions.

In the light of the above, this project is evaluated to be highly satisfactory.

1. Project Description



Project Location

Rehabilitated Irrigation Canal

1.1 Background

The Government of Sri Lanka (GOSL) initiated the Uda Walawe Scheme in the early 1960s, targeting irrigation development and settlements in the southern dry zone of the country. The scheme comprised the construction of the Uda Walawe dam on the Walawe river and irrigation systems on

both banks. Subsequently, GOSL self-financed the construction of the Uda Walawe dam and main canals on both banks, which were completed in the 1960s. During the 1970s and 80s, the development of the right bank was prioritized with the support of the Asian Development Bank. Meanwhile, only 4,400 hectares (ha) of 30,000 ha were reclaimed in the northern half of the left bank and the existing irrigation facilities had eroded, collapsed and deteriorated at the time of appraisal, meaning they had to be upgraded and irrigation water management improved. Moreover, the southern half there remains thorny scrub land, where unproductive burn agriculture had been practiced on small patches of land.

Against this background, GOSL decided to complete development of the Walawe left bank, which proceeded for around thirty years to realize the full benefit of past investment and ease the ever-increasing population pressure in the south of the country. Based on a request by GOSL in 1987, JICA, with the collaboration of the executing agency, Mahaweli Authority of Sri Lanka (MASL), implemented a feasibility study from 1991 to 1992 and a detailed design study from 1994 to 1995, whereupon it continued upgrading and extending the irrigation facilities.

1.2 Project Outline

The objective of this project is to increase agricultural production, promote effective land and water usage as well as settlements[1] in the Walawe left bank by upgrading and extending the irrigation and drainage system, reservoir facilities and social infrastructure, thereby boosting living standards, income and employment opportunities and the regional economy.

Loan Approved Amount/ Disbursed Amount	(E/S) 379 million yen / 379 million yen (I) 2,572 million yen / 2,495 million yen (II) 9,393 million yen / 8,711 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	(E/S) June, 1994 / July, 1994 (I) July, 1995 / August, 1995 (II) May, 1996 / October, 1996
Terms and Conditions	(E/S) Interest Rate: 2.6% Repayment Period: 30 years (Grace Period: 10years) ; Conditions for Procurement: General untied (I) Interest Rate:2.6% Repayment Period: 30 years (Grace Period: 10years) ; Conditions for Procurement: Compound untied (II) Interest Rate: 2.3 % Repayment Period: 30 years (Grace Period: 10years) Conditions for Procurement: General untied
Borrower / Executing Agency(ies)	Government of the Democratic Socialist Republic of Sri Lanka/ Mahaweli Authority of Sri Lanka
Final Disbursement Date	(E/S) March, 1997 (I) June, 2003 (II)December, 2008
Main Contractor (Over 1 billion yen)	(I) Korea Heavy Industries & Construction Co., LTD. (Republic of Korea)/Southern Group Civil Constructions (PVT.) LTD.(Sri Lanka)

[1] Promotion of settlement is targeted only in Phase II.

	(II) China National Overseas Engineering Corporation (China)、Sinohydro Corporation (China)
Main Consultant (Over 100 million yen)	(E/S)(I)(II) Nippon Koei Co., Ltd.
Feasibility Studies, etc.	F/S(September,1991–January,1993): Walawe Agricultural Development Planning Survey, Special Assistance for Project Implementation (SAPI)(March 2000) Review on Water Balance in the Uda Walawe Basin and Appropriate Water Use Plan
Related Projects	Project of the Improvement in Rural Infrastructure in the Walawe Left Bank Area (1994-1995): Development of Agricultural Infrastructure (Rural road, bridges, drinking water facilities)

2. Outline of the Evaluation Study

2.1 External Evaluator

Hisae Takahashi, Ernst & Young Sustainability Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: September, 2011 – October, 2012

Duration of the Field Study: January 7 – February 7, 2012 and April 22 – May 7, 2012

2.3 Constraints during the Evaluation Study

Although the Engineering Service (E/S), which was a detailed design study for Phase I, was conducted, information, including details of the output and total actual cost of E/S, was missing, meaning not all the project could be captured.

3. Results of the Evaluation (Overall Rating: A[2])

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance with the Development Plan of Sri Lanka

The Public Investment Plan (PIP)(1990-1994)(1995-1999)[4], which was the development policy of Sri Lanka at the time of appraisal, emphasized "an acceleration in economic growth" and "equal distribution of growth" as its overall goals and cited "investment in infrastructure in rural areas" as the priority for achieving them. In the agricultural sector in particular, 1) improving the self-sufficiency rate of basic food commodities[5], 2) boosting the productivity of tree crops to increase export income, and 3) improving income and employment opportunities in agricultural areas were identified as priority areas. This project was therefore consistent with 1) and 3) among these three areas. The

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[3] ③: High, ②: Fair, ①: Low

[4] PIP (1990－1994) was the national policy as of E/S and phase I. At the time of appraisal for phase II, PIP (1995-1999) was formulated as national policy. The major purposes of the agricultural sector in PIP (1995－1999) are the same as PIP (1990-1994).

[5] Basic foods include rice, sugar, pulses and milk, etc.

"National Policy Framework (1995)", which was formulated as an agricultural policy, also presented self-sufficiency of basic food commodities as primary means and prioritized 1) increasing rice self-sufficiency, 2) improving the living standards of the poor and 3) balancing farmers' income.

The Mahinda Chintana: Ten Year Plan (2006-2016), which is the present development policy, also targets the development of basic infrastructure, which includes irrigation facilities in rural areas, as well as regional development and easing poverty through community development. To achieve these purposes, this policy emphasizes ensuring food security and boosting the income of small scale farmers as priority areas. Moreover, the Ten Year Development for Agricultural Policy, which was formulated in 2007 in line with Mahinda Chintana, clearly states that growth in the agricultural sector is crucial to achieving food self-sufficiency and income distribution as well as eventually reducing poverty. Accordingly, this policy cited goals of 1) increasing food production, 2) expanding agricultural productivity and 3) improving income for the agricultural community and living standards.

As mentioned above, Sri Lanka's development policy consistently prioritized the development of infrastructure in social service area, which is thought to be of direct benefit in improving the self-sufficiency ratio of food and boosting the income of farmers. The project thus corresponds to the national and other relevant development policy of Sri Lanka at the time of appraisal and ex-post evaluation.

3.1.2 Relevance with the Development Needs of Sri Lanka

During the appraisal, the agricultural sector prioritized the attainment of self-sufficiency in rice, which was 40% in the 1950s, rising to 80-90% in the 1980s. However, it remained rather stagnant in the 1990s due to the production decline. As such, no adequate supply of rice emerged and rice production had to be boosted by providing a stable volume of irrigation water to farmers who relied on rain-fed cultivation. The self-sufficiency ratio of rice achieved 100% in the 2000s, as shown in table 1, while crop diversification, which helps increase OFC production as well as reducing food imports, was promoted at the time of ex-post evaluation. As mentioned above, the project has ensured consistency as a project not only targeting increased rice production but also crop diversification, including an increase in OFC production.

Table 1 Self-sufficiency Ratio of Rice in Sri Lanka

1993	2008	2009	2010
83%	117%	107%	114%

Sources: Appraisal documents, Department of Census and Statistics of Sri Lanka

The Walawe left bank had been considered an area of high potential for agricultural development with abundant water sources for irrigation, land and labor forces. Conversely, the income level there was lower than the national average, and it was less developed compared to the right bank, underlining the substantial need to extend the irrigation land and develop social infrastructure as well as agriculture. As of now, a gap in the income level remains between the target area and the national average, although it has declined, as shown in table 2.

Table 2 Average Monthly Income per Household in Sri Lanka

(Unit: Sri Lanka Rupee (Rs.))

Before Project (1991)					After Project (2010)			
National Average	Urban Area	Rural Area	Target Area		National Average	Urban Area	Rural Area	Target Area
			Irrigated Area	Rain-fed area				
4,940	7,633	4,309	3,740	2,250	7,271	9,463	7,032	6,543

Source: Appraisal documents, documents provided by MASL

Note: Data is shown in real terms. The real term is calculated based on the price of a specific year to eliminate price fluctuation. (The base year was taken as 1982.) In nominal terms, the average monthly income as of the ex-post evaluation is Rs.35,495 for the national average and Rs. 31,490 for the target area.

The majority of people residing in the target area are settlers mainly engaged in the agricultural sector and settlement here is still ongoing. Under these circumstances, irrigation facilities and social infrastructure are cornerstones of their lives and the importance of developing such facilities remains high.

3.1.3 Relevance with Japan's ODA Policy

At the time of appraisal, Japan's ODA policy towards Sri Lanka prioritized five areas, namely 1) improving economic infrastructure, 2) industrial development, 3) developing agriculture, forestry and fishing, 4) human resource development, and 5) improving health and medical services. Among these, 1) clearly described the importance of improving social infrastructure to develop the southern area, while 3) underlined the importance of promoting the improvement in agricultural infrastructure, including rehabilitating existing irrigation facilities[6]. Since the project aims to improve living standards and the economy by rehabilitating existing irrigation facilities, its relevance with Japan's ODA policy for the agricultural sector in Sri Lanka is consistent.

Thus, this project has been highly relevant with the Sri Lanka's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Effectiveness[7] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

(1) Production of Crops in the Target Area

Table 3 shows the planned and actual production volumes of each crop in the target areas.

【Paddy】The actual production of paddy, which is a major crop in the target area, exceeded the planned volume in both phase I and II areas. Thanks to the rehabilitated irrigation facilities, sufficient irrigation water is now available year-round in the target area. Farmers have also been able to shift from a one crop to a dual-crop system, which has significantly boosted paddy production. The paddy yield also peaked at 6.7tons/ ha in the phase I area and 6.6t/ha in the phase II area[8], in 2010. However, a certain number of farmers have shifted their major cultivation from

[6] Based on the policy dialogue between Sri Lanka and Japan, which includes an economic cooperation mission dispatched in 1999 from the Japanese government and policy debate. (Source: ODA white paper, 1999, Vol. 2).

[7] Sub-rating for Effectiveness is to be put with consideration of Impact

[8] Source: Data provided by MASL

OFCs to paddy since the soil of many phase I areas is more suitable for cultivating paddy in relative terms than OFC.

【Bananas and Papayas】At present, the target area is famous for banana production in Sri Lanka[9], where the actual production in the phase I area and phase II area exceeds 2-5 times and 3 times respectively compared to the originally planned volume. Though not as popular as bananas, papaya and dragon fruit have also been richly cultivated in recent years. At the time of appraisal, it was not expected that papayas would be produced in the target area, but training for OFC cultivation, such as water management, was implemented under the project as crop diversification was one of its purposes. This training prompted farmers, who were originally unaware of OFC cultivation or lacked relevant experience, to attempt the cultivation of papayas, bananas, vegetables etc.

【Vegetables and Pulses】Vegetable production achieved only 10 to 20% of the planned amount because more farmers tended to cultivate bananas, which are more profitable and easier to cultivate than vegetables for the following reasons: 1) the price of vegetables is more volatile, 2) it is difficult to prevent damage from insects in vegetables compared to bananas. Since the phase II area in particular is famous for banana and papaya production in Sri Lanka, more farmers have shifted to banana or papaya cultivation instead of vegetables or pulses. Actually at the planning stage, the project stipulated the planned pulse production[10] and while actual production exceeded this amount in 2009, it was slightly below the figure in 2010. At the target area, there was no pulse production before the project and it had just started, meaning a certain period will be needed to establish stable production. Although the production of vegetable and pulses was below the planned amount, producing bananas, which is more stable and profitable for farmers, is an appropriate and rational choice as a means of achieving the impact, namely improving the income of farmers by boosting production.

Table 3 Production of Each Crop in the Target Area

【Phase I Area】 (Unit: 1,000kg)

Crops	Baseline	2005	2006	2007	2008	2009	2010
Paddy	Original plan: 24,420						
Maha[Note 1]	21,884	12,712	13,192	14,169	13,850	19,613	20,201
Yala [Note 1]		12,100	13,383	14,235	14,874	16,967	22,950
Total	21,884	24,812	26,575	28,404	28,724	36,580	43,151
Bananas	Original plan : 6,800						
	750	35,748	35,196	35,100	26,184	19,188	15,900
Papayas	No original plan						
	-	1,440	1,188	2,700	2,124	1,260	1,404
Vegetables	Original plan : 13,000						
	12,400	1,200	1,272	1,440	2,268	3,024	3,192

[9] Bananas are produced mainly for domestic consumption.
[10] In the phase I area, no original plan was set for pulse production.

Pulses	No original plan						
	-	543	495	511	854	805	836

【Phase II】 (Unit : 1,000kg)

Crops	Baseline	2009	2010
Paddy	Original plan : 23,430		
Maha	-	16,720	14,120
Yala		9,810	14,321
Total	-	26,530	28,441
Bananas	Original plan : 10,800		
	-	38,184	35,700
Papayas	No original plan		
	-	13,644	23,220
Vegetables	Original plan : 26,000		
	-	4,788	2,904
Pulses	Original plan: 1,110		
	-	1,153	759

Source: Appraisal documents, documents provided by MASL
Note 1: The cultivation period of the agriculture of Sri Lanka is divided into two terms, namely the Mala period (northeast monsoon in October - March) and the Yala period (southwest monsoon in April - September). Rain is brought only to the southwest in the Yala period and to the entire island in the Maha period.
Note 2: Figures don't match in an average or total because of rounding.

As mentioned above, production for each crop except vegetable has steadily increased. Though farmers used to depend on rain-fed cultivation or traditional Chena (burn) cultivation before the project, now dual cultivation has become available due to the rehabilitated irrigation facilities under the project, which spearheaded the increase in crop production. In addition, thanks to the installation of facilities for efficient water usage such as the dual canal system[11], storage tanks and ensuring adequate water usage, farmers can now cultivate not only paddy but also OFC, including bananas and papayas, which farmers could not water before the project[12].


Dual Canal System: The left canal is for paddy and the right canal is for OFC

3.2.2 Qualitative Effects

A beneficiary survey was conducted in the target area[13] to confirm the qualitative effect. 150 farmers, housewives and merchants etc. responded and the following points were confirmed as

[11] The dual canal system is a water management device which provides two separately designed canals, one exclusively for paddy and the other exclusively for OFC. This is intended to promote the cultivation of OFCs to a high percentage by using water more efficiently.
[12] For reference, the rainfall and production amount were confirmed year by year to determine whether they were related. No significant inter-relation was confirmed.
[13] This project covered four blocks located in the Walawe left bank, namely Kiriibbanwewa and Sooriyawewa blocks in phase I and Maurapura and Tissapura blocks in phase II.

results of this survey:

(1) Optimum usage of irrigation water

According to the beneficiary survey result, farmers can now obtain sufficient irrigation water as the irrigation facilities cover a wider area and water leakage has decreased compared to before the project due to the development of irrigation facilities. More than 50% of respondents replied that adequate irrigation water was not available before the project, but this figure has currently decreased to 2% as shown in Figure 1.

Furthermore, the "dual canal system" and "night storage tanks[14]" were first introduced in Sri Lanka under the project and have functioned as water saving techniques and helped encourage optimum usage of irrigation water in the target areas. In addition, the project took the necessary measures to utilize irrigation water efficiently, for example, repeatedly implementing water management training for farmers. In the beneficiary survey, about 93% of respondents answered that rehabilitation or construction of irrigation facilities boosted the efficient usage of water, especially in the phase II area where dual canal systems were installed, while about 93% answered that the installation of the dual canal system had promoted the efficient use of water.

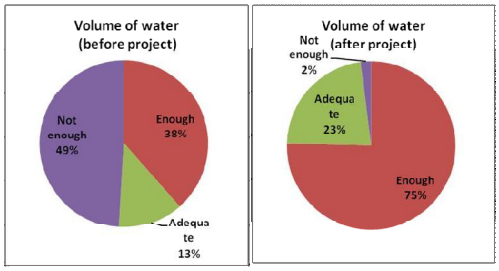


Figure 1 Volume of Irrigation Water before and after the Project

(2) Strengthening FOs' capacity

In the target area, most Farmers Organizations (FOs) were newly organized as most of the farmers in the target area were settlers there. Therefore, at the time of appraisal, there was concern over whether FOs had sufficient capacities to utilize the end irrigation canals appropriately. However, 99% of respondents replied that FOs participated in the operation and maintenance of field canals.

Under the project, the differences caused by currency fluctuations were utilized to implement the Integrated Development Program (IDP). Thanks to the workshops and training implemented as part of IDP, the FO members had opportunities to learn about operating and maintaining field canals, agricultural development, water management, management of FO and income generation methods etc. In other words, the implementation of IDP helped enhance the capacities of FOs. Furthermore, the foundation to utilize the irrigation facilities and maintain their effectiveness was considered to be strengthened through these activities. At the time of ex-post evaluation, a plan including timetables for the water supply to each canal was prepared for all farmers to obtain an adequate volume of irrigation water on a regular basis. As such, it was confirmed that FOs' capacity to utilize the water usage had been enhanced and well established.

[14] The night storage tank is a water storage facility which can store water overnight. Without the night storage tank, water keeps running into canals all night, even if they do not need the water.

3.3 Impact

3.3.1 Intended Impacts

(1) Securing the Stable Food Supply and Saving Foreign Currency

It is difficult to measure the direct relationship between the project and foreign currency saving. However, it was confirmed that rice imports in Sri Lanka at the time of ex-post evaluation decreased by less than half compared to those before the project as shown in table 4[15]. Though the proportion of paddy production in the target area is limited to within 4-5% of the total for Sri Lanka, it is assumed that the increased paddy production in the target area played a certain role in helping reduce rice imports as well as foreign currency saving, albeit to a limited extent.

Table 4 Rice Import in Sri Lanka

(Unit：Thousand ton)

Before project (1993)	After project (2010)
304	126

Source：Data provided by MASL

(2) Improvement in Employment Opportunities and Farmers' Income Level

Table 5 shows the annual average income per person in the Walawe[16] and Mahaweli[17] areas, which has largely increased compared to the pre-project figures. The rate of increase in recent years is even higher for the whole Mahaweli area and the beneficiary survey also shows 98% of respondents stated that their income had increased after the project. The project involved the development of irrigation facilities and various training, including on the usage of irrigation water as well as agricultural development. This support helped boost the income of farmers by increasing production in the target area. Besides, it was assumed that employment opportunities would be boosted by promoting settlers in the phase II covered area by implementing the project. Although no data concerning the employment rate in the target area was available, the number of settlers in the Walawe area increased 1.4 times compared to before the project, as shown in table 6. In this sense, it can be said that the settlement in the target area was promoted by the implementation of the project.

Table 5 Average Income per Person

(Unit：Thousand Rs)

	1996	2008	2009	2010
Walawe	18.3	60.4	58.5	79.0
Mahaweli	15.7[Note]	325.9	304.4	373.7

Note: There is no consistency where the income in Walawe area is lower than that in Mahaweli area. According to the staff of MASL, this is presumably due to simple procedural mistakes.
Sources: MASL, "Mahaweli Handbook"

【Result of the Beneficiary Survey】

Has the household income changed after the project implementation?	Increased	Same	Decreased
	98%	2%	0%

Table 6 Number of Settlers in the Walawe area

Before project (1995)	After project (2010)
30,262	47,512

Source: MASL, "Mahaweli Handbook"

[15] According to the staff of MASL, imported rice is quality rice for hotels or certain special occasions.
[16] The Walawe area includes both the right and left bank areas along the Walawe river.
[17] In Sri Lanka, irrigation facilities are basically under the jurisdiction of the Department of Irrigation. However, the area situated along the Mahaweli river, the longest in Sri Lanka, is under the jurisdiction of MASL. In this report, this area is indicated as the Mahaweli area.

(3) Improvement in Regional Economic Development

The value of agricultural production has continued to rise in both Walawe and Mahaweli areas, as shown in table 7. Since the main industry in these areas is agriculture, the increase in the value of agricultural production is considered to have boosted regional economic development in the target area. Although macro data on a regional level, such as the Gross Regional Domestic Product at a district level was not available in Sri Lanka, 98% of respondents replied that the regional economy had improved due to the project in the beneficiary survey. Furthermore, all respondents answered that the project had promoted agricultural activities in the target area.

Table 7 Value of Agricultural Production (Paddy + OFCs) in the Walawe area

(Unit: Million Rs.)

	1996	2008	2009	2010
Walawe	2,319	11,160	11,021	15,184
Mahaweli	7,359	39,198	33,634	48,028

Source: Planning & Monitoring Unit, MASL, "Mahaweli Handbook"

[Result of the Beneficiary Survey]

Has the regional economy been stimulated by implementing the project?	Yes	No
	98%	2%

Has the project helped promote agricultural activities?	Yes	No
	100%	0%

(4) Poverty Alleviation

Through increased income and the value of agricultural production as explained above, the project helped improve living standards and alleviate poverty. Since the poverty rate of the target area was unobtainable, the executing agency advised that the Hambantota district should be used as a reference for poverty, since it covered a large portion of the target area. The poverty rate in the Hambantota district greatly improved from 31% at the time of appraisal to 6.9% after the project as shown in table 8. However, a number of development projects were implemented in the Hambantota area, including the development of Hambantota port, making it difficult to confirm the direct relationship in data between the project and poverty alleviation.

Table 8 Poverty Rate

	Before project (1995/96)	After project (2009/10)
Hambantota district	31.0%	6.9%
Sri Lanka	28.8%	8.9%

Source: Department of Census & Statistics, "Poverty Indicators"

(5) Improvement in the Living Environment

Farmers in the target area used to make a living by rain-fed cultivation or burned agriculture, meaning their lives were dictated by the weather and thus insecure, given the inability to cultivate crops in dry seasons due to the lack of water. According to interviews with farmers, their life has significantly improved since adequate volumes of water have now become available in a planned

manner, which has allowed them to engage in dual cropping thanks to the irrigation facilities developed under the project. The beneficiary survey also shows results showing that 99% of respondents are satisfied with their living standards after the project.

3.3.2 Other Impacts

(1) Impacts on the natural environment

Under the project, there was consideration of the natural environment, for example an "elephant management and conservation program", including relocating dangerous lone elephants to national parks, installing electric fences, establishing a "tree planting program", "water quality test", "soil conservation" etc. based on an Environmental Impact Assessment". In Sri Lanka, the human-elephant conflict is a serious issue as wild elephants harm houses and crops. Since the population of wild elephants is relatively high in the target area, the "elephant management and conservation program" has eased the problem for farmers and residents in the target area. Though the human-elephant conflict remains an issue in part of the target area, there are no other negative impacts on the natural environment.

(2) Land Acquisition and Resettlement

At the beginning of the project implementation, extended negotiation was required to convince individuals encroaching on the project area to resettle. This was because some resisted leaving the place or others lacked an understanding of the project and thus refused to resettle. Thanks to support from the MASL staff and continued dialogue among them, land acquisition and resettlement was completed amicably, although the smooth implementation of the project was affected. Resettlement was implemented in line with the appropriate process and a certain amount of land was allocated to resettled residents. Most are now engaged in the agricultural sector and cultivate paddy or OFCs in the project area[18].

(3) Unintended Positive Impact (Success as a banana production area)

The phase II area of the project, where agricultural activities had to rely on rain-fed or burn cultivation, is now becoming famous for banana production, which accounts for 15% of total production in Sri Lanka. In the process, the project helped increase banana production and explore the distribution route via diversified support, including not only the development of irrigation facilities but also training in agricultural development and water management, the development of a market and organizing food exhibitions (Refer to Box 1 for more information).

As mentioned above, this project has largely achieved its objectives, therefore its effectiveness is high.

[18] Based on interviews with the executing agency and a site survey.

Box 1: Development and Significance of Banana Distribution in the Walawe Area

【Efforts to Increase Banana Production】

The project phase II area was thorny scrub land and cultivation was not possible in the dry season before the project. Now, however, crops can be produced in this area year-round due to efficient water usage by the developing of a dual canal system, hence this area is now known for its banana production. In the course of the project, project consultants advised farmers that bananas were profitable crops which used less water, and conducted training to transfer the necessary skills for banana production. These activities helped increase banana production, the volume of which is now more than double the originally planned level in the target area.

【Market Route Exploitation】

This project also supported efforts to explore the market route of bananas, for example holding the Walawe Food Exhibition in Colombo, developing a market (Pola) to link producers and buyers, approaching the supermarket (Keells) and offering land and building collecting centers in Keells as part of IDP. Thanks to these efforts, buyers and Keells expanded their business to the Walawe area and bananas produced in the project area are now transported to major cities in Sri Lanka, including Colombo, via various market routes.

【Current Situation of Market Routes】

Bananas produced in the project area are shipped to major cities via major five distribution routes, namely 1) Pola (traditional market), 2) Economic Center (more or less the same as Pola but farmers can find intermediaries between farmers and buyers), 3) Collecting points operated by individuals, 4) Collecting centers of supermarket chains and exporters, 5) Collectors at farm gates.

Pola

Collecting centres of Keells

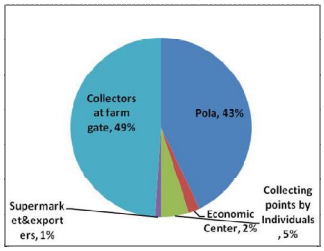


Figure: Proportion of each market route

Table: Price of bananas

Keells collecting centre	Pola, Collecting center, collectors at farm gate
Rs. 35 / kg	Rs. 15–25 / kg

Source: Interview Survey

According to the simplified beneficiary survey and interview surveys, the popular market routes are Pola, which is the traditional and accessible market route and collectors reaching the farm gate, as shown in the figure above. This is because of the reduced burden of transportation costs on farmers. Conversely, collecting centers buy bananas at approximately double the price compared to Pola or other market routes though the proportion is limited to just 1% as shown in the figure. This collecting center was built with the support of the project by offering land and building, thanks to the efforts of MASL and project consultants, whereupon the business in the project area of shipping bananas all over Sri Lanka got underway. Since Keells imposes quality requirements on farmers in terms of shapes and sizes, only member farmers who can satisfy these requirements can sell bananas to this collecting center. In addition, to date only one collecting center for Keells has been established in the project area and member farmers must incur transportation costs, therefore the number of members is limited to 200. However, Keels is now planning to expand the collecting center to increase the volume of bananas since a stable volume of bananas can now be collected year-round in this area.

【Future Prospects】

The volume of banana production in the target area accounts for 15% in Sri Lanka. According to the regional office of MASL, Pola and collecting at the farm gate will remain major marketing routes for farmers who do not prioritize quality when producing bananas or who do not want to pay transportation costs. However, the market route of the Keells collecting center also has the potential to expand business in the target area. Cargils, which is the largest supermarket, has already decided to open a collecting center and plans to ship a larger volume of bananas than Keells. Furthermore, three kinds of bananas are produced in Sri Lanka and farmers in the target area are currently producing the

cheapest kind called Embul since it is the easiest for production. Accordingly, efforts to increase farmers' income e.g. by producing different types of bananas will be made in future.
From the perspective of agricultural development in the Walawe area, if farmers' awareness of factors such as "quality bananas are profitable" "taking more time and effort to produce bananas will increase income" increases as they can see transactions with Keells, this might encourage new settlers or the poor in this area and is expected to help build capacity. In the Walawe area, this can now be seen to emerge.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

The project consists of the following: Engineering Service (E/S), which is a detailed design for phases I, in which irrigation facilities and appurtenant structures were developed for irrigated areas, and phase II, in which developed irrigation facilities and appurtenant structures were developed for a new irrigation area. Table 9 shows the planned and actual outputs of the project.

Table 9: Project Output (Planned/Actual)[19]

【Phase I 】

Item	Planned	Actual
Upgrading and Rehabilitation of irrigation facilities		
・Beneficial Area	・2,900ha	・2,960ha
・Main and Branch Canals	・24.2 Km	・49.8 Km
・Distribution and Field Canals[20]	・162.4 Km	・251.7 Km
Construction of irrigation and drainage system		
・Beneficial Area	・1,040 ha	・1,047 ha
・Main and Branch Canals	・ 9.7 Km	・3.5 Km
・Distribution and Field Canals	・73.1 Km	・121.4 Km
・Drainage System	・15.0 Km	・88.4 Km
Provision of development center and agricultural facilities		
・Agricultural education center	・1 no.	・As planned
・Collecting and shipping center	・2 nos.	・0
・Pola (Market)	・1 no.	・2 nos. (Rehabilitation)
Provision of equipment		
・Heavy machines for facility maintenance	・N/A	・5 machines
・Vehicles for maintenance & communication facilities		・4cars , 8 motorbikes
・Vehicles and tools for working maintenance		・PC, Projector, etc.
Environmental Monitoring and Measures		
・Afforestation	・220 ha	・56.5 ha
・Soil preservation	・1set	・As planned
・Collecting data and monitoring	・1set	・As planned
Consulting Service	・F/S review ・Construction management ・Planning of training 36M/M(Man/Month)	・As Planned 48 MM

【Phase II】

Item	Planned	Actual
Irrigation and drainage extension works		

[19] Details of E/S were not obtained from either consulting firms or the executing agency.
[20] Distribution and Field Canals indicates end irrigation waterways. Each FO member is a farmer in this distribution waterway downstream. Field canals indicate the waterway where the distribution canals exists further in the downstream.

・Beneficial area ・Main and branch canal ・Distribution and Field canal ・Drainage canal ・Storage tank	・5,152 ha ・43.0 Km ・473.0 Km ・407.0 Km ・65 nos.	・4,706 ha ・42.0 Km ・450.0 Km ・601.0 Km ・63 nos.
Provision of Social Infrastructure ・Covered area (Education facilities, health and medical centers and etc.)	・1,454 ha	・1,391 ha
Reservoir rehabilitation ・Upstream riprap and surface preparation ・Toe road ・Renovation of electric system for spillways gate ・Renovation of mechanical system for spillways gate ・Repairs gates, cleaning, painting and provision of water seals	・59,000 m^2 ・3.5 Km ・5 nos. ・1 no. ・5 nos.	・44,816 m^2 ・3.5 Km ・5 nos. ・1 no. ・5 nos.
Operation and maintenance equipment	・1set	・1set
Environment measures ・Fuel wood plantation ・Wild elephant program (Construction of power fence and establishment of jungle corridor) ・Soil Conservation ・Data collecting and monitoring	・1,319 ha ・ 292 ha ・1 set ・1 set	・377 ha ・669 ha ・1 set ・1 set
Consulting Service	・F/S review ・Construction management ・Planning of training 96M/M	・As planned 132 M/M
Integrated Development Program	-	Trainings for water management, agricultural development, strengthening of FO, income generation activities, supporting to installation of collecting centers, etc.

The planned output at the time of appraisal was modified based on the local conditions, and the consequent major modifications were as follows:

【E/S】Analysis for E/S was not possible as data was not available.

【Phase I】

1) Construction of distribution and field canal: During the initial project implementation, the local conditions were re-confirmed, and the depth and length of the canals were modified based on the lifestyles of the farmers and discussion with them. This did not impact on the project but influenced the smooth implementation of civil works.

2) Extension of the drainage system: At the time of appraisal, the scope of drainage systems was formulated referring to the map. However, small canals and farmland, which were not on the map, were confirmed, so the necessary modification, including extension and construction of the drainage system, was made.

3) Construction of a collecting and shipping center: It was cancelled as the functions of the collecting and shipping centers were integrated into Pola.

4) Area for afforestation: The settlement program under the government, which was supposed to be completed before the project, remained ongoing when the project started. Since some people were still living in some of the areas scheduled for afforestation, the project progressed within the areas possible.

5) Consulting services: Based on the extension of the project, the assignment period of the consulting service was also extended. Since consultants played an indispensable role in the course of the project implementation, the increase in the M/M of the consulting services with the extension of the project was considered reasonable and appropriate. Other than this extension, the consulting services were executed as planned without any problems.

【Phase II】

1) Reduction of the beneficiary area: GOSL started a project to develop the Hambantota sea port as a priority task and requested MASL to release a certain land area from the proposed development area of this project. Accordingly MASL decided to release part of the project area for the Hambantota Sea Port Development Project, which resulted in a reduction in the beneficiary area.

2) Extension of the drainage system: Same reason as Phase I

3) Reduction of the afforestation area: Same reason as Phase I

4) Wild elephant program (construction of a power fence and establishment of a jungle corridor): The Walawe area is known for wild elephants and there were many cases of conflict between humans and elephants, including ruined crops in the cultivating area. Accordingly, the area for the power fence and corridor was extended to minimize this damage based on the local circumstances.

5) Addition of IDP: IDP was implemented by utilizing the saving caused by currency fluctuation. It was recommended by the Special Assistance for Project Implementation (SAPI) conducted in 2000, which suggested that as well as appropriate irrigation and social infrastructure, the necessary assistance and training to farmers to improve their incomes and living standards should be supported. Taking account of this recommendation, MASL took the initiative and implemented various activities under IDP, including training farmers in water management, agricultural development and extension, the institutional development of FOs, income generation, etc., by utilizing 445 million Rp. of savings.

6) Consulting services: Same reason as Phase I. In phase II, a consultancy contract was also extended accordingly as a result of the implementation of IDP, particularly in support of training of water management, agricultural development, etc.

3.4.2 Project Inputs

3.4.2.1 Project Cost[21]

The planned project cost was 14,076 million yen (of which the Japanese ODA loan accounted for 11,965 million yen), and the actual total project cost was 13,628 million yen (of which the Japanese ODA loan accounted for 11,206 million yen), which was 3% lower than planned. The reasons why the actual cost was lower than the planned cost, despite the increased scope, was due to the substantial savings in the loan due to the appreciation of the Japanese Yen against Sri Lanka Rupees over the project period. Accordingly, IDP was implemented by utilizing part of these savings (445 million yen) in phase II.

3.4.2.2 Project Period[22]

While the planned project period, including E/S, was 165 months, the actual project period was 243 months, 47% longer than planned[23]. The major reason for this extension was the need to modify part of the construction works based on local circumstances and farmers' requests. In addition, when the project started, considerable time was required for dialogue with people who were illegally occupying the resettlement area, which delayed the project implementation. The commencement of the Hambantota Sea Port Development Project, which was initiated by GOSL, also affected the smooth implementation of this project in phase II. Since the project had to be suspended until the exact land requirement for sea port development had been identified, this delayed the completion of the project works by an additional 3 years or so. However, this delay was unavoidable because MASL needed to comply with the Hambantota Sea Port Development Project, which was initiated by the government as priority work. In addition, the tsunami of 2004 also affected project progress, since it hampered efforts to obtain materials and human resources. The unique issue of the irrigation project was also raised as one of the reasons, since it would ordinarily be necessary to dam canals to construct and rehabilitate irrigation facilities, meaning this work could not be carried out during the cultivation season.

[21] The project cost for E/S was not included in the analysis as the information was not available.
[22] The project period is defined as the period from the signing of L/A to the completion of all work included in the project.
[23] The project period of each phase is as follows. For E/S, the project period was to last from April 1994 to March 1996 (24 months), but the actual project period was from April 1995 to September 1996 (18 months), which was within the planned schedule (75%). Conversely, the project period of phase I was to last from August 1995 to June 2006 (59 months), but the actual project period was from August 1995 to March (80%) which was 30% longer than planned. For phase II, the project period was to last from October 1996 to July 2003 (82 months) but the actual project period was from October 1996 to October 2008, which was considerably longer than planned (177%).

3.4.3 Results of Calculation of Internal Rates of Return (IRR)

The Economic IRR (EIRR) was calculated at the time of appraisal. At the time of ex-post evaluation, when the actual figures were calculated via the same preconditions, the results exceeded the planned values as shown in table 10[24].

Table 10: EIRR

	Original	Plan	Actual
EIRR	15%	19%	21%

Note: Cost = Investment cost, Replacement cost, Maintenance cost, Benefit = Production, Price, Gross income, Production cost, Net Income

As mentioned above, although the project cost was within the plan, the project period was exceeded, therefore efficiency of the project is fair.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

The operation and maintenance (O&M) of major irrigation facilities such as main canals, reservoirs etc., is to be overseen by MASL. The O&M for drainage systems and end irrigation facilities are under the responsibilities of each FO[25], while each of the line ministries has responsibilities for O&M for equipment and social infrastructure. Although there were concerns over the lack of institutional capacity of FOs as they lacked experience in O&M of irrigation facilities at the time of appraisal, a system of unit offices and block offices to support FO in the event of any damage or maintenance has been well established. The support system in the block office also functions well, since each block office includes technical staff, including technical officers, engineering assistants and water masters. In addition, coordination among FOs, unit offices, block offices and regional offices proceeds smoothly and there is no problem in the O&M structure.

3.5.2 Technical Aspects of Operation and Maintenance

MASL, the executing agency and also the responsible entity for O&M of major irrigation facilities, has the technical capacity for the necessary O&M by training technical staff, although this depends on the budget each year[26]. According to the site survey, interview survey and beneficiary survey, no issues of water shortages were confirmed, even at the lower part of the area, since water masters who staffed each block office and FO controlled the water volume based on the plan. It should be noted that project consultants visited the farmers more than 1,000 times as part of the IDP and kept advising on the importance of water management and O&M of the irrigation facilities carefully and eagerly. As such, most FO members were well aware of the importance of water management, maintenance of facilities, bookkeeping, etc. and experienced them by participating in training or workshops under the guidance of the consultants. Therefore, no problems on the technical capacity of FOs were observed.

[24] Only the EIRR for phase II was calculated, since documents showing the precondition of the EIRR calculation for Phase I were not available.

[25] The Walare left bank area is divided into four blocks, which are grouped together as a unit, ultimately forming an FO along each of the end irrigation canals.

[26] It is normally planned once a year.

3.5.3 Financial Aspects of Operation and Maintenance

According to the appraisal documents, the total annual O&M cost needed for the project facilities was estimated at 15 million Rs.[27]. As shown in table 11, the budget of O&M in the Resident Project Manager (RPM) Walawe office for these years has shown an upward trend. According to MASL staff, the O&M budget before 2009 was insufficient but has been increased since 2010 because of growing awareness of the importance of O&M of irrigation facilities in MASL. Under present circumstances, maintenance or rehabilitation work, which is considerably costly, has not been performed for either major irrigation facilities or end irrigation facilities. The cost of O&M or end irrigation canals is covered by the maintenance fund collected as fees from FO members[28].

3.5.4 Current Status of Operation and Maintenance

Both irrigation and other facilities are now fully utilized and no cases of water shortages in the lower area or damage to facilities were confirmed in the observation survey. The irrigation facilities are usually maintained twice a year before the cultivation periods start, and the necessary maintenance for reservoirs and cutting of grass as well as cleaning around facilities is conducted by FO on a voluntary basis. Basically, since the farmers are beneficiaries and understand the importance of facilities and the change in their living standards after the project, their involvement in the maintenance activities is significant, hence the maintenance is appropriately made.

One concern for the future is O&M for power fences for elephants, since maintaining a long fence is very costly and there are some cases which FO cannot afford. Therefore follow up from MASL on a regular basis will be expected. In addition, the number of farmers cultivating paddy has shown a tendency to increase recently, possibly resulting in a shortage of irrigation water in future, since paddy cultivation requires a relatively larger volume of water compared to OFC. Hence, it is necessary to observe the situation carefully, though no serious cases have yet been confirmed.

No major problems have been observed in the operation and maintenance system, therefore sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aimed to increase agricultural production, promote effective land and water usage as well as settlements in the Walawe left bank by upgrading and extending the irrigation and drainage system, reservoir facilities and social infrastructure, thereby helping improve living standards and boost income and employment opportunities and the regional economy.

The relevance of this project is high, as it is consistent with the priority area of Sri Lanka's development plans and Japan's ODA policy, and it has development needs. The project effectiveness is also high, as developing the irrigation facilities helps farmers obtain sufficient irrigation water

[27] Source: Appraisal documents
[28] Price of the collection fee differs from FO to FO within the range 200 to 620Rs per cultivation season.

efficiently and increase production, not only of paddy but also bananas, through crop diversification. Moreover, the impact of the project as mentioned above has also been mostly achieved. The efficiency of the project is fair, as the actual project cost was within budget while the actual project period exceeded the plan. The sustainability of the project is also high as no major problems were observed in terms of institutional aspects, technical capacity, financial status and current O&M conditions.

In the light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

- Facilities supported by the project are well-maintained and effectively utilized under the appropriate management of farmers. However, maintaining the power fence is very costly and there are some power fences which FO cannot afford. Wild elephants are liable to harm humans as well as disrupt agricultural activities without a power fence in the target area, hence MASL is expected to monitor and support the O&M of the power fence on a regular basis.
- The effect will be reduced if knowledge of the proper use of irrigation facilities as well as the capacity to conduct proper maintenance are not at an appropriate level. Therefore, IDP was implemented in addition to the training originally planned under this project. Moreover, training or workshops under IDP, such as water management, institutional management and agricultural development, etc., were repeatedly conducted with the eager and polite support of consultants. This was highly effective in ensuring sustainability because farmers first understood the meaning or importance of maintenance and then acquired knowledge and experience through such training or workshops. In the phase II area, it is recommended that FOs and MASL actively take initiatives to share knowledge and experience on the importance of maintenance and efficient usage of irrigation facilities with new settlers.
- In this evaluation, no record of detailed information such as the project cost of E/S was available in either Japan or Sri Lanka. Such a record must be maintained, however, since E/S was conducted as a detailed design for phase I and E/S. For future projects, an improved and sound project management system is expected as well as operating and information management of the same.
- Irrigation facilities are fully utilized in the project area and sustainability has also been ensured with sufficient water reaching the lower area. This was partly thanks to the patient work of consultants and MASL to encourage farmers to understand the importance of agricultural development, water management and skills in producing crops such as bananas, etc. Although these activities were additionally implemented as part of IDP, which was not included in the original plan, they supported efforts to ensure good practice, whereby training with the ceaseless and careful support of consultants and executing agencies will help ensure effectiveness and sustainability. These activities and components are also expected to continue in the target area and be included in the project plan for future similar projects.

4.3 Lessons Learned

- This project started civil work on the one hand, and also involved dialogue with farmers. It turned out some modification was needed based on the lifestyle of farmers having delayed the project implementation. Furthermore, discussion with those who illegally occupied the project land took a long time and also delayed the project. Taking time to discuss with local people and ensuring mutual understanding is critical for the project implementation. Accordingly, a process which reflects the needs of beneficiaries, for example holding a briefing session or workshop, must be taken at the planning stage, to avoid such problems.
- This project is evaluated as highly satisfactory in terms of full effectiveness. Key to this result was the installation of irrigation facilities, which optimally exploit a water saving approach. Sufficient water has been provided to the target area, which was originally barren, due to the installation of new facilities which meet the needs of beneficiaries, e.g. a dual canal system targeting both increased paddy and OFC, storage tanks, etc. Thus, it is effective to install facilities which are designed to meet local needs and circumstances in order to retain sustainability.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1.Project Outputs 【Phase I】	Upgrading and Rehabilitation of irrigation facilities	
	・Beneficial Area : 2,900 ha	2,960 ha
	・Main and Branch Canals : 24.2 Km	49.8Km
	・Distribution and Field Canals : 162.4Km	251.7Km
	Construction of irrigation and drainage system	
	・Beneficial Area : 1,040 ha	1,047 ha
	・Main and Branch Canals: 9.7 Km	3.5 Km
	・Distribution and Field Canals: 73.1 Km	121.4 Km
	・Drainage System: 15.0 Km	88.4 Km
	Provision of development center and agricultural facilities	
	・Agricultural education center: 1 no.	As planned
	・Collecting and shipping center: 2 nos.	0
	・Pola (Market): 1no	2 nos(rehabilitation)
	Provision of equipment N/A	
	・Heavy machines for facility maintenance	5 machines
	・Vehicles for maintenance & communication facilities	4 cars, 8 motorbikes
	・Vehicles and tools for working maintenance	PC, Projector, etc.
	Environmental Monitoring and Measures	
	・Afforestation: 220 ha	56.5 ha
	・Soil conservation	As planned
	・Collecting data and monitoring: 1 set	As planned
	Consulting Service 36M/M (Man/Month)	48 MM
	・F/S Reviews	As planned
	・Construction management	As planned
	・Planning of training	As planned
【Phase II】	Irrigation and drainage extension works	
	・Beneficial area: 5,152 ha	4,706 ha
	・Main and branch canal: 43.0 Km	42.0 Km
	・Distribution and Field canal: 473.0 Kn	450.0 Km
	・Drainage canal: 407.0 Km	601.0 Km
	・Storage tank: 65 nos.	63 nos.
	Provision of Social Infrastructure	
	・Covered area (Education facilities, health and medical centers and etc.): 1,454 ha	1,391 ha
	Reservoir rehabilitation	
	・Upstream riprap and surface preparation: 59,000m^2	44,816 m^2
	・Toe road: 3.5 Km	As planned
	・Renovation of electric system for spillways gate: 5nos.	As planned
	・Renovation of mechanical system for spillways gate: 1 no.	As planned
	・Repairs gates, cleaning, painting and provision of water seals: 5 nos.	As planned
	Operation and maintenance equipment: 1 set	As planned
	Environment measures	
	・Fuel wood plantation: 1,393 ha	377 ha
	・Wild elephant program (Construction of power fence and establishment of jungle corridor): 292.2 ha	669.0 ha
	・Soil Conservation: 1 set	As planned
	・Data collecting and monitoring: 1 set	As planned
	Consulting Service: 93M/M	132 M/M
	Integrated Development Program : N/A	Trainings, income generation activities, installation of collecting center, etc.

2.Project Period 【E/S】	April 1994 – March 1996 (24 months)	April 1995-September 1996 (18 months)
【Phase I】	August 1995 – June 2000 (59 months)	August 1995 – March 2002 (80 months)
【Phase II】	October 1996 – July 2003 (82 months)	October 1996 – October 2008 (145 months)
3.Project Cost 【E/S】 Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	 306million yen 157 million yen (71 million Rs) 463 million yen 379 million yen 1Rs = 2.22 yen (N/A)	 No information
【Phase I】 Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	 1,435 million yen 1,591 million yen (784 million Rs.) 3,026 million yen 2,572 million yen 1Rs = 1.93 yen (N/A)	 1,818 million yen 1,205 million yen (971 million Es.) 3,023 million yen 2,495 million yen 1Rs = 1.06 yen (Average between August, 1995 and June 2003)
【Phase II】 Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	 6,253 million yen 4,797 million yen (2,485 million Rs.) 11,050 million yen 9,393 million yen 1Rs. = 1.93 yen (N/A)	 5,098 million yen 5,507 million yen (5,195 million Rs.) 10,605 million yen 8,711 million yen 1Rs. = 1.06 yen (Average between October, 1996 and December, 2008)

Indonesia

Ex-Post Evaluation of Japanese ODA Loan Project
"Batang Hari Irrigation Project"

External Evaluator: Masami Sugimoto
Shinko Overseas Management Consulting, Inc.

0. Summary

The objective of this project is to increase agricultural production and productivity by constructing irrigation and related facilities, conducting farmland development and the agricultural extension services program in West Sumatra and Jambi Provinces in Sumatra Island, and thereby contribute to the maintenance of self-sufficiency in food, increases in farmers' incomes, and improvement of their living standard.

The project is consistent with the purpose of the national development and agricultural sector development plans of Indonesia that attach importance to holistic agricultural development as a base for economic development coupled with the food security. It is also consistent with the total national development policy and meets the nation's development needs. It has a partial problem, however, in its project formulation which placed too much emphasis on rice production. Therefore the project relevancy is moderate. Efficiency of the project is also moderate due to implementation delays; however, the effectiveness and impact are high in meeting agricultural as well as other comprehensive regional water demand by creating multipurpose water resources and contributing to the improvement of people's living standard through increases in their incomes and the economic and social development of the region. Though some problems have been observed in financial sufficiency for the facilities' operation and maintenance as well as in maintenance conditions of the tertiary canals, sustainability of the project is fair.

In light of the above, this project is evaluated to be partially satisfactory.

1. Project Description

Project Location

Completed Batang Hari Weir

1.1 Background

The Batang Hari River rises at the Highlands of Minan Kabau of the West Sumatra Province, having a total length of 800km with its catchment area of about 5 million hectare, which is the second largest in Indonesia. Having commenced in the Dutch colonial era, a transmigration policy, to remove people in densely populated Java and Bali to outer islands, has been consistently followed since independence in 1945. At the start of the national first five-year plan (1969 ~ 1973), the government accelerated its implementation. The Sumatra region is one of the major absorbers, and Batang Hari region has been also receiving a number of Javanese farmers.


Flow of Batang Hari River Mainstream

This project was initially planned to accommodate migrants under the relocation program from the site of Wonogiri Dam in Central Java, which was constructed under Japan's ODA loan assistance in 1981. The Sitiung region which was selected for this project site is located at the right bank of the upstream Batang Hari River stretching across West Sumatra Province into adjacent Jambi Province at an average elevation of 70 ~ 100m. The region accepted about 4,000 households from Wonogiri until 1988 and about 3,000 households from other areas. As part of the water resources policy for the approximately 3,000 hectares of rain-fed paddy fields allocated to the migrants, a pump station to directly draw Batang Hari River water was installed under World Bank financing, and in addition three units of weirs were constructed at three small tributaries, the Palangko, Piruko and Siat streams. However mechanical troubles occurring in three out of the six installed pumping-up facilities, coupled with the extreme water flow decrease of the three tributaries in the dry seasons resulted in serious irrigation water scarcity in the settlements.

To break through this situation, a 1980s era plot to construct a weir at the mainstream of Batang Hari River was reconsidered and crystallized into this project. The Project was to supply irrigation water throughout the planned region as a whole with water resources from the newly constructed Batang Hari Weir and three existing tributary weirs based on the feasibility study conducted in 1992 by the Indonesian government, "Batang Hari Weir and Irrigation Development Project." The first Japanese ODA loan was provided in November 1993 for detailed study and design-engineering services prior to the project. Under such a background, this project was planned to address the national policy to efficiently use the existing irrigation facilities and increase the irrigation areas for the purpose of self-sufficiency in rice and other food crops in Indonesia.

1.2 Project Outline

The objective of this project is to increase agricultural production and productivity by constructing irrigation and related facilities, conducting farmland development and the agricultural extension services program in West Sumatra and Jambi Provinces in Sumatra Island, thereby contributing to maintenance of self-sufficiency in food, increases of farmers' incomes, and improvement of their living standard.

Approved Amount / Disbursed Amount	(E/S) 676 million yen (I) 6,050 million yen (II) 7,639 million yen (Total) 14,365million yen / (E/S) 483 million yen (I) 6,024 million yen (II) 6,351 million yen (Total) 12,858 million yen
Exchange of Notes Date / Loan Agreement Signing Date	(E/S) October, 1993 (I) December, 1996 (II) March, 2001 / (E/S) November, 1993 (I) December, 1996 (II) July, 2001
Terms and Conditions	(E/S) Interest Rate: 2.6%, Repayment Period: 30 years (Grace Period: 10 years) Procurement: Partially Untied (I) Interest Rate: 2.7% (For Consulting Service Portion: 2.3 %), Repayment Period: 30 years (Grace Period: 10 years), Procurement: General Untied (II) Interest Rate 1.8% (For Consulting Service: 0.75%), Repayment Period 30 years (Grace Period: 10 years), Procurement: Compound
Borrower / Executing Agency	(E/S) Republic of Indonesia / Directorate General of Water Resources, Ministry of Public Works (I)(II) Republic of Indonesia / Directorate General of Water Resources, Ministry of Public Works/ Directorate General of Food Crops, Ministry of Agriculture
Final Disbursement Date	(E/S) December 1999 (I) December 2002 (II) October 2009
Main Contractor (Over 1 billion yen)	(I) PT.Batanghari Perdana, PT. Pembangunan Perumahan (II) PT. Nindya Karya, PT. Hutama Karya, PT. Waskita Karya, PT Sac Nusantara (all Indonesia)
Main Consultant (Over 100 million yen)	(E/S) Nippon Koei (Japan) (I) Nippon Koei (II) Nippon Koei (Japan), PT. Wiratman & Associates (Indonesia), PT. Mettana Engineering Consultant (Indonesia), PT. Virama Karya (Indonesia), PT. Trans Intra Asia (Indonesia)
Feasibility Studies, etc.	Feasibility Study for Sungai Dareh, Sitiung Irrigation Project (August 1979, World Bank) Sungai Dareh Sitiung Irrigation Project Integrated Rice Rubber Study (July 1980, World Bank)

	Updating Feasibility Study Bendung Batang Hari serta Pengembangan Irigasinya (1992, Government of Indonesia)
Related Projects	"Survey for Maximum Utilization of Irrigation Water in the Republic of Indonesia" (2012, JICA)

2. Outline of the Evaluation Study

2.1 External Evaluator

Masami Sugimoto, Shinko Overseas Management Consulting, Inc.

2.2 Duration of Evaluation Study

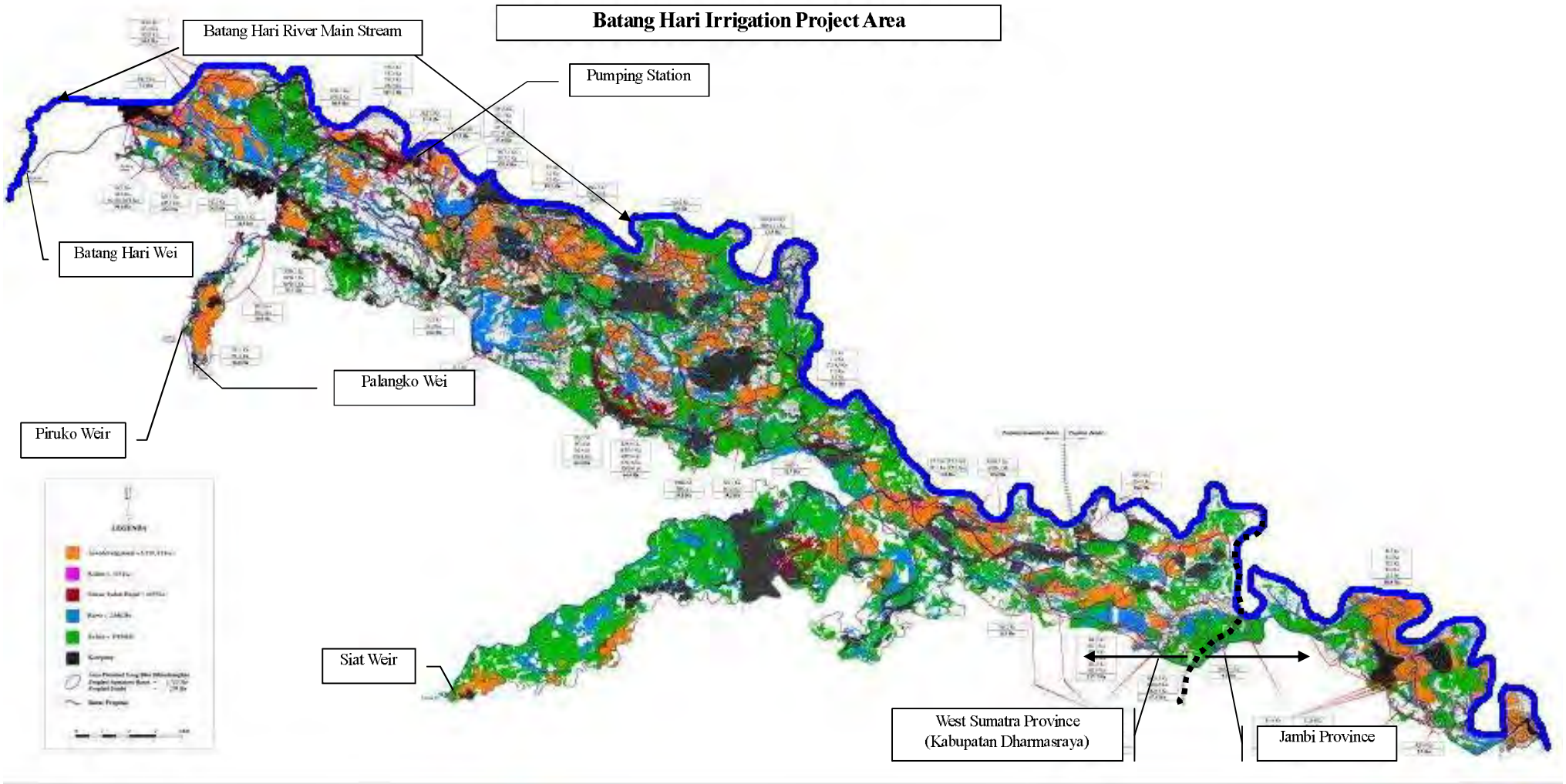
Duration of Evaluation Study: September 2011 ~ October 2011

Duration of the Field Study: January 15 ~ 28, 2012, March 24 ~ April 1, 2012

2.3 Constraints during the Evaluation Study

1) The project was implemented under three consecutive ODA loans initiated by the Engineering Services (E/S) Loan. However, its record, including the cost information, was not kept by the implementing agency; therefore nothing about that portion could be captured.
2) No operation and effect indicators of relevant agricultural production are available after project completion for the project region. What are available are the kabupaten or district-based BPS (Badan Pusat Statistik: Statistics Indonesia) statistics originated by the Agricultural Office of Kabupaten (District) Government which can not be consistently compared with the ones before the project completion. In addition, Kabupaten Dharmasraya of West Sumatra Province, to which the major part of the project area belongs, is a new municipality born in January 2004 as the region of the Batang Hari Irrigation project and the adjacent area separated from Kabupaten Sawahlunto and Sijunjung; therefore, consistent BPS Kabupaten statistics, including agricultural data, exist only after the year 2004, which prevents their quantitative comparison with previous statistics.
3) The water supply that became available to the project region, mainly located in Kabupaten Dharmasraya, West Sumatra Province, is used not only for agricultural production but is eventually used to satisfy a wider range of regional water demands, contributing to the economic and social development. However, the initial project purpose was limited mainly to the rice production, and no operation and effect indicators have been taken, other than rice-related items, to provide quantitative information on the project's other realized effects and impacts.[1]

[1] Performance indicators set out in the study entitled "Establishment of Performance Monitoring Indicators and Re-evaluation of Economic Viability" (former JBIC: Japan Bank for International Cooperation, October, 2000) are also rice-related ones. The economic viability of the project was reviewed by means of EIRR (Economic Internal Rate of Return) (cf. Section 3.4.3 Internal Rate of Return (IRR) (for reference))


Batang Hari Irrigation Project Area
Batang Hari River Main Stream
Pumping Station
Batang Hari Wei
Palangko Wei
Piruko Weir
Siat Weir
West Sumatra Province
(Kabupatan Dharmasraya)
Jambi Province

3．Evaluation Results (Rating: C[2])

3.1 Relevance (Rating: ②[3])

3.1.1 Relevance with the Development Plan of Indonesia

3.1.1.1 Relevance at Appraisal

The sixth Five-year Development Plan of Indonesia (REPELITA VI, 1994/5~1998/9) set a purpose, among others, of growth and diversification of agricultural production with quality improvement and productivity increases, aiming at improving the living standard of farmers' society and emphasizing the importance of expansion of total irrigation capacity to achieve it. The Five-year National Development Plan (PROPENAS, 2000~2004), which was the succeeding plan of REPELITA after the economic crisis in 1998, aimed at "beating poverty and satisfying people's basic human needs." It emphasized as important policy measures the increase of agricultural production, agricultural diversification to meet the demand of agro-industries to increase farmers' incomes, among which expansion of rice and other food crops production and diversification of plantation products were attracting focused importance. To achieve those targets, irrigation development was going to proceed to satisfy increasing agricultural water demand by implementing the "Water Resources Development and Utilization Program."

3.1.1.2 Relevance at Ex-Post Evaluation

The 20-year long-term national development plan (RPJP, 2005~2025) formulated in 2005 sets out policy targets to (1) maintain 90% rice self-sufficiency at the minimum, (2) increase animal protein ingestion, (3) diversify the food consumption structure to alleviate excessive dependence on rice; it also makes much of the comprehensive development of the agricultural sector in a broad sense (including food and plantation crops, fishery and forestry) as a basis for economic development coupled with the food security requirement. Also, in its second phase, the National Medium-term Development Plan (RPJMN, 2010~2014), stresses the activation of the consolidated sector encompassing agriculture, fishery and forestry (PPK Sector) together with the food security. On the other hand, the Long-term Agricultural Development Plan (2005~2025) advocates the "creation of household-based agricultural industry" as one of the twelve policy directions; and for fishery, it encourages and supports domestic aquaculture in line with PNPM Mandiri, the central sub-program of the poverty alleviation national program entitled "National Program for Community Empowerment (PNPM)." The government has been conducting "Minakera" and "Mina Padi" programs[4] within that framework throughout the

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[3] ③: High, ②: Fair, ①: Low

[4] "Mina" and "Kena" mean "Aquaculture" and "Non-farm land including "Pekarangan <home garden>" respectively in Javanese. "Padi " is "Paddy" in English. Therefore "Minakena" and "Mina Padi" is the promotion of domestic aquaculture in vacant plots of farm households. The kabupaten government of Dharmasraya is also actively con-

country. This policy framework is considered development support for agro-forestry[5], which consolidates agriculture, forestry, fishery and animal husbandry.

It can be concluded that the project is consistent with the development policies of Indonesia, both at appraisal and ex-post evaluation.

3.1.2 Consistency with the Development Needs of Indonesia

3.1.2.1 Consistency at Appraisal

According to the "Study for Program Formation of Nationwide Irrigation Development" (1993) by JICA, national rice consumption was estimated to total 66,232 thousand ton by 2018, and to self-satisfy that demand, rice production would need increase 15,232 thousand ton by then through continuous irrigation development, strengthened provision of producers' goods, and dissemination of agricultural technology. From the regional perspective, the total population of West Sumatra Province was about 4.3 million with the annual rate of growth at 1.3%, while the share of agriculture was higher than 40% of the GRDP (Gross Regional Domestic Products). West Sumatra Province was supplying other adjacent provinces with 8 million tons of rice. Its position as an important domestic rice supplier necessitates the Province's effort to continuously increase its rice production to meet said demand.

Since 1976, a total of 7,000 households from Java Island had transmigrated to the projected irrigation area. However the available irrigated area for rice production was limited to only 4,983ha, about one third of the 12,650ha which was potentially irrigable, forcing migrants to resort to unwilling cultivation of rubber and cassava instead, which were possible with less water. The low unit rice yield also required intensive effort for irrigation development to raise the rice production and productivity by a large extent. The projected irrigation area was designated to cope with the relocation urged by the Wonogiri Irrigation Project in Java Island, therefore, the necessity of developing irrigation to arrange farmland for the coming migrants was especially urgent.

3.1.2.2 Consistency at Ex-post Evaluation

Although the initial plan was mainly targeted to cope with receiving transmigration of Java farmers caused by the construction of the Wonogiri Multipurpose Dam, as a newly developed area after accepting the transmigration, it came to encounter multiple water demands not only for rice production, as will be discussed in the following section of "Effectiveness and Impact."

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ducting organization of fish farming groups which utilize water resources from this project with technical guidance and financial support.

[5] Though various definitions are prevailing, it is defined here as a land use or production system combining agriculture, stock farming, forestry and aquaculture from many angles centering around crop production. (cf. "Symposium on Agro-forestry: Significance and possibility for sustainable regional and global development (Japanese)" Ministry of Foreign Affairs, Japan http://www.mofa.go.jp/mofaj/area/latinamerica/agroforestry_gs.html)

Consequently the project turned out to satisfy higher-level regional development needs as comprehensive water resource facility rather than those solely for rice production.

Kabupaten Dharmasraya, which is the main district of the project area, has much expected of it as a selected priority area for developing fish farming to supply animal protein for food consumption as promoted by the government, in addition to rice and other food crops. The development need of this project to construct a leading facility to supply water for that purpose is significant from the viewpoint of the food security issue.

3.1.3 Relevance with Japan's ODA Policy

Japan's Medium-term Policy on Official Development Assistance (ODA) 1999 enacted based on the ODA Charter in 1992 announces in the section for "Responding to Global Issues (3) Food," standing on the objective to achieve global food security agreed upon in the World Food Summit 1996, that it is important for poverty alleviation and self-sustained development to support the food-agriculture sector and rural development, and it expresses an intention to support irrigation development and other agricultural infrastructure improvement. The operational policy for implementing ODA of the former JBIC (Japan Bank for International Cooperation) also listed the social and economic infrastructure development as an integral area for assistance to Indonesia and placed agriculture as an important pillar in its country assistance policy (September 2000).

3.1.4 Summary of Relevance

The project is to support the national policy of Indonesia for agricultural and national economic development, emphasizing sustained food security and diversification of food consumption and attempts to cope with multiple water demands of the newly developed project region. From that aspect, relevance of the project can be judged high at the time of ex-post evaluation. As for the rice self-sufficiency in the context of the food security, the following Table 1 shows the recent situation annually.

Table 1: Annual Trend of Rice Self-Sufficiency in Indonesia

(Unit: 1,000 ton in Rough Rice)

	2007	2008	2009	2010	2011
Production	37,000	38,310	36,370	36,900	37,600
Consumption	36,350	37,100	38,000	38,850	39,140
Import	350	250	1,150	1,750	400
Production / Consumption	102%	103%	96%	95%	96%

Source: "World Markets and Trade," USDA (US Department of Agriculture)

From the above fact that rice self-sufficiency has been maintained at a point exceeding the targeted national minimum of 90% by a good margin, the rice production increase required from the viewpoint of food security became less significant in Indonesia as a whole compared to its two other RPJP objectives specified in section 3.1.1.2. Additionally, rice production in West Sumatra Province only accounts for 3.3% of the total in Indonesia, of which the share of Kabupaten Dharmasraya, to which the major part of the project area belongs, is minimal at 2.6% (0.9% in Indonesia total). Therefore the influence of this project on the national rice self-sufficiency of Indonesia turns out to be insignificant.

In the above context, the significance of this project should be regarded as the creation of the water resources to satisfy the regional multi-purpose water demands. Although this project was initiated to meet the requirement for preparing a settlement to receive Java rice farmers, the original project design as only for rice irrigation facilities was hardly relevant. As has been discussed, therefore, it is considered appropriate to have considerably reduced its originally targeted irrigation area (cf. Table 2) and sought and promoted other water uses than rice irrigation[6]. However, discussions between the Indonesian government and JICA and consequent reconsideration had not been satisfactorily made on such issues as the change in project needs during the project implementation, partial correction of the project purpose in accordance with the diversified project needs, and establishment of an updated effect and impact monitoring system. The above mentioned issues should have been dealt with in the project supervision during the implementation and reviewed to adjust the project precisely to the updated external conditions.

It was judged inappropriate to have fixed the project purpose to supply irrigation water only for rice production and never properly reviewed the prevailing conditions. Therefore the project was partly irrelevant with development needs, and its relevancy is moderate.

3.2 Effectiveness[7] (Rating: ③)

As stated in Section 3.1.2, the purpose of this project is to increase production and productivity of rice and other agricultural products, and thereby contribute to the increase of farmers' income and their living standard. It was also confirmed in Section 3.1.1.2 that the current Indonesian long-term (RPJP 2005~2025) and medium-term (RPJMN 2010~2014) development plans

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[6] There have been several discussions and actions taken in that direction such as, among others, the recommendations of the Mid-term Review in 2007 by former JBIC (Japan Bank for International Cooperation); and agreement between the Ministry of Public Works and Kabupaten Dharmasraya on diversified use of surplus water for production of clean water, aquaculture, mini-hydro electric generation, etc. in 2010 and JICA's "Survey for Maximum Utilization of Irrigation Water in the Republic of Indonesia" in 2012. This Ex-post evaluation takes an aggressive stance that the initial perspective limiting its scope to mere rice production was not realistic and more effective uses should be actively sought regarding the purpose of this project as overall water resources to meet various water needs prevailing in the region, rather than an inactive stance to passively consider other uses of the redundant water because the demand for paddy irrigation had shrunken.

[7] Sub-rating for Effectiveness is to be put with consideration of Impact

regard the agricultural sector in the broader sense as a wide-range primary industry involving food and estate products, fishery and forestry. Section 2.3 3) above mentioned that the project management during the implementation phase included monitoring by means of operation and effect indicators concentrating only on rice production. However, the project's effects and impacts widely encompass an extended scope of non-rice agricultural production and other economic and social spheres, and they have been contributing to the project's higher objectives represented by increases in the regional people's income and general standard of living by way of different scenario that had not been originally expected. Therefore, the ex-post evaluation also takes those factors to measure project's effect and impacts.

3.2.1 Quantitative Effects (Operation and Effect Indicators)

The project almost realized the total irrigable area as was planned. However, due to the economic, social, technical institutional and administrative constraints listed in Section 3.4.1 1 for rice irrigation, the completed length of the tertiary canals and the total area of land development were only 36% of the planned. Consequently, both the total rice cultivation area and production resulted in considerably behind the targeted level at the project appraisal.

Table 2: Operation Indicators

Indicators	(1) Baseline (1996)	(2) Target at Appraisal (2007)	(3) Amended Target (2011) (Note 1)	(4) Realized Performance (2011)
Total Irrigable Area (ha) （Note 2）	-	18,733	18,936	18,936
Realized Irrigation Area (ha)	(Rainy Season)4,983 (Dry Season)1,250	18,733	6,682	6,779

(Source) (1) (2) JICA appraisal documents, (3) JICA internal documents, (4) Dinas Pertanian (Kabupaten)

(Note 1) It was recognized during the project implementation that the targeted irrigation area of the initial plan would not be achievable due to the various adverse factors listed in Section 3.4.1, 1 below, and became inevitable to drastically reduce the original figure. ("Mid-term Review Report" 2007, JICA) The amended figure is shown in JICA internal documents.

(Note2) Total area of irrigable paddy fields realized by the completion of main irrigation facilities (Batang Hari Weir, trunk canals and drainages, etc.)

Table 3: Effect Indicators

Indicators	(1) Performance at Appraisal (1996)	(2) Target at Appraisal (2013)	(3) Amended Target (2011)	(4) Performance (2010) (Note 1)
Rice Planted Area (ha)	(Rainy Season) 3,772 (Dry Season) 3,772	(Rainy Season) 18,733 (Dry Season) 18,733	6,682	8,278
Rice Production (ton)	(Rainy Season) 10,977 (Dry Season) 9,430	(Rainy Season) 93,330 (Dry Season) 75,695	53,957	37,523
Unit Rice Yield (ton/ha)	(Rainy Season) 2.9 (Dry Season) 2.5	(Rainy Season) 4.5 (Dry Season) 3.7	4.5~5.0	4.33
Gross Agricultural Revenue (1,000 rupiah)	(Rainy Season) 1,004 (Dry Season) 863	(Rainy Season) 1,553 (Dry Season) 1,277	-	21,871 (Note 2)

(Source) (1) (2) JICA appraisal documents, (3) JICA internal documents, (4) BPS (Kabupaten) statistics (Aggregated figure of Kecamatans which involve the project area)

(Note 1) As explained in Section 2.3 2), statistics relating to the effect indicators of the project area have been replaced by the municipality (Kabupaten)-based ones after the project completion. Figures in (4) are the referential approximations aggregating the figures of Kecamatans (sub-districts) which involve the project area, therefore not directly consistent with the previous figures in the left columns. Those are yearly figures since the seasonal (rainy and dry) data are unavailable.

(Note 2) Statistics of BPS (Kabupaten) do not take this indicator. This figure is the gross agricultural revenue per household in 2009 reported in a JICA internal document.

The JICA Mid-term Review (cf. footnote 6) points out the following factors that have caused the unsatisfactory results above: the economic factor of steep price increases in estate crops during the project implementation that lessened the incentive for rice farming; social factors such as obstacles for land development derived from unclear land ownership of communal lands, difficulty in arbitrating conflicts of interest between immigrants and natives; consequent technical and institutional factors making the secondary to tertiary canal connections difficult; and an administrative factor of newly established immature organizational management capacity. However, as will be discussed in the following Section (1), although the performance of rice production could not achieve the target mainly due to a bottleneck of fertilizer supply, the performance of other indicators exceeds the amended targets. The unit yield successfully attained the initial target at the appraisal as well.

Primary Canal
Functioning as a Regional River

Tertiary Canal
Extending to Farm Fields

(1) Impact Study conducted within Project

Coupled with the physical construction of irrigation facilities, the project extended the Agricultural Extension Services Program (AESP) which organizes ten Tertiary Development Units (TDUs) and extends assistance to them by supplying agricultural machines for group farming and stationing permanent extension workers. The project conducted a baseline survey taking samples of 120 rice farmers from nine TDUs located in Kabupaten Dharmasraya in 2003 and an ex-post study in 2008 asking same questions to the same respondents. The following study results indicate that the contribution of the irrigation system by the project is obvious for rice production.

(a) The rate of irrigated farms increased from 25% (baseline) to almost 100% (at Ex-post study)

(b) Insufficiency of water, the top-ranked bottleneck for agricultural production at baseline, has disappeared as a disturbing factor except minor numbers of respondents at the ex-post study.

On the other hand, the volume and area of rice production at the ex-post study have declined from the level of the baseline. Table 4, which shows the regional rice production trend in West Sumatra Province, also indicates this phenomenon. Rice production in 2009 and 2010 was less than the level of 2008 only in the project region. In terms of unit yield, as well, it is only 3.27 ton/ha, much less than the BPS statistics (cf. Table 3) and 0.58 ton/ha down from the baseline. The main reason for this reduction was the difficulty of fertilizer procurement, which is obvious from the results of the impact survey in which the respondents rated it as the overwhelming top-ranked obstacle for their rice production, while it used to be one of four main reasons at the time of the baseline survey. This is also consistent with the official opinions expressed in the

meetings with the regional governments of West Sumatra Province and Kabupaten Dharmasraya during the ex-post evaluation field survey. The Agricultural Office (Dinas Pertanian) of the regional government of Kabupaten Dharmasraya has changed the official suppliers of fertilizer based on the analysis that the problem lies in its distribution process. They optimistically stated their opinion that this decision would get rid of that tough bottleneck. It is therefore necessary to continue watching how things turn out.

Table 4: Annual Rice Production in Different Regions in West Sumatra Province

(Unit: 1,000 ton)

	2004	2005	2006	2007	2008	2009	2010
West Sumatra Province			1,889	1,938	1,965	2,105	2,211
Kabupaten Dharmasraya			27	45	49	51	58
Total of Kecamatans which involve Project Area	33	30	26	43	47	36	38

(Source) Made by the Evaluator based on the BPS Statistics

(2) Beneficiary Survey in Ex-post Evaluation

The Ex-post Evaluation conducted a beneficiary survey interviewing total of 131 rice farming households of four TDUs (including one in Jambi Province) discretionarily selected to avoid regional bias. As for the rice production, 85% of the respondents answered “increased” (82% answered “remarkably increased” among them) and enjoyed consequent income increase. It is not consistent with the result of the “Impact Study” discussed above, however, most of the respondents complained about the fertilizer problem as a major obstacle for rice production. With regard to the AESP, some discontent was heard from some farmers against infrequent extension services, but most of the respondents appreciated the positive effect of the provided farming machines and other physical inputs on their agricultural production.

In view of the fact that the project’s effects and impacts extended over a wide range, the questions were not limited to rice production issues but expanded to include general economic and social matters to freely hear from the farmers as the general public in the region. The project effect and impact issues analyzed in the following sections reflect those opinions and comments.

3.2.2.1 Economic Effects

1. Sapling Production of Estate Crops

Although rice production is a general priority, estate crops such as rubber and oil palms are inherently recognized as having a comparative advantage over rice with higher priority in regional development in Sumatra Island where this project is located. That advantage is also stated in the national RPJMN (2010~2014): Section for “Development with Territorial Dimen-

sion) and Regional (RPJMD Dharmasraya 2011~2015) Medium Development Plans. As the latter declares "blessed with suitable weather and soil conditions", Dharmasraya has great potentiality in producing estate crops. The total planted area of rubber and oil palms occupy more than 70% of the national total.

In the beneficiary survey conducted in the ex-post evaluation, which directly interviewed 131 rice farmers (households), 61 and 5 farmers are planting rubber and oil palms respectively. To

Table 5: Production and Unit Price of Rice and Major Estate Crops

	Production (t)	Planted Area (ha)	Productivity (t/ha)	Price (Rp./kg)
Rice	58,043	12,956	4.5	7,000
Rubber	28,238	38,271	0.7	14,500
Oil Palms	371,413	24,310	15.3	15,200

Source: Dharmasraya Dalam Angka (Dharmasraya in Figures) 2011, BPS Dharmasraya

the question of the future possibility of quitting estate crop production and specializing in rice, all the respondents answered "definitely no possibility."[8]

On the contrary, most of the specialized rice farmers expressed their hope to extend their farming to rubber, oil palms and other estate crops when they are able to afford it. They would like to do so, aiming to get rid of the present rice monoculture, and to be prepared for extraordinary expenditures like entrance fee for children's enrollment to higher-grade schools, etc. with more stable earnings through diversified income sources. Income earned by raising cattle is also for the same purpose.

Seedbed of Rubber Sapling

Planted Saplings in Rubber Estate

Oil palms were scarcely planted before this project plan, but it has already grown as one of the major crops, together with rubber. Adult rubber plants dislike water, but during its sapling

[8] Prevailing answers confess their wishes to go on to rubber or oil palms, quitting present rice production due to difficulties caused by the fertilizer problems already stated.

stage, it demands sufficient water to grow. The availability of water for that particular use from the project canals has been greatly helping the growing sapling production businesses in the region. Information regarding these activities obtained at the Kabupaten Office of Estate Crops and Forestry (Dinas Perkebunan dan Kehutanan) is as follows:

(1) Besides the major estate crops of rubber and oil palms, cocoa is also planted. Those estate crops had been partly planted before the project, but it was not until the project that their rapid growth has been experienced.

(2) Currently eight companies and other organizations are operating estate crop production. According to the official production reports to the kabupaten government, they have a total of 1.7 million trees planted, normally bearing two crops a year. Some of them directly draw water from small rivers in the region, but mostly they utilize water taken from the project canals.

(3) Besides that organizational production, there are numbers of farmers individually producing estate crops, but the kabupaten government does not collect any data on their production.

According to the individual answers of the farmers, depending on the variety, they are selling for approximately 10,000 rupiah a piece on average. Excluding the transactions of the products without using the project canal water in (2) and (3) for which no official production figures are available, the annual total value of production amounts to about 34,000 million rupiah.

2. Aquaculture

Freshwater aquaculture is widely operated in the fish ponds developed in the project area. Those activities also previously existed, according to the Kabupaten Office of Livestock & Fishery (Dinas Peternakan dan Perikanan), but their rapid growth occurred after the advent of the canals by the project completion. The kabupaten government has been also actively promoting the national policy of “Minakena” and “Minapadi” programs (cf. Section 3.1.1.2).

The potentiality of the fishery in Kabupaten Dharmasraya is significantly high, which is evident from the following Table 6 that shows the overwhelmingly high growth rate of the forecasted fishery production during 2010~2014 among the 19 kabupatens and cities in West Sumatra Province with a 28-times increase during that five years.

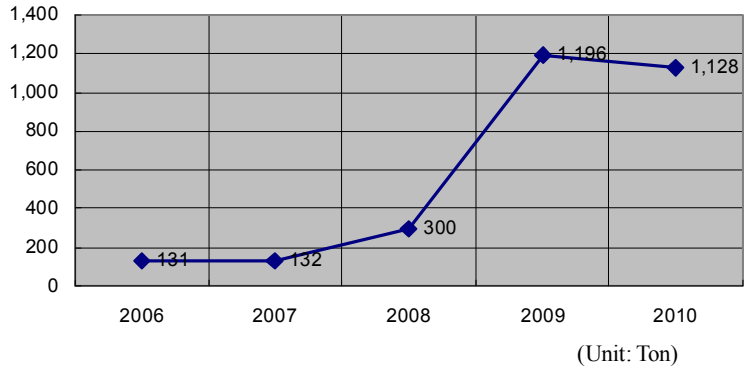
Table 6：Production Plan of Aquaculture in West Sumatra Province

(Unit: ton)

	2009	2010	2011	2012	2013	2014	Annual Growth
Province Total	84,864	118,372	150,946	192,450	243,034	306,940	29%
Other Kabupatens & Cities	83,816	115,559	144,683	180,549	224,075	277,690	27%
Kabupaten Dharmasraya	1,048	2,813	6,263	11,901	18,959	29,250	99%
Performance of Kabupaten Dharmasraya	-	1,555	5,354				

Source: Governor's Regulation, West Sumatra Province No. IV OR 523-24-2010, data from Dinas Peternakan & Perikanan, Kabupaten Dharmasraya

Figure 1 shows the production volume of the regional fish farming during the five years before and after the project. It indicates a conspicuous increase after 2008 when the water supply became fully available by the completion of the total project canals. This also supports the above assertion of the Kabupaten Office of Livestock & Fishery.



Source: Prepared by the evaluator from the BPS statistics

(Note) Since the sources are deferent, the performance shows different figures from the ones in Table 6

Figure 1: Aquaculture Production in Kabupaten Dharmasraya

Although income statistics relating to the fish farming in the project area and Kabupaten Dharmasraya are not available, the result of the beneficiary survey to fish farmers of six southern provinces of Sumatra Island conducted in the ex-post evaluation of the JICA financed "Freshwater Aquaculture Development Project in Indonesia" (2010) indirectly supports the income effect of the Batang Hari Irrigation Project. The study has shown that the average annual

sales profit earned by fish farmers (100 households) of two kabupatens in Jambi Province (Bungo and Batang Hari) [9]was 3,640 thousand rupiah[10], which is 25% of the average income of the two kabupatens concerned in 2010 at 14,583 thousand rupiah. Even after taking account of the probable fact that their income level would be considerably higher than the average household because fish farming is usually a supplemental income source in addition to agriculture or some other main income generating activities, the weight of the fish farming income is rather high. In the light of above, it can be judged that the income effect of this project is also high.

The fish farming in Kabupaten Dharmasraya is operated by the government-owned fish farms, organized farmer groups or individual farmers.

(1) Government-Owned Fish Farms (Hatchery Centers)

Two government-owned hatchery centers (BBI: Balai Benih Ikan), one by the central and kabupaten governments each, are currently operating. According to the Kabupaten Office of Livestock & Fishery, the production in 2011 was 1.6 million fry in total. Depending on the variety and size, an 8~12-inch Nila (Nile Tilapia), which occupies the majority, is sold at 600 rupiah on average. The performance above indicates that the estimated total production in 2011 is evaluated at 960 million rupiah. Construction of additional hatchery centers under the central government budget is under planning now to supply fry to throughout the Sumatra Island (the ultimate target is to the whole country). Land acquisition of 30ha, which was the condition for the central budget allocation, has already been completed (converted from the former candidate site for an unrealized airport construction). A concrete production plan has not been fixed yet; however, it is expected to produce several million fry after the completion.

Government-Owned Hatchery Center
(BBI: Balai Benih Ikan)

Aquaculture by Group Farmers

9 The Kabupatens of Jambi Province, which include the project area, are Bungo and Tebo. Kabupaten Batang Hari is outside of the project area.

10 Ex-post evaluation report 2010 "Freshwater Aquaculture Development Project in Indonesia" (http://www2.jica.go.jp/ja/evaluation/pdf/2010_0600245_4_f.pdf)

(2) Fish Farms by Group Farmers

As have been discussed in Section 3.1.1.2, the national policy has been promoting farm-based aquaculture under the schemes of "Minakena" and "Minapadi" in the social empowerment programs supporting the poverty alleviation program in the fishery sector. Kabupaten Dharmasraya is also actively implementing policies for organizing fish farmer groups, providing technical assistance and financial support for construction and operation of fish ponds.

(3) Fish Farming Business by Individual Farmers

Individual-based fish farming is widely operated in the project area installing small-size fish cages (kerambah apung) on the project primary canals and contributing to additional cash income for farm households. However, the Kabupaten Office of Public Works, which is responsible for canal management, and the Office of Environment are carefully watching and regulating those activities because disordered expansion of this practice will damage the water flow and quality.

Installed Aquaculture Cage on Primary Canal

3.3 Impact

3.3.1 Impacts to Beneficiaries

3.3.1.1 Improvement of Living Environment of Regional People and Economic and Social Development of the Region

All the project effects other than ones for rice production, discussed in preceding Section 3.2 "Effectiveness," are the water resource effects derived from the direct water use from the canals constructed by this project. The central as well as regional governments are of the unanimous opinion that the influence of the facts stated in Section 3.2.2.1, as the economic effect and indirect impacts identified in Section 3.3.2.1, have significantly contributed toward the regional economic growth and development. Kabupaten Dharmasraya's Gross Regional Domestic Product (GRDP) was 2,678 billion rupiah in 2011. The rate of per capita income growth in the same year was 6.51%, and it is the highest among the 19 kabupatens and cities in West Sumatra Province, as shown in Table 7, well exceeding the Province average of 5.93%. In addition, the growth rate of Dharmasraya has been continuously above the Province average since 2005. Its performance has been stably maintaining a constant level of 6%, even at the time of the Lehman Shock in 2009 when the growth rate of West Sumatra Province drastically dropped down to 4.1%.

According to the JICA documents at appraisal, the perceived per capita income of the project

region at the E/S Loan appraisal was 157 US dollars. The current corresponding figure is not available. The approximate value of the per capita income of Kabupaten Dharmasraya in 2010 taken from the BPS statistics was 13,984 thousand rupiah. Discounting this amount with accumulated rate of inflation since the E/S loan appraisal (assuming it be a 1992 figure), the adjusted figure is 2,072 thousand rupiah. This level shows approximately a 1.5-times increase from the 1,425 thousand rupiah, which is obtained by converting the original 157 US dollars with the exchange rate at 2010.

Table 7: Income Indicators of West Sumatra Province (2010)

	Per Capita Income (rupiah)	Increase Rate of Per Capita Income
Average: All Kabupatens & Cities	17,978,726	5.93%
Kabupaten Dharmasraya	13,984,041	6.51%
Average: Other 18 Kabupatens & Cities	18,200,653	5.90%

(Source) GRDP Kabupaten Dharmasraya (Long-term Regional Development Plan <RPJMD> 2006-2010, BPS Kabupaten Dharmasraya

As already seen in Section 3.2.1.2, the beneficiary survey in this ex-post evaluation to 131 people including non-farmers, all the respondents affirmed income increases and resultant improvement in their general living standard (84% answered “remarkably”) compared to the conditions before project. Particularly, all of them recognize improvement in children’s education (94% answered “remarkably”) and family health (82% answered “remarkably”). The result also revealed an overall increase in household income, agricultural production cost and general cost of living, which can be regarded as a reflection of the expansion and activation of the regional economy occurring in the project area. Furthermore, 98% of the respondents affirmed its relation to this project (85% answered “remarkably”). It attracts special attention that 69% of rubber and 60% of oil palm planters, who do not use water for production, also acknowledged production and income increases, mentioning remarkable improvement of transport for marketing their products by means of former inspection roads of the project that became available for normal transportation after the project as a major reason. As for the cost of production and living, 90% of the total respondents connect it to the project as well. As basic reasons for the changes, quite a few respondents pointed out multiple and complex factors including increase of cash income from rice production, promotion of estate cropping, activated economic operation through smoother transportation by means of the irrigation canals and roads constructed originally for canals inspection. It obviously indicates that the project effects and impacts are by no means

single or linear, but they have brought a compound, sometimes synergetic influence.

The project's income effect on the aquaculture has been discussed in Section 3.2.2.1 2. In addition to that, it is recognized that all of the other multiple elements explained in this evaluation report that were brought about by the project have substantially contributed to the economical development of the region.

As evidence of the remarkable income increase in the region, people pointed out the disappearance of regional public transportation services. They remarked on the phenomenon that most households in the region now possess one or more motorcycles (more than a few residents even own an automobile) as the factor to make minibus operations economically unprofitable due to insufficient passengers to carry. There are other indications that represent the advancement of the regions' economy. A typical example is the plan to construct an airport, although it was eventually unrealized (cf. Section .3.2.2.1 2, about fish hatchery center to be constructed at this site). In 2006~2007, institutes of higher education (STIKES, STMIK, STKIP) having departments of science of nursing, computer and education were established. A television station is opening in 2012, and a large-scale hospital is now under construction, too.

Kabupaten Dharmasraya is a municipality newly established on January 7, 2004, detaching the area of the Batang Hari Irrigation System and adjacent part from Sawahlunto and Sijunjung Kabupatens. It was born as a result of the regional development of the Batang Hari Irrigation Area. In other words, according to the statements of central, provincial and kabupaten governments, if there had not been the Batang Hari Irrigation Project in the region, the Kabupaten would not exist. If that is the case, this project also exerted its influence on the municipal administration in addition to the economic and social aspects.

STIKES Collage Campus

Regional Hospital under Construction

3.3.2 Other Positive and Negative Impacts

3.3.2.1 Secondary Impact Derived from this Project

1. Regional Transportation

The north part of the project region is located along the Trans-Sumatra Highway, but internal transportation under poorly developed regional road systems was considerably limited. Local transportation of products used to be made mainly with manually-handled trolleys on foot. After the project, however, in addition to the trunk canals that became utilized as water transport, the canal inspection and connecting roads constructed under the project also started to be used for general uses as integral transportation media. All of them are thus contributing to the regional economic and social vitalization as transportation routes for work and life.

Although no statistics are available on the traffic volume, it was found from the explanation of the Kabupaten Office of Transportation, Communication, Information Tourism and Culture and listening to the people that the former inspection roads have enabled speedy transportation of various products in bulk. Especially the greatest beneficiaries are the estate crop planters for their marketing transport by means of the former inspection roads constructed under the project[11]. Synergy with private vehicles, reflecting the regional income growth, is also recognized. Furthermore, distant locations are now approachable and then may be used as fields for estate cropping.

Former Inspection Road
Regional Major Transport Media after Project

2. Advent of New Water-using Businesses

A typical example is the advent of car washing businesses using the canal water. The level of their service charges is 35,000 rupiah for a car and 10,000 rupiah for a motorcycle, which is profitable enough with generally higher charges than prices prevailing in the capital city, Jakarta.

3. Mini-hydro Power Generation

A pre-feasibility study has been conducted for construction of a mini-hydro power plant at the location of a former pumping station which has been discontinued from the 1990s (JICA: Survey for Maximum Utilization of Irrigation Water in the Republic of Indonesia).

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[11] The selling price of crude rubber, which is sold by weight, drops with the lapse of time because of weight reduction. Oil palms rapidly go bad if the oil expressing is not finished within 24 hours. Therefore those products require speedy transport to the markets.

A mini-hydro generator has been installed and working for the electric supply in the recreation site "Danau Cinta" shown in Section 7 (1) below.

4. Increase of Ground Water

As already introduced in Section 3.2.2, the widespread local opinion heard during the field survey expressed that this project has brought almost the same effect as the creation of a new never-drying river in the region and turned the underdeveloped arid land into wet, arable soil. The Kabupaten Office of Livestock & Fishery stated that the soil turned green and cattle grazing has been facilitated with rich pastures. Almost all the 131 respondents of the beneficiary survey are raising cattle, goats and/or other livestock for investment to prepare for children's entrance to the schools of higher grade, local ceremonial events and other extraordinary expenditures. Most of the respondents mentioned that it was not until the project completion when the dry season ceased to kill the pasture. Water supply systems for domestic use have not been developed at the moment in the project region (see the following Section 5). The people revealed that it used be necessary to bore a deep well to reach the water vein but it often dried up in dry seasons. However, it scarcely happens throughout the year nowadays. It was also disclosed during the joint meeting with the relating governmental agencies at the Regional Planning Agency (BAPPEDA) Kabupaten Dharmasraya that it used to be necessary to drill 10m-deep well to draw ground water, but now, only 4m sinking is enough.

Secondary Canal
Arid Soil Turned Watery

5. Domestic Water

Kabupaten Dharmasraya has had no water supply system yet for domestic use, mainly depending on ground water now (see Section 4 above). To end this situation, three water processing plants are under preparation, two of which have already entered the stage of tendering of candidate contractors. After the construction has been completed and operations have begun, the facilities will be able to supply domestic water throughout the kabupaten.

6. Disaster Protection

According to the Regional Disaster Management Agency (BPBD), this project has contributed a lot to regional disaster prevention. It brings about not only the social but also economic benefit alleviating natural damages on economic activities.

(1) Flood Control

The lowland areas along the Batang Hari River used to be subjected to occasional floods in

the rainy seasons every year in January and February. However, floods are now being prevented by the water flow control with the Batang Hari Weir constructed under the project.

(2) Fire Fighting

Regional fire fighting activities became more effective and efficient by easier access to water intake from the canals running throughout the project area.

7. Provision of Recreational Opportunity for Regional People

There used to be almost no recreational facilities for people before. This project has indirectly provided regional people with the following entertainment facilities and contributed to increasing the people's welfare.

(1) An entertainment facility named "Danau Cinta (Lake of Love)" was developed with private sector participation. It has a play pond and swimming pool for children which collect several hundred visitors every weekend. During the Islamic New Year in 2011, more than a thousand people in total visited this facility.

(2) A citizens' boat racing festival is held by the kabupaten government on the project main canals.

(3) The Batang Hari Weir itself became a tourist spot, also providing a place suitable for entertainment fishing.

Danau Cinta：Swimming Pool for Children

Danau Cinta：Boating Pond

3.3.2.2 Impact on Natural and Social Environment

(1) Impact on Natural Environment

Impact of project implementation on natural environment was examined monitoring water quality and fish habitat at the Batang Hari Weir, and periodical environmental checks were also conducted during the construction stage. Those assessment results were reported to BAPPEDA of West Sumatra Province with no specific negative impact on natural environment.

The Office of Environment of Kabupaten Dharmasraya reported no specific negative impact as well, or rather, they declared a positive environmental impact with the ecological improvement overall from the previous arid soil to watery conditions[12].

(2) Impact on Social Environment (Including relocation and land acquisition)

Land acquisition as large as 730ha for the project implementation was completed in 2006 with the allocated budget by the Directorate General of Water Resources, Ministry of Public Works under the relevant Indonesian laws and regulations without any specific problems. Relocations did not occur as planned.

To summarize the points discussed above, the original purpose of the project at the time of planning had been to contribute to agricultural production mainly focusing on rice, but it changed its course to diversify the water use for various economic and social activities. The Indonesian government reviewed and then adjusted the targeted irrigation area, which is one of the rice related indicators, to fit the reality in the course of project implementation. This change in project purpose could be hardly anticipated at the appraisal of the phase II stage; however the amended targets in relation to the rice production have been mostly achieved at the time of ex-post evaluation. In addition to this fact, the development of aquaculture, estate crop production and other multiple project effects have been successfully contributing, as discussed in this Section, to the higher objectives which are the people's income increases as well as the activation of the regional economy. Those positive facts are also supported by the results of the beneficiary survey and discussions with responsible officials of the governments.

As a conclusion, therefore, this project has largely produced the expected effects and impact, and its effectiveness is high.

3.4 Efficiency (Rating: ②)

3.4.1 Output

The project is to implement construction of Batang Hari Weir, development of irrigation and drainage canals, farmland development and consulting services at the upstream area of Batang Hari River in West Sumatra Province. It was implemented under three ODA loans being initiated by the engineering service loan (E/S loan), preceding to the phase I and II loans for physical implementation.

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[12] However it by no means signifies that there is no environmental problem prevailing in the region. Batang Hari River has long been known as a placer mining spot, and has been annoyed by illegal mining in spite of the control of the environmental authorities. It threatens the water quality of Batanghari River and its irrigation system, and consequently, it may adversely affect the project effects and impacts. Although this has not yet occurred, the Kabupaten Office of Environment mentioned it as a matter of careful watch on a constant basis. That control is actually a continuous headache for the Office of Environment together with the illegal logging at the watershed of Batang Hari River.

According to the plan, the E/S Loan stage was to carry out additional studies to supplement existent studies, topographic and geological surveys, preparation of the implementing schedule and then to provide detailed designing. The following physical project implementation has proceeded based on the study results of the engineering services under the E/S loan, however the volume of man-month input, actual project cost incurred and its other details are unknown due to the lack of relating project implementation record. The phase I stage implemented civil works: rehabilitation of existing main office and its related structures; construction of inspection roads and their connections to the local public roads; construction of Batang Hari Weir; construction of primary and secondary canals; and drainages downstream and in the area of the Siat Weir. The phase II works included continued civil works for construction of remaining primary, secondary and tertiary canals and drainages, farmland development, procurement of operation and maintenance (O&M) equipment and implementation of Agricultural Extension Services Program (AESP). Table 8 comparatively shows the planned outputs and their actual performance.

Table 8: Comparison between Planned Outputs and Performance

Planned Output	Actual Output
(1) Civil Works Construction of Batang Hari Weir: One unit Construction of Access Roads: 12.1km Rehabilitation of Project Office & Related Structures: One set Headrace Channel: 15.5km Primary Canals: 76.1km Secondary Canals: 257.0km Drainages: 187.1km (2) Procurement of O&M Equipment Dump Trucks, Bulldozers, Portable Pumps, etc. (3) Tertiary Canals & Farmland Development Tertiary Blocks: 465 units Farmland development: 12,543ha (4) AESP (5) Consulting Services E/S (International: 102MM Domestic: 233MM) (I) International: 261MM Domestic :314MM (II) International: 242MM Domestic: 605MM	(1) Civil Works Construction of Batang Hari Weir: One unit Construction of Access Roads: 12.1km Rehabilitation of Project Office & Related Structures: One set Headrace Channel: 15.5km Primary Canals: 76.9km Secondary Canals: 286.2km Drainages: 186.9km (2) Procurement of O&M Equipment Dump Trucks, Bulldozers, Portable Pumps, Trailers, etc. (3) Tertiary Canals & Farmland Development Tertiary Blocks: 197 units Farmland development: 3,600ha (4) AESP (5) Consulting Services E/S (Unknown) (I) International: 265MM Domestic :610MM (II) International: 247MM Domestic: 1,028MM

Source: JICA Internal Documents, Consultant's Records

Except for the differences between the plan and actual performance in the areas of tertiary canal construction, farmland development and consulting services due to the following reasons, the actual outputs are almost the same as planned.

1. Tertiary Canals and Farmland Development

The Mid-term Review Report and JICA internal documents analyze the main reasons of the significant decrease of the actual outputs against the plan.

(1) Economic Reason

Prolonged time for waiting to start rice production, due to several reasons including malfunction of the World Bank funded irrigation facilities, obliged farmers to plant rubber and other estate commodity crops instead of rice for subsistence. In addition to the background of the region's suitable environment for estate crops, price hikes further worked on the farmers giving disincentives to go back to the original rice farming. These factors strongly affected the situation to drastically reduce the demand for rice farming from the initial plan.

(Drastic Reduction in Rice Farming Area vis-à-vis Original Plan)

The area actually irrigated in 2011is 6,682ha (35%), against the total farmable area by irrigation of 18,936ha (from JICA internal documents). The difference consists of (a) estates of commodity crops (7,200ha), (b) non-paddy farms (1,400ha), (c) swamp (2,500ha) and (d) forests and grasslands (1,800ha). (Figures obtained at the Mid-term Review are shown in the brackets for reference)

(Drastic Reduction in Farmland Development Area vis-à-vis Original Plan)

The area actually developed is 3,600ha (26%), against the plan of 13,750ha, among which totally 800ha has not been used at the project completion. The main reasons are that (a) it has been converted to other crops, (b) the expected land use has been prevented due to unclear land ownership, (c) farmers are discouraged from rice farming due to heavy workload of cultivation, etc.

(2) Social Reason

The project has also been subject to social obstacles such as (a) difficulties for farmland development due to unclear land ownership, (b) conflict of interests with the native inhabitants, etc.

(3) Technical and Institutional Reason

Scattered land development areas caused by above reasons made the connection between secondary and tertiary canals difficult.

(4) Administrative Reason

To solve problems relative to land ownership effective official arbitration by the government is needed. However, Kabupaten Dharmasraya which was newly born in 2004 was not yet

matured enough to effectively carry out that responsibility in practice.

2. Consulting Services

As shown in Table 8, man-month volume of domestic consultants was well over the plan. It was the result of the increased tasks from the significant design change due to the following factors.

(1) Frequent rout changes of tertiary canals due to the reasons stated in 1 above.

(2) Changes in acquired lands.

(3) Requests from tertiary canal site landowners to change the original design to concrete lining to prevent landslides.

Additionally, increases of AESP activities also worked as a factor to increase domestic consulting works.

3.4.2. Input

3.4.2.1 Project Cost

The amount of total project cost is unknown because of the lack of all the information regarding the E/S loan. The total project cost of the main portion excluding the E/S is as follows.

Planned project cost of the main portion was 23,352 million yen (the total cost including E/S loan portion was 24,148 million yen), and the corresponding actual cost incurred is 12,982 million yen, 56% of the planned. The main reasons by which the plan was completed under budget, in spite of delays in the project implementation, are as follows.

(1) Considerable reduction in the scope of tertiary canals and farmland development.

(2) The drastic depreciation of rupiah currency, up to a quarter of the previous level due to the Asian currency crisis, occurred in 1998 before starting the phase II stage and wrought a significant negative influence on project costs of the E/S loan and the stage I portion of the project.

(3) The actual cost obtained does not include the contingency and taxes which were estimated in the plan

3.4.2.2 Project Period

Under the initial plan, the total project period was from November 1993 to December 2006 (158 months), but the actual project period was from November 1993 to March 2009 (185 months), which turned out 117% of the original plan, slightly longer than planned.

Stage I was completed mostly as scheduled, in spite of some additional works, however, stage II was delayed due to the reasons below. The considerable outputs decrease in the tertiary canals and farmland development has brought no significant period reduction because the efforts were fully attempted to attain the planned outputs.

(1) The tender evaluation result of the International Competitive Bidding (ICB) package during the contractor selection was approved by the tender committee but failed to obtain the final authorization of the Minister of Public Works. This imposed re-tendering based on the authorized Pre-qualification (PQ) result and prolonged the construction commencement for two years.

(2) Hikes in construction cost mainly due to the rise in oil prices occurred twice during the stage I implementation and obliged cost re-allocation from the second stage. It took about a year to clear the required administrative procedures for that.

3.4.3 Internal Rate of Return (IRR) (for reference)

As this project does not aim for revenue earning operation, the Financial Internal Rate of Return (FIRR) has not been applied since the project appraisal.

Based on the original project purpose of irrigation for paddies, the Economic Internal Rate of Return (EIRR) was calculated using agricultural production increases, mainly focusing on rice as the project benefit at appraisal. As already discussed in the previous sections, this project has grown out of the original scheme with paddy irrigation mostly as the sole purpose, and became a comprehensive water resource system to meet the region's various water demands effectively. There is no data to precisely quantify all the identified project effects and express them in monetary terms. In addition to that, the total project cost is unknown due to the lack of cost information for the E/S loan. This situation prevents estimating the EIRR meaningfully. However, EIRR calculation only based on the benefit of rice production increase with the same method as the appraisal is attempted in JICA internal documents. The result is presented below for reference.

The EIRR has reduced below less than a half from the appraisal figure. The main reason would be the significant reduction in scope of the tertiary and farmland development and resultant remarkable decrease in expected rice and other agricultural production growth.

Table 9: Conditions and Results of EIRR Calculations

	Appraisal	JICA Internal Documents
Project Life	50 years after operation commencement	
Cost	1. Construction Cost (Total Project) 2. O&M Cost (1,354million rupiah annually) 3. Facility Replacement Cost	
Benefit	Net income increase derived from increases of rice and other food crops production	
EIRR	(I) 12.42%	5.47%
	(II) 12.6% (Project life: 45 years. Other conditions remain unchanged.)	

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

Since the Batang Hari Irrigation area extends across two provinces, West Sumatra and Jambi, the operation and maintenance of the weir and trunk canals falls under the jurisdiction of the Directorate General of Water Resources, Ministry of Public Works following the Government Regulation for Irrigation, and is practically managed by the Sumatra VI River Basin Organization (Balai Wilayah Sungai Sumatera VI) continuously from the implementation phase. However, in reality, because of the system's importance stressed below, the kabupaten government discretionarily takes part in the operation, maintenance and restoration activities if need be[13].

Canal Maintenance Work by Farmers

As for the AESP portion, the function of the BH-AD: Batang Hari Agricultural Development Office which was responsible for carrying out the services has been succeeded to the Office of Agriculture (Dinas Pertanian) of Kabupaten Dharmasraya after the project completion, and continuing extension services and monitoring with agricultural indicators are conducted (the scope is not the project area but on a municipal basis by kecamatan <sub-district>). The equipment procured under the project is in good condition.

On the other hand, operation and maintenance of end irrigation canals is under the responsibility of Water Users Associations (WUAs). However for the Batang Hari Irrigation System, their functional organization remains immature and inactive. Therefore, systematic operation and maintenance of end canals has not been satisfactorily performed.

The facilities constructed under the project have grown beyond a mere irrigation system for rice irrigation and have been supplying water to various uses that exceed the scale of compact and limited water management by WUAs. The Batang Hari Irrigation System is now working as the lifeline of the Kabupaten Dharmasraya. That reality provides a strong incentive for operation and maintenance to the Ministry of Public Works, which is responsible for the whole system excluding end canals of the farm fields as well as to the Kabupaten Dharmasraya as a project beneficiary. This "demand-pull" factor induces consolidation of the structural aspect for imple-

[13] Typical cases include the collapse of a primary canal on September 18, 2011, and water leakage from a canal on January 30, 2012. To cope with these problems, the Balai Wilayah Sungai Sumatera VI carried out emergency restoration works in strong collaboration with the kabupaten government. This news made the headlines of the local newspapers.

menting operation and maintenance from the "supply side." On this background, a system for functional cooperation is solidly working, being led by the Balai Wilayah Sungai Sumatera VI with official leading responsibility, and its weaknesses are supplemented by the kabupaten government. Conversely, the conditions that are supported by this "demand-pull" factor may have been hampering functional organization and development of WUAs. As the well-organized operation of WUAs is essential for proper operation and maintenance of the paddy irrigation portion of the whole system, the Office of Agriculture of the kabupaten government should make further efforts to lead and support their improvement as the institution in charge.

As detailed in the sections for effectiveness and impact, the irrigation system developed under this project is functioning as comprehensive water resource facilities to meet a wide range of water demand beyond the original purpose for rice production, and it is also contributing to regional economic development as indicated in the impact section. Irrigation facilities in Indonesia are governed under the Government Regulation for Irrigation ("Peraturan Pemerintah tentang Irigasi"). The facilities developed by this project are literally an irrigation system and managed by the Ministry of Public Works. However the substance has already expanded beyond a scope to be managed by sticking to the agricultural rules, taking mainly account of rice production which supposes small scale water utilization. The central as well as local governments actually connive at its discretionary use and exercise no prohibition on account of official regulations for almost any use of the project water. That behavior has been actually deriving the maximum effect from the facility operation; however it establishes a situation where facility use deviates from official regulations and tends to allow disordered water and facility use. By reviewing the water balance of the canals and river flows, plans for agricultural extension, water utilization plans of each diversified water use, and so forth, the government should develop consistent and appropriate rules for facility operation and management aiming to maximize effective water use on a regular basis.

3.5.2 Technical Aspects of Operation and Management

Technical teams are organized in Balai Wilayah Sungai Sumatera VI for operation and maintenance of weirs and trunk canals. The weirs are operated and maintained by six assigned technicians. Trunk canals are separated into two management areas and severally managed by approximately fifteen conventional water masters called "juru." They have been working for a long time, since the days of the old systems, by weirs installed at two small tributaries before the project, and are technically capable enough. However, they are basically part-timers, and no permanent staff are assigned due to budget shortages which prevents satisfactory operation and maintenance of the system. Operation and maintenance manuals for weirs and canals were prepared within the project and effectively used as guidelines for field works.

3.5.3 Financial Aspects of Operation and Maintenance

An operation and maintenance budget of 150,000 rupiah per hectare is allocated according to the area of irrigated farm fields. For the Batang Hari system, budget allocation is made based substantially on the actually irrigated area (6,779ha) to be used for entire coverage (18,936ha), which is not satisfactory. Balai Wilayah Sungai Sumatera VI gives priority on the operation and maintenance activities of the Batang Hari system, giving preferential budget allocation and sometimes utilizing budget for other purposes by postponing non-urgent programs in order to avoid malfunctions of the system.

In case the system faces a shortage in operation and maintenance budget, it is voluntarily supplemented by the kabupaten budget in order not to leave the system unrepaired due to fund shortages. However, it is necessary for the Ministry of Public Works to allocate the operation and management budget on a more rational basis to fit the field reality enabling smoother implementation, not sacrificing other public programs or putting budgetary burdens on the kabupaten.

3.5.4 Current Status of Operation and Maintenance

According to the result of technical audit by the Ministry of Public Works conducted after the project, the facilities are basically in a good condition (cf. the table below), and the water flow is also kept as designed.

Table 10: Technical Audit Opinion by Ministry of Public Works

Facilities	Conditions
Batang Hari Weir	Condition is fair with little sedimentation. The water volume is kept as initially designed.
Primary Canals	50.5km out of the 95.1km in total have no problem. Although a portion of 45.6km has slight trouble, overall conditions are found satisfactory.
Secondary Canals	Slight trouble in 15km, and medium trouble in 15km out of the total 203.4km is found, but the total conditions are fair.

Source: Lampiran Pendukung "Audit Teknis Infrastruktur Sumber Daya Air – Daerah Irigasi Batang Hari (Technical Audit Report of Water Resources Infrastructure: Batang Hari Irrigation Region <D.G. Water Resources, Ministry of Public Works>

A visual check was also performed in the field beneficiary survey. Although some parts of the end canals are not maintained well and fail to supply enough water to the paddy fields, the maintenance conditions of Batang Hari Weir and trunk canals are fair.

Effective function of facility operation and maintenance to support project sustainability primarily depends on the supply side factors consisting of the structural, technical and financial aspects. From the other side, in the case that the beneficiary and the operation and maintenance

body are identical or duplicate, the demand-pull inducement reflecting the strength of the facility needs and operational effect strongly works on good maintenance practice. The officially responsible agency for operation and maintenance of this project is Balai Wilayah Sungai Sumatera VI, but a framework has been formed in which the weaknesses are supplemented by the kabupaten government, who is the direct beneficiary of the project facilities, and a collaborative operation and maintenance is practiced. Although there are prevalent challenges in organizing and strengthening the immature WUAs in the field of paddy irrigation and in rationalizing the operation and maintenance budget, they could hardly be identified as problems to seriously impede the total sustainability of the project effect. Basically, the possibility that a serious problem will occur in the operation of maintenance of the facilities as a comprehensive water resource supply system is regarded low.

As a conclusion, though some problems have been observed in terms of structural and financial aspects of operation and maintenance, sustainability of the project effect is fair.

4. Conclusion, Recommendations and Lessons Learned

4.1 Conclusion

This project was to increase agricultural production and productivity by constructing irrigation and related facilities, conducting farmland development and agricultural extension services in West Sumatra and Jambi Provinces, and thereby contribute to the maintenance of self-sufficiency in food, increasing farmers' income, and improvement of their living standards.

The project is consistent with the national development and agricultural sector development plans of Indonesia that attach importance to agricultural development as a base for economic development coupled with the food security. It is also consistent with the total national development policy and meets the nation's development needs. It was not relevant, however, to have placed so much emphasis on rice. Therefore the relevancy of the project is moderate. Although the efficiency is moderate due to the delay in project implementation, the effectiveness is high, meeting regional water demand by creating comprehensive water resources for agriculture and all other prevailing uses and contributing to the peoples' income increase and the consequent improvement of the living standard within the region. The sustainability is fair because of some extent of current problems in the financial aspect and maintenance of the end canals. In light of the above, this project is evaluated to be partially satisfactory.

4.2 Recommendations

4.2.1 Recommendations to Implementing Agencies

(1) Being represented by the lack of the project cost record of the E/S loan phase of the

project, the record keeping on the project implementation is weak. It is recommended to establish and operate a solid project management system including project accounting in implementing future projects.

(2) The operation and management budget of this project is allocated corresponding to the actually irrigated area in substance while the facilities developed are functioning as comprehensive regional water resources and providing quite a wide scope of water supply, well exceeding the irrigation area of rice and other kinds of agricultural crops. In order to maintain the total function of the facilities, a more rational concept and method of budget allocation are to be discussed.

(3) In Kabupaten Dharmasraya, the supply of farm inputs, especially fertilizer, with an appropriate price, was bottlenecked, and it has been one of the main causes of productivity and production decreases in recent years. It is required for the Offices of Agriculture of the provincial and kabupaten governments to look deeply into the causes for improving this unfavorable situation.

(4) Organization and development of water users associations (WUAs) to perform operation and maintenance of end canals is weak and it causes unfair water distribution and delayed end canals maintenance. The Kabupaten Office of Agriculture (Dinas Pertanian), which is in charge of organization and strengthening of WUAs, should focus on intensified effort and guidance to improve the present situation.

(5) The facilities developed under this project have been primarily carrying out a wide function as multiple or comprehensive water resources in the project area. Related government agencies, the Ministry of Public Works, the Ministry of Agriculture and Kabupaten Dharmasraya, should further develop effective water use with a broad perspective. Since the administration lags behind actual practices, the central and kabupaten governments should establish comprehensive water resources management with proper sharing of responsibility and promote rational and sustainable utilization of the resources.

4.2.2 Recommendation to JICA

(1) Management of project implementation and evaluation is performed on a well-established project management system. Clear agreement on the concrete procedures with the recipient government has to be reached based on satisfactory discussions at the appraisal. Especially, it is often the case in Indonesia that project accounting records are poorly kept due to a weak project management system. Paying due attention to the prevailing practice, concrete book-keeping structures and procedures to record incurred project cost are to be determined and obtain consensus with the government side.

(2) This project came to exercise wide influence over the regional economy and society well

exceeding the function only for rice irrigation. It is recommended to separately carry out an impact study to completely grasp the comprehensive effects and impacts influenced by the project facilities aiming for proper formulation and operation of future irrigation and other types of water resource development projects. The study should primarily focus on the impact items identified in this ex-post evaluation with a parallel attempt to extract other impact items. The impact items are then classified into quantifiable and unquantifiable groups; monitoring indicators are to be applied to the former and monitored using time series BPS or other statistics if available; for the latter, or items for which suitable statistics are unavailable, statistically meaningful beneficiary survey will play a central role.

4.3 Lessons Learned

(1) Although the project was originally planned with rice irrigation as its central purpose, due to the subsequent changes in surrounding conditions, the facilities came to function as comprehensive water resources to meet various water uses. Downward adjustments of the original targets and consideration and promotion of water uses other than rice farming were performed at the stage when the rice production purpose was of decreasing importance, however, a revised monitoring system for identifying new purposes has not been developed, and satisfactory discussions between JICA and the Indonesian government have not been held either on the issues relating to the change in the project's purpose. In future supervision of similar projects, there should be satisfactory discussion and establishment of revised indicators and their monitoring system if changes are needed in the project purpose during implementation.

(2) Water resources development projects including irrigation, especially ones which can enjoy abundant water volume for rice production and other targeted uses, inherently have wide range of potential impacts. Therefore, the project should be formulated with a broad perspective encompassing potentiality for other kinds of secondary use, identification of expected additional benefits, and determination of suitable indicators to monitor the identified effects, impacts, and so forth.

Comparison of the Original and Actual Scope of the Project

<table>
<tr><th>Item</th><th>Original Scope</th><th>Actual Performance</th></tr>
<tr><td>1. Output</td><td>(1) Civil Works
Construction of Batang Hari Weir: One unit
Construction of Access Roads: 12.1km
Rehabilitation of Project Office & Related Structures: One set
Headrace Channel: 15.5km
Primary Canals: 76.1km
Secondary Canals: 257.0km
Drainages: 187.1km
(2) Procurement of O&M Equipment
Dump Trucks, Bulldozers, Portable Pumps, etc.
(3) Tertiary Canals & Farmland Development
Tertiary Blocks: 465 units
Farmland development: 12,543ha
(4) AESP
(5) Consulting Services
E/S (International: 102MM Domestic: 233MM)
(I) International: 261MM Domestic :314MM
(II) International: 242MM Domestic: 605MM</td><td>(1) Civil Works
Construction of Batang Hari Weir: One unit
Construction of Access Roads: 12.1km
Rehabilitation of Project Office & Related Structures: One set
Headrace Channel: 15.5km
Primary Canals: 76.9km
Secondary Canals: 286.2km
Drainages: 186.9km
(2) Procurement of O&M Equipment
Dump Trucks, Bulldozers, Portable Pumps, Trailers, etc.
(3) Tertiary Canals & Farmland Development
Tertiary Blocks: 197 units
Farmland development: 3,600ha
(4) AESP
(5) Consulting Services
E/S (Unknown)
(I) International: 265MM Domestic :610MM
(II) International: 247MM Domestic: 1,028MM</td></tr>
<tr><td>2. Period</td><td>(Total) November 1993 ~ December (158 months)</td><td>(Total) November 1993 ~ March 2009 (185 months)</td></tr>
<tr><td>3. Project Cost
Foreign Currency (FC)
Local Currency (LC)
Total:
Japanese ODA Loan Portion

Exchange Rate</td><td>(Unit: (million yen)
<table><tr><th></th><th>FC</th><th>LC</th><th>Total</th></tr><tr><td>E/S</td><td>431</td><td>365</td><td>796</td></tr><tr><td>(I)</td><td>7,191</td><td>7,173</td><td>14,364</td></tr><tr><td>(II)</td><td>1,480</td><td>7,508</td><td>8,988</td></tr><tr><td>Total</td><td>9,102</td><td>15,046</td><td>24,148</td></tr></table>
ODA Loan Portion: 14,365 million yen

(E/S)1US$=121yen
=2,060 rupiah
(I)1 US$=105.7yen
=2,298 rupiah
(II) 1US$ =109.21 yen
=8,401 rupiah</td><td>((I) (II) Total <E/S loan cost and composition of FC, LC are unknown>)
12,982 million yen

ODA Loan Portion: 12,375 million yen

Only converted amount into yen is available. The amounts of expenditures in local currency and therefore exchange rates are unknown.</td></tr>
</table>