India

FY2017 Ex-post-Evaluation of Japanese ODA Loan Project
"The Karnataka Sustainable Forest Resource Management and Biodiversity Conservation Project"

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0. Summary

This project was implemented with the aim to restore the forests and improving the standard of living of the local residents through tree planting, livelihood improvement activities, and biodiversity conservation activities at the village level[1] by a community participation approach, thereby contributing to the reduction of poverty and conservation of biodiversity in the state of Karnataka in Southwest India

This project is highly relevant since it is consistent with priority areas under the Indian development policy as well as the Japanese ODA policy, and matches the development needs. The efficiency is fair since the project cost is kept within the planned cost but the project period exceeds the planned duration. Trees were planted mostly as per the plan by this project, which has promoted the regeneration of forests. While the degree of contribution of this project towards the improvement of the local standard of living cannot be measured quantitatively, owing to the fact that other factors such as local economic growth have been pushing up household incomes, various impact studies and interviews have confirmed that target households have increased their annual income, at least through income from small scale business through micro credit implemented for a certain period in this project. It can be said that the effectiveness is high since the planted trees had a high survival rate at the ex-post evaluation and further regeneration of forest is expected from the growth of the planted trees. Impacts of the project include conservation of biodiversity, diversification of income generation, activities organized by the village forest committees and the encouragement of women' participation through income improvement activities. In light of these things, the effectiveness and impact of the project are judged as high. The operational and maintenance system of the executing agency is well established without any technical problems, and the state of maintenance is generally favorable. Some issues remain with respect to the management of village forest committees and eco-development committees from a financial perspective, however, overall the sustainability of the effect is high.

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

1. Project Description

Project Location

Self Help Group of Village Forest Committee
Mulur Sub-district, Kolar Division

[1] The village referred in this document is not administrative village "Panchayat Village," but rather a unit of forest village consisting of either a set of settlements or a single settlement.

1.1 Background

The state of Karnataka is located in Southwest India, covers 191,791km^2 in area, and has a population of approximately 61.1 million[2]. The nominal GDP of the state is 217 billion dollars and ranks the fifth among all Indian states[3]. Direct investment by foreign capital reached 2.2 billion dollars in FY 2017 and ranked the third in India[4].

Eighty percent of the population in Karnataka are farmers. Forty nine percent of the revenue in the state comes from agriculture. Rice and sugarcane are cultivated in the plains along the western coast. Coffee and tea are cultivated at the foothill of the Western Ghats. The region produces timber, bamboo, and sandalwood, and the export of sandalwood, in particular, is limited to that produced in this region, as most of the raw materials for sandalwood refined oil in the world are produced in Karnataka. Cotton, onion, grains, sunflower, and peanuts are cultivated in the northwestern part of the state.

1.2 Project Outline

This project is to restore the forests and improving the standard of living of the local residents through tree planting, livelihood improvement activities, and biodiversity conservation activities at the village level by a community participation approach, thereby contributing to the reduction of poverty and conservation of biodiversity in the state of Karnataka in Southwest India.

Loan Approved Amount/Disbursed Amount	15,209 million yen / 15,040 million yen	
Exchange of Notes Date / Loan Agreement Signing Date	March 2005 / March 2005	
Terms and Conditions	Interest Rate	0.75 %
	Repayment Period (Grace Period)	40 years (10 years)
	Conditions for Procurement	General Untied
Borrower / Executing Agency	President of India / Karnataka Forest Dept.	
Project Completion	March 2015	
Main Contractor(s)	None	
Main Consultant(s)	None	
Related Study	SAPROF "Sustainable Forest Management and Development in Karnataka" (Nov. 2004)	
Related Project	ODA Loan Project "Eastern Karnataka Afforestation Project " (1997)	

2. Outline of the Evaluation Study

2.1 External Evaluator

Noriyo Aoki (Alfapremia Co., Ltd.)

[2] 2011 population census.
[3] Karnataka Finance Dept. March 2018 (Estimates).
[4] Department of Industrial Policy and Promotion, FDI Statistics.

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted during the following schedule.

Duration of the Study: August 2017 - January 2019

Duration of Field Study: November 13 - 25 and December 9 - 22, 2017, and June 17 - 26, 2018

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

3.1 Relevance (Rating: ③[6])

3.1.1 Consistency with the Development Plan of India

In its *10th Five Year Plan (2002-2007)*, India set a goal to raise the rate of area covered by forests and trees[7] up to 25% by the end of the tenure of the Plan[8]. The *10th Five Year Plan* has proposed recovery of degraded forests, sustainable forest management through joint forest management (JFM), and providing support for securing alternative incomes for local residents who are dependent on forests[9]. Since the Plan considered the conservation of biodiversity as a priority issue, this project was also designed to conserve biodiversity in the Western Ghats[10].

National policies in the forest sector is the *National Forest Policy (1988)*, which set a goal for 1/3 of the national land area to be covered by forests and trees. The government of India has also emphasized the need to protect wildlife and areas critical for biodiversity under the *Biological Diversity Act of 2002* and the *National Environmental Policy of 200*6.

In the *10th Five Year Plan of the State of Karnataka (2002 to 2007)*, the recovery of degraded forest has been specified as one of the issues having the highest priority, and the degraded forests that were previously not covered by the Eastern Karnataka Afforestation Project were identified as the area to be covered by this project[11].

At the time of ex-post evaluation, the government of India had set a goal for forest and tree cover rate to reach 33% by the end of the *11th Five Year Plan (2007-2012)* and stated the conservation of biodiversity to be important in the section of the Plan dealing with sustainable environment. While a target ratio of the land to be covered by forests and trees is not specifically defined in the *12th Five Year Plan (2012 - 2017*), the Plan lists forest management and enhanced greening through Joint Forest Planning and Management (in Karnataka JFM is termed as JFPM, herein after referred to as JFPM) by village forest committees (VFC) as well as strengthened forest management at the district level.

The *11th Five Year Plan of the State of Karnataka (2007-2012)* places emphasis on forest conservation, improvement of productivity in forestry, and conservation of biodiversity. The

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

[6] ③: High, ② :Fair, and ① : Low

[7] A forest is an area (over 1 ha) having a collection of trees where the crown rate is 0.1 and over 0.1 (10%). A crown is a part of the tree that is beset with branches and leaves. A group of trees whose crown rate is less than 0.1 is called a scrub, and a scrub is not classified as a forest. A forest whose crown rate is between 0.1 and 0.4 is called an open forest. A forest whose crown rate is 0.4 and over 0.4 was referred to as a dense forest at the time of the project appraisal, but dense forest was further subdivided into moderately dense forest (crown rate is between 0.4 and 0.7) and very dense forest (crown rate is 0.7 and over 0.7) at the time of the ex-post evaluation. Forest cover rate is a ratio of combined open forest, moderately dense forest, and very dense forest areas, divided by a total geographical area. Crown rate is a ratio in which the area covered by trees with dense branches and leaves within a 1 ha range is divided by the geographical area. Therefore, crown rate and forest cover rate are different. Forest and tree cover rate is a sum of the forest ratio and a crown rate less than 0.1.

[8] Ex-ante Project Evaluation Sheet.

[9] Same as the above.

[10] Same as the above.

[11] Same as the above.

12th Five Year Plan for the State of Karnataka (2012 - 2017) pledged to provide measures against the decline in the proportion of dense forests, planned tree planting for 73,000 ha of degraded forest through the Karnataka Forest Development Corporation (a part of the Karnataka Forest Department), and aimed to strengthen activities towards resolving conflict with the livelihood of the people that arise as a result of the loss of habitat for wildlife.

In light of the above, this project is consistent with the development policies of the government of India and the state of Karnataka both at the time of appraisal and ex-post evaluation.

3.1.2 Consistency with the Development Needs of India

At the time of appraisal, the state of Karnataka started the Eastern Karnataka Afforestation Project in 1997 and planted trees on 200,000 ha of degraded forests. However, since the burden on forests due to collection of fuel wood and grazing of livestock was still high, the remaining 450,000 ha of degraded forest that were not covered by the Eastern Karnataka Afforestation Project needed to be handled by this project in an attempt to recover forests[12].

At the time of appraisal, many people, including the poor, depended on forests to obtain livestock feed and fuel, and earn an income, and the burden on the forests were increasing due to an increase in population. As a result, it was in a vicious circle that, due to deterioration of soil and moisture conservation function, leading to a decline in groundwater level, the shortages of agricultural and drinking water occur, it was eventual threatening of the livelihood of the poor, causing, in turn, an excessive forest use beyond allowable amount for sustainable forest preservation. For this reason, simultaneously expanding the area of forest and improvements in the standard of living for those dependent on forests was an important tasks[13]. In order to cut off the vicious circle, it is important to supply sustainable forest products to 5.99 million poor in rural Karnataka and to support to secure alternative income, which would lead to not only for conservation of natural environment and water resources, but stabilization and improvement of the lives of local residents. Therefore, it was considered urgency and importance high.[14]

At the time of appraisal, the Western Ghats was among the most significant biodiversity hotspots[15] in the world and in need of conservation of biodiversity[16].

At the time of ex-post evaluation, trees were planted on approximately 180,000 ha of degraded forests through the project, which corresponded to 40% of the total area required for afforestation.

At the time of ex-post evaluation, trees were planted for fuelwood in order to reduce the amount of livelihood fuel collected from the forest by the poor, who were highly dependent on forest resources. In order to prevent them from earning an income by cutting timber, support was also provided towards the improvement of alternative sources of income for the poor.

Additionally, at the time of the ex-post evaluation, eco-development committees (herein after referred to as “EDC”) were formed for the purpose of biodiversity conservation in the Western

[12] Materials provided by JICA.
[13] Same as the above.
[14] Same as the above.
[15] Refers to regions where species are endangered or under the risk of destruction despite of a high level of biodiversity at a global scale. Certified by an international NGO, Conservation International (CI).
[16] Materials provided by JICA.

Ghats, and they conducted activities that raise awareness on the protection of biodiversity and the environment. The elephant, an endangered species, forms the main focus of protection, and activities were undertaken to reduce the conflict between elephants and people, which involve capture and domestication of elephants that disturb farmlands. The number of elephants also increased through mating among the captured elephants.

Aside from the 180,000 ha where trees were planted under this project, 270,000 ha of degraded forests still remain. And while trees are being planted on 73,000 ha of degraded forest by the Karnataka Forest Development Corporation, which is a part of the Karnataka Forest Department. Since there are many devastated forests, the afforestation needs still remain.

The demarcation of roles with other donors are clear and do not overlap with each other. The Western Ghats Forest Project (1993 - 2002) by the UK Department for International Development (DFID) formed VFC and conducted tree planting by JFPM in the tree-planting districts not covered under this project. Of the Zones covered under this project, B Zone was an area not covered by the DFID project. Therefore, B Zone was designated as a project target area by the Karnataka Eastern Afforestation Project and then afforestation was carried out.

Development needs which were highly urgent at the time of appraisal were more satisfied by tree planting under this project than that of appraisal period, but the need for planting trees remained in degraded forests at the time of ex-post evaluation. However, the priority of this project and the regions selected by this project is said to be relevant.

3.1.3 Consistency with Japan's ODA Policy

Under the *Medium-Term Strategy for Overseas Economic Cooperation Operations (2002)* at the time of appraisal, priority areas in support to India were "regional development in which the poor receive benefit" and "improvement of the environment". In the *Country Assistance Strategy for India (2004)* the forestry sector was positioned as a major sector for support to India. The improvement of the quantity and quality of forests through the expansion of forest areas and a reduced open forest cover rate[17], the sustainable supply of forest products and support for acquisition of alternative income to the poor highly dependent on forest resources leads to both conservation of the natural environment and water resources, as well as the stabilization and improvement of livelihoods among local residents, and these efforts were considered to be highly urgent and important from the perspective of measures against poverty[18].

3.1.4 Appropriateness of the Project Plan and Approach

This project was afforestation project by using a community participatory method that tailored to forest conditions in state of Karnataka, especially, the poor who need fuel materials for daily life. The activities for planting trees and improving livelihood were conducted with the aim of preventing decrease of the forest cover rate and regenerating forest. Microfinance opportunities provided to the poor were supportive in improving the standard of living through enhancing income. From the viewpoint of biodiversity, it was appropriate as an approach that residents were organized, activities started, and biodiversity was conserved.

[17] Crown rate is the area covered by trees out of a forest area, while an open forest is a forest whose crown rate is 10 or over 10-40%.
[18] Materials provided by JICA.

In light of the above, the implementation of this project is consistent with the development policies of both India and the state of Karnataka. In terms of development needs, while the demand for afforestation in degraded forests remains, the project sufficiently matched Japanese aid policies, and the project plan and approaches were also appropriate. Judging comprehensively, it can be said that the relevancy is high.

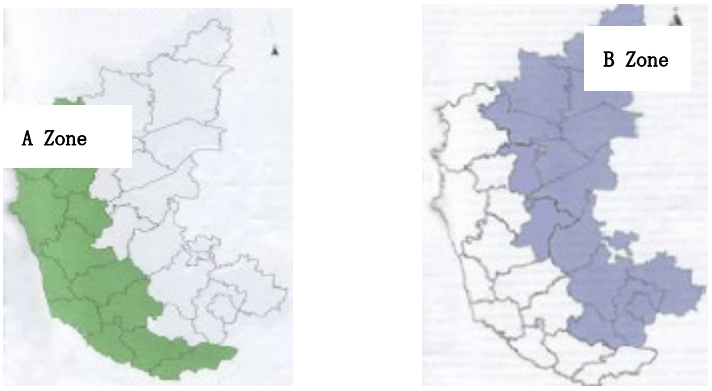

Figure 1 Districts in Karnataka Covered by This Project
Source: Provided by the executing agency.
Note) Differences between A Zone and B Zone is discussed in the Effectiveness section.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

3.2.1.1 Afforestation

Trees were generally planted as planned. Models 1 to Model 5 were models in which trees were planted on state-owned land managed by the Forest Department, and the seedlings were grown in nurseries by the Forest Department. The Forest Department and the VFC[19] jointly planted the seedlings and protected growing trees. Upon advice from the Forest Department and NGO on technical and social considerations, a forest management plan called a microplan was formulated, and trees were planted based on this plan. For species of planted trees at the time of appraisal, seedlings of tree species requested by the residents were planted, if the soil condition, other planting conditions etc. are met.

In model 6, tree planting activities were implemented in schools under the National Rural Employment Generation Scheme, and some of the schools covered by the scheme were also covered by this project, which resulted in a narrowing down of the target schools to be covered by this project[20]. For this reason, model 6 did not reach the goals set at the time of appraisal. Mangrove tree planting under model 7 measured planting area on-site at the time of appraisal, and the actual area did not reach the planned due to the fact that a measuring instrument like GPS was not used for accurate measurement.[21].

[19] Requirements for the establishment of a VFC are the willingness of at least 60% of villagers (one male and one female per household) to participate in a VFC in a planting village, and participation from at least 40 households from a settlement or a village in the VFC. A VFC must be no more than 2 km from a tree planting zone occupied predominantly by scrub, the area for planting must be 100-200 ha, and the planting site and the VFC village must be located within the same micro watershed. Establishment of a VFC is approved by the division office (from response to the questionnaire for the executing agency).
[20] From an interview with the Forest Department.
[21] Same as the above.

Table 1 Afforestation by Model[Note1)] (model 1 - model 7) (Unit: ha)

Model		Planned Area	Actual Area	Achieved %
Model 1[Note2)]	Natural Regeneration Model	35,000	35,500	101
Model 2	Supplemented Natural Regeneration Model	50,000	51,659	103
Model 3	Timber Production Model	25,000	26,420	106
Model 4	Fuelwood Model	50,000	51,521	103
Model 5	Non-timber Forest Products Model	18,000	18,100	101
Model 6[Note3)]	School Tree Planting Model	4,000	2,109	53
Model 7[Note4)]	Mangrove Planting Model	3,000	1,815	61
	Total	185,000	187,124	**101**

Source: Materials provided by JICA, responses to a questionnaire for the executing agency
Note 1) A model refers to a type of tree planting relative to the objective of tree planting, i.e. (fuelwood, timber production, and conditions in the target area (crown rate, soil conditions, rainfall, slope)). See Appendix 1 for the types of model.
Note 2) Selection criteria for planting areas from model 1 to 5 are different between A Zone and B Zone. See Appendix 1.
Note 3) Conducted by the Forest Department and school officials.
Note 4) Conducted by fishery officials and the Forest Department.

Plans for job creation were formulated at the time of appraisal to provide employment opportunities in tree planting and soil and moisture conservation projects. However, the number of people for whom jobs were created, as defined in the initial plan, was not achieved due to the fact that contractors perform the tasks using their own machines and personnel in instances where a tree planting contractor is selected through competitive bidding under the Karnataka Procurement Act (1999). However, since bidders were absent for remote areas, VFC members conducted tree planting and soil and moisture conservation activities. As shown in Table 2, the actual value was 77% of the target value defined at the time of appraisal. The target value was not achieved because this act was enacted during the Eastern Karnataka Afforestation Project (1999), and the target value should have been defined for the evaluated project by implementing this new law. However, the study was insufficient and appropriate consideration was not given, and the target value remained unchanged during this project. There were issues in terms of insufficient study and project supervision at the time of appraisal for both JICA and the executing agency.

Table 2 Planned and Actual Related with Job Creation by Tree Planting and Soil and Moisture Conservation Activity

	Plan	Actual	Achieved %
Jobs created (person / day)[Note)]	44,464,000	34,391,474	77%

Source: Materials provided by JICA, response to the questionnaire for the executing agency
Note) Total conversion for employment of a person a day (person/day)

Table 3 Activities for Participatory Afforestation Project

Activities for Tree Planting	Unit	Plan	Actual
Workshops, seminars, discussions (forests, agriculture, and livestock, water use, agroforestry, tree planting management, watershed conservation, etc.)	times	80	80
Preparation of pamphlets, posters and documents on success cases	no.	30	30
Participatory monitoring and evaluation for VFC (midterm, final)	times	4,000	4,000

Source: Materials provided by JICA, response to the questionnaire for the executing agency

Aside from models 1 to 7, there was also another model called model 8, which involved farmer forestry in which seedlings grown by the Forest Department were sold to individual

farmers[22] to promote tree planting on privately owned farmland. According to the plan at the time of appraisal, distribution of seeds to farmers originally had the purpose of growing seedlings from seeds and transferring afforestation technology. However, the farmers were afraid of the loss of small seedlings due to livestock grazing etc. The farmers did not want to be distributed seeds and wanted the distribution of large seedlings that grew to a certain extent, so the number of seeds distributed was below the plan.[23] Regarding the damage caused by grazing of livestock and the appropriate size of seedlings, the Forest Department should have the experienced knowledge, and it seems to have been predicted from the time of appraisal, but the on-site needs of farmers' forestry was not sufficiently confirmed.

Table 4 Outputs for Individual Farmers

Model 8	Unit	Plan	Actual	Achieved %
Afforestation at the demonstration site	ha	2,150	2,165	1019
Distribution of seeds to farmers, etc.	ton	500	160	32
Distribution or Selling of seedlings (8"×12")	no.	1,000,000	1,000,000	100
Distribution or Selling of seedlings (5"×8", 4"×6")	no.	75,000,000	75,000,000	100

Source: Materials provided by JICA, response to the questionnaire for the executing agency

3.2.1.2 Livelihood Improvement Activities (Income Generation Activities)

VFC were provided with 400,000 rupees as incentive for JFPM activities over the course of two years after establishment, which were used for activities pertaining to the improvement of income for self-help group (herein after referred to as SHG)[24]. SHG included new SHG for VFC formed at the start of the project and existing SHG formed in other programs in the past. Approval for the establishment of new SHG of VFC was given by division offices. When the management committee of a VFC approved, micro credits were also made available to existing SHG. Approximately 10% of the SHG were male and approximately 90% of the SHG were female[25].

Table 5 Number of VFC and SHG Newly Formed

	Unit	Plan	Actual	Achieved %
VFC	No.	1,200	1,222	102
SHG[Note)]	No.	6,000	6,066	101

Source: Materials provided by JICA, response to the questionnaire for the executing agency
Note) Data was not available on the existing number of SHG.

3.2.1.3 Biodiversity Conservation Activities

As a part of biodiversity conservation activities executed under this project, ditches were constructed to separate habitat conserved for elephants and other wildlife from the residences in nearby villages. The Forest Department has the Biodiversity Bureau, which is in charge of the management of national parks and wildlife sanctuaries as well as other activities for biodiversity conservation. Since the Bureau increased the area designated as wildlife

[22] There is no subsidy system supported by the government.
[23] Influence on the cost due to changes in the output has not been verified (from a response by the Forest Department).
[24] Loans were provided normally with an interest rate ranging from 10% to 12%.
[25] I*mpact Assessment Study of JICA Assisted Forestry Projects in the State of Karnataka, 2015*, the Forest Department. From 1222 newly formed VFC villages, a total of 30 villages were extracted from circle offices in proportion to the number of villages under the jurisdiction of each circle office.

sanctuaries[26], only areas for the improvement of habitat environment have increased in terms of a comparison between the planned value at appraisal and the actual value. .

3.2.1.4 Strengthening of Forest Management Capacity

(a)Monitoring and Evaluation

As noted in the plan submitted for the appraisal, a baseline study was conducted on livelihood by survey institutions and NGO in order to implement the project and perform post-project monitoring in an efficient manner, and *Project Implementation Manual 2015* was developed as planned, which includes detailed guidelines for livelihood improvement activities.

(b)Training

In order to implement the project efficiently and ensure sustainability after the completion of the project, a series of training sessions were conducted for the Forest Department staff, VFC management committee members, and NGO on tree planting techniques and Joint Forest Management, as shown in Table 6. The plan submitted for appraisal assumed the training session to be from one week to six weeks, but right after the start of the project, the executing agency shortened the training period to four days to accommodate VFC and SHG members, as detailed below. Training for forest guards, foresters, and village motivators were changed from four days to two days. These changes were appropriate since training sessions were accommodated to the livelihood of the people and ensure practicality of the training content. While skill training for improvement of livelihood was not planned initially, such training sessions were actually conducted due to a recognition of their need.

Table 6　Training for VFC, SHG and so on.

Training	Actual
VFC & SHG member training (4-day training)Note1)	1,635 sessions
Development of a microplan (village forest management plan)	200 plans
Training from community to community	165
Trainings for VFC representatives and managing committees	105
Training for NGO	4
Forest guard, forester, village motivator	15
Skills training for improvement of livelihoodNote2)	1,500

Source: Materials provided by JICA, response to questionnaire for the executing agency
Note1）Long-term training sessions spanning a week to two weeks were planned at the time of appraisal.
Note2）The number of skill training sessions for improving livelihood were not defined at the time of appraisal.

(c) Expansion of GIS System

As detailed in the plan submitted for appraisal, a software for processing, analyzing, creating a database, web site making of topographic and administrative data was installed in the Forest Department headquarters to improve efficiency in selecting afforestation points and forest management. A software for accessing the database in real time was also installed in each local office. Overseas training on the geographic information system (GIS) and training session at the Forest Department on development of maps established in Eastern Karnataka Afforestation Project were also held. At the time of ex-post evaluation, a management information system (MIS) was developed using the funds for the Forest Department (which were not part of the fund for the project) to enable an electronic lumbering application. Development of these systems were achieved due to continuous support through the Eastern

[26] From an interview with the executing agency.

Karnataka Afforestation Project and this project[27].

(d) Infrastructure Development for On-site Staff

The construction of facilities for on-site staff and procurement of office equipment and facilities (computers, etc.) were completed generally as outlined in the plan at appraisal.

Project outputs were executed mostly as planned. In relation to the plan and actual, please see "Comparison of the Original and Actual Scope of the Project " at the end of this report.

3.2.2 Project Inputs

3.2.2.1 Project Cost

Total project cost at the time of appraisal was 18,477 million yen, of which 15,209 million yen was covered by ODA loan. Actual total project cost was 16,099 million yen, but the information could not be obtained in the details in foreign and local currencies. Actual cost covered by the ODA loan was 15,040 million yen[28], which was 99% of the planned ODA loan amount. In terms of the total project cost, the planned total project cost was 18,477 million yen while the actual cost was 16,099 million yen (87% of the planned cost). This is largely due to the fluctuation in the exchange rate. Actual cost covered by the executing agency was 1,025 million yen.

Table 7 Comparison of Plan and Actual Related with Project Cost (Unit: million yen)

	Plan[Note1)]		Actual[Note4)]	
	Total	ODA Loan	Total	ODA Loan
Afforestation	10,622	10,622	12,563[Note3)]	12,563[Note3)]
Income generation activities	468	468	584	584
Biodiversity conservation	308	308	302	302
Strengthening of forest management capacity	1,649	1,649	1,626	1,626
Price escalation	868	868	0	0
Physical contingency	696	696	0	0
Tax	7	0	0	0
General and administrative expense	3,261	0	1,025	0
Interest during construction	598	598	0	0
Total	18,477	15,209	16,099[Note4)]	15,074[Note4)]

Source: Planned cost from materials provided by JICA, and actual cost from the response to the questionnaire for the executing agency

Note 1) Exchange rate: foreign currency 1 USD=109 yen, local currency 1 rupee = 2.40 yen: price escalation rate: foreign currency 1.4 %/year, local currency 1.8 %/year: physical contingency rate: 5.0 %: period for cost estimation: August 2004.

Note 2) Exchange rate (actual): (average exchange rate between March 2005 and March 2015 is 1 USD = 101 yen), and 1 rupee = 2.10 yen. Final actual cost reported by the executing agency may be different from the amount reported by the Japanese side since the executing agency had converted to yen every month.

Note 3) Actual cost is larger than the planned cost since physical contingency and price escalations are taken into account.

Note 4) The total does not necessarily match because a value below one million yen is rounded down for each project cost. Cost accounted by the ODA loan in this table is the actual cost reported by the executing agency, which is different from the actual cost reported by JICA.

3.2.2.2 Project Period

The project period lasted from March 2005 (L/A signed) to March 2015, which was 10 years and one month, or 121 months[29]. The project was designed to end in March 2013, in other words, in eight years and a month or 97 months[30], but the actual duration was 125% longer than the

[27] From a response by the staff in charge of information management at the executing agency.
[28] From materials provided by JICA. 15,074 million yen according to the materials provided by the executing agency.
[29] Responses to the executing agency questionnaire.
[30] The ex-ante evaluation sheet.

planned duration.

Definition of the project completion was not mentioned in official documents, thus the evaluator assumed it, based on the JICA provided documents and through discussions with the executing agency, as the time of completion of supplementary planting activities and biodiversity conservation activities[31]. While some research studies were still underway at the end of FY2014, essentially all the planned activities had been implemented and the project was considered complete at the end of fiscal year FY2014[32]. The periods for supplementary planting and tree planting were longer than planned because tree planting was continued as a result of reduction in total project cost owing to the influence of the fluctuation in exchange rate during the project period and the use of those funds on tree planting and supplementary planting[33].

Table 8 Comparison of Plan and Actual Related with the Project Period

	Planned Period	Period (months)	Actual Period	Period (months)
■ Afforestation				
Planting trees	2005/3 - 2009/3	49	2005/6 - 2012/3	82
Supplementary planting	2006/3 - 2013/3	85	2006/6 - 2015/3	106
■ Income generation activities	2005/3 - 2010/4	62	2005/6 - 2015/3	118
■ Biodiversity conservation	2005/3 – 2013/3	97	2005/6 - 2013/3	94
■Strengthening of forest management capacity				
Monitoring and evaluation	2005/3 - 2010/3	61	2005/6 - 2013/3	94
Training and study	2005/3 - 2010/3	61	2005/6 - 2015/3	118
Expansion of GIS system	2005/3 - 2010/3	61	2005/6 - 2010/3	58

Source: Materials provided by JICA, response to the questionnaire for the executing agency

3.2.3 Results of Calculations for Internal Rates of Return (Reference Only)

The financial internal rate of return and economic internal rate of return for the afforestation project were calculated based on the method defined at the time of appraisal. Similarly, environmental impact was also calculated using estimation items defined at the time of appraisal.

Table 9 Internal Rate of Return of Project

	Financial Internal Rate of Return (FIRR)	Economic Internal Rate of Return (EIRR)
At Appraisal	9.8 %	13.7 %
At Ex-post Evaluation	10.3 %	13.7 %
Cost	Planting and soil conservation, forest management, infrastructure development for the Forest Department, dissemination and training, maintenance costs	Planting and soil conservation, forest management, infrastructure development for the Forest Department, dissemination and training, maintenance costs
Benefit	Revenue by sales of forest products	Increased amount of forest products, water source protection, income from agriculture, environmental effect.
Project Life	30 years	30 years

Source: Materials provided by JICA, response to the questionnaire for the executing agency
Note) Since the project cost was calculated at the time of appraisal without taking price escalation into account, this calculation is also performed without considering the price escalation.

[31] Result of discussion with the executing agency at the time of the on-site study.
[32] Activities for strengthening VFC activities were conducted by NGO between April 2013 and September 2014. This was conducted using local currency, given that the total project cost was reduced due to influence of the fluctuation in the currency exchange rate during the project period.
[33] Response by the executing agency.

The financial internal rate of return was 10.3%, since the profit, which is the fees collected, was large based on conversion from the values of timber and NTFPs of the forests in Karnataka based on benefit-allocation ratio for the Forest Department and VFC. The economic internal rate of return was 13.7%, which was the same as the rate at the time of appraisal.

In light of the above, the project cost is mostly within the planned, but the project period was exceeded by 24 months than original plan. Outputs were implemented mostly as planned, but job creation by tree planting did not reach the target specified in the plan because of a constraint imposed by the procurement act of the state, and the research plan at the time of appraisal required a longer period of time than originally planned. Therefore, the efficiency is judged as fair.

3.3 Effectiveness (Rating : ③)

3.3.1 Quantitative Effects (Operational and Effects Indicators)

3.3.1.1 Planted Area, Number of Planted Seedlings, and Survival Rate (Operational Indicator)

As shown in Table 10, indicators for tree planting were mostly achieved in this project. Since there were no other tree planting projects, it is considered these changes were mainly due to tree planting activities conducted jointly by the Forest Department and VFC. As shown in Table 11, the survival rate of the planted trees was 68% at the time of ex-post evaluation, which is not the target level. While this is likely because of the fact that the survival rate was not set properly, high survival rate at the time of ex-post evaluation indicates afforestation is in a favorable state.

Table 10 Comparison between Plan and Actual Related with Plantation in Target Villages

Indicator Name	Target Value (2015)	Actual Value (2015)	Achieved %
	Completion Year	Completion Year	
Planted Area	185,000 ha	187,085 ha	101 %
Number of Planted Trees (Excluding Farm Forestry)	147,120,000	146,464,171	100 %
Number of Planted Trees (Farmer forestry)	15,955,947	16,869,885	106 %
Number of Supplementary Planting	18,390,000	18,390,000	100 %

Source: Ex-ante Evaluation Sheet. Materials provided by the executing agency, response to the questionnaire for the executing agency

Table 11 Survival Rate of Planted Tree in Target Villages[Note1)]

Indicator Name	Target Value[Note2)] (2019)	Actual Value (2015)
	6 Years After Completion	Completion Year
Survival rate of planted trees	75 %	68 %

Source: Ex-ante Evaluation Sheet, response to the questionnaire for the executing agency.
Note1) Trees planted by supplementary planting are counted in the survival rate. Survival rate is defined in India as the rate against the number of planted seedlings.
Note 2) The survival rate being lower than the target value for 2019 (target value defined at the time of appraisal) is understood to be due to the influence of a drought (rainfall was 10% or more lower than average) that continued between 2007 and 2015 in B Zone (from response to the questionnaire for the executing agency).

3.3.1.2 Changes in Forest Cover Rate in the Target Districts (Reference Indicator)

Forest cover rate is a rate of the area covered by forests out of the total land area, and the

cover rate shown in Table 12 is cited from the *India State of Forest Report*[34] for districts covered by this project. On this satellite data, observation on urbanization and other commercial afforestation areas, the area of agricultural crops regarded as forest, reduction of forest burden by using LPG, etc. is not comprehensively calibrated. Since it is not the forest coverage rate that specifically identified the afforestation area of this project, it is treated as a reference indicator and is not included in the evaluation.

Table 12 Forest Cover Rate (Reference Indicator)

Indicator Name	Forest Cover Rate (2005)	Forest Cover Rate (2015)	Increase in Forest Area 2005⇒2015
	Project Start Year	Completion Year	
A Zone[Note1)]	39.0 %	40.0 %	727 km^2 (72,700 ha)
B Zone[Note2)]	6.5 %	7.0 %	483 km^2 (41,800 ha)

Source: Forest cover rate by the *India Sate of Forest Report*
Note1) A Zone: 2006-2015 2,015 mm/ average annual rainfall
Note2) B Zone: 2006-2015 697 mm/average annual rainfall

A Zone includes the Western Ghats region where rainfall is abundant, and this region has a favorable condition for a natural increase in forest cover rate. As shown in Table 13, forest area of scrub in A Zone has decreased by 2.4% while the area of open forest has increased by 10.8%. Dense forest has slightly decreased by 1.1%. However, because the Forest Department pointed out that there were changes in the form of land use in agriculture and resort development sites among the forest areas, it is difficult to simply judge the factors affecting decrease and increase of forest cover rate (those of open forest).

Table 13 Changes of Forest Area in A Zone (Reference Indicator) (unit: km^2)

Indicator Name		Plan (2004)	Actual (2017)	Changes in Area	Rate of change
		Appraisal	Ex-post Evaluation		
Crown density	Scrub (0-less than 10%)	884	863	-21 km^2	-2.4 %
	Open Forest (10 or over 10%- less than 40%)	9,141	1,0125	984 km^2	10.8 %
	Dense forest (40 or over 40%)	21,080	20,844	-236km^2	-1.1 %

Source: Forest cover rate by the *India Sate of Forest Report*

Unlike A Zone, B Zone is a region where agriculture alone cannot sustain a livelihood due to its soil quality (laterite soil, black cotton soil, etc.) and insufficient rainfall amount. Therefore, lots of migration of labor to cities and the Western Ghats takes place.

B Zone is also affected by a drought that lasted from 2007 to 2015 (rainfall was 10% or lower than average)[35]. Scrub areas expanded in districts in central parts of the state and in Bengaluru city and its surrounding rural areas and are increasing slightly even in prefectures in suburbs of Bengaluru. Open forest has increased by 11% (440 km^2). The majority of this increase was due to an increase of 342 km^2 in Tumkur district. Among the districts in B Zone, soil in Tumkur was suited to tree planting while afforestation activities were well taking place, leading to an

[34] Data from the executing agency, which is based on the Indian satellite data.
[35] Information from the executing agency.

increase in open forest. Dense forest (including very dense forest) decreased by 1.8%.

Table 14 Changes of Forest Area in B Zone (Reference Indicator) (unit: km^2)

Indicator Name		Baseline (2004)	Actual (2017)	Changes in Area	Rate of change
		Appraisal	Ex-post Evaluation		
Crown Density	Scrub (0 - less than 10%)	2,267	2,328	61 km^2	2.7 %
	Open Forest (10 or over 10% - less than 40%)	4,012	4,452	440 km^2	11.0 %
	Dense forest (40 or over 40%)	1,018	1,000	-18 km^2	-1.8 %

Source: Forest cover rate by the *India Sate of Forest Report.*

3.3.1.3 Improvements on the Standard of Living

As shown in Table 15, annual household income has increased by a certain amount through micro credit activities according to an evaluation conducted by the executing agency at the time of project completion, but whether "a 10% increase in the income of farming households in target villages", which was one of the targets defined at the time of the appraisal, has been achieved or not is not verified quantitatively[36]. Standard of living in VFC villages itself cannot be qualitatively regarded as due to an impact purely from this project because regional total production value has been pushed up in general, but as detailed in "3.3.2.2 Improvements on the Standard of Living" for qualitative impact, an improvement on standard of living has generally been confirmed through the study.

Table 15 Increase in Annual Income of Households[Note)] by Micro Credit Activities

Annual Income Increase for Households	No. of Respondents	Ratio
30,000 rupees or more	435	22 %
20,000 rupee or more– less than 30,000 rupees	637	33 %
less than 20,000 rupees	872	45 %
Total	1,944	100 %

Source: *Final Review and Evaluation, 2015* Forest Department

Note) The survey from the *Final Review and Evaluation*, which is the source of this table, is a result of a survey of VFC in 122 villages in A Zone and B Zone. The report states that villages were sampled randomly in a number proportional to the number of villages in each district, but the report does not specify the method of random sampling. This survey conducted a household survey for 1,944 households, and included farmers, self-employed, and other employed families in 472 SHG within surveyed villages. Classification of social hierarchy of surveyed households showed that 30% were scheduled tribes (ST) and scheduled caste (SC), 19% were backward class, and 54% were others.

Examples of businesses that utilized micro credit are as follows.

Table 16 Examples of Businesses that Used Micro Credit (Unit: %)

Type	
Dairy, poultry, sheep, fishing, etc.	48 %
Agriculture	49 %
Retail	1 %
Dressmaking	2 %
Total	100 %

Source: *Impact Assessment Study of JICA Assisted Forestry Projects in the State of Karnataka, 2015* Forest Department; see footnote No.25 for method of extracting villages

In order to conduct these businesses, some have borrowed from other financial institutions

[36] This household income is compared based on the baseline study at the start of the project (from the response by the executing agency). This baseline study was conducted at the start of the project with an NGO and led by division and range offices of the Forest Department. Studies took place during the development of the microplan at each village.

or lenders. The repayment rate of micro credit by SHG is 54%[37]. Such a low repayment rate is suspected to be largely due to a lack of clear standards for assessment for loans. In actual lending, loans were provided based on an evaluation of loans and skills useful for improving income (existing skills and new skills acquired through skills training implemented by this project) based on past repayment records. Penalties for SHG members who failed to repay the loans were to be predefined by SHG. Penalties for cases in which SHG fail to repay VFC were to be determined by the VFC management committee[38].

3.3.2 Qualitative Effects

3.3.2.1 Regeneration

Two villages out of 804 VFC villages in A Zone were visited at the time of ex-post evaluation, but forest regeneration was making progress in all of the plantation areas in villages. At Venugopalaswamy village in Kolar, for the purpose of forest conservation, trees were planted to forest scrub areas and activities were implemented for the protection of seedlings by VFC residents, which specifically included the appropriate management of livestock [39] and strengthening of a prohibition against entering the afforestation area for several months following planting[40]. These villages also reinforced reporting duties by residents to the Forest Department on forest fires and illegal logging, activities that were likely a cause of reforestation. Three out of 418 VFC villages were visited for B Zone, of which one village was making progress on reforestation. This is largely due to the soil quality and rainfall in B Zone, but is also due to the fact that afforestation was planned without consideration of drought periods. At the village of Ganjigatte in Chitradurga district, where reforestation was not making progress, an absence of VFC residents due to seasonal labor migration during draughts[41] led to free-grazing livestock entering the afforestation area in search of grass and water, damaging the seedlings and likely preventing reforestation from making a progress[42]. Trees could have been protected if taller seedlings that have grown to some extent were distributed to places in which rainfall is limited[43].

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[37] *Impact Assessment Study of JICA Assisted Forestry Projects in the State of Karnataka, 2015*, the Forest Department.
[38] *Project Implementation Manual*, the Forest Department.
[39] Penalties include leashing and preparation of fodder for cows, enforcement of limits to range of grazing by goats and sheep, etc., for the purpose of protecting the environment.
[40] An example is the VFC village in Anabur Navagram, Davanagere district, in B Zone, and VFC village in Baruve, Shivamogga district, in A Zone.
[41] As noted earlier, there was an impact from a prolonged drought (i.e. rainfall was lower than the average by at least 10%) which continued from 2007 to 2015 in B Zone.
[42] From an interview..
[43] From an interview with a staff from the Forest Department in Chitradurga district.

		
Plantation area cleared at the time of planting (Mulur, Kolar) November 2006 (Region with an annual average rainfall of 883 mm)	Red sandalwood grown in the planting area on the left (Mulur, Kolar) June 2018	Trees in the plantation area on the left (Mulur, Kolar) June 2018

According to an interview with the Forest Department staff[44], government policy for introducing LPGs led to an introduction of LPG in over half of the VFC households in A zone and about 30% of households in B Zone. This policy may have caused a decline in the use of fuelwood from forests, which may have influenced regeneration of forests in both A Zone and B Zone.

3.3.2.2 Improvements on the Standard of Living

While the pure impact of this project cannot be measured quantitatively due to the influence of the development of the local economy for more than 10 years, improvement in rural infrastructure, and improved income through migrant labor. At the ex-post evaluation, out of the visited villages

there were the two villages of Anabur Navagram VFC village and Venugopalaswamy VFC village where an improvement in livelihood was observed through this project. Residents who needed loans to cover the repair cost for their homes prior to the beginning of this project were now in need of loans for the education and marriage of their children, and were at a stage where they were wanting a livelihood with an even higher standard of living[45]. The final review study and the impact study conducted by the Forest Department have also shown cases in which micro credit by SHG groups at VFC villages[46] in A Zone were able to allow villagers to earn a stable revenue through dairy businesses[47]. In terms of nutritional improvement, interviews have also revealed that groups and individuals who participated in dairy and other income improvement activities also experienced an increase in the amount of dairy products their families consumed[48]. Some EDC members also noted that water storage tanks, deep well digging, and installation of roads for better access to villages have led to an improvement in the living environment. Further evidence and studies are needed to verify a causal relationship for questions pertaining to incomes improvement only by this project, which are tailored to forest regeneration and improvement on the standard of living.

[44] From interviews with state-level and division-level staff.
[45] Baruve village, Shivamogga district. Venugopalaswamy village, Kolar district.
[46] Baruve village, Shivamogga district. Venugopalaswamy village, Kolar district.
[47] *Impact Assessment Study of JICA Assisted Forestry Projects in the State of Karnataka, 2015*, the Forest Department. *Final Review and Evaluation, 2015*, the Forest Department.
[48] Baruve village, Shivamogga district. Venugopalaswamy village, Kolar district.

3.4 Impacts

3.4.1 Intended Impacts

3.4.1.1 Impacts on Poverty Reduction

Since the raising of the groundwater level and soil conservation through the effects of afforestation and soil and moisture conservation are crucial to agricultural income, an impact on the groundwater level and agriculture will be discussed first among items for reduction of poverty.

(1) Rising of the groundwater level and soil conservation

The rising of the groundwater level was observed mainly in districts in A Zone, but since information on the ratio of VFC where groundwater level either increased or did not change was not obtained[49], a comprehensive evaluation on groundwater level is not possible. However, according to the final review report by the Forest Department in 2015, some VFC experienced a significant change before and after the project, as shown below. Information on groundwater level was not obtained about the districts of B Zone. Table 17 shows cases of VFC villages where a positive change was observed in terms of groundwater level.

Since the period after afforestation is not long, the rise in the groundwater level is mostly considered to be the influence of the civil engineering work of soil and moisture conservation such as check dam construction and so on.

Table 17 Pumped Discharge from the Deep Well and Changes in the Groundwater Level in A Zone (Unit:feet)

Name of the District and VFC	July - December		January - June	
	Before 2004	After 2015	Before 2004	After 2015
VFC at Mahadevnagar, Mysore				
Pumped discharge Note1) Note2) (m3/h)	7.57	9.46	5.68	6.81
Water level from the ground	125.00	120.50	135.00	127.50
VFC at Kuthyadka, Mangalore				
Pumped discharge (m3/h)	8.52	11.36	7.00	8.14
Water level from the ground	207.50	200.00	217.50	210.00
VFC at Yelllambalse, Chikumagare				
Pumped discharge (m3/h)	7.57	9.46	-	-
Water level from the ground	250.50	237.50	-	-

Source: *Final Review and Evaluation, 2015*, Forest Department

Note1) With regards to the groundwater, there is a limit to deep well digging and pumped discharge due to an ordinance by the state government, which provides permission-based regulation on excessive use of groundwater for cash crops and excessive pumping for industrial use. Because the limit by this license system minimizes the impact on the water level of the groundwater by other factors, this table is generally representative of the impact of this project.

Note 2) Regarding the rainfall amount of each site before and after the project, there was no description in the source.

A general trend in soil quality could not be compared since this project did not measure soil pH and soil carbon content before and after the project, but in Baruve village in Shivamogga district in A Zone, soil nutrient runoff and soil erosion was prevented by a soil and moisture conservation facility and rooting of planted trees[50]. Due to limited rainfall, some of the incoming information noted that a significant impact of soil and moisture conservation was not observed in B Zone[51].

[49] This is because not all transitions for VFC villages were being monitored. It is also because the study also investigated only a portion of VFC (from a response by the executing agency).

[50] From an interview with VFC members in A Zone.

[51] From an interview with VFC members in B Zone.

(2) Impacts on agricultural and non-agricultural activities

Through this project, some VFC villages experienced impacts from soil and moisture conservation and a rise in groundwater level, which resulted in diversification of planted crops[52]. While crops were traditionally limited to ragi, sorghum, and maize, some have reported that carrots, onions, ginger, cotton, and mulberry leaves are now being planted[53]. Diversification of crops was also reported in villages where rice was the main crop, expanding their crops to areca nuts, flowers, legumes, medical herbs, and spices[54]. The increased number and diversity of planted crops likely led to the increase in income. Income related to agriculture is greatly affected by the weather in B Zone and it resulted in many men and young people migrating elsewhere for labor during seasons with poor rainfall, while women raising children and elder villagers engaged in non-agricultural income improvement activities which can be conducted, including the production of mulberry and silkworms, and income-improving activities involving hoya fibers (a succulent plant used as a raw material for ropes)due to the limited rainfall, the agricultural cropping items are limited. An impact on agriculture could not be confirmed for B Zone, but a positive impact towards non-agricultural activities were confirmed[55].

3.4.1.2 Biodiversity Conservation

An initial plan for biodiversity conservation was designed that included four wildlife sanctuaries, but interest in biodiversity by the executing agency increased after the project started, and 12 wildlife sanctuaries were added to the project[56]. As Table 18 shows, some changes were observed such as an increase in the number of species in wildlife sanctuaries where EDC are active. Underlined parts are the impacts caused by this project.

Table 18　Changes in Number of Endangered Species in Biodiversity Risk Zone

Wildlife Name (Binomial Name)	Number (Year)	Number (Year)
Tigers (*Panthera tigris*)		
Within Karnataka	290 (2006)	406 (2014)
Wildlife sanctuary (Shivamogga district)Note1)	7 (2005)	13 (2015)
Elephants (*Elephas maximus*)		
Within Karnataka	4,347（2005）	6,068（2016）
Wildlife elephant sanctuary (Shivamogga district)Note2)	1 (2005)	3 (2015)
Tamed elephants (Shivamogga district)	18 (2005)	21 (2015)

Source: Response to a questionnaire for the executing agency
Note1） This wildlife sanctuary (Shettihalli Wildlife Sanctuary) is covered by EDC activities.
Note2） Of the three elephant wildlife sanctuaries in the state of Karnataka, this elephant sanctuary is located in Shivamogga district. This is a sanctuary covered by EDC activities.

Because the number of individual elephants increased, four elephants were donated from Karnataka to the state of Uttar Pradesh, which are being utilized for educational activities on biodiversity and protection of the forest environment within the sanctuary[57].

[52] Baruve village, Shivamogga district, and Venugopalaswamy village, Kolar district, in A Zone.
[53] Same as the above.
[54] Baruve village, Shivamogga district. Venugopalaswamy village, Kolar district, etc.
[55] Anabur Navagram village, Davanagere district, in B Zone, etc.
[56] From a response by the executing agency.
[57] From information provided by members of an EDC for wild elephant sanctuaries.

3.4.1.3 Improved Awareness for Forest Conservation among VFC Residents

Residents contribute to the improvement of the natural environment through participation in afforestation and forest conservation activities, and receive practical benefits in the form of improved standard of living. For this reason, residents are engaging in surveillance through VFC activities for illegal grazing, logging, and capture of wildlife[58]. The number of reported forest fires is also declining due to an awareness for the importance of preventing fires and reporting fires to the Forest Department, as shown on Table 19. Through this project, improved awareness of forest and nature protection among residents is evident.

Table 19 Forest Fire Incidences

Items	2012	2013	2014	2015
Number of incidences[Note1)]	713	606	431	295

Source: Response to a questionnaire for the executing agency
Note1) Combined number of cases for A Zone and B Zone.

3.4.1.4 Changes in Socio- economic Activities of Women's Participation in VFC and SHG

One male and one female member of a household are required to participate in a VFC, which has raised the number of officials of the VFC management committee[59], and ratio of women among members as compared to Eastern Karnataka Afforestation Project. Detailed study of the village confirmed that, as a result, participation by women in decision-making on forest management increased, and the voices of the women are being reflected more in forest management[60]. Information could not be obtained on the ratio of women in EDC.

Table 20 Ratio of Women among the VFC Executive Board Members and VFC Members

Item	Eastern Karnataka Afforestation Project	This Project
Ratio of women among executive board members	29 %	43 %
Ratio of women among VFC members	21 %	45 %

Source: *Impact Assessment Study of JICA Assisted Forestry Projects in the State of Karnataka, 2015*, Forest Department

3.4.2 Other Positive and Negative Impacts

3.4.2.1 Impacts on the Natural Environment

The undesirable effects on the environment were judged not to be serious, in consideration of sector, project, and regional characteristics as defined by the *JBIC Guidelines for Confirmation of Environmental and Social Considerations (April 2002)*. This project was also exempt from the requirement for the development of an environmental impact report under the local Indian law, and from obtaining approval on matters pertaining to the environment. A burden on the natural environment was not considered to be existent since agricultural chemicals and fertilizers were used appropriately, and indigenous species were used for tree planting[61].

3.4.2.2 Resettlement and Land Acquisition

Neither resettlement of villagers nor land acquisition has taken place in this project[62].

[58] From an interview with the Forest Department.
[59] A guideline for the management committee specifies that an equal number of male and female representatives need to be assigned as officers.
[60] Detailed study of villages in A Zone.
[61] From the response to the questionnaire for the executing agency.
[62] From an interview with the executing agency.

To evaluate and determine the effectiveness and impact of this project, operational indicators, effectiveness indicators, and impact were weighted as 40%, 40%, and 20%, respectively, and higher weighting was given to indicator items within each operating, effectiveness, and impact category if they should have had a particularly high weight.

Table 21 Attempts to Determine Effectiveness and Impacts

Evaluated Items (Weighting Ratio)	Item (Item in the Appraisal Report)	Achievement %	Weighting	Result Note1)	Evaluation Score	Evaluation Score × Weighting Ratio
Operational Indicators (40%)	Afforestation area	101	0.2	3	0.6	
	Planted trees (except farmer forestry)	100	0.2	3	0.6	
	Planted trees (farm forestry)	106	0.1	3	0.3	
	Supplementary trees (10%)	100	0.1	3	0.3	
	Survival rate of planted trees	Nearly achieved	0.2	3	0.6	
	Established VFC and SHG	101	0.1	3	0.3	
	Job creation	77	0.1	2	0.2	
				Total Evaluation Score	**2.9**	**1.16** Note2)
Effectiveness Indicator (40%)	Forest Cover rate of the forest in the target afforestation region (reference indicator)	N.A	0.5	2)	1	
	Production quantity/value of forest products	Commercial forest currently grown	0.2	3	0.6	
	Beneficiary forestry farmer revenue per one household	Achieved in most households	0.3	3	0.9	
				Total Evaluation Score	**2.5**	**1** Note3)
Impacts (20%)	Improved water environment and soil conservation	A Zone: Effective	0.3	2	0.6	
	Impact on agriculture	A Zone: effective	0.1	2	0.2	
	Conservation of biodiversity	Effective	0.2	3	0.6	
	Diversification of income generating measures	Generally effective	0.2	2	0.4	
	Improved nutritional standards	Partially improved	0.1	2	0.2	
	Promotion of participation in society by women	Effective	0.1	3	0.3	
				Total Evaluation Score	**2.3**	**0.46** note 4)
					Overall Evaluation	**2.62**

Note 1) Scores were defined as: ③ : high, 80% or over 80% of the plan (2.4); ② : fair, 50 or over 50%-80% of the plan (1.5 - 2.4); and ① : low, less than 50% of the plan (less than 1.5).
Note 2) 2.9×0.4 (weighting ratio of operational indicators)
Note 3) 2.5×0.4 (weighting ratio of effectiveness indicators)
Note 4) 2.3×0.2 (weighting ratio of impacts)

As a result of the evaluation from a comprehensive viewpoint, this project was given a score of 2.62, which exceeded the rating of 80% (2.4) as defined in the plan, and therefore the project was highly effective and impactful.

In light of the above, the effectiveness and impact are high.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional /Organizational Aspect of Operation and Maintenance

3.5.1.1 Forest Department

The Forest Department is the executing agency of this project[63], and manages trees planted by this project and provides guidance for operations and management of VFC. A part of the Forest Department is the Biodiversity Bureau, which manages national parks and wildlife sanctuaries and is in charge of conservation of biodiversity. This Bureau is responsible for EDC and provides operational guidance.

Structure for maintenance and management were confirmed at the time of ex-post evaluation with the range office, which reports on the state of afforestation and survival rate to division offices, the circle office, and implementation units of the state every month. The circle office has the jurisdiction over the field level and provides on-site monitoring and supervision. Document-based reporting is stipulated to be submitted every month, but in reality, reports are submitted every week, while matters such as fires and illegal forest activities are reported as needed.

The Forest Department handles all responsibilities on project activities, and its organizational structure has not changed since the time of appraisal. As shown in Table 22, division of scope for each of the offices is clear, structures for coordination and cooperation between different levels are well-established, and communication and reporting take place frequently.

Under the State Forest Department, which is the executing agency for this project, the evaluator found upon visiting offices at each level that a system of supervision, reporting, and command has been well-established at each level, including the circle office[64], division office, range office, section office, and beat office. The number of the Forest Department staff was 11,444 at the time of project completion on March 2015, which was reduced to 14,121 at the time of ex-post evaluation. According to the Forest Department, the institution plans to increase its staff to 18,836 by 2020 to enhance forest supervision by reinforcing on-site staff such as forest guards and forest watchers.

[63] During the period of project implementation, senior executive committee made decisions with the Minister of Environment and Forests as its chairman. In JFPM committee at the state level, the Principal Assistant Secretary of the State served as the chairman and the committee gave approvals for annual management plan within the state government and conducted monitoring. This committee was held once a year. Officer in charge of each division in the State Finance Department served as a chairman for the JFPM committee at division level, and gave approvals and monitored annual management plan within the state government. This was held once a month, and a report on project progress was submitted to the state once every half a year.

[64] Circle office is an office that manages three to six division offices.

Table 22 Forest Department Stakeholders and Their Duties (Actual)

Administrative Level	Duties	Main Officer and Staff in Charge	Reporting Structure
State Forest Department	Giving directions and supervising the entire state	・Principal Chief Conservator of Forest ・Additional Principal Chief Conservator of Forest	
Circle office	Supervising several districts	・Chief Conservator of Forest	Quarterly reports to the State Forest Department
Division office	General management of the division, in charge of planting and forest conservation	・Deputy Conservator of Forest ・Assistant Conservator of Forest	Quarterly reports to the circle office
Range office	In charge of planting and forestry within the range	・Ranger ・Forester	Monthly reports to the division office
Section office	Supervision of planting and forestry in beat	・Forest Guard	Monthly reports to the range office
Beat office	In charge of forests that cover multiple Panchayat Villages (24-hour structure)	・Watcher	Monthly reports to the section office

Source: Developed based on an interview with the Forest Department

3.5.1.2 VFC and EDC

The management committees of VFC and EDC consist of 14 people. The executive committee consists of 10 people. These include two individuals each from SC, ST, landless farmers, village-level skilled artizan[65], and general residents where one is a male and the other is a female. In addition, four committee members are added and they include an accountant from the village administration, a secretary from the village administration, an NGO representative, and one member thoroughly familiar with agriculture and forestry. Management committees held meetings at frequencies ranging from once a week to once a month. According to the results of an impact study by the Forest Department, selection of a representative was conducted by an election in only 2% of the sampled 122 VFC villages, and the rest were by appointment[66]. To the extent the study was able to confirm, representatives were exclusively male. At the time of visit for the field study, committees were able to secure an environment in which women could express their opinions by ensuring one male and one female were selected as members from each household and for the management committee, even if the representatives were males. At the time of ex-post evaluation, the Forest Department, with the support of NGO, was developing an updated version of the microplan[67] (village forest management plan) to revitalize activities by VFC and EDC.

[65] Artisans who produce products by processing NTFPs, etc. (*Project Implementation Manual 2015*).
[66] *Impact Assessment Study of JICA Assisted Forestry Projects in the State of Karnataka, 2015*, the Forest Department.
[67] The microplans are updating every ten years

Table 23 Division of Duties among Forest Department, VFC, and EDC (Actual)

Organization	Duties	Structure for Support and Coordination
Forest Department	・Patrolling facilities for soil and moisture conservation and planting areas in VFC ・Checks on status and cost studies for maintenance, growth of trees, and NTFP ・Permission for sampling of NTFP, etc. in the planting area	・Requests budget for maintenance based on cost survey ・If technical issues arise, support from the Forest Department Specialized Bureau
VFC	・Checking facilities for soil and moisture conservation and reporting to watchers and forest guards (as needed) ・Reports on revolving funds for VFC (once a year)	・Consults and sends requests for support to Forest Department staff in case of an issue
EDC	・Reporting to Biodiversity Bureaut staff ・Environmental education in local area and schools ・Activities for the protection of forests and species ・Securing revenue sources	・Coordination with environmental events hosted by the government ・Proposals and support for securing revenue sources ・Support for administrative procedures

Source: Descried by the author

3.5.1.3 System for Protection and Growing Trees

Afforestation areas for VFC have an access area where residents can obtain livestock feeds. While afforestation areas for VFC are generally managed by Forest Department staff with specialized knowledge of tree species, trees are planted on a private land in the case of farmer forestry, where buyers of seedlings are held responsible and farmers themselves handle supplementary planting, watering, and weeding.

The executing agency already has an established organizational structure, and a VFC/EDC system is formed as assumed at the time of appraisal through good coordination with the Forest Department. Therefore, the sustainability from institutional and organizational aspects is judged as high.

3.5.2 Technical Aspect of Operation and Maintenance

For technical skills among Forest Department staff, training sessions are held on tree planting techniques at various levels while management capabilities are also being enhanced[68].

Evaluation after Eastern Karnataka Afforestation Project deemed the progress insufficient in terms of participatory afforestation and forest conservation activities, and based on the lessons learnt, four NGOs were employed in this project to strengthen facilitation of guidance and training[69].

According to interviews at every level of the office of the Forest Department, NGO initially provided support for guidance and facilitation of training for management related to resident participation and micro credits, but Forest Department staff managed to learn guidance approaches by leading guidance on VFC activities alongside NGO[70]. A manual on guidance

[68] From an interview with the executing agency staff.
[69] From an interview with the Forest Department staff.
[70] From an interview with the executing agency staff.

approaches was developed by this project and used in training sessions[71].Except these things, a manual was developed in Kannada language on the maintenance of tree species and orchards[72], which describes how they should be planted and maintained, and their benefits in the future through effective use. The manual was even used at the time of ex-post evaluation.

From a technical perspective, Forest Department staff possessed high levels of technical skills, and the department continues to actively develop GIS and MIS[73] under its own budget. Forest Department staff also acquired capabilities for managing VFC, and comprehensively their technical levels are judged as high.

3.5.3 Financial Aspect of Operation and Maintenance

3.5.3.1 Karnataka Forest Department

The State Forest Department has secured approximately budget of 11-14 billion rupees from FY2014/15 to 2016/17. The budget has also been secured for FY2017/18. The overall budget for the state government is 1.38 trillion to 1.63 trillion rupees. As shown in Table 24, the Forest Department has secured approximately 0.8% of the budget for the entire state, and meets the budget required for this project. According to the State Forest Department, its future maintenance budget is also expected to be secured. In the future, the budget of the Forest Department will emphasize forestry production in advantageous regions of Karnataka, and plans to turn these regions into future pillars for revenue[74].

Table 24 Budgetary Spending and Allocation for State Government and State Forest Department[Note)]

(unit: million Rs)

	FY2014/15	FY2015/16	FY2016/17	FY2017/18
State Government Budget: A	1,380,080.00	1,425,340.00	1,634,190.00	1,865,610.00
State Forest Department budget :B	11,648.60	12,581.30	13,995.60	14,191.40
B/A = %	0.84	0.88	0.85	0.76

Source: Response to a questionnaire for the executing agency

Note） The figures from FY2014/15 to FY2016/17 are the executed budget. The figures for FY2017/18 are the allocated budget.

3.5.3.2 Financials for VFC/EDC

The VFC received an accounting audit by a certified public accountant once a year. The results are reported to the staff member in charge of the division office.

At the Forestry Department Headquarters, about 30% of VFC are answering that activities are continuously and financially sustained. Financial resources for VFC are limited to the revolving fund, trees that can be logged and sold in a relatively short period such as acacia, and NTFPs that can be harvested and turned into a financial resource. Fifty VFC villages out of 1,222 VFC villages have earned an NTFP revenue of 6.7 million rupees by the time of the ex-post evaluation. Turnover of the revolving fund for VFC was 150% at the time of project completion (2015)[75]. At the time of ex-post evaluation, some SHG were dormant due to the

[71] *Project Implementation Manual 2015*, *Guidelines for Income Generation Activities 2008*, *Care and Share 2011*.
[72] Custard Apples, Amla, Indian Gooseberry, Neem, Jackfruit, Tamarind, and Sandalwood and so on.
[73] An example is an electronic processing of approvals for cutting down forests.
[74] From an interview with the executing agency staff.
[75] Data provided by the Forest Department. Revolving fund for VFC had a generally high turnover for two to five years after the loan began, which reached a rate as high as over 250% in some cases (from an interview with the executing agency staff).

labor migration of their members[76].

The reason for the low repayment rate is that there are members who do not repay, and they will not repay in a chain reaction. It is also related to the fact that the establishment of penal provisions is left to a decision of each VFC · SHG.

As with VFC, EDC also receive an accounting audit by a public accountant once a year. Some groups have been able to utilize the entrance fee of elephant sanctuaries as a financial resource, and other groups have organized trekking routes and converted entrance fees and parking fees into a financial resource[77].

When there are sources of income, revolving funds for EDC reach a good amount and financial sustainability is secured. Of 73 EDC, it was confirmed that 10% of EDC have secured such sustainability[78]. Even in cases where financial sustainability is lacking, some groups conduct EDC activities through volunteering. Environmental forest conservation and biodiversity conservation activities are areas that local schools and administrations have an interest in, and some EDC groups coordinate with these institutions to engage in various activities and events, etc. In some cases EDC groups are able to obtain financial resources from other organizations and administrations. While some EDC are dormant, other EDC are acting autonomously based on the purpose of the EDC activities, and most of them were in a state that they could continue them.

3.5.3.3 Allocation of Benefits

While the benefit allocation ratio was formulated as follows, permission for harvesting NTFPs is granted by range offices depending on the growth of the planted trees in the afforestation area. According to the executing agency, 50 out of 1,222 VFC villages have obtained a permission from the executing agency to capitalize on VFC under the following distribution of NTFP revenue at the time of ex-post evaluation. Since planted trees were still young, many VFC were not able to gain benefits yet.

Table 25 Benefit Allocation Ratio between Forest Department and VFC (policy) (unit: %)

Item	Forest Department	VFC
Non-timber forest products (NTFP)	10	90
Forest products VFC was involved in	25	75
Forest products produced before formation of VFC	50	50
Forest products naturally grown before formation of VFC	50	50
Forest products from trees in schools, etc. Leaves, fruits Final harvests	 0 25	 100 75
Forest products from trees in lands managed by other departments, etc.	50	50

Source: Response to a questionnaire for the executing agency.

[76] From an interview result in Chitradurga district.
[77] From an interview result with staff of Forestry Department.
[78] Information provided by the executing agency and a result of visiting and verifying with EDC of the Gajanur Agrahara village in Shivamogga district by the evaluator. Since EDC is prohibited from collecting NTFP etc. from the forest, it is only inputs of revolving funds and infrastructure support activities at the beginning, so 90% EDC, together with the Forest Department, needs to take measures for EDC to secure financial resources.

As noted above, the Forest Department has a stable budget for the future, and plans to concentrate on forest conservation by increasing the number of staff for forest protection, thereby reducing the area to be covered by each staff member. The Forest Department is providing guidance to EDC and VFC to increase their revenues at the district and range office levels to secure financial resources for EDC and VFC even after completion of the project. However, given the limited number of EDCs and VFCs that can act autonomously[79], the overall state of operation and management of EDC and VFC is judged to be fair from a financial perspective.

3.5.4 Status of Operation and Maintenance

The format of the report is defined under the *Project Implementation Manual*, and range offices report to a division office once a month on the situation in plantation area. Seedlings that were wilted or damaged within few years after planting were replaced by supplementary planting. Watering depended on the rainfall in the area, but the trees were nonetheless watered continuously for several months after planting or supplementary planting[80].

Periodic grazing of grass by livestock was permitted in an access area within the plantation area, and feed was secured for livestock while the measures against livestock was undertaken.

Afforestation areas needed professional protection and supervision, and forest watchmen sent by the Forest Department monitored the trees 24 hours a day.

With respect to the growth of the forest, trees planted in intervals based on the rainfall of the region (i.e. water retention by the land) are growing, although there is some variability by area. In A zone, many plantation areas are protected by entanglements and metal fences, and seedlings and trees are growing without problems. On the contrary, B zone experienced insufficient livestock management while livestock owners were absent due to labor migration, and some regions reported forest disturbances by livestock seeking food and water in periods when rainfall was scarce[81].

Maintenance and management of mud walls for soil and moisture conservation and prevention of livestock intrusion was to be performed by VFC, but on-site study showed that the Forest Department was to handle repairs that incurred costs, such as check dams[82], fire belts, and Elephant Proof Trench (EPT).

Division offices manage plantation lands based on a working plan[83]. The microplans were formulated with residents of VFC at the beginning of the project. The Forest Department has obtained a budget and an updating microplan is under developing.

Considering the measures taken to protect plantation area and the current state of soil and moisture conservation, overall operation and management was mostly favorable.

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[79] From an interview with the Forest Department.
[80] From an interview with the Forest Department.
[81] From an interview with the Forest Department.
[82] A small-scale check dam facility built on a micro watershed for prevention of erosion.
[83] Working plan is formulated for 10-year forest conservation, regeneration of vegetation, and afforestation, and approved by the circle office and the Forest Department of the state, followed by an approval by the Ministry of Environment, Forest, and Climate Change.

In light of the above, the duties and responsibilities of each officer and staff are clear in terms of maintenance and management of afforestation, and the number of staff is on an increasing trend. The roles of VFC on maintenance and management and the roles of EDC on environmental conservation and protection of biodiversity were clear. Therefore, there are no issues in terms of the institution and organization. In terms of technical skills, the Forest Department staff at state, division, and on-site levels possessed forest conservation and tree planting capabilities, while VFC and EDC also held a high level of awareness and engagement in forest management and biodiversity and are capable of acting as a group. Financially, a necessary budget has mostly been secured from the state government and a budget is expected to continue to be secured in the future. There are some issues in terms of management and operation of financial resources for VFC and EDC. The status of the management of forests and plantations is generally favorable owing to the Forest Department and VFC. Some VFC and SHG are dormant, and the Forest Department and NGO hired by the Forest Department are stepping up their support for activities by VFC and income improvement for SHG. Overall, the sustainability of the project is judged high.

4. Conclusion, Lessons Learned and Recommendations

This project was implemented with the aim to restore the forests and improving the standard of living of the local residents through tree planting, livelihood improvement activities, and biodiversity conservation activities at the village level by a community participation approach, thereby contributing to the reduction of poverty and conservation of biodiversity in the state of Karnataka in Southwest India

This project is highly relevant since it is consistent with priority areas under the Indian development policy as well as the Japanese ODA policy, and matches the development needs. The efficiency is fair since the project cost is kept within the planned cost but the project period exceeds the planned duration. Trees were mostly planted as per the plan by this project, which has promoted the regeneration of forests. While the degree of contribution of this project towards the improvement of the local standard of living cannot be measured quantitatively, owing to the fact that other factors such as local economic growth have been pushing household incomes up, various impact studies and interviews have confirmed that target households have increased their annual income, at least through income from small scale business by micro credit implemented for a certain period in this project. It can be said that the effectiveness is high since the planted trees had a high survival rate at the ex-post evaluation and further regeneration of forest is expected from the growth of the planted trees. Impacts of the project include conservation of biodiversity, diversification of income generation, activities organized by the village forest committees and the encouragement of women' participation through income improvement activities. In light of these things, the effectiveness and impact of the project are judged as high. The operational and maintenance system of the executing agency is well established without any technical problems, and the state of maintenance is generally favorable. Some issues remain with respect to the management of village forest committees and eco-development committees from a financial perspective, however, overall the sustainability of the effect 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

None.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

Setting Appropriate Effectiveness Indicators

Indicators for the evaluation of project effectiveness at the time of the appraisal included survival rate, which was considered to be important for tree planting projects, but the target value for this indicator was set in 2019, six years after the completion of the project. Appropriate target year and target survival rates need to be defined by taking local climate, soil quality, tree species, and rainfall into account. Measurements need to cover across several plots and the data recording should be monitored by a third party. This is because the area for tree planting was

large and the survival rate may vary greatly depending on the location of where it is measured. Regarding the forest cover rate, the data available is only for the entire state or district level and no data related to the project target area existed. Therefore the evaluator had no choice but to use it as a reference indicator in judgment of evaluation. As regard to the indicator on the standard of living, the target value was set as an average increase in income by 10% for target households two years after the completion of the project. However, regarding this household average income increase, since there are other factors such as regional economic growth and migration labor, except those due to this project, the document at the time of appraisal was requested to set up these indicators and clearly show the measurement method. In order to enable an appropriate ex-post evaluation, it is crucial to assess operation and effectiveness indicators at the time of the appraisal with inputs from forest specialists who are thoroughly familiar with tree plantings in subtropical areas, and clearly note the approach for measuring these indicators. To set an appropriate indicator and target value for effectiveness is also crucial to overall project management as they are used during the project implementation and ex-post project monitoring. These things should be done by stakeholders at the time of the project formation, planning, and appraisal.

Tree Planting Seedling for Farm Forestry and Plantation in the Area of Scarce Rainfall

An objective of seed distribution to farmers in this project was to transfer the techniques for raising seedlings from seeds, but rather than that, farmers preferred distributing and selling of larger seedlings grown to some extent. They do so in fear of losing small seedlings by livestock grazing and so forth. This led to the distribution of smaller number of seeds than that of originally planned. In the future it is expected to distribute and sell larger grown seedlings than farmers wanted, considering the survival of seedlings. Not only for the seedlings for farm forestry, but also for planting seedlings in the plantation, especially in areas with low amount rainfall in B zone, large seedlings are needed. The size of seeds and seedlings based on the needs of seedlings for farm forestry and seedlings for plantation should have been surveyed in the field in advance. It is necessary to conduct an investigation through hearing from the people who are familiar with the field, such as the sites of seedling of the range office, the staff of the range office and so on. The results of these studies should be reflected in the plan.

Economic Development, Forest Protection, and Future Direction on JFM

Compared to the start of the project, the economic situation had changed by the time of ex-post evaluation. Rapid economic development has stimulated seasonal and migrant labor, and some VFC experienced a long-term absence of their members. The reality is that labor by family members in other regions is a significant source of income. In view of these changing circumstances, the approach to micro credits may be at a turning point and it needs to be reassessed through further studies. As a way of JFM (JFPM in Karnataka state), funds were granted to VFC which became an incentive for formation of starting JFM, and micro credit was conducted through the funds. Considering the low repayment rate of micro credit and existing dormant VFC and SHG, the future significance of micro credit needs to be reconsidered. Since the staff of the Forest Department is specialized in forest management and is not specialized in

small-scale finance, the livelihood improvement, poverty alleviation, and micro credit etc., they cannot manage them as the Rural Development Department has been doing. Proposals from staff of each level of the Forest Department were suggesting that NGOs can well manage the micro credit, by letting them do, Forest Department staff would be able to engage more in the original work. When micro credits are implemented, specialized lending and funding can be professionally managed by contracting out with NGOs owing to their plenty of experience. Micro credit under NGOs controlled by strict penalty provisions can be managed more effectively. The Forest Department, should concentrate on forest conservation, , management of forest plants and woods with high added values and work focusing on profitability from NTFP etc.by using their expertise in those fields. By setting those profits return to the village groups as an incentive for protecting forests, it is necessary to make forest protection by existing VFC more sustainable.

Project Supervision that meets the Karnataka Procurement Act and Establishment of Target Values

At the time of appraisal the plans for job creation were formulated to provide employment opportunities through tree planting and soil and moisture conservation projects. However, the amount of job creation targeted in the initial plan was not achieved because when contractors were selected by competitive bidding under the Karnataka Procurement Act (1999), they performed the tasks of tree plantation by using their machines and personnel. This Act was applied during the Eastern Karnataka Afforestation Project (1997), and employment issues of VFC arose during the Eastern Karnataka Afforestation Project. In view of the above, this should have been reviewed and specific countermeasures needed to be applied in this project. Investigations for the definition of target values were not well defined either. Furthermore the target values were not changed during the implementation of this project. The reason for this may have been that, the studies at the appraisal, and during the project supervision for both JICA and the executing agency were insufficient.. At the time of appraisal, specific issues during the implementation of the Eastern Karnataka Afforestation Project should be concretely pointed out, the opinions of the on-site staff on these issues should be confirmed at every level, and then the plan shall be developed accordingly.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1.Project Outputs	(1)Planting project 1)Planted area 185,000ha 2)Number of planted trees (excluding farm forestry) 147,120,000 3)Number of planted trees (farm forestry) 15,955,947 4)Supplementary planting 18,390,000 5)Employment (day/person) 44,464,000 (2)Village Forest Committees established 1,200 (3)Self-Help Groups established 6,000 (4)Biodiversity conservation activities 1)EDC established 73 2)Fire belt established 2,206 mm 3)Preventive ditch for elephant intrusion 375 km 4)Improvement of habitat 3,750 ha (5)Forest management facility 1)Lodging for local staff 72 2)Office for local staff 23 3)Vehicles 100	(1)Planting project 1)Planted area 187,085ha 2)Number of planted trees (excluding farm forestry) 146,464,171 3)Number of planted trees (farm forestry) 16,869,885 4)Supplementary planting 18,390,000 5)Employment (day/person) 34,391,474 (2)Village Forest Committees established 1,222 (3)Self-Help Groups established 6,066 (4)Biodiversity conservation activities 1)EDC established 73 2)Fire belt established 2,144 mm 3)Preventive ditch for elephant intrusion 532 km 4)Improvement of habitat 7,036 ha (5)Forest management facility 1)Lodging for local staff 82 2)Office for local staff 23 3)Vehicles 100
2. Project Period	March 2005 - March 2013 (97 months)	March 2005 - March 2015 (121 months)
3. Project Cost Amount Paid in Foreign Currency Amount Paid in Local Currency Total ODA Loan Portion Exchange Rate	 735 million yen 17,742 million yen (7,392 million Indian rupee) 18,477 million yen 15,209 million yen 1 Indian rupee ＝2.40 yen (as of August 2004)	 N/A N/A （N/A） 16,099 million yen 15,040 million yen 1 Indian rupee ＝2.10 yen (average between March 2005 and March 2015)
4.Final Disbursement	July 2015	

Appendix 1 Afforestation Model

Model	Crown Rate and Forest Type	Annual Rainfall	Soil Type and Topography	Period Up to Logging
Model 1: Ecological recovery through natural regeneration (Natural regeneration model))				
A Zone	25 % - 40 % Evergreen trees, semi-evergreen trees	over 2,500 mm	Laterite soil; red soil Upper part of hills and mountain slopes	Depends on the rotation of the planted species, but generally a long period ranging from 30 years to 60 years
B Zone	10 % - 40 % Deciduous trees, dry deciduous trees ((Trees whose leaves fall off in dry seasons))	600 mm to 1,200 mm	Black soil; red soil Site with abundant rocks and stones in the soil Loose or steep slope with poor access	
Model 2: Supports natural regeneration (Natural regeneration supplementary model)				
A Zone	10 % - 40 % Semi-evergreen trees, moist deciduous trees, dry deciduous trees	over 1,200 mm	Laterite soil; red soil Low topography with gentle or gradually sloped hill	Depends on the rotation of the planted species, but generally a long period ranging from 30 years to 60 years
B Zone	10 % - 25 % Dry deciduous trees	600 mm to 1200 mm	Black cotton; red soil; Gradual slope	
Model 3: Afforestation zone for timber production (Timber production model)				
A Zone	0 % - 10 % Moist deciduous trees, dry deciduous trees	1,200 mm to 2,000 mm	Laterite soil; red soil Gentle or gradual slope	Understood to be approximately 30 years
Model 4: Afforestation zone for production of fuelwood and small-diameter trees (Fuelwood model)				
A Zone	0% - 10% Shrub consisting of quite degraded, damaged, and sparse vegetation	over 1,200mm	Gradual slope with laterite soil	Understood to be approximately 8 years
B Zone	0 % - 10 % Thorny bushes	900 mm to 1,200 mm	Black cotton; red soil; laterite soil	
Model 5: NTFP ((non-timber forest products)) planting zone (Non-timber forest products model)				
A Zone	0 % - 25 % Moist deciduous trees, dry deciduous trees	1,200 mm to 2,500 mm	Laterite soil; red soil Gentle, gradual slope	Trees where only fruits can be harvested
B Zone	0 % - 25 % Dry deciduous trees; thorny bushes		Black cotton; red soil; laterite soil Gradual slope	
Model 6: Afforestation in schools (School tree planting model)				
A Zone and B Zone	Planted within the school ground			Approximately 8 years
Model 7: Regeneration of mangroves (Mangrove planting model)				
A Zone	No specific definition	over 1,200 mm	Alkaline swamps with high salinity, brackish water, river mouths and coasts along the watershed	No harvests
Model 8: Farmer forestry, farm forests, agro-forests (Agroforestry in which trees are planted and livestock and crops are raised and cultivated between trees)				
A Zone and B Zone	Distributes seeds and seedlings for farm forests and agro-forests for interested farmers and general residents			Depends on plant species, but eight years for fuelwood. A long rotation period for other species.