Ex-Post Project Evaluation 2011:

Package III-1

(India, Laos, Guatemala, Paraguay, Brazil)

December 2012

JAPAN INTERNATIONAL COOPERATION AGENCY

FOUNDATION FOR ADVANCED STUDIES ON INTERNATIONAL DEVELOPMENT (FASID)

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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 2008, and Technical Cooperation projects and Grant Aid projects, most of which project cost exceeds 1 billion JPY, that were mainly completed in fiscal year 2007. 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.

December 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.

India

Ex-Post Evaluation of Japanese ODA Loan

"Attappady Wasteland Comprehensive Environmental Conservation Project"

Keiichi Takaki, FASID

0. Summary

The objective of the project is to recover wasteland and formulate society that sustainably uses natural resources by undertaking tree plantation and other activities for recovering environment with people's participation, thereby contributing to promoting self-sustaining economic activities of the local people, which is balanced with environmental conservation in Attappady in Southern India. The relevance is high since the Government of India emphasized recovering environment in the forest areas and reducing poverty of tribal people, while Attappady had issues of degraded forest areas and worsening poverty situations. Japan's ODA policies emphasized recovering environment and reducing poverty. The effectiveness and the impact are high since wasteland was recovered by tree planting and other activities with the people's participation, and local people raised their awareness on environment protection, leading to the formulation of society that sustainably uses natural resources. The efficiency is fair since the expenditure was within the plan but the period was extended. The sustainability is fair. Although organizational and technical aspects of the operation and maintenance do not have problems, some budget for the operation and maintenance is not secured and some facilities are not appropriately maintained. In light of the above, this project is evaluated to be satisfactory.

1. Project Description

Project Location (Kerala State)

(Mountains with rich vegetation by plantation)

1.1 Background

The project area is Attappady block of Kerala State that is a part of Biosphere Reserves. Although this area used to have rich vegetation, it had excessive development activities, and land degradation was rapidly worsening because of the pressure of population increase. Given this situation, it was needed to undertake comprehensive conservation of wasteland while conserving nature and recovering land productivity, and to promote sustainable regional development by generating income, making

productive investment, providing means of production through extension activities, and increasing income of the local people.

1.2 Project Outline

The objective of the project is to recover wasteland and formulate society that sustainably uses natural resources by undertaking tree plantation and other activities for recovering environment with people's participation, thereby contributing to promoting self-sustaining economic activities of the local people, which is balanced with environmental conservation in Attappady in Southern India.

Loan Approved Amount/ Disbursed Amount	5,112million yen /4,867million yen
Exchange of Notes Date/ Loan Agreement Signing Date	January 1996 /January 1996
Terms and Conditions	Interest Rate: 2.1％ Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General untied
Borrower / Executing Agency	President of India/ Local Self Government Department of Government of Kerala
Final Disbursement Date	March 2010
Main Consultant	Nippon Koei

2. Outline of the Evaluation Study

2.1 External Evaluator

Keiichi Takaki, FASID

2.2 Duration of Evaluation Study

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

Duration of the Field Study: February 6 – March 2 & August 8 – September 10, 2012

3. Results of the Evaluation (Overall Rating: B[1])

3.1 Relevance (Rating: ③[1])

3.1.1 Relevance with the Development Plan of India

The Government of India established National Wastelands Development Board under Ministry of Environment and Forests and implemented wasteland development measures on the ground of 7th Five Year Plan (1985-90). However, these measures entailed mostly tree planting, and the effect was limited.

In 1992, the Government of India established the Department of Wastelands Development under Ministry of Rural Development in order to implement comprehensive development plans that included not only tree plantation but also income generation activities such as agricultural

[1] ③: High, ② Fair, ① Low

processing, livestock, and others[2].

The 8th Five Year Plan (1992-97) expressed concern over negative impact of degraded vegetation on environment and society, and emphasized importance of corrective measures.

At the time of the ex-post evaluation, the 11th Five Year Plan (2007-2012) was effective with the priority in conserving and expanding forests. It also stated the importance of people's participation and the necessity to ensure livelihood for poor people such as schedule tribe for sustainable recovery of forests while referring to National Forest Policy, 1988 as the approach to actualize these priorities.

From the above, this project is consistent with development policies of India.

3.1.2 Relevance with the Development Needs of India

In India, wasteland was expanding in the whole country because of increased demand of firewood, timber, and fodder due to population increase, as well as flood, soil erosion, tree felling and others. In 1984, 40% of the total land became wasteland.

Kerala state where the project was implemented is located in the southernmost part of India, and had the highest population density at the time of the project appraisal. The production per capita was 16th among all the 24 states in 1992, and the living standard was among the lowest in India. Scheduled tribe[3] constituted about 1.1% of the state population, and wasteland accounted for one third of the whole land in accordance with the statistics in 1984.

The project site is Attappady and is located in the northeast of Palakkad district of Kerala State, and is a part of the Nilgiri Reserve, one of seven Biosphere Reserves in India. However, because of development pressure due to increased population and other factors, land became degraded, and about 60% of the area became wasteland. From 1960s, attempts to stop degradation were made, but the measures were not comprehensive, and did not include water resource development and others due to financial limitation. Measures were mostly of land development such as constructing terrace[4] of which effect was rather limited.

This environmental degradation affected the people of scheduled tribe, indigenous people of this

[2] The implementing agency of this project was AHADS (Attappady Hills Area Development Society) which was newly established for this project under Local Self Government Department of Government of Kerala

[3] Scheduled Tribe is the administrative category after India's independence for the people who lived in India before the immigration of Aryan people who constitute the majority of contemporary India. It is for the purpose of giving them priority measures since they are extremely poor with disadvantages in economic and social opportunities. Attappady has the three Scheduled Tribes that are Irula, Muduga, and Kurumba.

[4] A method to cut a piece of sloped plane of a mountain into a series of successively receding flat surfaces, which resemble steps, to prevent soil from running off.

area, the most. Fertile land was sold to settlers and these people of scheduled tribe had no choice but to live among mountains, and began to live by slush and burn agriculture. Since slush and burn agriculture does not wait for regeneration of trees, it exhausted forest resources, and this lead these people to lose their means of living, a vicious cycle, and their lives became even more difficult. Their patterns of their livelihood brought the broad range of serious environment degradation that included degradation of forests, soil erosion, and dry rivers and wells.

This project aimed to recover environment that included forest, soil, and water in Attappady and improve lives of local people and promote self-sustaining economic activities so that they do not have to rely environment excessively. Thus, it was consistent with development needs.

3.1.3 Relevance with Japan's ODA Policy

Japan's ODA policy for India had priorities in economic infrastructure (electricity and transportation), and poverty reduction (agriculture & rural development, and environmental conservation (tree plantation)), following the policy dialogue between the Japanese government's mission for the comprehensive economic cooperation for India and the Government of India in March 1995.

From the above priorities, this project concerned poverty reduction and environmental conservation. Thus, it was consistent with Japan's ODA policy.

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

3.2 Effectiveness (Rating: ③)

3.2.1 Quantitative Effects

I evaluated quantitative effects of outcomes of "recovery of wasteland" and "formulation of society that sustainably uses natural resources" by examining how much below indicators were achieved.

(1) Recovery of wasteland

I evaluated an outcome of recovery of wasteland is by examining following indicators: 1) water depth of wells (wells that became dried because land became wasteland), 2) recovery of farmland (agricultural land became barren and not suitable for agricultural production because of environmental degradation), and 3) regeneration of forests (the recovery conditions of trees which almost died because of land becoming infertile).

1) Water level of wells

In Attappady, the degradation of soil reduced its moisture holding capacity, and many wells became dried up. Thus, water coming back and rising water level indicate improved soil quality.

Table 1 shows levels of water depth of the driest areas in Attappady from 2004 to 2012. Although the water levels of some wells became shallower in 2008, it shows that water-holding capacity below ground was improved by soil recovery and conservation measures, indicating land becoming suitable for production activities.

Table1. Changes of water depth of the driest wells in Attappady（unit：meter）
（Observations were made on May 1st of each year except 2012 when it was on February 1st）

Wells	2004	2006	2008	2010	2012
Panchayat well	1.5	2	2.1	6.75	11
Ramamoorthy	3.5	9.1	4	7.4	11.5
Choriyamoopan	1	2.1	0.7	2.3	4
Masani	2.5	3.1	0.9	2.8	6
Vellingiri	4.5	6.25	3.6	6.7	12
Abdul Kareem	1.5	2.1	1.9	2.7	5.1
Jayavel	0.2	0.5	1.1	2.9	7

Source：AHADS

2) Recovery of Farmland

Tables 2 and 3 indicate the production areas and productivity level of beans, vegetable and other products in Attappady in 1996, 2000, 2005, and 2010 when the project was completed. Both production areas and productivity became about three times compared with those of 1996. Prior

Table 2. Cultivated areas in Attappady

Product	Cultivated Areas（ha）				Percentage of cultivation area in 2010 vis-à-vis that in 1996
	1996	2000	2005	2010	
Beans	141	189	262	339	240
maize[5]	148	200	276	406	274
Spice	138	181	217	254	180
Rice	8	12	22	26	310
Vegetable	150	184	231	272	180
Banana	209	230	502	606	290
Arecanut[6]	225	290	450	500	220
Coconut	300	315	320	750	250

Source：AHADS

Table 3. Productivity of Agricultural Products in Attappady Block

Product	Productivity（ton/hectare）				Percentage of productivity in 2010 vis-à-vis that in 1996
	1996	2000	2005	2010	
Beans	95	125	170	373	390
maize	193	248	367	381	197
Spice	730	964	1154	1366	190
Rice	6	8	16	20	360
Vegetable	299	347	429	558	190
Banana	13,063	14,375	31,375	39,375	300
Arecanut	338	405	675	1,200	360
Coconuts (thousands)	1,071	1,125	1,142	1,867	170

Source：AHADS

to the project implementation, much land was barren and not suitable for production. The project implementation improved the land, and the annual increase of cultivated areas in Table 2 confirms its achievement. Land improvement contributed to improving productivity together with increased inputs such as water, inputs, labor and others. It also indicates a positive cycle of stable/active production and recovery of farmland

[5] According to AHADS, about 30% of maize is estimated to be produced by the people of Scheduled Tribe with slush and burn agriculture in Attappady. The cultivation areas for maize in Table 2 do not include areas where they practice slush and burn agriculture.

[6] It is a kind of coconut grown in tropical areas in Asia and Africa.

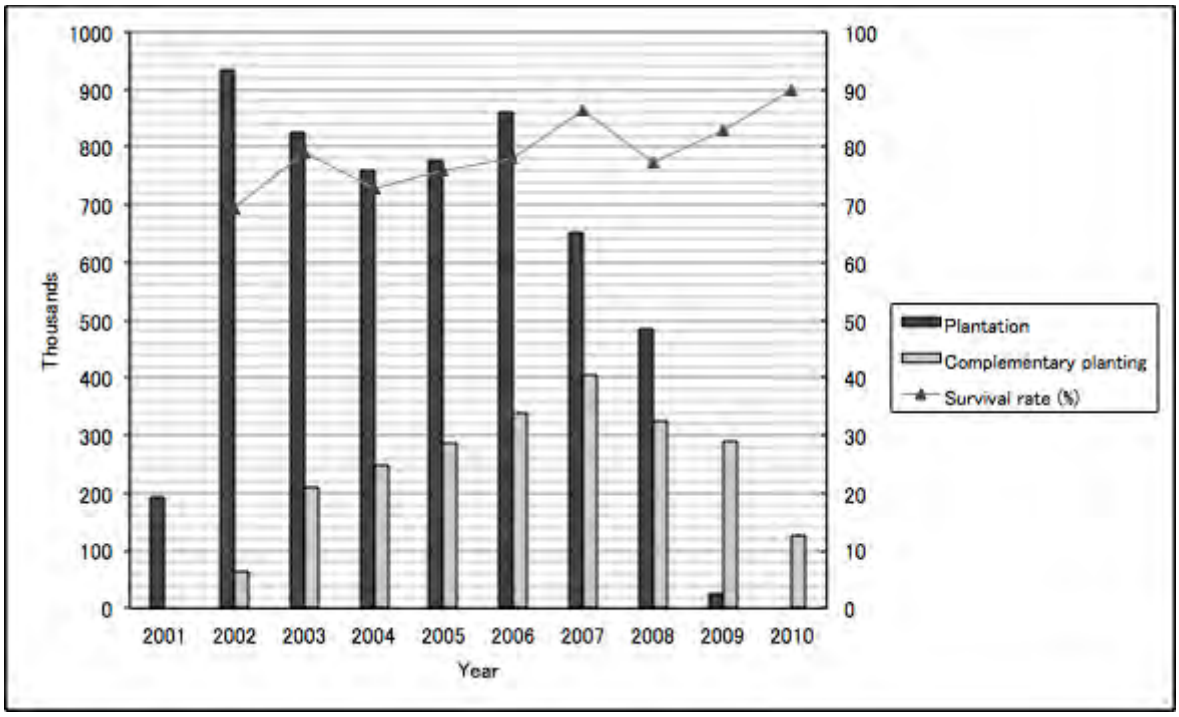


Figure 1. The number of trees planted, the number complementary planting, survival rate
Source：AHADS

3) Recovery of forests

Figure 1 concerns the number of trees planted, the number trees complimentarily planted, and survival rate[7]. The survival rate refers to the percentage of all trees newly planted and complimentarily planted in the previous years. The survival rate increased from 69.5% in 2002 to 90% in 2010. This indicates recovery of soil conditions together with improved organizations and skills for maintaining trees.

As discussed above, the water depth increased, agricultural land was expanded, agricultural productivity was improved, and survival rate of trees was improved. From these, it can be said that the environment was much recovered.

(2) Formulation of society that sustainably uses natural resources

One of the project outcomes was the formulation of society that sustainably uses natural resources. In order to use resources sustainably, it is important that people comply with rules that protect environment and use natural resources. This ex-post evaluation conducted a beneficiary survey[8] to collect information of how much responsibly people used natural resources in each year from 1999

[7] Plantation was started in 2001 and complimentary planting was started in 2002, and the data of survival rates were collected from 2002.

[8] In order to select respondents of the beneficiary survey, I randomly selected 10 villages from all the target villages of this project, and then randomly selected 40 households from each of the selected 10 villages. I administered the questionnaire survey to the household heads or their spouses of the selected households. In total, I collected the data from 393 households. It should be noted that the responses were based on the recollections of the respondents and may not be necessary accurate.

to 2011. The result shows that people were not necessarily responsible in 1999 but they became more responsible since 2006, indicating that people changed their behavior to use natural resources in the forest more responsibly.

Table 4 concerns statistical analyses[9] of why people became more responsible in using natural resources. This analysis indicated factors that contributed to behavioral changes of the local people who became more responsible in using natural resources. The results indicate that people became more responsible in using natural resources (1) if they are more aware that environmental conservation is necessary in order to maintain and improve their livelihood, (2) if the leader and community cooperative with the project, (3) if people feel responsible in conserving environment and they are cooperative with one another, and (4) if they trusted AHADS.

From the result, people became responsible in using the natural resources, because people improved their awareness on their awareness of environment and changed their behavior to protect it. The result also indicates that it is not only by changes in individual awareness and behavior, but also changes in their social environment. When village leaders and community cooperate

Table 4. Analysis of the degree by which people responsibly use natural resources[10]

Factor			Coefficient
The degree by which people are aware that environmental conservation is important in order to maintain and improve livelihood			0.19***
The degree by which village leader and community are cooperative with the project			0.10***
The degree by which people feel responsible in conserving environment x the degree by which people are cooperative with one another			0.08***
The degree by which people trust AHADS			0.04***
intercept			0.64***
sigma_u			0.46
sigma_e			0.40
rho			0.57
R^2	Within = 0.63 Between = 0.41 Overall = 0.51	Pob>Chi2 = 0.000	

*** p<0.01 ** p<0.05 * p<0.1

Source：Beneficiary survey

[9] The statistical analysis was by mixed effect model.

[10] The figures with the asterisks indicate that they are statistically significant, meaning those factors with the coefficients with the asterisks are possibly affecting “the responsible use of natural resources by the people.”

with the project, when people cooperate with one another to enhance their awareness on the importance of environment, and when they trust AHADS, people become more responsible in using natural resources. From above, we can say that the society that responsibly uses natural resources was formulated.

3.2.2 Qualitative Effects

The qualitative outcomes of the project at the time of the appraisal were that "to provide another source of income to the peoples of scheduled tribes who were dependent on the assistance from the state government and promote their self-sustenance," and "to conserve the precious environment." The achievements in these regards were as follows.

(1) Economic independence of the people of Schedule Tribes.

In the interview at the time of field survey for the ex-post evaluation, the respondents said "Prior to the project, many people did not have working opportunities, and had to go outside Attappady to work. Since the project gave them working opportunities, they did not have to go outside Attappady and they lived together with their families."

People of the Scheduled Tribes were engaged in construction of check dams[11] and irrigations as part of this project by which they earned wages. These improved their living standard. Figure 2 indicates the numbers of households that received wage by the project. Since 2000 when the project began full implementation, it increased gradually and reached 7,639 in 2006, after which it decreased as the constructions were completed.

On the one hand, about economic independence of the people, people said in the interview that "Working for the project gave more cash income than farming their own land, and many people did not engage in agriculture." This project did not necessarily promote economic self-sustenance. I will discuss this later in the section of impact with the result of the beneficiary survey.

[11] Check dams were constructed in order to prevent soil from entering rivers and to store water.

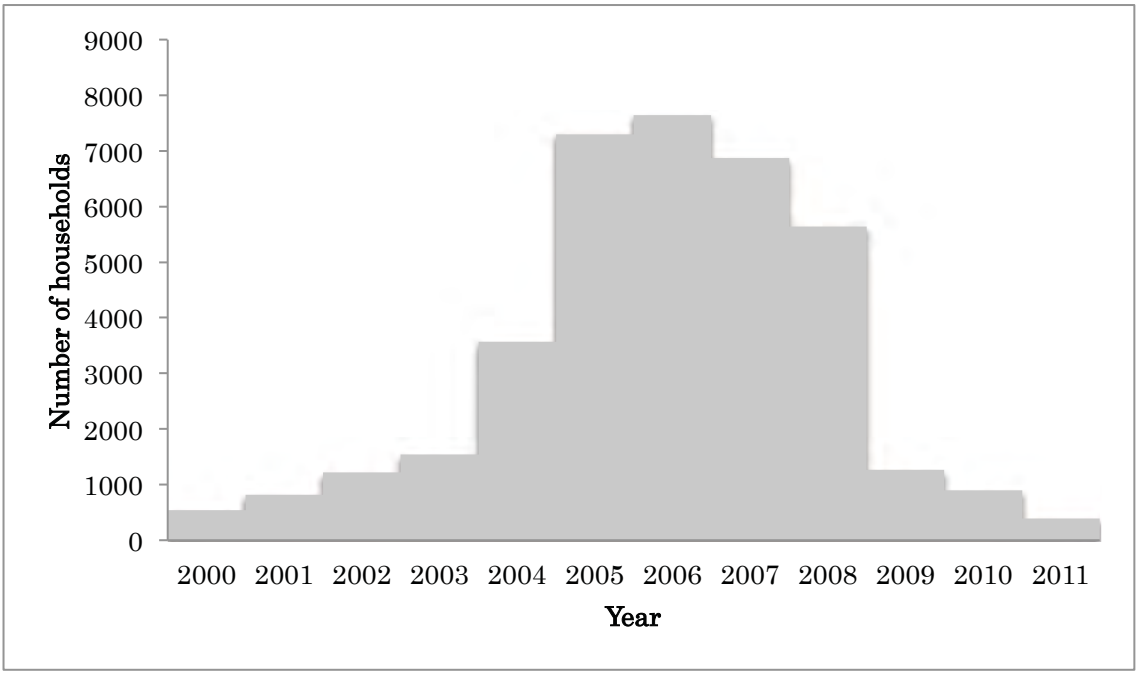


Figure 2. The number of households[12] that were engaged in and received wage from the project

Source：AHADS

Attappady block had many incidents of starvation before the project. In order to see how the project improved the situation, the beneficiary survey asked the respondents the number of meals a day, and the degree by which they were well fed in each year from 1999 to 2011[13]. Figure 3 shows the results that the average numbers of meals were 2.37 in 1999, 2.63 in 2005 and 2.87 in 2011. The degree by which people were well fed was that they were not so well fed in 1999, and they gradually became better fed, and in 2011, they had some sufficiency. These indicate improvement of their living standard.

[12] According to AHADS the number of the households of Scheduled Tribe is estimated about 8,000.

[13] The actual question was “How well fed were your family in each year from 1999 to 2011?” and the responses were in the scale of 5=very much well fed, 4=fairly well fed, 3=not well fed, 2=not well fed at all, 1=hardly fed.

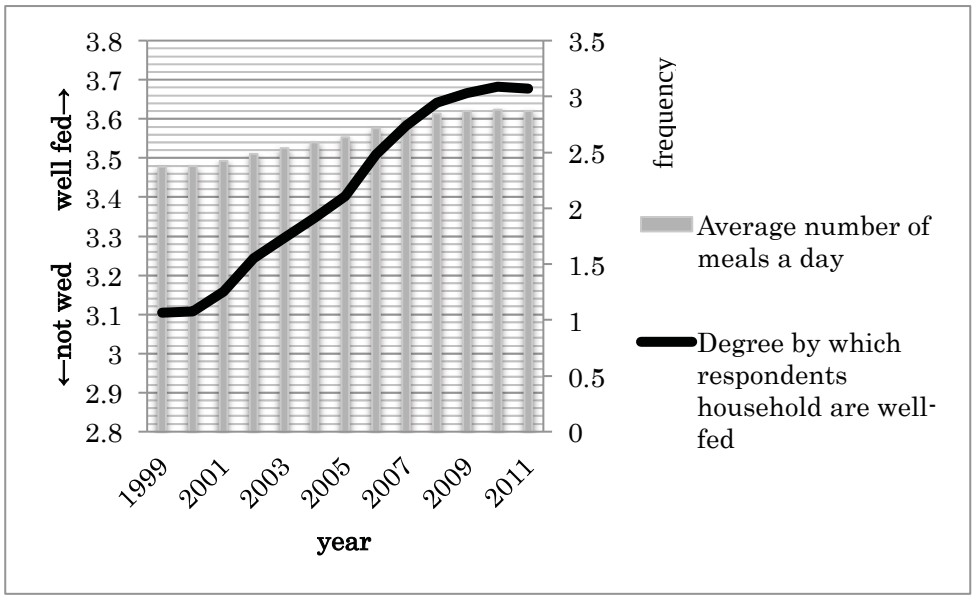


Figure 3. Average number of meals and the degree of being well-fed of the respondents

Source：Beneficiary survey

(2) Conservation of Ecosystem

Prior to the project, the area was wasteland. After the project implementation, the area had seven million vegetation in both state and private land. The survival rate improved from 60 to 90%. Prior to the project, rivers that only had water during rainy season prior to the project have water throughout years after the project. Groundwater increased and more water from wells is available. Check dams and other facilities for soil and water conservation purpose had the effects on soil conservation. These indicated recovery of ecosystem.

3.3 Impact

3.3.1 Intended Impacts

Next, I evaluate the impact of "self-sustaining economic activities of the local people, which is balanced with environmental conservation." The beneficiary survey of this ex-post evaluation shows that the main working opportunities of the local people are wage work (agriculture and non-agriculture), self-employed agriculture, and employment in public and private sectors. The self-sustaining economic activities balanced with environment conservation among them are relatively stable, and not excessively exploiting environment, and these are self-employed agriculture and employment. On the one hand, wage work is only for the period need, thus not stable, and may not be necessarily self-sustaining.

As indicated by Tables 2 and 3, Attappady expanded cultivated areas, and increased productivity. 80% of people of Scheduled Tribe in Attappady block own land, and many farmed with water from rain and wells in their neighborhood. However, environmental degradation reduced rainfall, and moisture holding capacity of soil became lower, which lead to lower agricultural productivity, and

many stopped farming before the project implementation. The project improved moisture holding capacity through soil conservation and water resource development, and irrigation was installed, water became available and people started farming. However, the beneficiary survey with the respondents who were scheduled tribe found that the main source of income in each year from 1999 to 2011 was wage labor with about 35% of all the respondents in non-agriculture as indicated in Figure 4. The second most common source of income was wage labor in agriculture, and it was 34% in 1999, and 31% in 2011. Self employed agriculture was 20% in 1999 and it became 18% in 2011. Those who had the wage labor for the project accounted for 3.8% in 1999 and gradually increased until 2007. Then, as the construction was completed, the working opportunities also decreased. This was followed by the increase in the wage labor in non-agriculture and other source of income. This indicates that the household that could not earn wage went for wage in non-agriculture and other income source.

The above indicates that although agriculture expanded, it was by those who are relatively well-off and are not of scheduled tribe[14]. On the one hand, wage labor by the people of the Scheduled Tribe increased, and their self-employed agriculture did not increase. This indicates that expansion of agriculture do not correlate with independent economic activities by the tribal people, the project has not necessarily expanded self-sustaining economic activities of the local people.

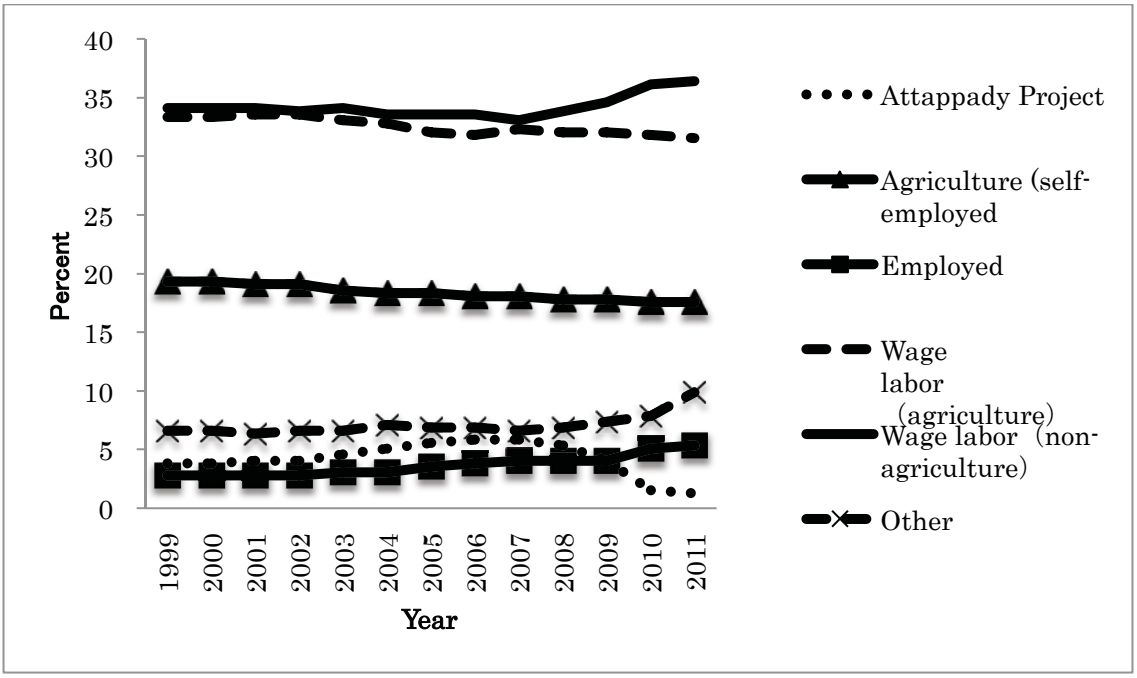


Figure 4. The Main source of income of the respondents

Source：Beneficiary survey

[14] Respondents of the beneficiary survey were all of Scheduled Tribe.

3.3.2 Other Impacts

(1) improved women's status

Other impact includes improved women's status in their communities. Prior to the project, women in Attappady had no contacts outside their own communities. The project gave them literacy education and training for acquiring technical skills, they participated in people's institutions, and they interacted with government, NGO and banks. These experiences gave them confidence, and made them less reluctant to have contacts with those outside of their communities. People's institutions have a rule that Governing Bodies should have a certain minimum numbers of women with an intention to improve women's status in their communities. Actually, 56% on average, more than half of the Governing Body members were women. By participating in this project, they had more opportunities of leadership.

A negative impact is that because of wage income by participating in this project, many men spent it on excessive drinking and drugs, and these became nuisance in the communities. To deal with these problem, women established a People's Institution called Thai Kula Sanghams and This also improved their social status as well.

(2) Capacity Development of People's Institution

This project established five people's institutions (PIs) that are User Association (UA), Ooru Vikasana Samithies (OVS), Joint Forest Management Committee (JFMC), Thai Kula Sanghams, Income Generation Activity Groups The beneficiary survey collected data on how effectively each organization functioned [15] (refer to Figure 5). The result demonstrated that in 1999 these institutions were not effective, and then their effectiveness gradually improved.

In order to find the factors that contributed to improving effectiveness of PIs, I analyzed the data by statistical method[16] (refer to Table 5). The results indicated that people's activeness in the project activity, people' trust in AHADS, PIs responsiveness to people's needs contributed to PI's effectiveness.

For the PIs to function, the cooperation with AHADS is necessary. When people trust AHADS, people would be more receptive to the advice by AHADS, and it may improve the effectiveness of PIs. From this it can be said that in order to improve the effectiveness of PIs, it may be advisable to ensure whether people and implementing agency have the trust relationship, and if not the effort to promote trust relationship may improve effectiveness of PIs.

[15] For this data, I asked the question, "How effective was your People's Institution in achieving project objectives?" for each of five PIs, and received the responses in five scales (5=very effective, 4=effective, 3=neutral, 2=not so effective, 1=not effective at all).

[16] The statistical analysis was by mixed effect model.

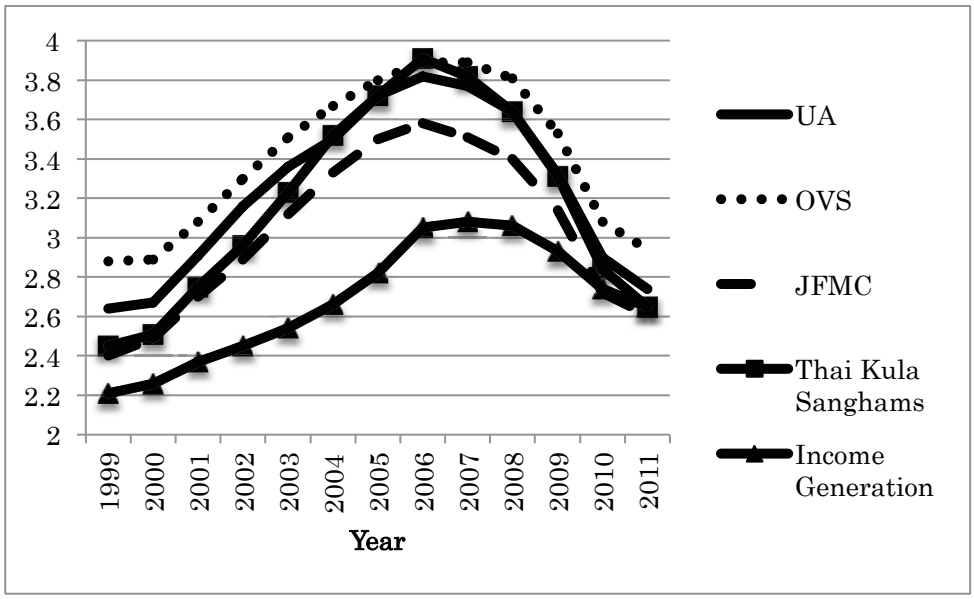


Figure 5. Effectiveness of People's Institutions

Source：Beneficiary survey

Although the members of the governing body are elected by all the members of the PIs, they may manage the PIs differently and they may differently respond to the community needs. The analysis indicates that those PIs that are responsive the people's needs have higher effectiveness. When PIs can meet their needs, they can be more cooperative with the activities of the organization and improve the effectiveness. In order to improve organizational effectiveness, meeting people's needs is important.

From the result, the project recovered wasteland and contributed to formulating a society that sustainably uses natural resources. Although the contribution to promoting self-sustained economic activities of the people balanced with the environmental conservation is limited, the project contributed to improving women's status and PIs. Thus, this project has largely achieved its objectives, therefore its effectiveness is high.

Table 5. Analysis of Capacity of People's Institution[17]

Factors	Users Association	Ooru Vikasana Samithies	Joint Forest Management Committee	Thai Kula Sangha ms	Income generation activity groups
Active participation in the project activities	0.10***	0.09***	0.06***	0.04***	0.01**
Trust in AHADS	0.07**	0.05***	0.08***	0.06***	0.06***
Responsiveness to community needs	0.78***	0.79***	0.80***	0.85***	0.89***
intercept	0.03	0.14***	0.05	0.07	-0.02
sigma-U	0.30	0.31	0.38	0.29	0.32
sigma-e	0.45	0.44	0.40	0.42	0.25
rho	0.30	0.33	0.47	0.32	0.62
R2 within	0.70	0.70	0.72	0.76	0.87
between	0.77	0.79	0.79	0.82	0.90
overall	0.73	0.74	0.76	0.80	0.90

Source：Beneficiary survey

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

The outputs were planned to achieve the objective of soil recovery and conservation, and water resource development in Table 6. The plan and achievements are listed in Table 7.

The area of wasteland to be recovered by the project was determined in the following manner. Attappady block was divided into 146 micro watersheds, where user associations (UAs) were established, and these UAs formulated microplans for recovery and reuse of wasteland with the technical help of consultants. The plan and the achievements are in Table 7, and the percentage of the achievements vis-à-vis the plan is mostly 100%.

[17] The numbers with asterisks indicate that they are statistically significant, meaning factors with numbers with asterisks possibly contributed to effectiveness of People's Institutions.

Table 6. Contents of soil recovery and conservation measure, and water resource development

Measure		Treatment	Effects
Soil recover and Conservation Measures	Agronomic Measure	Plantation, Agroforestry (fruit tree plantation, grass raising)、agriculture	To prevent soil erosion and increase rainfall infiltration by covering surface, thereby increasing productivity of land and promoting effective use
	Land Development	Construction of terrace	To prevent run-off of soil and increase rainfall infiltration
Water Resource Development		Check dam	To prevent soil run-off to river and store water

Table 7. Plan and Actual of Output

Items		Plan (2003)	Actual (2011)	The percentage of the actual vis-à-vis the plan
Soil recovery And conservation (Vegetative measures)	Land for soil recovery and conservation measures	16,065	16,344	102
	Agroforestry (ha)	4,905	5,347	109
	Land for improved cultivation (ha)	2,084	2417	116
	Mulberry land for Sericulture (ha)	574	181.5	32
	Plantation (ha)	3,938	3776	96
Soil recovery And conservation (land development measures)	Drainage Treatment (km)	361	342	95
	Small scale irrigation (km)	800	764	96
	Structures for water and soil conservation measures (drains, terraces, and others) (km)	158	279	177
Water resource development	Irrigation facilities (no)	91	134	147
	Check dam (no)	493	311	63
	Installing pond for recharging aquifers (no)	1,749	1,339	77
Assistance for tribal people	Cattle sheds (no)	4	3	75
	Community Centers（meeting halls）(no)	116	102	88
Infrastructure	Chavadiyur Bridge* (no)	1	1	100
Total Hamlet Development Program	Houses (no)	2,047	1,981	97
	Energy saving cooking device (no)	3,822	3,679	96
	Lights and solar battery (no)	3,822	3,679	96
Health and educational facilities	Hospital buildings (no)	4	4	100
	Drinking water supply scheme at Agali ** (no)	1	1	100
	School buildings (no)	12	12	100

Source：AHADS

* Length：135metre Width：7.5metre

** The number of user households：2,500 (1,200 tribal people included)

The reasons why some outputs did not reach the goal were as follow. The achievement of mulberry land for sericulture is 32% of the plan. This was because the introduction of this activity

was late, and the local people did not have sufficient time to have more interest in this activity.

The achievement of the check dams for water resource development is 64% of the plan with 311 check dams constructed. The other check remaining in the plan dams were shifted to structures for water and soil conservation measures that were 177% of the plan. This component includes drainage treatment that prevent run-off of soil, and it has the same structure of check dams. The places where they constructed 311 check dams already had the structure of drains and did not have to construct them.

This project understood the importance of poverty reduction of the tribal people in order to recover and maintain the environment. However, at the beginning of the implementation, the project did not plan sufficiently for the facilities that directly contributed to the improvement of the living conditions of these people. In 2002, "Total Hamlet Development Program" was added to construct houses, schools, and hospitals. The achievements were 1,981 houses with the plan of 2,047 houses (ratio of the achievement to the plan: 96.8%), 4 hospitals and 12 schools as planned. Because of this component, many tribal people acquired houses, and their living standard was improved, and they did not have to do activities to damage the environment such as felling trees for firewood, grazing of live stocks and exposing soil. Thus, this component was useful for effectiveness and sustainability of the project.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The plan was 6,338 million yen vis-à-vis 5,663 million yen (plan ratio 89.3%). Approved yen loan was 5,112 million yen, and the disbursement was 4,867 million yen (plan ratio 95.1%). It was lower than planned

3.4.2.2 Project Period

The planned project period was 87 months from January 1996 to March 2003. The actual period was 172 months until February 2010 (Plan ratio 198%). Because of the delay in the implementation, L/A period was extended twice since March 2002.

The reason why the project implementation was delayed was as follows.

(1) Delay in the recruitment of AHADS staff

At the beginning of the project implementation, AHADS were to be staffed by the government officials all over India by the open application. However, the project site did not have basic infrastructure such as tap water and electricity, and no officials applied to the positions. AHADS opened the posts to the general public, and recruited 96 staffs although they had 168 positions. Gradually, they recruited staffs, but the delay in filling the positions delayed the project

implementation.

(2) Delay in microplan

With regards to the preparation of the implementation plan, detailed plans for 15 watersheds of Attappady bock was to be prepared, based on the master plan prepared by Centre for Water Resources Development and Management (CWRDM), a public company of Kerala state government. And they microplans for all 146 micro watersheds were to be prepared. In June 1999, CWRDM prepared detailed plans for 10 watersheds, and AHADS technical committee rejected them on the ground that they were not detailed enough for the implementation. Then AHADS was required to make the detailed plan. However, at that time AHADS staff did not have experiences in designing and implementation, and members of UA did not have experiences of contractors. They had to work on plan, designing, and implementation with trial and error, and these required time. It took until 2003 to complete all the microplans.

(3) Delay in people's participation.

Although the project was assuming the people's participation, only few were cooperative at the beginning of the project implementation. Prior projects by the government did not take in account people's intention, and people did not trust government organization. It took about 4 years to gain the full cooperation of the local people.

In 1999, the first people's institution was registered, and it took until 2002 to formulate all the PIs. AHADS undertook various activities to nurture trust relationship with local people such as camping together with the local people. Those villages had serious social problem of alcoholism and use of drugs. In order to respond to the needs of community, AHADS did awareness program by play and films, removing alcohol suppliers from the area, and burn the plants for drugs. Through these cooperation to solve problems by the local people, AHADS acquired cooperation from the people.

(4) Addition of Total Hamlet Development Program

At the beginning of the project planning, the project intended to promote self-sustained economic activity to avoid people's excessive use of forest resources for sustainable conservation of environment. However, the seriousness of people's poverty was more than expected. The project took this into account, and added Total Hamlet Development Program that included construction of local people's houses. Although this addition caused some delay in the project implementation, this addition was necessary, as mentioned in the section of the output, in order to ensure effectiveness and sustainability.

From the 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: ②)

3.5.1 Structural Aspects of Operation and Maintenance

This project was implemented by AHADS that was established specifically for managing the project and operate project activities under Local Self Government Department of Government of Kerala. AHADS had the Governing Body of which Chairman was Secretary to Government, Rural Development Department, and members were representatives of central, state, and local governments.

The number of staff members were 86 officials, and the total number was 126 including secretary, drivers, photo copier, cleaners and others (as of March 2011)

For the project implementation at the field level, Attappady block was divided into 146 micro watersheds, and villagers living in 93 micro watersheds were organized into User Associations (UAs) and were engaged in planning, implementation and management for the construction of facilities for the recovery of environment. All the villagers living within each of these micro watersheds were the members, and nine persons were elected to be the office bearers of the governing body. Among these nine office bearers, at least five had to be women, and at least six had to be of Scheduled Tribe. Remaining 53 micro watersheds were state forestland, and villagers living in this neighborhood constituted Joint Forest Management Committee and engaged themselves in plantation and forest protection.

In 166 villages of Attappady block, Ooru Vikasana Samithies (OVS) was established of which governing body was consisted of 13 office bearers which had to include at least three women. In addition, Thai Kula Sanghams was established by women to campaign against social problems such as alcoholism. Income Generation Activity groups were established for income increasing the income of the members. The number of groups, the number of members, and their function are as in Table 8.

Table 8. The number of People's Institution, the number of members and the functions

Name of the people's institution	The number of groups	Total number of members except income generation groups	Functions
User Group	93	30,702	To plan, construct and maintain facilities
Joint Forest Management Committee	53	9,227	Plantation and maintenance of forests
Ooru Vikasana Samithies	166	19,754	To plan, construct and maintain facilities for community development
Thai Kula Sanghams	111	1,990	To be engaged in campaign against social problems such as excessive drinking and illegal drugs
Income Generation Activity groups	220	12-15member in each group	To be engaged in income generating activities

Source : AHADS

PIs are the only mechanism by which villagers participated in the project activities, and they had the function of contractors to construct facilities of this project. In order to support these PIs, AHADS divided Attappady block into five areas (Figure 6), organized five Field Management teams each of which had AHADS staff who were experts on forestry, agriculture, soil conservation, civil engineering, and extension, and supported the PIs of area to which they were assigned.

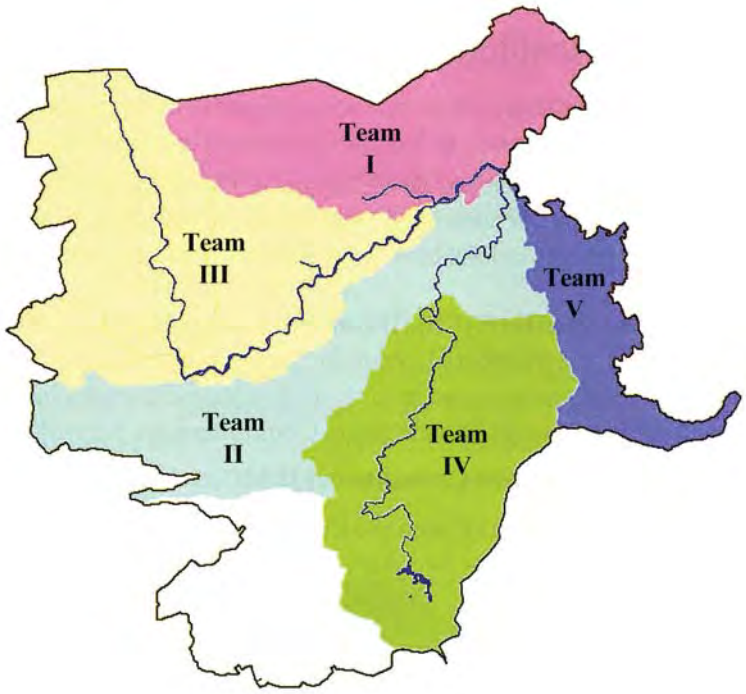


Figure 6. Assigned areas of AHADS Field Management Team

Source : AHADS

After the project implementation, the maintenance and operation of the project outputs such as forests and facilities were transferred PIs and local governments. Maintenance and operation of forest was entrusted to JFMC that employ forest watchers to patrol and keep eye on illegal felling, and JFMC decides the necessary arrangements for the maintenance and management of the forests that include the number of the watchers, their wages and frequency of patrolling.

Facilities such as check dams and others are owned by the UAs and OVS and they are responsible for the maintenance and operation. As for the maintenance of check dams of the large size, heavy machines are necessary, which requires additional funds and the request is forwarded to Kerala state government.

The facilities of which maintenance and operation were transferred to the state and local governments are as follows. Hospital buildings were transferred to the health department of Kerala state government, and its maintenance and operation is taken care of by HMC (Hospital Development Committee) whose members are medical officers, and the Grama Panchayath President, Grama Panchayath members and others. The budget for the maintenance and operation is covered by Kerala health department and local governments.

School buildings were transferred to Kerala education department and its maintenance and operation are entrusted to school headmasters who are also the officials of the department. The actual maintenance is the responsibility of PTA (Parent Teachers Association) of which members are the representatives of students' parents and teachers. The budget for the maintenance is from Kerala state government, local government, and donations from parents and others.

Agali drinking water scheme is maintained by Agali Grama Panchayath. The number of user households is about 2,000 and each household pays the fee of 60 rupee per month, and this fee is used for its maintenance and operation.

Although AHADS was expected to be reduced in its size and engage itself in supporting PIs, it continued its functions with the size similar to during the project implementation until March 2012. Since April 2012, Kerala state government has not disbursed the budget, and made a decision to continue it in a smaller size with 12 staff members, and is presently deciding the organizational structure. Until when the Kerala state government decides the organizational structure, AHADS have a temporary organizational arrangement and assists PIs as necessary

3.5.2 Technical Aspects of Operation and Maintenance

The members of PIs were engaged in the construction of the facilities such as irrigation facilities, check dams and others, and learned knowledge and skill necessary for maintenance and operation of these facilities. When they need technical assistance, AHADS in the new organizational

structure will assist them, thus no technical problem is expected.

At the time of the field survey for this ex-post evaluation, I visited hospitals, schools, a bridge and Agali drinking scheme, I observed that their maintenance conditions were mostly good, and were functioning as planned. AHADS stated that the local governments have necessary technique to maintain and manage these facilities, and if they need technical assistance, they have the organizational arrangement to have the assistance from external agencies, and no technical problem is expected.

3.5.3 Financial Aspects of Operation and Maintenance

After the project implementation until the end of FY2011[18], Kerala state government had the budget of 178 million rupee for the maintenance and management of the facilities constructed by the project. AHADS was engaged in maintenance and operation together with PIs, and spent 117 million rupee. However, there is no budgetary allocation since April 2012. AHADS said that the consideration of the budget for the maintenance and management is at the final stage, and is expected to be soon. However, there is no guarantee for this budget yet.

During the project implantation, UAs, OVSs, and JFMCs received 4% of the contract amount for the administrative fee, and each saved it as Community Development Fund in the PIs' bank account. The balance as of August 2011 is as in Table 9, and its use is determined by the PIs, and PIs can spend it with the agreement of AHADS. Currently, it is used for the maintenance expenses of the project outputs such as forests and facilities, and the capital for the loan for the economic activities of the PI members. Each PI determines the loan periods and the interest rates (the annual interest rate has to be at least 4%). The loan disbursement as of October 2012 is about 710,000 rupee for dairy and other business activities. In addition, one million rupee is to be disbursed for purchasing seeds and fertilizer for agricultural production.

Table 9. The total balance of Community Development Fund
as of August 30, 2011

People's Institutions	Balance (1,000 rupee)
OVS (Total of all 166 groups)	3,642
Users Association (Total of all 93 groups)	4,867
JFMC (Total of all 53 groups)	12,831
Total	21,340

Source：AHADS

[18] A fiscal year in India starts in April and ends in March next year.

Local governments that received facilities such as hospital buildings have sufficient budget for maintenance and operation, and are expected to have it in the future.

3.5.4 Current Status of Operation and Maintenance

PIs are in charge of operation and maintenance of many facilities that they constructed in the project implementation, and AHADS provide necessary technical assistance. Thus, it mostly appears no problem. AHADS said that some check dams that were transferred to PIs have sand deposited, and it will be removed soon once they have the necessary fund for this from the State government. On the one hand, as stated in the section of technical aspects of operation and maintenance, I observed that the facilities transferred to local governments were in good conditions and functioning adequately as planned.

Some problems have been observed in terms of budget for the operation and maintenance, and the current status of the maintenance therefore sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The objective of the project is to recover wasteland and formulate society that sustainably uses natural resources by undertaking tree plantation and other activities for recovering environment with people's participation, thereby contributing to promoting self-sustaining economic activities of the local people, which is balanced with environmental conservation in Attappady in Southern India. The relevance is high since the Government of India emphasized recovering environment in the forest areas and reducing poverty of tribal people, while Attappady had issues of degraded forest areas and worsening poverty situations. Japan's ODA policies emphasized recovering environment and reducing poverty. The effectiveness and the impact are high since wasteland was recovered by tree planting and other activities with the people's participation, and and local people raised their awareness on environment protection, leading to the formulation of society that sustainably uses natural resources. The efficiency is fair since the expenditure was within the plan but the period was extended. The sustainability is fair. Although organizational and technical aspects of the operation and maintenance do not have problems, some budget for the operation and maintenance is not secured and some facilities are not appropriately maintained. In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Although this project was highly effective in recovering degraded environment and organizing people, it is important to continue to support people's institutions so that they can operate and maintain the project outputs so that the project effectiveness will be sustained. For this purpose, it is important to use accumulated know-how by implementing this project. Kerala state government

decided to continue it in a smaller size, and it should determine the organizational structure, and plan appropriate activities and implement them as soon as possible.

4.2.2 Recommendations to JICA

Although Kerala state government decided to maintain AHADS in a smaller size and made it responsible for operation and maintenance of the project outputs, its concrete directions are not yet clear. Kerala state government should be urged to make the pertinent decision and implement the new organization of AHADS as soon as possible.

4.3 Lessons Learned

One reason why the project implementation was delayed was that AHADS needed about four years to nurture cooperative relationships with the local people. At the time of planning, information on people's needs was not collected, and the difficulty that AHADS faced in nurturing the cooperative relationships had not been expected. As the lesson of this project, especially those projects that involve people's participation should collect information on the relationships between people and government organizations, social situations, living conditions, development needs and others. If they identify problems that may be expected to make project implementation difficult, the risk of delay should be assessed, and the implementation schedule should be sufficient for dealing with such risk.

In this project, it was important to promote self-sustained economic activities so that environments would not be damaged again. People's livelihood was improved by the wage from construction activities. However, their economic activities were not necessarily promoted. It can be a lesson that the project should have undertaken more activities to promote people's self-sustaining economic activities.

Comparison of the Original and Actual Scope of the Project

<table>
<tr><td>Item</td><td colspan="3"></td></tr>
<tr><td>1.Project Outputs</td><td colspan="3"><table>
<tr><th>Items</th><th></th><th>Plan (2003)</th><th>Actual (2011)</th></tr>
<tr><td rowspan="5">Soil recovery And conservation (Vegetative measures)</td><td>Land for soil recovery and conservation measures</td><td>16,065</td><td>16,344</td></tr>
<tr><td>Agroforestry (ha)</td><td>4,905</td><td>5,347</td></tr>
<tr><td>Land for improved cultivation (ha)</td><td>2,084</td><td>2417</td></tr>
<tr><td>Land for Sericulture (ha)</td><td>574</td><td>181.5</td></tr>
<tr><td>Plantation (ha)</td><td>3,938</td><td>3776</td></tr>
<tr><td rowspan="3">Soil recovery And conservation (land development measures)</td><td>Drainage Treatment (km)</td><td>361</td><td>342</td></tr>
<tr><td>Small scale irrigation (km)</td><td>800</td><td>764</td></tr>
<tr><td>Structures for water and soil conservation measures(drains, terraces, and others) (km)</td><td>158</td><td>279</td></tr>
<tr><td rowspan="3">Water resource development</td><td>Irrigation facilities (no)</td><td>91</td><td>134</td></tr>
<tr><td>Check dam (no)</td><td>493</td><td>311</td></tr>
<tr><td>Installing pond for recharging aquifers (no)</td><td>1,749</td><td>1,339</td></tr>
<tr><td rowspan="2">Assistance for tribal people</td><td>Cattle sheds (no)</td><td>4</td><td>3</td></tr>
<tr><td>Community Centers（meeting halls） (no)</td><td>116</td><td>102</td></tr>
<tr><td>Infrastructure</td><td>Chavadiyur Bridge* (no)</td><td>1</td><td>1</td></tr>
<tr><td rowspan="3">Total Hamlet Development Program</td><td>Houses (no)</td><td>2,047</td><td>1,981</td></tr>
<tr><td>Energy saving cooking device (no)</td><td>3,822</td><td>3,679</td></tr>
<tr><td>Lights and solar battery (no)</td><td>3,822</td><td>3,679</td></tr>
<tr><td rowspan="3">Health and educational facilities</td><td>Hospital buildings (no)</td><td>4</td><td>4</td></tr>
<tr><td>Drinking water supply scheme at Agali
** (no)</td><td>1</td><td>1</td></tr>
<tr><td>School buildings (no)</td><td>12</td><td>12</td></tr>
</table></td></tr>
<tr><td></td><td>Original</td><td colspan="2">Actual</td></tr>
<tr><td>2.Project Period</td><td>July 1995 – March 2003
(93 months)</td><td colspan="2">October 1995 – February 2010 (176 months)</td></tr>
<tr><td>3.Project Cost
Amount paid in Foreign currency
Amount paid in Local currency
Total
Japanese ODA loan portion
Exchange rate</td><td>688 million yen
5,650 million yen
6,338 million yen
5,112 million yen
1 rupee = 2.89 yen
(As of April 1995)</td><td colspan="2">240.17 million yen
4,896 million yen
5,136.17 million yen
4,866.6 million yen
1 rupee = 2.62 yen
(Average between October 1995 and February 2010)</td></tr>
</table>

India

Ex-Post Evaluation of Japanese ODA Loan

"Punjab Afforestation Project Phase I & II"

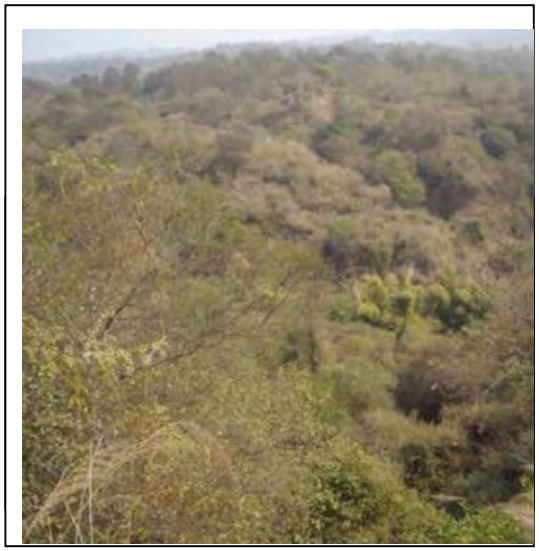
Keiichi Takaki, FASID

0. Summary

This project aimed to improve self-sufficiency of wood products in the state and to recover degraded environment and to increase forest stock[1] by planting trees and undertaking activities to recover soil and water resources in degraded forest areas with the participatory approach in the State of Punjab. The relevance of the project is high since it is consistent with the policies of the Governments of India and Punjab to promote tree plantation while giving consideration to the welfare of the poor, with development needs of the Punjab State to expand forestry areas, and with the Japanese ODA policies for India that has the priority in poverty reduction and conservation of environment. The effectiveness and the impact are high since tree plantation and soil conservation activities expanded the forest areas, improved the self-sufficiency of wood products, and reduced soil erosion. The efficiency is fair since the budget was within the plan but the period was longer than the plan. The sustainability is high since organizational arrangements, technical aspects, financial resources, and sustenance of the project achievements are all good in Punjab forest department. In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description

Project Location



Mountains with rich vegetation by plantation

1.1 Background

India used to have rich forests that covered about 40% of her land at the beginning of the 20th century. Because of the subsequent rapid population increase, forest areas were converted to farmland for food production. Trees were felled for making firewood, timber, and pulp. There was also much grazing.

[1] Total volume of tree planted in a given area

Because of these reasons, the forest area was drastically reduced, and forest cover became 22% in 1950. The main industry of Punjab State is agriculture with 82% of the state land being for farming, and the forest areas have been small since past years. State Forest Policy of India aimed at converting 33% of the whole India to forests, but the forest areas of Punjab state is 4.40% (1991), which was far from the goal of 33%. The Government of Punjab state formulated State Forestry Action Plan (1997 – 2017) in 1997 with the main objectives of converting 15% of the state land to forest areas and reducing the gap of demand of wood products and supply. In order to meet these objectives, this project was implemented.

1.2 Project Outline

This project aimed to improve self-sufficiency of wood products in the state and to recover degraded environment and to increase forest stock by planting trees and undertaking activities to recover soil and water resources in degraded forest areas with the participatory approach in the State of Punjab.

Loan Approved Amount/ Disbursed Amount	Phase I: 6,193 million yen/6,188 million yen Phase II: 5,054 million yen /4,809 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	Phase I: December 1997 /December 1997 Phase II: March 2003/March 2003
Terms and Conditions	Interest Rate: 2.1 ％ Repayment Period: 30 years (Grace Period: 10 year) Conditions for Procurement: General untied
Borrower / Executing Agency	President of India/ Department of Forests and Wildlife Preservation, Punjab
Final Disbursement Date	July 2009

2. Outline of the Evaluation Study

2.1 External Evaluator

Keiichi Takaki, FASID

2.2 Duration of Evaluation Study

Duration of the Study: October 2011 – December 2012

Duration of the Field Study: February 18 – 28, 2012 & August 25 – September 2, 2012

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

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance with the Development Plan of India

The Government of India adopted the goal of converting one third of the land to forest areas, and formulated National Forest Policy 1952. Subsequently, she has been been engaged in tree plantation with the five year plans. However, since the forest areas were continuously converted to the land for other purposes, and could not stop the reduction of the forest cover, the Government of India formulated National Forest Act in 1988 and has been pursuing below policy measures, giving considerations to the importance of forests from the perspectives of balanced ecosystem and actualizing environmental conservation and sustained economic growth.

1. Maintenance of the natural environment by protecting the ecosystem
2. Preservation of the remaining natural forests with the vast variety of flora and fauna
3. Meeting the basic needs (fuel-wood and others) of the people living in rural areas and those of scheduled caste[4].
4. Maintenance of the traditional relationship with the forests by preserving the traditional rights of the tribal people and the poor living near forests.

The 10th National Plan (2002-2007) had the objective of promoting sustainable development, taking into account environment and socioeconomic development, and attempted to plant trees and recover degraded forest of 7.5 million hector in five years (1.5 million hector per year), and increase the national forest cover from 19% in 2002 to 25% in 2007, and to 33% in 2012.

The 11th Five Year Plan (2007-2012) at the time of the ex-post evaluation has the policy priority in conserving and expanding forest, which referred to National Forest Policy 1988 and emphasized the importance of people's participation for sustainable forest conservation, and the necessity of improving the livelihood of the poor such as scheduled tribe for sustainable forest recovery.

The Punjab State government formulated State Action Plan for Forest (1997-2017) in 1997 in order to implement the national forest policy in the state with the following seven main points.

1. To increase the forest areas to 15% of the state land (4.4% in 1991)
2. To decrease the difference between the supply of tree products and demands (improve the self sufficiency within the state)
3. To improve the productivity of the existing forest by improving plantation technique and

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

[3] ③: High, ② Fair, ① Low

[4] Scheduled caste is the administrative category after India's independence for the people who lived in India before the immigration of Aryan people who constitute the majority of contemporary India. It is for the purpose of giving them priority measures since they are extremely poor with disadvantages in economic and social opportunities.

planting more productive trees

4. To protect existing forest from fire and other disaster and preserve the diverse ecosystem
5. To recover the ecosystem for the sustainable use of the natural resources in Shiwaliks hills where soil runoff and moisture loss worsens
6. To Promote the cooperation among Punjab Forest Department, related departments and local residents including farmers
7. To strengthen policy and institutional frameworks

From the above, the development policies of the Governments of India and Punjab has been emphasizing improving wasteland and expanding forest areas by the participatory approach from the time of project implementation until that of ex-post evaluation, thus it can be stated that they are consistent with the objective of the project.

3.1.2 Relevance with the Development Needs of India

India used to have rich forest all over the country with 40% of her land being forest at the beginning of the 20th century. Because of the rapid increase of the population, forest became farmland in order to increase food production. Trees were felled for making firewood, timber and pulp. These activities drastically reduced the forest area, and the forest cover became 22% in 1950. In 1999, the forest area in India was 63.73 million hector (composition: dense forest 59%, open forest 40%, Mangrove 1%), constituting 19.4% of the total land.

The main industry of Punjab state has been agriculture and 82% of the land has been farmland with little forest area since past years. The National Forest policy 1988 was to have 33% of the forestland, and forest area in Punjab state was far from it with 4.4% in 1991 in accordance with Punjab state statistics. In terms of the quality of forest, the dense forest was 517km^2 （37%）, the open forest was 895 km^2 (63%) and much forest was in the fragile condition, and the percentage of the dense forest was lower than that of the whole country. The one major cause for this was that the soil of the northern areas along the state borderline called “Shiwaliks” was mostly sand, and did not have much vegetation.

Self-sufficiency of wood product in the state was low. In accordance with the research[5] by Punjab Agricultural University, the demand in the state for the wood was 5.53 million m^3 in 1991 and its 75% is consumed by villagers living near the forests, and the change in the supply of the wood products was expected to have much impact on the lives of those people. In order to meet the demand by the supply within the state, about 20% of the forests in the whole state had to be felled, and rapid reduction of the forest was much likely. Because of the subsequent population increase, the demand of firewood and wood product was expected to increase, and the supply was not

[5] Karam Singh and et al. “Demand for Wood in Punjab”, Punjab Agricultural University. 1991.

expected to increase. It was of much concern that illegal felling may become more prevalent, much forest could have unrecoverable damage, supply of wood products may decrease, and poverty may become much more problematic.

This project increased the areas of thick forest to 736km^2(42%) and open forest to 1,028km^2 (58%)[6]. Although the project increased thick forest and improved the quality of forest, they are not up to the national level. Although forest areas expanded, and the supply of firewood and timber increased, the demand of the local people for the forest resource is high, which makes it necessary to maintain and expand the forest areas furthermore.

From the above, it can be stated that this project was to improve the composition of plantation, expand forest and improve self-sufficiency of wood products, hence it is consistent with the development needs of India and Punjab State.

3.1.3 Relevance with Japan's ODA Policy

Japan's ODA policy has the priorities in improving economic infrastructure (electricity, transportation, and others), and poverty reduction (agriculture/rural development, environmental conservation (plantation)). These were mentioned in the policy dialogue between Japanese economic cooperation mission and the Government of India in March 1995.

In March 2002, Japanese government sent policy dialogue mission for economic cooperation for India with the Government of India, and confirmed four priority areas that were economic infrastructure, environmental conservation, agriculture/rural development, and health/medicine.

This project concerns poverty reduction and environmental conservation among these priority areas, and is consistent with Japan's ODA policies.

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

3.2 Effectiveness[7] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

The effectiveness is evaluated by examining whether the project outcomes were achieved. These outcomes were the reduced gap of demand and supply of wood products (improvement of self-sufficiency within the state) and the improved conditions of degraded environment. The indicators are self-sufficiency of wood products for examining the reduced demand-supply gap, and improved conditions of soil erosion and water resource as the result of soil recovery activities

[6] State of Forest Report 2011, Ministry of Environment and Forest
[7] Sub-rating for Effectiveness is to be put with consideration of Impact

for examining the improved conditions of degraded environment.

(1) Improvement of self-sufficiency of wood products

It is estimated that the demand of wood products in Punjab state in 1993 was 5.50 million m^3 and its 75% was consumed by the local residents living near forests for their firewood and other purposes. The supply of wood products was estimated as 3.15 million m^3 (50 thousand m^3 from state forest land and 3.1 million m^3 from the private land)[8], and the percentage of self-sufficiency within the state was 57%.

The forest stock in 2011 in the state was estimated to be 15.71 million m^3, and the volume that can be supplied as wood products was estimated[9] to be 6.32million m^3. The demand for wood products was estimated to be 7.59 million m^3[10], making the percentage of self-sufficiency 83%, which was an improvement from 57% in 1993. Although these volumes of supplies and demands are estimates and the exact comparison is not possible, it can be said that self-sufficiency improved in 2011 compared with that in 1993. (refer to Table 1). From the above, the outcome of improved self-sufficiency of wood product is about to be achieved.

Table 1. Self-sufficiency of wood products in Punjab state

year	Demand (10,000 m^3)	Supply (10,000m^3)	Self-sufficiency
1993	550	315	57%
2011	759	632	83%

Source：Project Report on Social Forestry in Punjab, Punjab Forestry Department, 1995, India State of Forestry 2011, Ministry of Environment and Forest.

2) Survival rates of trees

The survival rate of trees affect self-sufficiency of wood products, and its data are shown in Table 2. The survival rates for 1998 and 1998 are measured for trees that were planted one to two years prior to the measurement. Since these trees did not pass long period of time, the survival rate was 87% or 88%. The survival rates for 2006 and 2011 were measured for trees that were planted one to four years prior to the measurement. Since they include more trees planted for longer periods, they were subject to illegal felling and disease, which made the survival rates between 60% and 70%. Since Punjab state has the criterion of survival rate that more than 51% is good[11], the survival rate of 60%-61% are sufficiently good. The improvement in forest stock mentioned previously was the result of the plantation that took into account that the survival will become of this level.

[8] Project Report on Social forestry in Punjab, Punjab Forestry Department, 1995

[9] The calculation of annual yield is by Von Mantel method (annual yield = annual growing stock volume x 2/the number of rotation years)

[10] India State of forestry 2011, Ministry of Environment and Forest

[11] Notification (July 23, 1986) Forest & Soil Conservation Department, Government of Punjab

Table 2. Survival rate of planted trees

	Hill areas (%)	Plain areas (%)
1998	87	87
1999	88	88
2006	70.6	65.5
2011	61	60

Source: Punjab Forest Department

(2) Improvement of degraded environment in hill and plain areas

1) Reduction of soil erosion

The project contributed to reducing soil erosion by soil treatment measures that prevented soil erosion by covering soil surface, and vegetative measures that stabilized surface soil by planting short trees. Soil treatment measures were implemented in Phase I from 1997 to 2002 as planned and in Phase II from 2003 to 2010 with some delay. The vegetative measures were implemented in Phase I from 1997 to 2002 as planned and in Phase II from 2003 to 2005 as planned.

Punjab Forest Department gave a contract to a private consultancy company to examine the effectiveness of the project after its implementation[12]. This survey was conducted by the comparison of areas affected by soil erosion between 2006 and 2008 by different types of soil erosion in 21 villages where they had soil erosion among 22 villages that were randomly selected[13].

In the whole village, the number of villages that had sheet erosion in the broad range was reduced from six in 2006 to one in 2008. The number of villages that had gully erosion in a broad range was reduced from two in 2006 to one in 2008. The number of villages that had bunk cutting in the broad range was reduced from four in 2006 to one in 2008. As the result of the reduction in the soil erosion, those villages that had the soil erosion in the broad range in 2006 became those villages that had it in the middle or narrow ranges in 2008. This indicates the improvement of soil degradation as the result of the construction of check dams and others that were the component of soil conservation activities of the project (please refer to Table 3).

[12] Monitoring and Evaluation of Project Activities under Punjab Afforestation Project, Punjab Department of Forestry, 2009.

[13] In order to measure the project achievements, the data should have been collected before and after the project implementation. However, the data before the project implementation are not available, and data collected during the project implementation are those mentioned in this evaluation. Although there is some limitation, this evaluation uses these data of 2006 and 2008.

Table 3. Conditions of erosion and soil degradation（Whole village）

Categories by the extent of erosion areas / Types of soil erosion and description	Narrow range (Less than 20%of village area)		Middle range (from 20% to 40% of the village area)		Broad range (from 40 to 60% of the village area)		Broader range (More than 60% of the village area)		total
	‘06	‘08	‘06	‘08	‘06	‘08	‘06	‘08	
The number of villages that had any type of erosion and soil degradation	17	17	3	4	1	0	0	0	21
Sheet erosion (Run-off of surface soil)	8	10	7	10	6	1	0	0	21
Gully erosion (deep belt-shaped cut in soil	7	14	12	6	2	1	0	0	21
Bank cutting (erosion of river bunks)	9	12	8	8	4	1	0	0	21
Soil deposition (soil accumulation of low land)	12	15	6	5	3	1	0	0	21
Roadside erosion	14	16	5	5	2	0	0	0	21

Source：Punjab Forest Department

Table 4 shows the conditions of 19 villages that had forests among 21 villages, and shows the erosion conditions in forest areas. The number of forest areas that had sheet erosion in the middle range was reduced from nine in 2006 to six in 2008 while the number of forest areas that had sheet erosion in the narrow range increased from nine in 2006 to 12 in 2008. The number of forest areas that had gully erosion in the middle range did not change from 11 in 2006 to 2008. The number of forest areas that had gully erosion in the narrow range increased from four in 2006 to nine in 2008. This means that the number of forest areas that had gully erosion in the broad range decreased from four in 2006 to zero in 2008, and these four forest areas may have joined the category of the narrow range, or they joined the category of middle range, and those of the category of the middle range joined the category of the narrow range. In either case, this indicates that the range of gully erosion became smaller and may indicate the improvement of soil degradation as the result of soil conservation component of the project.

Table 4. Conditions of erosion and soil degradation（Forest area）

Categories by the extent of erosion areas / Types of soil Erosion and description	Narrow range (Less than 20%of forest area)		Middle range (from 20% to 40% of the forest area)		Broad range (from 40 to 60% of the forest area)		Broader range (More than 60% of the forest area)		total
	‘06	‘08	‘06	‘08	‘06	‘08	‘06	‘08	
The number of villages that had any type of erosion and soil degradation	13	17	6	2	0	0	0	0	19
Sheet erosion (Run-off of surface soil)	9	12	9	6	1	1	0	0	19
Gully erosion (deep belt-shaped cut in soil	4	8	11	11	4	0	0	0	19
Bank cutting (erosion of river bunks)	6	13	10	5	3	1	0	0	19
Soil deposition (soil accumulation of low land)	7	14	10	5	2	0	0	0	19
Roadside erosion	13	15	4	4	2	0	0	0	19

Source：Punjab Forest Department

2) Achievement of soil conservation activities

Soil degradation reduced moisture-holding capacity of soil, and dried many wells. This affected availability of water for the local residents for drinking and for agricultural production. In order to improve the conditions of water resources, this project attempted to improve soil conditions and increase the moisture-holding capacity of soil. In order to find out the change in the moisture holding capacity of soil, the survey collected data on the changes of the use of wells of different types (please refer to table 5). Among all the villages assisted by the project, 22 villages were selected by random sampling, and the number of villages in 2006 and 2008 were compared[14]. Table 5 indicates that many villages had water returned in their wells, and agricultural land had supply of water in broader areas by irrigation. This indicates the achievement of soil conservation activities.

[14] Please refer to footnotes 13 of Page 7.

Table 5. Conditions of water by the types of wells

Use conditions of water source / Type of water source	The number of villages		The number of water sources usable		The number of water source usable throughout year		The number of water source used for irrigation		Irrigated area irrigated (ha)	
	'06	'08	'06	'08	'06	'08	'06	'08	'06	'08
Shallow open well*	18	22	157	209	145	178	8	14	22	32
Shallow tube well**	12	22	75	161	71	154	74	154	209	388
Deep tube well***	11	19	57	77	55	75	50	66	862	1183
Hand pump****	14	19	431	513	237	449	0	0	0	0
Total			720	960	508	856	132	234	1093	1603

The depth of each water source is as below.
*20 feet **50 feet ***150 feet **** 25-125 feet

Source：Punjab Forest Department

From the above, it can be said that the reduction of soil erosion and recovery of water source indicates that the outcome of improving environmental degradation in the hill and plain areas was achieved.

3.2.2 Qualitative Effects

For improving self-sufficiency of wood products, the supply has to increase, for which forest protection is important. The Government of India started to organize Joint Forest Management Committee (JFMC) in 1990 in order to promote forest protection by the participatory approach in the whole nation[15]. Punjab State started JFMC in 1993[16] and this project started forest protection activities with JFMC in 256 villages since 2003 when Phase II was started.

1) Strengthened Forest Protection

The main role of JFMC is to protect forest from illegal felling and fire, to plant trees, and manage Non Timber Forest Product (NTFP) that includes fodder, grass for making ropes, and fruits such as mango in collaboration with Punjab Forest Department. JFMC has the governing body with 10 to

[15] The Government of India started forest protection with the participatory approach in the whole nation by its notifications of 1990 and 2000. With the assisted of the forest department of each state and NGO, people organized JFMC, and formulated forest management plan called microplans with the assistance from technical and social perspectives. Based on this microplan, JFMC received seedlings from the forest department and engaged themselves in plantation, forest protection and nurturing the trees.

[16] India State of Forest Report 1999, Ministry of Environment and Forest

15 members that include chairperson (usually village chief), vice chairperson, and the accountant, and they are elected every year. JFMC has about 30 members including the members of the governing body.

In collaboration with JFMC, Punjab Forest department undertakes activities to prevent illegal felling, illegal grazing, ban entries to areas where plantation is new and requires protection. The number of forest offenses decreased by 33% in 2008 from 2003, although it slightly increased from 2006 to 2007 (refer to Table 6).

Table 6. The numbers of Forest Offenses in Punjab State

Year	2003	2004	2005	2006	2007	2008
The number of forest offense	7,241	5,443	4,116	4,193	4,862	4,810
Percentage of decrease vis-à-vis 2003		24	43	42	32	33

Source：Punjab Forest Department

2) Change in the awareness of the local people on forest protection

JFMC may be contributing to the decrease of forest offenses. At the time of the ex-post evaluation, one JFMC member said, "I became aware of the importance of forest by becoming a member of JFMC. If I find offenders, I try to persuade them to stop it with other members, and if they do not stop, I report to Forest Department." Another JFMC member said, "Many forest offenders were local residents, but they became members of JFMC, realized the importance of forest and they are now on the side of protecting the forests."

These changes of awareness and behaviour of the local residents on forest protection are shown in the results of the beneficiary survey[17]. This project promoted forest protection by the participatory approach from its Phase II, and the survey collected data on the changes of the local residents of each year from 2003 (when Phase II started) to 2011. Figure 1 indicates the changes in people's sense of responsibility in environmental protection[18] and those of their responsible use

[17] The respondents of the beneficiary survey was selected by randomly selecting 5 villages among all 256 villages assisted by the project, then 20 JFMC members of those 5 villages were randomly selected, totaling the number of the respondents as 100. It should be noted that the data are based on the recollection of the respondents and may not be accurate.

[18] The actual question was "How responsible do you think people were in protecting the natural environment in each year from 2003 to 2011?" and the response was by the scale of 5=much responsible、4=responsible、3=neutral、2=not responsible、1=not responsible at all.

of forest resources[19]. Each graph indicates that in 2003, people did not necessary have sense of responsibility in environmental protection, and in 2006 they began to have it, and continued to strengthen it. Similarly, people became more responsible in using forest resource. The results of the survey indicate that because people changed their awareness on environmental protection, and they became more responsible in using forest resources, and these contributed to reducing the number of forest offenses (please refer to Table 6).

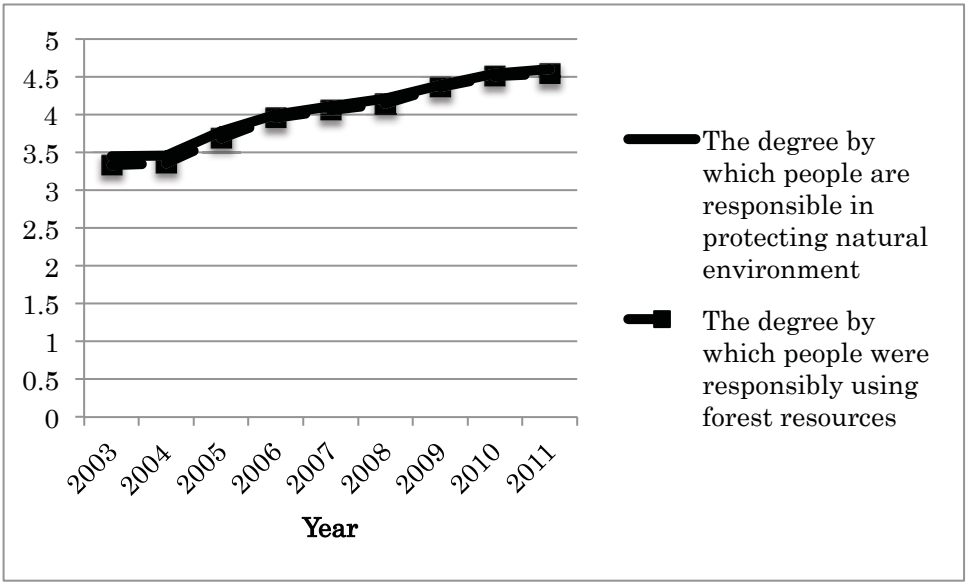


Figure 1. People's sense of responsibility in protecting natural environment and the responsible use of forest resources
Source: beneficiary survey

3) Nurturing trust relationships between local residents and Forest Department.

Local people were not actively engaged in the forest protection at the beginning of the project implementation. During the implementation of the project, Punjab Forest Department nurtured the relationship with the people through JFMC, and they became gradually active in the forest protection. At the beginning of the project, the department and the people did not have good relationships since it was restricting tree felling in the land owned by an individual and a group of individuals on the ground of the Forest Act 1927 and others. The officials of Punjab Forest Department said, "At the beginning of the project implementation, most people at the forest department found it very difficult to have the cooperation of the local people." Later in the project implementation, the relationship between the people and the department improved, and people became more actively engaged in JFMC.

In order to nurture the relationship, and improve the organizational effectiveness of JFMC, Punjab

[19] The actual question was "How much responsibly people were in using the forest resources in each year from 2003 to 2011?" and the response was by the scale of 5=much responsibly、4=responsibly、3=neutral、2=not responsibly、1=not responsibly at all.

Forest Department implemented the scheme of entry point activity that provided the villages with what people needed such as school classrooms and paved road for free. They also expanded the organizational arrangement to support people in order to nurture the trust relationships. The department divided the state into 17 divisions and assigned officers to each for the task, and 5 divisions among 17 had JFMCs supported by the project. At the beginning of the project, the department supported JFMC with the regular work arrangement, but staff and know-how was not sufficient, and their support was not sufficient. In December 2005, the department expanded the arrangement to support JFMC by recruiting facilitators with social science background, and assigning them in each division. Under the direction of the Coordination and Resource Unit, each division had four to seven facilitators, and each division supported JFMCs of 36 to 62 villages (refer to Figure 2). By assigning the facilitators for each division, the same facilitators can visit the village and became familiar with the villagers, know the situations and needs of the villages and this facilitated development trust relationships with villagers.

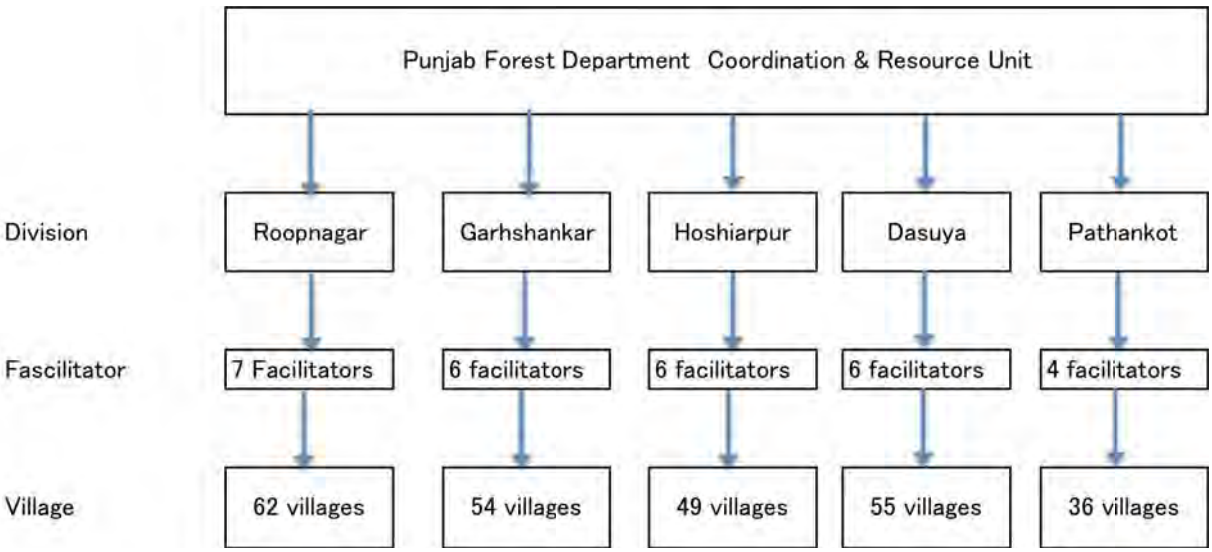


Figure 2. Support arrangement for villages

Source: Punjab Forest Department

The beneficiary survey asked JFMC members the degree by which the Punjab Forest Department was responsive to the community needs[20] and the degree by which people trusted the department[21]. These indicate the effectiveness of entry activity and support arrangement for the villages. As Figure 3 shows, the responsiveness of Forest department improved similarly to the degree of

[20] The actual question was "How much responsive was the Punjab Forest Department to the needs of the community in each year from 2003 to 2011?" and the response was by the scale of 5=very much、4=much、3=neutral、2=not so much、1=not at all.

[21] The actual question was "How much did you trust the Punjab Forest Department in each year from 2003 to 2011?" and the response was by the scale of 5=very much、4=much、3=neutral、2=not so much、1=not at all.

people's trust in the department. This trend indicates that as the department responded to the people's need, they earned people's trust.

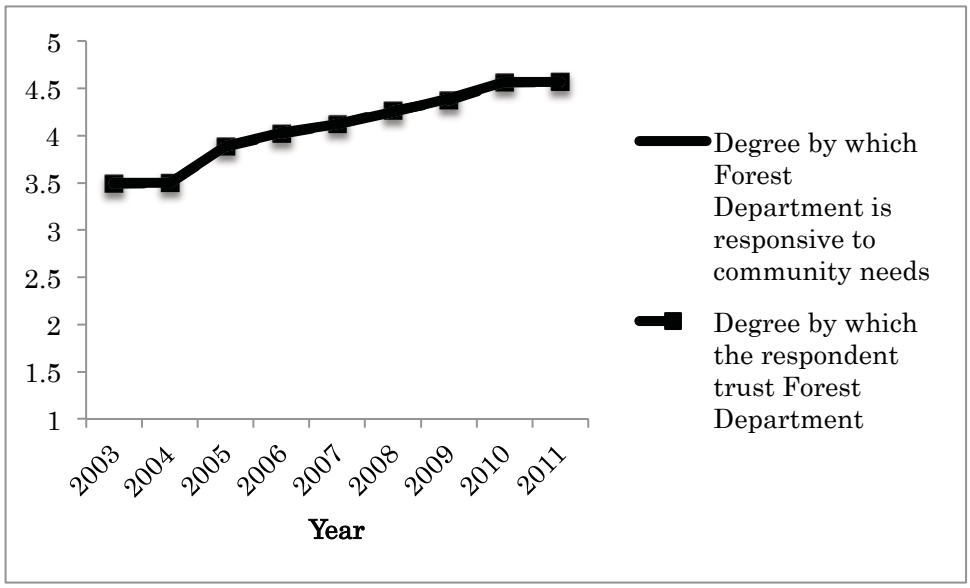


Figure 3. Forest Department's responsiveness to people's needs and people's trust in the department
Source: beneficiary survey

Punjab Forest department nurtured trust relationship with villagers, promoted active participation in JFMC activities and enhanced JFMC effectiveness to manage forest resource by trainings. This is indicated by the beneficiary survey on the changes of "the degree by which JFMC members actively participated in JFMC activities[22]" and "the degree of JFMC effectiveness[23]" As shown in Figure 4, for both questions, they were neither good nor bad in 2003. As years went on, people became more active in JFMC activities, and JFMC became more effective. This indicates that people's relationship with the Forest Department improved, people's participation was promoted, and these contributed to improvement in their effectiveness.

From the above, although the relationship between the forest department and the local people was not so good, they were improved by the forest department efforts to meet the people's needs. Then, people became more active in JFMC activities, JFMC became more effective, and people became more aware of the importance of environmental protection, and became more responsible in the use of forest resource by complying with rules. All these contributed to the forest protection.

[22] The actual question was "How much actively were you participating in JFMC activities in each year from 2003 to 2011?" and the response was by the scale of 5=very actively、4=actively、3=neutral、2=not so actively、1=not actively at all.

[23] The actual question was "How effective was your JFMC in its activities in each year from 2003 to 2011?" and the response was by the scale of 5=very effective、4=effective、3=neutral、2=not so effective、1=not effective at all.

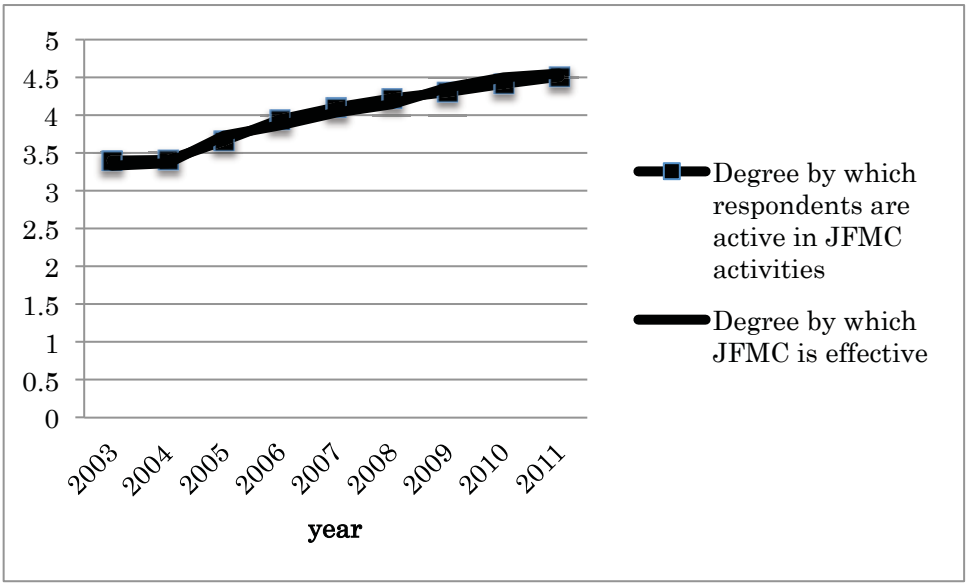


Figure 4. Members' activeness in JFMC activities and effectiveness of JFMC
Source: beneficiary survey

3.3 Impact

3.3.1 Intended Impacts

The impact of the project was to expand forest stock. The total volume of forest stock was 7.1 million m^3 in 1993[24], and was 15.71 million m^3 in 2011[25], thus it was achieved.

3.3.2 Other Impacts

(1) Diversification and promotion of economic activities of the people.

Punjab Forest Department tried to establish Self Help Group (SHG) in 256 villages in order to promote economic activities of the people in order to contribute to income increase. In December 2008, 348 SHGs in 219 villages were established, and the total number of the members was 4,755. Their economic activities were chosen by themselves, and they were sewing, embroidering, rope making, candle making, soap making, dairy, and retails, contributing to diversification of economic activities.

Punjab State Department provided technical skills to each group necessary for their activities, and provided loan. This loan scheme was implemented through JFMC. JFMC assesses the business plan of SHG and provided loan to those who passed the assessment. There is no direct connection between SHG and JFMC, and there are those who belong to both groups.

The survey[26] conducted by a consulting company on contract by the Forest Department indicated the SHG activities contributed to poverty reduction of the SHG members. This survey randomly

[24] Project Report on Social Forestry in Punjab, Punjab Forestry Department, 1995.
[25] India State of Forestry 2011, Ministry of Environment and Forest.
[26] Monitoring and Evaluation of Project Activities under Punjab Afforestation Project, Punjab Department of Forestry, 2009.

sampled 142 members and they answered that their income that included that from SHG activities increased from 28,721 rupee to 35,944 rupee.

(2) Increased income of the people

The beneficiary survey collected data of monthly income of each household on average and the income from SHG in each year from 2003 to 2011. From these data, I calculated annual income from non-SHG and SHG activities as shown in Figure 5. The household income was about 30,000 rupee in 2003, and became about 82,000 rupee in 2011. The average annual income from SHG activities was 3,100 in 2003, and gradually increased to 11,000 rupee in 2011. The percentage of income from SHG activities was 10% and became 13%, an increase by 3% in 2011, which indicates the modest contribution to the income by SHG activities.

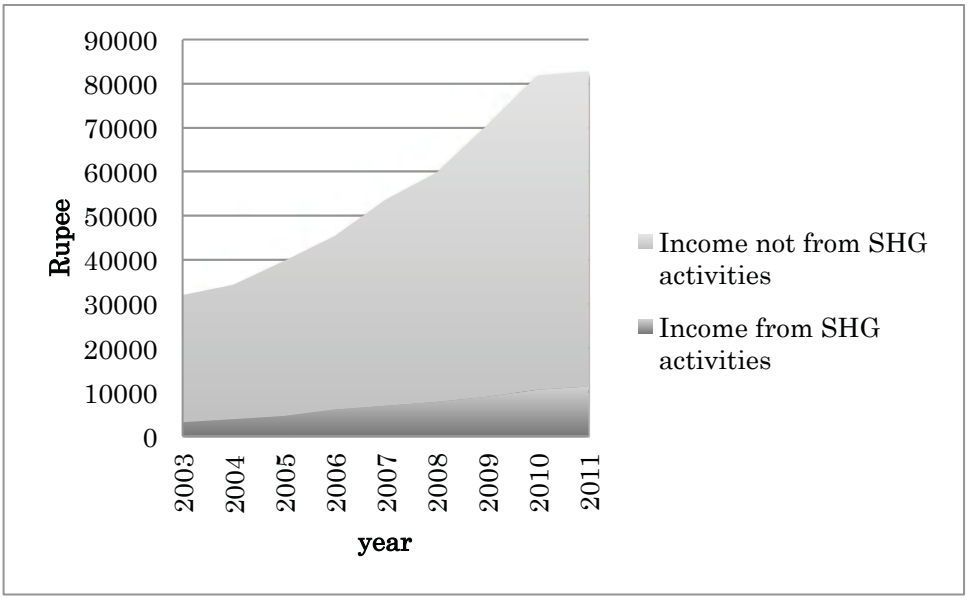


Figure 5. Trends of the income trend of the respondents
Source: beneficiary survey

Together with the project's contribution to household income by SHG activities, people are more satisfied with their cash income. The beneficiary survey asked the respondents how sufficient was the cash income[27], and the result shows that the level of sufficiency increased gradually from 2003 to 2011 (Please refer to Figure 6).

[27] The actual question was "How sufficient was your income for meeting cash needs of your household? And the responses were with the scale of 5=more than sufficient, 4=sufficient, 3=neutral, 2=not sufficient, 1=not sufficient at all.

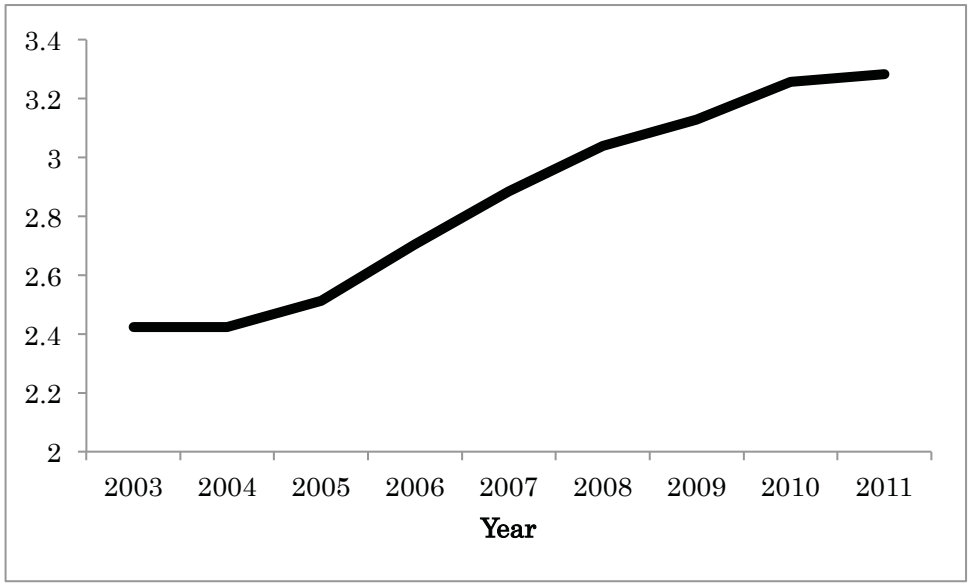


Figure 6. The degree of sufficiency of cash income for respondents' households
Source: beneficiary survey

(3) Limitation of use of forest resource

Although JFMC's forest management restricted the use of forest resources, it did not negatively affect poor people who were using Non-Timber Forest Product (NTFP) that included fodder and plants for rope making and medicinal use since villagers had the priority in the use of NTFP.

From the above, it can be stated that this project has high achievements, thus its effectiveness and impact are high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

An output of this project was to plant and undertake activities to recover soil and water resource in degraded forest areas with participatory approach in Punjab State, and the concrete activities were planting trees and construct facilities for soil recovery and water resource development.

Plantation was mostly done as planned. (Refer to Tables 7 and 8). The outputs of Phase I were brushwood check dams, dry stone masonry check dams, and crate wire structures in streams/choes and they were as planned (refer to table 9). The outputs of Phase II were brushwood check dams, and dry stone masonry check dams and they were constructed more than planned. Punjab Forest Department explained that the reason why crate wire structures in streams/choes were constructed less than planned was the increased prices of the materials. I could not collect the information of why the renovation of village ponds and installation of new village ponds were made less than the plan (refer to Table 10).

Table 7. The plan and actual of plantation activities by plantation models (Phase I)

Area / Plantation Model	Plan (1997)	Actual (2002)	Ratio of the actual to the plan (%)
Enrichment Planting[28] (ha)	25,000	25,120	100.4
Vegetative Shrub Barriers[29] (ha)	2,500	2,275	91.0
Bamboo Planting (ha)	1,800	1,802	100.1
Bamboo Working (ha)	2,000	1,700	85.0
Rehabilitation of Degraded Forests (ha)	20,000	20,151	100.8
Reclamation of Saline/Alkaline areas (ha)	5,000	5,000	100
Reclamation of water logged areas (ha)	2,450	2,433	99.3

Source：Punjab Forest Department

Table 8. The plan and actual of plantation activities by plantation models (Phase II)

Area / Plantation model	Plan (2003)	Actual (2009)	Percentage of the achievement vis-à-vis the plan (%)
Enrichment Planting (ha)	11,000	11,005	100.0
Vegetative Shrub Barriers (ha)	1,200	1,200	100.0
Silvipasture in Shiwaliks (ha)	400	400	100.0
Bamboo Working (ha)	300	307	102.3
Rehabilitation of Degraded Forests (ha)	6,500	6,677	102.7
Reclamation of Saline/Alkaline areas (ha)	800	800	100.0
Reclamation of water logged areas (ha)	700	706	100.9

Source：Punjab Forest Department

[28] This model plants young trees among existing ones For the purpose of increasing the density of trees of a given species.

[29] This model plants low trees to stabilize the surface soil for the purpose of preventing soil erosion.

Table 9. Plan and actual of outputs（Phase I）

Soil conservation and water management works	Plan	Actual	The difference from the plan
Silt retention dams (Earthen)（no）	366	366	0
Dry stone masonry check dams（no）	266	266	0
Crate wire structures in streams/choes（no）	16	16	0

Source：Punjab Forest Department

Table 10. Plan and actual of outputs（Phase II）

Soil conservation and water management works	Plan	Actual	The difference from the plan
Brushwood check dams（no）	246	300	+54
Dry stone masonry check dams（no）	200	362	+162
Crate-wire structures in streams/choes（no）	130	70	∆60
Renovation of village ponds（no）	100	63	∆37
New village ponds（no）	110	27	∆83

Source：Punjab Forest Department

3.4.2 Project Inputs

3.4.2.1 Project Cost

Yen loans approved in L/A were 6,193 million yen for Phase I and 5,054 million yen for Phase II. The loan disbursement amounts were 6,188 million yen for Phase I and 4,809 million yen for Phase II. The percentages of the disbursement vis-à-vis the L/A approved amounts were 99.9% and 95.1 respectively and these were within the plan. The budgets of the Punjab State Government were 278 million rupee for Phase I and 615 million rupee for Phase, and the actual expenditures were 190 million rupee for Phase I and 698 million rupee for Phase II. The percentages of the expenditure to the budget were 68.3% and 113.5% respectively. The totalled budgets and expenditures of Phase I and Phase II were 893 million rupee and 888 million rupee and the percentage of the expenditure to the budget was 99.4% and was within the plan (refer to Table 11). From the above, the project expenditure was lower than planned

Table 11. Comparison of the budget and expenditure

	Yen Loan (million yen)			Punjab State Government Budget (million rupee)		
	Plan (L/A approval)	Actual (Disbursement)	Percentage of the actual vis-à-vis the plan (%)	Plan	Actual	Percentage of the actual vis-à-vis the plan (%)
Phase I	6,193	6,188	99.9	278	190	68.3
Phase II	5,054	4,809	95.1	615	698	113.5

Source：JICA and Punjab Forest Department

3.4.2.2 Project Period

The planned project period was from December 1997 to March 2007 (112 months) for Phases I and II and the actual was from December 1997 to March 2010 (148 months). The percentage of the actual vis-à-vis plan was 132%. The reason of delay was the delayed disbursement by the Punjab State Government, which delayed the activities in soil conservation and research. Thus the project period was longer than planned.

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

Economic Internal Rate of Return (EIRR) was 27% at the time of appraisal and was 39.2% in 2011. The cost and the benefit are as in Table 12. The reason why EIRR increased in 2011 was that although some leaves and plants were assumed having no monetary value or undervalued at the time of plan in 2004, they were actually the income source of the local residents as they were used for medicinal purpose and fodder. Taking the monetary value into account, some unit prices of the benefits were increased.

Table 12. EIRR

	Plan (2004)	2011
EIRR	27%	39.2%
Cost	Plantation, soil conservation, forest conservation/fire prevention, research & development, extension/awareness/training, equipment/office, wages/miscellaneous	
Benefit	Sales of Timber, firewood, leaves, bamboo, grass, leaves, and fruit, CO^2reduction effect	
Project life：	67 years	

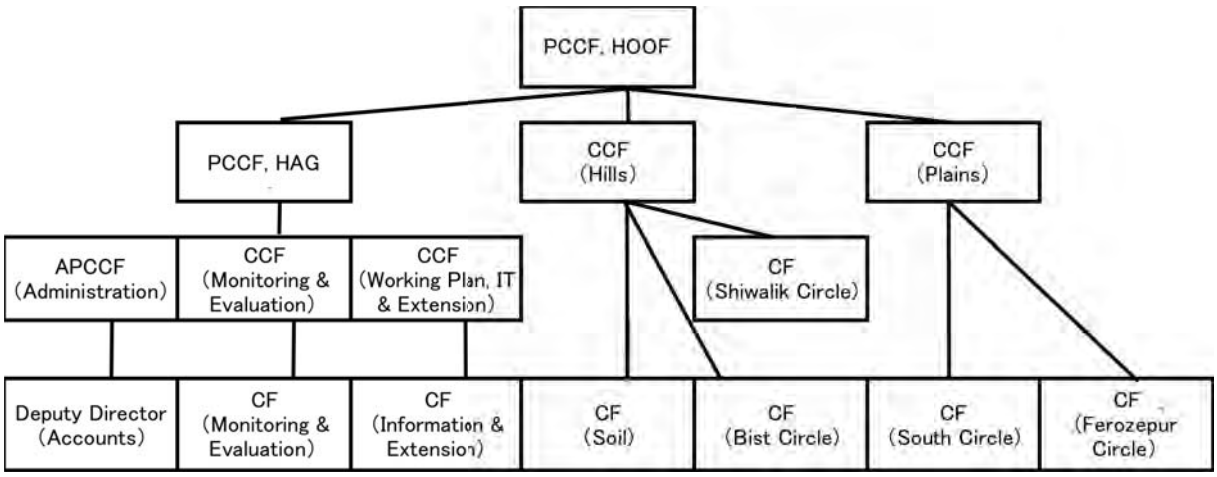
Source：Punjab Forest Department

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

Punjab forest department is an implement agent of this project, and plan and implement projects for conserving forest and wildlife as one department of the state. The department has the organizational arrangement headed by PCCF, HOFF (Principal Chief Conservator of Forests, Head of Forest Force) in the headquarters and has PCCF (Principal Chief Conservator of Forests) and two CCFs (Chief Conservators of Forests) who are in charge of the headquarters' administration, and plain and hill areas under him (please refer to Figure 7).



PCCF, HOFF: Principal Chief Conservator of Forests, Head of Forest Force
PCCF, HAG: Principal Chief Conservator of Forest, Higher Administrative Grade
APCCF: Additional Principal Chief Conservator of Forest
CCF: Chief Conservator of Forests
CF: Conservator Forest

Figure 7. Organizational Chart of Punjab Forest Department

Source：Punjab Forest Department

Punjab Forest Department has the decision-making hierarchy as described above. In addition, they also have the hierarchical arrangement for the maintenance and operation activities at the field level （refer to Table 13）.

Table 13 Demarcation of Punjab State at the field level

Demarcation	Units and the number of the Lower rank	Official in charge of each unit and the total number of the officials in Punjab state
Division	4-5 ranges	2 Chief Conservators of Forest (Plan/Hill areas) 17 Divisional Forest Officers
Range	10-8 forest blocks	107 Rangers
Forest block	3-2 beats	240 Foresters
Beat	3-2 villages	980 Forest Guards

Source：Punjab Forest Department

In the field, Punjab Forest department maintains the project outputs in collaboration with JFMC in each village. Foresters and Forest guards regularly patrol and maintain plantations in the State Forest land. Plantations owned by villagers are maintained by villagers who are members of the JFMC that employs guards to patrol the forest as needed. Foresters and Forest Guards of the Punjab Forest Department maintains soil conservation facilities such as check dams in collaboration with JFMC, and if the repair is needed, expenditure is covered by the project for Punjab forest watershed development described later. From the above, it can be stated that the organizational arrangement does not have problems to manage and operate the project outputs.

3.5.2 Technical Aspects of Operation and Maintenance

Chief Conservators and Conservators of Punjab Forest Department are the specialists in plantation, soil conservation, or civil engineering. They planned and implemented plantation and construction of check dams and other facilities for soil recovery with the labour of the local people, and they produced outputs as planned.

As for the maintenance of trees, all the trees are numbered and recorded and Foresters assigned to each section regularly monitor the trees.

Punjab Forest Department said that the local people are engaged in plantation and the construction of soil recovery facilities, and learned necessary skills. Therefore, they have no technical problem in the maintenance of the project outputs.

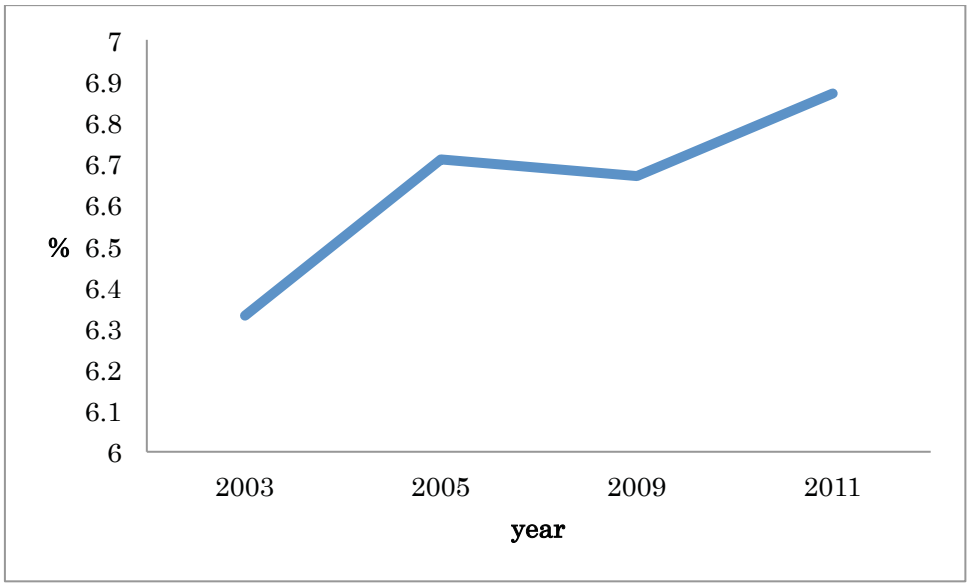


Figure 8. Trends of forest cover in Punjab state
Source：Forest Survey of India

Figure 8 shows that the forest cover in Punjab State increased from 6.33% in 2003, to 6.71% in 2005, and to 6.87% in 2011 and continues to increase after the project implementation while it decreased to 6.67% in 2009. This indicates the appropriate management of the existing forests and new plantation, and this shows that there is no technical problem at the forest department.

From the above, Punjab Forest Department has no problem in technical aspects in the maintenance and operation.

3.5.3 Financial Aspects of Operation and Maintenance

Punjab Forest Department formulated Watershed Development project in Punjab State with Punjab State budget and started the implementation since FY2010[30]. Table 14 shows that the budget was 74,210,000 rupee in FY2011 and the expenditure was 72,601,000 rupee. The official of the Punjab Forest Department said that the budget is sufficient for the operation and maintenance of the project outputs, and similar level budget will be available in the future. JFMC manages its own fund by keeping records of income, expenditure, and the purpose. Punjab Forest Department does not monitor the finance of JFMC although as mentioned in the qualitative effect, JFMC is functioning.

Table 14. Budget and expenditure of the project for Punjab forest watershed development in FY2011

Item	Budget (Thousand Rupee)	Expenditure (Thousand Rupee)
Wage	60,368	60,575
Materials (seeds, pesticide, and others)	11,650	10,072
Fuel and others	850	849
Office expenses	650	607
Others	700	698
Total	74,218	72,601

Source：Punjab Forest Department

3.5.4 Current Status of Operation and Maintenance

The project outputs such as trees and check dams, ponds, and irrigation facilities are maintained by Punjab Forest Department and JFMC. I visited these facilities, and found that the conditions are mostly good, and functioning. I asked Punjab Forest Department to rate the conditions of maintenance of the trees and these facilities with the five scale[31], and they gave five (very good) and the project outputs are mostly in good conditions. From the above, the conditions of maintenance are good.

[30] The fiscal year in India starts from April and ends in March in the next year.
[31] The meanings of ratings are 5=very good, 4=good, 3=neutral, 2=bad and 1=very bad.

From the above, it can be said that 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 improve self-sufficiency of wood products in the state and to recover degraded environment and to increase forest stock by planting trees and undertaking activities to recover soil and water resources in degraded forest areas with the participatory approach in the State of Punjab. The relevance of the project is high since it is consistent with the policies of the Governments of India and Punjab to promote tree plantation while giving consideration to the welfare of the poor, with development needs of the Punjab State to expand forestry areas, and with the Japanese ODA policies for India that has the priority in poverty reduction and conservation of environment. The effectiveness and the impact are high since tree plantation and soil conservation activities expanded the forest areas, improved the self-sufficiency of wood products, and reduced soil erosion. The efficiency is fair since the budget was within the plan but the period was longer than the plan. The sustainability is high since organizational arrangements, technical aspects, financial resources, and sustenance of the project achievements are all good in Punjab forest department. In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

none

4.2.2 Recommendations to JICA

none

4.3 Lessons Learned

The relationship between the implementing agency and the local residents was a difficult one at the beginning of the project implementation, because of the reasons such as the implementing agency tried to control trees planted in private land. At that time the implementing agency found it difficult to have the cooperation from the people for the project implementation. However, by responding to the needs of the people by entry activities and improved the arrangement to support the people, the implementing agency improved communication and eventually had the cooperation from the people. It can be said as the lesson that the trust relationship between implementing agency and the people are important for the participatory projects, and they can nurture trust relationship by promoting understanding needs of each other and willingness to compromise.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1.Project Outputs	Please refer to Tables 10 and 11	Please refer to Tables 10 and 11
2.Project Period	ID-P132 December 1997- February 2003 (63 months) ID-P146 March 2003 - March 2007 (49 months)	ID-P132 December 1997 - February 2003 (63 months) ID-P146 March 2003 - March 2010 (85 months)
3.Project Cost Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	 0 million yen 13,437 million yen (Local currency) 13.437 million yen 11,247 million yen 1 rupee＝2.45yen (As of September 2002)	 0 million yen 13,261 million yen (Local currency) 13,261 million yen 10,997 million yen 1 rupee＝2.55yen (Average between 1997 and 2010)

Lao P.D.R.

The Forest Management and Community Support Project (FORCOM)

External evaluator: Hideyuki Takagi,
Ernst & Young Sustainability Co., Ltd.

0. Summary

This project was implemented for the purpose of the creation and improvement of alternative livelihoods for shifting cultivation farmers, and the control of deforestation by reducing dependence on shifting cultivation in the poorest districts in the Lao PDR. Its relevance is high and it conforms well to the development policies and development needs of the Lao PDR as well as the aid policies of Japan. The achievement of project objective is fair because although this project objective has contributed to the creation and improvement of alternative livelihoods for shifting cultivation farmers at the project sites, some of indicators haven't been achieved yet and also these project activities haven't expanded. Although the prevalence and state of development after completion of the project is limited, the activities of the shifting cultivation farmers at the project sites have continued at some level. On the other hand, there is no sufficient data showing a reduction in deforestation, and it is observed that the project needs more time and further efforts for contributing to a reduction in deforestation. Comprehensively considering these facts, its effectiveness and impact are considered to be fair. The efficiency is considered to be high because the inputs were appropriate for the outputs of the achievements, and there was no problem with the period of the project and the amount of funds. The sustainability is considered to be low because, although the activities of the villages at the project sites have continued to some extent, there are problems in the implementation system and financing by the local government to extend the effects of the project to the neighboring regions. In light of the above, this project is evaluated to be partially satisfactory.

1. Project Description

(Project location map: 9 districts in 6 provinces in the North)

(Developing an action plan mainly by the residents)

1.1. Background

The Lao PDR is a country with abundant forest resources, where the agriculture and forestry sectors account for half of the gross domestic product, and about 80% of its population make their living from agriculture and forestry. Although the mountainous areas conventionally depended on dry-land rice production from traditional shifting cultivation and agroforestry in the shifting cultivation fields, a sufficient fallow period cannot be secured as part of shifting cultivation to maintain this form of livelihood due to population growth and land-use limitations. Shifting cultivation without securing a sufficient fallow period degrades the land capability, and the secondary forest cannot recover, which is one of the causes of deforestation, and the rate of forest cover has dropped to 41.5% in 2002 from 70% in 1940. The Lao government is therefore working on forest protection activities through the preservation of the natural environment and poverty reduction measures in the mountainous areas together with the local residents and international cooperation organizations. Although a Forest Law was established in 1996, and a Ministerial Ordinance on Village Forest Management was established in 2001, the forest management activities in villages were not sufficient due to the lack of skills of the responsible officers of the local governments and the budget.

In order to address these issues, the Lao government implemented a "Forest Conservation and Afforestation Project" (hereinafter called "FORCAP") in Vientiane province from 1996 to 2003 in cooperation with the Japanese government. In the project, after developing the basic concept and the action plan for creating a forest conservation and afforestation model based on participation by the residents, forest conservation including agroforestry and profit-sharing forestry[1]and activities including weaving for improving livelihoods have been implemented as well as the development of a village forest management planning model and human resources at the provincial level.

This project was implemented from February 2004 for the purpose of the creation and improvement of alternative livelihoods for shifting cultivation farmers, and the control of deforestation through a reduction in dependence on shifting cultivation in the poorest districts by extending the achievements of FORCAP to six provinces in the North.

[1] A forest where the landowner of the forest and those who plant and tend the trees, or three parties if those who pay the expenses are included, conclude a contract to plant and tend the trees and to share the profits after cutting the trees at a certain rate.

1.2. Project Outline

Overall goal		The rate of deforestation (by shifting cultivation) is reduced in the districts where the project sites are located.
Project Objective		The activities leading to the sustainable land and forest use begin to expand in the project site and its surrounding areas, initiated by villagers.
Outputs	Output 1	Activities based on appropriate land and forest use are demonstrated in the Initial Sites (IS)[2].
	Output 2	Extension staff gain extension skills and techniques through training.
	Output 3	Under the framework of Community Support Programme (CSP)[3], activities based on appropriate land and forest use are implemented at the Pilot Sites (PS)[4] by villagers and extension staff.
	Output 4	Recommendations are made on sustainable land and forest use practices and on extension systems and methods.
Input		Japan Side: 1. Experts: 20 in total (11 for Long-term, 9 for Short-Term) 2. 25 Trainees received 3. No Trainees for Third-Country Training Programs 4. Equipment: 29.940 million yen (29 motorcycles, 3 vehicles, office equipment, etc.) 5. Local Cost: 114.31 million yen 6. Others: Baseline surveys and annual household budget monitoring of the project sites, and the analysis of satellite images in the targeted areas Lao PDR Side: 1. 43 Counterparts 2. Land and Facilities: project offices 3. Local cost: 46,000 US dollars
Total cost		688.6 million yen
Period of Cooperation		February 2004 - February 2009

[2] A village where the technology is transferred to the counterparts through the formulation and demonstration of activities based on the appropriate use of land and forests mainly by the residents.

[3] Activities for forest management and livelihood improvement in country villages for the purpose of reducing the rate of deforestation.

[4] Villages where the counterparts and the extension officers are central to the support for the residents to implement the extension of CSP.

Implementing Agency	Ministry of Agriculture and Forestry (MAF) and the National Agriculture and Forestry Extension Service (NAFES)
Cooperation Agency in Japan	Forestry Agency of the Ministry of Agriculture, Forestry and Fisheries of Japan
Related Projects	(Technical cooperation from Japan) • "Forest Conservation and Afforestation Project (FORCAP)" as a prior project • Collaboration with the "Lao PDR Aquaculture Improvement and Extension Project Phase II (AQUIP 2)" at some sites • "Participatory Land and Forest Management Project for Reducing Deforestation (PAREDD)" as a subsequent project (Other international bodies, aid agencies, etc.) • "Laos Extension for Agriculture Project (LEAP)" by the Swiss Agency for Development and Cooperation • "Northern Upland Development Program" by the Asian Development Bank • Support for villages by the international NGO World Vision, etc.

1.3. Outline of the Terminal Evaluation

1.3.1. Achievement of Overall Goal

In order to "reduce the rate of deforestation (by shifting cultivation) in the districts where the project sites are located" as the overall goal, the CSP should be implemented targeting about 20,000 households. It was pointed out that about 4.3 million US dollars in funding is needed in terms of finance, and further improvement of the extension system of the local governments (Provincial Agriculture and Forestry Office (PAFO) and District Agriculture and Forestry Office (DAFO)) is required in terms of establishing the level of organization to achieve this. The population increase (when the improvement of production per field is difficult, an increase in the population might expand the area of cropland) and the impact of commercial crop cultivation using foreign capital (a rapid development might hinder the orderly land use policies promoted by the government) were listed as hindering factors.

1.3.2. Achievement of Project Objective

It was likely that the project objective, "activities leading to the sustainable use of land and forests are extended mainly by the residents in and around the project sites," would be achieved because three indicators (Indicators 3 to 5) out of the five indicators for the project objective have been achieved, and the two indicators (Indicators 1 and 2) not yet achieved have made good progress. Although the situation of Indicator 2 on the increase in income depends on the period required to achieve this, the effects and maintenance of the activities

by the participating farmers were confirmed. More than half of the participating farmers also recognized the effects of Indicator 5 on reducing their dependence on shifting cultivation.

1.3.3. Recommendations

Recommendations were made concerning the "institutionalization of the CSP," "extension of the CSP at the field level," and "improvement of land and forest management." The institutionalization of the CSP was incorporated into the official Lao Extension Approach (LEA) by the Ministry of Agriculture and Forestry of the Lao PDR, and measures were taken including the establishment of the self-reliance and development committees to secure the budget of the provinces and districts to continue the CSP. Meanwhile, the adjustment of the CSP in light of a new extension system such as the cluster system[5] was expected to be implemented in the subsequent project. Human resources development, the preparation of extension materials, improving the revolving system[6] and analysis of the trends in shifting cultivation by the farmers were listed for the extension of the CSP at the field level, which was expected to be implemented in the subsequent project. The utilization plan for the land and forests, and an awareness-raising campaign among the residents and so forth were listed for the improvement of land and forest management, which was expected to be implemented in the subsequent project.

2. Outline of the Evaluation Survey

2.1. External evaluator

Hideyuki Takagi (Ernst & Young Sustainability Co., Ltd.)

2.2. Duration of the Evaluation Study

Duration of the Study: October 2011 – December 2012

Duration of the Field Study: January 8, 2012 – January 15, 2012 / March 18 – March 31, 2012

[5] A system to enhance more effective government services by establishing a "village cluster" by bringing five to ten villages together. As a new extension system, extension staffs will be assigned to agricultural technology service center at cluster level. This is expected that extension staffs become providing careful supports for extension services by more frequent visits to the villages.

[6] A system in which the achievements (such as the breeding of livestock) acquired through the activities by the farmers participating in the project are managed and operated by the responsible persons in the village to gradually extend them to the whole village.

3. Result of the Evaluation (Overall Rating: C[7])

3.1. Relevance (Rating: ③[8])

3.1.1. Relevance with the Development Plan of Lao PDR

(Relevance at the policy level)

Since the major causes of deforestation include expanding shifting cultivation due to the increase in population and poverty, the Lao government promotes poverty reduction policies, and the conversion from shifting cultivation to settled agriculture through the adoption of alternative means of livelihood (stabilization of shifting cultivation). During the project period, the national plan including the Five-year National Socio-economic Development Plan is aimed at reducing the number of poor households, reducing dependence on shifting cultivation, and improving the forest coverage.

"The Fifth Five-year National Socio-economic Development Plan" (2001 - 2005) at the start of the project is aimed at reducing the number of poor households and moving away from agriculture that is dependent on shifting cultivation. Regarding the stabilization of shifting cultivation, achieving basic stabilization by 2005, and completing stabilization by 2010 were defined as the goals. This stabilization should be carried out through conversion to alternative means of production such as settled agriculture, and development of the infrastructure required for this conversion and support including the introduction of commercial crop and new cultivation methods should be implemented. "The Sixth Five-year National Socio-economic Development Plan" (2006 - 2010) at the end of the project is also aimed to reduce the number of poor households (to less than 15% of all households) and to improve the forest coverage (to over 50%) as goals for the social environment sector. In addition, the agriculture sector development guidelines in the northern area in the regional development strategies should promote the ongoing stabilization of shifting cultivation through conversion to the cultivation of commercial crops and the rearing livestock and poultry, and so on. Another policy for poverty reduction, the "National Growth and Poverty Eradication Strategy" (2004) addresses improvement of the production methods, mainly with shifting cultivation and livelihood improvement as important issues.

(Relevance at the enforcement level)

The "Ministry of Agriculture and Forestry Five-year Development Plan" (2001 - 2005) at the start of the project aimed at the stabilization of shifting cultivation as one of the most important goals of the agriculture and forestry sector in the Lao PDR. The "Ministry of Agriculture and Forestry Five-year Development Plan" (2006 - 2010) at the end of the project also aimed at the stabilization of shifting cultivation as one of the most important

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

[8] ③: High, ② Fair, ① Low

goals of the agriculture and forestry sector in the Lao PDR. The "Forest Strategy 2020" approved by the government in January 2004 also includes a plan to restore the forest cover to 70% by 2020. Both the "agriculture strategy" and the "forest strategy" are aimed at the improvement of the production methods mainly with shifting cultivation and livelihood improvements in the northern area as important policy issues.

3.1.2. Relevance with the Development Needs of Lao PDR

(Needs of the targeted areas and the target groups)

In the northern mountainous area, policies for the above-mentioned poverty reduction, the stabilization of shifting cultivation and the control of deforestation are the most important issues. In particular, seven districts out of the nine districts in the North as the project target areas are classified as the poorest districts in the "National Growth and Poverty Eradication Strategy," and the needs of the targeted areas and the target groups of the project remain the same.

In particular, in the regions where measures to control the expansion of shifting cultivation cropland including the land and forest distribution project[9] are promoted (such as Luang Prabang Province), a transition in the means of livelihood from a self-sufficient livelihood based on traditional shifting agriculture (dry-land rice cultivation) to the expansion of rice paddies (if there is suitable land), cultivating commercial crops and planting gum trees, and buying food with the proceeds from the sale of livestock, etc., is required. Therefore, if the measures to control the expansion of shifting cultivation are promoted without securing a means of livelihood as an alternative to dry-land rice cultivation, then the farmers who cannot adapt are unable to make a living and end up living in poverty. In a situation where shifting cultivation is restricted based on these policies, there is a high need to protect the life of poor farmers through securing an alternative means of livelihood.

(Needs of the counterparts)

The counterparts in this project are the extension officers of the Agriculture and forestry extension organizations of the national and local governments. In 2001, the National Agriculture and Forestry Extension Service (NAFES) was established, and the extension system was pursued by the extension officers of the provinces and districts led by NAFES when the organization's activities just began, thus improvement of the capacity of the extension officers of NAFES, provinces and districts were the issues concerning the needs of the counterparts. Under the circumstances in which the government budget remained limited,

[9] Land classification for the purpose of the promotion of agriculture and the protection of the forest. The land is classified into farmland, forest land, etc., and the forest land is subject to protection and preservation.

the need for technology transfer and support for extension activities by the project continued.

3.1.3. Relevance with Japan's ODA Policy

"JICA Country Program"

The aid priority areas in the Country Program for the Lao PDR include the agriculture and forestry sector, and the strategies for comprehensively and effectively addressing the improvement of rural development, the promotion and improvement of fishery and stockbreeding, and forest preservation are described.

Considering the 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 and Impact (Rating: ②)

3.2.1. Effectiveness

3.2.1.1. Relationship between the project design and the CSP extension system

As a method for extending the Community Support Program (CSP) to establish a means of livelihood without depending on shifting cultivation, this project adopted the approach of gradually extending the program to the northern mountainous areas by placing the project sites consisting of the Initial Sites (IS), Pilot Sites (PS) and Extension Spots at the center of the activities.

Although the extension of the CSP is the role of the extension officers of the local governments, farmer-to-farmer extension was also considered to be an important factor in the project in order to support the sustainable development of the project effects based on the low budget of the Lao government. Therefore, a resident-centered project was implemented, whereby the local government supported the development of action plans and implementation of the activities by the residents, and the maintenance and extension of these activities in the villages through a revolving system in order to lead to extension of the activities.

At the start of the project, technology transfer through the formulation and demonstration of the activities based on the appropriate use of land and forests mainly by the residents in IS was expected to be achieved by implementing training given by experts for the counterparts. The activities actually formulated and demonstrated in the IS are classified into the two types mentioned below. This project focused on the Type 2 activities with the aim of improving livelihoods as the focus of the activities. Therefore Type 2 activities account for a large proportion of the activities in the PDM.

(Type 1 activities)

These involve efforts by all the residents in the village to improve forest management. Activities include teak planting in the community forests and school afforestation for education (fruit gardens in the school premises).

(Mangos and bananas planted as part of the school afforestation activities)

(Type 2 activities)

These are production activities by individual households to create and improve alternative means of livelihood for shifting cultivation farmers. Suitable activities for mountainous areas such as stockbreeding, expansion of rice paddies, fruit cultivation, fish farming and weaving were implemented so that farmers could manage with affordable low-cost technologies. Gradual extension to the whole village is envisaged through a revolving system.

(Pig rearing activities are successful in many villages)

(Weaving activities also lead to valuable cash earnings)

The next step involves the activities in the PS, where it was envisaged that technology transfer would be implemented by the counterparts for the PAFO / DAFO extension officers and the key farmers[1], and that the counterparts and the PAFO / DAFO extension officers would become central to providing the resident support for the implementation of the extension of the CSP.

The final step in the CSP extension process that the project aimed at was the promotion of

[1] These are village mayors and the leaders of each activity group who are in charge of the extension of the activities in the village.

the extension of the CSP to the villages at the IS /PS and further extension to the neighboring villages (Extension Spots). The "farmer-to-farmer extension[2]" by the participating farmers to non-participating farmers was envisaged in the villages at the IS / PS and extension by the DAFO extension officers[3] to the neighboring villages.

3.2.1.2. Project Output

In the project, after the training provided to the extension officers of the Provincial Agriculture and Forestry Office (PAFO) and District Agriculture and Forestry Office (DAFO) was first completed, activities based on the appropriate use of land and forests were formulated and demonstrated at the IS. Through these activities at the IS, practical technology transfer to the counterparts was implemented. Then, the counterparts and the DAFO extension officers became central to providing the resident support at the PS to implement the CSP. As referred to hereinafter, the activities at the IS and PS were mostly smoothly implemented by the end of the project. The activities at the PS were planned and implemented on an annual basis over four years (the 1st – 4th PS). (See the Table 1 "Number of participating farmers in major Type 2 activities" for the trends in the number of the participating farmers in each project step from the IS to the fourth PS.) Concerning the Extension Spots, on the other hand, there was no particular increase discernible in the number of participating farmers at the IS /PS and extension of the CSP to the neighboring

Table 1. Number of participating farmers in major Type 2 activities
(breakdown by project step)

	IS (Mar. 2005 –)	1st PS (Nov. 2005 –)	2nd PS (May 2006 –)	3rd PS (May 2007 –)	4th PS (Apr. 2008 –)	**Total or Ratio (%)**
Number of villages	4	7	7	8	8	**34**
Number of farmers(1)	516	792	701	595	651	**3,255**
Start of the project:						
Number of participants	218	259	259	288	243	**1,267**
Rate of participation	42%	33%	37%	48%	37%	**39%**
End of the project:						
Number of participants	301	299	256	282	238(2)	**1,376**
Rate of participation	58%	38%	37%	47%	37%	**42%**

Source: Created by the evaluator based on the evaluation report upon termination. ((1) is the total number of farm households at the start of the PJ, (2) is calculated using the number of participating farm households at the start since the data was not obtained for four villages in the 4th PS.)

[2] Extension of technologies by making use of a revolving system by the village leaders and the key farmers as the center of the activities.

[3] Extension to the neighboring villages by the DAFO officers who developed the extension methods at the PS.

villages by the DAFO extension officers by the end of the project. However, in this evaluation survey, it was confirmed that the number of participating farmers had steadily increased at some project sites by the time of the post-project evaluation.
The degree of attainment of each achievement is mostly achieved as referred to hereinafter. Among the achievement indicators for which the level of attainment did not meet the target value, the "increase in the number of participating farmers" and "increase in income of the participating farmers" indicated the achievement of the effects after the project was completed in the survey at the time of the post-project evaluation. As for the efforts regarding the recommendations of Output 4, the activities for ensuring sustainability were implemented in the final stages of the project, and some parts are to be dealt with in the subsequent project of PAREDD[4]. The details of the level of attainment of each achievement are indicated below.

1) Output 1 "Activities based on appropriate land and forest use are demonstrated in the Initial Sites (IS)" had been achieved by the end of the project, which means that the activities based on the appropriate use of land and forests at the IS were displayed. In the project, the technology transfer was implemented for expanding the sustainable activities mainly by the participating farmers.

Indicator 1 "Identification of low-cost technology" has been achieved, considering that the technologies for the alternative means of livelihood (Type 2 activities) such as low-cost feeding methods for livestock (cows, pigs, goats and chickens), and production methods for lac (ingredient for varnishes and dyes) and paper mulberry (ingredient for paper) as agroforestry making use of croplands during the fallow period have been introduced at the IS. In the process of the introduction of the technologies, the experts conducted technology transfer regarding the methods for the introduction and operation of the activities in the villages for the extension officers as well as technical guidance for the means of livelihood through training and OJT at the IS. For farmers, technology transfer regarding the extension methods focusing on autonomy, capacity for analyzing and solving problems and the self-reliance and the development of the farmers from the viewpoint of ownership was conducted by the cooperation of the experts and the extension officers at the IS.

Indicator 2 "Continuance of the adopted technologies at the IS (50% or more of the introduced technologies)" has been achieved since all the participating farmers had continued 50% or more of the major introduced technologies two years after the start of the

[4] "Participatory Land and Forest Management Project for Reducing Deforestation (PAREDD)" This is a subsequent project, which aims to establish systems to reduce deforestation mainly through participatory land and forest management.

activities according to a survey (on the number of participating farmers rearing livestock, etc., in four villages) conducted by DAFO in September 2007.

Indicator 3 "a 20% increase in income at the IS (60% or more of the participating farmers within two years)" has been achieved to a limited extent since the proportion of the participating farmers using production methods introduced by the project that led to a 20% increase in income was 2.7% one year later and 39% two years later. Regarding the activities for which the period required to create a profit is short among the Type 2 activities (pigs, goats, chicken rearing, fish farming, paper mulberry cultivation, etc.), the proportion of participating farmers gaining a 20% increase in income two year later was 56.3% on average, which was almost 60% of the target value. On the other hand, regarding the activities for which the period required to create a profit is long (expansion of rice paddies, cattle rearing and fruit cultivation), at the evaluation upon termination, it was believed to be difficult to attain the goal by the end of the project. As for expansion of rice paddies, the proportion of the participating farmers gaining a 20% increase in income two year later remains at 20.7%. As for cattle rearing and fruit cultivation, the proportion of participating farmers gaining a 20% increase in income was less than 10%, but according to the survey in the post-project evaluation, the number of cows is steadily increasing in at least 16 villages out of the 26 villages that introduced the activities of cattle rearing, and further accomplishment (income increase) is expected in the future. Meanwhile, harvesting was confirmed in at least two villages out of the seven villages that introduced the activities of fruit cultivation, but other villages have not shown significant achievements.

Indicator 4 "Increase in the number of visitors to the IS": According to the visitor record book and interviews with the residents of the village, many farmers from the neighboring villages visited to observe the site, which indicates that the number of visitors is on the increase. In particular, Hat Houay Village had many visitors (117 visitors from July 2005 to August 2007) since it is close to Luang Prabang, a local city, and it has model farmers involved in pig rearing, fish farming, fruit plantation and weaving.

Indicator 5 "The demonstration capacities of CSP by the key farmers": At the evaluation of the demonstration capacities, more than 90% of the village mayors and activity group leaders can explain the contents of the activities of the IS to visitors, which means this indicator has been achieved.

2) Output 2 "Extension staff gain extension skills and techniques through training." has been achieved since the extension officers have acquired the skills for systematization of the activities among the residents and skills for Type 1 and 2 activities through the training. As a

system to maintain the extension activities, the institutionalization of the CSP, establishment of the self-reliance and development committees, etc., were achieved as referred to below.

Indicator 1 "The capacity building of extension officers with regard to extension services (60% or more of the extension officers (PAFO: 11, DAFO: 8) who went through the training obtained 4 or higher in the examination on a scale of one to five" has been achieved since 100% of the examinees got 4 or higher at the second examination conducted in June 2008. The examination consisted of the following items: (1) Agriculture and forestry extension system in Lao PDR, (2) Code of conduct, (3) FORCOM, (4) CSP, (5) Monitoring and evaluation.

Indicator 2 "The technical scope that can be extended (providing 60% or more of the standard training contents about the extension activities developed by the project to farmers)" has been achieved since the extension team of PAFO / DAFO has practiced at least 66% of the activities at the PS.

Indicator 3 "Understanding of the farmers who received the training (60% or more)" has been achieved since about 90% of the participating farmers answered, "Well understood" or "Understood" (targeted at the monitoring results of the fourth PS / stockbreeding activities).

3) Output 3 "Under the framework of Community Support Programme (CSP), activities based on appropriate land and forest use are implemented at the Pilot Sites (PS) by villagers and extension staff" has mostly been achieved for the continuation of the CSP at the PS and the improvement of the livelihoods of the participating farmers as a result of establishing the CSP mainly carried out by the residents and the extension officers. The project focused on activities to ensure that the alternative means of livelihood provided a substantial incentive for the shifting cultivation farmers (Type 2 activities), and adopted an approach to indirectly reduce their dependence on shifting cultivation by promoting the activities. In the project design, therefore, many achievement indicators regarding Type 2 activities were set.

Statistically the activities at the project sites are summarized in Table 2 and 3 below. The number of project sites where Type 1 activities aiming at the improvement of forest management were conducted is relatively small. Although there are some villages where school afforestation activities are being carried out smoothly and the students consume the fruit, the activity results are not good on the whole, with plantation trees having died and the lack of demand for the seedlings. In particular, the activities of livestock rearing among the Type 2 activities were carried out at a number of project sites, and the pig rearing activities above all were successful in many villages. On the other hand, activities in which the number

of participating farmers declined had some cases of failure, where chicken rearing experienced disease epidemics (particularly in the rainy season), and fish farming experienced flooding in the rainy season and droughts in the dry season. Lac production was stopped due to a price collapse and a transition to another activity was implemented.

Table 2. Breakdown of the major Type 1 activities

Activity	Number of project sites that introduced the activity	Proportion of all the project sites
Community forests	13	38%
School afforestation	17	50%
Water source forests / water facilities	12	35%

Source: Created by the evaluator based on the evaluation report upon termination.

Table 3. Breakdown of the major Type 2 activities and trends in the number of participating farmers

Activity	Number of project sites that introduced the activity	Proportion of all the project sites (34 villages)	Number of participating farmers (households)		
			At the start	End of PJ *	Increase (decrease)
Pig rearing	26	76%	272	374	102
Cattle rearing	26	76%	267	283	16
Goat rearing	22	65%	225	230	5
Chicken rearing	10	29%	72	65	(7)
Expansion of rice paddies	16	47%	148	150	2
Fruit cultivation	7	21%	53	53	-
Fish farming	11	32%	83	72	(11)
Lac production (Ingredient of varnishes and dyes)	7	21%	49	44	(5)
Paper mulberry cultivation (Ingredient of paper)	3	9%	33	35	2
Fabric production	7	21%	65	70	5
Total			1,267	1,376	109

Source: Created by the evaluator based on the evaluation report upon termination. (* These are calculated using the number of participating farm households at the start because the data was not obtained for four villages in the 4th PS.)

Indicator 1 “Number of CSP sites” has been achieved in the context of the target goal of “At

least four project sites in each of the targeted six districts," since 1,404 participating households had conducted CSP activities in 34 villages in the targeted nine districts by the end of the project.

Indicator 2 "Continuance of the technologies adopted in the first PS (50% or more of the participating farmers continue using 40% or more of the introduced technologies)" has been achieved since almost all the participating farmers have continued 40% or more of the activities.

Indicator 3 "20% increase in income at the first PS": 12.4% of the participating farmers achieved a 20% increase in income one year later, and 16.8% two years later. As for the activities that generate profits in a short period (pig rearing and weaving), 32.7% of the participating farmers achieved a 20% increase in income as the goal.

Concerning the activities for which the period required to generate profits is long, which it was believed would be difficult to achieve by the end of the project in accordance with Achievement 1-3, it was confirmed that cattle rearing in particular is steadily expanding in at least 15 villages, which is leading to an increase in income according to the survey in the post-project evaluation. Although in the expansion of rice paddies it is difficult to secure appropriate land, which resulted in only a limited rise in the number of participating farmers, it has contributed to an increase of the profits of the farmers who are continuing the activity. Since fruit cultivation takes the longest, about eight years for fruit with a long growing period, some activities have not been linked to any increase in income, and the number of participating farmers remains at the same level.

4) Output 4 "Recommendations are made on sustainable land and forest use": Based on the recommendations, the CSP has been incorporated into the agricultural extension system in Lao PDR by integrating it with the LAO Extension Approach (LEA), and the establishment of the self-reliance and development committees has been achieved. Many efforts to ensure sustainability were made in the final stages of the project, which had a certain level of achievement in terms of the CSP adjustment in accordance with the new extension systems such as the cluster system and the Extension Technical Service Center (ETSC). In this process, it was recognized that further activity development would be desirable for extension of the CSP at the field level and the improvement of land and forest management (utilization plans for land and forests, awareness-raising campaigns among the residents, etc.) in order to achieve the overall goal, which is expected to be implemented in the subsequent project.

Indicator 1 "Response by the MAF to the recommendations in the mid-term review": It was

decided that the level of attainment of this indicator is not applicable since there were no recommendations in the interim evaluation. The preparatory committee, which was established in the related organization of the Lao PDR to respond to the interim review, made recommendations including the institutionalization of the CSP, which were deliberated on with regard to the establishment of the mechanisms and through discussions by a working group.

Indicator 2 "Response by the MAF to the recommendations in the terminal evaluation": The recommendations and the efforts made in response were as mentioned below.

1. Institutionalization of the CSP
Recommendation ①: Support for the internalization of the CSP as part of the Lao Extension Approach (LEA) through a coordination group committee.
Efforts under the project: With the letter by the National Agriculture and Forestry Extension Service of Ministry of Agriculture and Forestry on the "Internalization of the CSP"[5], the CSP was certified as a Community Support Program Tool (CSPT) as an effective tool for village development intended for poor districts in the northern mountainous areas in Lao PDR. As a result, it was integrated into the LEA that was being promoted by other donors, which resulted in the internalization of the agricultural extension system within the Lao PDR.

Recommendation ②: Securing the budget for continuing the CSP in the provinces and districts, and the implementation of extension of the CSP through the self-reliance and development committees.
Efforts under the project: At a seminar on the final achievements in January 2009, the self-reliance and development committees of the targeted six provinces reported on their action plans for extending the CSP. Five provinces secured the budget for monitoring, but have not secured the budget for extending activities to other villages.

In this project, an average of about 700,000 yen per village (about 18,000 yen per participating farmer) was provided from the project budget as an activity fund for the project sites (see Table 4 "Amount of project activity funds"). In addition to this, the extension activity budget of DAFO (such as gasoline costs) is also needed, but securing such a budget for extension services is difficult, which has become a major factor adversely affecting the sustainability of the project effects.

[5] Letter No. 3588 / NAFES 08, 29 November 2008

Table 4. Amount of the project activity funds (breakdown by project step)

(Unit: million Kip)

	IS	1st PS	2nd PS	3rd PS	4th PS	**Total or Average**
Activity fund per village	215	226	157	135	121	**164**
Ratio borne by the village	57%	60%	62%	57%	58%	**59%**
Ratio borne by the PJ	43%	40%	38%	43%	42%	**41%**

Source: Created by the evaluator based on the evaluation report upon termination

(Exchange rate at the post-project evaluation: 8,000 Kip ≒ US$1)

Recommendation ③: CSP adjustment in accordance with the new extension systems such as the cluster system and the Extension Technical Service Center (hereinafter called ETSC).

Efforts under the project: Since the efforts for the establishment of the ETSC and in relation to staff extension officers through the village cluster system are being made as a form of support by FORCOM led by the Lao government, a recommendation was made that NAFES should adjust the CSP in accordance with such new extension systems jointly with FORCOM, for which a lot of effort was made in the last stages of the project. As a result, CSP adjustment in accordance with the new extension systems such as the cluster system and the Extension Technical Service Center (ETSC) has resulted in certain achievements, which are also to be dealt with in the subsequent project "PAREDD."

2. Extension of the CSP at the field level

Recommendation: Human resources development, creating extension materials, improving the revolving system and analysis of trends in shifting cultivation among farmers.

Efforts under the project: As stated previously in the "Outputs," the technology transfer for the extension of the CSP at the field level was implemented as planned in the project. Considering that the further development of such activities is desirable to attain the overall goal, continual activities are expected to be conducted in the subsequent project of PAREDD.

3. Improvement of land and forest management

Recommendation: Utilization plans for land and forests, awareness-raising campaigns for the residents, etc.

Efforts under the project: Considering that the further development of such activities is desirable to attain the overall goal, continual activities are expected to be conducted in the subsequent project of PAREDD.

3.2.1.2. Achievement of Project Objectives

The project objective is "The activities leading to the sustainable land and forest use begin to expand in the project site and its surrounding areas, initiated by villagers" and the level of attainment is mostly achieved as mentioned below according to each of the indicators. Indicator 1 "Number of participating farmers" and Indicator 2 "Increase in income of the participating farmers" were not achieved, which was mainly due to the fact that the timing of the effects varies since the activity cycle of the CSP, which consists of a period during which the fund revolves and profits are created, depends on the type of activity. As previously stated in Indicator 3 of Output 1, pig rearing and weaving in which the activity cycle is short had an effect during the project period and created an increase in profits, which led to an increase in the number of participating farmers under a revolving activities. On the other hand, cattle rearing and fruit cultivation in which the activity cycle is long did not produce sufficient effects by the end of the project, which did not lead to revolving activities and the number of participating farmers did not increase. However, the interview survey in the post-project evaluation indicated that there are a number of successful cases not only in pig rearing, but also in activities requiring a long period, which enabled to understand the situation where the residents share and transfer know-how for success to extend activities in the village. For this reason, at the sites where the project was involved (project sites), the number of participating farmers has steadily increased and the livelihoods have been improved, which is evaluated as a certain level of achievement. The level of attainment of the project objective can be evaluated not only by the indicators, but also by considering such points. Indicator 5 of the project objective "Reduction of shifting cultivation" has a basis in common with Indicator 2 for the overall goal, and both of them have been achieved.

Indicator 1 "Number of the participating farmers (The number of the first participating farmers who started production before April 2007 at the IS, the first PS and the second PS increased by 50% and more)": In general, the activities with a short activity cycle have a relatively good level of achievement of the target, and the activities requiring a long period had a low level of attainment during the project period. The increase in the proportion of farmers participating in all the activities was 37.6 % for the IS, 15.7 % for the first PS and -1.2 % for the second PS as of October 2008. Although this indicator was not achieved by the end of the project, pig rearing with a short-term activity cycle, which was intensively introduced in this project, increased the number of participating farmers greatly in a number of villages by the end of the project as shown in Table 5 (in the order in which the activity started, four villages out of seven villages in all the IS and the first PS, and one village out of seven villages in the second PS achieved a rate of increase of more than 50%). According to the interview survey in the post-project evaluation, it is understood that the residents have

shared and transferred know-how for success at the project site to gradually extend them since the implementation of the project not only in pig rearing as described above, but also in activities requiring a long period such as cattle rearing and fruit cultivation.

Table 5. Villages where the number of farmers involved in pig rearing activity greatly increased

Project site	Village	Number of the first participating farmers	Number of the participating farmers as of October 2008	Rate of increase in the number of the participating farmers (%)
IS	Samton	8	24	200
IS	Pongdon	10	28	180
IS	Namon	11	28	155
IS	Hat Houay	10	20	100
1st PS	Natak	11	22	100
1st PS	Phakha	4	8	100
1st PS	Pangthong	8	15	88
1st PS	Vangheung	10	16	60
2nd PS	Silimoon	6	16	167

Source: Project-related data

Indicator 2 "An increase in income at the IS and the first PS (At the end of the project, 50% or more of the participating farmers at the IS and the first PS increased their income through the production activities under the project by 30% or more compared to before the start of the project)": Although 12% of the sampled farmers covering all the activities increased their income by 30% or more in 2006, 17% of them in 2007 and 15.8% of them as of October 2008, that indicator, for which the target was set at 50% or more of the participating farmers has not been achieved. However, along with Indicator 1, the degree of attainment depends on whether the period of the activity cycle is short or long, and the short-term activities including pig rearing have a relatively good level of attainment, for which 22% of the sampled farmers increased their income by 30% or more in 2006, 29% of them in 2007 and 27% of them as of October 2008. On the other hand, the long-term activities including cattle rearing had a low degree of attainment by the end of the project, for which 1% of the sampled farmers increased their income by 30% or more in 2006, 3% of them in 2007 and 3% of them as of October 2008.

Along with Indicator 1, according to the interview survey in the post-project evaluation, it is

understood that the activities requiring a long period have been also extended gradually at the project sites since the implementation of the project and led to an increase in income.

Indicator 3 "Adoption of the introduced technologies by non-participating farmers (Non-participating farmers around the IS, the first PS and the second PS areas introduce the technologies for the sustainable use of land and forests by the end of the project)": There are some cases in which non-participating farmers adopted alternative means of livelihood based on the CSP activities. The survey conducted during the evaluation upon termination revealed that pig rearing, vaccination of livestock, fish farming, lac production and so forth were introduced in more than one village around the project sites. However, these are considered to be at a level where only an indirect effect can be expected in terms of a reduction in shifting cultivation and preservation of the forest. Regarding the extension of the CSP activities to the neighboring areas after the project was completed, although there are not so many cases, project site tours for neighboring villagers given by the DAFO officers (Houyla Village in Nan District in 2010, etc.) and voluntary visits from neighboring villages were conducted.

Indicator 4 "Evaluation of the extension officers by the participating farmers (At least 50% of the participating farmers in at least 60% of the villages in which PS are located give an evaluation by the end of the project that the performance of the extension officers has progressed)" was achieved since 80% of the farmers where the survey was conducted answered that the performance of the extension officers has progressed.

Indicator 5 "Reduction in shifting cultivation by the participating farmers (30% or more of the participating farmers reduced the area of shifting cultivation in all the project sites by the end of the project)" has been achieved since 54.5% of the participating farmers managed to reduce shifting cultivation compared to the time at the start of the project (see Indicator 2 of the overall goal).

On the occasion of the evaluation, the project design was also reviewed. This project aims to expand the formulation and extension of the activities at the project sites to the neighboring villages, which is set as the project objective. It seems, however, the activities and outputs of the project set out in the Project Design Matrix (PDM) remain those leading to the formulation and extension of the CSP at the project sites. The setting of the indicators for the project objective does not focus on expanding activities to the neighboring villages. For this reason, as a result of implementing the project pursuant to the activity and output indicators in the PDM, although "Extension of the CSP at the project sites" had a certain level of attainment by the end of the project, extension to the neighboring areas appears to have a low

degree of attainment, in which validation of the relationship between the activities and expected outputs was insufficient. In addition, in the setting of the indicators, the timing of the onset of the effects varies depending on the activity under this project (pig rearing as a short-term activity and cattle rearing as a long-term activity), but these were not differentiated. This point is also regarded as a defect in the project design.

(A door plate indicating a participating farmer)

(A new participating farmer using the revolving fund is distinguished by the color of the door plate)

3.2.2. Impact

3.2.2.1. Degree of attainment of the overall goal

"The rate of deforestation (by shifting cultivation) is reduced in the districts where the project sites are located": It appears that this initial overall goal has not been achieved as mentioned below. It is also unlikely to be achieved in the future since the CSP has not been expanded beyond the project sites.

Indicator 1 "Reduction in the area of forest degradation (The annual area of forest degradation decreases to the level of from 1992 to 2002 in the districts in which the project sites are located)": Sufficient information was not provided since a survey was not conducted to measure this effect of the project. However, as stated above, considering the situation in which the CSP activities have not expanded to the neighboring areas of the project sites yet, it is considered that the effects of the project on the reduction in the area of forest degradation are not very substantial.

For reference, the trends in the forest coverage were reviewed based on the data from the survey on land coverage trends in Luang Prabang Province conducted for the subsequent project of PAREDD. As a result, as shown in Table 6 "Trends in the forest coverage in Luang Prabang Province," although the decrease in forest coverage is slowing down for the whole province, it is believed that there is no identifiable improvement in the reduction in forest coverage in the districts targeted by the project compared to the districts not targeted by the project.

Table 6. Trends in the forest coverage in Luang Prabang Province

District	Forest coverage (%)				
	Around 1990	Increase/ decrease	Around 2000	Increase/ decrease	Around 2010
Districts targeted by the project in Luang Prabang Province:					
Viengkham District	68.2	-9.7	**58.5**	**-4.6**	**53.9**
Nan District	62.1	-9.1	**53**	**-3.0**	**50**
Pakseng District	61.3	-10.4	**50.9**	**-9.1**	**41.8**
Average for the districts not targeted by the project	62.4	-8.7	**53.7**	**-5.9**	**47.8**

Source: Created by the evaluator based on the PAREDD-related material (Assessment of the land coverage trends based on the analysis of satellite images)

Indicator 2 "Reduction in shifting cultivation (50% or more of the first participating farmers reduce shifting cultivation at all the project sites)" has been achieved since 54.5% of the participating farmers managed to reduce shifting cultivation from the time of the start of the project. In particular, at the first PS, 70% or more of the participating farmers managed to reduce shifting cultivation. As a specific example to show the scale of reduction in the area of shifting cultivation fields, the field survey and interviews in the beneficiary survey[6] show that Pondong Village in Nan District (IS) reduced the area of shifting cultivation fields from 103 ha to 75 ha, Hat Houay Village in Pakseng District (IS) from 100 ha to 36 ha, Natak Village in Sayaboury District (1st PS) from 78 ha to 36 ha, Tha Village in Sayaboury District (2nd PS) from 280 ha to 180 ha, and Houasaking Village in Pakseng District (3rd PS) from 70 ha to 13 ha (There are various reasons given for the reduction in the area of shifting cultivation: the fact that the policy bans shifting cultivation in some regions, the transition to alternative means of livelihood is proceeding due to the large amount of labor required for shifting cultivation in general, and the Lao Policy Bank and Lao Agriculture Promotion Bank that provide funds for the expansion of rice paddies for promotion have all had an influence in addition to the effects of this project).

While Indicator 2 is considered to have been achieved, for the evaluation, it is necessary to pay attention to the fact that the scope targeted by the overall goal is the whole district that the project sites are located in. Therefore, it is impossible to evaluate the likelihood of the attainment of the overall goal using the attainment of Indicator 2, which is aimed at the effects only at the project sites. On this point, Table 7 "Trends in the proportion of shifting

[6] Interviews were conducted with the village mayors and activity group leaders on the situation of continuation of the activities and the situation of the onset of the effects.

cultivation fields in Luang Prabang Province" shows that there is no identifiable reduction in the proportion of shifting cultivation fields in the districts targeted by the project compared to the districts not targeted by the project.

Table 7. Trends in the proportion of shifting cultivation fields in Luang Prabang Province

District	Proportion of shifting cultivation fields (%)				
	Around 1990	Increase/ decrease	Around 2000	Increase/ decrease	Around 2010
Districts targeted by the project in Luang Prabang Province:					
Viengkham	3.0	-0.1	**2.9**	**-0.1**	**2.8**
Nan	4.4	-0.9	**3.5**	**1.1**	**4.6**
Pakseng	4.1	-1.6	**2.5**	**1.1**	**3.6**
Average for the districts not targeted by the project	3.9	-0.4	**3.5**	**0.6**	**4.1**

Source: Created by the evaluator based on PAREDD-related material (Assessment of the land coverage trends based on the analysis of satellite images)

Regarding the reduction in deforestation as the overall goal, although it is expected that the effects of reducing shifting cultivation may be seen at some level due to the project activities and the achievement of the project objective, the achievement is to be difficult under current project framework and requires further activities and time to expand the effects to lowering the deforestation rate at district level within the project site. On this point, in this project, more direct activities for the "control of deforestation by shifting cultivation" such as developing a utilization plan for land and forests and awareness-raising campaigns among the residents regarding forest preservation have not been fully implemented, and JICA reaffirms that such projects for the purpose of more direct activities should be implemented in an integrated manner to reduce the deforestation rate. As a result, these activities have been taken over by and implemented in PAREDD, the second phase of this project. Considering these points, it is considered that the overall goal and indicators that logically accord with the project objective should have been set in the design of the PDM.

3.2.2.2. Activities by the counterparts

Specific examples in which the local government has implemented extension technologies after the project was completed include Houysao Village in Sayaboury District. In the village, the CSP was newly introduced in the local government budget, which can be said to be a successful case of an Extension Spot. As a result of the provincial assembly appreciating the effects of the project and after getting good results in the approaches taken by the counterpart

Table 8. Successful case of an Extension Spot (Houysao Village in Sayaboury District)

Background and policy	• The budget was requested to the provincial assembly as an idea of the counterparts after the project was completed. As a result, the CSP activity costs were secured as part of the PAFO budget to implement the activities in a village (Houysao Village). • As a future policy, the extension should be expanded by recovering the funds from Houysao Village to utilize in other villages. In the pre-arrangement with the village introducing the activities, an agreement that the funds should be recovered and transferred to other villages in the future is supposed to be implemented. • When introducing the activities in the village, support including technical guidance should be provided mainly for the counterparts.
Budget allocation	• 50 million Kip (about 6,300 U.S. $) was approved in total as the PAFO budget. The amount actually used was less than this. • A million Kip/HH was allocated in the village. The interest payback is 33,000 Kip/year (3%). In future, however, it is expected that the interest at an annual rate of 8% should be paid to PAFO (to enable the extension funds to be utilized for other villages).
Activity contents	<Type 1 activities> • Community forest • Water supply facility (installing a tank to supply water for the villagers)
	<Type 2 activities> Among all the 82 HH of the farmers • Fish farming: 11 HH at the start → 12 HH at present • Expansion of rice paddies: 6 HH at the start → 8 HH at present Examples of livelihood improvement • Fish farming: 1.8 million or more Kip (about 225 or more U.S.$) annually /HH • Expansion of rice paddies: 3 tons of yield annually Others • Knowledge and know-how are shared at meetings in the village before the agricultural season.

Source: Interviews with the counterparts and a door-to-door survey in Houysao Village

staff and the efforts to continue the activities, the budget was secured (see Table 8 “Successful case of an Extension Spot”). Other than this, the extension technologies are also applied by the counterpart staff in projects using funds from other donors. As a specific example, Agrisat of France have implemented activities near a project site in Samton Village

in Viengkham District where the CSPT is applied and it was found that the counterparts actively make use of the technologies transferred in this project if the opportunity arises.

As described above, the activities for the control of deforestation have been taken over by the subsequent project called PAREDD in order to make efforts in a form that responds to the changes in the social environment where the change in land use from dry-land rice cultivation by shifting cultivation to commercial crop cultivation is noticeable in the targeted area. In PAREDD, more direct activities and land utilization plans to control deforestation are being implemented as well as activities focusing on livelihood improvements for farmers since they are necessary to preserve the forests. In these activities, efforts to develop a system to reduce deforestation are being made, for example, the REDD (Reducing Emissions From Deforestation and Forest Degradation)[7] policy has been adopted and methods of making use of the funds from emissions trading for the CSP are being studied.

3.2.2.3. Other impacts
None

Considering the above, the effectiveness and the impact are medium, where certain effects have been found due to the implementation of this project. At the project sites, the number of participating farmers has gradually increased and livelihoods have been improved, and the project has contributed to improvement of the domestic system, which means that there has been a certain level achievement. As for the project objective, while the indicators where the effects that can be shown in the short term have mostly been achieved, some efforts have also been confirmed for those activities that require some time to achieve, where the CSP has been expanded within the project site and where the effect has been found in a reduction of shifting cultivation. However, as for the overall goal, the CSP has not been expanded beyond the project sites and thus, it is unlikely to be achieved the overall goal.

[7] Efforts to reduce the emissions of greenhouse gases by avoiding deforestation and forest degradation in developing countries or projects to achieve this.

3.3. Efficiency (Rating:③)

3.3.1. Inputs

Table 9. Comparison of the plan and the results of the inputs

Input factor	Plan	Results (upon termination)
(1) Dispatch of experts	・Long-term experts: 6 ・Short-term experts: dispatch as needed	・Long-term experts: 11 in total ・Short-term experts: 9 in total
(2) Acceptance of trainees	Village development, forest management etc.: 2 to 3/year	Participatory resources management, extension methods, etc.: 25 in total
(3) Training in third countries	None	―
(4) Provision of equipment	Major equipment provided: materials, vehicles, office equipment	Major equipment provided: 29 motorcycles, 3 vehicles, office supplies
Total cooperation amount	686 million yen in total	688 million yen in total
Input amount by the Lao government	―	46,000 US dollars in total

Source: Evaluation report upon termination

3.3.1.1. Input factors

Japan side

(1) Dispatch of experts

Long-term experts: chief advisor, operation coordination / extension promotion, regional development, training / extension, participatory resources management and village program coordination

Short-term experts: stockbreeding development, agroforestry, agriculture and forestry technology, farming system development, preparation of guidelines on sustainable use of land and forests, village development funds, analysis of PCM / organization and development of extension materials

(2) Acceptance of trainees

A total of 25 counterparts (6 from NAFES, 11 from PAFO, and 8 from DAFO) took part in the courses below during training in Japan.

Table 10. Contents and participants of the training courses in Japan

Training courses	Participants
Participatory resources management / training and extension / regional development	PAFO: 5, DAFO: 2
Formulating projects for regional development focusing on human security	NAFES: 2
Participatory development / extension methods / local development	NAFES: 1, PAFO: 4, DAFO: 6
Joint training course for forest guardians	NAFES: 1
International cooperation seminar: operation of a natural environment conservation project including livelihood improvements through resident participation	NAFES: 1, PAFO: 1
Third country training program for participatory approaches in the management of the extension implementation system	NAFES: 1
Group training for forest restoration	NAFES: 1
Regional training for formulating a project for regional development focusing on human security	PAFO: 1

Source: Evaluation report upon termination

(3) Other factors

A baseline survey of the project sites, annual household budget monitoring during the project period and the analysis of satellite images in the targeted areas were conducted.

Lao PDR side

(1) Assignment of the counterparts

From NAFES, PAFO, DAFO, a total of 43 officers took part in the project activities. Among these, 11 officers (2 from NAFES and 9 from PAFO in Luang Prabang Province) were assigned to the project office in Luang Prabang City, the center of the activities, and they were engaged full-time in the project activities.

Table 11. Details of the assignment of the counterparts

Organization	Number	Work contents / assignment of teams
NAFES	6	Managing the project as Project Director, Project Manager and Project Coordinator.
PAFO	13	Belonging to 4 teams ((1) Project/management team, (2) Community development team, (3) Training / extension team, (4) Participatory resources management team) established in the project office and the project team in each targeted province.
DAFO	24	Belonging to the project team in each targeted province.

Source: Evaluation report upon termination

(2) Provision of land and facilities

A project office in Luang Prabang City was provided as the base for the project activities, and a project office in Vientiane City was provided for operation coordination with NAFES, etc.

3.3.1.2. Cooperation amount

The cooperation amount was planned to be 686,360,000 yen and resulted in 688,600,000 yen (100% of the plan) in expenditures, which was as planned.

3.3.1.3. Cooperation period

The cooperation period was planned to be 60 months and was completed in this time, which was as planned.

Considering the above, in this project, the input factors were appropriate for the output of the achievements. As a result, activities leading to the sustainable use of land and forests through livelihood improvements for farmers have been developed at the project sites, and the counterparts have acquired the technologies to extend the CSP to the neighboring areas. The cooperation amount and period turned out almost as planned, which means the efficiency is high.

3.4. Sustainability (Rating:①)

3.4.1. Policy and system aspects

The sustainability of the policy and system aspects of this project has been maintained at the time of the post-project evaluation, as mentioned below. Regarding the sustainability of the policy aspect, a reduction in the number of poor households (to less than 11% of all households) and improvement of the forest coverage (to over 65%) have been continuously

set as a goal of the social environment sector in "The Seventh Five-year National Socio-economic Development Plan" (2011 - 2015). The policy for the development of the agriculture and forestry sector has been set as the improvement of agricultural production through the promotion of science and technology, an increase in the number of model farmers, a complete halt to shifting cultivation, the strengthening of forest management and

Table 12. Trends in dry-land rice cultivation[8]
in each province targeted by the project

	2005	2006	2007	2008	2009	2010
Luang Prabang Province						
Growing area of dry-land rice (Unit: 1,000 ha)	20.6	20.0	16.6	15.8	19.0	16.8
Yield of dry-land rice (Unit: 1,000 tons)	39.6	32.1	24.1	21.8	27.6	32.4
Sayaboury Province						
Growing area of dry-land rice (Unit: 1,000 ha)	15.0	14.7	15.7	13.5	14.4	14.3
Yield of dry-land rice (Unit: 1,000 tons)	31.4	28.7	23.1	24.9	27.6	29.5
Bokeo Province						
Growing area of dry-land rice (Unit: 1,000 ha)	3.9	7.8	9.3	8.7	7.0	10.1
Yield of dry-land rice (Unit: 1,000 tons)	8.6	13.9	18.4	20.4	19.2	20.7
Luang Namtha Province						
Growing area of dry-land rice (Unit: 1,000 ha)	6.7	6.7	6.0	5.1	6.2	4.9
Yield of dry-land rice (Unit: 1,000 tons)	12.9	11.5	10.7	9.5	11.0	8.5
Houaphan Province						
Growing area of dry-land rice (Unit: 1,000 ha)	13.6	12.0	12.1	12.0	14.0	15.8
Yield of dry-land rice (Unit: 1,000 tons)	25.2	22.7	26.0	27.0	32.0	35.0
Vientiane Province						
Growing area of dry-land rice (Unit: 1,000 ha)	1.3	1.7	1.2	12.0	9.5	8.6
Yield of dry-land rice (Unit: 1,000 tons)	2.8	3.3	1.5	19.7	15.5	15.2

Source: Statistics of the Food and Agriculture Organization (FAO)

[8] Since the targeted areas traditionally pursue a self-sufficient life through dry-land rice cultivation in shifting cultivation system, dry-land rice cultivation and shifting cultivation are taken as being synonymous here. Currently, however, other crops (including adlay) are being cultivated in the shifting cultivation system.

so forth. The policy for the development of the agricultural and forestry sector in the northern area includes promotion of the modernization of agriculture and forestry, the cultivation of commercial crops and so forth. In the “Ministry of Agriculture and Forestry Five-year Development Plan” (2011 - 2015), (1) food security, (2) the expansion and modernization of agricultural production, (3) the introduction of sustainable production modes and (4) sustainable forest management are also listed as goals to reach by 2015. As issues to be tackled regarding the “introduction of sustainable production modes” and “sustainable forest management,” the stabilization of shifting cultivation, poverty reduction, preservation of the forest environment, etc., are listed.

The trends in dry-land rice cultivation in each province targeted by the project for the last five years are shown in Table 12 below. This shows that many provinces appear to still practice shifting cultivation, which is an issue requiring continuous efforts.

3.4.2. System of the counterparts

Although the outputs of this project were incorporated into the Lao Extension Approach (LEA) in the form of the CSPT, it is a fact that utilization of the CSPT is not being promoted. This is not a problem only with regard to the CSPT, but it stems from the fact that the entire agricultural extension service requires further improvement of its system and financing as described below. It is believed that the implementation system of the local governments (PAFO and DAFO) is not being maintained as the counterparts have not continued the activities conducted in the project for various reasons such as the transfer of personnel to another project or another department, while the restructuring of the extension system based on the cluster system has not progressed as planned. Table 13 “Extension system of the local government in the targeted areas” shows the system of PAFO and DAFO, where most of the counterparts in PAFO and DAFO who were questioned answered that the number of officers was insufficient compared to the number of targeted villages for the continuation of the project activities, which means that the extension system of the local governments requires further improvement. It is considered that contract workers in particular, who account for a substantial proportion of the personnel, are inexperienced young people at an insufficient technical level and their capacity needs to be improved. Although the self-reliance and development committees in regard to the sustainability of financing were also established in the provinces targeted by the project, the results have not been sufficient to secure the budget for extending the CSP as the major purpose.

Table 13. Extension system of the local governments in the targeted areas (1)

Province/ district	PAFO/ DAFO	Situation of the officers (at the post-project evaluation)		
		Sufficient/ insufficient	Number of officers *	Description
Luang Prabang Province	PAFO	Insufficient	A hundred and several tens	The number of all officers. There are quite a lot of extension officers, but the counterparts are currently engaged in other projects. Most of them are young office workers with a low extension technical level.
Nan District	DAFO	Insufficient	34	The number of the extension officers includes 21 regular workers and 13 contract workers. The extension service needs a few more officers. Currently most extension officers are stationed in the village cluster (the same applies to the following).
Pakseng District	DAFO	Insufficient	37	The number of the extension officers includes 20 regular workers and 17 contract workers.
Viengkham District	DAFO	Insufficient	36	The number of the extension officers includes 15 regular workers and 21 contract workers.
Sayaboury Province	PAFO	Insufficient	15	The number of the extension officers.
Sayaboury District	DAFO	Unknown	72	The number of the extension officers,
Bokeo Province	PAFO	Insufficient	129	The number of all officers, which includes 99 regular workers and 30 contract workers. There are 7 extension related departments, where there is a shortage of officers for the amount of work.
Pha Oudom District	DAFO	Insufficient	50	The number of all officers includes 38 regular workers and 12 contract workers. Of the total, 42 extension officers are stationed in the village clusters.

Source: Questionnaire surveys and interviews with the counterparts (* All the extension officers were surveyed, but since some of them have contract workers as well, the total number of officers is indicated where there is no accurate figure).

Table 13. Extension system of the local governments in the targeted areas (2)

Province/ district	PAFO/ DAFO	Situation of the officers (at the post-project evaluation)		
		Sufficient/ insufficient	Number of officers *	Description
Long District	DAFO	Sufficient	40	The number of all officers, which includes 34 regular workers and 6 contract workers. There are enough officers for the amount of work.
Houaphanh Province	PAFO	Insufficient	157	The number of all officers, which includes 92 regular workers and 65 contract workers.
Viengthong District	DAFO	Sufficient	30	The number of all officers, which includes 17 regular workers and 13 contract workers. Although a recent increase in the number of contract workers secured the required number of officers, the budget for the activities is insufficient.
Houamuang District	DAFO	Insufficient	23	The number of all officers, which includes 18 regular workers and 5 contract workers. Due to the budget deficit, contract workers were employed, but they have limited capacity. The number of officers is still insufficient.
Vientiane Province	PAFO	Sufficient	18	The number of the extension officers, who are all regular workers. Three or four of them are dispatched to each district.
Feuang District	DAFO	Insufficient	7	The number of extension officers. The total of 6 village clusters in the district requires about 12 extension officers.

Source: Questionnaire surveys and interviews with the counterparts (* All the extension officers were surveyed, but since some of them have contract workers as well, the total number of officers is indicated where there is no accurate figure).

On the other hand, an external factor influencing sustainability at the project sites is the rapid expansion of commercial crop cultivation, gum plantations, etc., using foreign capital in recent years. In particular, in the regions near the border or where the transportation

infrastructure has been developed, there are some cases where the CSP activities have stopped in the villages where the project was introduced and completed. One third of all the project sites have not maintained the implementation system involving the residents mainly due to such external factors. However, in the rest of the project sites that have not been influenced by external factors, more than half of the project sites have maintained the implementation system, although this varies according to the village (See Table 14 “Current situation of implementation and the extension system at the project sites”).

(Encouragement of commercial crop cultivation using foreign capital is rapidly expanding to villages in the targeted areas.)

Table 14. Current situation of implementation and the extension system at the project sites

	IS	1st PS	2nd PS	3rd PS *	4th PS *	**Total**
	4 villages	7 villages	7 villages	8 villages	8 villages	**34 villages**
Implementation and extension system in the village:						
Very good	2	1	3	1	1	**8**
Good	2	2	3	2	2	**11**
Having issues	-	4	1	1	1	**7**
Poor	-	-	-	2	-	**2**
Not surveyed	-	-	-	2	4	**6**

Source: Results of the beneficiary survey (* 2 villages in the 3rd PS and 4 in the 4th PS were not surveyed).

3.4.3. Technological practice of the counterparts

In the local governments, as stated above in the “overall goal,” there are some cases in which the utilization of the CSP was implemented mainly by the counterparts after the project was completed and where it is believed that some of the technologies transferred in the project have been maintained. The interviews with the counterparts also revealed that they have maintained the transferred technologies and actively make use of them. After the project was completed, however, due to the problems with the system and financing, monitoring of the villages that had already introduced the activities and their extension to new areas have not

fully implemented by the extension officers, which requires improvement to maintain them as practical technologies in the future.

Meanwhile, regarding the residents of the project sites, although there are some villages that have been greatly influenced by commercial crop cultivation, gum plantations, etc., using foreign capital, as mentioned above, more than half of the project sites have maintained the implementation system. The reason given as to why the implementation system has been maintained in these villages given in interviews conducted in the survey revealed that this is greatly dependent on the quality of the efforts of the activity group leader. It is believed that the proportion of villages where the transferred technologies are maintained at a high level and are mostly still used is consistent with the proportion of villages where the implementation system is also being maintained.

The issues to be resolved when continuing Type 2 activities at the project sites include coping with diseases in stockbreeding in which the number of participating farmers is high, and coping with drought in the dry season and floods in the rainy season in the fishponds in which the number of participating farmers is not high but where the impact is considerable. The surveys conducted at the project sites show that certain stockbreeding activities where a disease broke out were stopped in the village when the livestock died due to the disease, which only left them with a debt to the revolving fund. It is assumed from the interviews with farmers that there is room to improve both the capacity and the number of veterinarians. The current support from the local government involves setting a day for the vaccination of livestock annually, which started three or four years ago.

3.4.4. Financing of the counterparts

The finances of the local governments are a major factor limiting the sustainability, since the budget for the monitoring and extension of the CSP activities has not been sufficiently secured in PAFO and DAFO. The questionnaire surveys of and interviews with the counterparts revealed that the amount of the budget of a province for the extension activities was about several tens of millions of Kip (about several hundreds of thousands of yen) and there was hardly any allocation of the budget in the districts which resulted in a shortage of revolving fund’s resource necessary for the activities as well as all the costs, such as gas, to support traveling villages. Thus, all the PAFO and DAFO counterparts answered that it was insufficient.

As for the residents at the project sites, except for cases where the area is greatly influenced by commercial crop cultivation, gum plantations, etc., using foreign capital, many villages make use of the revolving fund to maintain their activities without the additional injection of funds from outside and the number of participating farmers is increasing. Among the 34 villages at the project sites, the operational situation of the revolving fund is “very good” or “good” in 21 villages (excluding six villages that were not surveyed) (See Table 15 “Operation of the revolving fund at the project sites).

(At the project sites where continuation of the activities is good, books for each activity are prepared to manage the increase or decrease in livestock, etc.)

Table 15. Operation of the revolving fund at the project sites

	IS	1st PS	2nd PS	3rd PS *	4th PS *	**Total**
	4 villages	7 villages	7 villages	8 villages	8 villages	**34 villages**
Operational situation of the revolving fund:						
Very good	1	1	4	2	2	**10**
Good	3	3	2	2	1	**11**
Having issues	-	1	1	-	-	**2**
Poor	-	2	-	2	1	**5**
Not surveyed	-	-	-	2	4	**6**

Source: Results of the beneficiary survey (* 2 villages in the 3rd PS and 4 in the 4th PS were not surveyed).

3.4.5. Continuation of the effects

Although the continuation of the extension of the CSP activities by the local governments is an essential element in achieving the goals of the project, it has not been fully continued for the reasons as mentioned above, and it is not likely that the effects will be sustained.

Regarding the residents of the project sites, except for cases where the situation is greatly influenced by commercial crop cultivation, gum plantations, etc., using foreign capital, the number of villages where the Type 2 activities have been very well maintained has declined to 19 villages (excluding the six villages that were not surveyed, this is the sum of the “very good” and “good”), which is a little over half of the total of 34 villages (See Table 16. “Continuation of the CSP at the project sites). The proportion of villages where Type 1

activities have been maintained has declined slightly to about 40% (excluding the seven villages with no activity results). At the project sites with a good level of continuation, the interview surveys show that it is likely that the activities will be continued in the future in a form tailored to the situation in each village (focusing on pig rearing, expansion of rice paddies, etc.), while the response to diseases of livestock where the residents need support has not been accomplished and this remains a concern.

Table 16. Continuation of the CSP at the project sites

	IS	1st PS	2nd PS	3rd PS *	4th PS *	**Total**
	4 villages	7 villages	7 villages	8 villages	8 villages	**34 villages**
Continuation of Type 1 activities:						
Very good	1	-	1	-	-	**2**
Good	2	3	2	1	1	**9**
Having issues	-	2	1	-	-	**3**
Poor	1	2	1	3	-	**7**
No activity results	-	-	2	2	3	**7**
Not surveyed	-	-	-	2	4	**6**
Continuation of Type 2 activities:						
Very good	1	2	3	1	2	**9**
Good	3	-	4	2	1	**10**
Having issues	-	3	-	1	1	**5**
Poor	-	2	-	2	-	**4**
Not surveyed	-	-	-	2	4	**6**

Source: Results of the beneficiary survey (* 2 villages in the 3rd PS and 4 in the 4th PS were not surveyed).

Considering the above, this project has some issues although continuation of the activities in the villages at the project sites has been relatively effective and there are some critical problems with regard to the system of the counterparts and the financial conditions for extending the effects of the project to neighboring areas. As a result of comprehensive consideration of these in the context of the goals of the project, it is determined that the sustainability of this project is low.

4. Conclusions, Lessons Learned and Recommendations

4.1. Conclusions

This project was implemented for the purpose of the creation and improvement of alternative means of livelihood for shifting cultivation farmers in the poorest districts in the Lao PDR, and the control of deforestation by reducing the dependence on shifting cultivation. Its relevance is high since it is consistent with the development policies and development needs of the Lao PDR and the aid policies of Japan. The achievement of project objective is fair because although this project objective has contributed to the creation and improvement of alternative livelihoods for

shifting cultivation farmers at the project sites, some of indicators haven't been achieved yet and also these project activities haven't expanded. On the other hand, there is no sufficient data showing a reduction in deforestation, and it is observed that the project needs more time and further efforts for contributing to a reduction in deforestation. Comprehensively considering these facts, its effectiveness and impact are considered to be fair. The efficiency is considered to be high because the input factors were appropriate for the output of the achievements, and there was no problem with the period and the amount of funds. The sustainability is considered to be low because, although the activities of the villages at the project sites have continued at a relatively good level, there are problems in the implementation system and the finances of the local governments to extend the effects of the project to the neighboring regions. Considering the above, this project is viewed as having issues in part.

4.2. Recommendations

4.2.1. Recommendations to the counterparts

1. Recommendations for extension of the CSP by PAFO / DAFO officers

The sustainability of this project was a serious problem from the planning and implementing phases. The major cause of this is the deficits in the local government budgets, and the situation has not improved since the project was completed. Meanwhile, unless the extension officers of PAFO / DAFO extend the CSP activities to the regions surrounding the project sites, it cannot be expected that the effects that the project aimed at can be fully demonstrated. In this survey, future efforts for the extension of the CSP were discussed with the concerned parties and were then compiled as the following recommendations.

(1) Sharing successful cases: The successful case of the Extension Spot in Houysao Village in Sayaboury Province as stated previously in the "overall goal" has not been shared among other targeted provinces and districts. The information on securing and implementing the budget for introducing the CSP (recovering the capital of the revolving fund in the future to utilize it to further introduce the CSP to other villages) should be shared and referred to, and incentives for the extension of the CSP should be provided as well.

(2) The extension of the CSP to the neighboring villages utilizing the project site village fund: The capital of the revolving fund of the project site was provided to each village without any requirement for compensation, which successful villages then maintained and increased as a village fund, and some villages are considering loaning such funds to neighboring villages to invest as a form of the capital for the extension of the CSP. It is expected that PAFO and DAFO will mediate these efforts and provide support to realize them in the near future.

(3) Staffing by workers resident in the village clusters and their assignment to villages newly introducing the CSP: Even when the CSP is newly introduced to a village through the above efforts, there remains the issue that the activity budget for the extension officers of

DAFO is low. It is therefore expected that the resident workers can be assigned to villages that are newly introducing the CSP to provide them with technical support by making the best use of the village cluster residence system that is currently being implemented. Since most resident workers sent to a village that is newly introducing the CSP do not have sufficient knowledge of the extension technologies, they need to be provided in advance with sufficient training by the extension officers of DAFO, including the project counterparts.

2. Recommendations for the maintenance of the transferred technologies by the counterparts

After the project was completed, monitoring the villages that had already introduced the activities and further expansion to neighboring areas was not fully implemented by the extension officers, which means there are concerns about the maintenance and passing on of the practical technologies transferred in the project. It is recommended that improvements be made through the implementation of regular CSPT training sources or by including the CSPT in LEA training in order to maintain the technologies in the implementing organizations in the future.

3. Recommendations for extending stockbreeding in the villages

The villages where continuation of the CSP is good include successful cases, especially with regard to livestock breeding. On the other hand, the improvement of measures to control livestock diseases is an issue that many villages face. I recommend expanding assistance for the vaccination of livestock and increasing support to improve the level and increase the number of veterinarians in order to assure future continuation and further extension of livestock breeding activities in the villages.

4.2.2. Recommendations to JICA

I recommend providing support to resolve these issues as proposed above through subsequent cases, etc., and following up the sustainability of the project effects of this project and the subsequent cases. In particular, under this project, provision of the following cooperation for the local governments at the project sites is possible.

(1) In regard to the recommendations for extension of the CSP by the extension officers of PAFO and DAFO; 1) Sharing the successful cases in Houysao Village in Sayaboury Province through workshops, etc.; and 2) Technical support for expanding the CSP to the neighboring villages making use of the project site village fund (advice in designing the revolving fund, etc.).

(2) Support for the implementation of regular CSPT training (advice on preparing the curriculum and educational materials, etc.) with regard to the recommendation for maintaining the transferred technologies by the counterparts.

(3) Technical support for improving the veterinarian system with regard to the recommendation for extending stockbreeding in the villages.

4.3. Lessons learned

1. Efforts for sustainability

The main factor obstructing the sustainability of this project is that neither the governments nor the residents can secure the funds to continue the activities, not only with regard to the system aspects. The counterpart organizations of this project have a limited budget, and the shifting cultivation farmers as beneficiaries basically have no funds to implement any new activity since they practice a self-sufficient agricultural system as their means of livelihood. Due to these circumstances, this project focused on the introduction of low-cost technologies, but the financing remained an issue after the project was completed, which is a lesson to learn for future project implementation.

In particular, in addition to the above, although it was assumed that securing the activity budget would be difficult after the end of the project in the Lao PDR, the capital for the revolving fund at the project sites was handed over to each village in this project, which is recognized as the property of the village that the funds were granted to (village funds). This makes it impossible to recover such funds from the project sites in the future to utilize them for the extension of the activities to new villages. In contrast to this, in the successful case of the Extension Spot in Houysao Village in Sayaboury Province, the counterparts adopted an approach for the recovery of the capital of the revolving fund in future for utilization as capital for activities in other villages, in recognition of a situation in which it is difficult to secure the budget for the further application of the improved know-how acquired in the project.

In the future implementation of the project, it is believed that discussions should be conducted with the counterparts when planning the vision after the end of the project and other essential matters and the activities for these should be clearly defined in the project design, and measures to ensure the sustainability of the effects of the project should also be developed during the project.

2. Issues in the project design

This project aimed to expand the formulation and extension of the activities at the project sites to the neighboring villages, which is set as the project objective. However, the activities and achievements of the project set in the PDM remain those leading to the formulation and extension of the CSP at the project sites, and the setting of the indicators for the project objectives did not focus on their extension to the neighboring villages. For this reason, as a

result of implementing the project pursuant to the activity and achievement indicators in the PDM, although “extension of the CSP at the project sites” had been achieved to a certain extent by the end of the project, extension to the neighboring areas appears to have had a low degree of attainment since validation of the relationship between the activities of the project and the expected achievements was insufficient. In agricultural and forestry extension projects in the future, a project design that is logically in accordance with the attainment of the project objectives should be established so that extension to the neighboring areas can be expected through the implementation of the project according to the PDM.

In addition, in determining the indicators, the timing of the onset of the effects varies depending on the activity in this project (pig rearing as a short-term activity and cattle rearing as a long-term activity), but these were not differentiated in the design. When expecting a different timing for the onset of the effects depending on the activity, in the implementation of future projects the indicators should determined by taking this into consideration.

[End of text]

Guatemala

Ex-Post Evaluation of Japanese ODA Loan

"Rural and Main Roads Improvement Project"

External Evaluator: Choshin Haneji, Japan Development Service Co., Ltd.

0. Summary

The Project was conducted in Guatemala where civil conflict had come to an end after many years. The main purpose was to improve some major roads of which the upgrading had long been delayed and/or severely damaged so that the improved transportation would vitalize economic activities and facilitate the smooth implementation of the Peace Agreement. The relevance of the Project was high as it was fully consistent with the development policy of the Government of Guatemala which was eager to develop infrastructure to preserve the peace, the development needs of Guatemala and the ODA policy of the Government of Japan. With the completion of the Project, smooth transportation became possible throughout the Project Area except for a section affected by a landslide, halving the transportation time on the improved roads. In this area, the Government of Guatemala had been earnestly constructing departmental and municipal roads linked to the roads targeted by the Project and the vitalization of local agriculture and livestock farming is hoped for. As the improved road should contribute to the socioeconomic development of the area (ZONAPAZ[1]) subject to the Peace Agreement[2] signed in 1996 between the Government of Guatemala and the rebel forces, the Project has contributed to preserving the peace. Meanwhile, both the effectiveness and impact of the Project are judged to be fair as smooth travelling has been hampered at a section due to a landslide. The project cost exceeded the original plan as the civil engineering cost increased due to the unanticipated work of drilling rocks. The project period far exceeded the original plan and the occurrence of an unexpected large-scale landslide was a major contributory factor. Apart from this, the repetition of tender, drilling of rocks of which the presence was not anticipated and additional work, including the work to revise the original design, also contributed to the lengthening of the project period. As such, the efficiency of the Project is judged to be low. Meanwhile, the sustainability of the project effects is judged to be high as no problems are found either with the maintenance system or in the technical and financial aspects. In light of the above, the project is evaluated to be partially satisfactory.

[1] This area (ZONAPAZ) was defined by the Peace Agreement in 1996 and was the area in which the rebel forces had been waging guerrilla warfare since the 1960's (area marked by a red line on the map showing the project locations).

[2] In December, 1996, the then Arzú Administration signed the Peace Agreement with the URNG (Unidad Revolucionaria Nacional Guatemalteca), the umbrella organization for rebel groups, in exchange for the cessation of anti-government military activities. While the URNG agreed to lay down their arms, the government promised the legalisation of the political activities of the URNG and a reconstruction plan for the area (ZONAPAZ), the development of which had been hampered by the civil conflict.

1. Project Description

Project Locations

Present State of International Road CA-01W

1.1 Background

At the time of appraisal in 1998, 74% of the total road length of 13,238 km (total of international highways, national roads and rural roads) consisted of earth roads, partly because of the prominence of highland and partly because of the slow progress of upgrading work which was badly affected by the civil conflict. The end of this conflict in December, 1996 led to a plan to implement a reconstruction programme in 10 departments composing ZONAPAZ. Road improvement work was given top priority in this programme. The Project formed part of the programme and conducted rehabilitation work for international highway CA-01W (hereinafter referred to as "CA-01W") which passes through Chimaltenango Department and paving work for national road RN-7W (hereinafter referred to as "RN-7W") which crosses Alta Verapaz, Quiché and Huehuetenango Departments.

CA-01W is a trunk road linking Guatemala City with San Cristóbal Frontera on the border with El Salvador and La Mesilla on the border with Mexico. Prior to the Project, the road surface was cracking and the shoulders were missing in many parts, making it difficult to drive safely above 50 km/hr. RN-7W is connected to CA-01W and another international highway, CA-14. Apart from the function of providing access to isolated rural areas as part of the circular road network originating from Guatemala City, this road helps residents along its route to have access to San Cristóbal Verapaz and Huehuetenango, the third largest city in Guatemala. It also acts as a community road linking communities along the route. At the time of appraisal, it was unpaved and the possible travelling speed for even four-wheel drive vehicles was less than 20 km/hr.

Following the signing of the Peace Agreement with the rebel forces in December, 1996, the Government of Guatemala promised conscious reconstruction and development efforts in the

subject area of the Peace Agreement which consisted of those departments severely affected by the civil conflict because of their strong association with the rebel forces. RN-7W traversing the said area was a major factor for the slow development of the area as the unpaved road became impassable during the rainy season despite its importance. Most people in the Project Area are indigenous people engaged mainly in agriculture and/or livestock farming. At the time of appraisal, the average poverty ratio of local public bodies along the route was far below the national average.

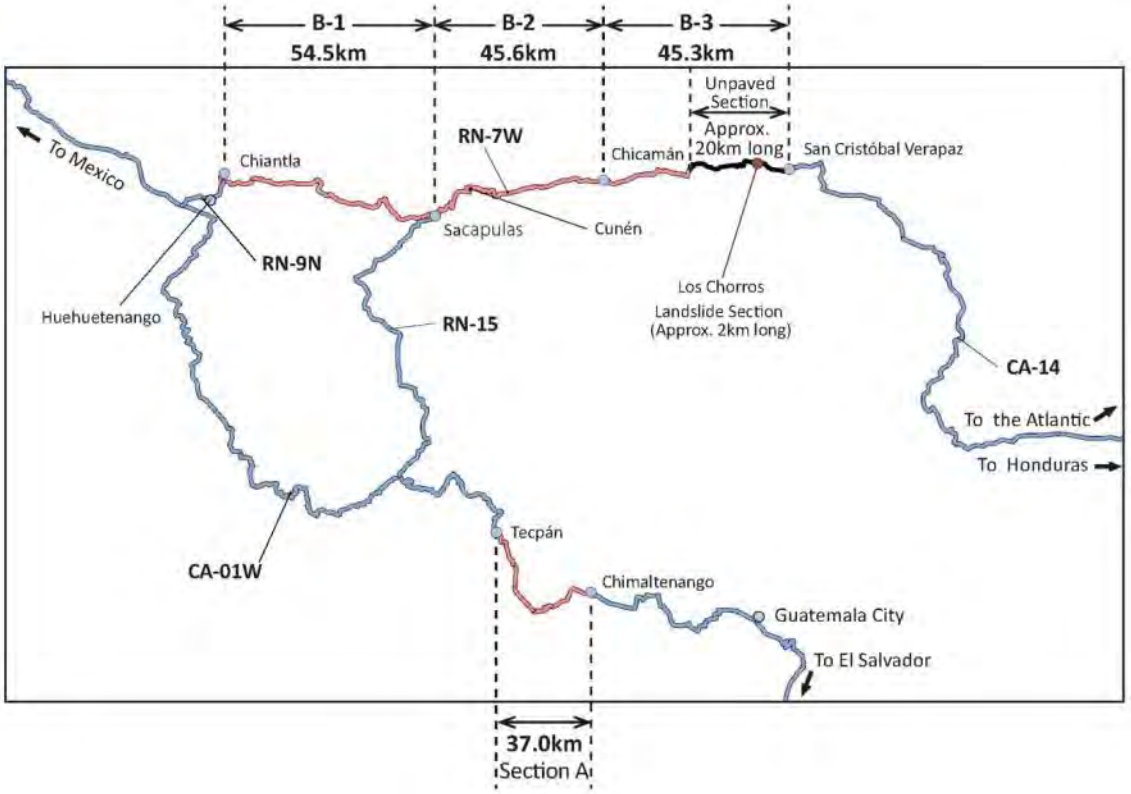
1.2 Project Outline

The objective of this Project is to improve the efficiency of transportation on Guatemala's road network by means of improving those trunk roads considered to be of crucial importance, thereby contributing to the vitalization of the economic activities of local residents and facilitating the smooth implementation of the Peace Agreement.

The project components were the improvement of CA-01W (hereinafter referred to as "Section A") and three sections (Section B-1, Section B-2 and Section B-3) of RN-7W as well as the replacement of two bridges. Of these, the work for Sections A, B-1 and B-2 was completed. In the case of Section B-3, a some 2 km long section of the total length of 45.3 km of Section B-3 is impassable because of a massive landslide which occurred during the work period. Moreover, the paving of a some 20.3 km long section, including the above-mentioned 2 km long impassable section, has not been completed because of the prohibition of work in this section by the National Disaster Management Agency (CONRED) after the said landslide even though is it is passable on its approximately 18.3 km.

Table 1 Outline of the Project

Item	Road Section		Distance
Road Improvement	Section A	Between Tecpán and Chimaltenango of CA-01W	37.0km
	Section B-1	Between Chiantla and Sacapulas of RN-7W	54.5km
	Section B-2	Between Sacapulas and Chicamán of RN-7W	45.6km
	Section B-3	Between Chicamán and San Cristóbal Verapaz of RN-7W	45.3km
	Total		182.4km
Bridge Replacement	Chixoy Bridge (65 m); Río Branco Bridge (20 m)		



Note
Red line : subject road sections of the Project
Blue line : non-subject road sections
Black line : uncompleted road sections
Source : Prepared by the author

Fig. 1 Project Sites

Loan Approved Amount / Disbursed Amount	5,781million yen/5,777million yen
Exchange of Notes Date/ Loan Agreement Signing Date	October, 1998/September, 1999
Terms and Conditions	Interest Rate : 2.2% Repayment Period : 30 years (Grace Period: 10 years) Conditions for Procurement: general untied
Borrower/ Executing Agency	Guarantor: Government of Guatemala/ General Directorate (DGC), Ministry of Communications, Infrastructure and Housing (MCIV)
Final Disbursement Date	July, 2007
Main Contractors	(1) Constructora Nacional (Guatemala) (2) Constructora DL (Guatemala)/ Tokura Construction (Japan) (3) Tokura Construction Japan)
Main Consultants	Construction Project Consultants CPC (Japan); Inpla SA (Guatemala)

Feasibility Studies, etc.	(1) The detailed design for CA-01W was already completed using a World Bank loan (year of completion unknown). (2) The pre-F/S for RN-7W (Estudio de Factibilidad Limitada Téchnico-Económica-Ambienfal de la Ruta Nacional 7W, Tramo: Buenos Aires (Chiantla) – Sacapulas – San Cristóbal Verapaz) was already completed using the PHRD fund of the World Bank (year of completion unknown). The detailed design was also completed using an Inter-American Development Bank loan (year of completion unknown).
Related Projects	(1) World Bank, Secondary and Regional Road Rehabilitation Project: Loan No. 3002GU, L/A in 1993 (2) Inter-American Development Bank, Road Rehabilitation and Modernization Program: GU-0017, L/P in 1995 (3) JICA, Rural Socioeconomic Infrastructure Development Project (yen loan: ¥2,962 million), Social Investment Fund, GT-P3, L/A in 1995 (4) JICA & World Bank, Rural and Main Roads Project, Loan 4260-GU (US$ 66.7 million), M/D in 1997 (5) KfW, Rural Road Construction I (€7.7 million), BMZ 1987 65 927, P/A in 1997 (6) JICA, Rural Road Construction and Repair Equipment Improvement Project, Grant Aid: ¥992 million, 1998 (7) ZONAPAZ Road Improvement Project (Yen Loan: ¥7,357 million), GT-P5, LA in 2006 (8) Central American Bank for Economic Integration, Rehabilitación de la existente y ampliación a cuatro carriles de la ruta CA-2 Occidente (US$ 119.4 million), Linea 2079, L/A in 2011

2. Outline of the Evaluation Study

2.1 External Evaluator

Choshin Haneji (Japan Development Service Co., Ltd.)

2.2 Duration of Evaluation Study

The ex-post evaluation study for the Project was conducted over the following period.

Duration of the Study : Study Period (September, 2011 to December, 2012)

Duration of the Field Study : Field Survey (4th to 17th March and 19th to 28th August, 2012)

2.3 Constraints during the Evaluation Study

From the time of appraisal to the present ex-post evaluation, the government changed three

times and the resulting reshuffling of personnel means that none of the present staff members of the executing agency have knowledge of the implementation situation of the Project. In addition, some of the documents relating to the actual construction work have been disposed of, making it necessary to rely on interview surveys to gather essential information for the evaluation of various aspects of the Project.

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

3.1 Relevance (Rating: ③[4])

3.1.1 Relevance with the Development Plan of Guatemala

Following the Peace Agreement with the rebel forces, the Government of Guatemala promised to award indigenous people in the ZONAPAZ the right to form political parties and to provide assistance for the socioeconomic development of the area. This promise made the development of agriculture and stock raising in the area an important target and road improvement was identified as the priority means of achieving such target. The government plan (Plan de Gobierno) for 1996 – 2000 stressed the crucial importance of road improvement for the reconstruction of the ZONAPAZ.

The MCIV has prepared the Nationwide Road Development Plan for the 10 year period from 1008 to 2017 and has been proceeding with the repair of major roads, paving of rural roads, construction of access roads to major cities and construction of bridges.[5] At present, the ZONAPAZ is included in the poor and extremely poor area where development is the priority. The present government plan (2012 – 2016) lists road improvement as an important task to facilitate the socioeconomic development of poor areas, including the ZONAPAZ.

3.1.2 Relevance with the Development Needs of Guatemala

CA-01W is the trunk road linking Guatemala City with El Salvador and Mexico. At the time of appraisal, it was conspicuously suffering from surface cracks and missing shoulders and travelling above 50 km/hr was quite difficult for safety reasons. The importance of this road as a trunk road remains unchanged today as it functions as a major industrial road for many large buses and trucks. It also functions as an artery for people to travel long distances. Meanwhile, RN-7W is connected to CA-01W and CA-14, another international road, and comprises part of the circular road network stretching from Guatemala City. It provides access points for isolated rural areas and also functions as a community road for residents

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

[4] ③: High; ②: Fair; ①: Low

[5] At the time of appraisal, there was no sector policy governing roads although road improvement work was in progress under the World Bank's Rural and Main Roads Project.

along its route. At the time of appraisal, this road was unpaved and even four-wheel drive vehicles can only travel at less than 20 km/hr. To make matters worse, part of the road becomes impassable during the rainy season, hampering the development of areas along the route. Today, RN-7W has grown to become a much more important road for the transportation of goods due to population increase and vitalized agriculture along the route. The population of the departments in the Project Area has increased by 178% – 277% in the period from appraisal to the present ex-post evaluation, subsequently increasing the transport demand along the route.

In December, 1996, the Government of Guatemala signed a Peace Agreement with the rebel forces and designated the area severely affected by the civil conflict because of its close association with the rebel forces as the ZONAPAZ (see Map of Project Locations in p.2) as the target area for the promised reconstruction and development efforts. Most of the residents of the ZONAPAZ are indigenous people principally engaged in agriculture and the average poverty ratio of local public bodies along the roads targeted by the Project was far higher than the national average.

The Project was compatible with the development needs of Guatemala as its purpose was to improve the major roads in the ZONAPAZ to increase the efficiency of transportation, thereby facilitating the peace.

3.1.3 Relevance with Japan's ODA Policy

Following the signing of the Peace Accord in December, 1996, Japan conducted a policy consultation in June, 1997, identifying five areas, including infrastructure development and security, as priority areas for Japanese assistance to rectify the various gaps between urban and rural areas. The Implementation Policy for Overseas Economic Cooperation Projects in Latin America at the time (1999) emphasized Japanese assistance for the development of basic infrastructure to rectify income and regional gaps as there are many areas suffering from low income and the lack of development in this region.

Based on this observation, this Project has been highly relevant with the Guatemala's development policy as well as development needs and also with the Japan's ODA policy, therefore its relevance is high.

3.2 Effectiveness[6] (Rating: ②)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

Two indicators to measure the quantitative effects of the Project were established. These were "improvement of the transportation efficiency" and "improvement of the International Roughness Index (IRI)". However, no actual quantitative target was set for the former. The latter was subsequently achieved as planned. The situation regarding these two indicators is described below.

3.2.1.1 Improvement of the Transportation Efficiency

(1) Average Velocity Increase

Section A (CA-01W)

While transporting safely at high speeds was not possible before the Project, it is now possible to transport safely at an average speed of 70 km/hr, halving the transportation time (based on the results of interviews with officials of the DGC and local public bodies along the route[7]).

Section B (RN-7W)

The suspension of the road rehabilitation work due to a landslide means that a some 2 km long (equivalent to 1.1% of the planned road improvement length under the Project) section at Los Chorros in Section B-3 is still buried, making a detour (existing farm road) necessary. The paving of some 20.3 km (equivalent to 11.1% of the planned road improvement length under the Project) has not been completed, including that of the above-mentioned 2 km long section. However, ballast[8] has been laid to make travelling at a speed of approximately 40 km/hr all the way possible.

Travel at an average speed of 60 km/hr is possible in the case of the remaining some 25 km of Section B-3, Section B-1 (54.5 km) and Section B-2 (45.6 km), cutting the travelling time in half. It has been reported that the shorter transportation time has cut the transportation cost by more than 50% (results of interviews with officials of the DGC and local public bodies

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[6] For rating of the effectiveness, the impacts are taken into consideration.

[7] The author interviewed various offices of seven local public bodies along the routes. These were the Planning Bureau of Chimaltenango Departmental Government for CA-01W (between Chimaltenango and Tecpán), the Planning Division of the Santa Cruz Verapaz Municipal Authority for the eastern end of RN-07W, the Planning Division of the San Cristóbal Verapaz Municipal Authority for RN-07W (between San Cristóbal Verapaz and Chicamán), the Planning Division of the Chicamán Municipal Authority and the mayor as well as Planning Office of the Uspantán Town Council for RN-07W (between Chicamán and Sacapulas) and the Planning Division of the Sacapulas Municipal Authority and councillors as well as the Planning Office of the Aquacatán Town Council for RN-07W (between Sacapulas and Chiantla).

[8] This is a type of simple surface treatment to make RN-7W, which was an earth road, more passable by laying a gravel layer on top of the earth surface.

along the route).

(2) Traffic Volume

Compared to the time of appraisal, the currently daily traffic volume has increased by 61% for Section A (8,479 vehicles to 13,623 vehicles, 70% for Section B-1 (255 vehicles to 383 vehicles), 213% for Section B-2 (92 vehicles to 288 vehicles) and 89% for Section B-3 with some unpaved sections (128 vehicles to 242 vehicles).[9] In every section, the current traffic volume far exceeds the forecast increase of the traffic demand at the time of appraisal (increase of 47% in 14 years). The completion of the Project has made it possible to use RN-7W even during the rainy season. Prior to the Project, Sections B-1, B-2 and B-3 were all unpaved and became impassable during the rainy season (usually from late May to early October). Since the completion of the Project, the entire route except for the landslide section of some 2 km has been passable all year round.

3.2.1.2 Improvement of the IRI

The IRI[10] indicating the unevenness of the road surface of CA-01W improved from 1.05 to 1.63 in 2006 which was better than the target range of 2.0 to 3.0.[11] In regard to RN-7W, a DGC official stated that an average IRI of 2.8 was achieved between Chiantla and Chicamán (covering Sections B-1 and B-2) immediately after the completion of the work (2005 for Section B-1 and 2007 for Section B-12).[12] This value was much better than the target value of 3.5.

3.2.2 Qualitative Effects

3.2.2.1 Improvement of Road Safety

The current road surface conditions are generally good for both roads and safe travel is possible except for a limited section. According to data provided by the National Statistical Office of Guatemala, the number of traffic accidents has fallen throughout the Project Area between the pre-project (2001) and post-project (2010) years (62% in Chimaltenango

[9] This data was originally provided by the DGC. The Project estimated an annual traffic volume increase of 3% for the two roads. This rate can be translated to 47% in 14 years. (Source: JICA)

[10] The IRI (International Roughness Index) was developed by the World Bank to evaluate road surface roughness. According to the World Bank Technical Paper No. 46 (Guidelines for Conducting and Calibrating Road Roughness Measurements), a perfectly smooth road surface has an IRI value of 0 and rough unpaved road surfaces have an IRI value of 8 or higher. The recommended IRI value is up to 2 for airport runways and highways and 1.5 to 3.5 for paved roads. There is no official IRI standard for road surfaces in Guatemala.

[11] The source was data provided by Construction Project Consultants, Inc. in 2006 based on continuous measurement using Dynatest's road surface profiler model 5051 Mark III L5.2+ for the period from January through February, 2006.

[12] No current IRI measurements are available.

Department, 20% in Alta Verapaz Department, 47% in Quiché Department and 64% in Huehuetenango Department). The interview survey with local public bodies along RN-7W found that the decline of the number of accidents was a result of the safer transporting conditions, in turn caused by a free vehicle check and traffic safety campaign organized by the General Directorate of Road Protection and Safety (PROVIAL) of the MCIV and also by the improved road surface. All of these results indicate the positive contribution of the Project to improved road safety.

This project has somewhat achieved its objectives, therefore its effectiveness is fair.

3.3 Impacts

3.3.1 Intended Impacts

3.3.1.1 Stabilization of the ZONAPAZ

Road improvement was one of the highest priority issues identified by the Peace Agreement and the actual progress of the work had a big impact on the preservation of security in the ZONAPAZ. All four of the departments involved in the Project comprise part of the ZONAPAZ and the implementation of the Project as a priority component of the Peace Programme was publicly promised by Presidential Decree No. 28-99. The URNG has been continuously monitoring the progress of the Peace Agreement. Since the promulgation of the above-mentioned Presidential Decree and confirmation of the road improvement projects in progress, the URNG has not been involved in any armed activity. According to the Peace Secretariat (SEPAZ), the improvement of CA-01W and RN-7W has made these roads the foundation for local development as they have facilitated the construction of departmental roads and rural roads connected to these trunk roads. It is, therefore, safe to conclude that the Project has contributed to the stabilization of the ZONAPAZ.

3.3.1.2 Vitalization of Economic Activities

Although the latest national data on agriculture and stock farming is unavailable because of the on-going compilation of such data, an interviewee at the Ministry of Agriculture (MAGA) informed that agriculture and stock farming have been on the increased in areas served by the improved roads following the Peace Agreement. In his opinion, the decline of the transportation cost is a factor for such an increase.

In Guatemala, there is no GDP or other data by department, making it impossible to quantitatively determine the vitalization of the local economy by the Project. However, the long-term development plan (Plan de Desarrollo Departamental 2011 – 2013) for the four target departments of the Project contains a plan for the construction, expansion and repair of departmental and municipal roads branching from CA-01W in Chimaltenango Department.

A similar plan exists for Alta Verapaz, Quiché and Huehuetenango Departments through which RN-7W traverses. The eventual construction of such roads will boost the impact of road development on the vitalization of the national and local economy.

3.3.1.3 Improved Access to Health Services

Local public bodies along the routes of the two improved roads have confirmed that access to the nearest hospital has much improved, making emergency transportation possible. In Chimaltenango Department, the general hospital in Chimaltenango City is the only general hospital administered by the Ministry of Public Health and Social Assistance and CA-01W provides the only transport route from a cluster of cities and towns around Chimaltenango City. The improved RN-7W has shortened the access time to a nearby hospital, making such access possible all year round. The substantial improvement of the access of residents to medical services is the result of the assured passability of the road throughout the year and the shorter transporting time of a nearby hospital. One example is the shortening of the transporting time from some three hours to one hour in the dry season from the furthest Cunén Town to Huehuetenango General Hospital.

3.3.2 Other Impacts

3.3.2.1 Impacts on the Natural Environment

No significant impact on the environment has been recorded as a result of the Project. The problem of the illegal dumping of waste wood along the route which was raised at the time of appraisal has not occurred due to improvement of the waste collection service and the introduction of final disposal sites by local public bodies.

3.3.2.2 Land Acquisition and Resettlement

The Project did not require the resettlement of residents. The rehabilitation and/or paving work for the existing CA-01W and RN-7W under the Project took place at state-owned land where no houses or other structures existed even though the road width was widened in some places. Site acquisition was, therefore, unnecessary.

In short, the transport time on the subject roads was halved as smooth travel became possible throughout except for the section blocked by a landslide. Meanwhile, the Government of Guatemala has been proceeding with the construction of departmental and municipal roads branching from the two subject roads of the Project and the further vitalization of agriculture and stock farming is hoped for. No anti-government activities have taken place as the road construction work which will contribute to socioeconomic development has been conducted in areas subject to the Peace Agreement. As such, the Project is said to have contributed to the preservation of the peace. However, the prohibition of road work which is still being

enforced at the section affected by a landslide means that the paving work is not fully completed. In turn, this means that improvement of the transportation efficiency has not been fully achieved, making the effectiveness and impact of the Project to be fair.

3.4 Efficiency (Rating:①)

3.4.1 Project Outputs (See Fig. 1)

The target roads of the Project were classified into the following four sections. The work was completed as planned as shown in Table 2 except for a section between San Cristóbal Verapaz and Chicamán on RN-7W.

Table 2 Outputs

Item	Road Section		Distance	Achievement Ratio
Road Improvement	Section A	(CA-01W: Between Tecpán and Chimaltenango)	37.0 km	100%
	Section B-1	(RN-7W: Between Chiantla and Sacapulas)	54.5 km	100%
	Section B-2	(RN-7W: Between Sacapulas and Chicamán)	45.6 km	100%
	Section B-3	(RN-7W: Between Chicamán and San Cristóbal Verapaz)	45.3 km	55%
	Total		182.4 km	88.9%
Bridge Replacement	Chixoy Bridge		Replacement was found to be impossible as both bridges are designated as cultural assets. Only the reinforcement work was done.	
	Río Branco Bridge			

Source: DGC

3.4.1.1 Section A (CA-01W: Between Tecpán and Chimaltenango)

The rehabilitation work for this 37 km long section was completed as planned and the present conditions of the road surface are generally good. Repair work or widening work is being conducted in some places.

3.4.1.2 Section B-1 (RN-7W: Between Chiantla and Sacapulas)

The paving work for this 54.5 km long section was completed as planned and the present conditions of the road surface are generally good. The road surface was damaged at four sites by minor landslides which occurred after the completion of the work. These sites are passable as the collapsed sediment has been removed by repair work supervised by the DGC. Although subsidence (by 2 – 3 cm) is observed for a length of some 50 m at another site, it has not affected the surface of the road which is still passable. The DGC is currently supervising the work to repair an area where the road has collapsed to the width of half a lane for a length of some 20 m.

3.4.1.3 Section B-2 (RN-7W: Between Sacapulas and Chicamán)

The paving work for this 45.6 km long section was completed and the present conditions of the road surface are generally good. One site was slightly damaged by a minor landslide after the completion of the work but the removal of the collapsed sediment by repair work supervised by the DGC has made this part passable.

3.4.1.4 Section B-3 (RN-7W: Between Chicamán and San Cristóbal Verapaz)

Of the planned 45.3 km, some 25 km has been paved and the present conditions of the road surface are generally good. The remaining some 20.3 km has been given ballast treatment as mentioned earlier and an average travelling speed of 40 km/hr is achievable for a length of some 18.3 km.

The major landslide mentioned earlier occurred at Los Chorros during the construction work (January, 2009), using local funds after the loan completion of the Japanese ODA loan disbursement, and some 2 km of the road was buried. The National Committee for Disaster Mitigation (consisting of the Minister of Defense, representatives of local residents and the Director General of the National Institute for Seismology, Vulcanology, Meteorology and Hydrology) promptly prohibited any construction work at this stretch of the road. Since the occurrence of the landslide, the CONRED has been conducting a ground survey at the site every three months. As landslides or subsidence takes place from time to time at this site, there is no firm prospect at present that the prohibition of construction work will be cancelled.

RN-7W lies on the Chixoy-Polochic Fault and it was known prior to the Project that the road work would take place on fragile ground. Accordingly, it was expected that the road work would experience minor landslides and subsidence, necessitating regular repair work as part of the subsequent road maintenance work. The problem of vulnerable ground was not confined to RN-7W but extended to the ZONAPAZ in general. The major landslide at Los Chorros was, however, reported by the CONRED to be an unprecedented natural disaster because of its massive scale as well as timing during the dry season in which landslides do not usually occur.

At the buried section of some 2 km in length, a narrow earth private road which runs in the south of this section is used as a detour. Even though this road is just wide enough to allow single vehicle traffic in some places, the detour is used by large trucks as well as buses.

A minor landslide occurred at three sites on the 25 km long completed part of Section B-3. Small-scale subsidence (in a circular shape of some 5 m in diameter) is observed at one of these sites. The road widening work supervised by the DGC has kept the area of subsidence

under control, making vehicle traffic possible without much reduction of the speed.
(See 3.5.4.2 for the plan for the hitherto uncompleted section.)

The photograph below shows the state of the landslide at Los Chorros (taken in March, 2012 during the field reconnaissance).

Fig. 2 Current State of the Major Landslide Site at Los Chorros on RN-7W

3.4.1.5 Bridge Replacement

Under the Project, the replacement of Chixoy Bridge and Rio Branco Bridge was originally planned. However, because of their designation as cultural assets, permission to rebuild the bridges could not be granted. As a result, only reinforcement work was carried out. According to the DGC, the service life of these bridges was prolonged by some 15 years by the work.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The overall project cost was higher than the planned cost (143%) despite the incompletion of the work at part of Section B-3 and the change of the plan from rebuilding to reinforcement of two bridges. As shown in Table 3, the cost of the civil engineering work increased by 40% and the cost of the consultant increased by 66%. The increase of the civil engineering work cost was attributable to the drilling of rocks of which the presence in the planned road work sections was not anticipated and also to additional work, including the revision of the original design. This led to significantly increased funding (314%) by the Guatemalan side. Meanwhile, the principal cause of the increased consultant cost was the lengthening of the project period, in turn caused by the replacement of Constructora DL, which was responsible for the paving work for the entire RN-7W, by Tokura Construction because of the bankruptcy of the former during the Project period.

Table 3 Planned and Actual Project Costs

Item	Amount (¥ million)		Differences	
	Planned (With Tax)	Actual (With Tax)	Amount (¥ million)	Difference (%)
Civil Engineering Work	5,957	8,330	+2,373	+40%
CA-01W	1,473	2,091	+618	+42%
RN-7W	4,484	6,239	+1,755	+39%
Consultant	733	1,214	+481	+66%
Total	6,690	9,544	+2,854	+43%
JICA Portion	5,781	5,777	-4	0%
Guatemala Portion	909	3,767	+2,858	+314%

Source: DGC

3.4.2.2 Project Period

The actual project period was significantly longer (more than 206%) than the originally planned. The commencement of the work under the Project was delayed by some 5 – 6 years in each section. The main reasons were (i) repetition of the tender, (ii) extra drilling work because of the presence of unanticipated rocks, (iii) need to carry out design revisions and other additional work and (iv) fairly lengthy procedure of transferring the contractor contract because of the bankruptcy of the original contractor. In terms of the duration of the work, the performance at all sections except Section B-2 was almost as planned. The significant extension of the work duration at Section B-2 (by 20 months) was caused by the extra drilling work to deal with unanticipated rocks, additional work and the procedure of transferring the contractor contract as mentioned above. The incomplete work at part (some 20.3 km) of Section B-3 has already been mentioned in 3.4.1.4. Table 4 below shows the planned and actual project periods.

Table 4 Planned and Actual Project Periods

Item	Planned		Actual	
	Period	Duration	Period	Duration
Section A (CA-01W)	1997-2000	30 months	August, 2003-April, 2006	33 months
Section B (RN-7W)	1998-2001	30 months	January, 2003-January, 2009 (work suspended)	73 months
・ Section B-1			January, 2003-May, 2005	29 months
・ Section B-2			February, 2003-April, 2007	50 months
・ Section B-3			February, 2003-January 2009 (work suspended)	72 months
Work Supervision CA-01W	1997-2000	30 months	August, 2003-April, 2006	33 months
Work Supervision RN-7W	1998-2001	30 months	September, 2000-January 2009 (work suspended)	101 months

Source:DGC

3.4.3 Internal Rate of Return (For Reference Purposes Only)

Economic Internal Rate of Return (EIRR)

① CA-01W (Section A): 38%

② RN-7W (Section B1 + Section B2 + Section B3): 7%

③ RN-7W (Section B-1): 12%

④ RN-7W (Section B-2): 6%

⑤ RN-7W (Section B-3): 3%

The EIRR is high for CA-01W where the completed work in entire Section A has considerably boosted the traffic volume. In the case of RN-7W, the EIRR decreases from the western part where the work is completed towards the eastern part where the work is incomplete.[13] Both project cost and project period were significantly exceeded the plan, therefore efficiency of the project is low.

3.5 Sustainability (Rating:③)

3.5.1 Structural Aspects of Operation and Maintenance

At the time of appraisal, the DGC was the competent agency for road maintenance with some maintenance work being contracted out. At present, the DGC and the Road Maintenance Execution Unit (COVIAL)[14] are responsible for road maintenance with the entire actual maintenance work being contracted out. The DGC is responsible for the construction and repair of roads as well as large-scale maintenance work while the COVIAL is responsible for small-scale maintenance work. A smooth operation and maintenance system is well established. The organization of the DGC consists of the Technical Department and the General Affairs Department under the General Director. The Technical Department has the Planning and Survey Division (7 staff members), Work Division (4 staff members), Maintenance Division (5 staff members) and Project Accounting Division (1 staff member). The General Affairs Department has the Finance Division (7 staff members) and Administration Division (7 staff members). The total staff strength is 37, including the General Director, two Deputy General Directors, secretary, internal auditors and legal advisor. The COVIAL consists of the Technical Committee (11 staff members), Technical Guidance Division (1 staff member), Operation Management Division (3 staff members),

[13] The estimated EIRR takes the decrease of the road maintenance cost and the opportunity cost for road users (i.e. benefits for road users due to the lower vehicle maintenance cost and shorter transporting time) into consideration. The EIRR at the time of appraisal was estimated to be 20.6% for CA-01W and 12% for RN-7W. Because the detailed basis for this estimation is unknown, it is difficult to compare these figures with the recalculated EIRR figures for the present ex-post evaluation.

[14] The COVIAL is placed under the MCIV but is independent from the DGC. It is responsible for the maintenance of roads and bridges although expensive repair work is conducted by the DGC.

Planning Division (8 staff members), Finance Division (1 staff member) and Accounting Division (10 staff members). The total staff strength is 35, including the General Director. Repair as well as extension work for CA-01W and RN-7W has steadily been conducted as both the DGC and COVIAL have the necessary manpower.

3.5.2 Technical Aspect of Operation and Maintenance

In view of the smooth implementation of the roads improvement activities, the DGC has prepared (i) a unit price catalogue for road improvement and repair projects (Catálogo de Precios Unitarios de Referencia de Proyectos de Mejoramiento y Mantenimiento de Carreteras) which forms the basis for the selection of possible bidders for tenders and (ii) a manual for the compilation of an operation and accounting management report for each type of work. The DGC has introduced a set of rules for the use of such catalogue and manuals for the control of contractors to ensure the quality of road construction, repair and maintenance work. As mentioned earlier, small-scale road maintenance work is principally the responsibility of the COVIAL and the actual work is conducted by private contractors who have selected by the bidding process. The COVIAL manages the tenders and supervises the maintenance work of successful bidders. The participation in tenders is restricted to prequalified private companies which have registered with the COVIAL based on their clearance of the technical and financial registration criteria. The COVIAL strictly enforces the application of the catalogue and manuals prepared by the DGC to ensure the quality of road maintenance work.

3.5.3 Financial Aspect of Operation and Maintenance

The necessary long-term construction and maintenance expenses for the road sections improved by the Project have been planned. As far as the maintenance of the subject roads of the Project is concerned, the COVIAL is currently responsible only for the tender for and supervision of the maintenance of those roads sections of the Project for which the said work has been transferred to the COVIAL from the DGC. The maintenance of RN-7W is managed by the DGC as repair work, including work to improve the stability of slopes, is currently in progress. The repair and maintenance plans for 2012 and 2013 include work to partially widen CA-01W to four lanes and work to repair the damage caused by post-project subsidence and landslides to RN-7W. It is planned that the COVIAL will be responsible for all maintenance work from 2014 onwards. Table 5 shows the planned road maintenance budget.

Table 5 Actual and Planned Budgets for Improvement and Repair of Roads Managed by the DGC (Unit: million USD)

Section	CA-01W (widening, repair)	RN-7W (slopes stabilization, repair)		
	Section A	Section B-3	Section B-2	Section B-3
2008~2011 Average *	1.675	1.396	1.406	1.691
2012	7.744	11.644	9.077	8.392
2013	7.744	11.645	9.078	8.394

* The figures for 2008 through 2011 are estimates by the DGC.
Source: GDC

Table 6 Planned Budget for Repair of Roads Managed by the COVIAL (Unit: million USD)

Section	CA-01W	RN-7W		
	Section A	Section B-1	Section B-2	Section B-3
2014	1.640	0.408	0.410	0.598
2015	1.640	0.408	0.410	0.598

Source: GDC

The maintenance cost of CA-01W did not change much after the Project as shown in Table 5 and Table 6 because it was already paved before the Project. In contrast, the maintenance cost of RN-7W is expected to fall from 2014 onwards due to the change from an earth road with a high repair and maintenance cost to a paved road which is easy to maintain. At present, the repair and maintenance budget for CA-01W and RN-7W is included in the MCIV's Nationwide Road Development Plan for 2008 – 2017 and the budget up to 2015 has so far been secured. The unit prices are to be reviewed to reflect the actual market prices and are shown in the catalogue mentioned earlier.[15] The planned budget for 2014 when the large-scale repair work will be completed and thereafter is believed to be highly executable especially for RN-7W as the planned figures are well below the average figure for 2008-2011 because of the reasons described above.

Although general financial information concerning the DGC and COVIAL has not been obtained, the on-going extension of the nationwide road network[16] suggests continual progress of the above plan. The unit prices in the catalogue mentioned earlier are set to be revised by the COVIAL and General Accounting Office of Guatemala (CGC) based on the

[15] The unit price is revised by the COVIAL and the General Accounting Office (CGC) of Guatemala as required.

[16] The total length of the nationwide road network increased from 14,436 km in 2005 to 15,700 km in 2009 (a 9% increase). Paved international and national roads increased from 6,044 km to 6,920 km (a 14% increase), unpaved international and national roads from 5,365 km to 4,679 km (a 13% decrease) and rural roads from 3,028 km to 4,101 km (a 35% increase). (Source: National Statistical Office)

actual performance. As the planned budget is settled based on set unit prices, it is highly executable.

3.5.4 Current Status of Operation and Maintenance

3.5.4.1 Status of Operation and Maintenance of the Completed Sections

The field reconnaissance by the author found that the road surface conditions are generally good. Widening work supervised by the DGC and maintenance work supervised by the COVIAL are in progress for CA-01W. In the case of RN-7W, widening or repair work supervised by the DGC is in progress in several places. At sites of a minor landslide or subsidence on RN-7W, repair work supervised by the DGC is currently in progress as part of the routine maintenance work, making the entire route passable except for a some 2 km long section at Los Chorros.

3.5.4.2 Planning for the Uncompleted Section

The DGC plans to deal with the some 20.3 km long incomplete section by dividing it into two sections: (i) some 2 km long section at Los Chorros where the road is buried by collapsed sediment and (ii) the remaining some 18.3 km long section. The DGC is ready to start paving and repair work for the latter as soon as the work prohibition order is lifted. In the case of the former, the DGC is currently examining three options: (i) work on site, including stabilization of the ground and the slope, (ii) construction of a detour running in the north of Los Chorros and (iii) improvement of the current provisional detour running in the south of Los Chorros (the purchase of private land is required). Because of an existing pipeline which runs parallel to the current route of RN-7W to convey water to a nearby hydroelectric power station, the CONRED is examining possible measures to stabilize the slope at Los Chorros while preserving the road and pipeline.

At both sections, the work will start when it is considered to be safe by the CONRED by its three monthly ground survey.

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

The Project was conducted in Guatemala where civil conflict had come to an end after many years. The main purpose was to improve some major roads of which the upgrading had long been delayed and/or severely damaged so that the improved transportation would vitalize

economic activities and facilitate the smooth implementation of the Peace Agreement. The relevance of the Project was high as it was fully consistent with the development policy of the Government of Guatemala which was eager to develop infrastructure to preserve the peace, the development needs of Guatemala and the ODA policy of the Government of Japan. With the completion of the Project, smooth transportation became possible throughout the Project Area except for a section affected by a landslide, halving the transportation time on the improved roads. In this area, the Government of Guatemala had been earnestly constructing departmental and municipal roads linked to the roads targeted by the Project and the vitalization of local agriculture and livestock farming is hoped for. As the improved road should contribute to the socioeconomic development of the area (ZONAPAZ) subject to the Peace Agreement signed in 1996 between the Government of Guatemala and the rebel forces, the Project has contributed to preserving the peace. Meanwhile, both the effectiveness and impact of the Project are judged to be fair as smooth travelling has been hampered at a section due to a landslide. The project cost exceeded the original plan as the civil engineering cost increased due to the unanticipated work of drilling rocks. The project period far exceeded the original plan and the occurrence of an unexpected large-scale landslide was a major contributory factor. Apart from this, the repetition of tender, drilling of rocks of which the presence was not anticipated and additional work, including the work to revise the original design, also contributed to the lengthening of the project period. As such, the efficiency of the Project is judged to be low. Meanwhile, the sustainability of the project effects is judged to be high as no problems are found either with the maintenance system or in the technical and financial aspects. In light of the above, the project is evaluated to be partially satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

The National Committee for Disaster Mitigation established prohibition to conduct construction activities in Los Chorros and its influence areas until verification of stability of the ground affected by massive landslide. Due to this, pavement activities of unconcluded portion of RN-7W (between San Cristóbal Verapaz and Chicamán) cannot be continued. The DGC should commence paving work at the unpaved section of RN-7W except for the Los Chorros section as soon as the prohibition of road work is lifted. It should also finalize the plan to deal with the currently blocked Los Chorros section as soon as possible and should try to implement the plan.

4.2.2 Recommendations to the JICA

There is no specific recommendation to the JICA in connection with the ex-post evaluation of the Local Roads Improvement Project in Guatemala.

4.3 Lessons Learned

There is a high risk of landslides in the mountainous areas; thus, road construction or improvement plan in these areas must fully take this risk into proper consideration. For road construction in mountainous areas, even if the planned work is to improve an existing road, a careful ground survey should be conducted in advance especially when the high risk is already known so that the need for slope stabilization work is properly assessed.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
① Project Outputs	CA-01W: Between Chimaltenango and Tecpán: Repair Work RN-7W: Between San Cristóbal Verapaz and Chicamán: Paving Work RN-7W: Between Chicamán and Sacapulas: Paving Work RN-7W: Between Sacapulas and Chiantla: Paving Work Work Supervision: CA-01W Work Supervision: RN-7W	CA-01W: Between Chimaltenango and Tecpán: As Planned RN-7W: Between San Cristóbal Verapaz and Chicamán: Paving Work (Incomplete) RN-7W: Between Chicamán and Sacapulas: As Planned RN-7W: Between Sacapulas and Chiantla: As Planned Work Supervision: CA-01W Work Supervision: RN-7W
② Project Period	1997 – 2001 (Approx. 30 months)	January, 2003 – July, 2007 (55 months)
③ Project Cost Amount paid in Foreign currency Amount paid in Local currency Total (Japanese ODA loan portion) Exchange Rate	 0 million yen 6,690 million yen 546.12 million Q 6.690 million yen 5,781 million yen 1Q = 12.25 yen (as of 1999)	 0 million yen 0 million yen 593.86 million Q 9,544 million yen 5,777 million yen 1Q = 9.73 yen (Average for 2000 through 2007)

Republic of Paraguay

Agricultural Sector Strengthening Project II (PG-P14)

External Evaluator: Hideyuki Takagi,
Ernst & Young Sustainability Co., Ltd.

0. Summary

The objective of this project was to strengthen the overall competitiveness of one of the key economic sectors in Paraguay, the agriculture and livestock farming sector, by implementing various assistance programs to small- and medium-scale farms in line with the country's agricultural and livestock farming promotion policy, thereby contributing to the sustained growth of the national economy and improving the standard of living of many small-scale farmers who belong to the low-income bracket. This project has been highly relevant with the country's development policy and development needs, as well as Japan's ODA policy. The project outputs that were originally contemplated were modified in the course of the implementation of the project because the project structure was found to be too complex to be realizable. In this report, the project effectiveness and impacts are evaluated after an analysis of the background and process of the modifications and on the basis of the finalized project outputs. In terms of effectiveness, certain positive outputs have been obtained in the sub-projects, agricultural extension and granting of capital investment funds. In addition, the infrastructure sub-projects that were enlarged in scale in accordance with the local needs have benefitted a wide array of beneficiaries in the project region. As for impacts, whilst the original project objective was the strengthening of agriculture and livestock farming sector, a greater project impact was obtained with respect to the standard of living of rural farming communities through the infrastructure sub-projects. With all these facts taken into consideration, the project effectiveness and impacts are considered to be fair. The project efficiency is also adjudged fair because the project period significantly exceeded the plan even though the project cost was within the plan. The sustainability is considered to be fair because some problems are observed in the continuity of the model farm sub-project, the maintenance and repair of roads and the non-performing loans of small-scale farms. In light of the above, this project is evaluated to be partially satisfactory.

1. Project Description

(Project location: Paraguay country map)

(A small-scale farmer with his cassava harvest enjoys increased productivity that was brought about by the model farm sub-project)

1.1 Background

Paraguay is a landlocked country on the South American Continent and its major industry is agriculture and livestock farming. Today, more than 80 percent of its exports still depend on the agriculture and livestock farming sector. Accordingly, the sector is regarded as the major place of work by the people. Over 30 percent of the entire working population is engaged in this sector. However, most of the agriculture and livestock farming population is engaged in small-scale farming[1] in rural communities and many of the farms are small family farms that grow only what they need to consume. What little cash they earn from the sale of some cash crops or from wage labor is expended to pay for farm machinery, supplies, seeds and other farm inputs and to cover the education of children and medical care. They belong to the low-income class of the society. Typically, they use family labor to cultivate 3 – 4 hectares of land a year, a size that is cultivable using family labor. They depend on the traditional farm technique of rain-fed cultivation, only growing crops that do not require irrigation. Their harvests and production efficiency are both low. The widening income disparities between these numerous small-scale farms and the medium- to large-scale farms have long been a major social issue. In addition, Paraguay's entry into the Mercosur (1991) that promotes trade liberalization within the region, it was feared, would unleash a large influx of inexpensive agricultural products into the country, destroy the life of small-scale farmers and push them jobless off the land and into the cities. Entry into the common market also makes it necessary to enhance the competitiveness of medium-scale farms through financial support so as to enable them to continue exporting agricultural products to a more liberalized market.

To address the situation, the Paraguayan Ministry of Agriculture and Livestock (MAG) developed an assistance policy package setting out the assistance bodies and assistance measures directed to each of the two farm groups, small-scale and medium-scale. The measures for small-scale farms included: agricultural extension, small-scale infrastructure improvements and improved access to funding, all designed to help the farmers to stay on their farms and continue farming on a sustainable basis. For the medium-scale farms, the financial support that was launched under the Agricultural Sector Strengthening Project (I) and extended through the National Development Bank (BNF) was continued and the emphasis was also placed on the support for the livestock farming industry that had not been eligible for loans in the framework of this Project (I). This project under evaluation was implemented as a follow-up to the country's policy of agriculture and livestock farming promotion and was aimed at helping the entire agriculture and livestock farming sector develop in a well-balanced manner.

[1] The categorization is by the area of farmland owned. Small-scale means up to 20 ha. Medium-scale means from 20 ha up to 300 ha. Large-scale means over 300 ha. Most small-scale farms are family-owned and the average farm size is several hectares (about 40% of all farming units own no more than 5 ha each). In fact, farmland ownership is not clear in many cases. The area size of 20 ha was the unit used at the time of land redistribution under rural reforms.

1.2 Project Outline

The objective of this project is to strengthen the overall international competitiveness of one of the key economic sectors in Paraguay, the agriculture and livestock farming sector, by implementing various assistance programs to small- and medium-scale farms (production platform strengthening, small-scale infrastructure improvements and agricultural loans to farmers), thereby contributing to the sustained growth of the national economy and improving the standard of living of many small-scale farmers who belong to the low-income bracket.

Loan Approved Amount / Disbursed Amount	JPY 15.525 million / JPY 13.824 million
Exchange of Notes Date / Agreement Signing Date	December 1997 / August 1998
Terms and Conditions	Interest Rate: 2.7% (Consulting Services 2.3%) Repayment Period: 25 years (Grace Period: 7 years) Conditions for Procurement: General Untied
Borrower / Executing Agencies	Government of the Republic of Paraguay / Ministry of Agriculture and Livestock (MAG), National Development Bank (BNF)
Final Disbursement Date	February 2010
Main Constructor	—
Main Consultant	PACIFIC CONSULTANTS CO. LTD. / NIPPON KOEI / OC Ingenieros Consultores SRL / Cialpa S. A.
Related Studies (Feasibility Study) etc.	Special Assistance for Project Implementation (SAPI)
Related Projects	・ Agricultural Sector Strengthening Project (Phase I of this Project), ・ Dispatching a Financial Advisor to Agricultural Credit Agency (CAH), ・ Project for improvement of agricultural extension and small financing systems for rural development based on the territorial approach (supplemental project to Japan's ODA Loan)

2. Outline of the Evaluation Study

2.1 External Evaluator

Hideyuki TAKAGI (Ernst & Young Sustainability Co., Ltd.)

2.2 Duration of Evaluation Study

Duration of the study: October 2011 – December 2012

Field study: January 21 – 30, 2012 and April 21 – May 7, 2012

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

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance with the Development Policy of Paraguay

(Relevance with the National Development Policy)

A focus on the development of agriculture and livestock farming has constantly been a priority agenda item in the national development plans of Paraguay. At the time of this ex-post evaluation, agricultural reform is listed as a cornerstone of the agriculture and livestock farming policy in the Economic and Social Strategy Plan 2008 – 2013, which is focused on an economic agenda, the Public Policy Plan for Social Development 2010 – 2020 which is focused on a social agenda, and the national campaign "Paraguay for All Men and Women (*Paraguay para Todos y Todas*)." In addition, assistance to small-scale farms is identified as a priority item in the fight against poverty and efforts are underway to raise the standard of living of all the people to reduce income disparities.

(Relevance with the Sector Development Policy)

At the time of project planning, enhancement of the international competitiveness of the small- and medium-scale farms in the agriculture and livestock farming sector was considered an impending challenge since international trade was to be liberalized as a result of Paraguay's entry into Mercosur. The MAG, the executing agency, drew up a Small-scale Farm Strengthening Plan to raise the income level of small-scale farm households and the Second Farm Loan Plan for the benefit of medium-scale farms, and used these plans to improve the strengths of the two farm groups. The Small-scale Farm Strengthening Plan included an assistance program consisting of agricultural extension, small-scale infrastructure improvements and improved access to farm funding, all intended to help small-scale farmers to stay on their farms and continue farming on a sustainable basis. In the Second Farm Loan Plan, the financial support that was launched under the Agricultural Sector Strengthening Project (I) and extended through the National Development Bank (BNF) was continued and the emphasis was also placed on the support for the livestock farming industry, which had not been eligible for loans in the framework of the Project (I). The

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

[3] ③: High, ②: Fair, ①: Low

MAG's Agriculture Strengthening Plan in effect at the time of this ex-post evaluation continues to be directed to the objective of assisting small- and medium-scale farms and prioritizes increased productivity, enhanced international competitiveness in both price and quality and job creation through assistance to small-scale family farms in the agriculture and livestock farming sector. Currently, Technical Assistance Project related to ODA loans named "Project for Improvement in Agricultural Extension and Microfinance System for Rural Development Based on Territorial Approach" (2011-2013) is underway. Under this Technical Assistance project, the model farm project is continued and enlarged from the village-level of the past to the local government level and the linkage of the model farm sub-project to the microfinance program is reinforced.

3.1.2 Relevance with the Development Needs of Paraguay

This project was implemented with the objective of helping solve the problems of Paraguay's agriculture and livestock farming sector by extending assistance to its small- and medium-scale farms simultaneously and thus promoting the entire sector in a balanced manner. At the time of the ex-post evaluation, the agriculture and livestock farming sector remained a major industrial sector of the country, accounting for 20% of the GDP and 85% of exports. Meanwhile, the economic disparity between large and small farms still remains a major social issue; the per capita GDP of large-scale farms amounts to the equivalent of 12,000 US dollars whilst that of small-scale farms that account for 80% of the farm population is equivalent to a mere 360 U.S. dollars. There is an additional development challenge for Paraguay's agriculture and livestock farming industry, which is that its geographical situation as a landlocked country makes the cost of logistics high and poses a disadvantage in international competition.

3.1.3 Relevance with Japan's ODA Policy

Japan's country assistance policy for Paraguay includes the agriculture and livestock farming sector, a basic industry in that country, as one of the priority areas for assistance. In addition, Japan has extended financial assistance, technical cooperation and other forms of assistance to Paraguay's agriculture and livestock farming sector, reflecting the historically good relations with the country and the presence of Japanese immigrants and their descendents among the population.

This project has been highly relevant to the country's development policy, development needs, as well as Japan's ODA policy, and therefore its relevance is high.

3.2 Effectiveness[4] (Rating: ②)

The program of assistance for small-scale farmers was intended to ensure financial backing to commercial farming supported by improved farm technology by promoting agricultural extension

[4] The evaluation results of the project impacts are incorporated into the Effectiveness rating.

through a model farm scheme and infrastructure improvements, coupled with financial grants. The program of assistance for medium-scale farms was designed to help raise the productivity to enhance international competitiveness in light of the entry to Mercosur. The project outputs that had been originally contemplated were modified in the course of project implementation. In this report, the project effectiveness is evaluated after an analysis of the background and process of the modification and on the basis of the finalized project outputs.

3.2.1 Quantitative Effects (Operational and Effect Indicators)

< Program of Assistance for Small-Scale Farmers >

1) Strengthening of production platform and improvement of small infrastructure

(1) Agricultural Extension (Sub-project of Model Farms)

The model farms sub-project was implemented with the objective of transferring technology to sections of farmland owned by the model farms in order to extend the farm technology to the other small-scale farms in the community.[5] The model farms were chosen through interviews with small-scale farmers in the community and in accordance with selection criteria that included the size of the farmland owned and the willingness to participate in the program. By the end of the project, a model farm was designated and the sub-project implemented in each of 166 farm communities in 14 departments in the eastern part of the country. The crops used for the model farm sub-project were basically those that the small-scale farms had grown traditionally because they were small-scale and did not have any surplus cash. In most of the model farms, green manure[6] and other soil conservation and restoration techniques were employed because soil degradation of the farmland was a serious problem in many parts of the country.

Model farms that received the technology transfer and the materials and equipment did see their productivity, efficiency and profitability improved, owing to the introduction of green manure, soil restoration, direct sowing, crop rotation and other techniques. Most small-scale farms were growing maize, cassava and poroto beans using traditional methods mainly for self-consumption. They also grew cotton or some other cash crops. The results of the beneficiary survey[7] show that a large majority of the sampled farms gave affirmative answers to the question on productivity increases (90% of the 20 sampled model farms responded “Greatly improved,” 5% “Improved,” and another 5% “Not changed” while 84% of the 57 sampled farms in the project communities responded “Greatly improved,” 14% “Improved,” and 2% “Not changed”). Table 1 “Productivity

[5] Farmer groups organized by the DEAg as recipients of the technology transfer. The minimum membership was 10. On average each group had 15 members.

[6] A fertilization technique wherein some grown plants are directly tilled into the soil to be allowed to decompose. In this project, leguminous plants were mainly used because they are effective particularly in supplying nitrogen to the soil. In addition to nitrification of the soil, they serve to prevent soil erosion caused by heavy rain during the fallow period and they are toppled to serve as soil cover (mulch).

[7] Conducted in February-March 2012. Questions were asked about the effects and sustainability of the sub-projects. A total of 120 responses were obtained.

increases due to the model farm sub-project" shows a comparison of the per hectare production before the project implementation and at the time of the ex-post evaluation in terms of crops that are mainly produced in the farms. Crops traditionally grown for self-consumption have begun to find their ways to markets in Paraguay; an increasing number of farms grow these crops in larger quantities for outside sale. Cotton is a traditional cash crop in Paraguay, but the decline in the market price in recent years is forcing the growers to switch to other crops. The observed no increase in productivity may reflect the decline in the number of cotton farms and the harvest.

Table 1. Productivity increases due to the model farm sub-project (Unit: kg/ha)

	Before project execution (a)	At project completion	At ex-post evaluation (b)	Change ((b-a) / a)
Model farms:				
Maize	721	2,009	2,259	+213%
Cassava	9,105	9,430	12,267	+35%
Poroto beans	409	767	856	+109%
Cotton	888	800	700	-21%
Farms in the project communities:				
Maize	796	2,047	1,971	+148%
Cassava	7,675	10,160	10,195	+33%
Poroto beans	381	432	524	+38%
Cotton	1,123	1,070	1,053	-6%

Source: Beneficiary survey (number of samples: 20 model farms and 57 farms in communities)

(Green manure-covered pre-planting field)

(Vegetable field after technology transfer)

(2) Improvement of Rural Roads

The improvement of rural roads has left positive impacts on vehicular traffic and the amount of farm products transported has increased. In more specific terms, the beneficiary survey revealed that buyers have come to visit farm villages more frequently than before and transportation using large vehicles has been made possible. Most residents living near the improved roads responded that the road improvements made a positive contribution to their commercial farming (84% of the

25 sampled farms responded that their agricultural production and product transportation had "Greatly improved," 4% "Improved," 8% "Not changed," and 4% "Not applicable"). According to the Ministry of Public Works and Communications (MOPC), the project effects are recognized in terms of the increased traffic with an estimated number of beneficiaries in the project region of over 240,000 residents, even though no specific surveys have been conducted on the physical distribution of agricultural produce.

(3) Supply of Drinking Water

The installation of water supply facilities has improved the access to drinking water. According to the National Environmental Sanitation Service (SENASA) of the Ministry of Public Health and Social Welfare, 14,200 households had a drinking water supply system installed in their houses. The beneficiary survey showed that most respondents used the drinking water not just for domestic uses, but also for cattle and gardens and used it very frequently (90% of the 40 farms sampled responded "Use very often," 5% "Use," and another 5% "Not use much").

2) Agricultural Loans to Small-Scale Farmers

The agricultural loans extended to small-scale farmers by CAH under this project were intended to enable farmers to achieve self-supported growth through a combination of technical assistance and access to funding. However, the loans were mostly made available to the relatively well-off farmers because many of the truly small-scale farmers failed to meet the loan conditions (annual income of at least 10 million guarani - about 200,000 yen, evidence of land ownership, no records of non-performance, etc.). Loans to farms in the communities covered by the model farm sub-project accounted for only 8% of the total loans. The intended synergistic effects with the technical assistance are considered to be low.

(Vegetables field with equipment installed using a loan at a thriving suburban farm
Left: Sprinkler irrigation; Right: Plastic greenhouse for tomato growing)

According to CAH, some farmers who used the loan to invest in a tractor, planter, harvester, truck or other farm equipment enjoyed improved productivity, even though no detailed surveys have been conducted on the productivity or efficiency of the borrowers. However, the loan extended to

each farm household is no more than 50 million guarani (about one million yen), which in many cases was used as working capital. It is difficult to believe that the CAH loan played a major role in stimulating capital investment. According to the beneficiary survey, 79% of the 19 sampled farms replied the productivity "Increased greatly" because of the use of the loan, 5% "Increased," and 10% "Not changed." Only 25% of the 20 model farms and 7% of the 57 project community farms sampled in the beneficiary survey received CAH loans.

While there have been positive effects to a certain extent, with the loans to small-scale farms the CAH is experiencing a problem of non-performance. Farms that have a repayment problem are believed to be suffering from economic hardship. The non-performing loan problem is due not only to the financial difficulty of the farms; it derives also from the softening of the borrowing conditions to provide small-scale farms with easier access to credit as well as the less-than-perfect credit management on the part of CAH. Small-scale farms tend to fall behind in their repayments, particularly when they are hit by drought. Phenomena like this that are unique to farm loans make commercial farming difficult and place a burden on CAH to manage credit properly. With a view to helping solve these problems and addressing CAH's overall non-performing loan problem, JICA has initiated an expert dispatch program to help CAH improve its financial base.

< Program of Assistance for Medium-Scale Farmers >

The loans to medium-scale farms were mostly used to finance capital investment for the production of cereals, an export item. According to BNF, farms producing cereals, which account for a large percentage of the borrowers, enjoy generally high profitability and sound management, even though no detailed surveys have been made on their productivity or efficiency. Our beneficiary survey on the program of assistance or medium-scale farmers was only conducted on a limited scale due to the BNF's strict policy on the disclosure of customer information. The two farms from which responses were obtained both replied that their productivity had "Improved greatly" through the use of the loan.

3.2.2 Qualitative Effects

< Program of Assistance for Small-Scale Farmers >

1) Strengthening of production platform and improvement of small infrastructure

(1) Agricultural Extension (Sub-project of Model Farms)

Replies received in our beneficiary survey, as summarized in Table 2, show that most farms recognized improved production capacity as a result of the technology transfer through the model farm sub-projects. This is considered to correspond to the improved productivity of the self-consumption crops mentioned in 3.2.1 "Quantitative Effects" above. Meanwhile, the effects on crop diversification were relatively small, partly because the marginal and small-scale farms still depend on the cultivation of self-consumption crops. Ninety-percent of the respondents answered

affirmatively to the question about the project effects on their standard of living.

Table 2. Qualitative Effects of the Model Farm Sub-project

	Model farms (# of samples: 20 farm households)		Farms in the project communities (# of samples: 57 farm households)	
Production capacity improvement	Greatly improved	90.0%	Greatly improved	84.2%
	Improved	10.0%	Improved	14.0%
	Not changed	0%	Not changed	1.8%
Variety of crops (diversification)	Greatly increased	60.0%	Greatly increased	50.8%
	Increased	15.0%	Increased	24.6%
	Not changed	25.0%	Not changed	24.6%
Standard of living	Greatly improved	70.0%	Greatly improved	79.0%
	Improved	20.0%	Improved	14.0%
	Not changed	10.0%	Not changed	7.0%

Source: Beneficiary survey (Number of samples: 20 model farms and 57 farms in communities)

(2) Improvement of Rural Roads

Rural farms found it extremely difficult and at times impossible to gain access to the cities or have their harvest transported to markets due to the road conditions, especially during the rainy season. Gravel- or stone-paved rural roads were made available under this project and the farmers can now ship their agricultural produce even in bad weather.

3.3 Impact

3.3.1 Achievement of the intended Impacts

< Program of Assistance for Small-Scale Farmers >

At the project planning stage, stabilization of the employment situation was intended through the maintenance and improvement of income to be achieved through assistance for sustained commercial farming on small-scale farms. The continued widening of the income gap between urban Paraguayans and rural farm communities stands in the way of preventing immigration into the cities. The younger generation living on marginal farms continues to move to the cities to work, and many of the parents interviewed in the beneficiary survey said: “We want the children to first go to school and then work in the cities.” The country’s average unemployment rate[8] hardly changed before the project implementation (5.8% in 1998) and at the time of ex-post evaluation (5.6% in 2011). Whilst positive effects have been observed to a certain extent in the sub-projects of Agricultural Extension, Infrastructure Improvements and Loans as described above, the originally intended project impact of “improvement in the commercial farming activity of small-scale farms” was much less than had been planned because the model farm sub-project was reduced

[8] Source: IMF World Economic Outlook Database. The unemployment rate peaked at 10% in 2002 and is on a declining trend.

considerably in scope. In light of all of the above, it cannot be said that the project made a positive contribution to employment stabilization in rural farm communities.

MAG continues to promote assistance to rural marginal farms through a Technical Assistance project related to ODA loans to raise their future potential and stabilize the youth employment situation. The Ministry regards the increasing demand for cassava and other self-consumption crops as a positive indication, and is implementing a "One village, One crop" campaign and other agriculture promotion measures. MAG says that most of the rural marginal farms live with little basic infrastructure, and that improvement of the infrastructure and living conditions is essential, in addition to the efforts mentioned above, to prevent the outflow of young people into the cities. From a longer-term perspective, furthermore, the problems in the distribution system of farm products and land ownership of marginal and small-scale farms need to be addressed. The farm products market in Paraguay is heavily concentrated in the capital of Asuncion. Road systems from rural farming areas are underdeveloped and the products that marginal and small-scale farms produce are denied access to the market. Many marginal and small-scale farms also do not possess documentation of their land ownership. Although the resolution of this problem is considered to be extremely difficult, uncertainty about the title to land poses a serious impediment to the procurement of funds and to the efforts to have young people stay on the farm and till the land.

< Program of Assistance for Medium-Scale Farmers >

The project plan envisaged the expansion of exports through the increased production of major agricultural and livestock products. As will be later discussed in 3.4.1 "Outputs," the BNF loans were mostly used to finance capital investment for the mechanization of soybeans[9] and other cereals that are internationally competitive major export items. Accordingly, it is fair to state that the project did make a positive contribution to a certain extent to the increased production and export of cereals. However, the impact on export expansion is considered to be smaller in scale than originally planned because the total funding for the loans in this project component was reduced considerably from the planned amount: 8,193 million yen to 1,925 million yen.

3.3.2 Other Positive and Negative Impacts (Benefits to the communities and surrounding areas, environmental impacts, relocation of villagers, land acquisition, etc.)

No particular impacts on the natural environment, either positive or negative, were observed as a result of this project. With respect to potential negative impacts on the environment, an environmental assessment was made prior to project implementation of the drinking water for cattle and the flora and landscape of the wetlands in the planned road construction zone. Waterways, bridges and other structures were planned and designed so as not to have adverse

[9] Paraguay is the No.4 exporter of soybeans in the world. They are produced by large agricultural corporations.

impacts. A hydro-geological study was also carried out prior to the construction of farm water canals in terms of the subterranean water level, wetlands, the landscape, chemical contaminants, etc., so as to achieve harmony with the environment. There have been no problems of land acquisition and resettlement.

(Other Positive Impacts)

The small-scale infrastructure project has made a positive contribution in a wide variety of ways as described below to the improved standard of living of the residents in the project area and the neighboring communities.

(1) Improvement of Rural Roads

Improvements to rural roads have contributed not only to the efficient distribution of agricultural produce, but also improved access to hospitals, schools and other basic public services, thus providing a better infrastructure for rural life in general. Our beneficiary survey revealed that all respondents living by the improved roads answered affirmatively to the question about their standard of living (96% of the 25 farms surveyed responded “Greatly improved” and the remaining 4% “Improved). Of particular note is the betterment of bridges that solved the problems associated with the traditional wooden bridges being washed away during the rainy season and the resulting cut-off of traffic. Other responses included: now the bus runs even in the rain; the new bridge ensures safe passage: more tourists are coming (a comment heard at a touristic location); more jobs have been created.

(An improved rural road)

(Left: Old wooden bridge, Right: New concrete bridge)

(2) Supply of Drinking Water

The installation of water supply facilities has improved the infrastructure of rural life in terms of a reduction in waterborne infectious diseases and parasites and other hygienic improvements due to the easier access to safe drinking water. The beneficiary survey revealed that most residents held the view that the provision of drinking water supply systems improved the hygienic conditions (95% of the 40 farms sampled responded “Greatly improved,” 2.5% “Improved,” and 2.5% “Not applicable”). All the residents surveyed agreed that their standard of living became better (97.5% of the same 40 farms sampled replied “Greatly improved” and the remaining 2.5% “Improved”).

(A water supply tank installed in the community)

(Negative impacts)

According to the MOPC, large vehicles have come to use the gravel-paved roads more frequently and cars run faster than before, causing more traffic accidents. The ministry is working to improve traffic signs and driver education.

In summary, the effectiveness of the project was evaluated on the basis of the finalized planned outputs. The evaluation found that certain positive outputs had been obtained from the sub-projects. The infrastructure improvement sub-projects that were expanded in scope with a view to meeting the local needs had indeed benefitted a wide array of beneficiaries in the region. However, the loan grant program for small-scale farms is faced with the problem of non-performing loans and the farms that borrowed the loans are not necessarily better off than before. These are negative elements in the effectiveness evaluation. With respect to project impacts, the initially intended primary impact was strengthened agriculture and livestock farming sector. In reality, the raised standard of living of rural farming communities due to the improvement of infrastructure was the relatively stronger impact of the project. With all of the foregoing considered, this project has somewhat achieved its objectives, and therefore its effectiveness and impacts are considered to be fair.

3.4 Efficiency (Rating: ②)

3.4.1 Outputs

3.4.1.1 Modification of Outputs

The initially contemplated outputs of this project were modified roughly in three ways: (1) expansion of the small-scale infrastructure improvement sub-project and the granting of farm loans to small-scale farms, (2) reduction in the scope of the agricultural extension to small-scale farms and the granting of farm loans to medium-scale farms, and (3) exclusion from the project scope of assistance for organizations of small-scale farms and the granting of farm loans to farmers organizations. The output of this project was generally generated in accordance with each project component as modified. However, problems did occur in the course of project implementation because there was not sufficient coordination and cooperation among the organizations and agencies involved. Before the model farms were selected, project locations for road improvements and water supply systems installation were determined from the viewpoint of the greater need for infrastructure. In addition to the farm roads in the agricultural community where the model farms were located, regional roads connecting villages with the national highway were made a part of the project. With respect to water supply, efforts to quickly improve farm production were made on the basis of the widely-practiced conventional technique of rain-fed cultivation by marginal farms; installation/improvement of irrigation systems was excluded from the project and only the drinking water system improvements, which had a higher priority, were implemented. Thus, the synergistic effects among the project components were less than expected since some of the components did not match the model farm sub-project areas.

3.4.1.2 Background of the Modification of Outputs

The output modifications were made mostly on two occasions. The loan disbursement deadline was extended in December 2005 for four more years and the occasion was used to realign the complex project composition and reduce the project size in order to improve the project feasibility. In February 2007, the sub-projects “Model Farm and Small-Scale Infrastructure Improvements” and “Small-Scale Farm Loans” were also expanded.

December 2005 modifications: The work progress was only 22% with six months left until the originally planned completion date. In order to increase the project feasibility, the following modifications were made:

(1) Reduction of the model farm and small-scale infrastructure improvements sub-projects ((i) 120 model farms rather than 750 would receive materials and equipment, (ii) A total of 230 kilometers of roads rather than 400 kilometers would be improved, (iii) 85 locations rather than 140 would receive drinking water supply systems);
(2) Elimination of the farm loan program to farmer organizations through the Farmers Development Fund (FDC);

(3) Reduction of the farm loan program to medium-scale farms through BNF (With a cumulative total commitment of 2 billion yen, no new loans would be allowed until the financial conditions recovered);
(4) Strengthening of commercial farming training through enhanced consulting services.

In conjunction with these modifications, a Presidential Decree was promulgated to prevent further project delays, setting out measures to the effect that: (a) a project execution unit is newly created, and (b) this project is given high priority status and the local currency budget is to be allocated preferentially.

February 2007 modifications: The model farm sub-project and the small-scale infrastructure improvement sub-project were about to gain momentum. Accordingly, the project size of these components was re-expanded and the L/A allocations were realigned as follows:

(1) The number of model farms was increased to 166;
(2) The small-scale infrastructure improvements were re-expanded ((i) The total length of road improvements was increased to 406.93 kilometers, (2) The number of locations for the water supply systems installation was increased to 166);
(3) The L/A allocation to small-scale farm loans was increased to 5,828 million yen.

With the modifications described above, the L/A allocations were fixed and the project composition finalized in February 2009. For a comparison of the initially planned project composition and the actual, please refer to Table “Comparison of the Original and Actual Scope of the Project” that appears at the end of this document.

3.4.1.3 Results of the Outputs

< Program of Assistance for Small-Scale Farmers >

1) Strengthening of production platform and improvement of small infrastructure

(1) Agricultural Extension (Sub-project of Model Farms)

A total of 166 model farm communities were chosen, to which technical assistance and materials and equipment were provided.

The technical assistance covered topics including subsistence crops, cash crops, subsistence vegetables, commercial livestock farming and management, conservation and restoration of the soil. The techniques introduced for these purposes included: use of improved seeds, use of chemical fertilizers, pest control with agricultural chemicals, combined use of green manure and direct seed planting, organic agriculture, crop diversification, livestock hygiene, fertilization by agricultural lime, fertilization by organic fertilizers and crop rotation. The major equipment granted included: farm tools, green manure rippers, direct seed planters, maize threshers, sprayers, silos and lime applicators. The major materials included: improved seeds, chemical fertilizers, agrochemicals and green manure seeds.

Figure 1. Locations of the model farms

Source: JICA in-file data

(2) Assistance for organizations of farmers

The planned assistance for organizations of farmers was excluded from the project scope on account of its poor feasibility. According to MAG, some of the communities involved in the project are promoting joint efforts in securing sales outlets and saving transportation costs outside the scope of the project.

(3) Improvement of Rural Roads

In addition to the originally-planned roads inside the model farm communities and the farm roads for the adjacent farmlands, some heavily-travelled rural roads were improved under the project.

The total road length was 406.93 km in 24 sections. Gravel pavement was the norm, but a stone pavement technique was applied to the mounted parts, slopes and other spots requiring reinforcement. As was mentioned earlier, the roads to be improved were selected out in the course of project execution even before the model farms were chosen. At some locations, therefore, no matching exists between the two sub-projects.

(4) Supply of Drinking Water

Drinking water supply systems (intake water wells, elevated tanks, piping, etc.) were constructed on the model farms and some other communities. Although irrigation systems were included in the original project plan, they were not constructed because the model farms were marginal rain-fed farms growing the kind of crops that do not require irrigation and because there was an overriding need for drinking water.

Figure 2. Road improvement sites

Source: JICA in-file data

Figure 3. Drinking water systems sites

Source: JICA in-file data

2) Granting of capital investment funds to small-scale farms

Farm loans to finance the purchase of farm machinery, tools, materials and seeds are available to marginal farms in amounts equivalent to some tens of thousands to a hundred thousand yen a year per farm. Some farms near cities or with more sophisticated farming techniques are engaged in commercial farming growing vegetables and other high-profit crops with hired workers, even though the land they own may be small (less than 20 hectares). Such small-scale farms are eligible for farm loans in amounts equivalent to some hundred thousand to one million yen to cover vegetable farm irrigation or greenhouse construction in the case of agricultural farms and the

purchase of calves in the case of livestock farms. According to CAH, the proportion of loans is about 50:50 for agriculture and livestock farming.

Table 3. Breakdown of the CAH sub-loans (as of June 30, 2011)

	Accounts	Loan amount	
		(Unit: million guarani)	(Unit: million yen)*
First loan	12,100	234,635	4,685
Second loan	7,500	110,967	2,083
Total	19,580	345,602	6,768

Source: JICA in-file data

* Converted according to the exchange rate used in JICA in-file data for the First loan and the monthly average of exchange rates for the Second loan

3) Granting of capital investment funds to farmers organizations

This was excluded from the final project composition because there is already similar funding available from the International Fund for Agricultural Development (IFAD) and the timing coincided with the restructuring of the public funding organizations concerned.

<Program of Assistance for Medium-Scale Farmers>

Capital investment loans mainly for the mechanization of cereal production (soybean, maize, wheat and other export items) are available to all medium-scale farmers in Paraguay in amounts equivalent to some millions to some tens of millions of yen. The first loan was used to fund 656 agricultural loans, 225 livestock farming loans and 3 food processing loans. In terms of the loan amount, agriculture accounts for 73.7% (52,324 million guarani). Loans for livestock farming (purchase of calves, machinery and equipment, etc.) are not as much with 23.7% (16,819 million guarani) including both capital investment and working capital. The use of these loans has not been as active as was envisaged in the original plan.

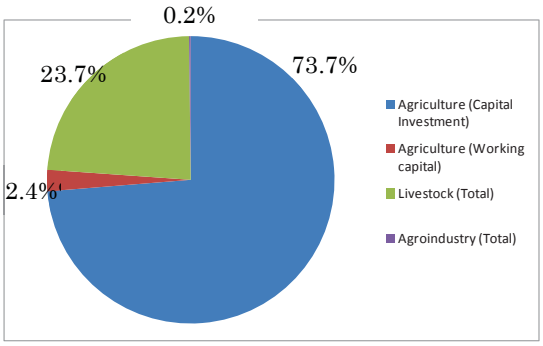

Figure 4. Breakdown of BNF financing (for the first loan)

Source: BNF document

Table 4. Breakdown of the BNF sub-loan (as of June 30, 2011)

	Accounts	Loan amount	
		(Unit: million guarani)	(Unit: million yen)*
First loan	884	70,976	1,925
Second loan	55	7,743	145
Total	939	78,719	2,070

Source: JICA in-file data

* Converted according to the exchange rate used in JICA in-file data for the First loan and the annual average of exchange rates for the Second loan

3.4.2 Inputs

3.4.2.1 Project Costs

The actual project cost of 16,153 million yen was within the plan (98%) of 16,480 million yen. The actual local currency portion of the project cost increased to 682,732 million guarani (233%) from the plan of 292,940 million guarani. In yen terms, the local currency portion was 14,213 million yen or 87% of the planned 16,244 million yen. This is due to the dramatic drop in the value of the Paraguayan guarani against the Japanese yen (1 guarani was ca.0.06 yen at the time of project examination but the simple average during the loan period was 1 guarani = ca.0.02 yen.)

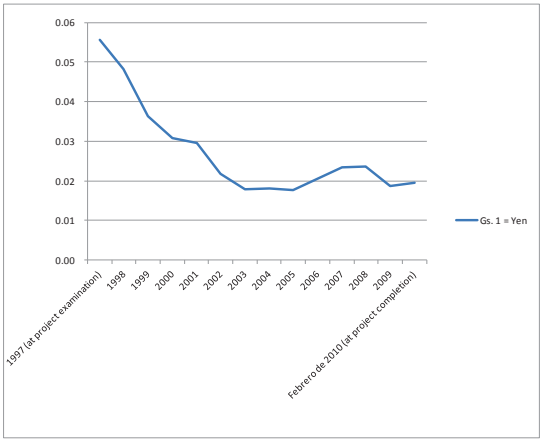

Figure 5. Exchange rate of the guarani against the yen

Source: OANDA "Historical Exchange Rates"

As was described in the section "Outputs," the project composition was modified and the project cost after modification of the outputs was re-planned following a re-allocation of the ODA loan L/A amount. The original project planned (before the modification of the project composition), the finalized L/A allocation and the actual project cost are compared in the table below, itemized by project components.

Table 5. Comparison of the planned and actual project costs

(Unit: million yen)

	Plan			L/A allocation (Final)	Actual			Difference
	ODA loan	Paraguay Gov't	Total (a)		ODA loan	Paraguay Gov't	Total (b)	(b - a)
Small-scale farm assistance								
1) Production platform strengthening and small-scale infrastructure improvements	2,414	522	2,936	6,660	5,105	2,483	7,588	4,652
2) Granting of farm loans for small-scale farms	3,468		3,468	4,735	4,686		4,686	1,218
3) Granting of farm loans to farmers organizations	998		998	0	0		0	-998
Sub-total	6,880	522	7,402	11,395	9,791		12,274	4,872
Medium-scale farm assistance (granting of farm loans)	8,193		8,193	2,000	1,925		1,925	-6,268
Consulting	236		236	1,979	1,940		1,940	1,704
Contingency	2169	433	649	151	14		14	-635
Total	15,525	955	16,480	15,525	13,670	2,483	16,153	-327

Source: Project examination documents, JICA in-file data

3.4.2.2 Project Period

The actual project period of 132 months (February 1999 to February 2010) far exceeded the plan of 72 months (February 1999 to February 2005) (183% of the planned period). As was mentioned earlier, the progress had been a mere 22% when the project period was extended. At that point in time, hardly any progress was observed in the agricultural extension, road improvements and drinking water supply. Due to the slow progress in project execution, the deadline for disbursement was extended twice (in 2005 and 2009) as detailed in Table 6. In conjunction with the agreed extension of the project period, a Project Management Unit (*La Unidade de Gerenciamiento del Proyecto* – UGP) was created within the MAG reporting directly to the Minister and a Presidential Decree dated December 27, 2004 was promulgated, providing for preferential allocation of the

local currency budget to the project. After these efforts, the project was implemented generally as re-scheduled.

Table 6. Yearly progress of the execution of the sub-projects (loan amounts unit: million guarani)

year	Agricultural extension	Road improvements	Drinking water supply	Small-scale farm loans	Medium-scale farm loans
	(2003-2009)	(2008-2010)	(2007-2010)	(2002- /incl. Second loan)	(2000- /incl. Second loan)
1999 Feb	L/A in force (project start)				
2000					15,807
2001					20,430
2002				12,215	18,319
2003	15			27,731	10,094
2004	5			34,821	360
2005	Disbursement deadline extended (for 4 years to February 2009)				
	20			37,362	2,151
2006	21			30,323	415
2007	59		26 locations	28,932	38
2008	46	212.7 km	53 locations	59,438	3,362
2009	Disbursement deadline re-extended (for 1 year to February 2010)				
	Technical verification of 35 of the above model farms	156.45 km	82 locations	46,824	6,969
2010		37.78 km	5 locations	51,229	628
2011 June				16,727	146
Total	166 model farms	406.93 km	166 locations	345,602	78,719

Source: JICA in-file data

The major causes of the delay include the following:

(1) The project consisted of multiple project components and involved multiple implementing agencies (five components to be implemented by six agencies). There was no strong leading body that could perform overall supervision and coordination.

(2) Preparatory tasks took a much longer time, as exemplified by the completion of the operation manual for the small-scale infrastructure improvements as late as in December 2002.

(3) At an early stage of the project, budgetary constraints on the part of MAG prevented full appropriation of the local currency funds required for the implementation of the production platform strengthening. This also affected the small-scale infrastructure improvement sup-project.

In addition to the above, the following problems, though unrelated to each other, prevented smooth execution of the project in the implementation stage:

- Changes in the project plans due to changes in the MAG ministers
- Sites for rural road improvements and drinking water supply were selected before the model farms were selected. It was difficult and time-consuming to find suitable candidate communities for model farms at the already-decided project sites.
- The long process of tender and procurement for the small-scale infrastructure improvement and construction work caused delays and suspensions during the rainy season.
- MOPC chose to use national public tender rather than international tender on the grounds that the latter would require more complicated procedures. But the application of the JICA guidelines on national public tender particularly on the maximum value allowed for a contract resulted in as many as 48 separate contracts for the construction work for 400 kilometers, which made it very difficult to manage the work.
- The procedures and change-over that became necessary as a result of the change in consultants added an extra burden.
- Initially there was no JBIC office in Paraguay and a long time was required for procurement and other services. The merger with JICA made it possible for the JICA local office to handle the ODA loan tasks and the communication in project management has become smooth.

As discussed above, this project experienced modifications of the planned outputs in the course of project execution, and the originally intended impacts were not necessarily obtained. However, the project with its final composition as was agreed between the two governments in consideration of the project feasibility was duly realized. Although the project cost was within the plan as modified, the project period was significantly exceeded, and therefore the efficiency of the project is fair.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

< Program of Assistance for Small-Scale Farmers >

1) Strengthening of production platform and improvement of small infrastructure

(1) Agricultural Extension (Sub-project of Model Farms)

The model farm sub-project is operated by the Agrarian Extension Bureau (*La Dirección de Extensión Agraria* – DEAg) of MAG. As of this writing, DEAg continues to provide technical assistance to about ten of the model farms, based on the cooperative framework with UGP in the

monitoring of the model farms and Technical Assistance Project related to ODA loans. For the model farms other than these ten farms, assistance continued in the form of telephone consultations to help solve problems. Thus, the follow-up technical assistance by DEAg to the model farms is rather limited in scale. This is partly due to the fact that the extension service officials of DEAg are currently engaged in the MAG's Food Production Promotion Program; a more fundamental issue is the rather weak strength of DEAg as a public service entity.

Because of budgetary constraints, a high percentage of DEAg's field officials engaged in assistance to small-scale farms are contract employees. When their contract term expires, the technical assistance to the farms that they were in charge of also ends. Continuity of the assistance is a serious problem. Similarly, the use of outside resources in the course of the project execution has left the adverse after-effect of deterring sustainability in the post-project period. The SAPI (Special Assistance for Project Implementation) that was made for this project between October 2005 and February 2006 pointed out the problem of insufficient capacity for technical assistance and, following its recommendation which is to strengthen the implementation system, 30 consultants were newly retained. As a result, effective technical assistance was extended in the project implementation stage, but with the project completion, these highly qualified personnel left the scene and the project was faced with the problem of uncertain continuity about the system of assistance to the model farms. DEAg in recent years is hiring new recruits to increase its extension staff. There are indeed more officials now but most of them lack the actual technical background. Capacity development is required to enable them to render effective agricultural extension services to the farmers.

(2) Improvement of Rural Roads

According to an explanation by MOPC, the ministry in Asuncion is responsible for the overall supervision of the project and its regional offices responsible for the project area look after the maintenance and repair of the roads that were improved by the project. In reality, neither integrated maintenance practice nor monitoring of the work done by regional offices is carried out by the ministry in Asuncion. Regional offices, in turn, are occupied with responses to emergency situations because most of the rural roads are unpaved and impassability is almost a daily event. The repair of unpaved roads has higher priority in the work schedule than the maintenance of already improved roads. The regional offices simply lack the human resources required to carry out scheduled maintenance of the roads that have been improved by the project.

(3) Supply of Drinking Water

The drinking water supply systems installed by the project are operated and maintained by the Sanitation Committee that is created in every community of the project area. Key committee members include: chair, vice-chair, secretary, treasurer and facilities manager. SENASA conducts

annual monitoring of the operation and maintenance of the communities.

2) Granting of capital investment funds to small-scale farms

A Project Implementation Unit has been formed within CAH, which continues to manage a revolving fund. The Project Implementation Unit consists of teams for: “Monitoring and Management”, “Accounting and Finance”, and “Agricultural Planning.”

< Program of Assistance for Medium-Scale Farmers >

BNF had experienced financial difficulties and was restructured in 2003. Recovery of its competitive strength was pursued by down-sizing of its operations and the introduction of private financial institution knowhow. Three divisions formerly known as Agriculture, Development and Commerce were regrouped into one Operation Division and this project component is handled by the Loan Committee created within the Operation Division. The revolving fund is managed today by the streamlined organization.

3.5.2 Technical Aspects of Operation and Maintenance

< Program of Assistance for Small-Scale Farmers >

1) Strengthening of production platform and improvement of small infrastructure

(1) Agricultural Extension (Sub-project of Model Farms)

DEAg is currently conducting a monitoring survey of the sampled model farms with regard to agricultural extension continuity, capital investment, credit access and other aspects. However, as discussed earlier with respect to its organizational strength, the dominant proportion of contract employees involved resulted in poor continuity in assistance and the less-than-sufficient technical background of the newly-recruited officials poses a technical challenge to DEAg’s effort to continue providing technical assistance to small-scale farms

(2) Improvement of Rural Roads

The roads improved by the project are either gravel- or stone-paved. The gravel pavement requires continuous maintenance work with a frequency of, say, once every six months. For such maintenance of the gravel pavement, four motor graders (road leveling machines), three trucks, two 30,000-liter fuel tankers, six 10,000-liter water tankers, twenty 6-cubic meter dump trucks, nine backhoes (hydraulic shovels), four tamping rollers, seven power shovels and three excavators (hydraulic shovels) were granted under the project. The machinery and equipment have been distributed to the regional MOPC offices in the project areas. In reality, they are used more often for the repair of unpaved roads requiring more urgent attention than for the paved roads completed under the project. According to MOPC, there are no problems regarding the technical capacity of the employees of the regional offices to maintenance the roads.

(3) Supply of Drinking Water

With respect to the operation and maintenance of the drinking water supply facilities granted under the project, SENASA provided the local Sanitation Committees in the project communities with full consulting on the operation, maintenance, tariff management, etc., within the framework of the project. This continues to function effectively. Any problems with the drinking water supply system that are too difficult for the Sanitation Committee to address by itself are communicated to SENASA, which provides technical support for the problems. An interview with one of such Sanitation Committees revealed that SENASA's technical support was highly appreciated. It is thus believed that SENASA's technical level is sufficient to ensure effective maintenance of the facilities.

2) Granting of capital investment funds to small-scale farms

CAH had no experience of handling funds as large as the ODA loans and had to amend its operations manual. However, insufficient credit management by CAH was one of the reasons for the non-performing loan problem, in addition to the circumstances peculiar to farm loans and the softening of the loan terms that was allowed after the project start. A representative of CAH admitted that better preparations should have been done for the project implementation in terms of capacity building on the one hand for CAH officials in providing financial services and, on the other, for the borrower farms in the fundamental skills of drawing up realistic repayment schedules and keeping books. Based on these experiences, CAH is now addressing the non-performing loan problem through the rescheduling of loans for borrower farms and the payment of debt collection bonuses to its employees.

In Paraguay, even now, only about 18% of farms have access to credit. CAH is trying to improve the situation by softening the loan terms with a view to providing as many small-scale farms as possible with modest amounts of loans. As a result, the annual income, land ownership and other loan prerequisites that hardly any small-scale farms were able to meet have been softened. The maximum loan amount per farm has been brought down from US$40,000 to Gs.50 million (ca. one million yen). The maximum repayment period has been shortened from 7 years to 4 years because inexperienced farmers find it difficult to draw up realistic repayment schedules.

< Program of Assistance for Medium-Scale Farmers >

BNF monitors the borrower farms through periodic visits by technical experts. According to BNF, the monitoring survey has found no particular problems.

3.5.3 Financial Aspects of Operation and Maintenance

< Program of Assistance for Small-Scale Farmers >

1) Strengthening of production platform and improvement of small infrastructure

(1) Agricultural Extension (Sub-project of Model Farms)

Currently, model farms are monitored to the extent the MAG budget for this is available. The budget for model farm monitoring was secured while the project was in progress. But in 2011 after the completion of the project, the budget is only sufficient to cover about ten farms, since MAG must allocate funds to Technical Assistance Project related to ODA loans.

Table 7. MAG budget for the project (last 3 years)

Year	Budgeted amount*1		Major uses
	(Unit: million guarani)	(Unit: million yen)*2	
2009	1,256	24	Monitor 166 model farms; technically verify 35 model farms
2010	1,160	21	Monitor, technically assist and train 66 model farms
2011	1,363	26	Farm community development through Technical Assistance Project related to ODA loans; improve small-scale farm access to credit (6 pilot territories, 10 model farms)

Source: MAG

*1 Includes budget for monitoring of all project components under MAG's jurisdiction

*2 Annual average exchange rates: 2009 (¥1 = Gs.53.24), 2010 (¥1 = Gs.54.28), 2011 (¥1 = Gs.52.61)

(2) Improvement of Rural Roads

As was mentioned in the section referring to the organizational and technical aspects, the regional offices of MOPC are occupied with emergency repairs, which use up a large portion of the financial resources available to them. According to an MOPC regional office, maintenance work on unpaved roads is carried out in addition to such emergency repairs, to the extent there is the budget available to cover the fuel costs of the earthmoving machinery. Thus, there is hardly any budget left for the maintenance and repair of the roads that were improved under this project, and no scheduled maintenance is possible. According to MOPC, a road maintenance program will be implemented under MOPC supervision in four departments of the country using an Inter-American Development Bank loan and also outsourcing of the road maintenance work to the private-sector is under consideration. The roads improved by this project will be partly covered by these programs.

(3) Supply of Drinking Water

The operation and maintenance costs of the drinking water supply system are covered by the fees that the Sanitation Committees collect from the users. The fees vary slightly from one community to another, but most are within the range of 10,000 - 15,000 guarani (ca.200 – 300 yen) per month per household.

2) Granting of capital investment funds to small-scale farms

As of June-end 2011, about 22% of the CAH sub-loans under the project were overdue and about 70% of them were non-performing loans with delays of over two years. To address this and other non-performing loan problems of CAH, JICA has dispatched a financial expert to help CAH improve its capacity to tackle the non-performing loan problems, and they provide assistance to solve these issues.

Table 8. Overdue problem of CAH sub-loans (As of June 30, 2011)

Delay period	Cases	Amounts overdue	
		(Unit: million guarani)	(Unit: million yen)*
Less than 3 months	159	3,416	69
3 – 6 months	148	266	5
Over 6 months – 1 year	651	926	19
Over 1 year – 2 years	1,797	3,789	76
Over 2 years	6,449	18,216	368
Total	9,204	26,613	537

Source: CAH

* Converted according to the exchange rate prevailing on June 30, 2011 (¥1 = Gs.49.52)

< Program of Assistance for Medium-Scale Farmers >

The ex-post evaluation for the Phase I of this project expressed a concern over the financial situation of BNF (before its restructuring). As was discussed in the section concerning "Organization," the Bank was reorganized in 2003 and efforts have been continuing to improve the financial soundness. As a result, the non-performing loan ratio in BNF's total credit improved considerably from approximately 60% prior to the restructuring to about 1.3% in 2012. BNF enjoys sound financial conditions as the indices in the table below show. According to BNF, there are no non-performing loans in the outstanding sub-loans.

Table 9. BNF financial indices (2009 - 2010)

Index	2009	2010
Liquidity ratio	108%	108%
Non-performing loan ratio	2.28%	2.09%
Profitability:		
Return on assets (ROA)	2.24%	2.25%
Return on equity (ROE)	27.56%	21.68
Net income (million guarani)	55,675	56,069
Net income (million yen)*	1,046	1,033

Source: BNF

* Annual average exchange rates: 2009 (¥1 = Gs.53.24), 2010 (¥1 = Gs.54.28)

3.5.4 Current Status of Operation and Maintenance

< Program of Assistance for Small-Scale Farmers >

1) Strengthening of production platform and improvement of small infrastructure

(1) Agricultural Extension (Sub-project of Model Farms)

As was reviewed in "3.2 Effectiveness," many farms in the model farm sub-project communities continue to practice the techniques introduced under the project. According to UGP, the model farms understand the effectiveness of the transferred farming techniques, and most farms continue to apply the soil tilling and green manure techniques, in particular. A survey of DEAg local agencies showed that an average of 14 farm households in the eleven project communities continued to practice the techniques. This is a very high percentage, given that an average of 15 farm households in each community participated in the project. Meanwhile, marginal farms find it difficult to finance the initial investment required for the introduced techniques (purchase of improved seeds, agricultural lime, chemical fertilizers, agricultural chemicals, etc.). In conjunction with the aforesaid problem of access to credit, this remains a challenge for the further extension of the techniques to nearby farms.

(2) Improvement of Rural Roads

The gravel pavement that was mainly specified for the road improvement under the project requires periodic maintenance work such as gravel refilling and post-rainy season damage repairs in order to keep the roads in good condition. However, such maintenance work has not been done to the fullest extent due to the human and budgetary resources problems of the MOPC regional offices. Our site visit revealed that some gravel-paved roads had ruts from heavy trucks. In rural areas large trucks carry firewood, which is the major source of fuel, and agricultural products. Roads where these trucks run even during periods of long rainfall get rutted. The beneficiary survey showed that, perhaps because the roads were relatively new, many respondents felt that the road conditions were good so far. Of the 25 households surveyed, 8 (32%) replied the road conditions were "Very good," 11 (44%) "Good," 5 (20%) "Bad" and 1 (4%) "Not applicable."

(3) Supply of Drinking Water

According to SENASA data, all the drinking water supply facilities are in operation and 18 of the 166 systems were experiencing insufficiency in the quantity of well water. Our site visit confirmed that all systems were operating free of trouble almost without exception (one intake water well suffered occasional turbidity). The beneficiary survey conducted in relation to the Sanitation Committee in four communities found that all agreed their drinking water supply systems were either "Very good" or "Good" (50% each).

2) Granting of capital investment funds to small-scale farms

While non-performing loans remain a problem as mentioned earlier, the revolving fund is utilized

actively. CAH is actively engaged in the utilization and management of the Second Loan by, for example, entering into a strategic alliance with a juice processing company and extending capital investment loans to fruit growing farmers.

Table 10. CAH revolving fund (As of June 30, 2011)

Item	Amount (Gs. millions)
ODA loan disbursement	234,635
Recovery of the principal of the First Loan	202,022
Recovery of the principal of the Second Loan	22,276
Total Revenue	**458,933**
Loans based on the First Loan	234,635
Loans based on the Second Loan	110,967
Repayment of the ODA loan principal	37,882
Total Expenditures	**383,484**
Balance	**75,449**

Source: CAH

CAH has cooperated with MAG again in Technical Assistance Project related to ODA loans and has developed eight financial products[10] directed towards marginal and small-scale farmers. CAH is also working to improve the access of marginal farmers to credit. It developed on its own a community based microfinance scheme called "*Banca Comunal*" (Community Bank) and conducted a trial in 2012. A *Banca Comunal* will lend an amount equivalent to some tens of thousands of yen per year to a farm and the loan is accompanied by technical assistance and education on the basics of borrowing and repaying.

<Program of Assistance for Medium-Scale Farmers>

The revolving fund has been managed successfully. In recent years, private-sector farm loans have become available at relatively low interest rates and this has slowed down the growth of the lending. Accordingly, BNF is considering lowering the lending rates. The fund has been made available in particular for the mechanization of sugar cane harvesting and other investments in agricultural equipment.

[10] (1) Family farms, (2) Marketing funds, (3) Fruit growing, (4) Cassava growing, (5) Initial investment fund for handcrafts, (6) Commercialization of agriculture, livestock farming and small-scale food processing, (7) Livestock farming, and (8) MAG-CAH joint evaluation program for family farm loans

Table 11. BNF revolving fund (As of June 30, 2011)

Item	Gs. Million
ODA loan disbursement	70,976
Recovery of the principal of the First Loan	68,622
Recovery of the principal of the Second Loan	4,148
Total Revenues	**143,746**
Loans based on the First Loan	70,976
Loans based on the Second Loan	7,743
Repayment of the ODA loan principal	38,103
Total Expenditures	**116,822**
Balance	**26,924**

Source: BNF

Some problems have been observed in terms of the sustainability of the model farm sub-project by MAG, road maintenance and repair by MOPC and non-performing loans at CAH. There are ongoing continued efforts by JICA on the issues involving MAG and CAH. However, unless proper maintenance is carried out on a periodic basis, the roads that have been improved by the project will deteriorate in quality and may become unusable. Therefore, the sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The objective of this project was to strengthen the overall competitiveness of one of the key economic sectors in Paraguay, the agriculture and livestock farming sector, by implementing various assistance programs to small- and medium-scale farms in line with the country's agricultural and livestock farming promotion policy, thereby contributing to sustained growth of the national economy and improving the standard of living of many small-scale farmers who belong to the low-income bracket. This project has been highly relevant with the country's development policy, development needs, as well as Japan's ODA policy. The project outputs that were originally contemplated were modified in the course of the implementation of the project since the project structure was found to be too complex to be realizable. In this report, the project effectiveness and impacts are evaluated after an analysis of the background and process of the modifications and on the basis of the finalized project outputs. In terms of effectiveness, certain positive outputs have been obtained in the sub-projects, agricultural extension and granting of capital investment funds. In addition, the infrastructure sub-projects that were enlarged in scale in accordance with the local needs have benefitted a wide array of beneficiaries in the project region. As for impacts, whilst the original project objective was the strengthening of the

agriculture and livestock farming sector, a greater project impact was obtained with respect to the standard of living of rural farming communities through the infrastructure sub-projects. With all these facts taken into consideration, the project effectiveness and impacts are considered to be fair. The project efficiency is adjudged fair since the project period significantly exceeded the plan even though the project cost was within the plan. The sustainability is considered to be fair because some problems are observed in the continuity of the model farms, the maintenance and repair of roads and the non-performing loans of small-scale farms. In light of the above, this project is evaluated to be partially satisfactory.

4.2 Recommendations

Recommendations as described below are submitted as a result of discussions with the concerned parties with respect to future efforts directed towards sustained development of the project effects.

4.2.1 Recommendations to the Executing Agencies

1. Institutional improvements for future assistance to marginal and small-scale farms

With a view to increasing the effects and sustainability of this project, a Technical Assistance project related to ODA loans called “Project for Improvement in Agricultural Extension and Microfinance System for Rural Development Based on Territorial Approach” is in progress with MAG and CAH as counterparts. The following points should be addressed for the future development of the Technical Assistance project:

- Statutory backing for the “territorial approach” and its positioning as MAG policy
- Further inter-ministerial and central-local governments cooperation for the promotion of the “territorial approach”
- Further collaboration between MAG and CAH to improve the access of marginal farmers to credit

2. Capacity development of DEAg extension officials

DEAg has hired new employees to enhance its extension personnel. However, many of them lack the necessary technical background and do not possess the required capacity to render technical assistance to the farmers. Human resources development programs are considered to be needed, including the planning of technical training programs and training by the counterpart extension officials to spread the technologies transferred by the project.

4.2.2 Recommendations to JICA

1. Cooperation for the improvement of access to credit for marginal farms

The community based microfinance scheme called *Banca Comunal* that CAH has developed independently and is conducting as a trial service is in line with one of the objectives pursued by the project, namely, improvement of access to credit availability for marginal farms. Positive

effects can be expected and this new scheme may be viewed as supplementary to the project. CAH has expressed an interest in receiving assistance regarding the aspects listed below. JICA's continued assistance would not only facilitate the *Banca Comunal* effort, but also reinforce the effectiveness of the project.

- Capacity development of CAH officials who will be managing the microfinance
- Organizational management of the borrower communities and improvement of their sustainability in terms of financing schemes and fund management
- Development of medium- to long-term financing for marginal farms after they "graduate" from the microfinance level

4.3 Lessons Learned

Lessons learned from the execution of the project are summarized as below as a result of discussions with the concerned parties.

1. Construction of an adequate project execution structure

The project was an integrated large-scale project designed to address a variety of problems in the agriculture and livestock farming sector. It was the first inter-ministerial project for the Paraguayan government. But the rather weak project execution structure at the early stage led to difficulties in the necessary coordination among the parties involved and forced the project to suffer delays and partial modifications of the project composition. It should be admitted that the partial modifications precluded realization of the "benefits to be achieved through the integrated nature of the project" which was the main focus of the project, to the extent as had been originally intended. It should be pointed out, however, that a Project Management Unit (UGP) was created and other improvements were made in conjunction with the extension of the project period and thereafter the project (as modified) was implemented generally as planned. One lesson learned from the foregoing is that it is very important to "construct from the very start a project execution structure adequate enough to pursue the project approach successfully."

2. Use of external resources with attention to autonomous development

In the execution of the model farm sub-project component, 30 external consultants were retained to make up for the deficiency in the human resources pool of DEAg agricultural extension service employees to render technical assistance to small-scale farms. This resulted in effective technical assistance during the project implementation phase, but with the project completion, the problem of the limited availability of highly-skilled officials reemerged, posing major concern over the continuity and sustainability of DEAg's technical assistance and follow-up monitoring. The lesson learned from this experience is that when external resources are to be used, a scheme should be devised to ensure that the project will eventually continue to develop and evolve in a self-reliant manner. By way of a specific example, inexperienced extension employees may be required to accompany retained external experts to the site to be trained on-the-job. Such a scheme would contribute to keeping the transferred

technology within the DEAg organization even after the project is over.

3. Verification and provision of technical assistance to the host country agency handling the two-step loan

As a prerequisite to the project launch, revision of the operation manuals of CAH was made with the recognition that it would be necessary for the efficient operation of fund management and lending in the two-step loan framework. But CAH simply lacked experience in handling such a huge amount of funds as the ODA loan. The agency was unfamiliar with the phenomena unique to agricultural loans, softened the loan terms and was not fully capable of credit management. For these reasons, the problem of non-performing loans emerged. Based on this experience, it was mentioned that, as prerequisites to the project implementation, CAH should have had a higher capacity for financial operations and the borrower farmers should have had basic knowledge of repayment plan preparation and bookkeeping. The lesson learned is that in the formation and designing of future projects, technical assistance such as that described above for two-step loan handling agencies should be considered.

4. Definition of loan schemes consonant with the project objectives

The loans to small-scale farms under this project were initially of rather tight conditions in light of the operational capacity of the CAH. As a result, many of the marginal farms envisaged in the model farm sub-project failed to qualify for a loan and the project could not reach out to the originally intended beneficiaries. More specifically, few marginal farms were able to meet the loan conditions of: a minimum annual income of ten million guarani (ca. 200,000 yen), clear evidence of land ownership, and a clean record of loan performance. Most of the CAH loan users were thus relatively well-to-do farms and large-scale farms. The fact that the small-scale farm loans under this project failed to reach out to the originally intended beneficiaries suggests that the lending conditions should have been soft enough for marginal farmers to satisfy them. The lesson learned is that, while attention must be paid to good credit management to prevent the occurrence of non-performing loans, necessary technical assistance should be rendered in light of the front-line realities, and the lending conditions should be adjusted to such adequate levels so as to help achieve the project objectives.

[End of text]

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
(1) Project Outputs	<Small-scale farm assistance project> 1) Production platform strengthening and small-scale infrastructure improvement (1)Agricultural extension ・Model farms: 750 households (2) Farmers organization assistance ・New farmers organizations: 90 (3) Road improvement ・Farm road improvement: total 400 kilometers (4) Drinking water supply system improvement ・Irrigation and drinking water supply: 140 locations 2) Granting of capital investment funds to small-scale farms ・Total credit line: 3,468 million yen 3) Granting of capital investment funds to farmers organizations ・Total credit line: 998 million yen	<Small-scale farm assistance project > 1) Production platform strengthening and small-scale infrastructure improvement (1) Agricultural extension ・Model farms: 166 households (2) Farmers organization assistance ・Dropped from the project (3) Road improvement ・Farm roads and rural roads improved: total 407 kilometers (4) Drinking water supply system improvement ・Drinking water supply: 166 locations 2) Granting of capital investment funds to small-scale farms ・Total amount loaned: 4,686 million yen 3) Granting of capital investment funds to farmers organizations ・Dropped from the project
	<Medium-scale farm assistance project > ・Total credit line: 8,193 million yen	<Medium-scale farm assistance project > ・Total amount loaned: 1,925 million yen
(2) Project period	February 5, 1999 – February 5, 2005 (72 months)	February 5, 1999 – February 5, 2010 (132 months)
(3) Project cost Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	 236 million yen 16,244 million yen (292,940 million guarani) 16,480million yen 15,525 million yen 1 guarani＝0.055 yen (As of January 1997)	 1,940 million yen 14,213 million yen (682,732 million guarani) 16,153 million yen 13,670 million yen* 1 guarani＝0.02 yen (Arithmetic average of the lending period, February 1999 to February 2010) *Unused amount of the loaned amount: 154 million yen

Brazil

Ex-Post Evaluation of Japanese ODA Loan

Parana State Environmental Improvement Project

External Evaluator: Choshin Haneji, Japan Development Service Co., Ltd.

0. Summary

This project was implemented with the objectives of improving the living environment for citizens and water quality in rivers and coastal areas through the construction of water supply system and sewage treatment system facilities in Curitiba Metropolitan Area and the coastal area of Parana State, which was suffering from chronic water outages due to low water supply capacity and less developed sewerage. The project was sufficiently consistent with the development policies and development needs of the Federal Government of Brazil and Parana State Government, which regarded public water supply and sewage system construction as priority issues, as well as Japan's ODA policy, therefore its relevance is high. Throughout the implementation of the project, water shortage problems in the target area were greatly improved. Particularly in the coastal area, coverage increase of sewage treatment resulted in a great improvement in the quality of river water flowing to the coast, thereby enabling bathing to be permitted at more bathing beaches. Thus, its effectiveness is also high. The project cost was mostly as planned. However, the project period greatly exceeded the plan due to delays in the land expropriation procedure for dam construction and the securing of environmental permits for water and sewage treatment facilities. Therefore efficiency of the project is fair. Since there are no problems concerning operation maintenance in terms of setup, technology and finances, sustainability of the project effects is high. In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description

Project Location

Miringuava Water Treatment Plant

1.1 Background

Parana State (Estado do Paraná) in southeast Brazil had a public water supply coverage rate of 92% and a sewerage coverage rate of 25% in 1997. Both these values were below the national averages for Brazil (96% and 34%), and there was an urgent need to improve the situation because it was causing deterioration of the living environment and natural environment.

The public water supply in Curitiba Metropolitan Area (Região Metropolitana de Curitiba) displayed a supply and demand disparity of 25% during the summer season from December to February and 10% during the winter season from June to August, causing restrictions to be imposed on the water supply. Water supply for 24-hours a day was only possible on 9% of the overall water supply system in Curitiba Metropolitan Area. As for the sewage treatment system, the coverage rate was only 25%, and discharges of untreated sewage were causing extreme water pollution in rivers.

Furthermore, because the population in the coastal area of Parana (Litoral do Paraná) increased by approximately fivefold during the summer tourism season, water shortages became even more critical. Similarly, sewage treatment capacity was insufficient due to the deterioration of existing sewage treatment facilities.

1.2 Project Outline

The project aimed to improve the living environment for citizens, preserve water quality, prevent water pollution in rivers and coastal areas, and thereby contribute to environmental improvement through the construction of water supply system and sewage treatment system facilities in Curitiba Metropolitan Area and the coastal area of Parana State.[1]

The project targeted 6 municipalities in Curitiba Metropolitan Area and 5 coastal municipalities for construction of water supply system, and 12 municipalities in Curitiba Metropolitan Area and 5 coastal municipalities for construction of the sewage treatment system. Table 1 shows the target works in each target area, and Figure 1 indicates the locations of the main project facilities.

[1] At the time of appraisal, a component entailing collection and treatment of prohibited agricultural chemicals and used chemical containers was included, however, resolution of this problem by the Brazilian side was subsequently confirmed in 2001. In 2004, the project underwent review and this component was removed from the contents.

Table 1　Project Target Areas

Area	Curitiba Metropolitan Area	Coastal Area
Water supply system construction	- Curitiba Municipality (9 districts) - Colombo Municipality - Campina Grande do Sul Municipality - Quatro Barras Municipality - Pinhais Municipality - Piraquara Municipality	- Guaraqueçaba Municipality - Morretes Municipality - Pontal do Paraná Municipality - Matinhos Municipality - Guaratuba Municipality
Sewage treatment system construction	- Curitiba Municipality (72 districts, industrial district) - Colombo Municipality - Campina Grande do Sul Municipality - Quatro Barras Municipality - Pinhais Municipality - Piraquara Municipality - São José dos Pinhais Municipality - Fazenda Rio Grande Municipality - Araucária Municipality - Campo Largo Municipality - Campo Magro Municipality - Almirante Tamandaré Municipality	- Guaraqueçaba Municipality - Morretes Municipality - Pontal do Paraná Municipality - Matinhos Municipality - Guaratuba Municipality

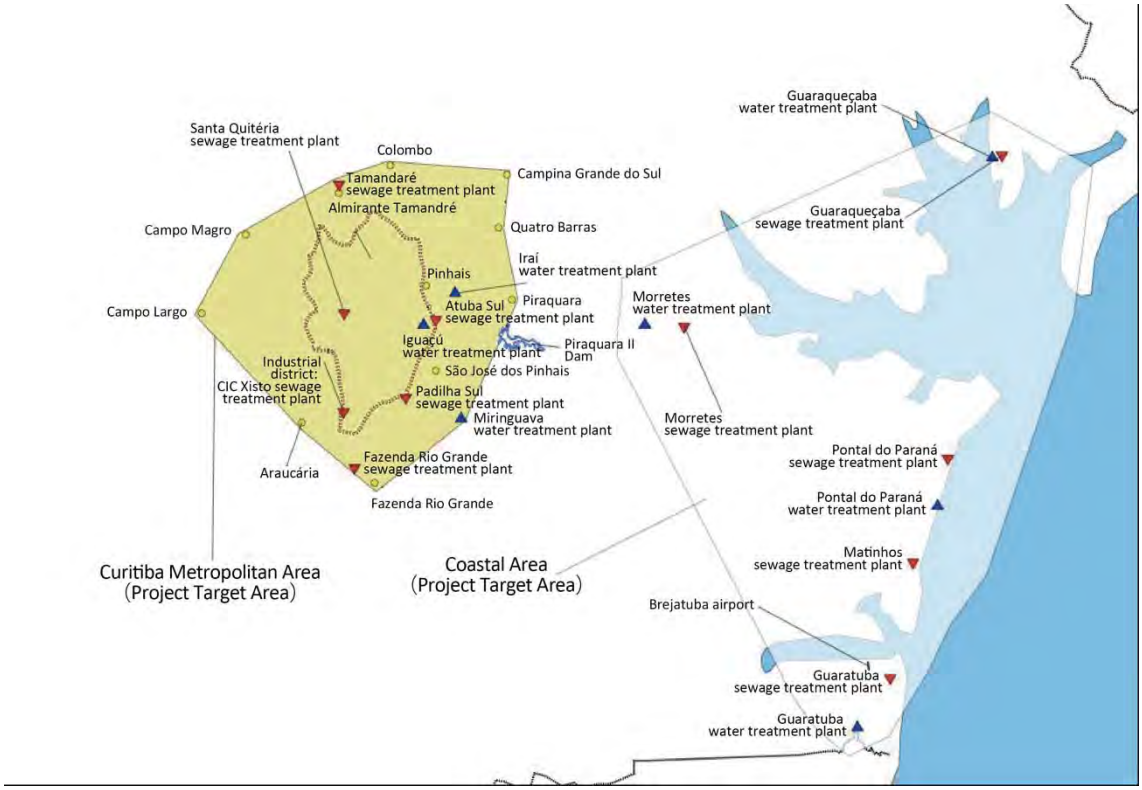

Figure 1　Map of the Water Supply and Sewage Treatment Systems Construction Target Areas and Facilities

Loan Approved Amount/ Disbursed Amount	23,686 million yen / 23,686 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	August, 1996 / January, 1998
Terms and Conditions	Interest Rate: 4% Repayment Period: 25 years (Grace Period: 7 years) Conditions for Procurement: General Untied
Borrower / Executing Agency	Parana State, Federative Republic of Brazil/ The Paraná State Sanitation Company (SANEPAR)
Final Disbursement Date	May, 2099
Main Contractor (Over 1 billion yen)	① Constructora Itau (Brazil) ② Queiroz Galvao (Brazil) - Pasarelli (Brazil) (JV) ③ OTV (Brazil)- Itajui (Brazil) (JV) ④ CEBSE (Brazil)- LFM (Brazil) (JV) ⑤ GEL (Brazil)- ACMA (Brazil)- COMIM） (Brazil) (JV) ⑥ GEL (Brazil)- ACMA (Brazil)- NWM (Brazil) (JV) ⑦ LFM (Brazil)- DM (Brazil)- SEF (Brazil) (JV) ⑧ SAENGE (Brazil)- CTL (Brazil) (JV) ⑨ J. Malucelli (Brazil)- Fuad Rassi (Brazil) (JV) ⑩ Itajui Engenharia de Obra (Brazil) ⑪ DM Consultora de Obras (Brazil) ⑫ GEL (Brazil)- ACMA (Brazil)- Formato (Brazil) (JV) ⑬ PAVIBRAS Pavimentacao e Obras (Brazil)
Main Consultant (Over 100 million yen)	① Engevix Engenharia (Brazil)- Chuo Kaihatsu Corporation (Japan)- Environmental Technology Consultant (Japan)- Black & Veach International (US) Estudos Tecnicos e Projetos (Brazil)- Esteio Engenharia e Aerolevantamentos (Brazil)- RDR Consultores Associados (Brazil) (JV) ② Multiservice Engenharia (Brazil)- Concremat Engenharia e Tecnologia (Brazil)- Yachiyo Engineering (Japan)- Ecosol Projetos de Engenharia, Saneamento e Meio Ambiente (Brazil) (JV)
Feasibility Studies, etc.	None
Related projects (if any)	None

2. Outline of the Evaluation Study

2.1 External Evaluator

Choshin Haneji(Japan Development Service Co., Ltd.)

2.2 Duration of Evaluation Study

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

Duration of the Field Study: March 25, 2012 – April 15, 2012, July 22, 2012 – July 27, 2012

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

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance with the Development Plan of Brazil

Construction of water supply and sewage treatment systems in Parana State is referred in the multiple-year plan (Plano Plurianual) pledged by the Federative Government of Brazil. At the time of appraisal, the plan for 1996-1999 aimed to modernize and expand the coverage rate of the water supply and sewage treatment systems, whereas the plan for 2012-2015 at the time of the ex-post evaluation aims to enhance water supply and sewage treatment system development from the viewpoints of improving the health of citizens and addressing environmental pollution. Moreover, as is referred in the state's multiple-year plan (2012-2015), the Environment and Water Resources Agency (SEMA) is advancing diffusion at the level of tributary river basin units based on the river basin-unit management method introduced under the Parana State water resources policy (promulgated in 1999), which continues to regard the water supply and sewage treatment system construction utility as an important issue.

3.1.2 Relevance with the Development Needs of Brazil

In Parana State and the project target areas, at the time of the appraisal, water shortages and water pollution in rivers and coastal areas were at critical levels. At the time of the ex-post evaluation, progress is being made in the construction of water supply and sewage treatment systems. However, concerning construction of water supply system, although the water outages that were occurring at the time of appraisal have been resolved, because the annual rate of population increase in the target areas ranges between 1.0-20.3% as opposed to the original forecast of 1.55%, it is forecasted that disparity between demand and supply will arise in the areas where population growth is most extreme. Similarly, concerning sewage treatment systems, compared to the target for Curitiba Metropolitan Area of 60% (2010), the mean coverage rate in 2011 was 81.5%, and the rate in individual districts varied between

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

[3] ③: High, ②: Fair, ①: Low

18.8% and 100%. In coastal areas also, the project resulted in a higher coverage rate of sewage treatment systems (no target value was set), however, depending on the city concerned, the rate fluctuates from 26.4% to 100%. Therefore, sewage system construction remains an important issue in the areas that continue to have a low rate of coverage.

3.1.3 Relevance with Japan's ODA Policy

The project has the objective to provide safe water supply and to reduce impacts on river water quality through conduction of sewage treatment; it responds to the need for development of water supply and sewage treatment systems in line with economic and social development; and it contributes to the balancing development with the environment. Also, according to the overseas economic cooperation work implementation policy for Brazil (1999) at the time of appraisal of the project contents and plan (2001 and 2004) mentioned above (see footnote 1), it was necessary to balance development with environment in terms of realizing a sustainable economy and society; therefore, support for sustainable development is highly relevant to Japan's ODA policy.

From 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[4] (Rating: ③)

3.2.1 Quantitative Effects (Results from Operation and Effect Indicators)

3.2.1.1 Water Supply System

(1) Population served[5]

The number of beneficiaries who have received water supply services due to the project is approximately 1.12 million (2011), representing an increase of approximately 380,000 (51.3%) over the number at the time of the appraisal (1998)[6].

(2) Amount of Water Supply

The overall amount of water supply increased by more than 30% (compared to the amount at the time of appraisal). Meanwhile, water supply per capita over the same period increased by 4.2-44.3% in the 5 target municipalities of Curitiba Metropolitan Area other than Curitiba Municipality, however, the water supply coverage rate in the 9 districts of Curitiba Municipality and the coastal area, where the rate was almost 100% at the time of appraisal

[4] Sub-rating for effectiveness is to be put with consideration of impact.
[5] Comparison of actual values (because no target value for population served was set)
[6] Population in the target area increased from 745,000 to 1,120,000 over the same period. The public water supply coverage rate reached 100% as indicated in Table 2.

fell slightly due to population increase (up by 73.4% compared to the time of appraisal) (-3.3%).

(3) Improvement in the water supply coverage rate

The target facilities of the project were successively completed between 2003 and 2008, and the water supply coverage rate[7] in each area has attained 100% in line with the completion of works. The following table shows this progress.

In the target 9 districts of Curitiba Municipality, Piraquara Municipality and Colombo Municipality, the rotating water outages that were in force at the time of appraisal have been abolished and major improvement is recognized; however, in other areas, minor water outages are sometimes enforced during the dry season (January to March). However, whereas it previously took a few days for water supply services to be resumed after water outages, this has been reduced to less than 4 hours in the project target areas. Meanwhile, in Colombo Municipality and Campina Grande do Sul Municipality in Curitiba Metropolitan Area and the 5 target cities in the coastal area, there are currently no water outages at all.

Also, according to the beneficiaries survey, 68.3% of respondents indicated that water supply services had improved as a result of the project (65% in Curitiba Metropolitan Area and 80% in the coastal area)[8]. Meanwhile, 51.2% responded that water shortages had been resolved, and 7.3% indicated that there were no water outages at all.

Table 2 Movements in the Water Supply Coverage Rate

Area	1998 (actual value at time of appraisal)	2005 (Actual value)	2010 (Target)	2011 (Actual value)
Curitiba Municipality (9 districts)	99.60%	99.98%	98%	100.00%
Piraquara Municipality	98.04%	98.04%		100.00%
Pinhais Municipality	98.28%	99.99%		100.00%
Colombo Municipality	97.29%	97.29%		100.00%
Campina Grande do Sul Municipality	90.01%	94.57%		100.00%
Quatro Barras Municipality	91.25%	92.62%		100.00%
Coastal area: Guaraqueçaba Municipality	95.01%	100.00%		100.00%
Coastal area: Morretes Municipality	94.37%	100.00%		100.00%
Coastal area: Pontal do Paraná Municipality	98.66%	100.00%		100.00%
Coastal area: Matinhos Municipality	96.57%	100.00%		100.00%
Coastal area: Guaratuba Municipality	100.00%	100.00%		100.00%

Source: SANEPAR

[7] Coverage rate here targets the houses and industrial and commercial facilities registered in land registers held by each municipality. Therefore, houses located in riverbank areas and illegal squatter districts (favela) are not included.

[8] 10.8% of respondents indicated “no change.”

(4) Rate of Facility Utilization (water treatment plants)

In line with fluctuations in demand for water supply, there are also differences in the utilization rates of water treatment facilities. In the coastal municipalities of Morretes and Guaraqueçaba, since demand is increasing in line with annual population growth rates of 7.8% and 4.7% respectively, the rate of facility utilization is high and it is necessary to expand the systems. Meanwhile, the mean rate of facility utilization of the water treatment facilities in Miringuava, Guaratuba and Pontal do Paraná is much lower than the treatment capacity. This is because, there is insufficient flow at the water intake point in the case of Miringuava treatment plant; however, the utilization rate is expected to improve as a result of construction of Miringuava Dam that is planned by SANEPAR. Moreover, since the design values for Guaratuba treatment plant and Pontal do Parana treatment plant are set corresponding to the greatly increased demand during the summer season, the utilization rate for the entire year is less than 50%. The following table shows the rate of facility utilization (see Figure 1 for the locations of facilities).

Table 3 Utilization of Water Treatment Facilities

Water supply system facilities	Treatment capacity (L/s)		Mean treatment level (2011)		Maximum treatment level (2011)	
	Design	Actual	L/s	Utilization rate	L/s	Utilization rate
Iraí water treatment plant	4,200	3,200	2,381	74.4%	2,900	90.6%
Iguaçú water treatment plant	3,500	3,500	2,768	79.1%	3,500	100.0%
Miringuava water treatment plant	0	1,000	750	37.5%	1,200	60.0%
Guaraqueçaba water treatment plant	10	10	9	90.0%	10	100.0%
Morretes water treatment plant	35	35	35	100.0%	37	105.7%
Pontal do Paraná water treatment plant	800	800	396	49.5%	655	81.9%
Guaratuba water treatment plant	260	260	112	43.1%	216	83.1%

Source: SANEPAR

3.2.1.2 Sewage Treatment System

(1) Population Served[9]

The number of beneficiaries who have received sewage treatment services due to the project is approximately 1.40 million (2011), representing an increase of approximately 733,000 (110%) over the number at the time of the appraisal (1998)[10].

[9] Comparison of actual values (because no target values were set for the sanitary sewage treatment population).

[10] Population in the target area increased from 1.32 million to 1.83 million (38.9%) over the same period. The sewage treatment system coverage rate reached 76.6% as indicated in Table 4.

(2) Improvement in the sewage treatment system coverage rate

The target areas of sewage treatment system construction in Curitiba Metropolitan Area were 72 districts of Curitiba Municipality, 1 industrial district and 11 municipalities. The sewerage coverage rate fluctuates greatly between 18.8% and 100%; however, the simple mean rate has increased to 81.5%. Out of the 72 target districts in Curitiba Municipality, 57 districts have a diffusion rate of 80% or higher. Meanwhile, the coverage rate is lowest in Almirante Tamandaré Municipality (18.8%), Campo Magro Municipality (22.5%) and Araucária Municipality (37.2%), which are located in the sparsely populated western part of Curitiba Metropolitan Area; moreover, Campo Magro and Araucária are situated relatively far away from sewage treatment facilities. In the coastal area also, the sewerage coverage rate increased to between 51.1~100% in all districts except for Pontal do Paraná Municipality. In Pontal do Paraná Municipality, the sewerage coverage rate has remained low (26.4%) due to rapid population growth even in coastal parts (population increased by 607% compared to the time of appraisal). The following table shows planned and actual values.

Table 4 Movements in Sewage Treatment Coverage Rate

Area	1998 (actual value at time of appraisal)	2010 (Target)	2011 (Actual value)
Curitiba Metropolitan Area (minimum level district)	0.0%	60%	18.8%
Curitiba Metropolitan Area (mean value)	52.1%		81.5%
Curitiba Metropolitan Area (maximum level district)	100.0%		100.0%
Coastal area: Matinhos Municipality	33.8%	Not set	51.1%
Coastal area: Guaraqueçaba Municipality	0.0%		100.0%
Coastal area: Guaratuba Municipality	31.9%		56.4%
Coastal area: Morretes Municipality	15.0%		53.0%
Coastal area: Pontal do Paraná Municipality	0.0%		26.4%
Coastal area (entire target area)	25.0%		46.4%
Target area of project	50.4%		76.6%

Source: SANEPAR

(3) Rate of Facility Utilization: sewage treatment plants

Most sewage treatment facilities show seasonal fluctuations in utilization rates but they have spare capacity over the entire year. However, in the coastal municipality of Morretes, since the annual mean utilization rate is 93.3% and the peak treatment flow exceeds the specified treatment capacity, there is a need to expand the facilities. The low utilization rate of Fazenda Rio Grande treatment plant is due to the fact that the sewage treatment system coverage rate in that area is only 40.4%, although SANEPAR is advancing the expansion plan. As for the treatment plants in Pontal do Paraná, Matinhos and Guaratuba, as with the

water treatment facilities, since the design utilization rate has been set corresponding to the higher demand during the summer tourist season, the year-round utilization rate is less than 50%. The sewage treatment system coverage rate in Pontal do Paraná is only 26.4% because population increased by 607% between the time of appraisal and time of the ex-post evaluation, however, if the sewerage expansion plans currently being advanced by SANEPAR are realized, the utilization rate of treatment plants will increase. The following table shows the rates of facility utilization (see Figure 1 for the locations of facilities).

Table 5 Utilization of Sewage Treatment System Facilities

Sewerage facilities	Treatment capacity (L/s)		Mean treatment level (2011)		Maximum treatment level (2011)	
	Design	Actual	L/s	Utilization rate	L/s	Utilization rate
Industrial district: CIC Xisto treatment plant	600	600	382	63.7%	448	74.7%
Padilha Sul treatment plant	440	440	289	65.7%	376	85.5%
Tamandaré treatment plant	70	70	42	60.0%	49	70.0%
Fazenda Rio Grande treatment plant	260	260	78	30.0%	142	54.6%
Atuba Sul treatment plant	1,450	1,450	981	67.7%	1,143	78.8%
Santa Quitéria treatment plant	600	600	403	67.2%	465	77.5%
Guaraqueçaba Municipality treatment plant	12	12	7	58.3%	12	100.0%
Morretes Municipality treatment plant	30	30	28	93.3%	31	103.3%
Pontal do Paraná Municipality treatment plant	140	140	20	14.3%	75	53.6%
Matinhos Municipality treatment plant	210	210	98	46.7%	168	80.0%
Guaratuba Municipality treatment plant	210	210	102	48.6%	181	86.2%

Source: SANEPAR

3.2.2 Qualitative Effects

(1) Water quality in water supply system

The following table shows data from monitoring of the quality of water supplied from water treatment facilities in Curitiba Metropolitan Area. This shows that the water satisfies all potable water quality standards, and the situation is the same in water treatment facilities in the coastal area. Since these standards are at the same level as or stricter than the permissible values prescribed in guidelines by the World Health Organization (WHO), it can be said that safety water is being supplied. In the beneficiaries survey that was implemented for the relation to the evaluation of project effectiveness, 120 people were targeted and a door-to-door questionnaire survey was conducted of households randomly selected in proportion to the population in each target area (implementation period: March 26-April 13, 2012). Out of the respondents, 20.7% indicated that water quality had improved.

Table 6 Results of Monitoring Quality of Treated Water (2011)

Item (unit)	Potable water quality standard	WHO guideline	Iraí plant		Iguaçú plant	
			Feb.	Sept.	Feb.	Sept.
Color (TCU)	<15	<15	2.5	2.5	5	2.5
Cyanide (mg/L)	<0.07	<0.17	<0.002	0.005	<0.002	<0.002
Fluorine (mg/L)	[0.6 , 1.1]	<1.5	0.7	0.7	0.8	0.7
Nitrate nitrogen (mg/L)	< 0	<50	0.25	1.11	0.21	0.31
Turbidity (NTU)	<1	<1	0.27	0.37	0.36	0.33
Surfactant agent (mg/L)	<0.5	No value	<0.025	<0.025	<0.025	0.05
Hydrochloric acid (mg/L)	<250	<250	10.8	17.5	4.4	4.8
Hardness-$CaCO_3$ (mg/L)	<500	<500	22.7	34.9	24.6	28.8
Hydrogen-ion exponent (pH)	No specification	[6.5, 8.5]	6.7	6.5	6.5	6.2
Suspended solids (mg/L)	<1,000	<1,000	90	106	38	72
Sulfate (mg/L)	<400	<1,000	<10.0	<10.0	<10.0	18.5
Nitrogen nitrite (mg/L)	<1	<3	<0.005	<0.005	<0.005	<0.005
Total suspended solids (mg/L)	No specification	No guideline	90	108	41	72
Ammonia (mg/L)	<1.5	<1.5	0.15	<0.05	0.24	<0.05
Hydrogen sulfide (mg/L)	<0.05	<0.1	<0.005	0.031	<0.005	0.015

Source: SANEPAR

(2) Sewage effluent quality

Concerning sewage, effluent from all sewage treatment facilities satisfies standards as indicated below. According to SANEPAR, it sets stricter values than those set by the federal government with respect to biological oxygen demand (BOD), and it also measures the chemical oxygen demand (COD) level, which isn't even included in federal government standards. Effluent standards at sewage treatment facilities in Brazil prescribe standard values for pH, water temperature and BOD level and the number of control items is smaller than compared to Japan; however, concerning the most important BOD level, the permissible value of less than 120 mg/L is more stringent than the level of 160 mg/L (daily mean 120 mg/L) in Japan. Meanwhile, in Brazil, no standard is prescribed concerning COD, although SANEPAR prescribes an internal level of 120 mg/L, which again is harsher than the corresponding standard of 160 mg/L (daily mean 120 mg/L) in Japan.

Table 7 Situation regarding Compliance to Effluent Standards (2011)

Sewage treatment facilities	BOD (mg/L)	COD (mg/L)
Effluent standard (Federal Environment Council Order 430 Article 21)	120.0	No specification
Industrial district: CIC Xisto treatment plant	60.0 or less	120.0 or less
Padilha Sul treatment plant	60.0 or less	120.0 or less
Tamandaré treatment plant	60.0 or less	120.0 or less
Fazenda Rio Grande treatment plant	60.0 or less	120.0 or less
Atuba Sul treatment plant	60.0 or less	120.0 or less
Santa Quitéria treatment plant	60.0 or less	120.0 or less
Guaraqueçaba Municipality treatment plant	17.9	39.4
Morretes Municipality treatment plant	22.7	36.2
Pontal do Paraná Municipality treatment plant	24.2	36.4
Matinhos Municipality treatment plant	22.2	41.3
Guaratuba Municipality treatment plant	24.3	40.2

Source: SANEPAR

3.3 Impact

3.3.1 Intended Impacts

3.3.1.1 Improvement of the Living Environment and Sanitary Environment

Concerning the effect of the water supply component of the project, most of the residents targeted in the beneficiaries survey indicated that water supply services had improved, specifically citing increased amount of water supply, better water quality, resolution of water outages, improvement of water pressure and so forth. In particular, many people (62.5%) responded that the effort exerted in procuring water had been resolved. Moreover, the majority (59.2%) of respondents indicated that outbreaks of waterborne infections had decreased.

3.3.1.2 Improvement of Water Quality in Effluent-receiving Rivers and Coastal Areas

In Curitiba Metropolitan Area, judging from conditions at the time of the appraisal, river water quality is generally deteriorated. Looking at the results of the beneficiaries survey, 60% of respondents indicated that water quality had improved in coastal areas, however, this figure was only 25% in Curitiba Metropolitan Area. However, as reported by Parana State Environment Agency (IAP), since pollution of rivers is also caused by leachate from solid wastes, industrial wastewater discharged by illegal operators and other factors, it is difficult to clarify the relationship between coverage rate of the sewage system and river quality.

Meanwhile, in coastal areas, since water quality in rivers flowing down to the coast has improved greatly as a result of the coverage of sewage treatment, seaside bathing has become possible, more and more bathing resorts have opened, and resort development is advancing in the 5 targeted coastal municipalities (according to IAP information and hearings with coastal municipalities).

3.3.2 Other Impacts

3.3.2.1 Impacts on the natural environment

Due to the construction of Piraquara II Dam 5.64 square kilometers of land were submerged, however, the location with the least impact was selected based on environmental impact assessment. Moreover, in consideration of the landscape and the preservation of ecosystems, afforestation activities using local species are being conducted. Moreover, as was mentioned above, since there are other pollution sources apart from sewage, even though recovery of river water quality cannot be recognized, the contamination of water has been mitigated as a result of the treatment of sewage. Therefore, no extreme negative impacts due to implementation of the project can be confirmed.

3.3.2.2 Land acquisition and resettlement

Regardless of expropriation of 5.64 square kilometers of land, resettlement of residents does not occur with the construction of Piraquara II Dam. Compensation was paid to landowners based on the expropriation regulations. Moreover, inherent with the construction of Piraquara II Dam, public hearings concerning the project contents and construction of tourism facilities and so on as social support for communities were conducted, for the residents of Piraquara, under supervision by the IAP. The public facilities that were relocated because of dam construction comprised power distribution lines, telephone and communications lines and access roads.

Summing up, since implementation of the project led to improvement of water supply and sewerage services in the target areas and improvement of the living environment for residents through enhancing water quality in the coastal area and so on, the planned effects were generally realized and the project has largely achieved its objectives, therefore its effectiveness is high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

The following sections indicate the planned and actual outputs under each of the project components.

3.4.1.1 Curitiba Metropolitan Area Water Supply System

The following table indicates the planned and actual contents of water supply system in Curitiba Metropolitan Area. In Curitiba Metropolitan Area, the demand for water is covered by Iraí treatment plant (treatment capacity: 3,200 L/s) in the northeast, Iguaçú treatment plant (treatment capacity: 3,500 L/s) in the center, and Miringuava treatment plant (treatment capacity: 1,000 L/s) in the southeast of the area. In terms of water main facilities, larger-diameter mains and more distribution pumps than planned have been installed. These facilities were installed in response to the higher demand in industrial areas that was gauged following the project plan.

Table 8　Curitiba Metropolitan Area Water Supply System

Item	Plan	Actual
Reservoir facilities	・ Piraquara II Dam	As planned
Intake facilities	・ Intake channel: Iraí River-intake, length 256 m, width 17-37 m ・ Intake gate ・ Raw water pump: 170 CV x 5 units	・ Intake channel: Iraí River-intake, length 256 m, width 17-37 m ・ Intake gate ・ Raw water pump: 172 CV x 5 units
Conveyance facilities	Headrace: Intake-Iraí River- treatment plant	As planned
Water treatment facilities	・ Iraí treatment plant: treatment capacity 3.2 m^3/s ・ Miringuava treatment plant: treatment capacity 1.0 m^3/s ・ Iguaçú treatment plant expansion ・ Iraí treated water reservoir: 8,000 + 12,000 m^3 ・ Miringuava treated water reservoir: 10,000 m^3	As planned
Aqueduct facilities	・ Water mains: ϕ 150-1,100 mm, length 115.48 km ・ Treated water pumps: 29	・ Water mains: ϕ 400-1,200 mm, length: 127.65 km ・ Treated water pumps: 39
Distribution facilities	・ Distribution pipes: length 310.38 km ・ Distribution reservoirs: 24 reservoirs, 1 tank, total capacity 190,000 m^3	・ Distribution pipes: length 358.42 km ・ Distribution reservoirs: 24 reservoirs, 1 tank, total capacity 191,500 m^3

Source: SANEPAR

3.4.1.2　Coastal Area Water Supply System

The following table indicates the planned and actual contents of water supply system in the coastal area. In the coastal area, the demand for water is covered by the water treatment facilities that were constructed in the 5 target municipalities in the project. The supply capacity is as planned at the time of appraisal, however, the number of reservoir facilities and total length of pipes are slightly less than planned because the water distribution and aqueduct system was revised to a more efficient model.

Table 9　Water Supply System in Coastal Areas

Item	Planned	Actual
Water treatment facilities	・ Intake facilities: 4 locations ・ Treatment plants: 4 locations	As planned
Reservoir facilities	・ Treated water reservoirs/distribution reservoirs, etc.: 12 locations, capacity 16,150 m^3	・ Treated water reservoirs/distribution reservoirs, etc.: 10 locations, capacity 15,350 m^3
Pumping stations	・ For intake and distribution: 20 locations	・ For intake and distribution: 22 locations
Aqueduct and distribution facilities	・ Aqueduct/water mains: 46,600 m ・ Distribution pipes: 93,031 m	・ Aqueduct/water mains: 41,830 m ・ Distribution pipes: 81,328 m

Source: SANEPAR

3.4.1.3 Curitiba Metropolitan Area Sewage Treatment System

As is indicated in the table below, the sewage treatment system has been developed almost exactly as planned. In Curitiba Metropolitan Area, sewage treatment facilities were constructed at 6 locations, namely the industrial district: CIC Xisto treatment plant (treatment capacity: 600 L/s), Padilha Sul treatment plant (treatment capacity: 440 L/s), Tamandaré treatment plant (treatment capacity: 70 L/s), Fazenda Rio Grande treatment plant (treatment capacity: 260 L/s), Santa Quitéria treatment plant (treatment capacity: 600 L/s), and Atuba Sul treatment plant (treatment capacity: 1,450 L/s).

Table 10 Sewage Treatment System in Curitiba Metropolitan Area

Item	Planned	Actual
Collecting systems	Length 1,840,344 m	Length 1,776,050 m
Service connections	100,799 locations	100,658 locations
Trunk collectors/ interceptors	・ ϕ 150 mm- ϕ 800 mm ・ Length 176,185 m	・ ϕ 150 mm-ϕ 800 mm ・ Length 175,393
Forced mains	・ ϕ 50 mm- ϕ 400 mm ・ Length 41,797 m	・ ϕ 50 mm- ϕ 400 mm ・ Length 41,691 m
Pump stations	New: 23 locations	As planned
Sewage treatment plants	・ New: 4 locations (treatment capacity: 1,275 L/s) ・ Expanded: 2 locations (treatment capacity: 2,050 L/s)	・ New: 4 locations (treatment capacity: 1,370 L/s) ・ Expanded: 2 locations (treatment capacity: 2,050 L/s)

Source: SANEPAR

3.4.1.4 Coastal Area Sewage Treatment System

In the coastal area also, sewage treatment facilities were constructed as planned in each of the 5 targeted municipalities (see Figure 1 for locations). The following table shows the planned and actual contents of the sewage treatment system development for this area. The number of facilities turned out to be greater than planned due to the construction of Brejatuba Airport in Guaratuba Municipality and revision of land use plans in Pontal do Paraná Municipality.

Table 11 Sewage Treatment System in the Coastal Area

Item	Planned	Actual
Sewage treatment plants	・ New: 5 locations (treatment capacity: 600 L/s)	・ New: 5 locations (treatment capacity: 602L/s)
Pump stations	・ 26 locations	・ 29 locations
Trunk collectors/ interceptors	・ Length 18,412 m	・ Length 20,956 m
Forced mains	・ 34,830 m	・ 38,455 m
Collecting systems	・ New 211,574 m	・ New 256,030 m
Service connections	・ 8,025 locations	・ 12,458 locations

Source: SANEPAR

3.4.2 Project Inputs

3.4.2.1 Project Cost

The project cost was 99.88% of the planned amount, so it was implemented mostly as planned. The following table shows the planned and actual costs of the project.

Table 12 Project Cost

Item	Planned (million yen)	Actual (million yen)	Difference (million yen)	Change ratio
Civil works costs	44,708	44,641	-67	-0.15%
Curitiba Metropolitan Area water supply system	17,922	17,855	-67	-0.37%
Curitiba Metropolitan Area sewage treatment system	18,696	18,696	0	0%
Coastal area water supply system	2,629	2,629	0	0%
Coastal area sewage treatment system	5,461	5,461	0	0%
Consulting services	6,827	6,827	0	0%
Project management	4,261	4,261	0	0%
Supervision of construction	2,559	2,559	0	0%
Service charge	7	7	0	0%
Contingencies	17	17	0	0%
Management cost, land expropriation cost, tax	3,877	3,877	0	0%
Total	55,429	55,362	-6.7	-0.12%

Source: SANEPAR

3.4.2.2 Project Period

Since a long period of time was required to acquire the necessary environmental permits for construction of the water supply and sewage treatment systems and to procure funds on Brazilian side, the project eventually took 113 months (March 2000-June 2009) to complete, far longer (163%) than the planned period of roughly 69 months (1998-2004). The following table shows the planned and actual project period.

Table 13 Project Period

Item	Planned		Actual		Difference
	Period	Months	Period	Months	Change ratio
Piraquara II Dam	1999-2003	54	2002/11-2008/12	62	+15%
Curitiba Metropolitan Area water supply system I	1998-2002	39	2000/03-2003/02	36	-8%
Curitiba Metropolitan Area water supply system II	1998-2004	69	2002/10-2008/09	72	+4%
Curitiba Metropolitan Area sewage treatment system I	1998-2003	48	2000/08-2003/10	39	-19%
Curitiba Metropolitan Area sewage treatment system II	1999-2004	60	2005/12-2009/06	43	-28%
Coastal area public water supply	1999-2003	51	2002/04-2005/03	36	-29%
Coastal area sewage system	1999-2003	57	2002/05-2006/07	52	-9%
Project overall	1998-2004	69	2000/03-2009/06	113	+63%

Source: SANEPAR

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

Financial Internal Rate of Return (FIRR):

① Water supply system: 11.7%

② Sewage treatment system: 1.1%

③ Water supply and sewage treatment systems combined: 6.4%

The above FIRR was calculated using the same method that was adopted at the time of appraisal, assuming costs consisted on the construction cost and operation and maintenance cost and benefit to comprise revenue from tariffs, and then calculating the rate of return for 15 years. According to JICA internal materials, the FIRR at the time of appraisal was 7% for the water supply system and 8% for the sewage treatment system. However, because these values were estimated before the plan changes entailed by revision of Pequeno Dam to Miringuava Dam which was further abolished, introduction of Miringuava water treatment plant, withdrawal of the coastal municipalities of Paranaguá and Antonina from the project and inclusion of the Pontal do Paraná water supply and sewage treatment systems, it is difficult to make a comparison with situation at the time of the ex-post evaluation. The relatively high FIRR in the water supply sector is thought to be affected by the fact that coverage rates exceeded targets, while the relatively low FIRR in the sewage treatment sector is thought to be impacted by the low coverage rate in coastal areas.

Summing up, although the project cost was within the plan, the project period was exceeded, therefore the project efficiency is fair.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

SANEPAR operates the water supply and sewage treatment facilities of Parana State by area, and the Metropolitan Area and Coastal Division (GGML) under the umbrella of SANEPAR has jurisdiction over the project target areas. It clearly separates duties between the water supply system and sewage treatment system services and has established a department in charge of maintaining facilities. The water supply department (USPD) under the GGML carries out operation of water treatment plants, intake and reservoir facilities and pump stations as well as maintenance of water conveyance, water mains and distribution facilities. The department currently has 66 water treatment plant employees, 88 employees in charge of dams and intake facilities, 99 employees in charge of water distribution system facilities and 6 management employees. Meanwhile, the sewage system department (USEG), also under the GGML, carries out the operation and routine maintenance of sewage treatment plants and

pump stations. It is currently composed of one professional engineer and 21 technicians. The GGML also as an electric and mechanic service unit (USEM), which is responsible for maintaining electric machinery and operation control systems in water treatment plants, sewage treatment plants, pump stations and reservoir facilities. It is currently composed of 11 professional engineers, 87 technicians and 11 management assistants. According to the hearing survey with SANEPAR, there are no problems regarding routine work and response to emergencies and the staff arrangement and maintenance setup are considered to be appropriate.

3.5.2 Technical Aspects of Operation and Maintenance

In the field survey on SANEPAR, the human resources, training plans and maintenance manuals necessary for conducting routine operations are in place, and no salient problems were observed concerning technical aspects of operation and maintenance.

However, in sewage treatment plants not equipped with anaerobic ponds[11] (3 treatment plants in Curitiba Metropolitan Area and 4 in the coastal area), the Dissolved Air Flotation (DAF) (one of the treatment processes)[12] is not functioning. These treatment plants are using the process as sedimentation tank[13] and they have introduced cyclone separators[14] in order to enhance the sludge removal efficiency. Moreover, if necessary, they diluted the treated effluent in order to ensure that effluent standards are satisfied.

The DAF process was adopted as an alternative to the anaerobic pond due to its small area requirements, however, it stopped functioning after operation (the cause has not been identified). Since DAF is not a commonly adopted sewage treatment technology, SANEPAR doesn't have engineers who are familiar with it. Even at sewage treatment plants that have introduced this process, no major problems have occurred because the plants utilize various processes in order to satisfy effluent standards; however, SANEPAR is conducting technical tests on the process at Matinhos sewage treatment plant with a view to restoring the inherent functions of DAF process.

Concerning other technical aspects, no particular problems are occurring.

3.5.3 Financial Aspects of Operation and Maintenance

The financial standing of SANEPAR, which has an independent accounting system, is good; and GGML, which has jurisdiction over the project target area, also has healthy finances. As

[11] A process in which dissimilatory respiration by microbial groups converts organic substances into carbon dioxide and methane

[12] A process in which sludge particles is attached to bubbles generated by air injection, floated and separated

[13] A device for settling and separating solids from liquid in a semi-static state

[14] A device that uses centrifugal force to separate solids (sludge) from liquid (treated effluent)

is shown in the tables below, the cost of maintaining the water supply system accounts for 56.7% of the overall revenue in the GGML operating budget, while the same statistic is 53.9% in the case of the sewerage system, indicating that sufficient profitability is secured. Even if funds do run out, since contingency funds for SANEPAR are secured within the budget of Parana State government, there should be no unease concerning future finances.

Table 14 Financial Indicators for SANEPAR (Unit: million R$)

Item	2009	2010	2011
Total revenue	1,389.40	1,480.27	1,742.40
Total expenditure	1,251.53	1,344.76	1,493.23
Net profit	137.87	135.51	249.17
Net assets	2,035.60	2,179.78	2,310.40
Investment	312.89	397.23	354.18

Source: SANEPAR

Table 15 GGML Revenue and Maintenance Cost in 2011 (Unit: million R$)

Water supply system	Total revenue	Maintenance cost*	Maintenance cost/ Total revenue
Curitiba Metropolitan Area	451,026	251,268	55.7%
Guaraqueçaba	303	267	88.1%
Morretes	1,537	1,117	72.7%
Pontal do Paraná	7,593	4,968	65.4%
Matinhos	9,973	7,690	77.1%
Guaratuba	8,126	5,994	73.8%
Total	478,558	271,304	56.7%
Sewage treatment system	Total revenue	Maintenance cost	Maintenance cost/ Total revenue
Curitiba Metropolitan Area	261,024	137,571	52.7%
Guaraqueçaba	194	242	124.6%
Morretes	575	775	134.7%
Pontal do Paraná	1,559	1,270	81.4%
Matinhos	3,811	3,149	82.6%
Guaratuba	3,464	2,867	82.8%
Total	270,628	145,875	53.9%

(*Maintenance cost includes personnel expenses and depreciation costs).
Source: SANEPAR

3.5.4 Current Status of Operation and Maintenance

Maintenance work is planned and managed by each facility. The annual maintenance timing and frequency by USPD and USEG for each process are determined, and maintenance is conducted according to plans. Moreover, USEM has introduced facilities maintenance planning including preventive inspections of electric systems, and so far no major problems have occurred and the operation and maintenance situation is good.

Summing up, 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 Conclusions

This project was implemented with the objectives of improving the living environment for citizens and water quality in rivers and coastal areas through the construction of water supply system and sewage treatment system facilities in Curitiba Metropolitan Area and the coastal area of Parana State, which was suffering from chronic water outages due to low water supply capacity and less developed sewerage. The project was sufficiently consistent with the development policies and development needs of the Federal Government of Brazil and Parana State Government, which regarded public water supply and sewage system construction as priority issues, as well as Japan's ODA policy, therefore its relevance is high. Throughout the implementation of the project, water shortage problems in the target area were greatly improved. Particularly in the coastal area, coverage increase of sewage treatment resulted in a great improvement in the quality of river water flowing to the coast, thereby enabling bathing to be permitted at more bathing beaches. Thus, its effectiveness is also high. The project cost was mostly as planned. However, the project period greatly exceeded the plan due to delays in the land expropriation procedure for dam construction and the securing of environmental permits for water and sewage treatment facilities. Therefore efficiency of the project is fair. Since there are no problems concerning operation maintenance in terms of setup, technology and finances, sustainability of the project effects is high. In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency (SANEPAR)

① Considering there are areas where disparity between demand and supply has already arisen as well as, in view of the overall demand and supply, there is a further need for expanding water supply and sewage treatment systems.

② In order to cope with the insufficiency in water supply that is expected to arise in line with increased utilization of Miringuava water treatment plant, which has spare capacity, it is necessary to quickly execute the planned construction of Miringuava Dam in the upstream area of the said plant and thereby increase the water supply capacity.

4.2.2 Recommendations to JICA

None in particular

4.3 Lessons Learned

None in particular

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	・ Curitiba Metropolitan Area water supply system ・ Curitiba Metropolitan Area sewage treatment system ・ Coastal area water supply system ・ Coastal area sewage treatment system ・ Consulting services ・ Contingencies ・ Administration expenses, land expropriation cost, tax	Mostly as planned
2. Project Period	1998–2004 (Approximately 69 months)	March 2000–June 2009 (113 months)
3. Project cost Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	 0 million yen 55,429 million yen (1,034.5R$) 55,429 million yen 23,686 million yen 1R$=52.62 yen (As of 2004)	 0 million yen 55,362 million yen (1,016.5R$) 55,362 million yen 23,686 million yen 1R$=50.73 yen (Average between 1999 to June, 2009)