People's Republic of China

FY2016 Ex-Post Evaluation of Japanese ODA Loan

"Henan Province Afforestation Project"

External Evaluator: Shima Hayase

0.　Summary

The Henan Province Afforestation Project (hereafter referred as the "Project") aims to enrich forest resources by afforestation in Henan Province, thereby contributing to suppression of soil erosion in mountainous areas and strong winds in plains, mitigating damage of natural disasters such as floods and sandstorms in the area, and improving the living environment.

The Project was prompted by the increase in importance of afforestation because of the escalation of natural disasters in the Yellow River and the Yangtze River basin areas at the time of appraisal. The Project's relevance is high because its aim is consistent with the Chinese Government's development policies, development needs and the aid policy of Japan. The targets on the enrichment of forest resources such as artificial afforestation area, forest coverage ratio, survival/preservation rate, and stock volume[1] were achieved. The Project implementation area was equivalent to 13% of the area afforested in the province during the same period; also the project contributed to improving the forest coverage ratio and stock volume in the province. Regarding the improvement of life, although the Project's economic effect from afforestation has not yet been developed, the Project yielded certain effects on reducing natural disasters such as deterrence of approximately 9% of the soil erosion and suppression of strong winds. Thus the effectiveness and impact of this project are high. With regard to the efficiency, the project cost was within the planned limit, though the project period exceeded the plan due to the extension of afforestation period. Thus the efficiency of the Project is fair.

At the time of ex-post evaluation, there was no change in the structure of the executing agency, and a structure to support forest management has been established. Because the central government allocated budget for national priority projects, funds for operation and maintenance including nursing and pest and disease control were secured in the province. The shortage was found in the maintenance costs of protection forests among some farmers and forest farms at the time of ex-post evaluation. However, the provincial forestry department had a policy to increase subsidy for the maintenance of protection forests for ecological purpose, thus in the medium term, the shortfall was expected to be resolved. Also, a few problems were observed in technical aspects, and the maintenance status, therefore the sustainability of the Project is fair.

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

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[1] An indicator to measure the quantity of a forest (trunk of trees) by cubic volume, It shows the status of a forest per unit area.

1. Project Description

Project Location

Protection Forest of Poplar
(Runan County)

1.1 Background

Henan Province in the central part of China is located in the upper middle watershed of the four major rivers[2], and 44% of its area is mountains and hills. In the province, the excessive deforestation to meet the demand for timbers and the expansion of cultivated land led to the soil runoff from mountain slopes where ground surface was exposed, and degradation of levee and dam due to soil sedimentation. Those were factors that worsened flood damage. Moreover, in the plain area, land surface exposed by overcutting, caused burial of roads and cultivated land at the time of sandstorms, and also soil flowage damages.

In the 71 project implementation counties, the economic loss due to natural disasters amounted to 26.6 billion Chinese yuan per year. In 2003, due to the floods caused by the heavy rain, 3,587 people suffered from damage, 73 people died, 420,000 houses collapsed, and the economic loss reached 18.2 billion Chinese yuan.
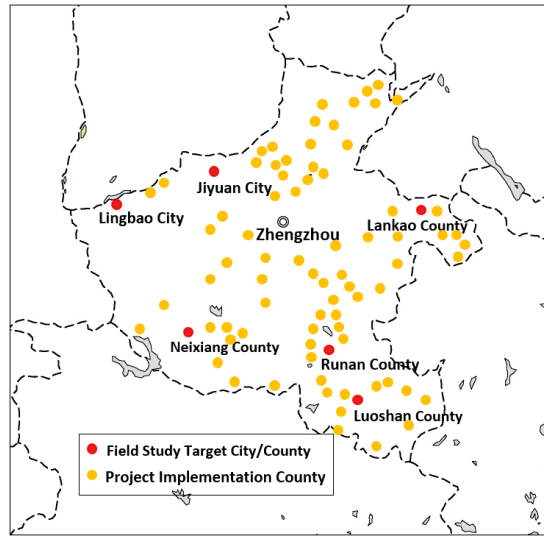
1.2 Project Outline

The objective of the Project is to enrich forest resources[3] by afforestation in Henan Province, thereby contributing to suppression of soil erosion in mountainous areas and strong winds in plains, mitigating damage of natural disasters such as floods and sandstorms in the area, and improving the living environment.

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[2] Yellow River, Yangtze River, Huaihe River, and Haihe River
[3] The objective of the Project at the time of appraisal was "by afforestation in 71 counties of Henan Province, contributing to suppression of soil erosion in mountainous areas and of strong winds in plains, mitigating damage of natural disasters such as floods and sandstorms in the area, and improving the living environment." However, the target corresponding to the direct effects by afforestation (outcome) was not clearly set. Therefore, this evaluation translated, the expected outcome as enrichment of forest resources (artificial afforestation area, survival rate, forest coverage ratio, and forest stock volume etc.), and added them to the evaluation of effectiveness.

Loan Approved Amount/ Disbursed Amount	7,434 million yen/7,218 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	June 23, 2006/June 23, 2006
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 People's Republic of China / Henan Provincial People's Government
Project Completion	August, 2012
Main Contractor(s) (Over 1 billion yen)	-
Main Consultant(s) (Over 100 million yen)	-
Feasibility Studies, etc.	"Feasibility Study Report" Henan Provincial Forestry Planning Institution July, 2005
Related Projects	【ODA Loan Projects】 ・Hubei Province Afforestation Project (L/A 2003) ・Jiangxi Province Afforestation Project (L/A 2003) ・Eco-Environmental Construction and Treatment Project in Sichuan (L/A 2005) ・Xinjiang Yining City Environmental Renovation Project (L/A 2005) 【Grant Aid Project】 ・Mother River Protection Afforestation Project (2000) 【Technical Cooperation Project】 ・Environment Construction at Co-existent Areas of Human Beings and Crested Ibis (2010) 【Other International Agency's Projects】 ・National Afforestation Project (World Bank 1990) ・Forest Resource Development and Protection Project (World Bank 1994) ・Forestry Development in Poor Areas Project (World Bank 1998)

Source: made by the material provided by Henan Provincial Department of Forestry Project Office
Figure 1: Position of Project Implementation Counties within Henan Province[4]

2. Outline of the Evaluation Study

2.1 External Evaluator

Shima Hayase, IC Net Limited

2.2 Duration of Evaluation Study

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

Duration of the Study: August 2016 – October 2017

Duration of the Field Survey: October 24, 2016 – November 8, 2016, April 9, 2017 – April 13, 2017

2.3 Constraints during the Evaluation Study

As this ex-post evaluation was carried out four years after the Project completion (2012), it was premature to observe the Project's mid to long-term effects, and analyze future prospective conclusively. Accordingly, the ex-post evaluation focused on analyzing basic effect indicators, prospects for the development and sustainability of the Project's effects and the status of the institutional, financial and technical environment to realize the prospects. Also, because the forests were still growing and not ready for observation of their fully developed status, and the Project covered expansive areas in 75 counties in Henan Province, and it was impossible to visit all the project sites within the allocated study period, the Project's effectiveness had to be

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[4] The cities and the counties for the field study were chosen by taking into consideration the impartiality of climate in the province, north, south, east, and west location, and the conditions of land. Eventually plain area (Lankao County, Runan County), mountainous area (Luoshan County, Lingbao City), and hill/ mountain area (Neixiang County, Jiyuan City) were selected.

provisionally evaluated by using the sampling data[5] collected through field survey.

3. Results of the Evaluation (Overall Rating: A[6])

3.1 Relevance (Rating: ③[7])

3.1.1 Consistency with the Development Plan of China

(1) Consistency with the Development Policy at the Time of the Appraisal

The Government of China established and announced *the National Plan for Ecological Construction (1998–2050)*, in January 1998 and set short/mid/long term numerical goals for natural environment restoration, and four areas[8] and agenda to be prioritized till 2010. In the plan, Henan Province corresponded to *the Yangtze River Upper and Middle Basin* and *the Yellow River Upper and Middle Basin* areas, and for each area numerical goals for soil runoff and afforestation area expansion were identified.

Moreover, in *the 10th Five-Year Plan for the National Economic and Social Development (2001-2005)*, an area for priority projects was set, and Henan Province was in the area of *the Natural Forest Protection Area in the Yangtze/ the Yellow River Upper and Middle Basin*.

(2) Consistency with the Development Policy at the Time of the Ex-Post Evaluation

From the time of appraisal, *the National Plan for Ecological Construction (1998–2050)* was continuously effective. Also in *the 12th Five-Year Plan for the National Economic and Social Development (2011-2015)*, Henan Province was in the area of various prioritized projects for natural environment protection/restoration, such as afforestation in the Yangtze/the Yellow river Upper and Middle Basin, for soil loss mitigation natural forest protection, building windbreak forests, and returning agricultural land at steel slope to forest project called *the Steep Farmland Conservation to Forestland* Therefore, the importance of afforestation projects has not changed in the national development policies and in Yangtze/the Yellow river upper and middle basin area including Henan province.

3.1.2 Consistency with the Development Needs of China

(1) Consistency with the Development Needs at the Time of the Appraisal

At the time of appraisal (2004), forest coverage ratio in Henan Province was 16.2%, which was lower than the national level of 18.2%, and excessive deforestation was cited as the cause.

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[5] The Project was implemented in vast areas consisting of 75 counties. Therefore, it was impossible to conduct a field study in all the project counties during the evaluation study period. To address this problem, the evaluation team asked the Henan Provincial People's Government , the implementing agency, to collect operation and effect indicators in all the counties In addition, the evaluation team chose representative areas to conduct field survey and beneficiary surveys in order to grasp the overall picture.

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

[7] ③: High, ②: Fair, ①: Low

[8] the Yellow River Upper and Middle Basin, the Yangtze River Upper and Middle Basin, Desertification Zone, Prairie Zone

The soil eroded in the mountain slopes where the surface was exposed by overcutting. In the 71 Project implementation counties, 140 million ton of soil eroded annually. The soil accumulated in the riverbed and dam lakes degraded the function of levees and dams, and were a factor that magnified the flood damage. In the plain areas, due to the wide surface runoff, damage caused by sandstorms buried roads and cultivated land, and soil runoff occurred in the cultivated land by strong wind due to insufficient protection by wind breaking forest. Based on the situation, Henan Provincial People's Government enacted the "Henan Province Greening Plan (2003)" and planned afforestation of 1.4 million ha by 2010 and of 2 million ha by 2020.

(2) Consistency with the Development Needs at the Time of Ex-Post Evaluation

In *the Henan Province 12th Five-Year Forestry Development Plan (2011-2015)* (announced on March 16, 2012), although the previous plan's targets were achieved, the forest area per capita was one-fourth of the national average, and because the share of mixed forests was small, the forest volume was about $46m^3$/ha, which was about 53% of the national average of $86m^3$/ha. Therefore, the delay in economical use of forest resources such as timber, and weak defense function against disasters, in addition to the delay in industrialization of forestry and forest management were pointed out. In response to the situation, the objectives were set to be achieved by 2015, the ending year of the plan, which were to raise the forest coverage ratio from 21.5% in 2010 to 23.61%, and to increase the forest stock volume to more than 159.6 million m^3, by conducting 933.3 thousand ha of artificial afforestation; 1,133.3 thousand ha of forest nursing (including low-efficiency forest rehabilitation); and tree plantation of 900 million seedlings by all the provincial residents.

In *the Henan Province Afforestation and Greening Project (2011-2020)*, about 1.8 million ha of artificial afforestation in 10 years, and nursing 240 ha of the existing forest were targeted.

The needs in afforestation have been consistent, also the consistency of the Project which was to implement artificial afforestation and low-efficiency forests rehabilitation, and to increase mixed forests in order to improve quality of forest has been high from the time of appraisal.

3.1.3   Consistency with Japan's ODA Policy

In all the policies, such as *the Economic Cooperation Plan for China* issued by the Government of Japan in October 2001, JICA's *Overseas Economic Cooperation Implementation Policy* and *the 2005 Fiscal Year Business Implementation Policy* of JICA, "environmental protection" was the area of priority. The Project's objectives such as afforestation, protection of natural forests, improvement of barren mountains, and sand prevention were consistent to the policies. Therefore, consistency to Japan's ODA policy is high.

3.1.4   Appropriateness of the Project Plan and its Approach

The counties for project implementation were selected according to the four principles below:

> (a)   Under target area for the Ecological Forest Protection Plan.
>
> (b)   A certain size of land is available for afforestation, and cooperation from township/village can be gained for the implementation.
>
> (c)   The county government agrees on fund provision and it has repayment capacity.
>
> (d)   There is no other forestry related investment projects.

Source: material provided by Henan Provincial Department of Forestry Project Office

Among the counties selected upon these principles, priorities were given to the following areas: mountains with steep slopes; flatlands in need of windbreak forest; lands where soil runoff had been progressing; and natural forests in need to be protected. In achieving the objectives of the Project, which were to reduce natural disasters and to improve environment by afforestation, the plan and its approach were appropriate.

In light of the above, the project implementation was fully consistent to the development policies of the Chinese Government and Henan Provincial Government, the development needs at the time of appraisal and ex-post evaluation, and Japan's ODA policy at the time of appraisal. Also the project implementation counties were selected according to the needs. Therefore the relevance of the Project is high.

3.2   Efficiency (Rating: ②)

3.2.1   Project Outputs

At the time of appraisal, the Project's envisioned outputs consisted of afforestation, procurement of material and equipment, and training. The plan and the actual of each item are as shown in Table 1.

Table 1: The Original and Actual Scope of the Project

Items	Plan	Actual	Difference
(a) Afforestation (unit: ha)			
Afforestation Area	**194,190 ha**	**197,031 ha**	**2,841ha**
Protection Forest	163,610ha	165,184 ha	1,574ha
Economic Forest	11,880 ha	12,580 ha	700ha
Timber Forest	18,700 ha	19,267 ha	567ha
(b) Procurement of Material and Equipment			
Signboard	2,202 locations	696 locations	△ 1,506 locations
Pump	161 sets	141 sets	△ 20 sets
Pesticide Spreader	172 sets	162 sets	△ 10 sets
Building for monitoring	480 locations	251 locations	△ 229 locations
Patrol Vehicle	71 sets	70 sets	△ 1 set
(c) Training			
Overseas Training			
Forestry related department staff	20 persons 5times Total 80 persons	5 times total 107persons	27 persons
Training in China			
Provincial Level	N/A	5084 persons	N/A
County Level	N/A	25,245 persons	N/A

Source: material provided by Henan Provincial Department of Forestry Project Office

(1)   Project Implementation Counties[9]

At the time of appraisal, 71 counties (69 cities/counties, 2 state-owned forest farms) were planned to implement the Project, but in reality, it was implemented in 75 counties (68 cities/counties, 7 state-owned forest farms). Two counties canceled participation before the beginning of afforestation, one was replaced, the afforestation area of a county were transferred to others, and the five state-owned forest farms that were a part of counties changed to county level unit. Consequently, there were no changes in the scope of the planned afforestation area in the Project as a whole.

(2)   Afforestation Area

While the planned afforestation area was 194,190 ha, the actual was 197,031 ha (101% of the planned), which is almost as planned at the time of appraisal. Breakdown by type of forest, plantation and afforestation area was almost the same as the plan.

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[9] The implementation unit was written as "county." However, it included cities and state-owned forest farms, which were also counted as one unit.

Table 2: Plan and Actual of Afforestation　　　　　　(unit: ha)

Plan at Appraisal (2006)					
Forest Type[10]/ Plantation Type	Artificial Afforestation	Mountain Closure[11]	Low Efficiency Forest Rehabilitation[12]	Middle-Young Forest Tending[13]	Total
Protection Forest	115,660	36,600	11,350	—	163,610
Economic Forest	8,880	—	3,000	—	11,880
Timber Forest	7,300	—	—	11,400	18,700
Total	**131,840**	**36,600**	**14,350**	**11,400**	**194,190**
Actual (2016)					
Forest Type / Plantation Type	Artificial Afforestation	Mountain Closure	Low Efficiency Forest Rehabilitation	Middle-Young Forest Tending	Total
Protection Forest	117,129	37,053	11,003	—	165,184
Economic Forest	9,680	—	2,899	—	12,580
Timber Forest	7,508	—	—	11,759	19,267
Total	**134,317**	**37,053**	**13,902**	**11,759**	**197,031**
Ratio to Plan	102%	101%	97%	103%	101%

Source: material provided by Henan Provincial Department of Forestry Project Office

(3)　Number of Participants and the Afforestation Area

Participating farmers of the Project were selected by public offering. The actual number of farmers/forestry famers, united farmers[14] and their afforestation area were almost as the same as the plan at the time of the appraisal. The number of collective forest farms[15] and the afforestation area were drastically decreased to 35% of the plan. This was because the form of collective forest farm has been decreasing nationwide. The forests which were important for an environmental protection were designated to the state's protection and they has been nationalized and managed with subsidies. Originally, 32 state-owned forest farms planned to participate, however, in reality, the number increased significantly to 143 farms, and the afforestation area also increased to 442% of the plan. The reason was that revenues could not be expected from mountain closure, which was planned at the time of the appraisal, and the afforestation allocation area was replaced from farmers to state-owned forest farms.[16]

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[10] According to the "Forestry Law of China", Protection Forest is a forest or shrub group purposed for water conservation, soil retention, engineering sand fixation, and farm land protection etc., Economic Forest is purposed mainly for producing fruits, industrial material and Chinese herbal medicine etc., and Timber Forest is mainly for timber production.

[11] A method taken in a forest where density is low but natural reproduction can be expected with supplemental planting and nursing, and by surrounding the area with fence.

[12] A method to improve the quality of a forest by thinning and/or artificial afforestation etc.　where are devastated or whose economic value is deteriorated due to overcutting, planting wrong tree species that do not match the land condition or planting low quality seedling.

[13] A method to promote the growth of the trees in young forests by thinning and nursing such as pest prevention

[14] A coalition of farm households which is for the farmers to cooperate in agricultural work and shipment etc.

[15] Forest farms managed by the local farmers whose forest lands used to be the possession of the People's Government Corporation and are delegated to the local community.

[16] Participants of this project were selected by public offering. Regarding the allocation of afforestation area, forest type, plantation type, adjustments were made according to the characteristics of the land that the participant has a right to use, the natural conditions, etc. and the overall goal. Especially for small-scale farmers, consideration was given to allocate more economically beneficial economic and timber forests from the viewpoint of poverty alleviation, while for large-scale farmers and state-owned forest farms, more area of protection forests and mountain closure that emphasize ecological effects were allocated.

Table 3: Number of Participants and the Afforestation Area (unit: household)

	Plan at Appraisal (2006)		Actual (2016)		Ratio to Plan	
	Number of Participants	Afforestation Area	Number of Participants	Afforestation Area	Number of Participants	Afforestation Area
Farmers / Forestry Farmers	300,000	145,340 ha	301,610	145,980 ha	101%	100%
United Farmers	1,000	8,500 ha	1,029	8,746 ha	103%	103%
Collective Forest Farms	250	33,400 ha	87	11,555 ha	35%	35%
State-Owned Forest Farms	32	6,950 ha	143	30,750 ha	143%	442%
Total	301,282	194,190 ha	302,869	197,031 ha	101%	101%

Source: material provided by Henan Provincial Department of Forestry Project Office

(4)　Procurement of Material and Equipment

Procurement of material and equipment related to afforestation and conservation of forest decreased overall because some items were purchased with the domestic project budgets between the time of appraisal and the beginning of the Project and these items were eliminated. The number of signboards for mountain closure was greatly reduced since they were excluded at the sites, which already had signboards. In the plan, monitoring buildings[17] planned to be constructed in 480 locations, but in reality, the number was half the plan. This was due to the fact that in the plain area there were no lands available for constructing buildings because the surrounding areas were agricultural lands, and that monitoring building was unnecessary in forests neighboring the villages. No issues occurred, and alternative input was unnecessary also because forest monitoring was possible from agricultural lands or from the villages.

(5)　Training

1)　Overseas Trainings

The original plan was to conduct training on afforestation technology (revegetation technique, forest management) at Shinshu University in Nagano Prefecture as a recipient institution. While originally 80 staff members of forestry related departments in the municipal governments (province, city, counties) were planned to participate, in reality 107 staff members[18] (134% of the plan) participated. Moreover, additional destinations were included and meetings with engineers from the following locations took place: Mie Prefecture (artificial forest management, seedling management field, forestry product utilization); Tokyo (urban greening); and Hokkaido (forests, municipality greening, soil conservation facility). After the trainings, some of the participants conducted joint research with the Shinshu University on technology of pot seedlings plantation in mountainous areas, where the natural

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[17]　Subsidies to construct a brick building per 400 ha of protection forest, and per 200 ha of timber and economic forest were planned.

[18]　The participants of the overseas training consisted of 92 men and 15 women.

environment are severe, and put the findings into practical use.

2) Trainings in China

While the details of the plan were unknown, the actual results were as follows:

(a) Trainings at provincial level : Trainings on project management and financial administration for city/county project administration offices, and trainings on forestry technology (environmental conservation, forest management, nursing, pest and disease control) for engineers were conducted 13 times, and a total of 5,084 officers and engineers attended.

(b) Trainings at county level : Trainings on project management for the county/township project administration offices and trainings on forestry technology for engineers were led by the city/county staff who attended provincial-level training. A total of 25,245 participants attended 11 courses of training. The trainings for engineers were conducted for township and forest farm staff, and the Project participants. The subjects contained field management and management technique corresponding to type of forest, which were more practical compared to the provincial-level trainings.

3.2.2 Project Inputs

3.2.2.1 Project Cost

At the time of the appraisal, the project cost was planned to be 11,444 million Japanese yen (480 million Japanese yen in foreign currency; 10,964 million Japanese yen in domestic currency). The actual cost was 10,966 million Japanese yen (258 million Japanese yen in foreign currency; 10,708 million Japanese yen in domestic currency), which was within the plan (96% of the planned cost). Actual procurement of material and equipment was less than the plan, but it was influenced by the exchange rate[19]fluctuations.

3.2.2.2 Project Period

In the plan, the project implementation period was scheduled from June 2006 to September 2011 (64 months) [20]. Actually, it was from June 2006 to August 2012 (75 months), and the project period was longer than planned (117% of the plan). Afforestation completion was planned in the winter of 2008 at the time of appraisal. However, the actual afforestation completion was the spring of 2010, which caused extension of the Project period more than a year.

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[19] At the time of appraisal, 1 Chinese yuan=13.7 Japanese yen was applied for conversion. In reality, the average exchange rate during the Project's expenditure (2007-2014) was 1 Chinese yuan =14.23 Japanese yen, thus the total Project cost converted in Japanese yen became smaller.
[20] The definition of the Project completion was passing the third-growing year inspection on preservation rate.

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

The economic internal rate of return (EIRR) was recalculated with the actual cost and benefit provided by the executing agency. Although it was 14.2% at the time of the appraisal, because the project cost was less than the plan, it was 16.6% at the time of ex-post evaluation (Table 4).

Table 4: Comparison of EIRR at Appraisal and the Ex-Post Evaluation Time

Appraisal[21] (2006)	Actual (2016)
14.2 %	**16.6 %**
Prerequisite Cost: Construction, Operation and Maintenance Benefit: Sales Proceeds of Timber/Fruits Project Life : 40 years	**Prerequisite** Cost: Construction, Operation and Maintenance Benefit: Sales Proceeds of Timber/Fruits Project Life : 40 years

Source: material provided by Henan Provincial Department of Forestry Project Office

As mentioned above, although the project cost was within the plan, the project period was significantly longer than the plan. Therefore, the efficiency of the Project is fair.

3.3 Effectiveness[22] (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

At the time of appraisal, quantitative indicators related to enrichment of forest resources such as area of artificial afforestation, forest coverage ratio, survival/preservation rate, and stock volume were set to confirm the Project's effects. In addition to the above, effectiveness was also checked based on the growth status of the trees in the forests at the field survey.[23]

Incidentally, because training was not a main component of the Project, its effects were to be evaluated in the technical aspect of operation and maintenance in the section on sustainability, but not in the section on effectiveness or impact.

(1) Artificial Afforestation Area

The target and the actual result of the artificial afforestation area (excluding mountain closure, forest rehabilitation, and middle-young forest tending) of the Project are shown in the below Table 5. The total area was 102% of the target. More artificial afforestation was built than the plan in all protection, economic and timber forests.

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[21] The EIRR calculated at the time of appraisal was 13.6% but it was the figure with tax. Thus the evaluator recalculated EIRR by eliminating the tax.

[22] Effectiveness is to be evaluated together with Impact.

[23] The plan at the appraisal, the objective of the Project was set as "by afforestation (output), the project mitigates the damage of natural disasters such as floods and sandstorms in the area and improves the living environment (impact)". The logic corresponding to the outcome level was missing. In this evaluation, outcome was interpreted as enrichment of forest resources (indicators with targets such as artificial afforestation area, forest coverage ratio, survival rate and forest stock volume, and additionally preservation rate and the growth situation of the forests).

Table 5: Artificial Afforestation Area by Forest Type

Forest Type	Indicators	Plan at appraisal Completion Year (2011)	Actual Completion Year (2012)	Ratio to the Plan (%)
Protection Forest	New afforestation Area (ha)	115,660	117,129	101%
Economic Forest	New afforestation Area (ha)	8,880	9,680	109%
Timber Forest	New afforestation Area (ha)	7,300	7,508	103%
	Total	131,840	134,317	102%

Source: material provided by Henan Provincial Department of Forestry Project Office

(2) Forest Coverage Ratio[24]

The target at the time of appraisal and the actual result are as shown in the Table 6. The average forest coverage ratio of the Project implementation counties was 20.14%. Thus, the target of 20.1% was achieved.

Table 6: Forest Coverage Ratio of Project Implementation Counties

	Baseline (2004)	Target at Appraisal Completion Year (2011)	Actual Completion Year (2015[25])
Henan Province	16.2%	20%	23.6%
Project Implementation Counties	**18.4%**	**20.1%**	**20.14%**

Source: material provided by Henan Provincial Department of Forestry Project Office

(3) Survival Rate[26]/ Preservation Rate

The target of survival and preservation rates, and the actual average of project implementation counties are as shown below in Table 7. In all the forest type, survival rate (85%) and preservation rate (80%) achieved the targets.

Table 7: Survival Rate and Preservation Rate[27]

	Target			Actual		
	Protection Forest	Economic Forest	Timber Forest	Protection Forest	Economic Forest	Timber Forest
Survival Rate 1st Growing Year	85%			96%	96%	97%
Preservation Rate 3rd Growing Year	80%			87%	89%	90%

Source: material provided by Henan Provincial Department of Forestry Project Office

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[24] Percentage of the forest area to the total area

[25] The Project completion was in 2012, which was the third growth period. However, because the forest ratio is measured every five years, this evaluation employed the neighboring data of 2015.

[26] At the time of appraisal of the Project, target was set only for the survival rate at the first growing year. Normally, preservation rate at the third growing year is included in afforestation inspection by the State. Therefore, in this evaluation, the preservation rate was also confirmed. According to the executing agency, the reason why preservation rate was not included in the target was that many of the participants of the Project were poor farmers, and in order to refund them the expenses for afforestation as early as possible, the agency set the survival rate as the condition for passing the inspection.

[27] For the mountain closure forests, setting signboards and fences, and barring entrance were the conditions for passing the forestry inspection. Thus, farmers did not have records regarding the forest density. Since no target was set for forest density, this evaluation did not use it as an indicator.

The average survival rate and the preservation rate according to the response of the beneficiary survey[28] are shown in Table 8. In all the forest types, the targets (survival rate 85%, preservation rate 80%) were attained. The majority of the farmers were able to achieve the targets, however 3 small-scale farmers[29] (3%) and 4 large farmers (4%) were not able to achieve the targets for the survival rate, and 1 small-scale farmer (1%) and 5 large-scale farmers (5%) did not achieve the target either for preservation rate. These farmers had been planting trees in the forests in severe natural environment.

Table 8:   Average Survival and Preservation Rate of Beneficiary Survey

	Small-Scale Farmer			Large-Scale Farmer		
	Protection Forest	Economic Forest	Timber Forest	Protection Forest	Economic Forest	Timber Forest
Survival Rate 1st Growing Year	94.2%	97.0%	90.7%	93.4%	94.6%	91.4%
Preservation Rate 3rd Growing Year	90.9%	92.1%	86.7%	89.6%	90.4%	85.6%

Source: Beneficiary Survey

(4)   Growth Status in the Forests

Considering the balance among the regional characteristics (plain, mountain, hill/mountain), the evaluation team selected 20 sites from six Project implementation cities/counties, and conducted a field survey to confirm planting techniques, growth status, and operation and maintenance status of the representative species of each afforestation type. The summary is described below:

1)   Artificial Afforestation

Plain: Protection forest (Poplar, Tung tree) is the main type. Afforestation was carried out for the purposes of (a) wind breaking for roads and waterways, (b) improvement of degraded land and wind breaking, and (c) wind breaking for agricultural land. Since the plain area had better natural conditions such as water resources, the growth status and maintenance of the forests were good. Not only ecological effects such as wind breaking and sand prevention, but also economic effects from the sales of timbers can be expected in the future (Lankao County,

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[28] A beneficiary survey was conducted to the farmers (a sample size: 199) participated in the project in six cities/counties (33,393 participants) which were selected from the 75 Project implementation counties balanced by regional characteristics. In each target city/county, two or three project implemented townships/villages were randomly selected, and a sample for the survey was extracted by a random sampling method from the participant list. Since the beneficiary survey was conducted by home visit using a questionnaire, it was not possible to conduct a survey to farmers who were absent due to migrant work etc., and taking a sample in perfect random manner was not possible. Of the respondents, 95% were men, and 5% were women. By the age group, 1% were in their 20s, 7% were in their 30s, 29% were in their 40s, 52% were in their 50s and 11% were in their 60s. There was no condition set for participating in the Project, such as sex or age, however, afforestation requires physical labor, and majority of the participants were men.
[29] Based on the afforestation area of the farmers, the answers of the beneficiary survey were analyzed by classifying the groups of small-scale farmers with 10 ha or less, and of large-scale farmers with over 10 ha. The total valid responses were 199, consisted of 94 small-scale farmers and 105 large-scale farmers.

Runan County, Neixiang County).

Hill/Mountain: Protection forests and economic forests are built on steep slopes in the mountains where natural conditions are especially severe. (a) Protection Forest (Pine, Black Locust, Sawtooth Oak, Chinese Arborvitae etc.) were built to prevent soil runoff from the steep slopes, (b) Economic forest (Walnuts, Oil-tea Camellia, Tea) were built on slopes which had comparatively better conditions. The growth status and the maintenance of the economic forests[30] were good. Meanwhile, in the protection forests, due to feeding damage caused by wild animals, farmers were forced to repeat supplemental plantation until the trees grew to a certain height (Luoshan County, Lingbao City, Jiyuan City).

Plain：Windbreak Forest for Agricultural Land (Lankao County)

Mountain：Protection Forest Damaged by Animal Feeding (Lingbao City)

2) Mountain Closure

Two methods were adopted according to the purposes. (a) In order to improve the quality of the forest, the natural shrubbery forest was blocked to grow, and arbores (mixed forest of broad-leaf and needle-leafed trees) was encouraged to grow (Luoshan County). While the forest density remained at 0.9 before and after the closure, arbors were encouraged to grow by the closure as expected. (b) In order to improve the coverage ratio, forest nursing was implemented. Wide-leaved trees were planted in the shrubbery forest where forest density was around 0.2, and the area was closed in order to prevent damage by livestock. By these being done, the forest density improved to 0.8 (including arbores 0.5, shrubbery 0.3) and growth of shrubbery was also promoted. Thus expected effects appeared (Jiyuan City).

3) Middle-Young Forest Tending

The method was applied to promote the growth of poor quality shrubbery forests by weeding, pruning, and pest and disease control (Neixian County, Jiyuan City). The Project implemented

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[30] Economic forests were built in areas which had comparatively better natural conditions. The tree species selected were those which were not susceptible to feeding damage. Thus supplemental planting due to feeding damage was not required.

middle-young forest tending in a forest of locust trees since 2009 (Lingbao City). In comparison with the forest without tending, the trees in the forest provided under the project grew as follows: the average height was larger by 27.7%; breast diameter by 30.5%; and accumulation amount by 92.2%. The effect of the project was manifested.

Mountain Closure forest which Quality Improved (Luoshan County)

Middle-Young Forest Tending (also closed for preservation: Jiyuan City)

Issues on Afforestation Model Preparation and Implementation:

The following issues should have been considered although the growing status of forests was generally good. In Henan Province, the climate and land conditions are rich in diversity. However, only 17 types of afforestation models were prepared for the Project. The mixing ratio of trees at planting, seedling grade, seedling density, ground leveling type, size of planting hole were recorded for each model, yet no graphic planting charts for each tree species were attached. It caused forestry design variation despite the same model among the participants. Each model had choices of tree species, but because the choice was entrusted to the farmers, there was a tendency that tree species with high selling price were chosen. As a consequence, economic aspect was prioritized over the conditions such as environment or characteristic of the land for afforestation.

(5) Forest Stock Volume

The average forest stock volume of the Project sites is shown in Table 9. The target figures was 53.0 m^3/ha while the actual result was 68.93 m^3/ha. Thus the target was attained.

Table 9: Forest Stock Volume

	Baseline	Target	Actual
	Appraisal (2004)	Completion Year (2011)	Completion Year (2015[31])
Henan Province	31.1 m^3/ha	N/A	43.33 m^3/ha
Project Implementation Counties	38.0 m^3/ha	N/A	55.98 m^3/ha
Project Sites	**38.0 m^3/ha**	**53.0 m^3/ha**	**68.93 m^3/ha**

Source: material provided by Henan Provincial Department of Forestry Project Office

[31] The Project completion year is 2012. However, because the forest stock volume is a value measured every five years, the neighboring 2015 result is used.

3.3.2   Qualitative Effects (Other Effects)

At the time of appraisal, the expected qualitative effect of the Project was "mitigation of damage caused by strong wind, restoration of multi-function of forest, and improvement of the living environment of residents." Because it corresponds to the impact level, it is mentioned in the "3.4 Impacts" section.

The targets of the artificial afforestation area, the forest coverage ratio, the survival /preservation rate, and the forest stock volume were achieved, and according to the field survey, the growth status of the forests was confirmed generally as expected. Furthermore, the forests provided by the Project accounted for 13% of the afforestation, which was conducted in Henan Province during the same period as the Project. It shows that the project contributed to the improvement of forest coverage ratio and forest stock volume in the province. Therefore, the effectiveness is well-observed.

3.4   Impacts

At the time of appraisal, according to the Project objective, "contribution to mitigating damages by natural disasters such as floods and sandstorms in 71 counties of Henan Province and improving the living environment" was set as the expected impact. Additionally, indirect effects such as reduction of soil runoff and suppression of strong wind etc. were also classified as the impact for this evaluation.

3.4.1   Intended Impacts
(1)   Contribution in a Reduction of Soil Runoff

To verify the effect of this aspect, a total area of soil runoff in the Project implementation counties, and a total amount of economic loss were set as indicators. The targets of both indicators in 2015 were achieved (Table 10). Additionally, a bar graph (Figure 2), which classified the total area of soil runoff in the Project implementation counties according to the degree of soil runoff shows that the proportion of soil runoff whose strength level is strong or more reduced. It indicated that level of runoff was reduced. However, since external factors such as weather conditions strongly influence the damage caused by such natural disasters, the clear trend by effects of afforestation was unknown.

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Table 10: Total Area of Soil Runoff and Economic Loss Caused by Flood
in the Project Implementation Counties

	Baseline (2004)	Target Completion Year (2011)	Actual Completion Year (2015[32])
Total Area of Soil Runoff (ha/year)	3,283,638	3,000,000	2,657,367
Economic Loss Caused by Flood (million Chinese yuan/year)	8,962	7,618	7,429

Source: material provided by Henan Provincial Department of Forestry Project Office
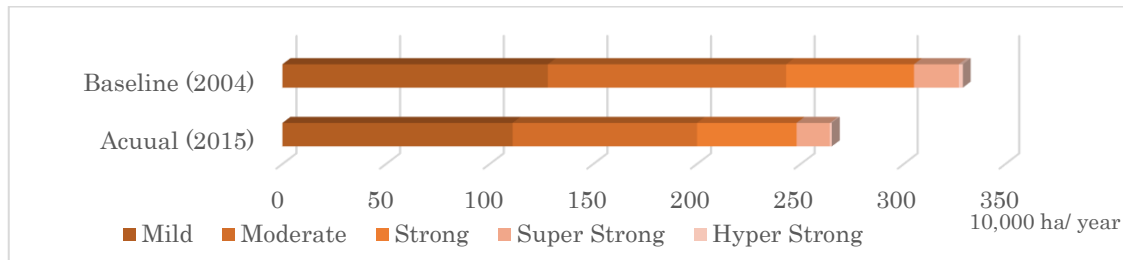
Source: material provided by Henan Provincial Department of Forestry Project Office

Figure 2: Total Area of Soil Runoff in the Project Implementation Counties
by the Level of Spilling

(2)   The Project's Contribution to Mitigating Soil Erosion

An area of 660,900 ha was less eroded in 2012, compared with that in 2003 (Table 11). Afforestation accounted for 70% (

Table 12) of the soil erosion control measures in the province. Thus it could be assumed that afforestation reduced erosion in 462,600 ha, which was 70% of the total erosion area reduced. Furthermore, since the afforestation area of the Project was about 13% of the total afforested area in the province (Table 13), it could be assumed that the Project was effective to deter 60,000 ha, which was about 9% of the erosion area in the province, therefore the Project contributed greatly to mitigating soil erosion in the province.

Table 11:   Soil Erosion Area in Henan Province

	2003	2012	Difference
Soil Erosion Area (ha)	3,007,300	2,346,400	△660,900

Source: data in 2003 refer to "2003 Bulletin of the National Census for Examination of Soil and Water Conservation." Source of the 2012's data referred is" Bulletin of the First National Census for Soil and Water Conservation (May 29, 2013)"

Table 12:   Soil Erosion Control Measure and the Area in Henan Province

Measurement	Area (ha)	Ratio
Engineering Work	8,904,600	29%
Afforestation	**21,691,400**	**70%**
Other Measurement	423,500	1%
Total	31,019,500	100%

Source: Provincial result refer to" Bulletin of the First National Census for Soil and Water Conservation (May 29, 2013)"

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[32] The Project completion year was 2012. However, because the stock volume is the value measured every five years, the neighboring 2015 result was employed for the evaluation.

Table 13:   Afforestation area by Province and the Project

Forest Type	Indicator	Afforestation Area by Province (2007 – 2012)	Afforestation Area of the Project (2007 – 2012)	Ratio of the Project (%)
Protection Forest	Afforestation Area （ha）	908,280	165,184	18%
Economic Forest	Afforestation Area （ha）	176,050	12,580	7%
Timber Forest	Afforestation Area （ha）	416,360	19,267	5%
Other	Afforestation Area （ha）	2,240	—	0%
Total		1,502,930	197,031	13%

Source: Afforestation Area of Henan Province referred to National Statistics Yearbook, material provided by Henan Provincial Department of Forestry Project Office for the Project's result.

(3)   Contribution to Mitigating Damage by Sand Storms

The expected effect by the Project implementation was the reduction in the number of sand storm occurrences, victims, damaged houses, livestock losses, and in the amount of damage. However, indicators to show such effect were not set in the Project plan and related statistics were not taken either.

As an alternative source of information, the evaluation referred to the Henan Agricultural Science Institution's report published by Henan Provincial Department of Forestry (August 2012). As a result of the 20-year observation, it is stated on average that developing windbreak forest around farmland reduced wind speed inside the forest by 35% to 40%, and moisture evaporation by 10% on average and increased humidity by 6.3%, and moisture

At the Gap of the Windbreak Forest, delay in growth observed in the wheat field
(Runan County: red circle indicates the part)

in soil by 6.1%. Then in the agricultural lands with protection forests, it is shown that yield of corn increased by 5.5% to 13.1%, wheat by 6.8% to 17.6%, peanuts by 4.7% to 8.4%, and cotton by 8.3% to 12.8%. In the average of all the crops, yield increased by 10%.[33]

In the Project, there was no such quantitative data, but in the field survey, the evaluation team observed that in the part where there was a gap in the protection forest, young wheat seedlings received strong wind and the growth delayed. It can be presumed that protection forests built by the Project also were effective in terms of wind breaking, moisturizing the farm lands, and also contributed in increasing in yield.

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[33] It was written in the report that the comparative data was taken in the same forest farm under the same conditions except with/without protection forest.

3.4.2   Impact on Improvement of Living Environment

(1)   Beneficiary Survey on the Economical Effect[34]

1)   Ratio of Afforestation Area by Forest Type

The average plantation area per a farmer by small-scale farmers was 3.8 ha, and timber forests and economic forests, which emphasized income from timbers and forest products, accounted for 55% of the area. The average plantation area of large-scale farmers was 44.8 ha, and the area of protection forests and mountain closure, which emphasize ecological effects, made up the majority, 85% of the area.

Table 14:   Afforestation Area by Forest Type

	Protection Forest	Mountain Closure	Timber Forest	Economic Forest	Average Area
Small-scale Farmers	42%	3%	27%	28%	3.8 ha
Large-scale Farmers	66%	19%	11%	4%	44.8 ha

Source: Beneficiary Survey

2) Changes in Net Revenue from Afforestation

Comparing a change in net revenue before the Project (2006) and after implementation, 58 small-scale farmers (62%) and 39 large-scale farmers (37%) answered that net revenue from afforestation increased. The same change in the balance after deduction of maintenance expenses etc. from the income was compared. Then the average net revenue of small-scale farmers doubled from 5,459 Chinese yuan of before the implementation to 12,361 Chinese yuan due to the sales of the products from economic forests and thinning cut. Meanwhile, the average net revenue of large-scale farmer resulted in red because maintenance expenses increased more than the income after the implementation of the Project. For large-scale farmers, only 15% of the afforestation area is composed of timber and economic forests, and they had heavy burden of maintenance cost from protection forests and mountain closure forests especially in the mountain areas. Also, at the time of the field survey, timbers, which were expected to be a large revenue source, were still premature for logging. Thus, it will take more time until clear trends on net revenue appears.

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[34] According to the executing agency, the expected effects by the Project were improvement in the livelihood of small-scale farmers and contribution to ecological effect by larger-scale farmers and forestry farms. Thus the beneficiary survey was compiled by dividing the responses into small-scale farmers (afforestation area 10 ha or less), and large-scale farmers (more than 10 ha).

Table 15: Changes in Net Income from Afforestation

|	Small-scale Farmer 94 households	Large-scale Farmer 105 households	Forest Farm 7 locations
Income increased significantly.	8 (9%)	12 (11%)	0 (0%)
Income increased in some extent.	50(53%)	27 (26%)	6 (86%)
No change.	20 (21%)	3 (3%)	0 (0%)
Income did not increased much.	4 (4%)	15 (14%)	1 (14%)
Income did not increased at all.	1 (1%)	2 (2%)	0 (0%)
Not answered	11 (12%)	46 (44%)	0 (0%)

Source: Beneficiary Survey

3) Survey on the Management of State-Owned Forest Farms

  In addition to the beneficiary survey, a questionnaire survey to the managers of seven state-owned forests farms was conducted to see the changes in management status. All the managers in the farms answered to the questions regarding management of the farm, income of the staff, employment opportunities "improved somehow" by the Project implementation. However, one of the farm managers answered that they were facing difficulty in repayment because they built mainly protection forests, and they were not making revenue for covering the maintenance expenses. Currently, the government has been taking over the repayment.

(2) Average Income of the Farmers

    The average annual income of the farmers in the project implementation counties was expected to be increased from 2,104 Chinese yuan in 2004 to 2,600 Chinese yuan in 2010. The target was achieved ahead of the schedule in 2009 (2,644 Chinese yuan), but because income may include other sources such as agriculture and migrant work besides afforestation, thus the degree of the Project's contribution was unknown. Also at the time of planning, afforestation labor fee was 28 Chinese yuan/person/day. Whereas, according to the interviews at the field survey, the fee was doubled to 50 - 60 Chinese yuan/person/day in 2008 - 2009. At the time of ex-post evaluation (2016), the fee was significantly increased to 100 - 120 Chinese yuan/person/day. Moreover, while the expenses for forest maintenance and materials etc. were also increasing due to the rise in commodity prices, the time was too early to expect the main income from forests obtained from the timbers. Therefore, it was difficult to conclude that the effect of the Project appeared at this point.

    In addition, when comparing the average annual income of farmers in Henan Province with that in China, income of farmers in Henan Province was 72% of the national and 55% of the provincial average income in 2004. The disparity tended to expand. In 2009 the Project's average income was 51% of the national income and 55% of the provincial income. In 2015 the Project' average income became 39% of the national income, and 41% of the provincial income.
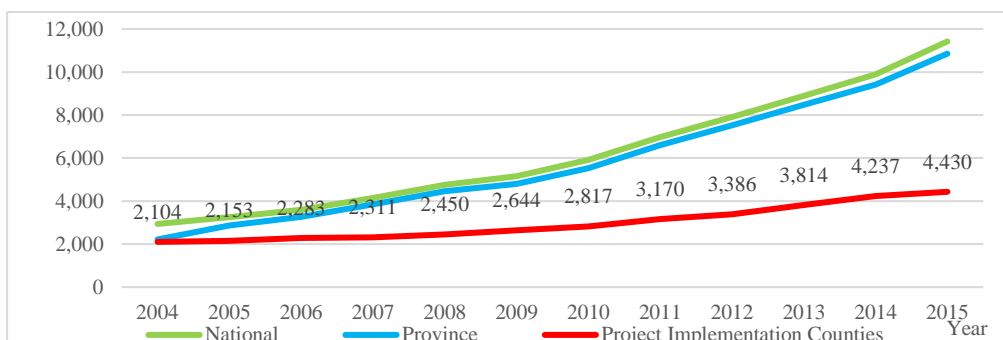
Source: National and Henan Province's data referred to National Statistics Yearbook, material provided by Henan Provincial Department of Forestry Project Office for Project Implementation Counties.

Figure 3: Changes of Farmers' Annual Income (2004-2015)

3.4.3 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

At the time of appraisal, because the Project was to contribute to improvement of the natural environment by implementing afforestation of native species where soil runoff and flood damage occurred, unfavorable impact on the natural environment was assumed to be minimized. According to an interview with the executing agency and answers from the beneficiary survey, by the implementation of the Project, no negative impact on the natural environment was confirmed.

(2) Land Acquisition and Resettlement

Because the afforestation area used in the Project were lands where the participants had ownership or borrowed from villages or residents with rental fees, therefore no land acquisition or resettlement of residents occurred. In the field survey, the evaluator confirmed that contracts were exchanged for lease of usage rights, and appropriate fee was paid according to the market price at the time of contracts.

(3) Unintended Positive/Negative Impact

Regarding the impact on the poor by implementation of the Project afforestation, the executing agency and the field survey cited the following:

(a) Afforestation project was implemented in the mountain areas which had a large population of the poor. In the areas, forest protection and ecological improvement were delayed.   (b) Employment opportunities for afforestation and nursing labor were created.   (c) Forest protection workers were hired for protection forests maintenance (The Forestry Department pays salary 1,500 - 2,000 Chinese yuan per month).

Considering the poor, the Project scheduled payment for the participants earlier. There were no special considerations for socially vulnerable people and women, but according to the interviews in the field survey, there was no case where poor, women, or socially vulnerable people suffered from detrimental treatment.

Among the economic forests, there was a Yabukita tea forest, where the species introduced from Japan were used. A Forestry Bureau staff

Economic Forest of Yabukita Tea
(Luoshan County)

who visited Japan for the Project's overseas training proposed the species. The species yields more because not only tea leaves but also branches can be used for tea[35]. Since there were few domestic competitors and the sales was also good, the forest owner built a local production factory. This tea forest provided employment opportunities for 1,000 households of farmers in the surrounding area with employment opportunities. For tea picking which required manual work, many elderly people and women were employed.

The targets set at the time of appraisal in the area of soil runoff and the economic loss due to soil runoff were attained. However, as the data was strongly affected by climatic influences, the degree of afforestation effects could not be measured. Meanwhile, according to the alternative data, afforestation provided by the Project is presumed to have prevented 9% of soil erosion in the province. Although there were no data regarding the prevention of sand storms available for the evaluation, according to the alternative data provided by the agricultural section proved that protection forests were effective in preventing winds, in moisturizing fields, and in increasing yields. Thus it can be presumed that the protection forests of the Project also contributed to suppressing strong winds.

Although the average income of farmers exceeded the target set at the time of appraisal, the degree of the Project's direct contribution was unknown. Analyzing the result of the beneficiary survey on the change in net income due to afforestation and on the management of the forest farms, because the time was early for receiving full-fledged income from the timbers in the forests, there was no clear trend in the Project's effects. To sum up, while the effect on improving the living environment did not fully come into the picture yet, there was a certain effect on mitigation of natural disasters,

In summary, the Project has largely achieved its objectives. Therefore effectiveness and impact of the project are high.

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[35] While the yield of normal tea leaves is 225 kg/ha, the yield of Yabukita tea is 600 kg/ha.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

(1) Executing Agency

For the implementation of the Project, "Project Office" was established within the provincial Forestry Department, which was responsible for administration of the Project, repayment of ODA loans, and coordination among the related organizations. County-level Implementation groups were responsible for supervising operation and maintenance of the forests (Forestry Bureau), and repayment services (Finance Bureau).

From the time of appraisal (2006) to the ex-post evaluation (2016), there was no major change in this organizational structure. In the structure, coordination relations among the bureaus, province, counties and townships were established, also the scope of work and the area of responsibility were clearly defined. Also, according to the project executing agency, the number of staff was sufficient.

Table 16: Number of Project Implementation group's staff of the Counties and
7 State-Owned Forest Farms (unit: persons)

	Actual at Ex-Post Evaluation (2016)					
	Project Implementation Group	Finance Bureau	Forestry Bureau	Water Conservation Bureau	Environment Protection Bureau	Township Forestry Station
Total of 68 Counties	503	150	198	78	77	849
7 State-Owned Forest Farms	41	12	17	6	6	—

Source: material provided by Henan Provincial Department of Forestry Project Office

(2) Support System for the Afforestation Participants

The engineers in the forestry stations at the township/village level have been providing supports and technical guidance for the participants in operation and maintenance of their forests. The forestry stations at the township/village monitored the status of forests, and if pruning and thinning are needed, or problems such as pest and disease happened, they contacted the farmers, and also provided countermeasure guidance. According to the interviews with the executing agency and the field survey, there was sufficient number of staff secured to conduct monthly monitoring on the township/village forests including the Project afforestation sites.

Since Henan was one of the provinces with a large number of migrating workers[36], the probability was high that farmers were absent due to migration work for two or three years

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[36] Although it is difficult to grasp the exact number of migration workers, Henan Province is one of the provinces which has a large population of migration workers in China. According to the statistics published in October 2016, 10 million people, which was about 10% of the population, were on migrant work outside the province. Besides this, there were also migration within the province, especially from rural areas to urban areas.

after new plantation, when the forests did not need nursing. Thus, the monitoring by township/village forestry stations have been taking an important role in forest maintenance.

As mentioned above, the organizational structure of the executing agency was established with the collaboration among the provincial, county and township/village levels, also forestry stations were providing monitoring and technical supports in the afforested areas, thus no problem was found in the executing agency's operation and maintenance system.

3.5.2 Technical Aspects of Operation and Maintenance

(1)　Operation and Maintenance Technique of the Forestry Department

To become an engineer at the forestry department, the executing agency of afforestation project, a degree higher than university, experiences in agriculture or forestry engagement, and knowledge on laws related to forestry were required. Also, to become an engineer of county-level, experiences in forestry project related to new species and technology, and in forestry design were required. Even after being employed, the engineers were required to participate in trainings in the fields of their responsibility. In fiscal 2016, 89 kinds of trainings including forestry related laws, forest designing, fund management, fire/insect prevention, and ecological environment protection were provided for 11,408 staff members.

(2)　Technical Guidance for the Afforestation Participants

Technical guidance for the forest farms was provided by the county Forestry Bureaus, and technical guidance for the farmers was carried out by township/village forestry station engineers alongside the monthly monitoring.

According to the beneficiary survey, 198 farmers (99%) participated in the technical training, and 92 small farmers (98%) and 83 large farmers (79%) received on-site technical guidance. Among the subjects, afforestation techniques, handling seedling, pest and disease control, and using fertilizers were accredited the effectiveness. Meanwhile, because the guidance was mostly provided at the afforestation time, the answer saying that the sales of forest products was effective remained less than 10%. In the future, such guidance and supports will be needed again when the time comes for logging/selling the timbers which are to be their major revenue source.

Table 17:　Training Subjects that Beneficiaries Answered Effective

Effects by guidance （multiple answers allowed）	Small Farmers	Large Farmers
Afforestation technique improved	100%	91%
Seedling and plants handled appropriately	87%	76%
Prevented and cured forest from pest and disease	87%	72%
Fertilizer used appropriately	88%	58%
Managed forest appropriately	53%	45%
Managed funds appropriately	41%	36%
Motivation for afforestation rose.	65%	25%
Sold products and thinning cut appropriately	8%	5%

Source: Beneficiary Survey

The executing agency obtained qualification standards of their engineers, and the technical level was maintained by trainings. Since the participants' forests have been monitored and technical guidance has been continuously provided, the sustainability of technical aspect of operation and maintenance is to be secured.

3.5.3 Financial Aspects of Operation and Maintenance

(1)　Finance of the Executing Agency.

The annual budget of the forestry departments in Henan Province is shown in Table 18 below. The budget increases year by year, and in 2015 the secured amount reached to 10 times or more than the budget in 2006. Since the Province was a target area for forestry-related priority projects at the national level, the national budget based on the "Henan Province Afforestation and Greening Project (2011-2020)" and the Forestry Development Five-Year Plans was committed. Data regarding on the budget was not provided. However according to the executing agency, the forestry bureau has budgetary frames for artificial afforestation, pest and disease control, fire and theft prevention, nursing, and sufficient amount for each has been allocated.

Table 18: Annual Budget for Forestry and the Sources　　(unit: ten thousand Chinese yuan)

	Annual Budget	National Budget	Domestic Loans	Bonds	Foreign Investment	Self - raising	Other Funds
2006	**107,531**	86,443	12,203	0	2,953	3,612	2,320
2007	**104,084**	92,049	5,133	0	5,820	481	601
2008	**138,904**	97,634	16,950	0	3,946	3,999	16,375
2009	**728,770**	202,708	153,956	0	15,000	224,600	132,506
2010	**951,927**	157,014	212,530	0	12,383	256,000	314,000
2011	**974,898**	297,098	213,000	0	4,900	249,900	210,000
2012	**976,351**	159,521	230,000	0	1,100	337,260	248,470
2013	**1,019,382**	110,350	310,000	0	3,800	430,000	165,232
2014	**1,102,935**	279,613	360,000	0	3,322	460,000	0
2015	**1,239,647**	766,900	109,600	0	47	363,100	0

Source: National Statistics Yearbook

(2) Finance of the Afforestation Participants

At the time of ex-post evaluation (2016), income was gained from forest products in economic forests, and thinning cuts of timber and protection forests. It was too early to cut timbers, so the participants supplemented the maintenance expenses by other incomes such as agriculture if they are deficient. However in the future, income from the timber was expected to exceed the maintenance expenses.

For example, in the forest of Poplar, six years after afforestation, 9,000 Chinese yuan/ha can be gained by thinning cut, and in about 15 years, 100 thousand Chinese yuan/ha can be earned from the sale of timbers. Even after deducting the maintenance cost of 85,000 Chinese yuan/ha, sufficient income can be expected from afforestation. Until the trees grow to a size for timbers to be shipped, it takes about 15 to 20 years for poplar and 30 years for needle-leaved tree, thus from the time of ex-post evaluation, about 5 to 20 more years will be needed until full earnings are to be obtained.

According to the beneficiary survey, regarding the maintenance of the forests at the time of the ex-post evaluation (2016), the shortage of the maintenance expenses for the protection forest of the mountainous areas was cited as a problem. As a measure for the insufficiency, the Henan Province Forestry Department expanded designation of ecological protection forests and subsidies, which included the forests arranged by the Project. In 2016, the provincial government allocated 248 million Chinese yuan for 1.29 million ha to national public benefit forests, and 58 million Chinese yuan to 320,000 ha of provincial public benefit forests as the maintenance expenses. Also, subsidies for middle-young forests tending expanded, and 424 million Chinese yuan for 140,000 ha were allocated in 2016. According to the executing agency, subsidies were to be extended to the protection forest and mountain closure forest arranged by the Project.

(3) Repayment Status of Borrowing[37]

At the time of ex-post evaluation, repayment of some contracts began. According to the executing agency, repayment has been smoothly done, and no problem occurred at the time of the ex-post evaluation. In the interviews conducted in the field survey, there were some cases of repayment delay[38], but the majority has been repaying smoothly.

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[37] The farmers who participated in the Project signed two contracts: one was with the government of the township/village which was for afforestation type and area; and the other contract was for loans for expenses such as afforestation materials. Forestry farms signed a contract with the county forestry bureau for afforestation and loan. The interest rate of the loan was uniformly 0.75% on a Chinese yuan basis, and the borrowing period and the grace period were decided by consultation between the township/village government and farmers depending on the tree species planted.

[38] The counties had been temporarily advancing the repayment in a case that the contract needed to be handed over to the family due to the death of the borrower (1 household), and the cases (4 households) that the borrowers can not be reached because of the absence for migrant work.

Henan Province has been implementing several national priority projects. Therefore sufficient amount of nursing expenses to maintain the Projects' forests was allocated. In addition, participants in this project were expected to earn income that will exceed expenses when the forests grow. Meanwhile, regarding the protection forests and mountain closure forests where income cannot be expected, the provincial government has been gradually expanding the subsidies to support the expenses. Based on the above, financial sustainability was expected to be secured.

3.5.4 Current Status of Operation and Maintenance

In this section, the status of the forests confirmed through the field survey and questionnaires, and perception about the current status of the forest by the beneficiary survey are to be analyzed, in order to determine whether the forests by the Project are to be sustainably operated and maintained.

(1) Condition of the Forests

According to the questionnaire conducted through the executing agency, all the counties recognized that their forests were in good condition. Moreover, the evaluation team visited the Project sites in the cities/counties and the forest farms during the field survey, and confirmed the condition of the forests were largely good at the time of ex-post evaluation.

Regarding the preservation rate at the time of ex-post evaluation (2016), the averages of the beneficiary survey are shown in Table 19. All the average preservation rate of protection forest, economic forest and timber forest exceeded 80%. Thus it can be stated that the condition of the forests were largely good. Meanwhile, the preservation rate of two small-scale farmers' protection forests (2%), two large-scale farmer's timber forests (2%) and 12 large farmers' protection forests (11%) were lower than 80%.

Table 19: Preservation Rate at the Time of Ex-Post Evaluation (2016)

	Small-scale Farmers			Large-scale Farmers		
	Protection Forest	Economic Forest	Timber Forest	Protection Forest	Economic Forest	Timber Forest
Preservation Rate	87.6%	87.5%	84.1%	86.6%	86.7%	82.0%

Source: Beneficiary Survey

Regarding the condition of the forest, 85 small-scale farmers (90%) and 87 large-scale farmers (85%) answered that their forests were in good condition. No farmer answered that there were many problems in their forests. However, seven small-scale farmers (7%) and 18 large-scale farmers (17%) responded that there were some problems. The main reasons cited were problems in pest and diseases (18 small-scale farmers, 43 large-scale farmers), and problems in survival /preservation rate (15 small-scale farmers, 27 large-scale farmers).

(2) Operation and Maintenance Status of Forests

Regarding the operation and maintenance status[39] of the forests, the province had a nursing and protection plan, and the engineers of the forestry stations have been conducting a monthly forest monitoring on the pest and disease control during the growing and winterization time, fire prevention, damage by livestock, theft, and the status of the forests. Regarding state-owned forest farms and mountain close forests, forest protection workers and the farms' staff were conducting monitoring twice in a month.

Regarding the forest operation and management status at the time of ex-post evaluation (2016), 79 small-scale farmers (84%) and 70 large-scale farmers (67%) answered in the beneficiary survey that their forests were operated and maintained well. No farmer answered that there were many problems. However, 12 small-scale farmers (13%) and 34 large-scale farmers (32%) responded that there were some problems. The main reasons were cited as shortage of maintenance budget (33 small-scale farmers, 29 large-scale farmers), and shortage of manpower (11 small-scale farmers, 30 large-scale farmers).

(3) Operation and Maintenance Status of Equipment

According to the executing agency, the operation and maintenance status of the equipment purchased by the Project[40] has been good. Some signboards were removed because the forests were improved to the state that the closure was unnecessary.

The 70 patrol vehicles were allocated to the forestry bureau of each county as a property of the bureau, but due to administration reforms started in 2015, the bureaus were requested to return some of the vehicles. According to the executing agency, although the number of vehicles returned was unknown, rental vehicles were appropriately allocated, and there was no obstacle to their forestry work such as patrolling.

The status of operation and maintenance was generally good. In some protection forests, where revenue could not be expected because ecological effects were emphasized, maintenance expenses were found to be insufficient. However, expenditure on protection forest maintenance has been covered by other income sources, and subsides for protection forests' maintenance have been expanding. Thus, sustainability of the Project's effects is expected to be secured.

As mentioned above, the operation and maintenance structure of the Project was established, and no major problems were found in the technical, financial aspects, and status

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[39] Through the field survey, existence of manuals, patrol records, and liaison structure at the time of emergency at forestry stations and state-owned forest farms were confirmed.
[40] Among the equipment procured, as pumps, spreaders and monitoring buildings did not exist in the Project sites the evaluator visited in the field survey. Alternatively confirmation was done by photographs.

of the operation and maintenance, therefore sustainability of the project is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The Project aims to enrich forest resources by afforestation in Henan Province, thereby contributing to suppression of soil erosion in mountainous areas and strong winds in plains, mitigating damage of natural disasters such as floods and sandstorms in the area, and improving the living environment.

The Project was prompted by the increase in importance of afforestation because of the escalation of natural disasters in the Yellow River and the Yangtze River basin areas at the time of appraisal. The Project's relevance is high because its aim is consistent with the Chinese Government's development policies, development needs and the aid policy of Japan.

The targets on the enrichment of forest resources such as artificial afforestation area, forest coverage ratio, survival/preservation rate, and stock volume were achieved. The Project implementation area was equivalent to 13% of the area afforested in the province during the same period; also the project contributed to improving the forest coverage ratio and stock volume in the province.

Regarding the improvement of life, although the Project's economic effect from afforestation are has not yet been developed, the Project yielded certain effects on reducing natural disasters such as deterrence of approximately 9% of the soil erosion and suppression of strong winds. Thus the effectiveness and impact of this project are high. With regard to the efficiency, the project cost was within the planned limit, though the project period exceeded the plan due to the extension of afforestation period. Thus the efficiency of the Project is fair.

At the time of ex-post evaluation, there was no change in the structure of the executing agency, and a structure to support forest management has been established. Because the central government allocated budget for national priority projects, funds for operation and maintenance including nursing and pest and disease control were secured in the province. The shortage was found in the maintenance costs of protection forests among some farmers and forest farms at the time of ex-post evaluation. However, the provincial forestry department had a policy to increase subsidy for the maintenance of protection forests for ecological purpose, thus in the medium term, the shortfall was expected to be resolved. Also, a few problems were observed in technical aspects, and the maintenance status, therefore the sustainability of the Project is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

In the protection forests in the mountains where ecological effects were emphasized, the

maintenance expenses were burden on the farmers and forest farms because the economic effects by the forest products etc. were small. It can not be denied if the maintenance expenses are insufficient, there are possibilities that necessary forest maintenance will not be carried out, and the forests may end up to be deteriorated. The Province has been expanding designation of ecological forests and provision of maintenance expenses. Especially for the protection forests in the mountainous area in severe natural conditions, immediate measures such as subsides for nursing etc.is desired.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Presenting Convenient Afforestation Models to Farmers

Henan Province is rich in diversity of lands. It has mountains, plains, and various conditions of lands. The Project provided only 17 types in a table including afforestation model including protection, economic, and timber forests.   Because the models were not prepared for each tree species, and the materials were not user friendly because there were no charts indicating planting methods. As the result, it caused variations in planting density. At the time of planning and also during the Project implementation, the Forestry Department should have prepared materials considering the convenience of farmers, incorporate the opinions of engineers at the county and township/village levels.

Selecting Tree Species with Future Potential

Farmers tended to select tree species with high selling prices because selection of tree species planted in their forest was left up to the autonomy of the farmers. Poplar in timber forests, and walnuts in economic forests were the popular selection. Similar tendency were observed in afforestation projects implemented in the state. The forest products of popular species have been oversupplied, which have been leading to the price decline. It seems that nature and land conditions were not sufficiently examined by farmers at the time of selection. For example, feeding damage by rabbits etc. occurred in protection forests in mountains, but it would have been prevented if the farmers had planted coniferous trees such as pine trees. The executing agency should have provided materials that allow farmers to understand the characteristic of the tree species so that they can choose species by taking into consideration the natural conditions, the characteristics of the land, and the afforestation effects of both ecological and economic aspects from the medium to long term. Also, the executing agency should have asked farmers to select tree species after seeking their understanding in trainings and local technical guidance.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs		
Afforestation Area	**194,190 ha**	**197,031 ha**
Protection Forest	163,610ha	165,184 ha
Economic Forest	11,880 ha	12,580 ha
Timber Forest	18,700 ha	19,267 ha
Procurement of Material and Equipment		
Signboard	2,202 locations	696 locations
Pump	161 sets	141 sets
Pesticide Spreader	172 sets	162 sets
Building for Monitoring	480 locations	251 locations
Patrol Vehicle	71 sets	70 sets
Overseas Training		
Staff of Forestry Related	20 persons 5 times	5 times
Departments	Total 80 persons	Total 107 persons
Training in China		
Provincial Leve	N/A	5,084 persons
County Level	N/A	25,245 persons
2. Project Period	June 2006 – September 2011 (64 months)	June 2006 – August 2012 (75 months)
3. Project Cost		
Amount Paid in Foreign Currency	480 million yen	258 million yen
Amount Paid in Local Currency	10,964 million yen (800 million Chinese yuan)	10,708 million yen (764.4 million Chinese yuan)
Total	11,444 million yen	10,966 million yen
ODA Loan Portion	7,434 million yen	7,218 million yen
Exchange Rate	1 Chinese yuan = 13.7 yen (As of September 2005)	1 Chinese yuan=14.23yen (average of actual exchange rate 2007-2014)
4. Final Disbursement	December 2014	