Viet Nam

Ex-Post Evaluation of Japanese ODA Loan Project
Rural Infrastructure Development and Living Standard Improvement Project (III)

External Evaluator: Kumiko Shuto, IC Net Limited

0. Summary

A total of 246 subprojects throughout Viet Nam were implemented in the five sectors, namely, the road, electrification, water supply, irrigation and afforestation sectors, under the project (The subprojects in the afforestation sector were undertaken in 53 communes in five provinces). Relevance of the project which promoted local development is very high. Effectiveness is also high because the project prompted local industry development, improved rural living conditions, and ameliorated the local natural environment. Efficiency is fair mainly because the project period was longer than planned. Sustainability of the project has challenges including budget constraints in the road, water supply and afforestation sectors and partially insufficient operation and maintenance status of the water supply sector.

Therefore, the project is evaluated to be satisfactory.

1. Project Description

Project Location

People traveling by motorcycle and bicycle on the provincial road constructed by the project in Quang Tri Province

1.1 Background

Viet Nam, which has a population of about 86 million[1] in an area equal to 87% of Japan, has seen a steady economic growth since 1986 under the Doi Moi economic reforms which promoted market economy. The growth of the country's gross domestic product (GDP) was as high as eight to nine percent per annum between 1992 and 1996, owing to the increased foreign direct investment and export. However, the economic growth was concentrated on the urban areas and the poverty rate of the rural areas, where 70 percent of the country's total population lived[2], was nearly five times that of the urban areas[3]. The widening urban-rural economic gap had become a serious issue as rural areas were left behind by development. Under these circumstances, the Government of Japan provided loans to Viet Nam for the development of rural infrastructure including rural roads, electricity, and water supply. The loan also covered the irrigation and afforestation sectors, which aimed at agricultural development and environmental conservation.

1.2 Project Outline

The objective of the project is to promote rural livelihoods, local industries, and the natural environment by constructing/ improving rural infrastructure, such as road networks, electricity distribution systems, water supply systems, irrigation systems and afforestation, thereby contributing to the improved living standards of rural residents.

Approved Amount/ Disbursed Amount	12,000 million yen/ 11,547 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 1999/ March 1999
Terms and Conditions	Interest Rate: 1.8% (Road, Electrification, and Irrigation Sectors), 1.3% (Water Supply Sector), 0.75% (Afforestation Sector) Repayment Period: 30 years (Road, Electrification, Water Supply and Irrigation Sectors), 40 years (Afforestation Sector and Consulting services) (Grace Period: 10 years) Conditions for Procurement: Multiple conditions
Borrower/ Executing Agency	The Government of the Socialist Republic of Viet Nam/

[1] According to the 2009 data by the General Statistics Office of Viet Nam (http://www.gso.gov.vn), Viet Nam's population was around 77 million in 1999.
[2] According to the 2009 data by the General Statistics Office of Viet Nam (http://www.gso.gov.vn), the rural population represented 76% of the total population in 1999 and the corresponding figure for 2009 was 70%.
[3] The data in Statistical Year Book of Viet Nam 2009 by the General Statistics Office of Viet Nam show that the poverty rates in the urban and rural areas are 9.0% and 44.9%, respectively, in 1998. In 2008, they were 3.3% and 18.7%, respectively.

	The Ministry of Planning and Investment (MPI)
Final Disbursement Date	December 2008
Main Contractor (Over 1 billion yen)	—
Main Consultant (Over 100 million yen)	Nippon Koei Co., Ltd./ OPMAC Corporation/ NTC International Co., Ltd./ KATAHIRA & ENGINEERS Inc./ JAVIDEC International
Feasibility Studies, etc.	OECF "Special Assistance for Project Sustainability (SAPS) on Rehabilitation Loan (I)", July-October 1998
Related Projects	JICA "Rehabilitation Loan (I), (II)" JICA "Rural Infrastructure Development and Living Standard Improvement Project (I)(II)"

2. Outline of the Evaluation Study

2.1 External Evaluator

Kumiko Shuto, IC Net Limited

2.2 Duration of Evaluation Study

Duration of the Study: December 2010 – October 2011

Duration of the Field Study: March 6 – 26, 2011 and June 25 – July 3, 2011

2.3 Constraints during the Evaluation Study

The project covers Viet Nam as a whole and the subprojects were implemented in most of the rural provinces. The number of subprojects in each sector was as follows: 94 in the road sector, 109 in the electrification sector, 27 in the water supply sector, 16 in the irrigation sector, and five provinces (17 districts and 53 communes)[4] in the afforestation sector, which makes the total of 246 subprojects in the four sectors and five provinces covered in the afforestation sector. Thus it was not possible to visit all the project sites due to time and resource constraints. Field visits were made to some sample project sites in seven provinces for an in-depth study. Document analysis[5], interviews with, and questionnaire survey to, the executing agency were conducted to elicit comprehensive information on all the subprojects implemented. The locations of the field visits and data collection methods are as shown in Table 1.

[4] The administrative units in Viet Nam are provinces, districts, and communes, in descending order.

[5] Some of the primary data on each sector except for the afforestation sector were already gathered by a survey entitled "Asset Survey for Small Scale Pro-Poor Infrastructure in Viet Nam" commissioned by JICA in 2010. This study made use of the relevant data collected in this survey.

Table 1: Locations of the field visits and data collection methods

Region	Province	Sector	Data collection method
North	Dien Bien	Road, Water supply	Interview, Observation, Beneficiary survey
Central	Quang Tri	Road, Afforestation	Interview, Observation
Central	Thua Thien Hue	Irrigation, Afforestation	Interview, Observation, Beneficiary survey
Central	Quang Nam	Electrification, Afforestation	Interview, Observation
Central	Quang Ngai	Water supply, Afforestation	Interview, Observation
Central	Phu Yen	Afforestation	Interview, Observation
South	Tien Giang	Road, Electrification	Interview, Observation, Beneficiary survey

The sample sizes and the numbers of subprojects[6] covered in the beneficiary surveys conducted in the three provinces are shown in the following table.

Table 2: Sample sizes and numbers of subprojects in the beneficiary surveys

Province	Sector Upper row: No. of people; Lower row in parenthesis: No. of subprojects					
	Road	Electrification	Water supply	Irrigation	Afforestation	Total
Dien Bien	71 (3)	–	47 (1)	–	–	118 (4)
Thua Thien Hue	–	–	49 (1)	104 (2)	93 (3 districts)	246 (3+3 districts)
Tien Giang	24 (1)	102 (3)	–	–	–	126 (4)
Total	95 (4)	102 (3)	96 (2)	104 (2)	93 (3 districts)	490 (11+3 districts)

3. Results of the Evaluation (Overall Rating: B[7])

3.1 Relevance (Rating: ③[8])

3.1.1 Relevance with the Development Plan of Viet Nam

At the time of the appraisal, the Government of Viet Nam regarded rural development as the priority issue for the realization of social stability in the Five-year Socio-economic Development Plan for 1996 to 2000. The Five-year Socio-Economic Development Plan for 2006 to 2010 analyzes that the government's efforts to improve rural infrastructure typified by the development of rural roads, irrigation and electricity has led to the improvement of living standards of rural residents. The Plan further aims at strengthening the rural economy by continuing the policies on rural development adopted in the Plan for 1996 to 2000.

These government policies indicate that the national development plans in Viet Nam

[6] As for the afforestation sector, the unit of "subproject" was not used. Instead, district was used to account for the areas covered. Thus, the number of districts is shown in the table.
[7] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[8] ③: High, ②: Fair, ①: Low

have consistently focused on rural development since the time of the appraisal to the time of the ex-post evaluation. The project, which tried to promote rural economy through rural infrastructure development, was well aligned with Viet Nam's development policies.

3.1.2 Relevance with the Development Needs of Viet Nam

The needs and urgency for Japanese yen loans were very strong at the time of the appraisal since the development of basic rural infrastructure and environmental protection were pressing problems. Table 3 shows the conditions of each sector at the time of the appraisal in 1998 as well as the ex-post evaluation.

Table 3: Conditions of each sector at the time of the appraisal and ex-post evaluation

Sector	Conditions in 1998	Conditions at the ex-post evaluation
Road	The pavement rates for the provincial roads and rural roads were 23.4% and 3.7%, respectively, while the corresponding figure for the national roads was 78%.	The pavement rates were 83.5% for the natural roads and 53.6% for provincial roads (as of 2004)[9]
Electrification	The rate of electrified households in rural areas was only 27.9%[10].	The rate of electrified households in rural areas was 94.6% as of 2009.[11]
Water supply	Only 130 (23%) out of 569 rural cities, town and villages had water supply stations. Around 60% of the residents in these cities, towns and villages received water from the stations.	The percentage of rural residents who were connected to the piped water system was 5.5% in 2000 and 10.6% in 2008[12].
Irrigation	About 40% of Viet Nam's farm land had irrigation systems. However, the systems were built before 1945, during the French colonial times, and 245 facilities were in need of rehabilitation by 2010.	There were 8,000 medium- to large-scale irrigation systems in 2006. Out of 9.7 million ha, 8.34 million ha (86%) are irrigated (as of 2007)[13].
Afforestation	Viet Nam has lost five million ha, or 35% of the total forest land, since the 1930s.	The forest land was 28.8%[14] in 1998. It recovered to 44.6%[15] in 2009.

Although 12 years have passed since the appraisal to the ex-post evaluation, the needs for rural development are still very strong in the five sectors as shown in Table 3.

3.1.3 Relevance with Japan's ODA Policy

At the time of the appraisal, Japan's ODA policy for Viet Nam included the promotion of agriculture and rural development as one of the priority areas. In providing yen loans to Viet Nam, Japan emphasized infrastructure development in such areas as transport and

[9] Viet Nam Road Administration (2004)
[10] "Population and Housing Census Viet Nam 1999" (http://www.gso.gov.vn/default_en.aspx?tabid=476&idmid=4&ItemID=1841)
[11] "The 2009 Viet Nam Population and Housing Census"(http://www.gso.gov.vn/default_en.aspx?tabid=515&idmid=5&ItemID=10799)
[12] "Result of the Survey on Household Living Standards 2008" (http://www.gso.gov.vn/default_en.aspx?tabid=515&idmid=5&ItemID=9647)
[13] Data by United Nations Environmental Programme (http://www.rrcap.unep.org/pub/soe/vietnam/issues/pressure/forest_pressure.htm)
[14] Data by United Nations Environmental Programme (http://www.rrcap.unep.org/pub/soe/vietnam/issues/pressure/forest_pressure.htm)
[15] "Statistical Yearbook of Viet Nam 2009"

electricity and gave priority to rural development for minimizing the regional gap. Japan has been assisting Viet Nam in agricultural and rural development through its ODA. Thus it is fair to say that the project is highly consistent with Japan's ODA policy.

This project has been highly relevant to Viet Nam's development plans, development needs, as well as Japan's ODA policy; therefore its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

In implementing the project, a direct line of command between the Ministry of Planning and Investment (MPI) and the Department of Planning and Investment (DPI) of each province was established. In the MPI, the Central Project Management Unit (CPMU) was set up which communicated directly with the Provincial Project Management Units (PPMUs) established at the DPIs[16]. According to the interviews with MPI and DPIs, decision and communication were made promptly and smoothly between the MPI, the supervising and coordinating body of the central government, and the DPIs, which held the main responsibility for implementing subprojects, as a result of this direct line. This structure was first introduced in the preceding projects, Rural Infrastructure Development and Living Standard Improvement Project (I) and (II), with the aim of managing the numerous subprojects throughout Viet Nam efficiently. The project also employed this structure because the effectiveness of this institutional setup was confirmed during the said projects. However, some weaknesses concerning insufficient management capacity of both the MPI and the provinces were identified during the implementation of the preceding projects. This project tried to minimize such weaknesses by improving the staffing at the MPI, strengthening communication with the provinces, and streamlining necessary paperwork.

The project implemented a number of subprojects in the five sectors, namely, the road, electrification, water supply, irrigation and afforestation sectors, throughout Viet Nam. The MPI had the final decision-making power in selecting the subprojects. Here is the procedure of the subproject selection: First, the MPI asked the provinces to submit a request of subprojects together with the feasibility studies (F/S) filled out in the format the MPI provided; Second, the DPI in each province submitted the F/S and a priority list of the subprojects to the MPI after taking into account the sector-wise five-year development plans and having discussions with the provincial people's committee and other relevant organizations; and Third, the MPI examined the documents submitted by the provinces and made a final selection of the subprojects. In prioritizing subprojects in the province, the

[16] For the MPI's other projects, communication and decisions are made through a complicated line such as the MPI's department in charge to the MPI's high level, then to the Provincial People's Committee, and finally to the province's DPI.

province used the selection criteria set by the MPI for each sector (facility size, investment amount, beneficiary size, etc.) and took into consideration social aspects such as poverty rates of the districts or communes. For the selection of subprojects, the provinces submitted to the MPI the lists of candidate subprojects together with the results of the feasibility studies (F/S). The MPI then finalized the selection based on the lists provided.

Table 4 shows the comparison between the plans and actual performance of the outputs.

Table 4: Comparison of planned and actual outputs

Sector	Original plan (at appraisal)	Revised plan	Actual performance (at ex-post evaluation)
Road	43 subprojects: 390 km of provincial and rural roads, 113 km of urban roads, 162 m of bridges (26 provinces)	94 subprojects (17 new and 77 improved): 988 km of provincial and rural roads, 41 km of urban roads, 1,805 m of bridges (55 provinces)	94 subprojects (17 new and 77 improved): 932 km of provincial and rural roads, 35 km of urban roads, 1,805 m of bridges (55 provinces)
Electrification	79 non-electrified villages: 1,766 km of electric lines, 510 transformers (39 provinces)	109 non-electrified villages: 2,638km of electric lines, 39,672 kVA (38 provinces)	109 non-electrified villages: 2,535 km of electric lines, 39,602 kVA (38 provinces)
Water supply	20 water supply stations: a total capacity of 83,000 m^3 (20 provinces)	27 water supply stations: a total capacity of 69,200 m^3 (26 provinces)	27 water supply stations: a total capacity of 85,900 m^3 (26 provinces)
Irrigation	Rehabilitation of 15 irrigation systems in the central region which was badly hit by drought in 1998. (Total 67,169 ha of irrigated areas) (11 provinces)	Rehabilitation of 16 irrigation systems (Total 29,158 ha of irrigated areas/ 36,631 ha of benefited crop areas) (16 provinces)	Rehabilitation of 16 irrigation systems (Total 38,576 ha of irrigated areas/ 52,626 ha of benefited crop areas) (16 provinces)
Afforestation	14 sites in the Northwest region, Northern and Southern coastal regions, and Northeastern Mekong Delta region for the creation and improvement of production forest aiming at environmental conservation and social forestry promotion (36,950 ha) (14 provinces)	20,779 ha of afforestation, 18,957 ha of natural forest protection, 4,438 ha of forest for assisted natural regeneration (total of 44,174 ha) in the five provinces in the Central region. Forestry infrastructure and rural infrastructure construction including nurseries, fire break lines, access roads, rural roads, a bridge and small irrigation systems. Training and extension on forest management and livelihood development (5 provinces)	20,253 ha of afforestation, 18,045 ha of natural forest protection, 3,843 ha of forest for assisted natural regeneration (total of 42,141 ha) in the five provinces in the Central region. Forestry infrastructure and rural infrastructure construction including nurseries, fire break lines, access roads, rural roads, a bridge and small irrigation systems. Training and extension on forest management and livelihood development (5 provinces)

Source: Appraisal documents, Project Completion Report by the MPI, Questionnaire to the MPI

Revisions of the plans[17] were made in all the five sectors due to substantial changes in the project scopes. The details of the changes of the plans and the actual outputs in each

[17] The revisions of the plans were made after the time of the loan agreement signing. The provinces conducted F/S and then the MPI selected the subprojects. The revised plans were based on the MPI's final selection of the subprojects.

sector are explained below.

(1) Road Sector

Outputs were substantially increased as a result of the surplus of budgets stemming from the foreign exchange gain during the implementation period. The number of subprojects was increased from 43 in the original plan to the actually implemented 94. Construction and improvement of provincial and district roads as well as access roads to commune centers were preferred to urban roads, taking particular note of the importance of rural development. To compare the revised plan and the actual performance, all the subprojects were implemented as planned and most of the outputs were produced as expected. Table 5 indicates the details of the outputs of the 94 subprojects.

Table 5: Details of the outputs in the road sector

Area	48 flat areas, 42 mountain areas (4 unknown)
Mode	30 new, 60 improved (4 unknown)
Category	49 provincial roads, 40 district roads, 1 Commune road, 3 urban roads (1 bridge only construction)
Class[18]	Class I: 0, Class II: 2, Class III: 4, Class IV: 29, Class V: 29, Class VI:16, Rural A:3, Rural B: 3 (8 unknown)

Source: Documents provided by JICA

(2) Electrification Sector

Outputs increased considerably because the preliminary cost estimation at the time of the appraisal was not so accurate that more subprojects turned out to be financially feasible with the originally secured budget. The original plan was to implement subprojects in 79 non-electrified villages. However, 109 villages were actually electrified by the project. The comparison of the actual outputs with the revised plan indicates that, while the total electric line length and total capacity decreased slightly, other outputs were produced as expected in the revised plan.

It was realized that, while the poverty rates and required costs for the subproject were taken into consideration in selecting subprojects, clear selection criteria were not necessarily set in each province.

(3) Water Supply Sector

The original plan at the time of the appraisal was to construct water supply stations in

[18] Roads in Viet Nam are categorized into six groups: from Class I to Class VI. Rural roads have two categories: Rural A and Rural B. Criteria for classification are as follows: Class II: >6,000 PCU/day, Class III: >3,000 PCU/day, Class IV: >500 PCU/day, Class V: >200 PCU/day, Class VI: <200 PCU/day, Rural A: a road connecting a commune and village (Road width of 3.5 m), Rural B: a Commune road (Road width of 3.0 m). PCU stands for Passenger Car Unit.

relatively large towns. However, the plan was revised to the construction of smaller-scale stations of capacity between 1,000 m^3 and 2,000 m^3 because of the change of policies which prioritized development of smaller towns. Thus the total number of subprojects increased from 20 to 27; so did the total capacity from 83,000 m^3 to 85,900 m^3.

(4) Irrigation Sector

To meet the latest needs, the project rehabilitated 16 irrigation facilities, as opposed to 15 facilities as originally planned. Although the total irrigated areas were 38,576 ha, slightly less than the original plan, it was more than 29,158 ha targeted in the revised plan. The benefited crop areas were also considerably more than the revised plan.

(5) Afforestation Sector

The original plan was substantially revised due to the changes in conditions caused by a natural disaster, changes in projects sites and target forest categories, and the introduction of new project components. The afforestation areas decreased from 36,950 ha planned originally to 20,568 ha of the actual performance. However, the total areas including natural forest protection areas and assisted natural regeneration areas amount to 43,664 ha, which is 20% more than the original afforestation plan. On the other hand, the revised plan targeted the total area of 44,151 ha, which was slightly more than the actual performance.
The revised plan introduced new components such as forestry and rural infrastructure development, training and extension on forest protection and fire control, which aimed at enhancing sustainability of forest management. As for these components, all the expected outputs were produced as planned in the revised plan.

As explained above, substantial changes in the outputs were made in all the sectors and the changes were reflected in the revised plans. In the road and electrification sectors, the outputs were increased substantially in the revised plans while the remaining three sectors did not change the scale of the outputs from the original plan. In all the sectors, the expected outputs were produced as targeted in the revised plans. The total road length, electric line length and capacity, and afforestation areas saw slight decreases from the revised plans. These decreases were mainly for meeting the latest needs and socio-economic and natural conditions in which each subproject was situated. Thus these changes were proved to be appropriate.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The total project cost was 2,076,447 million Vietnamese dong (VND), which was 147% of the original plan of 1,411,900 million VND. However, due to the depreciation of VND

against the Japanese yen[19], the total cost in yen was 15,781 million, which was 112% of the original plan of 14,119 million yen. In comparison with the revised plan, the actual cost was within the planned budget, or 98% of the cost in the revised plan.

Table 6: Planned and actual cost of each sector[20]

(Unit: million yen)

Sector	Original plan (at appraisal)			Revised plan			Actual performance			Difference between original plan and actual	Difference between revised plan and actual
	Counterpart fund	Loan portion	Total	Counterpart fund	Loan portion	Total	Counterpart fund	Loan portion	Total		
Road	530	2,718	3,248	2,874	3,767	6,641	1,738	4,635	6,373	196%	96%
Electrification	530	2,718	3,248	937	1,523	2,460	548	1,462	2,010	62%	82%
Water supply	423	2,175	2,598	789	2,109	2,898	789	2,109	2,898	112%	100%
Irrigation	318	1,631	1,949	525	1,368	1,835	498	1,329	1,827	94%	100%
Afforestation	318	1,631	1,949	271	1,442	1,713	576	1,474	2,050	105%	120%
Consulting services	0	1,127	1,127	96	527	623	96	527	623	55%	100%
Total	2,119	12,000	14,119	5,492	10,736	16,170	4,245	11,536	15,781	112%	98%

Source: Documents provided by JICA, Questionnaire to the MPI

The costs for the electrification, irrigation, afforestation sectors and consultation services were within the original plans, while the costs for the water supply and road sectors were 112% and 196% of the original plans, respectively. The cost increase in the latter sectors was mainly due to the increased number of subprojects. Although the cost of the afforestation sector was 120% of the revised plan, the other sectors kept their costs within the budgets in the revised plan[21].

Although the project cost was slightly higher than planned, it should be regarded appropriate considering the fact that the total outputs were increased and the actual cost was mostly as planned in the revised plan.

3.2.2.2 Project Period

While the planned project period was 70 months, the project actually took 118 months,

[19] The exchange rate was 0.01 yen to one VND at the time of the appraisal. However, a notable depreciation of VND against yen happened during the project period and the average exchange rate during that time was 0.0076 yen to one VND.

[20] The exchange rate used for calculating the costs for the original plan was 0.01 yen to one VND (as of October 1998). The average exchange rate between the period of March 1999 and December 2008, i.e., 0.0076 yen to one VND, was used for the calculation of the revised plan and actual cost. While the total loan amount was 11,547 million yen, the amount in the table is shown as 11,536, which is exclusive of the commissions.

[21] Rising inflation rates have become a major problem in Viet Nam particularly since 2007. "World Economic Outlook (October 2010)" by the International Monetary Fund (IMF) indicates the inflation rates of Viet Nam as follows: With the inflation rate in 2000 as a standard of 100, the rate was 101 in 2001, 105 in 2002, 108 in 2003, 119 in 2004, 129 in 2005, 138 in 2006, 156 in 2007, 187 in 2008. It can be observed that the rates have soared particularly since 2007. In the project, however, most of the subprojects were completed before 2007 and the influence of the hike in inflation rates remained nominal.

or 169% of the planned duration.

Here are the main reasons for the extended period of time: (1) partial changes in designs frequently occurred because there was a time lag for 1.5 to two years between the F/S conducted at the province and the start of the actual implementation period (particularly the road and electrification sectors); (2) the number of subprojects was increased mainly due to the foreign exchange gain (particularly the road and electrification sectors); (3) delay in land acquisition happened (particularly the road and water supply sectors); (4) delay in construction happened due to severe weather such as flood and heavy rain (particularly road and water supply sectors); and (5) substantial reconsideration of the target areas and target forest categories was necessary owing to the flood damage which hit the central region (the afforestation sector).

Although the project period was significantly longer than planned, the project cost was mostly as planned considering the increase of the output. Therefore, efficiency of the project is fair.

3.3 Effectiveness (Rating: ③)[22]

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators[23]

(1) Road Sector

According to the data of 31 subprojects for which information on traffic volume was available, the annual average daily traffic counted as Passenger Car Unit (PCU) increased from 193 to 531 on average, which was a 180% increase. Among the 31 subprojects, 12 roads had an increase of less than three times, 10 roads between thee times and less than five times, two roads between five times and less than ten times, and seven roads more than ten times. Many roads increased traffic volume by three times. Some increased their traffic volume as much as 20 times.

(2) Electrification Sector

The project provided electricity to 109 non-electrified villages. The average rate of electrified households was very high, reaching 96.8%[24]. A small number of the facilities, i.e., 4.2% (four out of 99 facilities which answered the questionnaire) were facing the lack of capacity. They were not fully meeting the growth of demand in the area.

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[22] The rating of the project's effectiveness takes into account the evaluation of the project's impact.

[23] Operation and effect indicators were not set at the appraisal since the project was approved before JICA introduced such indicators for the Japanese ODA loan projects. They were not set at the completion of the project either. The project is a nationwide multi-sector project which covers 246 subprojects in four sectors and five provinces for afforestation. While part of the data was obtained through existing documents and a questionnaire survey, it was difficult to gather data which served as operation and effect indicators for each subproject within the study framework. Thus the study relied on the data on subprojects collected by the "Asset Survey for Small Scale Pro-Poor Infrastructure in Viet Nam."

[24] Based on statistics on 82 subprojects for which data was available.

(3) Water Supply Sector

The total capacity of the 27 water supply stations was 85,900 m^3 and the average capacity per facility was 6,136 m^3. The total of the average water supply per day of the 27 facilities was 46,910 m^3, or 3,351 m^3 per facility. It indicates that the facilities used only 54.6% of their capacity whereas the planned facility utilization rate[25] at the time of the planning was 65.3%.

Three facilities had the low utilization rates of less than 20%. The main reason for the low utilization rate was that the population growth was unexpectedly lower than projected at the time of facility designing in smaller towns.

On the other hand, four facilities supplied an amount of water beyond their designed capacity. The total population served was 137,322, based on the data of 25 facilities where the information was available. The average rate of population served was 68.7%, based on the data of 17 facilities. The average rate of unaccounted-for water was 22.2%, with two facilities exceeding 50%. These facilities faced financial difficulties which had lead to high rates of unaccounted-for water. The difficulties included inability to repair broken water piles and to purchase new water meters for replacing degraded ones.

(4) Irrigation Sector

The total irrigated areas after the rehabilitation of 16 irrigation systems were 38,576 ha, which exceeded 29,158 ha targeted in the revised plan. The average irrigated area per facility was 1,837 ha. The average actual irrigated area rate was 98%, with only three out of 16 facilities not reaching 100%. The great majority of the irrigation systems achieved efficient irrigation systems as planned. The total benefited crop areas were 52,626 ha, which was far more than the planned 36,631 ha[26]. The total number of beneficiary farm households was 450,950 and the average number of benefited households per facility was 22,548.

(5) Afforestation Sector

The afforested areas in the five provinces in the central region were 20,547 ha. The total intervention areas including natural forest protection and assisted natural regeneration were 43,664 ha. It was predicted that the survival rate of the planted trees would be 10 to 20% if only the local tree varieties were planted. Thus the project chose to mix fast-growing acacia trees with local species. As a result, the survival rate was as high as 87%. Apart from afforestation and forest protection, forestry and rural infrastructure was

[25] The facility utilization rate is calculated by dividing the average water supply amount (m^3) by the capacity of the facility (m^3/day).

[26] The benefited crop areas include farm land which became arable due to mitigation of salt or flood damage after the project.

developed by the project[27]. The cumulative number of local residents who took part in the training and extension services on forest protection and livelihood development was 11,656. The total number of households in the nearby communities[28] was 44,530. Therefore, 26.2% of the households were deemed to have participated in the training, assuming that each household sent one member to the training.

In terms of job creation for local residents, about 2.7 million man/day of planting work was offered throughout the project period and the average 5.4 million VND (approximately 40,000 yen) of income per household was generated.

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

As data needed for quantitative analysis were not available, analysis for the internal rate of return was not possible.

3.3.2 Qualitative Effects

As shown in Table 2 in 2.3, the beneficiary survey was conducted in three provinces in order to measure qualitative effects of the project. The survey collected information from a total of 490 facility users and nearby community residents. The following is the sector-wise qualitative effect confirmed by the survey.

[27] 10 nurseries, 443 km of fire break lines, 240 km of access roads, 23 watch towers, and 17 guard stations were built as part of forestry infrastructure development. As for rural infrastructure, 42 km of rural roads, one bridge and small irrigation systems (10 check dams and 10km of irrigation canals) were developed.

[28] The total number of the households in the Communes in which the target forests are located. The data is based on the 2003 statistics in the five target provinces.

(1) Road Sector[29]

94.7% of the road users shortened their travel time to markets, commercial facilities, schools, hospitals and government offices. They shortened their travel time by 39.8 minutes on average both in the dry and rainy seasons.

The main purposes of travel on road were as shown in Fig. 1. 88.2% of the road users answered that they used the road more frequently than before.

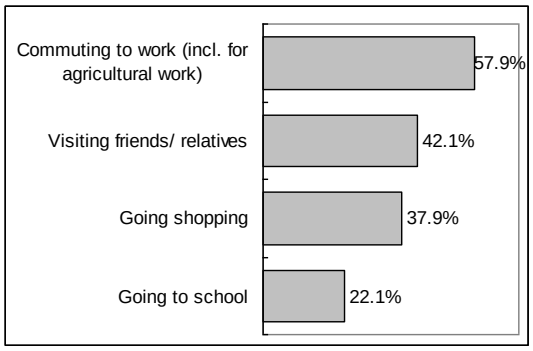

Fig. 1: Main purpose of travel by road users (multiple answers)

(2) Electrification Sector[30]

50.0% of the respondents said that the frequency of power outage was once or twice a week in the dry season, while 39.2% answered every other day. When power outage happened, it usually lasted for 13.1 hours on average. In the rainy season, on the other hand, the average power failure duration was 4.1 hours. 72.7% of the respondents said that the frequency of power outage in the rainy season was less than once a week. As for power voltage, 69.3% answered it was "very stable" or "stable," confirming that the supply was stable to a certain degree.

The problem was that the conditions of electric power supply had a substantial gap between the dry and rainy seasons. Frequent and long power outage in the dry season posed a problem. A small number of the respondents also pointed out that power failures sometimes occurred without prior announcement and insufficient power voltage was causing inconveniences. The unannounced power failures occurred because the O&M organizations failed to conform to the rule to give communes notice of the power outage schedule. The low power voltage problem was a result of the insufficient capacity of the transformers installed. In light of these drawbacks pointed by the beneficiaries, both the designs and operation of some facilities seem to have some challenges, although the extent of the challenges seems rather limited.

[29] The beneficiary survey in the road sector was conducted in three subprojects in Dien Bien Province and one subproject in Tien Giang Province. The total number of the survey respondents was 95. The four roads surveyed are: three provincial roads (3 at a flat location and one at a mountain location) and one district road (at a mountain location). Their classes are as follows: one Class IV, two Class VI, and one Rural B.

[30] The beneficiary survey in the electrification sector was conducted in three subprojects at three Communes in Tien Giang Province. The total number of the survey respondents was 102.

(3) Water Supply Sector[31]

62.0% of the users of the water supply stations answered that they were supplied with a sufficient amount of water throughout the year. 31.6% answered that they were able to obtain a certain amount of water. 67.1% of the respondents answered yes to the question "Do you obtain higher quality of water than before?" All the 32.9% of the respondents who answered "no" to the question were the users of the Tuan Giao water supply station in Dien Bien Province. They strongly complained about high mineral contents, strong chlorine smell and an impermissible level of turbidity. The water source of the Tuan Giao water supply station was a nearby lake and thus the maintenance of water quality posed a challenge. According to the interviews with the facility managers, the complaints of the users were partly attributable to the facility's weak water quality management.

Apart from the three facilities where the beneficiary survey and field visit were conducted, some facilities posed challenges in water quality management. Some facilities did not undertake legally required procedures of water management; others were concerned about deterioration of water quality which might be caused by an imminent population growth in the area[32].

(4) Irrigation Sector[33]

While the average crop area per farm household before the project was 0.58 ha, the figure increased to 0.74 ha, which was a 30% increase. Rice was the primary crop in the surveyed areas and the annual average rice yield increased from 4.36 tons to 7.02 tons, which was an increase by 61%. In terms of yield per ha, the increase was from 3.84 tons to 4.81 tons, or a 25% increase, in the dry season, and from 4.05 tons to 5 tons, or a 23% increase, in the rainy season (Box 4). 74% of the respondents said that the rehabilitation of the irrigation system had led to the production of substantially higher quality crop. The remaining respondents answered that the quality was improved to some degree. For example, the farmers observed changes such as more and heavier rice on the rice plant or vegetables grown better than before. 70.2% of the farmers felt they were able to obtain a sufficient amount of water. Those who did not feel that way pointed out problems including unannounced power outage at the pump station, dumping of waste in the irrigation canals by the local residents, and delays in necessary repair work at the irrigation system.

It was confirmed that the project increased the arable crop areas significantly. The agricultural yield, as well as yield per ha, had also been increased. The quality of the crop

[31] The beneficiary survey in the water supply sector was conducted at the Tuan Giao water supply station in Dien Bien Province and at the Phu Bai water supply station in Thua Thien Hue Province. The total number of the survey respondents, who were the users of the water supply systems, was 49.

[32] JICA (2011) "Asset Survey for Small Scale Pro-Poor Infrastructure in Viet Nam"

[33] The beneficiary survey in the irrigation sector was conducted in two subprojects, namely Phong Chuong and Cua Lac irrigation systems, in Thua Thien Hue Province. The total number of the survey respondents, who were the farmers who used the facilities, was 104.

had also seen improvement.

(5) Afforestation Sector[34]

66.7% of the survey respondents attended the training and extension services on forest management and livelihood development offered by the project. 99.0% of the respondents answered that they were satisfied with the afforestation work "very much" or "to some extent." All the respondents answered that they were satisfied with the tree species planted by the project "very much" or "to some extent." Furthermore, the satisfaction rate of the respondents in the forestry and rural infrastructure development exceeded 90%.

In light of the above quantitative and qualitative effects, the project has largely achieved its objectives, the promotion of rural livelihoods (mainly the road, electrification and water sectors), local industries (mainly the road, electrification, and irrigation sectors), and the natural environment (the afforestation sector). Therefore the project's effectiveness is high.

3.4 Impact

3.4.1 Intended Impact

(1) Road Sector

76.3% of the road users answered that the expenses for motorcycle and bicycle maintenance were less than before due to the improvement of the road. 53.9% answered that they were able to save fuel cost because the travel time became shorter. Almost all the respondents felt that their living conditions had improved "very much" or "to some degree" due to the upgraded roads. The main reasons for their improved living conditions include better access to major places, more business and employment opportunities, as shown in Figure 2.

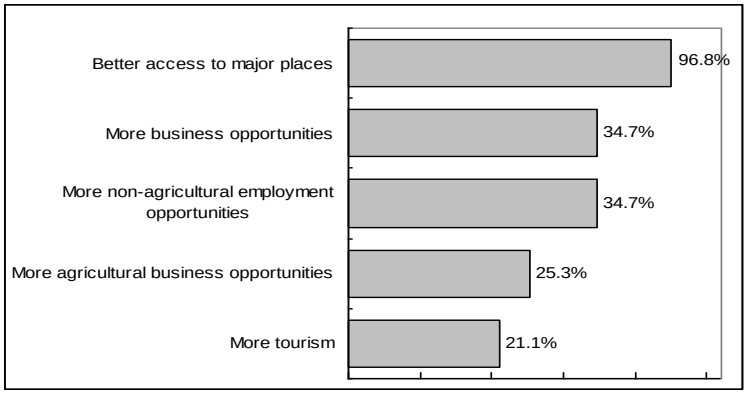

Figure 2: Reasons for better living conditions by use of road (multiple answers)

[34] The beneficiary survey in the afforestation sector was conducted in three districts in Thua Thien Hue Province. The total number of the survey respondents, who were the community members near the target forest, was 93. The respondents included 29 people from ethnic minority groups: eight Pha Hy, 13 Ka Tu, and eight Pa Ko.

Impact of the project in the road sector was observable because the project helped the road users save the cost of transportation and promote business and employment opportunities, which in turn led to livelihood development of the road users.

Because of the increase of the traffic volume, the frequencies of traffic accidents have changed on many roads. 54.1% of the subprojects saw an increase of two to three traffic accidents per year. However, most of the accidents were not serious because bicycles and motorcycles were the main modes of transportation. On the other hand, since 80% of the subprojects were improvement, rather than new construction of roads, the road conditions became better than before. Thus, 27.0% of the subprojects experienced a decrease of traffic accidents. 18.9% of the subprojects saw no difference in the number of traffic accidents[35].

Box 1: Road improvement in Quang Tri Province

The central road in Dakrong District in Quang Tri Province connects to Provincial Road 558. It was newly constructed by the project. Before the project, the four neighboring communes had a narrow road passable only by pedestrians. People used a boat for carrying goods. After the opening of the central road, easy access among the four commune was realized and the traffic volume increased from 150 PCU/day (annual average) in 2001 when the road was partially completed, to 300 PCU/day in 2004. Bridges and culverts were also constructed and transportation by motorcycle became much easier. After the completion of the road, a school for the minority people was constructed since more than 80% of the local residents are ethnic minorities. Business and government offices were also constructed and construction activities are still actively ongoing alongside of the road now.

A motorcycle on a bridge on the central road in Dakrong District

(2) Electrification Sector

The survey to the households and businesses in the electrified village revealed that they used a variety of electric appliances such as TV and cell phones as shown in Figure 3**:** 98% of the respondents answered that their living conditions improved because of the use of these electric appliances. Specifically, they pointed that they were now able to obtain information on health, raise agricultural and commercial income, communicate easily by cell phone, save agricultural labor, improve the study environment for their children, and so forth.

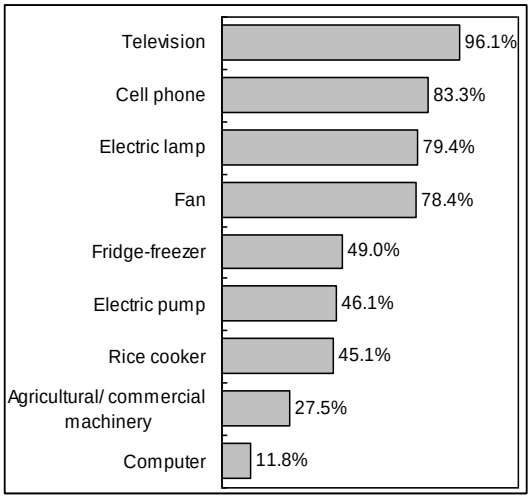

Figure 3: Electric appliances used in the electrified village (multiple answers)

[35] Based on statistics on 37 subprojects for which data on traffic accident were available.

96.1% answered that their household work became easier and they were able to save 54.6 minutes per day on average. Furthermore, 69.3% confirmed that they raised their income. The main reasons for raised income were as follows: more work on other things after the household work became less, raised agricultural productivity due to more information on agriculture and animal husbandry, less fuel cost after replacing gasoline pumps with electric pumps, raised productivity by use of an electric sewing machine, and so forth. It was confirmed that people's life became convenient and agricultural and business productivity was improved as a result of electrification.

Box 2: Generation of an alternative income source for a farm household in Quang Nam Province

Mr. P in Than Bihn District in Quang Nam Province used to be a full-time rice farmer. When his village was electrified, he purchased four machines and started a rice milling business on a part-time basis. He started the business because he wanted to stay home as long as possible to take care of his sick mother who had been bedridden for 15 years. He gave part of his rice field to his three children and he shortened his time in the field. Although his monthly income from rice decreased from 1.5 million VND to one million VND, he now earns 0.5 million VND from the rice milling business. He feels his life became better because he is able to maintain his income level even though his labor became much less. He is very much satisfied with his new lifestyle since he can take care of his family better than before.

Mr. P operating
a rice milling machine

(3) Water Supply Sector

96.2% of the users of the supply water system answered that their household work became easier than before. They were able to save 69.7 minutes per day on average because they no longer had to carry water from a well or river.

While 55.1% of the users of the Phu Bai water supply station in Thua Thien Hue Province recognized fewer incidents of water-borne diseases, only 4.3% of the users of the Tuan Giao water supply station in Dien Bien Province felt the same. Many users of the latter facility did not use water for drinking or cooking purposes because they were not satisfied with the chlorine and mineral content and turbidity of the water.

75.5% of the users of the Phu Bai water supply station were satisfied with the water supply service, whereas the corresponding figure for the users of the Tuan Giao water supply station was only 42.6%.

Box 3: Supply water in Duc Pho Town in Quang Ngai Province

People used to fetch water from a well and river for drinking and household purposes in Duc Pho Town in Quang Ngai Province. The well and rive water had high salinity and iron content and many people had digestive and skin problems. The problems were solved after water started to be supplied to the households. It required less time to obtain water and people's life became easier. Mrs. D runs a small rice porridge shop at her house. Her customers have told her that the porridge tastes better after tap water was used. Mrs. D has two children aged one and two, and gets a lot of clothes to wash every day. Shirts became red-tinged when she used well water for washing. Now she is happy that she gets her laundry white after switching to tap water.

Mrs. D operating her rice porridge shop

(4) Irrigation Sector

Before the project, the farmers in the project areas used a bucket to carry water manually from lowland to their farmland. All the farmers who participated in the survey answered that their agricultural workload for irrigation decreased significantly, requiring 133 minutes less per day on average. All the 104 respondents pointed to their raised income due to the rehabilitation of the irrigation system, and the average increase of income among the respondents was 27%. They purchased more fertilizer (36.5%), agricultural machinery (24.0%), pesticide (18.3%) by the extra income they obtained (multiple answers).

As other benefits they received from the project, they listed positive changes including mitigation of salt and flood damage, alleviation of drought damage in the dry season, easier access within and among villages by use of the dykes constructed, and relief of severe dryness in the residential area in the dry season. It was clear that the project in the irrigation sector gave a positive impact not only on agriculture but also on rural life in general.

Box 4: Rehabilitation of the irrigation system in Thua Thien Hue Province

Phong Chuong, located in the coastal area in Thua Thien Hue Province, had long suffered salt damage from seawater, frequent floods in the rainy season, and drought in the dry season, which severely affected rice and vegetable production. The project rehabilitated a dam, water gates, irrigation and drainage canals, and dykes. The Cua Lac & Phong Chuong irrigation system was completed in 2004. 90% of the local farm households benefited from the project as they now enjoyed reduced salt, flood and drought damage. The crop land per farm household increased by 30%, from 0.58 ha to 0.74 ha, and annual yield of rice increased by 60%, from 4.4 to 7.0 tons. The yield per ha was also raised by 25%, from 3.8 tons to 4.8 tons.

The rehabilitated irrigation

(5) Afforestation Sector

74.2% of the local residents near the afforestation sites answered that the project contributed to improvement of their living environment "very much" or "to some extent." The main reasons were the positive changes such as protection from wind or sand and

improvement of living conditions by rural infrastructure development as shown in Figure 4. All the respondents answered that the local natural environment had improved "very much" or "to some degree." Figure 5 indicates some of the main reasons for the improvement of the natural environment: natural disaster prevention including land erosion, forest fire, and flood, and amelioration of the environment including cleaner air, better landscape, and improved biodiversity. It was confirmed that many local residents recognized the positive impact by the project both on their living environment and the local natural environment.

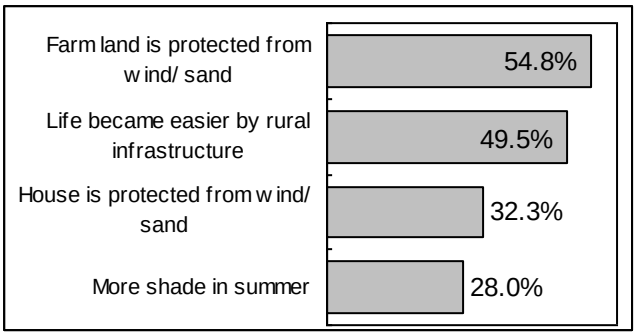

Fig. 4: Main reasons for the improvement of the living environment (multiple answers)

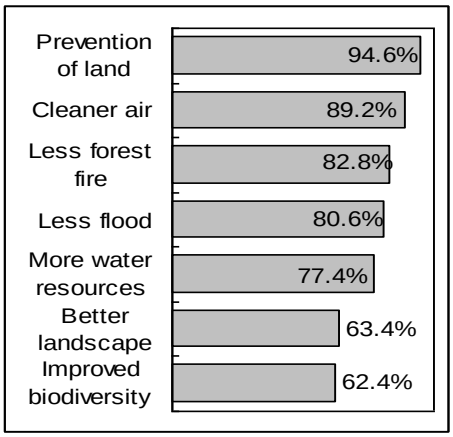

Fig. 5: Main reasons for the improvement of the natural environment (multiple answers)

Box 5: Additional activities implemented alongside of afforestation work

The project implemented forestry infrastructure development in order to realize effective and sustainable forest management. It also conducted rural infrastructure construction and training/ extension for local residents for the purpose of livelihood development and awareness-raising. Equipment for forest fire prevention and suppression was provided and rural roads for improving access to major village facilities were constructed as part of these efforts.

Fire fighting equipment purchased by the project

A rural road leading to a kindergarten in the village

3.4.2 Other Impacts

(1) Impacts on the Natural Environment

Apart from minor impacts happened in some subprojects, no major negative impact on the natural environment was confirmed[36]. In the afforestation sector, positive impacts such

[36] Negative impacts observed in some subprojects include noise and dust problems during the construction period of the facilities. In the road sector, noise and air pollution problems from the traffic are happening in some areas.

as increased water resources, prevention of land erosion, and biodiversity improvement (e.g., frequent sighting of monkeys, deer, and wild boars) were confirmed.

(2) Land Acquisition and Resettlement

Although land acquisition and resettlement took place mainly in the road and water supply sectors, little negative effect on society was observable since the incidents were on a small scale, usually affecting only 10 to 20 households. They were settled by the legal procedures in accordance with the Vietnamese regulations. The interviews with local residents confirmed that sufficient consensus among local residents was built and appropriate compensation money was paid to the affected people.

(3) Unintended Positive/ Negative Impacts

Table 7 lists major unintended positive and negative impacts in each sector, which were confirmed through the beneficiary survey and field visit. Although negative impacts including the increase of traffic accidents, social problems and pollution were confirmed in the road sector, these problems were limited to certain areas. The other sectors did not experience major negative impacts. Instead, various positive impacts were confirmed.

Table 7: Unintended positive and negative impacts by sector

Sector	Unintended positive and negative impact
Road	<Traffic accidents> 54.1% of the roads have more traffic accidents, while 27% have fewer accidents. <Better livelihood of ethnic minorities> The construction of roads in the mutinous areas helped the ethnic minority groups to have better access to schools and other facilities. Increased commercial and transportation activities also benefited local minority groups in raising living conditions. <Raised land price> Land price along the roads became higher. <Pollution> Construction vehicles and trucks caused noise, air and dust problems. <Social problem> Young people congregated on the roadsides. More incidents of thefts, smuggling, drugs, and prostitution happened.
Electrification	<Diversification of industries in rural areas> Farmers who used to rely fully on rice farming diversified their job, such as rice milling and carpentry after their village was electrified. Alternative income sources were generated and their livelihoods became stable.
Water supply	<Benefit to poor households> The monthly water charge for a household in a small town is so low, about 10,000 VND (about 40 yen), that even poor households can afford it.
Irrigation	<Prevention of natural disaster> The irrigation system led to not only raised agricultural productivity but also prevention of natural disasters such as drought, salt and flood damage. <Multipurpose use> The dykes constructed as part of the irrigation system were serving as rural roads which connected nearby communes. They were functioning as multipurpose facilities.
Afforestation	<Vigilance of local residents against forest loss> Local residents became more vigilant for illegal logging and forest fire owing to their raised awareness towards environmental and forest protection.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

During project implementation, the CPMU led by the MPI coordinated overall activities and PPMUs led by the DPI at provinces were responsible for implementing

subprojects. After the completion of the project, organizations such as government offices and private firms listed in Table 8 became responsible for operation and maintenance (O&M) of the facilities constructed.

Table 8: Organizations responsible for O&M in the five sectors

Sector	O & M organizations
Road	Private corporations or state-owned organizations under the Provincial Department of Transport, Provincial Department of Agriculture and Rural Development (DARD), District People's Committee, City People's Committee, and Town People's Committee
Electrification	(Before February 2009) Electricity Offices supervised by the Electricity of Viet Nam (EVN) where the EVN took charge of power distribution. The Department of Electricity of Provincial People's Committee where the local government took charge of power distribution. (After February 2009) EVN
Water supply	Water supply companies or privatized corporations supervised by the Provincial Department of Construction
Irrigation	In case of medium- to large-scale irrigation systems (such as dams, head works, pumping stations, main canals), DARDs, District People's Committees, Commune People's Committees, and irrigation management companies In case of small-scale irrigation systems (such as minor canals), farmers' organizations
Afforestation	For forest and forestry infrastructure, the Protection Forest Management Boards (PFMBs) in the provinces, forestry companies, and Commune People's Committees. For rural infrastructure, Commune People's Committees.

According to the interviews with organizations responsible for O&M, the water supply and afforestation sectors faced difficulties in conducting monitoring due to lack of field staff. Other sectors did not present any major issues in terms of organizational structures and O&M is functioning well.

3.5.2 Technical Aspects of Operation and Maintenance[37]

(1) Road Sector

Most of the O&M organizations formulate annual maintenance plans for conducting appropriate road maintenance. Their technical level is high in general. While statistical data gathering activities including traffic volume survey are held regularly for provincial roads, the data on district roads are scarce, which inhibits accurate traffic volume projections or formulation of detailed future plans. Private corporations responsible for O&M tend to have adequate equipment and machinery. However, local governments responsible for O&M often have few equipment and machinery items, which hinders efficient O&M activity.

(2) Electrification Sector

The Electricity of Viet Nam (EVN) has rich experience in managing the electric distribution systems in Viet Nam and its technical level is high. It has established O&M plans, implementation procedures and an information management system. Electricity

[37] The evaluation of technical aspects of operation and maintenance was made based on information gathered through document analysis, field visits and questionnaire surveys.

cooperatives at the district level, which are the contractors of the EVN for O&M, also have sufficient skilled staff and maintain high technical levels.

(3) Water Supply Sector

Mainly due to lack of technical staff and budget for O&M, the staff members of O&M organizations do not receive enough technical training. In particular, they are in great need of strengthening technical skills for water quality control.

(4) Irrigation Sector

Local governments responsible for O&M and irrigation management companies have rich experience and high technical capacity. However, more training for raising efficiency of irrigation may be needed as indicated by the fact that two facilities are having the problem of inefficient irrigation caused by leakages from earth lining[38].

The farmers' organizations are not required to have a high level skill since they are only in charge of daily maintenance of small-scale canals. Strengthening communication among farmers is needed for more effective daily operation such as cleaning of the canals.

(5) Afforestation Sector

The O&M of the protection forest is mainly undertaken by the Protection Forest Management Boards (PFMBs) under the Department of Agriculture and Rural Development (DARD). Their technical level and experience in protection forest management are sufficient. However, they have little experience of facilitating local community members in mobilizing them for forest management. Skills necessary for extension services such as awareness-raising and group formation need to be strengthened.

3.5.3 Financial Aspects of Operation and Maintenance

(1) Road Sector

The road O&M budget of the provincial government is insufficient and many roads are not sufficiently maintained. Urban roads with heavy traffic volume[39] and mountain roads are susceptible to quick degradation from floods and land slides and require large expenses for O&M. The current amount of the O&M budget allocated by the provincial government is not sufficient to cover costs for necessary repairs. For example, No. 862 Provincial Road in Tien Giang Province is allocated only 25% of the budget required for full O&M, according to the interview with the O&M organization. Substantial raise in budget allocation from the provincial government is needed for better O&M in the road sector.

[38] Earth lining is a method of construction which binds the surface of a canal with earth of low permeability.
[39] The number of urban roads constructed/ rehabilitated by the project was three and the total road length was 34 km.

(2) Electrification Sector

No major issue is observed. However, a commune[40] responsible for O&M said in the interview that only 70% of the necessary budget was allocated. Because of the budget constraint, the commune was unable to hire a sufficient number of technicians[41] for effective O&M.

(3) Water Supply Sector

According the interviews with the O&M organizations, many water supply stations in relatively small towns face financial difficulties mainly due to low water charges[42]. Relatively new water supply stations tend to face this situation because the amount of water supplied at such stations is still small. Because of the financial constraints, many stations cannot invest in necessary facilities and equipment. For example, they cannot install laboratories for speedy water testing or cannot purchase equipment for minimizing the amount of unaccounted-for water. The provincial government has the decision making power over the water tariff. The financial situation of water supply stations needs to be examined and the tariff should be reviewed by the provincial government so that each facility can have a strong financial base to generate profits.

(4) Irrigation Sector

Collection of user fees was abolished in 2008[43] and expenses for O&M are now covered by the subsidies from the central government. According to the O&M organizations, the subsidies are mostly sufficient to pay for necessary expenses. Before 2007, the organizations spent a substantial amount of time and effort in collecting user fees and delay in payments by the users occurred frequently. Now such problems do not occur, and they are able to secure stable income, which in turn enabled them to formulate medium- to long-term plans and to enhance financial and institutional sustainability. When the organizations need additional money for repairing facilities damaged by natural disasters, they can obtain an extra budget from the provincial government.

(5) Afforestation Sector

Daily forest patrol is necessary since illegal logging and forest fire occur frequently in the protection forest. The current number of personnel for guarding the forest is far from sufficient and more contracts with local community members need to be made for forest patrol. The budget for making contracts needs to be secured by using funds for national

[40] Chau Thanh Commune in Tien Giang Province
[41] Two more mid-career staff members and five more field technicians were needed in this Commune.
[42] Profits generated in the provincial capital and other cities are used to cover the deficit of the water stations in small towns.
[43] Decision made by Decree115/2008/CP.

afforestation programs and other relevant programs.

3.5.4 Current Status of Operation and Maintenance[44]

(1) Road Sector

Road inspection is carried out on a regular basis but its frequency is not enough to detect problems at an early stage. Sometimes damage to the road remains unnoticed until it becomes serious enough to raise the risks of traffic accidents. In particular, roads in the mountain areas tend to develop many potholes and erosion on shoulders, causing traffic accidents. At the time of the evaluation study, four roads in the mountain regions had been temporarily closed due to landslide[45]. Furthermore, overloaded vehicles often cause damage to the road surface. It is necessary to take measures against the problem of overload.

(2) Electrification Sector

In four subprojects, or 4.2% of all the subprojects, the capacity exceeds the area's demand because of population growth. In addition, a few other subprojects are likely to encounter the problem of insufficient capacity in the future. Such problems are most likely to have been caused by lack of detailed planning based on population projection. For some subprojects where a budget for O&M is insufficient, lack of field staff for O&M is a major problem.

(3) Water Supply Sector

The problems in the water supply sector are twofold: (1) problems caused mainly by lack of or insufficient city planning and population projection in time of planning; and (2) problems related to inadequate water quality management and insufficient measures against unaccounted-for water caused by financial limitations. The examples of the former are the four facilities which are not meeting the demand[46] and more facilities which are unlikely to meet the future demand as confirmed in the case of the Duc Pho water supply station in Quang Ngai Province. On the contrary, three water supply stations have the utilization rates of less than 20%[47].

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[44] The evaluation of current status of operation and maintenance was made based on information gathered through document analysis, field visits and questionnaire surveys. As for quantitative information, the data collected by "Asset Survey for Small Scale Pro-Poor Infrastructure in Vietnam" was used.

[45] Four roads in the mountainous areas: Quang Phong-Dong Xua road in Bac Kan Province; Ban Nga-Xuan Truong Commune Road in Cao Bang Province; Van Ho-Xuan Nha road in Son La Province; and Khau Lang-Cao Duong road in Tuyen Quang Province.

[46] The Tri Ton water supply station in An Giang Province, the Tuan Giao water supply station in Dien Bien Province, the Moc Chau water supply station in Son La Province, and the Vung An water supply station in Ha Tinh Province.

[47] The Yen Lac water supply station in Vinh Phuc Province, the Vu Quang water supply station in Ha Tinh Province, and the Hai Lang water supply station in Quang Tri Province.

The latter problems include a facility where legally required chlorination is not conducted[48] and facilities such as the Tuan Giao water supply station in Dien Bien Province where the residents are strongly dissatisfied with the quality of water supplied by the station[49].

Even if water quality is controlled presently, some facilities are likely to encounter the problem of degraded water quality caused by increasing groundwater contamination as population grows in the future. Other facilities are unable to replace damaged equipment (such as water meters) or repair broken parts because of lack of budget. Such facilities are unable to take necessary measures against the unaccounted-for water problem[50].

(4) Irrigation Sector

Settlement and erosion of dykes are not uncommon[51]. In two subprojects, the irrigation rates are around 90% due to the leakage from earth lining[52]. The leakage problem can be solved by upgrading the technical skills of the O&M staff.

The O&M structures of the irrigation sectors are categorized into two: (1) local authorities or irrigation management companies responsible for medium- to large-scale irrigation systems, and (2) farmers' organizations responsible for small-scale irrigation systems (Table 8). In the former case, it is important to strengthen communication between the O&M organizations and farmers groups. For the latter case, information sharing among the farmers and farmers' participation in O&M needs to be encouraged.

(5) Afforestation Sector

In general, afforested sites have seen healthy growth of planted trees and forests were regenerated on barren land. No large-scale forest loss has occurred since the completion of the project up to the time of the evaluation study. The protection forests planted or protected by the project are appropriately managed without being affected by illegal logging or forest fire. The forest protection has become effective especially since 2008 when local residents started patrolling forest as contractors.

Thinning at the sites where fast-growing acacia trees are dominating and inhibiting the growth of local species is urgently needed. Degraded forestry infrastructure such as

[48] The Sao Do water supply station in Hai Duong Province.

[49] Since the Tuan Giao and Duc Pho water supply stations have capacity of less than 3,000m^3/day, the law does not require them to have a water testing laboratory on the site as long as a local health office in the vicinity can undertake water testing services for them. These two facilities use the service by the local health offices. However, the time needed for the facilities to obtain the testing result is about one week for Duc Pho and two weeks for Tuan Giao, which suggests that they are not able to know the result in a timely manner.

[50] Such as the Tuan Giao water supply station in Dien Bien Province. The rate of unaccounted-for water at the Tuan Giao water supply station was 60% due to reasons including water meter problems.

[51] There are many cases where the problems were already solved at the time of the evaluation study after the efforts by the organizations responsible for O&M.

[52] The Ea Yeng reservoir in Dak Lak Province and the Song Rac irrigation system in Ha Tinh Province.

forestry roads and fire break lines also needs to be rehabilitated. The O&M organizations should secure a financial source for these activities.

Some problems have been observed in the road, water supply and afforestation sectors in terms of financial sustainability. The road and water supply sectors also have problems in the current status of O&M. Therefore, sustainability of the project is fair.

Box 6 Analysis of sustainability of the afforestation sector

Since it was Vietnam's first time to undertake an afforestation project with a Japanese yen loan, an additional in-depth study focusing on sustainability of the afforestation sector was conducted along with the ex-post evaluation study. The following is a summary of the analysis.

(1) Benefit-sharing mechanism – Purpose of its introduction

The project introduced a benefit-sharing mechanism which aimed at sharing economic benefits derived from the protection forest between the forest owners (PFMBs, local governments, etc.) and local residents. The mechanism was supposed to be fully operational after the termination of the project. Local residents were allowed to extract, free of charge, non-timber forest products such as firewood from the protection forest. Profits generated after thinning, which was to be conducted around eight years after the planting of the trees, were supposed to be shared by the forest owners and residents. In particular, profits from the thinning of fast-growing acacia trees were to be given only to residents. The purpose of the benefit-sharing mechanism was to raise the effectiveness of forest protection by introducing economic incentives to local residents.

Forest in the process of regeneration

(2) Actual operation of the benefit-sharing mechanism – Use of non-timber forest resources

The protection forests supported by the project are usually located at difficult-to-access sites such as very steep mountain areas or remote places very far from settlements. In most cases, households near the protection forests are surrounded by a production forest, which they own, and they collect a sufficient amount of timber and non-timber forest products from it. Therefore, few local residents rely on the protection forest for resource extraction purposes. The beneficiary survey has revealed that 75% of Kinh people, the majority ethnic group in Vietnam, and 38% of ethnic minorities do not use forest resources (firewood, nuts, fruits, honey, fodder, vine, etc.) from the protection forest at all. While ethnic minority groups living near the mountain peak have a tendency to use the protection forest, however infrequent it may be, for the Kinh group use of the protection forest is inconvenient and unappealing. Therefore, the forest resource sharing scheme can hardly serve as an economic incentive for residents since their reliance

(3) Actual operation of the benefit-sharing mechanism – Balance of payment of thinning

Due to the forests' remote locations and low market value of acacia, thinning of the forests that the project supported turned out to generate no profit. In 2008, the final year of the project, trial thinning of 50ha of acacia located at a relatively easy-to-reach area was conducted, which ended up with a negative balance of payment. Most of the protection forests which require thinning are located at more difficult-to-access places and high expenses of transportation, labor and forestry road repair costs are anticipated. The benefit-sharing mechanism was formulated on the premise that thinning would generate profits. However, the premise turned out to be untrue. Thinning, instead, incurs costs and the concerned organizations need to secure additional financing to conduct thinning.

Forest where trial thinning was conducted in 2008

(4) Occurrence of forest loss

Since project completion, no major forest loss has occurred. Thus, the forests generated or protected by the project can be said to have been managed and maintained effectively to a certain extent. During the project period, however, 256ha, or 0.6% of the total forest supported by the project, was lost due to reasons including death of trees caused by drought and severe natural conditions (100ha), forest fire (80ha), conversion to production forests by change of land zoning or conflicts with other development initiatives (60ha), and conversion to farm land or commercial forest land by encroachment (15ha). "Conflicts with other development initiatives" specifically mean that hydroelectric power plants were constructed in Phu Yen and Thua Thien Hue Provinces, and electric lines were laid down in Phue Yen Province. A number of trees were cut down during the constructions. Risks of forest loss listed here have been present for many years. It is, therefore, important for the concerned organizations to take

Illegally logged timbers confiscated by the PFMB

(5) Measures to raise forest sustainability

As stated in (4), strengthening measures to mitigate risks of forest loss is the key to sustainability. It is realized, as shown in (2) and (3), that the effects of the benefit-sharing mechanism for giving economic incentives to local communities are very much limited. It will be necessary to promote contracts with local residents for forest patrol with sufficient budgets which make such contracts possible. Participatory forest management mainly aiming at prevention of illegal logging and forest fire will be achieved by contracting out part of the forest management duties to local communities. In putting forward this measure, improvement of extension and facilitation skills of PFMB staff is necessary. In order to minimize death of trees, concerned organizations such as the Ministry of Agriculture and Rural Development (MARD), the Departments of Agriculture and Rural Development (DARDs) and PFMBs should strengthen their capacity particularly in the areas of soil analysis, tree selection, geographic information management, and mapping. For avoiding problems stemming from the change of land zoning and conflicts with other development initiatives, better communication and coordination with relevant government organizations will be effective. For preventing encroachment, raising residents' awareness is important, just as the measure for the prevention of illegal logging. In addition, training on generation of alternative income sources should be offered to the residents so as to avoid excessive reliance on forest and land resources in mountain areas. The concerned organizations are advised to undertake these measures and acquire necessary budgets.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

A total of 246 subprojects throughout Viet Nam were implemented in the five sectors, namely, the road, electrification, water supply, irrigation and afforestation sectors, under the project (The subprojects in the afforestation sector were undertaken in 53 Communes in five provinces). Relevance of the project which promoted local development is very high. Effectiveness is also high because the project prompted local industry development, improved rural living conditions, and ameliorated the local natural environment. Efficiency is fair mainly because the project period was longer than planned. Sustainability of the project has challenges including constraints in the road, water supply and afforestation sectors and partially insufficient operation and maintenance status of the water supply sector.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Planning Based on Long-term Perspectives

Some subprojects, particularly those in the water supply sector, were planned without long-term visions based on hard data such as the area's population projection. When formulating detailed plans, the provincial governments need to examine if the subprojects are designed to provide appropriate services over a long period of time. The MPI is also advised to examine this aspect by, for example, asking the provincial governments to fill out the information on the conformity to the area's long-term development plans in the standardized format used for the F/S.

(2) Strengthening the Monitoring System

The project covered multiple sectors and numerous target sites. While operational performances of each subproject can be measured, the examination of the project's effects as a whole is difficult. Despite having this constraint, the MPI needs to strengthen its monitoring system in order to access the operation and effect performances to a certain degree. It is recommended that the MPI review sector-wise problems and challenges experienced in the past projects and give necessary advice to the provincial governments based on the findings. The indicators which the O&M organizations routinely use for O&M can be used for monitoring purposes and the introduction of new indicators should be considered as long as it does not cause too much burden on the O&M organizations. In that way, the accuracy of the monitoring will be improved and it will be possible for the MPI to confirm if the project is producing expected effects continuously. For those sectors in which many challenges were identified, conducting sampling surveys to gather in-depth information on the project's effectiveness is recommended.

The recommended operation and effect indicators for each sector for regular monitoring are as follows:

Road sector: annual average daily traffic (AADT)
Electrification sector: Sales volume (MWh), electrification rate of household (%), distribution loss (%)
Water supply sector: population served, amount of water supply (m^3/day), rate of facility utilization (%), unaccounted-for water rate (%), number of incidences which did not meet water quality standards
Irrigation sector: area benefited by the project (ha), cultivated area by crops (ha), yield of rice per unit area (ton/year), number of benefited farmers
Afforestation sector: afforestation area (ha), survival rate (%), quantity of complementary planting, number of training participants

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

(1) Support for Human Resource Development and Institutional Strengthening

In the "recommendations" section, a major problem concerning the lack of long-term perspectives in planning is identified. It is also confirmed that insufficient capacity development hampers smooth O&M. When facilities are handed over to the O&M organization, training on skills development for the staff of the O&M organization should be offered so that sustainability of effective operation of the facility is ensured. This activity can be undertaken as part of the project during the implementation stage.

For solving these problems, JICA should give technical support to the recipient country not only in the areas of construction management and engineering but also in the fields of policy and institutional strengthening. The consulting services to be provided during project implementation should include services for supporting capacity building and institutional improvement activities.

(2) Efficient Project Management System and Delegation of Authorities to the Provinces

Quick decision-making was realized by establishing a direct and simplified line of command: from the CPMU at the MPI to the PPMU at the DPI in the province. In addition, the project employed a bottom-up approach of planning and delegated authorities to the provinces which were close to the project sites and better positioned to listen to what the beneficiaries had to say. These arrangements made it possible for the project to design subprojects which could best serve the needs of the beneficiaries. The provincial governments revised the plans flexibly in accordance with the changing needs and situations on the ground. As a result, outputs which met the expectation of the beneficiaries were produced and planned effects were achieved.

Smooth implementation of the project based on this decentralized management system seems to have been possible because the provincial governments in Viet Nam had sufficient capacity and experiences in managing multi-sector projects such as this project, as they have experienced in the preceding projects, "Rural Infrastructure Development and Living Standard Improvement Projects" (I) and (II).

(3) Setting Operation and Effect Indicators and Calculation of IRR

The project did not set operation and effect indicators which would enable the quantitative measuring of the project effects. Thus it was not possible to collect quantitative data on the project effects after the completion of the project. It is necessary to set the operation and effect indicators and conduct quantitative monitoring in order to confirm the outcome of the project at the completion and to appropriately conduct O&M after the project. It is recommended that sector-wise operation and effect indicators be set at the planning of the project.

Moreover, IRR was not calculated at the planning. The electrification and water supply sectors, in particular, are advised to calculate IRR so that the information can be used in setting appropriate user fees, which in turn leads to better cost recovery.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	(1) 43 subprojects: 390 km of provincial and rural roads, 113 km of urban roads, 162 m of bridges (2) 79 non-electrified villages: 1,766 km of electric lines, 510 transformers (3) 20 water supply stations: a total capacity of 83,000 m^3 (4) Rehabilitation of 15 irrigation systems: a total 67,169 ha of irrigated areas (5) 14 sites for the creation and improvement of production forest: a total of 36,950 ha (6) Consulting services	(1) 94 subprojects: 932 km of provincial and rural roads, 35 km of urban roads, 1,805 m of bridges (2) 109 non-electrified villages: 2,535 km of electric lines, 39,602 kVA (3) 27 water supply stations: a total capacity of 85,900 m^3 (4) Rehabilitation of 16 irrigation systems: a total 38,576 ha of irrigated areas and 52,626 ha of benefited crop areas (5) 20,568 ha of afforestation, 18,658 ha of natural forest protection, 4,438 ha of forest for assisted natural regeneration: a total of 43,664 ha Forestry infrastructure and rural infrastructure construction, training and extension on forest management and livelihood development (6) As planned
2. Project Period	March 1999 – December 2004 (70 months)	March 1999 – December 2008 (118 months)
3. Project Cost Amount Paid in Foreign Currency Amount Paid in Local Currency Total Japanese ODA Portion Exchange Rate	 2,787 million yen 11,332 million yen (1,133,200 million VND) 14,119 million yen 12,000 million yen 1 VND = 0.01 yen (As of October 1998)	 — 15,781 million yen (2,076,447 million VND) 15,781 million yen 11,547 million yen 1 VND = 0.0076 yen (Average between March 1999 and December 2008)