

People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan

Shaanxi Loess Plateau Afforestation Project

External Evaluator: Nobuyuki Kobayashi, OPMAC Corporation

0. Summary

The 1998 Yangtze River Floods raised awareness of the necessity to improve the water holding capacity of the major rivers in the area by expanding forest areas in the upper and middle river basins and as such form the background of this project. Based on the voluntary participation of Shaanxi province farmers located in 34 counties/county-level cities/city districts¹ of Loess Plateau area, the purpose of this project is to prepare economic, timber and protection forests.

The implementation of this project was in line with Chinese forestry sector's policy and development needs as well as Japan's ODA policy on China to support activities in the environmental field, therefore its relevance is high. From the time of project appraisal to the ex-post evaluation, the area afforested by this project accounted for approximately 30% of the total increase in forest areas, and the project's contribution towards the improved percentage of forest cover is prominent. The questionnaire survey results indicated that farmers expect an increase in incomes generated from economic and timber forests and are eager for further investment. The survey also surmised that the forest management is satisfactory. For the reasons above, the project's effectiveness and impact are high. As for the project's efficiency, the project period was significantly exceeded the plan because severe growth conditions necessitated supplemental planting and replanting. The project cost also exceeded the plan due to the lower exchange rate (Japanese yen to Chinese RMB) from the time of project appraisal. In regards to the project's sustainability, neither the county-level local government forestry department nor the local farmers responsible for activities relevant to forest maintenance, showed any significant problem.

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

¹ Within Chinese administrative divisions, there are counties, county-level cities and city districts under provinces. In this report, the local government of the counties, county-level cities and city districts is mentioned as county-level local government.

1. Project Description



Project Location



Chinese Pine in Protected Forest

1.1 Background

At the time when the People's Republic of China was established (1949), the country's forest coverage rate was less than 10%. Ever since then, the Chinese government has been promoting improvement in afforestation. At the beginning of 2000, although China possessed one of the world's largest forest areas, its forest coverage rate was below 20% and China has yet to reach the forest coverage rate of other vast countries (with various natural environments) such as the United States, Canada and Russia. China's low forest coverage had caused many natural disasters including the 1998 Yangtze River Floods. Such large-scale floods had resulted in 1,300 deaths and 2,300 million victims. Excessive disafforestation resulting in the weakened capacity of water holding was considered one of the primary causes of such disasters. In addition, more floods are now more likely to occur during rainy season as the river bottoms have been raised by the inflow of sand at the Loess Plateau basin. This has caused a phenomenon in which a river has dried up (shear flow) during dry seasons. In addition, sandstorms occurring in areas affected by desertification were increasing, including a severe sand storm in March 2000 which caused fatal damage in the northwest region.

After the Yangtze River Floods in 1998, the Chinese government introduced a forestry sector policy that focused more on environmental aspects, and set a major policy goal of expanding the forest areas in the upper and middle river basins of major rivers. This project was based on farmers' voluntary participation in the forestation activities at Loess Plateau in the upper and middle river basins of Huanghe River to improve forest cover and it was positioned to support the Chinese government's activities to improve natural environments. With this background, the loan agreement for this project was signed in 2001. During the same period, JICA has provided ODA loan projects to expand the forest areas of Loess Plateau including the "Shanxi Loess Plateau Afforestation Project" and the "Inner Mongolia Loess Plateau Forestation Project".

1.2 Project Outline

The objective of this project is to increase forest cover, prevent soil erosion, and improve the incomes of farmers through the afforestation of the Loess Plateau area within Shaanxi province in 34 counties/county-level cities/city districts, thereby contributing to the improvement of the social and economic stability of the said regions, and the living environments of the local residents and those in the lower river basin of Huanghe River, as well as China's natural environment².

Loan Approved Amount/ Disbursed Amount	4,200 million yen / 4,199 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 2001 / March 2001
Terms and Conditions	Interest Rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: Bilateral tied
Borrower / Executing Agency	The Government of the People's Republic of China / Shaanxi Provincial People's Government
Final Disbursement Date	July 2010
Feasibility Studies, etc.	Shaanxi Provincial Forest Survey and Design Institute, "Shaanxi Afforestation Project Feasibility Study", June 2000
Related Projects	- JICA "Shanxi Loess Plateau Afforestation Project" (ODA loan, 2000) and "Inner-Mongolia Loess Plateau Afforestation Project" (ODA loan, 2000) - World Bank "Loess Plateau Watershed Rehabilitation II" (1999) - KfW "Afforestation Shaanxi I & II" (1993 and 2000)

2. Outline of the Evaluation Study

2.1 External Evaluator

Nobuyuki Kobayashi, OPMAC Corp.

2.2 Duration of Evaluation Study

The ex-post evaluation was administered as follows;

² Although the project sites were expediently divided into 8 regions in the appraisal document, this ex-post evaluation report does not use the same 8 region division because the Chinese project related documents did not use the same divisions which could be confused with administrative divisions.

Duration of the Study: August 2012-September 2013

Duration of the Field Study: March 3-March 19, 2013 and June 4-June 21, 2013

2.3 Constraints during the Evaluation Study

Because the project sites were widely dispersed, many government agencies were involved in the project, and some information could not be directly obtained by those who were in charge at the time of project implementation due to personnel relocation. For this reason, details on the project costs (reasons for cost fluctuations for each category, payment period, etc.) could not be obtained, and it was difficult to carry out sufficient analysis on the fluctuations of the project cost.

3. Results of the Evaluation (Overall Rating: B³)

3.1 Relevance (Rating: ③⁴)

3.1.1 Relevance to the Development Plan of China

At the time of project appraisal (2001), the National Program for the Construction of an Ecological Environment (approved in 1999) was the long-term plan for the recovery and protection of the environment. The plan pursued the protection of an ecological environment and aimed at a forest coverage rate of more than 26% by 2050. At the time of ex-post evaluation (2013), the National Program for the Construction of an Ecological Environment remained an important policy in the forestry sector and a long term view has been taken in terms of forestry rehabilitation. Another long-term plan, the National Afforestation Plan (2011-2020) was also established. Within the policy of Loess Plateau regions, (1) expansion of the forest areas through plantation, regeneration by enclosures and aerial sowing (tree species to include black locusts, Manchurian black pines, etc.), and (2) afforestation of economic forests specializing in certain species such as apple and Sichuan pepper trees.

At the time of the project appraisal, the 10th Five Year Plan and the mid-to long- term plan for the forestry sector (2001-2005) aimed at a forestry coverage rate of 18.2% by 2005 and 19.4% by 2010. For the economic and timber forests, the policy focused on fast growing tree species in the state forests of northeast and inner Mongolian regions as well as the mid river basin of Huanghe River and the southern regions and emphasized the afforestation of timber forests for industrial raw materials (plywood and wood pulp manufacturing). For the protection forest, the upper stream of the Yangtze River and upper/middle stream of the Huanghe River were designated as the primary target regions. At the time of ex-post evaluation, the 12th Five Year Plan for the forestry sector (2011-2015) was a mid-term sector plan. During the planned period, this mid-term sector plan proposed planting trees over an area of approximately 30

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

⁴ ③: High, ②: Fair, ①: Low

million ha to achieve a forest coverage rate of 21.7% by 2015. Projects to accelerate harvesting as well as to construct a base for plywood and wood pulp manufacturing are an on-going part of the forestry sector's promotion policy, and there is no significant change in the focus of the policy. The sector policy of the 12th Five Year Plan for the forestry sector of Shaanxi province is to improve the environments of the target areas including those regions suffering from severe soil erosion and sand storms and aims at a 43% forestry coverage rate by 2015.

During the period of project implementation, new regulations for natural environment protection were enacted. In 2002, for example, the Law on Prevention and Control of Desertification was put into effect. The Law stipulated that the local government would now be in charge of establishing a soil erosion control plan, implementing afforestation according to the plan, and carrying out forestry management to regulate logging. The Law on Water and Soil Conservation to prevent or control soil erosion was revised in 2010, and the roles of the government have been broadened to include appraisal, selection of target regions, establishment of a soil erosion control plan and development of regulations, protection construction, and planting.

Afforestation implemented by this project is in line with the forest rehabilitation policy objectives and its relevance remains intact. Some of the tree species used in this project (black locusts, Manchurian pine trees, apple and Sichuan pepper trees, etc.) are the same species that are emphasized in the National Afforestation Plan. The needs for nurturing and protecting forests to improve the natural environment have been strongly reflected in the laws and regulations.

3.1.2 Relevance to the Development Needs of China

Although the forest coverage rate in China has improved from 8.6% in 1949 (immediately after the establishment of the People's Republic of China) to 13.9% in 1999, insufficient forestry resources has been the cause for various environmental issues. At the time of the project appraisal, the Loess Plateau regions, in particular, had some of the lowest forest coverage rates in China (6%), and showed significantly poor forestry resources.

Shaanxi province, the project site of this project, was exposed to the menace of soil erosion and desertification while the Loess Plateau lies in the northern half of the province and the Huanghe River lies on the northern and eastern provincial borders. Intensive rain combined with soil that has little tolerance to erosion has caused severe drain off of surface soil in Loess Plateau, and is one of the main causes of soil runoff into the Huanghe River. At the time of appraisal, the amount of soil runoff into Loess Plateau was 14 billion tons and it was estimated that approximately 0.2-2 cm of Loess Plateau surface soil was lost annually. Although vegetation could contribute to the formation of more erosion resistant soil, Loess Plateau (including the northern regions of Shaanxi province) exhibited a low forest coverage rate. For this reason, the needs for expanding forest coverage in order to prevent soil erosion and

desertification were high in Shaanxi province. Such soil erosion and desertification were mostly caused by severe natural conditions, and as such there was no significant change observed from the time of appraisal to the ex-post evaluation.

In regards to forest rehabilitation, it is a crucial challenge that the farmers who are in charge of the forest administration gain sufficient incomes so that they do not carry out exploitative use of the forests. This project adopted an administrative scheme in which the farmers that afforested economic and timber forests could harvest from woodland. In 1998, prior to the project implementation, an average net income of a farmer in a rural area of Shaanxi province was approximately 35% lower (RMB 1,406) than the national average (RMB 2,161). In 2010, the average net income of a farmer in a rural area of Shaanxi province remained 28% lower (RMB 5,027.87) than the national average (RMB 6,977.29). At the time of the ex-post evaluation, rural Shaanxi farmer's incomes are still below national average, and its necessary to improve their incomes by introducing value-added farm products.

3.1.3 Relevance to Japan's ODA Policy

Japan's former Official Development Assistance Charter (former ODA charter), which had been approved by the cabinet in 1992, referred to the close relationship between Japan and East Asia and emphasized assistance to the Asian region. In addition, the charter had a policy for supporting the effort of developing countries in the field of environmental protection. Japan's ODA White Paper in 1999 regarded the environmental sector as a priority for China's loan assistance, and in particular, pointed out the inland areas where non-governmental financial support is hard to reach. Furthermore, the Japan Bank for International Cooperation's (at that time) Medium-Term Strategy for Overseas Cooperation Operations (approved in 1999) stated solving global issues including environmental issues as one of its basic policies, and assistance for China in such field was considered to have a higher priority.

Through assistance for Shaanxi province's afforestation, this project contributed to forestry development located in the inland part of China, and thus it was consistent with Japan's ODA policy.

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

3.2 Effectiveness⁵ (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

(1) Forest Cover Ratio

Analysis of effectiveness/impact was based on the forest cover ratio for the following reasons: (1) It was the basis for the project appraisal decision and the target ratio was clearly set at the time of appraisal, and (2) Project's attribution to the project effect was clearly shown by this indicator. At the time of ex-post evaluation, the forest cover ratio has achieved its target (See Table 1). Based on the data in 2011, of all the increased forestry areas (approximately 328,000 ha) within project site from the time of appraisal to ex-post evaluation, the afforestation areas of this project (approximately 101,000 ha) took up about 30%. From the above, this project's contribution to the target regions to increase the forest cover ratio is evident.

Table 1: Increase of a Ratio in the Project Site

	Basis (At Project Appraisal)	Target (At Project Completion)	Actual (At Ex-post Evaluation)
Forest Area	957,344 ha	1,129,928 ha	1,285,162 ha
Forest Cover Ratio	26.1%*	30.8%**	35.0%***

Source: Appraisal documents, Shaanxi Forestry Department

Note: * (Forest + Shrubbery) ÷ Total area of countries/county-level cities/districts under the project

** (Forest + Shrubbery + Young Afforested Land) ÷ Total area of countries/county-level cities/districts under the project⁶

*** (Forest + Shrubbery) ÷ Total area of countries/county-level cities/districts under the project

(2) Survival Rate

Since the project site was located in an arid region with harsh growing conditions, constant monitoring of the plantation was conducted and supplemental planting was implemented as needed. At the time of project appraisal, the Chinese afforestation standard required supplemental planting and replanting in the areas with under 70% of survival rate. The areas with a survival rate over 70% of this project had decreased by approximately 3% over the period from the first to the third growing seasons (see Table 2), and the area's harsh climate was one of the factors. The damaged area from the floods in 2003 was 5,271.3 ha in total. Since the survival rates in 5 out of the 34 counties/city-districts were unfavorable during the September to December 2006 inspection, supplemental planting was conducted in 2,480 ha. Furthermore, additional afforestation and supplemental planting was conducted in 3,745 ha due to frost damage and a drought at the beginning of 2008.

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

⁶ As young afforested land at the time of appraisal was expected to be forest land at post-implementation period, the area of young afforested land was included in the target forest land area at project completion.

Table 2: Area of Survival Rate above 70% of by Forest Type

Unit: ha

	Designed Plantation Area	*Survival rate after 1 growing season (>70%)	** Survival rate after 3 growing season (>70%)
Economic Forest	24,536.3	23,452.2	22,755.1
Timber Forest	8,167.0	8,884.4	8,726.4
Protection Forest	12,379.6	12,728.4	12,268.9
Total	45,082.9	45,065.0	43,750.4

Source Shaanxi Provincial Forestry Survey and Design Institute, Shaanxi Forestry Department

Note: * Planted in spring and inspected in autumn or winter of the same year

** Inspected in autumn or winter after three growing seasons after plantation

Insufficient rooting was observed in Zhouzui and Pucheng Counties where aerial sowing was implemented and additional plantation was conducted. According to the Province Forestry Department, insufficient rooting was due to inappropriate access control in the plantation areas after aerial sowing. After the Province Forestry Department directed the forestry departments of both counties to improve their process, appropriate access control was put into effect after the plantation.

(3) Area of Grain For Green Project

Since cultivation of inclined land causes soil erosion, the project by the Shaanxi Forestry Department to make farmers abandon cultivation and convert the farmland into planted forest (Grain for Green Project) was implemented at the time of project appraisal. Although this project did not directly support the Grain for Green Project, a 6,800 ha target area was set for afforestation of land with an incline greater than 25 degree. As the implementation of this project may have interfered with the Grain for Green Project area and furthermore the counties/county-level cities/districts may have included this project's afforestation area in achievement of the Grain for Green Project, the target area for the Grain for Green Project was set and monitored. In the counties/county-level cities/city districts under the project, the Grain for Green Project converted 27,447 ha from cultivated land to forest land during the project implementation, and the above target was achieved. From above, it can be concluded that implementation of this project did not negatively affect the Grain for Green Project implementation areas. The achievement was contributed partly by the fact that the Grain for Green Project implementation areas increased during the same period that this project was extended and that the Grain for Green Project gave sufficient economic incentives to participating farmers.

(4) Decline of Soil Erosion Amount

In order to observe environmental effects of this project, environmental monitoring was outsourced to the North West Agriculture and Forestry University. The university set one monitoring site with gauging weir, four monitoring sites (in four counties) with a concrete frame

to monitor soil erosion, and eight monitoring points (in eight counties/county-level cities) to observe vegetation (forest density, tree height and diameter, etc.). Environmental monitoring was conducted between January 2002 and December 2012. Based on such environmental monitoring, soil erosion into one river on the project site in Lantian County declined from 1,100 tons/ km² in 2000 to 950 tons/km² in 2008. At the Lantian County project site, soil erosion improved as tree-age increased and tree crown became dense.

3.2.2 Qualitative Effects

(1) Harvesting of Economic and Timber Forests

This project adopted a scheme in which farmers carried out voluntary afforestation in return for receiving financial support, and eventually those who owned the economic and timber forests could harvest. The ex-post evaluation conducted a questionnaire survey to the farmers in order to confirm the beneficiary's actual benefit⁷. For the economic forests, most of the participating farmers have obtained harvests. This shows that the harvests from the economic forests is fully materialized

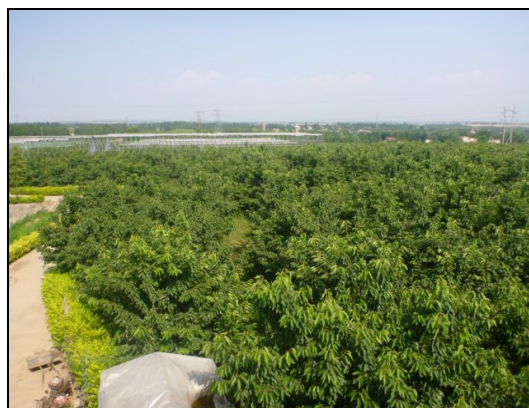


Photo 1: Economic forest (Cherry orchard)

at the time of the ex-post evaluation(See Table 3). According to the interview with farmers who made the economic forests, before plantation in this project they used to grow lower earnings per area unit grains (corn, wheat, etc.) so this project's economic forest has contributed to an increase in their income. In some cases, since the former orchards had aged and the crop yields had declined before plantation, the project introduced new varieties. On the other hand, about 50% of the participating farmers responded that they had "Some Income" or "Little Income". It should be noted that even though no actual harvest had yet materialized from the timber forest, some respondents answered positively to the question on income increase in expectation of future harvests from the forest planted by this project.

Table 3: Harvesting of Plantation (Results of Questionnaire Survey)

Type of Forest	"Some Income"		"Little Income"		"No Income"		No Answer		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
Economic	80	88.9%	7	7.8%	0	0.0%	3	3.3%	90	100.0%
Timber	4	23.5%	4	23.5%	9	52.9%	0	0.0%	17	100.0%

⁷ The questionnaire survey was conducted on the 138 project participating farmers from Liquan County, Hancheng County, Zhouzhi County, Linyou County, Qishan County, Changwu County and Huangling County (17 participants for Timber Forest, 90 participants for Economic Forest, 31 participants for Protection Forest). The Survey period was from March to April 2013.

Also the Shaanxi Forestry Exploration and Design Institute studied the impact of this project with 146 households within 26 counties in 2010 and observed the following impacts:

- Revenues had been made in about 80% of all economic forest areas (19,405 ha out of 22,755.1 ha).
- Revenue per 1 ha is approximately RMB 60,000 (approximately JPY 960,000).
- Based on the above results, the total project's economic forest is estimated to generate RMB 1,164 million in income.

At the time of the ex-post evaluation, harvests from the timber forest had not been fully materialized, and hence data regarding sales quantity and price could not be obtained. According to the data from the Shaanxi Forestry Department, the project's growing stock of forest⁸ was estimated to be 311,482.56 m³ (0.1% of the total stock in the Shaanxi province) as of 2010.

(2) Farmers' Use of Knowledge from Training

At the time of project implementation, training sessions for participating farmers were conducted on subjects such as pruning, fertilizing, and seedling pruning in all types of forests. According to the questionnaire survey, 84.8% of respondents (117 farmers) participated in the training. About 90% of these training participants actually utilized the knowledge from the training at the time of both time of afforestation and ex-post evaluation (See Table 4 and 5). As both product yields and product quality should improve through the knowledge gained from training in fertilizing and pruning methods, the farmers are eager to further utilize knowledge gained during the training.

Table 4: Use of Knowledge from Training at Plantation (Results of Questionnaire Survey)

Answer	Number	%
"Utilized knowledge"	93	79.5%
"Utilized knowledge to some extents"	20	17.1%
"Utilize knowledge very little "	3	2.6%
"Did not utilize knowledge"	0	0.0%
No answer	1	0.9%
Total	117	100.0%

⁸ The standing tree volume of the afforestation site.

Table 5: Use of Knowledge from Training at Ex-post Evaluation
(Results of Questionnaire Survey)

Answer	Number	%
“Utilize knowledge”	92	78.6%
“Utilize knowledge to some extents”	22	18.8%
“Utilize knowledge very little ”	2	1.7%
“Do not utilize knowledge”	0	0.0%
No answer	1	0.9%
Total	117	100.0%

3.3 Impact

3.3.1 Intended Impacts

(1) Environmental Improvement Effects within Project sites

The project sites were located in the inland area of arid regions where severe damage is caused by strong wind and dust. The questionnaire survey to the participating farmers assessed the decrease in damage caused by strong wind and dust as a result of the project’s afforestation. Most of the respondents felt that there was some improvement (See Table 6 and 7). In addition to decreased damage from strong wind and dust, survey respondents also noted decreased sand erosion and increased green areas as impacts on the environment. Some said that the afforestation project has made a more favorable living environment, noting that there had been many abandoned areas with scattered plants prior to the project’s afforestation.

Table 6: Damage Caused by Strong Wind (Results of Questionnaire Survey)

Answer	Number	%
“Decrease”	49	35.5%
“Decrease to some extents”	87	63.0%
“Decrease very little”	0	0.0%
“Do not decrease”	1	0.7%
No Answer	1	0.7%
Total	138	100.0%

Table 7: Damage Caused by Dust (Results of Questionnaire Survey)

Answer	Number	%
“Decrease”	62	44.9%
“Decrease to some extents”	75	54.3%
“Decrease very little”	1	0.7%
“Do not decrease”	0	0.0%
No Answer	0	0.0%
Total	138	100.0%

(2) Other Environmental Improvement Effects

Trees solidify CO₂ in their growing process and in the long-term will lead to a decline in the greenhouse gas effect. According to the estimate of the North West Agriculture and Forestry University, the annual CO₂ absorption of mature forest is 1,593 t/ hm² based on each tree species' afforestation area and CO₂ absorption. Based on those estimates, the annual CO₂ absorption of this project's total plantation is calculated to approximately 73,000 t.

(3) Prospective Harvest and Intention for Expansion of Forest Area

Of the farmers who responded to the questionnaire survey, more than 90% of farmers who participated in the economic forest (90 households) expect income over the next 10 years. 90% of respondents also said that they would "expand" or "expand much" of their economic forest (See Table 8 and 9). As aforementioned, although harvest from timber forest is relatively slow, 60% of the farmers (17 households) that possess timber forest expect incomes over the next 10 years. A total of 70% of those who have participated in the timber forest would "expand much" or "expand" their timber forest. Although harvests from timber forests take longer than harvests from economic forests, respondent's expectations for future harvests is high and the waiting time does not interfere with their intention to invest. The results of the questionnaire survey showed that farmers who own economic forest or timber forest have expectations of future income and intentions for investment, and therefore their forestry businesses are satisfactory.

Table 8: Income Outlook over the Next 10 Years (Results of Questionnaire Survey)

Type of Forest	"Some Income"		"Little Income"		"No Income"		No Answer		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
Economic	84	93.3%	2	2.2%	4	4.4%	0	0.0%	90	100.0%
Timber	11	64.7%	5	29.4%	1	5.9%	0	0.0%	17	100.0%

Table 9: Expansion of Forest Land (Results of Questionnaire Survey)

Type of Forest	"Expand Much"		"Expand"		"Do not Expand"		No Answer		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
Economic	7	7.8%	73	81.1%	6	6.7%	4	4.4%	90	100.0%
Timber	8	47.1%	4	23.5%	5	29.4%	0	0.0%	17	100.0%

3.3.2 Other Impacts

(1) Impacts on the Shaanxi Province Forestry Sector and Overall Agricultural Sector

The National Forestry Department Forest Survey and Design Institute was commissioned by the Japan Bank for International Cooperation (at that time) to conduct a study⁹. The output of

⁹ Upon implementation of this project, a project supervision manual on a forestry sector for those who are in charge at both JICA and the project executing agency was established, and a close inspection was conducted by the National

this project in Shaanxi province accounted for about 4% of the afforestation area, 2% of the plantation, 6% of the aerial sowing and 5% of the regeneration by enclosure. The project's investment amount approximately equals to 5% of the forestry's fixed asset investment of the said province. The study stated that the scale of the project was relatively large and it was complementary to other afforestation projects.

At the time of ex-post evaluation, of all of the techniques introduced by this project, the Shaanxi province forestry administration was continuing with two of them: (1) farmers get paid based on the afforestation areas that passed a test, and (2) providing training for farmers simultaneously with afforestation. During the implementation period, project personnel paid visits to Oita prefecture in Japan three times in order to see its One Village One Product movement. Based on their visits, the project introduced new varieties, purchased nursery trees, and conducted technical training and management guidance, focusing on specific forest products (Sichuan pepper, apple, cherry, etc.) at 30 project sites. Similar attempts were seen in agricultural products in the Shaanxi province at the time of the ex-post evaluation. Narrowing down the tree species has enabled the county-level forestry department which suffers from insufficient resources to work more efficiently and intensively and achieve enough scale of afforestation to ship products with low cost.

(2) Negative Impacts on the Natural Environment

During the ex-post evaluation site survey, no significant negative impact on the natural environment was observed. According to the Shaanxi Forestry Department, there was no disafforestation during the project implementation. Although the project constructed 90 km of forest road for the transportation of materials, the work involved was mainly limited to repairing existing trails by adding sand and gravel, hence it was considered that the impacts on the natural environments were minimal.

(3) Land Acquisition and Resettlement

According to the Shanxi Forestry Department, there was no land acquisition and resettlement. Neither land acquisition nor resettlement was necessary because farmers' participation was voluntary and the possession of land to be afforested was required in advance as a criterion for participation in the project. As described above, the construction of forest roads did not require land acquisition. The interview with the project's personnel during the site visit at the time of ex-post evaluation confirmed that no land acquisition or resettlement was undertaken.

Forestry Department Forest Survey and Design Institute during project implementation in order to confirm the validity of the manual.

This project has largely achieved its objectives, therefore its effectiveness and impact is high.

3.4 Efficiency (Rating: ①)

3.4.1 Project Outputs

The project output was “To carry out afforestation activities in 34 counties/county-level cities/city districts within the Loess Plateau region of Shaanxi province” or, to put it concretely, afforestation or equipment used for afforestation. This project has achieved most of the outputs as they were originally planned (See Table 10). Although there were some changes in the administrative divisions after the project was launched, there was no change in the project sites. In order to maintain outputs, supplemental planting and additional afforestation of 6,225 ha were implemented. There was an increase in the number of training participants; however, the interview with the Provincial Forestry Department stated that there was no change in the training policy and contents. Because government officials and neighborhood farmers could freely participate in the open-air training sessions there were more participants than originally planned which resulted in the large increase in the number of the training participants.

Table 10: Comparison of Outputs (Plan and Actual)

Plan	Actual
Afforestation total 100,000 ha	Afforestation total 100,676 ha
- plantation 45,000 ha (economic forest 30,000 ha, timber forest 8,000 ha, protection forest 7,000 ha)	- plantation 45,065 ha (economic forest 23,452.2 ha, timber forest 8,884.4 ha, protection forest 12,748.4 ha)
- Regeneration by Enclosures* 20,000 ha	- Regeneration by Enclosures 20,241 ha
- Aerial Sowing 35,000 ha	- Aerial Sowing 35,314 ha
Rebuilding/Expansion of Nurseries: 34 places	Rebuilding/Expansion of Nurseries: 34 places
Rehabilitation/Construction of Forest Road 90 km	Rehabilitation/Construction of Forest Road 90 km
Forest Protection (construction of fire tower, etc.)	Forest Protection (construction of fire tower, etc.)
Environmental Monitoring (Monitoring equipment, etc.)	Environmental Monitoring (Monitoring equipment, etc.)
Vehicles (4WD: 42 units, Trucks: 34 units)	Vehicles (4WD: 43 units, Trucks: 34 units)
Others (PC, office facilities)	Others (PC, office facilities)
Training (participating farmers: 30,300, employees of forestry departments of province/cities/prefectures /districts: 8,160)	Training (participating farmers: 58,346, employees of forestry departments of province/cities/prefectures /districts: 9,204)

Source: Appraisal documents, Shaanxi Forestry Department

Note: * Regeneration by Enclosures built fence to control access to forest land but did not carry out plantation.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The project cost was slightly higher than planned (114% of the original plan). Although the planned project cost was JPY 5,874 million, its actual cost was JPY 6,704 million. For the total loan amount, the actual loan amount was JPY 4,199 million whereas the planned amount was JPY 4,200 million. The project’s main output, afforestation, was almost as planned, and the

increase in the project cost was largely due to the lower exchange rate (Japanese yen to Chinese RMB) as the Japanese yen depreciated against RMB from the time of project appraisal by 13%.

At the time of the project appraisal, unpaid mandatory labor at properties with no usufruct was converted into a monetary value and counted as part of the project cost. According to the Shaanxi Forestry Department, such unpaid mandatory labor at the properties with no usufruct was abolished, and compensation is now paid for work for collectively-owned forests.

Table 11: Comparison of Project Cost (Plan and Actual)

Unit: JPY million

	Plan			Actual		
	Foreign Currency	Local Currency	Total	Foreign Currency	Local Currency	Total
Total cost of the project	270	5,604	5,874	356	6,348	6,704
for afforestation	0	3,459	3,459	0	3,853	3,853
for nurseries	0	221	221	0	438	438
for forest roads	0	117	117	0	124	124
for facilities and vehicles	257	49	306	343	0	343
for training	0	123	123	0	113	113

Source: Shaanxi Finance Department

3.4.2.2 Project Period

The project period was significantly longer than planned (183% of the original plan). The original project period was 58 months from March 2001 to December 2005, however the actual project period was 106 months from March 2001 to December 2009¹⁰.

At the time of the appraisal, the project was to be completed after the completion of planting by spring 2003 followed by the final inspection of the third growth period in 2005 to confirm the approval of its designated area (100,000 ha). However, during the actual project implementation, the completion of planting work was extended until 2004 since some areas needed replanting due to the floods in 2003, and supplemental planting and replanting was also conducted in regions that did not pass the inspection after the third growing seasons¹¹. Another supplemental replanting was done in response to the frost damage incurred at the beginning of 2008. Because of such supplemental planting and replanting, the project period was extended and the project was completed in December 2009 upon confirmation of the completion of the supplemental plantings.

¹⁰ The relevant agency in China recognized that the project completion date was December 2005. Supplemental planting and replanting were carried out due to incidents (such as natural conditions) which the project could not directly control and the ODA loan was disbursed for these activities. For this reason, it is concluded that the project completion date is December 2009 when the completion of these activities was confirmed.

¹¹ Supplemental planting and replanting were carried out in the areas with under 70% of survival rate according to the Chinese afforestation standard.

In regards to the Statement of Expenditure (SOE) method of loan disbursement¹², adjusting the format of the SOE form and auditing scheme was required and therefore it took four months from the loan agreement signing (March 2001) to its activation (July 2001). As a result, the first disbursement was made in March 2002. As described above, the end of the loan disbursement period was extended from July 2008 to July 2010 to accommodate the need for supplemental planting and replanting due to harsh growth environments.

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

Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR) were not utilized for the appraisal of the project as no common method was established to estimate the economic benefits of environmental improvement among the afforestation projects. In addition, sufficient data on the amount of harvested forest products attributed to the project has not been collected, and it is difficult to accurately estimate the benefit which was necessary for recalculation. Thus, the internal rate of return was not calculated. Reliable data for estimating economic benefits could not be obtained and therefore calculating IRR with high accuracy was not possible.

The project period was exceeded the plan while the project cost slightly exceeded the plan, therefore efficiency of the project is low.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

No factor was found that could interfere with the project impacts from an institutional point of view. On forestry management, the Provincial Forestry Department is responsible for establishing forestry management policies, plans and goals, the county-level local government forestry departments for pest control, forest fire prevention, setting countermeasures for illegal disafforestation and arranging training sessions targeting farmers, and the local farmers for routine maintenance activities (pruning, mowing and fertilization). In the Shaanxi province, forest tenure reform, which allocated forestland tenure of collectively-owned forest to farmers, started in 2008, and farmers took on the maintenance activity roles. The allocation of the collectively-owned forest to the farmers was completed by the end of 2010 in the Shaanxi province. For protection forests, if the forest was owned by a state-owned forest farm, a forestry department of the local government which owned the forest would be responsible for maintenance activities. There were some changes seen before and after the project implementation and each farmer has both forest usufruct and responsibilities for maintenance, therefore it is clearer who is responsible for the maintenance of forestland.

¹² A method that accepts a payment list (SOE table) as an evidence document for loan disbursement

For the timber and protection forests, state-owned forest farms also participated in afforestation, and especially for the protection forests, state-owned forest farms conduct both afforestation and forest maintenance in many areas.

Upon implementation of pest control, forest fire prevention and setting countermeasures for illegal logging by the forestry departments of county-level local governments, forest rangers are hired to patrol protection forests and inspect the entry of vehicles into the forests. Within the counties/county-level cities/city districts of the project sites, there were 1,606 forest rangers in 2009 and 1,576 in 2011, and no major change has been made.

In the areas covered by the site survey, forest departments of county-level governments maintained facilities and infrastructure such as fire towers and forest roads. At the time of the ex-post evaluation, North West Agriculture and Forestry University, which was commissioned to conduct the environmental monitoring, stored the equipment. However, the environmental monitoring ended and the equipment for environmental monitoring is not currently in use.

3.5.2 Technical Aspects of Operation and Maintenance

While the project was implemented based on the project area's technical level, there were training opportunities for both government officials and farmers to maintain and improve their skills at the time of the ex-post evaluation. Most of the tree species introduced by this project have been cultivated in the past, and both the government officials and farmers had accumulated relevant experiences. Materials in use that could be obtained domestically included; ground film, humectant, rooting stimulant, manure, and fertilizer.

From the interviews with the afforestation department staff, there were trainings for governmental officials during the project implementation on; project administration (fund management, account statement, etc.); and afforestation techniques (site preparation, cultivation, fertilization, fruit quality improvement, etc.). At the time of the ex-post evaluation, officials had several opportunities every year to participate in such trainings. Trainings which addressed needs in terms of forest law (and its related regulations), forest fire prevention and afforestation techniques (soil improvement in arid regions, selection of tree species, etc.) were especially strong. Based on the interview with the project's participating farmers, farmers participated in training (in cultivation techniques and fertilization, etc.) held by the forestry department of the county-level local government.

Providing trainings is a main task of the county-level local government's forestry department, and such trainings were continued



Photo 2 Fertilization (Apple orchard)

during the ex-post evaluation. The training needs of the farmers on pruning and fertilization in the economic forest are especially strong and the forestry department provides guidance periodically. Some orchard owners were interested in the mending of old trees since harvests have decreased due to the aging of the trees.

3.5.3 Financial Aspects of Operation and Maintenance

As described in 3.5.1. *Institutional Aspects of Operation and Maintenance*, the forestry department of the counties/county-level cities/city districts and the farmers are responsible for the works related to forestry management. At the time of the ex-post evaluation, there were no severe issues that may have interfered with the financial durability of both parties. The forestry department budget of the target county level local government has increased from 2009 (RMB 204,731,600 in 2009 to RMB 309,593,000 in 2011).

For the selection of participating farmers, there were certain requirements (voluntary participation, property usufruct of owned forests) to account for the necessary burden for forestry management in the future. At the point of ex-post evaluation, there were an increased number of farmers with forest usufruct due to the forestry tenure reform, and they could harvest from the forest in which they have property usufruct. Harvesting statuses are as follows:

- (1) Economic Forest: Although the area per household is small, income per area unit is high and harvesting for the main tree species (Sichuan pepper, apple, cherry, etc.) have started. Mending of the trees can influence harvests and therefore the incentive for maintenance of the forest is high.
- (2) Timber Forest: As with economic forests, mending of the trees can also influence the harvest; therefore the incentive for maintenance is high. Since large-scaled forests are necessary in order to gain revenue from timber forests, there is a tendency that farmers with a higher financial-burden potential participate more in timber forests (as compared to farmers in economic forests).
- (3) Protection Forest: Although there is no harvest from this type of forest, at the time of ex-post evaluation, the forest management cost and the work volume was relatively low. There is also a regulation on pruning and disafforestation for the purpose of nature protection and a scheme in which an appointed farmer can obtain a subsidy when a forest is designated as a national forest for public-purpose (appointments are renewed every 5 years). There is penalty for illegal disafforestation and accidental fire.

From the result of interview with the farmers, 60% answered that the expenses for maintaining forest land was “Enough” or “Almost Enough” (See Table 12). A breakdown of

those who answered “Insufficient” (42 farmers) was: 8 farmers in the timber forest, 16 farmers in the economic forest and 18 farmers in the protection forest. Compared to timber and protection forests, relatively few of the farmers who owned economic forests answered that the expenses for maintaining their forest were insufficient. A higher percentage of people who owned timber and protection forests, felt that there was a fund shortage. It should be taken into consideration that harvests had not yet materialized, which could help explain why farmers felt that there was a fund shortage. However, given that there are both penalties and incentives provided for forest maintenance and given that farmers who can bear higher financial costs were selected (as compared to economic forest farmers), it was surmised that there would be no severe influence on forest maintenance in the short-term.

Table 12: Expenses for Maintaining Forest Land (Results of Questionnaire Survey)

“Enough”		“Almost Enough”		“Often Insufficient”		“Insufficient”		Total	
Number	%	Number	%	Number	%	Number	%	Number	%
21	15.2%	59	42.8%	16	11.6%	42	30.4%	138	100.0%

In this project, the cost of seedling and materials was loaned by the province to the finance departments of the county-level local governments, and then farmers made payments to the financial departments. The local government decided whether to make the payments claimed by its finance department for the farmers. There are several counties where the county-level local governments bear all the expenses but receive no payment from the farmers. The questionnaire survey result revealed that about 70% of the farmers responded that their repayment burden was “Little” or “Very Little” (See Table 13). Most farmers do not feel the loan burden.

Table 13: Repayment of Seedlings and Materials (Results of Questionnaire Survey)

Very Heavy		Heavy		Little		Very Little		No Answer		Total	
Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
24	17.4%	3	2.2%	84	60.9%	9	6.5%	18	13.0%	138	100.0%

3.5.4 Current Status of Operation and Maintenance

In the project site where the site survey was conducted during the ex-post evaluation, the afforested areas were maintained appropriately. Within the inspected afforestation sites (6 economic forests, 1 timber forest and 5 protection forests in Hancheng city, Huangling county, Liquan county, Sanyuan county, Long county and Baquiao district), there were no sites in which dying seedling and thin density over a wide area was observed. For the economic forest in particular, the farmers with property usufruct continuously prune and fertilize because mending of the trees could influence the harvests. Feeding damage caused by wild rabbits did occur during the project implementation and some traps and chemicals were used to avoid such

damage, however the need for such damage control has decreased because as the forest has grown, it has become less likely to be influenced by the feeding damage of rabbits. In the area with many protection forests, the forest rangers controlled the entry of vehicles and conducted patrol activities to prevent forest fires and illegal disafforestation. During springtime when the weather becomes arid, the forestry departments of the county-class local governments spend most of their working hours undertaking fire prevention and fire extinguishing.

Among the inspected forest roads and fire towers, no severe infrastructure damage existed which would prevent project effects. According to the Shaanxi Forestry Department, devices such as film cameras, digital cameras and computers had been purchased a long time ago and some of them had become obsolete. However, substitution devices have been purchased and their work was not impeded.

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

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The 1998 Yangtze River Floods raised awareness of the necessity to improve the water holding capacity of the major rivers in the area by expanding forest areas in the upper and middle river basins and as such form the background of this project. Based on the voluntary participation of Shaanxi province farmers located in 34 counties/county-level cities/city districts of Loess Plateau area, the purpose of this project is to prepare economic, timber and protection forests.

The implementation of this project was in line with Chinese forestry sector's policy and development needs as well as Japan's ODA policy on China to support activities in the environmental field, therefore its relevance is high. From the time of project appraisal to the ex-post evaluation, the area afforested by this project accounted for approximately 30% of the total increase in forest areas, and the project's contribution towards the improved percentage of forest cover is prominent. The questionnaire survey results indicated that farmers expect an increase in incomes generated from economic and timber forests and are eager for further investment. The survey also surmised that the forest management is satisfactory. For the reasons above, the project's effectiveness and impact are high. As for the project's efficiency, the project period was significantly exceeded the plan because severe growth conditions necessitated supplemental planting and replanting. The project cost also exceeded the plan due to the lower exchange rate (Japanese yen to Chinese RMB) from the time of project appraisal. In regards to the project's sustainability, neither the county-level local government forestry

department nor the local farmers responsible for activities relevant to forest maintenance, showed any significant problem.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Since the project sites are located in arid regions, more efficient forest fire prevention and extinguishing are the most important issues for forestry management. Forest fires not only destroy the forest, but may also be fatal to humans. It is desirable to create simple hazard maps (mapping the place of the past fire outbreaks, frequency, time and difficult areas for fire extinguishing), to identify and prioritize the points and seasons for prevention activities, and share the hazard maps with local residents to promote better understanding of such prioritized regions and seek cooperation in prevention activities.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

(1) Scheduling the Project Period in a Severe Growth Environment

The project was implemented in a severe growth environment for trees, therefore there was a need for attentive care in order to maintain the afforestation area. From the sustainability point of view, a project period extension was needed for supplemental planting.

Upon scheduling the project period, it is desirable to examine the growth conditions as well as the needs for supplemental planting, the estimated supplemental planting area and the workloads for supplemental planting. If necessary these considerations should be reflected in the project period at the time of appraisal.

(2) Establishing a Project Supervision Manual and Interim Appraisal

In the implementation of this project, a project supervision manual in the forestry sector for those in charge at both JICA and the project executing agency was prepared because the executing agency did not have enough experience with ODA projects. In order to prove the validity of the aforementioned manual, an extensive assessment was conducted by the National Forestry Department Forest Survey and Design Institute during project implementation. The project carried out systematic and comprehensive project supervision, and information on project implementation and the incidence of effects were collected.

For a similar case in which an executing agency does not have sufficient ODA loan project experience, especially when project supervision is difficult due to a vast project area, it is

desirable to prepare a project supervision manual in advance and conduct an extensive assessment through interim review work in order to objectively review the project status.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	See Table 10	See Table 10
2. Project Period	March 2001 – December 2005 (58 months)	March 2001 – December 2009 (106 months)
3. Project Cost		
Amount paid in Foreign currency	270 million yen	356 million yen
Amount paid in Local currency	5,604 million yen (RMB 431 million)	6,348 million yen (RMB 433 million)
Total	5,874 million yen	6,704 million yen
Japanese ODA loan portion	4,200 million yen	4,199 million yen
Exchange rate	1 RMB = 13.0 yen (As of July 2000)	1 RMB = 14.7 yen (Weight average of disbursement between March 2002 and February 2010)