
People's Republic of China

FY 2019 Ex-Post Evaluation of Japanese ODA Loan Project
“Jilin Afforestation Project”

External Evaluator: Toshihiro Nishino, International Development Center of Japan Incorporated

0. Summary

The objective of the Project is to improve the forest coverage ratio and to regenerate grassland through afforestation and vegetation cover, improvement of related facilities and procurement of equipment in Jilin Province and training, thereby contributing to the restoration of the multiple functions of forests and prevention of desertification.

The Project advanced the restoration of the multiple functions of forests and grassland and the prevention of desertification through afforestation work, vegetation cover work and improvement of equipment at related facilities in line with the policy of the Government of China and Jilin Province to improve the ecological environment. As such, the Project conforms to the development needs of improving the ecological environment in Jilin Province and Japan's ODA policy. Therefore, the relevance of the Project is high. In the case of the project efficiency, although the outputs were achieved generally as anticipated by the revised plan with the project cost being within the plan, the project period significantly exceeded the revised plan. Therefore, the efficiency of the Project is fair. As a result of the materialization of the facilities required for afforestation work, vegetation cover work and improvement of the ecological environment, the target figures for the quantitative indicators (planted tree survival rate and forest coverage ratio) set at the time of appraisal were achieved at the time of ex-post evaluation and other quantitative indicators (grassland coverage ratio, forest/grassland area, etc.) have shown some improvement. In addition, wide-ranging qualitative effects of the Project are confirmed, including (i) functional improvement of the facilities related to improvement of the ecological environment and (ii) establishment of forests with multiple functions. Also highly noticeable are the impacts of “the restoration of the multiple functions of forests and grassland” ((i) reduction of the occurrence of sandstorms, flooding and soil erosion and (ii) increase of income other than farming and/or stock farming for women and poor people). Accordingly, the effectiveness and impacts of the Project are high. The sustainability of the Project is also high as there are no problems regarding the institutional, technical and financial aspects of operation and maintenance of the Project with confirmation of the good operation and maintenance conditions of the facilities and equipment. In the light of the above, the Project is evaluated to be highly satisfactory.

1. Project Description



Project Location
(The star mark indicates the location of Beijing)



A footpath built under the Project
(Model forest ecology park)

1.1 Background

While the Government of China had long adopted afforestation of the national land as one of its basic policies since the founding of the nation in 1949, the forest coverage ratio had been well below the international average (29.3% based on the year 2000 data and 16.6% as the national average of China in 1998) because of the vastness of its land area, severity of the natural conditions and excessive logging to meet the increasing timber demand. Moreover, desertification was progressing due to such man-made factors as over-grazing and excessive logging. Against this background, the Government of China announced the *National Ecological Environment Construction Plan* in 1999, clearly showing the attitude to place greater emphasis on environmental policies. In this plan, concrete target figures were set for the prevention of soil erosion, prevention of desertification, forest area, forest coverage ratio and improvement of degraded grassland. The plan also classified the national land into eight regions with such goals as the prevention of desertification in the three northern areas (northeast, north and northwest China), the prevention of soil erosion in the black soil region of northeast China, etc.

In Jilin Province, even though the forest coverage ratio of 38% in 2005 was above the national average, it was experiencing the severe degradation of forest land as well as a decline of the capacity to retain water due to its history of the excessive logging of forest land and the cultivation of grassland to meet the timber demand and to expand the land for crops. As a result, the soil erosion volume in Jilin Province reached 130 million tons a year and flood damage was becoming increasingly serious. Meanwhile, the frequency of sandstorms increased to 93 times a year. Under these circumstances, the Jilin Provincial Government formulated the “*11th Five Year Forestry Development Plan and Medium to Long-Term Plan for Jilin Province*.” This plan called for the afforestation and vegetation cover of waste land and areas of desertification in progress as its priority agenda and adopted target figures of 360,000 ha for afforestation and 133,000 ha for vegetation cover to be achieved by 2010, making the work of afforestation and vegetation cover urgent tasks to improve devastated land and to prevent desertification.

1.2 Project Outline

The objective of the Project is to improve the forest coverage ratio and to regenerate grassland through afforestation and vegetation cover, improvement of related facilities, procurement of equipment in Jilin Province and training in Japan, thereby contributing to the restoration of the multiple functions of forests and prevention of desertification.

Loan Approved Amount / Disbursed Amount	9,500 million yen/7,385 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 2007/March, 2007
Terms and Conditions	Interest Rate: 0.75% Repayment period: 40 years (Grace Period: 10 years) Conditions for Procurement General untied
Borrower/Executing Agencies	Government of the People's Republic of China/Jilin Provincial People's Government
Project Completion	December, 2016
Main Contractor (Over 1 billion yen)	-
Main Consultant (Over 100 million yen)	-
Related Study	Feasibility Study by Jilin Forestry Investigation and Design Research Institute (October, 2004)
Related Projects	-

2. Outline of the Evaluation Study

2.1 External Evaluator

Toshihiro Nishino, International Development Center of Japan Incorporated

2.2 Duration of Evaluation Study

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

Duration of the Study: September, 2019 – December, 2020

Duration of the Field Survey: January 1 – 18, 2020

2.3 Constraints during the Evaluation Study

There were several constraints for this ex-post evaluation of the Project as explained below.

Firstly, the outbreak of the new infectious COVID-19 in China occurred at the time of the implementation of this ex-post evaluation and the planned second field survey originally scheduled to take place in March, 2020 could not be conducted because of introduction by the Government of China of such measures as (i) suspension of the already issued visa for a specified period and (ii) compulsory quarantine observation period of two weeks for foreign nationals arriving in China. As a result, it became difficult to conduct (i) field reconnaissance and fact-finding work in some areas and (ii) an

interview survey with some beneficiaries, both of which were planned during the second field survey. In the face of this situation, efforts were made to obtain as much additional information as possible. However, the reality was that essential information for the ex-post evaluation was not fully obtained.

Meanwhile, an interview survey with beneficiaries was conducted with some 15 people. It was originally planned to employ the random sampling method for the selection of the target persons for the interview survey with beneficiaries from resident lists to ensure the objectivity of the survey. However, because even government-sponsored research institutes in China do not use the random sampling method to obtain the opinions of ordinary citizens and also because the executing agency had no experience of employing the said method, it was decided to entrust the concrete selection of the target persons to the executing agency while designating the area of residence, gender, age and other parameters (including that the target persons should not have any direct link to the administration). Therefore, the findings of the interview survey may not be fully devoid of arbitrariness.

3. Results of the Evaluation (Overall Rating: A¹)

3.1 Relevance (Rating: ③²)

3.1.1 Consistency with the Development Plan of China

The development plan of the Government of China at the time of the appraisal clearly indicated such directions as the prevention of soil erosion in the black soil region of northeast China and the prevention of desertification in north, northwest and northeast China, indicating the emphasis on the ecological environment issue as one of the priority policy fields as evidenced by the *National Ecological Environment Construction Plan (1999 – 2050)* and the *11th Five Year National Plan for Economic and Social Development (2006 – 2010)*. Particular emphasis was placed on the implementation of proactive efforts for the prevention of soil erosion, prevention of desertification, increase of the forest area and improvement of degraded grassland. Numerical targets were set for these objectives with a relevant timeline. Improvement of the ecological environment has been continually stressed in subsequent five year plans. The plan and policy at the time of ex-post evaluation, including the *13th Five Year National Plan for Economic and Social Development (2016 – 2020)*, call for “relative improvement of the quality of the ecological environment” as one of the main goals to achieve “moderately prosperous society” and to promote further improvement of the relevant indicators while reviewing the standards, etc.

In accordance with such policy and plan of the central government, the Jilin Provincial Government has been advancing the improvement of the ecological environment. Its *13th Five Year Plan for Jilin Province (2016 – 2020)* promotes protective measures for the ecological environment centering on forest management and protection, improvement of the forest coverage ratio in the midwest area and development of water conservation forests near water sources and aims at

¹ A: Highly satisfactory; B: Satisfactory; C: Partially satisfactory; D: Unsatisfactory

² ③: High, ②: Fair, ①: Low

achieving concrete numerical targets for the forest area, forest coverage ratio, afforestation area in areas around major rivers, implementation area of forest management and protection measures, etc.

Table 1 Principal Targets of Development Plans Related to the Project

Category	At the Time of Appraisal	At the Time of Ex-Post Evaluation
National Development Plan	<u>11th Five Year National Plan for Economic and Social Development (2006 – 2010)</u> - The plan identified priority programs concerning the protection of the ecosystem identified such targets as the prevention of soil erosion in the black soil region of northeast China, prevention of desertification in the three northern areas and the improvement of degraded grassland among others. - The Government of China planned the injection of 17 trillion JPY over a period of five years for environmental protection. (Principal goals) (i) suppression of outbreaks of new environmental pollution, (ii) suppression of destruction of the ecological environment, (iii) improvement of the environment in designated priority areas for environmental conservation and urban areas and (iv) conservation of the ecological environment at nature reserves. etc.	<u>13th Five Year National Plan for Economic and Social Development (2016 – 2020)</u> - The plan targets the achievement of “moderately prosperous society” and the goal related to the Project is “the overall improvement of the quality of the ecological environment.” - Part X: Ecosystems and the Environment states that “to improve the quality of the environment and resolve serious ecological and environmental problems, we will step up ecosystem and environmental protection efforts and simultaneously help the people become prosperous, help the country grow strong and build a Beautiful China.”
National Policy for the Environment Sector	<u>National Ecological Environment Construction Plan (1999 – 2050)</u> - The plan further emphasizes environmental measures and presents the national framework for 50 years for afforestation, water utilization, agriculture and environmental protection. - For afforestation, the plan sets forth concrete numerical targets for short-, medium- and long-term soil erosion prevention, prevention of desertification, forest area, forest coverage ratio and improvement of degraded grassland.	<u>13th Five Year National Plan for Environmental Protection (2016 – 2020) and National Afforestation and Greening Plan (2016 – 2020)</u> - Both plans adopt a policy of “accelerating the greening of the national land, strengthening forest management based on the law and enhancing the basic safeguards.” - Numerical targets are set for afforestation, forest coverage ratio, growing stock of forests, etc. up to 2020.
Jilin Provincial Policy for the Environment Sector	<u>11th Five Year Forestry Development Plan for Jilin Province (2006 – 2010) and Medium to Long-Term Plan</u> - These plans adopted the policy of “prioritizing afforestation and vegetation cover in devastated land and desertification areas.” - Numerical targets were set for afforestation, vegetation cover, etc. up to 2010.	<u>13th Five Year Plan for Jilin Province (2016 – 2020)</u> The plan adopted the policy of “promoting protection measures for the ecological environment, centering on forest management and protection, improvement of the forest coverage ratio in the Midwest area and development of water conservation forests around water sources.” <u>13th Five Year Forestry Development Plan for</u>

		<u>Jilin Province (2016 – 2020)</u> • Numerical targets are set for afforestation, forest coverage ratio, afforestation areas around major rivers and implementation area of forest management and protection, etc. up to 2020. <u>13th Five Year Environmental Protection Plan for Jilin Province (2016 – 2020)</u> • Numerical targets are set for the forest coverage ratio, afforestation areas around major rivers, implementation area for forest management and protection, etc. up to 2020.
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Sources: Materials provided by JICA and various plan documents.

Based on the above, the objective and contents of the Project are consistent with China’s policy for the environmental sector at the time of both the appraisal and ex-post evaluation in that “the Project aimed at preserving the ecological environment and improving the living environment of local people by means of strengthening the improvement and regeneration of forests and grassland through the expansion of related work to protect the ecological environment.”

3.1.2 Consistency with the Development Needs of China

As described above, Jilin Province was experiencing various serious deterioration of the ecological environment, adversely impacting civic life. The devastation of forest land and decline of the water retention capacity of the ground led to a serious increase of soil erosion, flood damage, etc. Accordingly, there was an urgent need for afforestation, vegetation cover and improvement of related facilities to improve the ecological environment and environment for civic life. As such, the consistency of the Project with the development needs of Jilin Province was high.

At the time of ex-post evaluation, a trend of shifting focus of ecological improvement measures from afforestation to the strengthening of forest management and protection in response to the degree of improvement in terms of the ecological environment and damage caused by the once deteriorated ecological environment. This improvement is illustrated by such comments made during the interview survey with project-related personnel at the executing agency as “forest and grassland areas have increased,” “the improvement of related facilities has progressed” and “disasters due to worsening of the ecological environment have been reduced.” Meanwhile, the level of improvement of the ecological environment hoped for by citizens is rising year by year and interest in a healthy ecological environment among citizens is becoming stronger. Compared to such level of interest, there are still many issues and geographical areas requiring further improvement.

In short, the Project is consistent with the development needs of Jilin Province at the time of both the appraisal and ex-post evaluation.

3.1.3 Consistency with Japan's ODA Policy

Japan's Official Development Assistance (ODA) Charter (2003) at the time of appraisal emphasized efforts to tackle global issues (environmental issues) while *the Medium-Term Policy on Official Development Assistance (ODA)* (2005) emphasized the protection of individuals from the “fear” of environmental destruction, etc. from the viewpoint of “human security” and established “environmental pollution control measures” as a priority field. All of *the Economic Cooperation Program for China* (2001, Ministry of Foreign Affairs), *Medium-Term Strategy for Overseas Economic Cooperation Operations* (2002, JICA) and *Country Assistance Policy for China* (2002, JICA) emphasized environmental conservation, indicating the consistency of the Project with Japan's ODA policies.

3.1.4 Appropriateness of the Project Plan and Approach

No problematic issues are observed with the planning and approach of the Project. In terms of consideration of the socially vulnerable, sufficient efforts were made by actively employing low income earners and women for afforestation, vegetation cover and facility construction work under the Project and also the management of afforestation sites after the completion of the Project. Such employment during and after the project period has greatly contributed to the increased income of vulnerable people.

This Project has been highly relevant to the China's development plan and development needs, as well as Japan's ODA policy at the time of both the appraisal and ex-post evaluation. Therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Of the components of the Project, the vegetation cover work was planned to be conducted and supervised by the Provincial Bureau of Forestry and Grassland (the Provincial Forestry Agency at the time) which was the executing agency and responsible for vegetation cover work at the time of the appraisal. However, the responsibility for the implementation and management of this work was transferred to the Provincial Bureau of Agriculture and Livestock Farming, which was not part of the implementation system for the Project, after the commencement of the Project. As a result, it became difficult to implement the vegetation cover work (part of the work not yet implemented) as part of the Project after the change of the supervisory body for this work. (In the end, the planned vegetation work was conducted using domestic funds (not included in the scope of the Project) after the change of the supervisory body.) Consequently, the planned outputs and cost for the Project were revised and the scale of planned outputs was slightly reduced. Following the revision of the planned contents of the Project, parts of the planned components were placed outside the scope of

the Project as described above. However, the development needs remained the same and the change did not appear to have significantly affected the achievement of the project purpose.

(i) The planned outputs at the time of the appraisal, (ii) planned outputs after the revision and (iii) actual outputs of the Project are shown in Table 2. In accordance with a request by the executing agency, JICA agreed to a change of the original implementation plan regarding the change for the vegetation cover work. For the comparative analysis of the planned and actual outputs in this ex-post evaluation, the basic approach is to compare the planned outputs after revision (see Table 2 for concrete contents) reflecting a change of the vegetation area necessitated by the change of the jurisdiction of administrative body in China (which was nothing to do with the Project) with the actual outputs in view of the fact that the revised plan was formulated based on mutual agreement between Japan and China, following the change of circumstances for the Project as described earlier.³

The principal outputs of the Project are (i) afforestation to create protection forests (137,000 ha), (ii) vegetation cover for the prevention of desertification (11,000 ha), (iii) renovation of nine related facilities, (iv) procurement of related equipment and (v) training (in Japan and China). A total of 23 counties, five cities and six areas directly controlled by the provincial government participated in the Project. Comparison between the planned outputs after revision and actual outputs while considering the reduction of the planned output for vegetation area shows that the actual performance under the Project generally met or even exceeded the planned outputs. In the case of the planned outputs which were not fully achieved, many of them recorded an achievement rate of 80% or higher. Multiple bodies were involved in the implementation of the Project but the competent administrative body in each field played a leading role in project operation and management. In each county, the deputy governor and others formed a command team to manage the Project. No negative impacts on the outputs occurred because of the fact that an adequate project operation and management system and capacity were established.

By project component, regarding the “afforestation and vegetation cover,” the actual area of vegetation cover achieved the planned output after revision. However, the actual afforestation area was 80% of the revised output. The reason for this was that the actual afforestation area of the land management by farming households was as low as 19% of the revised output because of adjustment made to reflect the changing need for afforestation (meanwhile, the actual afforestation area of national forest sites exceeded the revised output). The factors for the failure to fully achieve the planned output (afforestation) of the land managed by farming households were (i) emphasis on

³ As far as revision of the original plan for outputs is concerned, some outputs other than that for vegetation work were also revised. It was decided for the purpose of ex-post evaluation that the basic approach for the comparative analysis of other outputs would be to compare the originally planned outputs at the time of appraisal and the actual outputs because (i) it was believed to be important to evaluate and examine the factors and circumstances for discrepancies between the originally planned outputs at the time of appraisal and the actual outputs, (ii) simple comparison of the revised planned outputs and actual outputs would always lead to a planned output completion ratio of 100% as the revised outputs were based on the actual outputs due to delayed confirmation of the revised plan in writing and (iii) changes of the outputs other than the vegetation area could be judged to be minor as they occurred within the framework of the Project.

afforestation of national forest sites where the potential afforestation area was large and the available afforestation skills were strong so that the efficiency and management level of the work would be high to increase the survival rate and (ii) it was difficult for farmers to understand the initial request for them to bear part of the afforestation cost because of the lack of an immediate and direct economic advantage of the afforestation work (the township and village authorities were concerned about a possible financial burden on farmers). According to the findings of an interview with the executing agency, the afforestation of national forest sites characterized by a high level of specialist skill as well as equipment and large planting area resulted in a high survival rate and better growth of the planted trees compared to the afforestation of land managed by farming households. Meanwhile, the actual outputs for “improvement of related facilities” were as planned. In the case of “training,” training in Japan took place three times (compared to four times in the revised plan) with 58 participants (compared to 80 participants in the revised plan). The reason for this was the withdrawal of the fourth training because of China’s government policy of suppressing the overseas training of civil servants.

Table 2 Planned and Actual Outputs

	Description	Planned (at the Time of Appraisal)	Planned (after Revision)	Actual	Performance Against the Plan
Afforestation/ Vegetation Cover	Afforestation (Protection Forest) (ha)	171,100	171,100	136,900	80%
	Breakdown: (ha)				
	[Purposes of Afforestation]				
	•Water conservation forest and erosion control forest:	130,100	130,100	100,300	77%
	•Windbreak and sand fixation forest [Afforestation Land]	41,000	41,000	36,700	90%
	Land managed by farming households (ha)	78,672	78,672	15,300	19%
	(Number of households)	(15,316)	(15,316)	(2,982)	
Improvement of Related Facilities	National forest sites (ha)	114,218	114,218	121,600	106%
	(Number of sites)	(199)	(199)	(212)	
	Vegetation Cover (Prevention of desertification) (ha)	22,000	10,840	10,840	100%
	Renovation of seed collection and distribution facility				
	• Number of facility sites (number)	1	1	1	100%
	• Seed storage capacity (t)	620	620	620	100%
	Renovation of model nursery gardens				
Procurement of Equipment	• Number of facility sites (number)	4	4	4	100%
	• Annual seedling production volume ('000)	1,000	1,000	1,000	100%
	Renovation of model forest ecology gardens				
	• Number of facility sites (number)	4	4	4	100%
	• Land area (ha)	583	583	583	100%
	Patrol/ work vehicles (number)	32	32	32	-
	Irrigation equipment (sets)	-	-	550	-
Training	Monitoring equipment (sets)	-	-	22	-
	Monitoring huts (number)	-	-	4	-
	Fencing (number)			22	
	Information boards (number)			3,858	
	Training in Japan: Number of trainees (person) (frequency)	80 (4 times)	80 (4 times)	58 (3 times)	73%
	County level domestic training: number of trainees (person)	660	660	660	100%
	Township/village level domestic training: number of trainees (person)	5,220	5,220	5,598	107%
Other	Number of trainees for afforestation and vegetation cover work (person)	25,250	25,250	26,231	104%
	Number of cities and counties where the Project was implemented	23 counties, 5 cities/ areas under direct control by the provincial government	23 counties, 5 cities/ areas under direct control by the provincial government	23 counties, 5 cities and 6 areas under direct control by the provincial government	-
	Number of farming households participating in the Project (number)	15,316	15,316	17,982	117%

Source: Materials provided by JICA and replies to the questionnaire survey with the executing agency.



Nature Exhibition Room introduced under the Project (Model forest ecology garden)



An afforestation site under the Project



An afforestation site under the Project



The same site shown left before the afforestation work

3.2.2 Project Inputs

3.2.2.1 Project Cost

The actual project cost was 8,890 million JPY, falling by approximately 36% from 13,942 million JPY in the revised plan as shown in Table 3. It can be judged that the project cost was within the plan based on the revised plan for the Project. Especially in the case of afforestation and vegetation cover, their actual costs were as much as approximately 67% and 50% less than their corresponding costs in the revised plan respectively. The reasons for the actual project cost being much less than the cost in the revised plan are (i) in the competitive tender for the procurement of equipment, etc., the successful bid prices were often lower than the target prices, making the overall procurement cost lower than planned and (ii) the scale of the Project was reduced for such components as afforestation, vegetation cover, etc.

Table 3 Planned and Actual Project Costs

Unit: million yen

	Planned (at the Time of Appraisal)			Planned (after Revision)			Actual		
	ODA Loan Portion	Local Currency Portion	Total	ODA Loan Portion	Local Currency Portion	Total	ODA Loan Portion	Local Currency Portion	Total
Afforestation	7,281	3,571	10,852	7,281	3,571	10,852	6,122	1,352	7,474
Vegetation Cover	955	338	1,293	472	167	639	293	27	320
Civil Engineering Work/ Equipment	1,187	0	1,187	1,187	0	1,187	923	126	1,049
Training	60	32	92	60	32	92	12	0	12
Price Escalation	8	0	8	8	0	8	0	0	0
Contingency	9	662	671	9	662	671	0	0	0
Interest during Construction	0	269	269	0	269	269	0	0	0
Land Acquisition Cost	0	0	0	0	0	0	0	0	0
Administration Cost, etc.	0	224	224	0	224	224	35	0	35
Total	9,500	5,096	14,596	9,017	4,925	13,942	7,385	1,505	8,890

Source: Materials provided by JICA and replies to the questionnaire survey with the executing agency.

Notes

Foreign exchange rate: planned rate at the time of appraisal: 1 CNY = 14.8 JPY (December, 2006); planned rate after the revision: 1 CNY = 14.8 JPY (December, 2006); actual rate: 1 CNY = 15.2 JPY (mean exchange rate for 2007 through 2016)

3.2.2.2 Project Period

The actual project period of 118 months (from March, 2007 to December, 2016) greatly exceeded the planned project period of 70 months (March, 2007 to December, 2012) (by 169% or 48 months against the planned period). The reasons for such an extended project period were (i) the changes and modifications of the project contents meant that the preparation and approval of the revised plan took some time to complete, (ii) as Jilin Province is situated in northern China with limited time suitable for the planting of trees (a suitable period for tree planting last for approximately 6 months), the delay of project implementation caused a delay of the planting by almost one year at some sites and (iii) in some of the targeted counties, it took a long time to secure farmers to participate in planting on land managed by farming households ((i) was the primary reason for the extended project period). As a result, a delay was especially observed with the civil engineering work to renovate related facilities and part of the afforestation work.

Table 4 Planned and Actual Project Periods

	Planned (at the Time of Appraisal)	Planned (after Revision)	Actual
Signing of the Loan Agreement	March, 2007	As left	June, 2006
Entire Project	March, 2007 - December, 2012 (Project period: 70 months)	As left	March, 2007 - December, 2016 (Project period: 118 months)
Afforestation	July, 2007 - August, 2012	As left	April, 2008 - October, 2015
Vegetation Cover	July, 2007 - May, 2011	As left	April, 2012 - May, 2013
Civil Engineering Work. Equipment	July, 2007 - October, 2008	As left	January, 2008 - December, 2016
Training	July, 2007 - December, 2010	As left	July, 2007 - July, 2016
Acceptance Inspection	September, 2012 - December, 2012	As left	- December, 2016

Source: Materials provided by JICA and replies to the questionnaire survey with the executing agency.

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

Financial Internal Rate of Return

At the time of the appraisal, only the financial internal rate of return (FIRR) was calculated, thus this FIRR was recalculated in the ex-post evaluation.

At the time of the appraisal, the project cost, construction cost and operation/maintenance cost were considered to the cost while revenue from the sale of forest products (timber and seeds, etc.) was considered to the benefit. Based on the project period of 40 years after the start of operation, the FIRR for the Project was calculated to be 6.8%. In this ex-post evaluation, the same cost, benefit and project period were used for recalculation of the FIRR with the relevant numerical data being supplied by the executing agency. The resulting FIRR was 12.1%. The reason for the recalculated FIRR exceeding the FIRR calculated at the time of the appraisal is the reduction of the cash outflow to cover the construction cost, the maintenance cost, etc. of the Project.

Although the project cost was within the revised plan, the project period significantly exceeded the revised plan. Therefore, efficiency of the project is fair.

3.3 Effectiveness and Impacts ⁴ (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

The situation of the quantitative indicators which were set at the time of the appraisal and ex-post evaluation regarding “improvement of the forest coverage ratio and restoration of vegetation cover” is shown in Table 5.⁵ Of those indicators listed in Table 5, the “survival rate of

⁴ The effectiveness is rated in consideration of not only the effects but also the impacts.

⁵ At the time of revising the original plan, no changes were made to the operation and effect indicators regarding the quantitative effects.

the planted trees” and “forest coverage ratio” are indicators set at the time of the appraisal. Other indicators are added at the time of ex-post evaluation as they are thought to be useful to judge the effectiveness of an ecological environment project. Although some figures are unknown, judgement is made using data obtained for some indicators.

Table 5 Changes of Operation and Effect Indicators (Construction of Centralized Heat Supply Facilities)

Indicators	Reference Value	Target Value	Actual (Achieved) Value		
	2005	2013	2013	2017	2019
	Reference Year	At completion of the Project	At completion of the originally planned Project	At completion of the Project	Two year after completion of the Project (ex-post evaluation)
Survival rate of planted trees (%)					
• After the first growth period of afforestation	Unknown	95	≥95	≥95	≥95
• After the third growth period of afforestation	Unknown	85	≥85	≥85	≥85
Forest coverage ratio (%)	34	36	40	40	44
Forest area (thousand ha)	Unknown	-	131	137	137
Growing stock of forests (thousand m ³ /ha)	Unknown	-	Unknown	35,770	36,860
Grassland coverage ratio (%)	Unknown	-	52	55	59
Grassland area (thousand ha)	Unknown	-	1	11	11
Wasteland area (thousand ha)	1,460	-	1,460	1,450	1,450
Desertification area (thousand ha)	Unknown	-	Unknown	Unknown	Unknown
Area of cropland returned to forests (thousand ha)	Unknown	-	Unknown	Unknown	Unknown

Source: Replies to the questionnaire and interview results during the field surveys.

Note: “After the first growth period after planting” means the autumn of the year of planting. “After the third growth period after planting” means the autumn of the two years after the year of planting.

The actual project performance regarding the quantitative indicators for which the target figures were set at the time of appraisal shows that the target figures for the (i) survival rate of planted trees and (ii) forest coverage ratio are both achieved. At the time of ex-post evaluation (2019), the forest coverage ratio exceeds the target figure by 8 points. These two indicators were actually already achieved in 2013 which was the year for project completion in the original plan. While the project period substantially exceeded the planned period as described earlier, the target figures for the quantitative indicators were achieved as planned. Other quantitative indicators for which target values were not set at the time of the approval also show an improving trend in recent years. The grassland coverage ratio improved by 7 points in six years from 2013 to 2019 and both the forest and grassland areas increased in the same period. In the interviews with project-related personnel at the executing agency, it was pointed out that the Project had several positive effects, including (i) the production of pasture grass at land subject for vegetation cover increased by some 600 tons by the time of ex-post evaluation and (ii) the eastward expansion of desertification was suppressed due to an increase of the grassland area (grain production areas in central Jilin Province were protected). Based on the above, the improvement effect of the ecological environment by the Project is judged

to be substantial.

3.3.1.2 Qualitative Effects

(1) Effects of the Renovation of Facilities Related to the Ecological Environment, Improved Forest Coverage Ratio and Regenerated Grassland

As described earlier, the implementation of the Project renovated facilities related to the ecological environment, improved the forest coverage ratio and regenerated grassland. It is confirmed that these positive effects produced the qualitative effects described below.

Functional enhancement of facilities related to improvement of the ecological environment

The project components included the renovation of facilities related to improvement of the ecological environment (model nursery gardens, seed collection and distribution facilities and model forest ecology parks), all of which are important for the promotion of measures and activities to improve the ecological environment. As a result, many of the functions of these facilities are enhanced as shown in Table 6, achieving the strengthening of ecological environment improvement activities (see Box 1).

Table 6 Improvement of the function of facilities for ecological environment improvement

Facility	Improvement by the Project	Functional Enhancement	Improvement of Ecological Environment
Model Nursery Garden	• Construction of new storage for seeds and seedlings • Improvement of the irrigation facilities	• Adequate storage of seedlings until the temperature is suitable for planting • Storage of cultured seedlings through the winter • Adequate and uniform watering of seedlings	• Substantial increase of seedling production (supply of seedlings to meet the local demand for seedlings: 100%) • Improved quality of the supplied seedlings • Availability of seedlings during the appropriate planting season • Stable temperature control and increased supply of seedlings
Seed Collection and Distribution Facilities	• Introduction of seed processing equipment • Construction of a new seed processing center	• Improved quality of seeds to produce seedlings (supply of seeds passing the national standard; lowering of the damaged seed ratio) • Improvement of the seed processing efficiency and processing capacity • Realization of uniform management of seeds	• Increase of seed production • Improved quality of cultured seedlings
Model Forest Ecology Park	• Improvement of facilities protecting the ecological environment on the park • Planting in the park • Improvement of facilities for visitors and research purposes (nature exhibition room; footpaths; facilities for wild animals)	• Improvement of the protection of the ecological environment of the park • Opening of a nature exhibition room and start of educational events on nature • Start of a nature learning curriculum in cooperation with educational institutions • Improved breeding rate through improvement of the rearing environment for protected wild animals (the breeding number of Siberian tigers has increased from 8 to 21 a year)	• Increase of the number of visitors and number of participants in educational events on the ecological environment (increased opportunities for learning about the ecological environment for the general public) • Increased number of wild animals returned to nature

Source: Reply to the questionnaire survey with the executing agency.

Box 1: Improvement of Seedling Production Through Renovation of Model Nursery Gardens

Improvement of the Jiutaiqu Erdaogou Forest Land Protection Station (model nursery garden) under the Project included the construction of two boreholes, a water storage tank and two underground seedling storages, improvement of roads and introduction of sprinkler and soil

improvement systems.

Prior to the Project, water was diverted from a nearby river for sprinkling through rubber pipes. With the construction/introduction of boreholes, water storage tank and sprinkler system, it became possible to uniformly water seedlings in a sufficient quantity. As a result, the annual production volume of seedlings substantially increased from 200,000 to 3,000,000 with a greatly improved quality. Prior to the Project, 80 – 90% of the seedlings to be planted at national forest sites were purchased from external sources. At the time of ex-post evaluation, the entire seedlings are supplied from the model nursery gardens at the national forest sites. This local supply of seedlings is believed to have contributed to (i) the supply of high quality seedlings as deterioration during transportation no longer occurs and (ii) the swift supply of seedlings at an appropriate time for planting.



Cultured seedlings for planting



Sprinkler system introduced under the Project

Formation of forests with multiple functions and establishment of an afforestation model

For the implementation of the Project, emphasis was placed on the formation of “mixed forests” consisting of various species and believed to have a high level of water yield and soil retention with a rich natural ecosystem from the viewpoint of facilitating the enhancement of multiple forest functions. In the case of thin stands (forest land with a relatively small number of trees) often observed in eastern Jilin, the seedlings for planting were selected to ensure the diversity of trees in terms of the species, i.e. needle-leaved trees and broad-leaved trees, etc., and tree height. According to the results of interviews with project-related personnel at the executing agency and local residents, although not necessarily supported by quantitative effects, this conscious approach is believed to have enhanced such multiple forest functions as the suppression of harmful insects, improvement of the soil retention performance (no soil erosion occurred during the especially heavy rain in 2017), lowering of the forest management cost and improvement of the forest landscape.

Because of such positive effects of the afforestation efforts to create forests with multiple functions under the Project and the wide recognition of this approach among those involved in the improvement of forests and ecological environment as this approach adopted for the Project has been employed at other model forest ecology parks with PR and educational functions, this approach has been introduced to a certain extent to other areas of Jilin Province as it is considered

to be important as a model for afforestation to create forests with multiple functions. Accordingly, the Project is believed to have contributed to improvement of the ecological environment and enhancement of the multiple functions of forests in wide areas through the formation and spread of the afforestation model.

(2) Effects of Training in Japan

As mentioned earlier, training in Japan took place for project-related personnel. Interviews with the participants found that many of the participants shared such positive opinions as “the way that Japan conducts forestry work and afforestation in a systematic manner is a very useful reference” and “the training in Japan made it possible to widely learn about the experience of Japan and other advanced countries along with the acquisition of useful reference materials” Moreover, the following qualitative effects (improved capacity of those involved in afforestation, etc. and application of the training contents to the actual work) were confirmed as a result of the training in Japan. However, as far as the application of the training outcomes is concerned, while there have been cases of such application, they appear to be the result of individual rather than organizational efforts as the number of participants from individual specific areas was small due to the involvement of many areas in the Project.

Improvement of planting and silviculture techniques

While many new and unique planting and silviculture techniques have been developed and employed in China, there are cases where new planting and silviculture techniques learned during the training in Japan are actively applied. According to the findings of interviews with project-related personnel at the executing agency, the introduction of such new planting and silviculture techniques is believed to have made a certain contribution to the improved survival rate of the planted trees. Some examples of improving the planting and silviculture techniques utilizing the outcomes of the training in Japan are listed below.

- Re-examination of seedling composition and culture technique enabling the smooth implementation of planting and silviculture so that the entire afforestation work can smoothly proceed
- Introduction of a planting technique which uses a tree guard to improve the survival rate
- Strengthening of the measures to prevent illegal felling by means of employing a Japanese method, etc.

Promotion of the construction/improvement of forest parks and model forest ecology parks

As some of the participants of the training in Japan were responsible for the management of forest parks and model forest ecology parks which are facilities for the general public to have contact with and learn about forests and nature, there have been cases where the experience of the

training in Japan is utilized. Some concrete examples are listed below.

- The information boards and information on display have been improved for easier understanding by visitors.
- A new management organization has been established to improve the management level of the work.

3.3.2 Impacts

3.3.2.1 Intended Impacts

(1) Improvement of the Living Environment for Citizens (Quantitative Effects)

The situation of the various indicators set at the time of the appraisal and ex-post evaluation to indicate the qualitative effects of the Project on “improvement of the living environment for residents and prevention of desertification due to the restoration of the multiple functions of forests” is shown in Table 7 below. Of those indicators listed in Table 7, the “number of beneficiaries”, “reduction of soil erosion volume”, “average annual income of local residents” and “average annual income of residents participating in the Project” are indicators set at the time of the appraisal. Other indicators are added for ex-post evaluation and are thought to be effective to judge the impacts of an ecological environment project. While some figures are unknown, judgement is made using the data obtained.

Table 7 Changes of Indicator Values

Indicators	Reference Value	Target Value	Actual (Achieved) Value		
	2005	2013	2013	2017	2019
	Reference Year	At completion of the Project	At completion of the originally planned Project	At completion of the Project	Two years after the completion of the project (ex-post evaluation)
Number of beneficiaries (thousand person)	-	16,020	16,670	16,670	16,670
Reduction of soil erosion volume (thousand t)	-	8,030 (When planted trees have matured)	1,020	1,230	1,230
Average annual income of local residents (CNY)	3,264	3,500	22,275	26,530	28,319
Average annual income of residents participating in the Project (CNY)	3,000	-	13,280	18,161	18,161
Annual CO ₂ absorption volume (thousand t)	-	610 (When planted trees have matured)	Unknown	563	563
Soil erosion volume (thousand t)	130,000	-	124,970	121,970	121,970
Soil erosion area (km ²)	31,519	-	31,000	31,000	31,000
Number of flood victims (thousand person)	950	-	Unknown	700	700
Economic loss due to flooding (thousand CNY)	1,797,190	-	Unknown	Unknown	Unknown
Number of sandstorms (times)	12	-	8	6	4
Days of sandstorms (days)	6	-	≤4	≤3	≤3
Economic loss due to sandstorms (thousand CNY)	Unknown	-	Unknown	Unknown	Unknown
Production volume of commercial forests and forest products	Unknown	-	Unknown	Unknown	Unknown
Production value of commercial forests and forest products (thousand CNY)	Unknown	-	Unknown	Unknown	Unknown
Number of employment created (persons)	-	-	26,231	26,231	26,231
Poor population among agricultural population (person thousand)	890	-	860	130	20
Average annual income of the poor (CNY)	637	-	2,300	3,485	3,747

Source: Materials provided by JICA and replies to the questionnaire survey with the executing agency.

The actual number of beneficiaries of the Project of 16.67 million exceeded the target figure of 16.02 million set at the time of the appraisal, indicating that the Project benefitted many people as planned. As the Project targeted many areas of Jilin Province, the beneficiaries of the Project were spread over a wide area of the province.

Among the quantitative indicators relating to the situation of the living environment for residents, the performance of measures against “soil erosion, flooding and sandstorms” showed some

improvement under the Project.⁶ The effect on the number of flood victims and suppression of sandstorms were particularly positive (the number of flood victims decreased from 950,000 in 2005 to 700,000 in 2019 and the number of sandstorms decreased from 12 times in 2005 to four times in 2019). The interview survey with beneficiaries found that the frequency of flood and soil erosion decreased as typically evidenced by the fact that heavy rain in 2017 did not cause any flooding or soil erosion. Even when flooding or soil erosion did occur, the damage was less than before.⁷ The occurrence of flooding or soil erosion often caused major damage to farmland, houses and living infrastructure in nearby villages (for example, 1,000 *mu* (approximately 666,700 m²) of farmland was damaged in Huinan County in 2005) but the decrease of flooding and soil erosion has led to a noticeable decrease of the damage.

Another expected impact of “increasing the income of residents (escape from poverty)” is that the average annual income of local residents for which a target figure was set at the time of the appraisal increased to 26,530 CNY in 2017 when the Project was completed, far exceeding the target figure of 3,500 CNY. This income improvement was widespread, including the poor. While such an income increase may well be largely attributed to the high economic growth of China during the project implementation period, it is fair to say that the Project made a certain contribution in this aspect as shown by the creation of new employment for the implementation and management of the Project (26,231 jobs were created mainly for the poor and women). Furthermore, the annual CO₂ absorption volume reached 560,000 tons, already achieving 91% of the target 610,000 tons when the planted trees mature in the future).

(2) Restoration of Multiple Functions of Forests in the Project Area (Qualitative Effect)

The implementation of the Project achieved improvement of the forest coverage ratio and regeneration of grassland as described earlier. These achievements led to the following impact relating to the restoration of the multiple functions of forests in the project area.

Increase of rare wild animals and birds

The opinion has frequently been expressed that afforestation and vegetation cover under the Project led to improvement of the ecological environment and habitat for wild animals, resulting in confirmed increases of rare wild animals and birds. Typical examples showing the improvement of the natural environment are (i) the number of Siberian tigers has increases and their area of activity has expanded and (ii) 3,000 hooded cranes (*Grus monacha*) which is a designated Class 1 rare bird

⁶ The actual reduction of the soil erosion volume was far below the target value. However, the target is that expected to be achieved when the planted trees are mature. According to the interviewed project-related personnel at the executing agency, the target value is expected to be achieved when the planted trees mature. Meanwhile, the reduction of the soil erosion volume has shown an increasing trend in recent years.

⁷ According to the interviewed personnel at the executing agency, afforestation under the Project has facilitated “the withdrawal from farming and a return to forests (meaning the planting of trees on farmland of poor condition to make the land return to forest)” at sloping land and the resulting less use of agricultural chemicals has achieved soil improvement, in turn suppressing soil erosion.

for state protection, have been observed near the project area (the number was very small before the implementation of the Project). Moreover, the numbers of Class 2 birds for state protection, pheasants, wild boars, hares, deer, squirrels, etc. have also increased.⁸ Although the height and density of many planted trees and targeted stands under the Project are insufficient at the time of ex-post evaluation, they have still had a significant impact on the habitat for rare wild animals and birds.

3.3.2.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

No negative impacts on the natural environment were found by the ex-post evaluation. The interview survey with project-related personnel at the executing agency found that the environmental impact assessment (EIA) for the Project had been conducted by the time of the appraisal and that the Project was approved by the Bureau of Ecology and Environment, completing the necessary procedure for the implementation of the Project in China. Environmental protection measures relating to the implementation of the Project were properly implemented based on the EIA (even after the Project, the necessary monitoring of the use of agrochemicals with a small environmental load was conducted as planned). All of the monitored values were within the standards set by the administration and no problems were found.

Because of the implementation of adequate measures, no negative impacts on the natural environment have occurred by the time of this ex-post evaluation. Therefore, it can be judged that the Project did not cause any negative impacts on the natural environment.

(2) Resettlement and Land Acquisition

Although some parts of the afforestation and vegetation cover work took place at land managed by farming households, the Project did not necessitate any resettlement or land acquisition.

(3) Increase of Non-Agricultural/Stock Farming Income among Women, Poor Residents, etc.

The interviews with beneficiaries and project-related personnel at the executing agency found that there were areas where women and poor residents without sufficient access to earning opportunities accounted for a certain proportion of the local population prior to the implementation of the Project. As the recruitment and use of women and poor people were actively sought for the work of afforestation and facility construction and the post-planting management of the planted trees during the implementation process of the Project in addition to an increase of such jobs as the culture of seedlings for planting, etc., the income of women and poor residents increased (creation of new employment for 26,231 people, many of whom were women or poor residents). Among the employed people for afforestation, women and poor residents accounted for more than 50% and

⁸ According to some of the interviewed beneficiaries, the increased number of wild boar means expansion of the damage to farming in some areas (Huinan County, etc.)

they received a daily wage of between 80 CNY and 150 CNY. There is also the case of increased income for local residents, including women, at a model forest ecology park and forest exhibition room newly introduced or improved under the Project which also constituted a new sightseeing attraction, lengthening the stay of tourists in the local area (for example, operation of restaurants and hotels catering for tourists).

(4) Strengthening of Environmental Education and Research and Increase of Environmental Awareness among the Residents

During interviews with beneficiaries and project-related personnel at the executing agency, many of those interviewed expressed the opinion that the implementation of the Project led to (i) strengthening of environmental education and research and (ii) increase of environmental awareness among farmers and stock farmers through improvement of the ecological environment. Some concrete examples are listed below.

- After the implementation of the Project, the number of visitors to model forest ecology parks, which have a function of educating the general public, has substantially increased, partly because of improvement of the nature exhibition room, illustrating the intensification of environmental education for the general public. There are cases where the model forest ecology park functions as a base for environmental education through the acceptance of visits by university students specializing in the environment or dendrology.
- At the National Forest Protection Center in the Jilin Provincial Forestry Experiment District, a seedling culture room/laboratory was newly established under the Project, enabling detailed soil survey, vegetation research and the long-term preservation of seeds. As a result, provincial level work can be entrusted to this center and basic research at the center has been enhanced. At the time of ex-post evaluation, more than 100 master's degree and Ph.D. students have produced their research papers using the facilities of the center.
- Prior to the implementation of the Project, such activities showing the poor environmental awareness among local residents as illegal deforestation and farming on sloping land (thin stands/degraded land) and others were often observed. These problematic activities by residents have greatly declined as afforestation work and the improved ecological environment has produced positive outcomes for residents.

In short, it is believed that the Project has somewhat contributed to the establishment of a virtuous cycle where improvement of the ecological environment leads to increased environmental awareness among residents, in turn leading to further improvement of the ecological environment.

(5) Utilization of Experience of the Project for Other Large-Scale Ecological Projects

According to the results of interviews with project-related personnel at the executing agency, the experience of the Project has been utilized for subsequent large-scale ecological environment

projects (protection of natural forests, reforestation, withdrawal from farming and return to forests, etc.) To be more precise, the experience has been used to improve the project contents and proceedings, including the development of cooperative/collaborative projects involving broad ranging organizations, emphasis on and strengthening of the preliminary design of projects, enhancement of training for stakeholders and beneficiaries and implementation of outcome-oriented evaluation. In addition, the utilization of international cooperation has been in progress based on the experience of the Project. As such, it can be judged that the Project has made a certain contribution to the promotion of subsequent projects related to the ecological environment in general in Jilin Province.

Based on the above, the effectiveness of the Project is judged to have reached the level where the target values for the quantitative indicators have been generally achieved along with many positive qualitative effects relating to the local ecosystem. Regarding the impacts of the Project, improvement of the living environment for residents in the Project Area and other positive impacts of the Project are confirmed in terms of both the quantitative effects and qualitative effects. The Project has largely achieved its objectives. Therefore, effectiveness and impacts of the Project are high.

3.4 Sustainability (Rating: ③)

3.4.1 Institutional/Organization Aspect of Operation and Maintenance

The operation and maintenance system for afforestation sites, vegetation cover sites and various facilities which were developed, constructed or renovated under the Project has been established as planned at the time of appraisal with the administrative organizations responsible for project-related work and farmers/stock farmers performing the central roles as shown in Table 8.

Table 8 Operation and Maintenance System

Type of Work	Responsible Organization(s)
Overall Management	Provincial Bureau of Forestry and Grassland; county bureaus of forestry and grassland
Afforestation Site and Vegetation Site Management	[National forest sites] National forest sites (use of forest guards) [Land managed by farmers/stock farmers] Farmers, stock farmers and villages responsible for the management of afforestation sites; forest security offices of county bureaus of forestry and grassland (illegal logging control); forest fire control organizations (prevention and control of forest fires)
Facility Management	[Seed collection facilities; model nursery gardens; model forest ecology parks] provincial bureau of forestry and grassland

Source: Replies to the questionnaire survey with the executing agency.

The operation and maintenance system for facilities, etc. improved, constructed or renovated under the Project is basically the same as the system employed in other cities in China and those organizations responsible for operation and maintenance are also responsible for similar facilities constructed under different projects in Jilin Province or the relevant counties. Guidance for farmers

and stock farmers has been adequately provided and the operation and maintenance of the facilities, etc. constructed under the Project have been smoothly implemented. As such, no special problems have occurred regarding the institutional/organizational aspect of the operation and maintenance.

3.4.2 Technical Aspect of Operation and Maintenance

The organizations responsible for the operational management of the facilities and equipment constructed/introduced under the Project have rich experience of operating and managing similar facilities and equipment outside the scope of the Project. Therefore, they have sufficient technical capability. The manuals and rules to operate and maintain the facilities and equipment are properly established (these manuals and rules are common to other projects). The maintenance checks of the facilities constructed under the Project are regularly as well as routinely conducted in accordance with the relevant rules of each organization. When any equipment requires repair or mending, the basic principle is for an operation and maintenance organization, which is a specialist administrative body covering a specific field, to do the work. No stoppage of the service due to a defect, etc. of a facility has so far occurred. Farmers, stock farmers and forest rangers in charge of the maintenance of afforestation sites and vegetation cover sites undergo regular training organized by the relevant administrative bodies. No special problems have been encountered so far regarding the technical aspect of operation and maintenance.

3.4.3 Financial Aspect of Operation and Maintenance

The operation and maintenance of the facilities, etc. constructed, procured or renovated under the Project are funded by the budget of the provincial, municipal or county governments or national forest sites. The financial situation of the organizations responsible for the operation and maintenance of the project-related facilities, etc. is shown in Table 9. According to the results of interviews with project-related personnel at the executing agency and Table 9, the amount of fiscal expenditure related to the ecological environment has shown an increasing trend since the announcement of *the Policy to Emphasize the Construction of an Ecological Civilization* at the 18th National Congress of the Community Party of China in 2012. At the time of ex-post evaluation, the necessary budget has been secured and no financial problems regarding operation and maintenance are observed. Although the Chinese economy is severely affected by the spread of the new coronavirus, the GDP growth rate for April through June, 2020 returned to positive growth of 3.2%. The *IMF Global Economic Outlook* (June, 2020) forecasts China's overall economic growth rate of 1.0% for 2020 (compared to -4.9% for the world and -8.0% for advanced economies) and 8.2% for 2021 (compared to 5.4% for the world and 4.8% for advanced economies). As such, the high level of economic growth is expected to continue in China, suggesting that the necessary budget for operation and maintenance is secured. Based on the above, there are no problems regarding the financial aspect of operation and maintenance.

Table 9 Financial Situation of the Chinese Government and the Organization Responsible for Operation and Maintenance

Unit: million CNY

Organization	Expenditure	2017	2018	2019
Central Government	Environment	13,400	12,800	14,000
	Ecological environment	10,300	13,000	12,800
Jilin Provincial Government	Environment	21,500	23,900	24,500
	Ecological environment	45,500	48,800	46,900
Bureau of Forestry and Grassland, Jilin Province	Ecological environment	140	180	170

Sources: China Statistical Yearbook 2020 and replies to the questionnaire survey with the executing agency.

3.4.4 Status of Operation and Maintenance

The monitoring, maintenance and regular inspection of the facilities constructed under the Project have been properly conducted in accordance with the relevant rules set by the organizations responsible for such work. The field reconnaissance as part of the ex-post evaluation found no problems regarding operation and maintenance as evidenced by such facts that (i) there is a system in place to quickly respond whenever a problem emerges as any unusual occurrence is dealt with by a suitable body, (ii) all facilities are generally kept in a tidy and clean manner, (iii) the use and inspection of each facility are properly recorded, (iv) an irrigation facility and monitoring system are installed at some afforestation sites and (v) no problems are found regarding the procurement of repair equipment. The operation and maintenance of afforestation sites and vegetation cover sites by farmers, stock farmers or forest rangers are smoothly conducted as evidenced by such facts as (i) guidance by the relevant administrative body is regularly provided and (ii) there is active cooperation locally as the improvement of grassland leads to increased income from livestock farming. As a result, the level of operation and maintenance is high.

The utilization rate of individual facilities is high and no major operational problems have occurred during the period from the commencement of their operation to the time of ex-post evaluation. The field reconnaissance conducted by the evaluator confirmed that (i) the conditions of the principal facilities are generally good and they are functioning as initially planned, (ii) the planted trees and seeded grass have been growing without any problems and (iii) supplementary planting has been conducted when the initially planted seedlings have died.

No major problems have been observed in the institutional/organizational, technical and financial aspects and current status of the operation and maintenance system. Therefore, the sustainability of the project effects is high.

4. Conclusions, Lessons Learned and Recommendations

4.1 Conclusions

The objective of the Project is to improve the forest coverage ratio and to regenerate grassland through afforestation and vegetation cover, improvement of related facilities and procurement of

equipment in Jilin Province and training, thereby contributing to the restoration of the multiple functions of forests and prevention of desertification.

The Project advanced the restoration of the multiple functions of forests and grassland and the prevention of desertification through afforestation work, vegetation cover work and improvement of equipment at related facilities in line with the policy of the Government of China and Jilin Province to improve the ecological environment. As such, the Project conforms to the development needs of improving the ecological environment in Jilin Province and Japan's ODA policy. Therefore, the relevance of the Project is high. In the case of the project efficiency, although the outputs were achieved generally as anticipated by the revised plan with the project cost being within the plan, the project period significantly exceeded the revised plan. Therefore, the efficiency of the Project is fair. As a result of the materialization of the facilities required for afforestation work, vegetation cover work and improvement of the ecological environment, the target figures for the quantitative indicators (planted tree survival rate and forest coverage ratio) set at the time of appraisal were achieved at the time of ex-post evaluation and other quantitative indicators (grassland coverage ratio, forest/grassland area, etc.) have shown some improvement. In addition, wide-ranging qualitative effects of the Project are confirmed, including (i) functional improvement of the facilities related to improvement of the ecological environment and (ii) establishment of forests with multiple functions. Also highly noticeable are the impacts of "the restoration of the multiple functions of forests and grassland" ((i) reduction of the occurrence of sandstorms, flooding and soil erosion and (ii) increase of income other than farming and/or stock farming for women and poor people). Accordingly, the effectiveness and impacts of the Project are high. The sustainability of the Project is also high as there are no problems regarding the institutional, technical and financial aspects of operation and maintenance of the Project with confirmation of the good operation and maintenance conditions of the facilities and equipment. In the light of the above, the Project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Realization of early and steady improvement of internal facilities of the exhibition room of the Model Forest Ecology Park in Huinan County and commencement of its service

As part of the renovation of model forest ecology parks under the Project, a building housing the exhibition room was constructed at the National Forest Protection Center in Huinan County for the purpose of conducting PR and educational activities for visitors. However, the internal facilities planned to be arranged through domestic funding were not procured due to the government policy of restraining PR-oriented government facilities and the planned exhibition room has not been opened by the time of ex-post evaluation. Although parts of the building are used for forest fire prevention monitoring and internal meetings, a large part of the building remains unused.

As funding for the internal facilities of the exhibition room is now in the pipeline, the related

work started in May, 2020 with the prospect of commencing the service of this exhibition room towards the end of 2020. Accordingly, it is necessary for the Huinan County Bureau of Forestry and Grassland and the Huinan National Forest Protection Center to smoothly progress with the work to arrange internal facilities so that the service of the exhibition room can commence as planned. Meanwhile, it is desirable for the Jilin Provincial Bureau of Forestry and Grassland to provide adequate guidance for the Huinan County Bureau of Forestry and Grassland as well as the Huinan National Forest Protection Center so that the arrangement of the internal facilities and the commencement of its service can proceed early and steadily.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Importance of the establishment of an overall, systematic mechanism to facilitate training participants to utilize the training outcomes when the participants undergoing training in Japan come from many areas and organizations with only a small number of participants per area or organization

When the training participants in Japan come from many areas and organizations and the number of participants per area or organization is small, there is concern for the emergence of a considerable gap in the application of the training contents and outcomes to the practical work of the trainees as such application largely depends on the willingness and ideas of individual trainees. It is, therefore, important for JICA and the project executing agency to establish an overall, systematic mechanism at the project implementation stage with a view to making the training participants utilize the training outcomes. To be more precise, they should examine the viability of “information exchange on cases of utilizing the training outcomes by the training participants (establishment of a network using SNS, etc. to enable such exchange)” and “convening of regular meetings for the training participants to facilitate their use of the training outcomes.”

The contents of the training in Japan were highly appraised by the participants and the utilization of the positive outcomes of the training in Japan under the Project was confirmed in relation to “improvement of the planting and silviculture techniques” and “promotion of the construction or improvement/ renovation of forest parks and model forest ecology parks.” However, many target areas of the Project and the small number of training participants representing each area mean that the utilization of the training outcomes is largely dependent on the willingness and ideas of individual participants, resulting in differences in the utilization of the training outcomes between individual participants and between areas.

Importance of implementing an afforestation project based on sufficient examination of and consultation with the executing agency on the project effects and efficiency and suitability of financial

contribution by individual persons in the case where the project is planned for land owned or managed by individual persons

When an afforestation project is planned, the target sites may be owned and managed by individual persons or farming households in view of the actual conditions of the target country or area. In such a case, it is important for JICA to conduct the necessary examinations and discussions with the executing agency at the project planning stage on such issues as the project effects (impact on the survival rate, etc., implications of conducting afforestation work at privately owned and managed land, etc.), the efficiency of the project and suitability of financial contribution by individual persons towards the cost of implementing the project. In this way, it is possible to prevent modification of the plan and non-achievement of the planned outputs at the project implementation stage.

The original plan for the Project envisaged that the afforestation of land owned and managed by individual persons (farming households) would be conducted with a financial contribution by each owner (approximately 500 CNY/*mu* (1 *mu* = 666.7 m²); planned afforestation area of 78,672 ha with 15,316 participating farming households). However, it was subsequently judged that (i) it would be more efficient to plant on much larger national land than privately owned land of which the area per farming household was small, (ii) afforestation on national land could be expected to achieve a high survival rate as a high level of specialist skills and equipment could be mobilized and (iii) it would be problematic to request a financial contribution from individual persons for an afforestation project which offered little direct and short-term economic advantage. Based on such judgement, the actual performance of planting at privately owned land fell short of the planned output due to (i) encouragement of afforestation at national land and (ii) cancellation of a personal contribution (actual performance: afforestation area of 15,300 ha with 2,982 participating farming households). While such judgements and modifications are believed to be based on specific local circumstances, careful attention is required to the afforestation work at privately owned land. This is because such afforestation work to improve the natural environment takes place near residential areas for local residents/farmers and cultivated land and can have a substantial impact on civic life. The Qinghai Ecological Environmental Improvement Project succeeded in achieving direct advantages for individual persons (farmers) by including erosion control measures as a project component in addition to afforestation. Such an approach may be a useful reference when planning to request a financial contribution by individual persons.

Comparison of the Original and Actual Scope of the Project

Item	Plan (after Revision)	Actual
1. Project Outputs	[Afforestation and Vegetation Cover] 1)Afforestation (Protection Forest): 171,000 ha 2) Vegetation cover (prevention of desertification): 10,840 ha [Improvement of Related Facilities] 1) Renovation of seed collection and distribution facility: One site 2) Renovation of model nursery gardens: 4 sites 3) Renovation of model forest ecology parks: 4 sites [Equipment Procurement] 1)Patrol/work vehicle 2)Irrigation equipment 3)Monitoring equipment 4)Monitoring hut, fencing and information boards [Training] 1) Training in Japan: 80 trainees	[Afforestation and Vegetation Cover] 1)Afforestation (Protection Forest): 136,900 ha 2) Vegetation cover (prevention of desertification): 10,840 ha [Improvement of Related Facilities] 1) Renovation of seed collection and distribution facility: One site 2) Renovation of model nursery gardens: 4 sites 3) Renovation of model forest ecology parks: 4 sites [Equipment Procurement] 1)Patrol/work vehicle 2)Irrigation equipment 3)Monitoring equipment 4)Monitoring hut, fencing and information boards [Training] 1) Training in Japan: 58 trainees
2. Project Period	March, 2007 – December, 2012 (70 months)	March, 2007 – February, 2016 (118 months)
3. Project Cost		
Amount Paid in Foreign Currency	9,017 million yen	7,385 million yen
Amount Paid in Local Currency	4,925 million yen (332 million CNY)	1,505 million yen (99 million CNY)
Total	13,942 million yen	8,890 million yen
ODA Loan Portion	9,017 million yen	7,385 million yen
Exchange Rate	1 CNY = 14.8 JPY (as of December, 2006)	1 CNY = 15.2 JPY (mean for 2007 through 2016)
4. Final Disbursement	July, 2016	