

FY2015 Ex-Post Evaluation of Japanese ODA Loan Project
“Inner Mongolia Afforestation and Vegetation Cover Project”

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0. Summary

This project carried out afforestation and planted vegetation cover in the Yellow River Basin of the southern part of Inner Mongolia Autonomous Region (hereafter “Inner Mongolia”) located in northern China. Through this, it aimed to improve the living environment by improving the rate of forest cover and vegetation cover in the region, as well as preventing desertification in the region and the surrounding areas, thereby contributing to social and economic stability in the region. This project has remained relevant to the development plan and needs in China at the national and provincial levels from the time of the appraisal to the present, and it is therefore highly relevant. Both the forest land and production sites that were established through this project are showing favorable growth, and progress was made in establishing forest land. Because of the afforestation and vegetation cover initiatives including this project, the forested area in the autonomous region increased to nearly twice what it was before the implementation of the project, while there was a fall in the share of degraded land,¹ which is a contributor to desertification. As a result, the damage from yellow sand and other problems has been mitigated and this has led to improvements in the living environment for the local residents. Thus, the effectiveness and impact of the project are high. While the project cost fitted within the planned amount, the project period was longer than the planned period. Therefore, efficiency of the project is fair. Inner Mongolia has many years’ experience with implementing afforestation projects using aid and funding from within the region and without, and so no major problems were observed with its institutional and technical aspects of operation. In terms of the project’s financial aspect, the Inner Mongolia government continues to regard the afforestation projects to be important, so the expectation is that stable operations can be maintained for the time being. Thus, there are no major problems with the project’s sustainability.

Given the above, this project can be evaluated to be highly satisfactory.

1. Project Description



Project Locations



Photo 1: A shelterbelt planted in order to anchor desert land in place (Horinger County)

¹ Land degradation refers to arid, semi-arid, and dry sub-humid zones in which the land has deteriorated as a result of climate change or human activity.

1.1 Background

Desertification continues to advance in China, with roughly 30% of its national territory categorized as either desert, land undergoing desertification, or land that is at risk of desertification. This has been caused by the exploitative abuse of natural resources following the rapid economic development in China that has come about through the country's reforms and liberalization, including excessive logging of forests, excessive land reclamation, and overgrazing. As a result, the rate at which its desert area has been expanding was about 1,500 km²/year in the 1960s–1970s, but has averaged 2,460 km²/year since the 1980s, reaching an average of 3,436 km²/year in the latter half of the 1990s (1994–1999) (for reference, the geographical area of Tokyo is 2,102 km²). The damage from violent sandstorms that arise from such land has been increasing year by year, and has recently begun to affect other East Asian countries such as Japan.

Given such conditions, the Chinese government enacted and promulgated the “National Ecological Environmental Construction Program” in 1999. Through this, it set in place a national framework pertaining to ecological and environmental conservation spanning 50 years in the four areas of forestry, irrigation, agriculture, and environmental protection. It established four priority areas, including Inner Mongolia, as well as priority issues that include planting shelterbelt and preventing desertification, through which it planned large-scale afforestation projects.

In Inner Mongolia, 63% of the autonomous region's total area² is desert or land undergoing desertification,³ with 20% of the total amount of degraded land in China as a whole found within Inner Mongolia. Afforestation and planting vegetation cover have long been regarded as priority issues in Inner Mongolia, and from 1979 to 1998, a sum total of 7.75 million ha of land was afforested or covered in vegetation. Yet as of 1999 the rate of forest cover was only 14.8%. Inner Mongolia's “10th Five-year Plan for Forestry Development” (2001–2005), which is a medium-term plan for the forestry sector in Inner Mongolia, continues to regard afforestation and vegetation cover as priority issues. It set a goal of planting 6.67 million ha of land over a five-year period to raise the rate of forest cover up to 17%. The Yellow River Basin in the southwestern part of Inner Mongolia is one region with particularly low rainfall throughout the whole of China. The encroachment of desert upon farmland and human habitations poses a threat to daily life, and so preventing desertification by improving forests has come to pose a pressing issue.

1.2 Project Outline

The objective of this project is to improve the living environment by improving the rate of forest cover and vegetation cover in the region, as well as preventing desertification in the region and the surrounding areas by carrying out afforestation and planted vegetation cover in the Yellow River Basin of the southern part of Inner Mongolia, thereby contributing to social and economic stability in the region.

² The area of the autonomous region comes to 118.3 million ha. It is an arid zone that primarily consists of desert land and degraded land, and is a central region for outbreaks of yellow sand. This project targeted five counties (banners) in Inner Mongolia, where it carried out afforestation or planted vegetation cover over a total of 181,973 ha. This area is of a scale that is roughly equivalent to the area of Kagawa Prefecture (186,200 ha).

³ Desertification refers to arid zones where the earth's surface becomes entirely covered in sand, and where there is little rainfall and vegetation is scarce. It is incorporated in with the general notion of land degradation.

Loan Approved Amount/Disbursed Amount	15,000 million yen / 14,999 million yen
Exchange of Notes Date/Loan Agreement Signing Date	March, 2003 / March, 2003
Terms and Conditions	Interest rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: General untied
Borrower/Executing Agency	Government of the People's Republic of China/ Inner Mongolia Autonomous Regional People's Government (Finance Bureau)
Final Disbursement Date	October, 2013
Main Contractor	None
Main Consultant	None
Related Studies (Feasibility Studies: F/S), etc.	F/S (Inner Mongolia Forestry Investigation and Design Institute, July 2002) Environmental Impact Assessment Report (Inner Mongolia Environmental Sciences Academy, October 2002)
Related Projects	[Technical cooperation projects] Forest Protection Research Project in Ningxia (1994–2001) Watershed Management Training Project on the Loess Plateau Aftercare in the People's Republic of China (1990–1995) Project on Forestry Human Resource Development in Western Region of China (2003–2014) Dissemination of New Forestation Technology in Loess Plateau (yen-loaned-collateralized project) (2010–2015) Project on Forest Restoration after the Earthquake in Sichuan Province (2010–2015) [ODA Loan projects] Shaanxi Loess Plateau Afforestation Project (March, 2001) Shanxi Loess Plateau Afforestation Project (March, 2001) Inner-Mongolia Loess Plateau Afforestation Project (March, 2001) Gansu Water-Saving Irrigation Project (March, 2001) Xinjiang Water-Saving Irrigation Project (March, 2001) Ningxia Afforestation and Vegetation Cover Project (March, 2002) [Grant aid projects] Project for Improvement of Forestation Equipment for Conservation of Water and Soil in the Upper Stream of Hanjiang River (1998) Project for Afforestation for Conservation of Middle Stream of Huang He (2001–2002) [Projects by other international organizations, aid organizations, etc.] Loess Plateau Afforestation Project I-IIV (1990–2009, World Bank) Yangtze River Resource Protection Project (1995–2001, World Bank) Sustainable Forest Development Project (2002–2009, Global Environment Facility / World Bank) Regional Monitoring and Early Warning Network for Dust and Sandstorms (2003–2005, ADB) Children's Forest Program (1991, OISCA International)

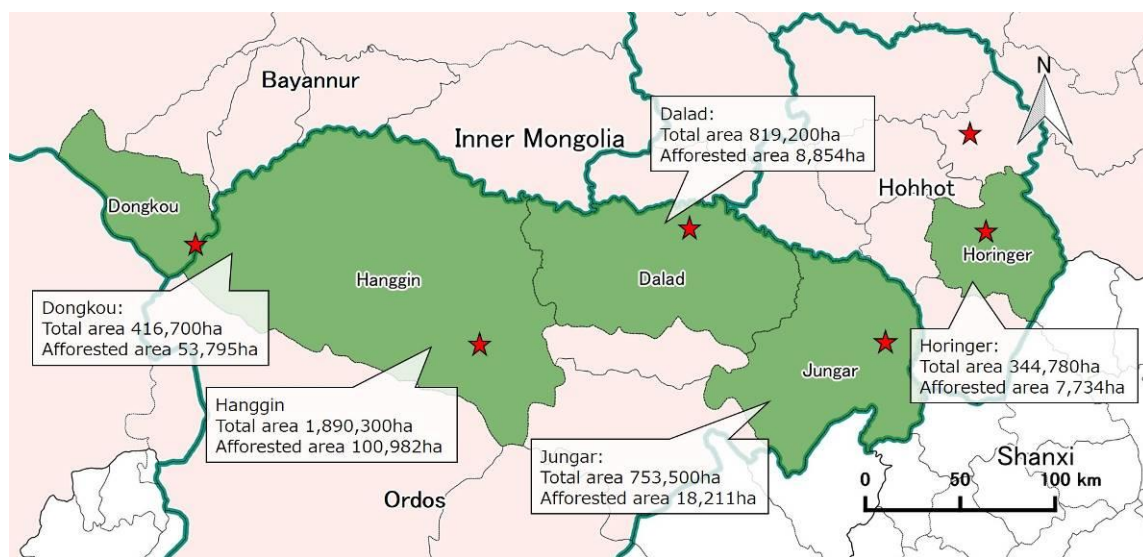
This project was implemented with a focus on five counties (banners)⁴ located in southwestern Inner Mongolia. Overviews of the five counties (banners) targeted are listed below.

⁴ Administrative divisions in China are categorized into four levels: provinces, cities, counties, and townships. In Inner Mongolia, some of the counties where the population consists primarily of nomadic peoples are called banners, and similarly some of the townships are called towns.

Table 1: Overviews of the Five Counties (Banners) Targeted

County (banner) name	Overview
Horinger County	Horinger County is located in the center of Hohhot City, Inner Mongolia. It has an area of 341,000 ha and a population of about 200,000 people. Its main industry is dairy farming (dairy industry). Of the county's total area, 50% is hills, 30% is mountains, and 20% is flat terrain. Its hills and mountains in particular are experiencing severe water and soil runoff, and so degraded land is expanding. According to statistics from 2014, it has 153,333 ha of forest land, 106,666 ha of forests, and a forest coverage rate of 31%. Its annual rainfall in 2014 fell below 400 mm to come in at 393.4 mm, and it is in a transition period from a steppe climate to a desert climate.
Jungar Banner	Jungar Banner is located in the Yellow River Basin in the northern part of Ordos City, which is an economically important city in Inner Mongolia. It has an area of 753,500 ha, and as of 2010 its population was approximately 360,000 people. Its main industry is mining, but aside from mining districts that produce petroleum and coal it also has stretches of agricultural villages and regions. Desert regions from the Mu Us Desert (28.78%) and the Kubuchi Desert (19.17%) account for roughly half of the total terrain in Ordos City, with the other half comprised of undulating plateaus (28.81%), hills and mountains (18.91%), and prairie land (4.33%). It suffers from severe desertification and water and soil runoff. The annual rainfall in Jungar Banner in 2003 and 2014 was 397.2 mm and 402.2 mm, respectively. Thus, it receives an extremely small amount of rainfall.
Dalad Banner	Dalad Banner is located in the Yellow River Basin in the northern part of Ordos City. It has an area of 819,200 ha and a population of roughly 320,000 people. Its main industries include mining and agriculture, and it has numerous coalfields that produce coal as well as a thriving agriculture industry due to its proximity to the Yellow River. Desert regions from the Mu Us Desert (28.78%) and the Kubuchi Desert (19.17%) account for roughly half of the total terrain in Ordos City, with the other half comprised of undulating plateaus (28.81%), hills and mountains (18.91%), and prairie land (4.33%). It suffers from severe desertification and water and soil runoff. The annual rainfall in Dalad Banner in 2003 and 2014 came to 335.6 mm and 400.5 mm, respectively. Accordingly, it receives an extremely small amount of rainfall.
Hanggin Banner	Hanggin Banner is located in the Yellow River Basin in the northern part of Ordos City. It has an area of 1,890,300 ha and a population of roughly 140,000 people as of 2010. Approximately 70% of Hanggin Banner is desert with a low population density, and it suffers from severe desertification and water and soil runoff. Its main industry is agriculture, and it has reserves of underground resources like natural gas. Its annual rainfall in 2014 was below 400 mm, coming in at 278.0 mm. Therefore, it receives an extremely small amount of rainfall.
Dongkou County	Dongkou County is located in the southwestern part of Bayannur City in the southeastern part of the Ulan Buh Desert. It has an area of 416,700 ha and a population of roughly 120,000 people. Its main industry is agriculture, and it produces tomatoes and sunflower oil. Desert accounts for 70% of the county's total area, with mountains at 20% and prairies at 10%. It has a great deal of degraded land, and on the whole it features severe inclines. Of the land area for the county as a whole, 10,467 ha is forest land, 36,933 ha is unfinished forest land, 69,913 ha is shrub land, and 83,483 ha is land that can be afforested. Its annual rainfall in 2014 was extremely low at 125.5 mm. Dongkou County has a temperate continental monsoon climate, where the summers are hot and the sunshine is intense.

Source: Prepared by the external evaluator based on data provided by the Forestry Bureaus of each county / banner



* The pink areas represent Inner Mongolia, while the green areas show the project sites. The red stars indicate the locations of the county (banner) capitals.

Figure 1: Locations and overviews of the counties (banners) targeted by the project

2. Outline of the Evaluation Study

2.1 External Evaluator

Kenji Momota (IC Net Limited)

2.2 Duration of Evaluation Study

This study was carried out as described below for this ex-post evaluation.

Duration of the Study: August, 2015 – January, 2017

Duration of the Field Study: November 22–December 17, 2015 and April 10–23, 2016

3. Results of the Evaluation (Rating: A⁵)

3.1 Relevance (Rating: (3)⁶)

3.1.1 Relevance to the Development Plan of China

Immediately following the heavy flooding of 1998, the Chinese government enacted and promulgated the National Ecological Environmental Construction Program (1999–2050) to serve as a national framework covering the four areas of forestry, irrigation, agriculture, and environmental conservation. It established short-term, medium-term, and long-term numerical targets pertaining to improving the environment, as well as four priority areas and priority issues to be addressed by 2010. Inner Mongolia was included in one of the four priority areas of “region undergoing desertification”, and it aimed to accomplish the targets of preventing desertification on 9 million ha and planting 1.6 million ha of shelterbelt by 2010. This program is still regarded as the priority national plan regarding improving the environment by the Chinese government, which has continued since the time of the appraisal. Thus, as of the time of the ex-post evaluation, its importance remained unchanged.

The Chinese government has been carrying out the Six Key Forestry Programs (2001) in the form of as national forestry projects. As part of one of these programs called the Key Shelterbelt Development Programs in the Three-North Regions and the Middle and Lower Reaches of the Yangtze

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

⁶ (3): High, (2): Fair, (1): Low

River, progress has been made with installing shelterbelt in regions that included Inner Mongolia. The Natural Forest Protection Program designated certain regions, including Inner Mongolia, as priority regions for natural forest conservation. At the time of the ex-post evaluation, these programs were still ongoing, and so this project is consistent with China's national policies for promoting forestry development in Inner Mongolia.

The 12th Five-year Plan for Forestry Development (2011–2015), which is China's medium-term plan for its forestry sector, set the goal of performing afforestation over 30 million ha during the plan period, as well as raising the rate of forest cover for China as a whole to 21.7% by 2015. The Inner Mongolia 12th Five-year Plan for Forestry Development (2011–2015) is the aforementioned plan's region-specific plan. It promotes tree planting and afforestation in Inner Mongolia with the goals of performing afforestation over approximately 4 million ha by 2015 and achieving a 21.5% rate of forest cover in the autonomous region.

This project was carried out in order to perform afforestation and plant vegetation cover, improve the rate of forest cover and vegetation cover in Inner Mongolia, mitigate the damage of desertification, and improve the ecological environment in the target region as part of these development plans and policies. Therefore, its relevance to development plan is high.

3.1.2 Relevance to the Development Needs of China

At the time of the appraisal, roughly 20% of the land that had undergone land degradation throughout China as a whole was found in Inner Mongolia, and 63% of the area in Inner Mongolia was either desert or land undergoing desertification. Afforestation and vegetation cover projects have been carried out in Inner Mongolia since before, through which a sum total of 7.75 million ha was afforested between 1979 and 1998, thus achieving a 14.8% rate of forest cover by the year 1999. However, this remains at a low level when compared against the national average. Thus, further afforestation and vegetation cover is needed.

At the time of the ex-post evaluation, the rate of forest cover in Inner Mongolia had improved significantly, reaching 24.879 million ha of forested area and a rate of forest cover of 21.03% in 2014. However, the target under the Inner Mongolia 12th Five-year Plan for Forestry Development (2011–2015) called for achieving a rate of forest cover of 21.5% by 2015, and so the attainment of this goal remained just slightly out of reach. Moreover, the area undergoing desertification was 42 million ha at the time of the appraisal and 41.47 million ha at the time of the ex-post evaluation, remaining largely unchanged. Airborne yellow sand storms and water and soil runoff in deserts continue to occur. Since preventing desertification and improving the living environment through afforestation and planting vegetation cover continue to pose challenges in Inner Mongolia, the need for afforestation will be high into the future.

3.1.3 Relevance to Japan's ODA Policy

Under Japan's ODA policy, cooperation projects that emphasized conservation of the natural environment were formulated to serve as its cooperation policy for the forestry sector at time of the appraisal. Through this, such policies have provided support for initiatives like afforestation, combatting desertification, reforming forest rights, and the conservation of biodiversity. Preventing desertification and improving the living environment through afforestation and planting vegetation cover were listed as this project's goals, and so this project is highly relevant to Japan's cooperation policy for the forestry sector at the time of the appraisal.

Therefore, implementing this project is highly relevant to China's development plan and

development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: (2))

3.2.1 Project Outputs

At the time of the appraisal, the project's outputs were envisioned to be the construction of shelterbelt, forest and grassland enclosures, and production sites for medicinal plants and grass, as well as installing related facilities like those for supplying electricity and water, training for the farmers taking part in the afforestation, and more. The outputs are listed below.

Table 2: List of Outputs

Items	Planned results (2000)	Actual results (2015)	% versus plan
(1) Afforestation and vegetation cover (Unit: ha)			
1) Forest and grassland enclosures	106,175	112,718	106.2%
Of which, supplementary planting area	n.a.	4,167	n.a.
2) Shelterbelt	64,281	68,821	107.1%
Supplementary planting area	n.a.	30,404	n.a.
3) Grass	1,533	1,533	100.0%
4) Shrub seed production sites	2,247	1,200	53.4%
5) Medicinal plant cultivation sites	1,000	1,000	100.0%
6) Seed/seedling production sites	6,737	4,303	63.9%
(2) Related facilities / equipment			
1) Irrigation facilities (km)	79.8	79.8	100.0%
2) Water pumping facilities (locations)	1	1	100.0%
3) On-farm irrigation facilities (sets)	2,974	2,189	73.6%
4) Wells dug (locations)	2,974	1,605	54.0%
5) Power supply facilities (locations)	320	224	70.0%
6) Installation of forest roads (km)	466.4	469.2	100.6%
(3) Training (people)	4,124	7,469	181.1%

The major changes with the outputs are listed below.

1) Under afforestation and vegetation cover, the enclosure forests and shelterbelt both increased from what was planned. Conversely, some of the shrub seed and seed/seedling production sites were set up through budgetary outlays from the Chinese side via a separate project by the Chinese government that preceded this project, and therefore the target number from this project decreased.⁷ In addition, because of the prior installation of facilities in this manner, there was also a decline in the on-farm irrigation facilities, wells dug, and power supply facilities incidental to these.

2) The surplus funds from the decline in some of the outputs mentioned above were allocated to the afforestation of additional forest and grassland enclosures and shelterbelt. In addition, supplementary planting⁸ was carried out for approximately 35,000 ha of forest land where the survival rate is low.

⁷ The shrub seedling production site in Dalad Banner was completely cancelled, while those in Horinger County and Jungar Banner were installed according to plan. As for the seed/seedling production sites, roughly 70% of the area for the one in Hanggin Banner was cancelled, while the ones in Horinger County, Jungar Banner, and Dongkou County were installed according to plan.

⁸ When the project was planned, it was decided that supplementary planting would be carried out if the survival rates failed to meet a certain standard value at the acceptance inspections performed on the afforestation and vegetation cover after one year and after three years. The budget for the supplementary planting was allocated within the project cost at the time of the appraisal. The standard for the survival rate was established in accordance with China's Forest Law.

3) The number of people who participated in the afforestation and vegetation cover training aimed at eligible farmers increased significantly over what had been planned. This was because the project scope was altered and the afforested area increased. Those eligible for the training included representatives from large-scale farm operators and farmer’s organizations that had concluded agreements directly with the Forestry Bureau. The plan was to disseminate management techniques for forest land via a secondary training program in which the farmers that had undergone training would then train the other farmers taking part in the project. At present, a total of 105,139 farmers have received training through this secondary training.

The seed and seed/seedling production sites were installed by a concurrent project, and so the majority of the investments from this project were diverted to installing forest and grassland enclosures and shelterbelt instead. The outputs that had been initially planned were separated but installed, and this can be evaluated as an alteration made according to the needs.



Photo 2: Afforestation of desert land (Jungar Banner)



Photo 3: The seedling nursery in Horinger County

3.2.2 Project Inputs

3.2.2.1 Project Cost

The actual project cost came to 19,930 million yen (of which 1,099 million yen came from foreign currency and 18,831 million yen came from domestic currency) versus the planned project cost of 20,080 million yen (of which 612 million yen was to come from foreign currency and 19,468 million yen was to come from domestic currency). Thus, the project stayed within the planned costs (99% versus the plan). There were changes to the outputs, such as a decrease in the number of shrub seed and seed/seedling production sites, and the addition of more afforestation area developed by reallocating the surplus funds. The project cost for the additional outputs were largely spent according to the reallocated budget plan that was redesigned when the additions were made. Therefore, the final project cost largely stayed within the amount that had been planned initially. The project cost from domestic currency increased marginally because of the increase in the afforestation area. However, because of the Japanese Yen tended to be strong throughout the implementation period, there were no significant changes with the total Japanese Yen-based project cost.

As items were changed from what was initially planned, it would be difficult to perform a simple comparison of the plan versus the actual results. However, after the changes, the plan was carried out mostly as planned, and the project cost was lower than planned. Therefore, the project cost can be evaluated as having been spent effectively on the whole.

3.2.2.2 Project Period

The actual project period had run from March 2003 to December 2013 (130 months / 158% versus the plan), versus the planned project period from March 2003 to December 2009 (82 months). Therefore, the project period was significantly longer than planned. The implementation periods for each project process are listed below.

Table 3: Comparison between the Planned and Actual Project Periods

County (banner) name	Project implementation period (planned)	Project implementation period (actual)	Versus plan (%)
Agreement - project completion	Mar. 2003 – Dec. 2009 (82 months)	Mar. 2003 – Dec. 2013 (130 months)	158.5%
Design	June 2003 – May 2007 (48 months)	Mar. 2005 – May 2009 (51 months)	106.3%
Training	June 2003 – May 2007 (48 months)	Mar. 2005 – Dec. 2009 (58 months)	120.8%
Afforestation/vegetation cover	June 2003 – Dec. 2009 (79 months)	Mar. 2005 – Dec. 2013 (106 months)	134.2%
Construction of seed/seedling sites	June 2003 – Dec. 2006 (43 months)	Mar. 2005 – Dec. 2009 (58 months)	134.9%
Construction of incidental facilities, etc.	June 2003 – Dec. 2006 (43 months)	Mar. 2005 – Dec. 2009 (58 months)	134.9%

The main reasons behind the substantial delays in the project period are described below.

(1) Delay in starting the project

The domestic procedures were delayed following the Loan Agreement, and the completion of the procedures to arrange sub-loans within China and procurement of domestic currency funds, agreement procedures, and so on were all pushed to the end of 2004. Because of this, the actual start of the project was delayed by two years over what was planned, being delayed to March 2005.

(2) Extension of the construction period

In the regions targeted by the project, there were some areas where the survival rates did not meet the standard values at the time of the acceptance inspections due to the damage from drought and yellow sand. Therefore, supplementary planting was carried out, which extended the project period. As a result, the implementation period for the afforestation and planting of vegetation cover was extended from 78 months from the time of the planning to 106 months.

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

This project was an afforestation project with the primary objective of preventing desertification. As no financial return was envisioned with the project, and because preconditions such as the economic benefits are uncertain, the internal rate of return was not calculated at the time of the appraisal or the ex-post evaluation.

As indicated above, although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair.

3.3 Effectiveness⁹ (Rating: (3))

The objective of this project was to improve the rate of forest cover and prevent desertification by carrying out afforestation. Based on this, the effectiveness will be evaluated by analyzing the growth status with the afforestation to date and the change in the rate of forest cover serving as the primary indicators.

⁹ The rating is performed by factoring the impact into the decision on effectiveness.

3.3.1 Quantitative Effects (Operation and Effect Indicators)

(1) Operating Status for the Forest Land and Production Sites (Operation Indicators)

1) Growth Status for the Afforestation and Vegetation Cover (Survival Rates)

As indicated in “3.2.1. Project Outputs,” approximately 190,000 ha of forest land was developed through this project. The survival rates and growth statuses as of one year and three years after the afforestation of this forest land are shown below.

Table 4: Survival Rates and Growth Statuses for Forest Land by County

County (banner) and its afforestation area		Standard values	Enclosures	Shelterbelt	Medicinal plants
Horinger Planned: 7,734 ha Actual: 7,734ha	One year after afforestation	Enclosed: 60% Protected: 70% Medicinal plants: 20 trees/m ²	76%	83%	Not implemented
	Three years after afforestation	Enclosed: 60% Protected: 60% Medicinal plants: 20 trees/m ²	75%	83%	Not implemented
Jungar Planned: 18,034 ha Actual: 18,211 ha	One year after afforestation	Same as above	Not implemented	65%	25 trees/m ²
	Three years after afforestation	Same as above	Not implemented	71%	20 trees/m ²
Dalad Planned: 8,580 ha Actual: 8,854 ha	One year after afforestation	Same as above	Not implemented	73%	22 trees/m ²
	Three years after afforestation	Same as above	Not implemented	70%	22 trees/m ²
Hanggin Planned: 93,830 ha Actual: 100,982 ha	One year after afforestation	Same as above	36%	Standing trees: 73% Shrubs: 71%	Not implemented
	Three years after afforestation	Same as above	55%	Standing trees: 76% Shrubs: 73%	Not implemented
Dongkou Planned: 53,795 ha Actual: 53,795 ha	One year after afforestation	Same as above	56%	Standing trees: 93% Shrubs: 75%	Not implemented
	Three years after afforestation	Same as above	53%	Standing trees: 93% Shrubs: 75%	Not implemented

Source: Responses to questions

*The standard values were established at the time of the appraisal based on the previously established values in China's Forest Law

The standard values for survival rates for the shelterbelt and medicinal plant cultivation sites were largely attained in each region. Conversely, for the forest and grassland enclosures the survival rates fell somewhat below the standard values in Hanggin and Dongkou, which account for 80% of the afforested area. On a whole, the survival rates can be evaluated as having achieved the planned levels, though it could be mentioned that the primary factor accounting for this is because water retention and desiccation countermeasures were taken. Water retention and desiccation countermeasures are particularly important when it comes to getting afforestation to take root in Inner Mongolia where

there is a great deal of degraded land.¹⁰ The autonomous region has made progress in amassing countermeasures based on its experiences with afforestation projects thus far. To improve the survival rate for the sapling trees, countermeasures were instituted from three primary perspectives: 1. Selection of tree species, 2. Innovative afforestation techniques, and 3. Supplementary planting and reforestation.

1. Selection of tree species

The tree species that were selected were primarily species native to Inner Mongolia that can grow even in arid land and which require almost no watering or other maintenance work. For the shelterbelt in particular, the focus was mainly placed on tree species that do not require watering after they have taken root, with virtually no damage from diseases and insect damage seen. In an effort to find the “the right place and right technique,” the appropriate tree species were selected to suit the topography and conditions of the forest land. Examples of this include planting coniferous trees in locations with excellent topsoil and site conditions, mixed forests with both coniferous and broadleaf trees in other locations, and shrubs in infertile land.

2. Innovative afforestation techniques

A number of innovative techniques were incorporated in practice. These include: leveling the ground prior to performing afforestation; planting trees during the rainy season; using potted saplings; using refrigerated seedlings; immersing the saplings in water for ten days prior to planting them to induce water retention; adopting water-retaining materials; adopting medicines that ensure the growth of the sapling trees’ roots; planting them while the soil was still frozen; installing irrigation facilities; setting up grass grids (underground fences designed to prevent sand from being moved by the wind), and more. Other innovations were devised to maintain an appropriate planting density given the tree species and soil, ensuring the density necessary to fix soil in place in the desert, particularly with the shelterbelt, as well as to ensure that excessive moisture is not absorbed underground because of overcrowded afforestation. These measures were adopted in the Inner-Mongolia Loess Plateau Afforestation Project (March 2001), a ODA Loan project that was implemented before this project, as well as the afforestation and vegetation cover projects in Inner Mongolia that were implemented by the Chinese government and other donors. These were adopted starting with those that proved effective, with efforts made to improve the implementation methods during this project, which boosted their effectiveness even further. System for handing down and improving technical skills were established within the organizations, including those for amassing this experience within organizations, applying successful technique of a certain project site at another project site, and utilizing it for the next time that similar projects are carried out.

3. Supplementary planting and reforestation

Conversely, the survival rates for the forest and grassland enclosures fell somewhat below the standard values in Hanggin Banner and Dongkou County. Factors on both the technical side and the geographical side are thought to be the primary reasons behind this. According to the executing agency, seeds were sown by airplane over the forest and grassland enclosures, which have an enormous surface area. As a result, it is estimated that the survival rate from this was lower relative to afforestation done by hand. In addition, damage from drought and yellow sand is also believed to have

¹⁰The annual rainfall in the target regions falls below 400 mm, which is the criteria for arid land, and there are frequent droughts given its desert climate.

had an impact on the tree saplings taking root. In regions where the survival rate fell below the standard value, supplementary planting was performed after stratified soil preparation and further water retention and desiccation countermeasures were carried out over the course of the project. After this, the standards were met with regard to the growth status.



Photo 4: Growth status of a Scots pine (six-years old)



Photo 5: Afforestation of desert land using grass grids

2) Growth Status of Forest Land (Quality of the Tree Species)

The quality of forest land is generally measured by means of forest density, but no statistical data could be collected on the tree crown ratios and crown densities in the project’s target regions. Therefore, the growth status of typical tree species was used as an alternative indicator, with experts on afforestation in arid land participating in the field study and performing sample studies on this. The results of the sample studies concerning the growth status in forest land that were carried out during the visit to each county are shown below.

Table 5: Reference: Sample Study on the Growth Statuses of Forest Land

County (banner)	Site species	Tree species	Height	Diameter
Horinger	Seed/seedling production sites	Scots pine	3 m	23 cm (chest height)
Horinger	Shelterbelt	Scots pine	4 m Annual growth: 0.36 m	23 cm (chest height) Annual growth: 0.62 m
Jungar	Shelterbelt	Desert willow	2.5 m	12 cm (base)
Dalad	Grass production sites	Alfalfa	60 cm	Not measured because it was after being felled
Hanggin	Seed/seedling production sites	Desert poplar	4 m	44 cm (chest height)
Dongkou	Shelterbelt	Zag	2 m	80 cm (base)

Source: Estimated results during the field study

According to the opinions of the executing agencies and experts on afforestation of arid land, the growth status mentioned above meet the standard levels for growth in the autonomous region. Thus, they were of the opinion that the conditions are generally favorable. The executing agencies of each county (banner) have been carrying out proper maintenance following the completion of the afforestation and planting of vegetation cover, and the shelterbelt of poplars and other trees have grown to the requisite height and are performing their protection functions. Based on these and other factors, the growth status to date has been favorable. The survival rates meet the standard values and the growth status of the planted trees has been proceeding favorably. Therefore, afforestation from this

project can be evaluated as manifesting the desired results with regard to the forests' qualitative aspects as well.

3) Operating Status of Related Production Sites

At the seed/seedling production sites set up in each county (banner) by this project, the afforestation and harvesting of sapling trees were carried out for commercial purposes. Accurate statistical data on the number of saplings produced are not recorded. However, the Scots pine nursery center set up in Horinger Country produces saplings for shelterbelt and for greening urban areas, where it is able to stably produce and ship 500,000 - 1 million trees for tree afforestation every year, combined with sales of about 600,000 trees each year. In addition, it retains up to 4 million trees. All of the production sites maintain nurseries that are consistent with the production scale and need for seeds and seedlings initially estimated. Therefore, they can be evaluated as fulfilling their envisioned functions.



Photo 6: Growth status of sapling trees (Scots pine)



Photo 7: Readyng sapling pots

(2) Improving the Rate of Forest Cover (Operation and Effect Indicators)

Afforestation projects, including this project, have been carried out in Inner Mongolia on an ongoing basis, and have resulted in steady improvements in the rate of forest cover within Inner Mongolia and the targeted regions. The trends in the forested area and rate of forest cover ever since this project have been compiled below.

Table 6: Afforestation and Vegetation Cover in the Project Regions
(Target Local Governments in Five Counties)¹¹

(Unit: ha)

	Standard values (2002-3)	Target values* ¹ (2009)	Actual values* ² (2015)	Versus time of appraisal	Versus target
Total area (project target region)	2,140,282	-	2,952,897* ⁴	+812,615	-
Total forested area	524,913	710,887	1,149,667	219.0% (+624,754)	161.7% (+438,780)
Of which, the increase from this project	-	+171,989	+181,539	-	105.6% (+9,550)
Rate of forest cover* ³	24.53%	33.21%	38.93%	158.7% (+14.4%)	117.2% (+5.7%)
Vegetation cover rate in enclosed land	30.00%	70.00%	n.a.	n.a.	n.a.

Source: Materials at the time of the appraisal and provided by the executing agencies

*1. Target values for the project's planned completion year (2009) set at the time of the appraisal (three years after the completion of the tree planting)

*2. Actual values at the time of the evaluation (2015) (afforestation was considered complete once the standard values for the survival rates had been achieved three years after the completion of afforestation in each project site; since the completion year varies by project site, here the actual value at the time of the evaluation (2015) is used as the standard)

*3. Rate of forest cover: Total area that passed the acceptance inspection for forest land/Area of the administrative districts at the project sites

*4. The increase in the total area was due to the consolidation of administrative divisions in Hanggin County.

This project produced effects in the following ways when it came to improving the rate of forest cover in Inner Mongolia.

1) The total forested area in the target region is approximately 1.15 million ha, which represents a more than two-fold increase since the time of the appraisal, including the efforts of this project. Approximately 180,000 ha of this represents the increase from this project accounting for approximately 15.8% of the total forested area, thus the project contributed to an increase of 6.1% in the rate of forest cover in the project region.

2) The rate of forest cover in this project's target regions rose to 38.93%, thus achieving the target value of 33.21% set at the time of the appraisal. The fact that the administrative divisions were altered from the time of the plan makes it difficult to perform a simple comparison. However, the increase in the rate of forest cover significantly exceeded the rate of increase for the total area after the changes in the administration divisions. Thus, effects were realized owing to the initiatives from the afforestation project on the whole.

3) Instances where this project served to incite further increases in the afforestation area were seen locally.¹² Examples of this include large-scale afforestation projects that are being carried out

¹¹ Plans for items like forested area were set on a county basis at the time of the appraisal. However, since the start of the project implementation, the county divisions were altered from those at the time of the plan as a result of municipal mergers in the target regions. For the current forest land, monitoring is not performed for the counties as a whole, but in accordance with the municipal divisions targeted by the project. Therefore, this table affirms the envisioned target area and actual results (townships and towns targeted by the project) from the time of the plan based on the divisions confirmed at the time of the ex-post evaluation, and compares the planned/actual results based on this.

¹² An erosion control station in Hanggin Banner that carried out afforestation and planted vegetation cover through this project used to be a desert and degraded land prior to the implementation of this project. However, as a result of performing afforestation and planting vegetation cover the soil has improved and now afforestation can be carried out on the land. Following this, a major company within China was able to attract projects successfully for greening the desert to serve as social contribution projects, and as such further afforestation and vegetation cover projects are being carried out.

through the support of domestic, private companies based on the effects of this ODA Loan project and others. Likewise, in consultations with people who are involved on the local side, opinions praising the project for its contribution to comprehensive countermeasures were heard, such as affirmation of the effects in preventing desertification from the ODA Loan project has prompted injections of private capital.



Photo 8: Afforestation of desert land (Dalad Banner)



Photo 9: Image of a shelterbelt (Dongkou Banner)

3.3.2 Qualitative Effects (Other Effects)

The project’s qualitative effects include improving the environment because of performing afforestation and the like. However, these effects frequently overlap with the entries listed in “3.4. Impacts,” and so this will be summarized and analyzed in the section “3.4. Impacts”.

3.4 Impacts

3.4.1 Intended Impacts

This project’s impact is to contribute to improving the living and economic environments by preventing desertification and improving the rate of forest cover, thereby by mitigating the damage from yellow sand as a result. These changes in the natural, living, and economic environments and the contributions of the project will each be summarized below.

- (1) Improvements to the natural environment in the project region (contributions to mitigating desertification)

Classifications of the area of desert land and the like which were referenced at the time of the appraisal were not used in Inner Mongolia. Thus, land was defined in written texts in such ways as “desert land area,” “degraded land area,” and “potential degraded land area.” Data based on these definitions are shown below.

Table 7: Desertification Improvement Status (Unit: km²)

	At the time of the appraisal (2003)	At the time of the ex-post evaluation (2014) (One year after the completion of the project)	Difference from 2003	Versus 2003 (%)
Total area of the autonomous region	1,183,000	1,183,000		
Of which, forested area	206,600	248,790	42,190	120.42%
Of which, potential degraded land area	180,300	174,000	-6,300	96.51%
Of which, degraded land area*	622,400	609,200	-13,200	97.88%
Of which, desert land area	415,900	407,900	-8,000	98.74%

Source: Provided by the Inner Mongolia Forestry Bureau

*Degraded land area indicates land area that is at risk of undergoing desertification.

Desert land area, degraded land area, and potential degraded land area all decreased slightly, and gradual improvements in desertification were observed. According to personnel in charge at one of the executing agencies, the project selected afforestation and vegetation cover target regions starting with degraded land that could be afforested. The personnel expressed the opinion that this project contributed directly to the decline in degraded land area and potential degraded land area in particular. What is more, responses were received from the executing agencies stating that the number of outbreaks of violent sandstorms occurring each year fell from seven per year at the time of the appraisal to one in 2014.

Because of the expansion of afforestation and vegetation cover projects, including this project, progress has been made with blocking the wind and fixing soil in place (soil fixation) in desert land, and with mitigating the damage from yellow sand. Those involved have expressed the opinion that improvements have been noted from this in not only the number of violent sandstorms, which has been defined statistically, but also in improvements in the damage from yellow sand on a day-to-day basis. Through actual interviews with the farmers who took part in the project during the field study, the following responses were affirmed a multiple of times.

- 1) The damage from yellow sand was severe in the years around the start of the project. Damage was observed in that yellow sand would bury tree saplings that grow agricultural produce and prevent them from sprouting, and from yellow sand blowing about so much that they could no longer see ahead of them while doing their farm work.
- 2) At present, the number of days on which yellow sand is blown about has decreased, and they feel that the damage from yellow sand has been mitigated.

As indicated above, it is conjectured that this project has had an effect to a certain degree in decreasing both degraded land area and potential degraded land area. More than 90% of the local farmers who responded to the beneficiary survey¹³ carried out through this project acknowledged that the area of land damaged by drought was reduced roughly by half, which mitigated the damage from yellow sand as well. It was also directly affirmed at the time of the field study that carrying out

¹³ The beneficiary survey was performed on a total of 200 people, including 40 people from each of five counties (banners) targeted by the project. Eligible participants were selected based on a list of farmers participating in the project in each county (banner) provided by the Forestry Bureau. In each county (banner), 20 farmers participating in the project who concluded agreements directly with the Forestry Bureau or other agency, and 20 farmers participating in the project taking part indirectly through farmers' organizations or cooperatives, were selected. The study was carried out in the form of a questionnaire survey, which inquired the changes in the natural, economic, and living environment following the implementation of the project, as well as maintenance under the project.

afforestation on degraded land had brought about clear and lasting effects with respect to fixing soil in place. Images of forest land growing in a stable manner on degraded land are corroborated by such pieces of evidence as data on the increase in the afforestation area and the stable survival rates. As a result, it can be conjectured that the spread of desertification has been curbed.



Photo 10: Degraded land prior to the start of the project (Hanggin Banner)



Photo 11: Image of the same site after afforestation was carried out

(2) Contributions to Economic Stability

Since the project began, a total of 100,000 farmers have taken part in it. In addition, farmers who had been hired by large-scale farm operators have also been counted as contributed through the project. The table below shows a comparison of the incomes of the farmers who took part in the project since the start of the project.

Table 8: Trends in and Comparison of Farmers’ Average Annual Income since Participating in the Project

	At the time of appraisal (2002)	Target values (2009)*1	Actual values (2013)	Versus 2002
Average annual income of participating farmers	2,096 yuan	2,647 yuan	11,000 yuan	524.8%
Average annual income in the project implementation region	2,136 yuan	2,996 yuan	n.a.	n.a.
Average annual income in farm regions nationwide*2	2,476 yuan		9,892 yuan	399.5%

Sources: Materials at the time of the appraisal, project completion report, China Statistical Yearbook, etc.

*1. Three years after afforestation was completed
 *2. “Average annual income in the project implementation region” was recorded in the materials at the time of the appraisal, but the standard was redefined in the project completion report, so this was changed to “Average annual income in farm regions nationwide.”

The average annual income of the participating farmers rose substantially compared with their income at the time of the appraisal, with a 10% or higher rate relative to the average annual incomes in farm regions nationwide. This was backed by the increase in prices and rising labor costs caused by socioeconomic development. However, in addition to this, the results from the direct rise in income sources and boost to agricultural productivity from this project are also believed to have contributed to the increased income to some extent. The effects of the aforementioned beneficiary survey also showed that household annual income from the year the project began (2003) and recently (2015) came to 5,287 Chinese Yuan on average and 19,880 Chinese Yuan on average respectively, marking a substantial increase. Ninety-three (93) % of the respondents have affirmed that their income sources

and income increased since the project began, which backs up the trends indicated above.

Examples of the economic effects brought about by this project in the region that were learned through the field study have been compiled below.

Reference: Examples of boosting income and productivity through participation in afforestation projects

1) Increase in income sources

Through their participation in this project, the participating farmers have gained access to three types of income: (1) Income from leasing land, (2) Income from providing labor for afforestation / planting vegetation cover and maintenance,¹⁴ and (3) Income from sales of wood and vegetation with economic value. With regard to (2), for the implementation of this project, an operating structure was adopted in which large-scale farm operators and private companies hire local farmers and pay their wages. Farmers took part in the project in the form of regular employment in which they were engaged in the afforestation and planting of vegetation cover along with maintenance in an ongoing manner, as well as short-term employment in which they were engaged on a temporary basis during the project's busy period.

2) Examples of boosting agricultural productivity

As part of the afforestation and planting of vegetation cover carried out in Dongkou County, in one region a shelterbelt was established so that it enclosed a state-run farm. These farms cultivate corn and alfalfa. At the time of the planning, the seedlings would be buried by yellow sand, which caused damage in terms of poor germination. Because of this, a shelterbelt of poplars was established surrounding the farm. As a result, the damage was alleviated because winds carrying the yellow sand would strike the shelterbelt, and this was effective at protecting the agricultural crops. In Dongkou County, where there is a thriving dairy farming industry, the harvested crops are used to feed the cows at a nearby ranch. Establishing the shelterbelt has contributed to the stimulation of local economy by means of protecting agricultural crops and allowing them to be supplied within the region.

3.4.2 Other Positive and Negative Impacts

(1) Impact on the Natural Environment

As a project designed to ensure vegetation cover for degraded land, one of the project's goals was to improve the environment by enriching forest resources and biodiversity. Thus, no major negative impacts on the natural environment were envisioned from the project.¹⁵ The project was carried out with especial consideration on the following points when the project was planned and implemented.

1) For the creation of forests, consideration is to be given to biodiversity through measures such as planting multiple tree species according to the vegetation without felling the existing forests in principle.

2) The impact on the existing ecosystem is to be kept to an absolute minimum by primarily using species native to the local region when planting trees.

3) To avoid having salt accumulation in semi-arid land, sandy soils and other locations that are resistant to salt accumulation are to be essentially selected for the forest land.

The field study at the time of the ex-post evaluation with the relevant executing agencies checked

¹⁴ Shelterbelt that consists of tall trees like poplars makes it possible to cultivate vegetables and grass in between the trees after afforestation has been carried out. Therefore, it was confirmed that this has the effect of diversifying income sources through the use of forest land management.

¹⁵ The Environmental Impact Assessment Study Report for this project was approved by the Ministry of Environmental Protection of the People's Republic of China in March 2003.

how the responses mentioned above were carried out. The following answers were received.

1) The regions targeted for afforestation and the planting of vegetation cover were almost completely lacking in vegetation cover, and so no felling of existing forests was carried out. What is more, mixed forests that hold multiple tree species together in order to prevent harm from insects were established, primarily for the shelterbelt.

2) Trees species that are suited to the soil and climate in the local region were selected by primarily focusing on species native to the local region.

3) For the afforestation and planting of vegetation cover, mainly those tree species that can grow in an arid climate and that do not need to be watered after they take root were selected in order to obviate the need for excessive irrigation or pumping up groundwater. In addition, other innovations were devised to maintain an appropriate planting density¹⁶ given the tree species and soil, ensuring the density necessary to fix soil in place in the desert, particularly with the shelterbelt, as well as to ensure that excessive moisture is not absorbed underground because of overcrowded afforestation.

The afforestation and planting of vegetation cover by this project was carried out by taking the existing natural environment and ecosystem into consideration, and so its negative impacts on the natural environment were minimal. As the rate of forest cover and vegetation cover in the targeted regions improved as a result of this project, it can be evaluated as having contributed to preventing desertification and improving the natural environment.

(2) Land Acquisition and Resettlement

Since all of the planned sites for afforestation under this project were degraded land, no resident relocation occurred. Land in the target region for the afforestation and planting of vegetation cover was obtained by being leased from the constituents who hold ownership rights to the land. These land included both “national forests,” where the state retains ownership rights, as well as “collective forests,” where ownership rights are retained by local, large-scale farm operators or farmer organizations. Expenses were paid for these in accordance with the area and lease period. It was explained to the nomadic peoples living in the vicinity around the regions targeted for afforestation and the planting of vegetation cover that the project will be implemented, and they were prohibited from grazing animals in the forest and grassland enclosures and shelterbelt. The project was implemented after first consulting and reaching agreements with households that engage in animal grazing.

The project achieved its planned afforestation area, and contributed to the project goals of improving the rate of forest cover and vegetation cover, preventing desertification, and improving the living environment. While there were some regions where the survival rates for the sapling trees remained low, stable survival rates were maintained by responses such as techniques for water retention and desiccation countermeasures, as well as supplementary planting. The improvements in the rate of forest cover served to fix soil in place, which resulted in mitigating damage from yellow sand. On the economic front, it was affirmed that local farmers gained access to new income sources through the project. Thus, it contributed to improving farmers’ incomes.

¹⁶ In Dalad Banner, the planting density adopted was the density needed to prevent sand erosion, and this was adopted based on the standards for preventing soil moisture to be absorbed unnecessarily as a result of the density being too high. Moreover, for the zag cultivation site in Dongkou County, the planting density was set at 420 - 450 trees/ha. Based on their experiences to date, this was set as the most appropriate density for achieving soil fixation in the desert of the target region.

As the above shows, the implementation of the project gave rise to effects largely as planned. Therefore, the effectiveness and impact of the project are high.

3.5 Sustainability (Rating: (3))

With this project, those involved in the project implementation can be classified into three main levels. Specifically, there are the people at the autonomous region governmental level, the local governmental level, and the local residents (farmers) overseeing the implementation work in the field. Therefore, this section will provide an overview of each level and analyze their coordination structures and other elements.

3.5.1 Institutional Aspects of Operation and Maintenance

Prior to the start of the project up to the present, new afforestation projects have been formed and implemented in an ongoing manner within the autonomous region. The International Cooperation Project Executive Office, which oversees these projects, has been established within the autonomous region. The office also oversaw this project. As for a more specific organizational structure, Inner Mongolia Project Management Leading Groups, Inner Mongolia Project Management Offices, and Inner Mongolia Project Implementation Offices were established at each of the three levels of Inner Mongolia, and its cities and counties.

The International Cooperation Project Executive Office persists to this day as an organization that manages afforestation projects as a whole in the autonomous region. In addition to this project, it also implements its own original projects as well as projects undertaken in cooperation with other international agencies, private companies, NGOs, and others. It has been confirmed that the office structure remains largely unchanged, and that it will exist for the time being. An overview of the organizational structures at each level, as well as their responsibilities and jurisdiction, is shown below.

Table 9: Overview of the Implementation Structures at Each Level

Level	Overview
Government of Inner Mongolia	The Inner Mongolia Project Management and Implementation Office serve as the management and supervisory agencies for the project. They have jurisdiction over matters like overall coordination for the project, appraising and approving the plans for each fiscal year, and the examinations and acceptance inspections for each fiscal year. There have been no major structural changes since the completion of the project.
Local government (city - county level)	<p>1. The Inner Mongolia Project Management and Implementation Office at the city and county (banner) level serve as the management and oversight agencies for this project’s forest and vegetation land. They have jurisdiction over matters like the project’s design, planning, budget management, bidding and procurement, training project implementers, progress management for the project, acceptance inspections and examinations, and reporting to the organizations at the Inner Mongolia-level. Of the tasks mentioned above, the governments at the county (banner) level have jurisdiction over matters like deciding on the land where the project was to be implemented, arrangements for work scheduling, independent inspections of the project implementation site, arrangements for the participating farmers, and technical guidance.</p> <p>2. At present, the Forestry Bureaus for each region continue to take responsibility for management and supervision when it comes to combatting diseases and insect damage in the shelterbelt and preventing forest fires, the same as they did at the time of the planning. Private companies and large-scale farm operators that have concluded contracts with the government oversee maintenance regarding the grass, shrub seeds, medicinal plants, and seed/seedling production sites.</p>

Level	Overview
Residents (farmers, etc.) participating in the project	<p>1. At the time of the project implementation: This project adopted a participatory project implementation structure in which local farmers carried out the actual afforestation and planting of vegetation cover. The Forestry Bureaus with which the offices at the county (banner) level are affiliated concluded subcontracting agreements for the afforestation and planting of vegetation cover with large-scale farm operators and private companies, and these entities hired local farmers and carried out the project by supplying the labor of the participants.</p> <p>2. Present: Similar to at the time of the project implementation, the participating farmers are in charge of overseeing the tree and vegetation growth and the maintenance of the on-farm irrigation facilities. The Forestry Bureaus of the county (banner) governments and the large-scale farm operators subcontracted to perform the afforestation and planting of vegetation cover hire local farmers as forest protection workers. They perform monitoring for diseases and insect damage, prevent forest fires, perform patrols to prevent grazing, and control vehicle entry.</p> <p>3. The main course of the maintenance works by the farmers, as found from the results of the beneficiary survey mentioned above, are described below. The project participants primarily handle the weeding and pruning, supplementary planting, monitoring for diseases and insect damage, and forest fire prevention activities. Each person oversees 58 ha on average, performing patrols on a continuous basis roughly once every two to three days.</p> <p>4. During the field study, experts confirmed the structures and maintenance status regarding maintenance on the farmers implementing the project in each county (banner). They found that the maintenance structures and tasks to be performed were clearly defined and understood. A structure was also set in place in which they would periodically report the growth status and if there were any problems to the townships and towns.</p>

Afforestation projects have been carried out in Inner Mongolia for a long time, with management and operating structures centered on Forestry Bureaus established at each administrative division level. Those involved in this project, as well as many of the Forestry Bureau personnel and engineers, are originally from the region. They have been engaged in afforestation projects in an ongoing manner since the time of the project planning, and have a wealth of experience. Afforestation projects require a great deal of time for project supervision, and so boosting the personnel retention rate contributes to enhancing structural stability from a continuity perspective.

3.5.2 Technical Aspects of Operation and Maintenance

The technical level for the project’s operation and maintenance can be affirmed from the following two items: (1) the accumulation of experience thus far; and (2) setting in place training programs to disseminate this.

1) Harnessing the Experiences from Past Projects

Afforestation and vegetation cover projects have traditionally been carried out extensively in Inner Mongolia, and the region possesses knowledge and a track record with afforestation and vegetation cover planting techniques in arid land. Accordingly, it has a high technical level regarding such efforts. With regard to techniques for water retention and desiccation countermeasures, which are particularly important, it has established effective countermeasures based on its track record.¹⁷

Moreover, for this project, implementation management via regulations (a type of detailed rules) prepared by the autonomous region’s Forestry Bureau was prescribed. This was based on the guidelines enacted through the Inner-Mongolia Loess Plateau Afforestation Project (March 2001), which was a precursor to this project. The regulations are broadly comprised of four areas ((1) Related

¹⁷ See the “3.3.1. Quantitative Effects” section for details.

rules, (2) Operational planning and supervision, (3) Examinations and acceptance inspections, and (4) Financial management). Regulations shared between the counties and regulations that have been customized to suit particular regional characteristics were both adopted and used as guiding principles for the actual project management.

2) Technical Transfer through Training

During the project implementation period, training envisioned for every level, from Forestry Bureau officials to participating farmers, was carried out in an ongoing manner. Technical transfers of the aforementioned techniques for water retention and desiccation countermeasures from the time of the afforestation were carried out to those involved in the project through training. This training included explanations of the project's implementation guidelines and laws and ordinances related to forestry, and it is run in accordance with the country's governmental and legal frameworks. This training has also provided instruction on successful case examples and lessons for afforestation and vegetation cover projects that had been implemented in the past in Inner Mongolia in aiming for coordination with other projects (see Attached Document: Overview of the Training and Implementation Structures for Participating Farmers).

As indicated above, training suited to each implementation level has been set in place and structures for disseminating the wealth of experience from afforestation projects to date have been established. On this account, afforestation projects in Inner Mongolia can be evaluated as having a high level of technical capacity on the whole at each level.

3.5.3 Financial Aspects of Operation and Maintenance

(1) Financial Status at the Governmental Level

There have been no changes to the management structures on the financial side, and in essence the project implementation structure has come about through fiscal expenditures by the state. As for the overall budget for the forestry sector, budgetary allocations have been provided for this from the central government and autonomous region's government for Inner Mongolia, and from the central government, autonomous region's government, and county (banner) governments for each county (banner), respectively. Fiscal management related to this project has not changed from the time of the planning, and it is overseen by the management offices for each county (banner) under the supervision of the offices at the autonomous region-level. The personnel expenses and project investments for forestry areas in the forestry sector in each county are shown below.

Table 11: Budget Trends for the Forestry Sector

	FY	Fixed costs (personnel costs) (10,000 yuan)	YoY growth rate (%)	Forestry investments (10,000 yuan)	YoY growth rate (%)
Inner Mongolia	2012	1,760	-	1,023,000	-
	2013	1,830	104.0%	1,117,000	109.2%
	2014	1,960	107.1%	1,006,000	90.1%
Horinger	2012	2,194	-	3,668	-
	2013	1,979	90.2%	10,608	289.2%
	2014	2,123	107.3%	7,698	72.6%
Jungar	2012	2,930	-	10,421	-
	2013	3,010	102.7%	10,691	102.6%
	2014	2,928	97.3%	10,117	94.6%
Dalad	2012	1,442	-	8,609	-
	2013	1,557	108.0%	13,926	161.8%
	2014	1,656	106.4%	10,332	74.2%
Hanggin	2012	2,174	-	5,248	-
	2013	2,263	104.1%	6,258	119.3%
	2014	2,530	111.8%	9,921	158.5%
Dongkou	2012	190	-	3,125	-
	2013	265	139.7%	4,257	136.2%
	2014	267	100.8%	1,712	40.2%

Fluctuations have been seen with the fixed costs (personnel costs) because of changes in the number of personnel and price increases. However, on the whole, stable spending has continued, and the ordinary budget can be described as stable. Fluctuations in the investments in forestry projects in each county (banner) were seen between the fiscal years, but officials from the Forestry Bureaus offered responses to the effect that the planned project investments have largely been secured in a stable manner.

For example, looking at the FY2015 budgetary trends for Horinger County reveals that the annual budget consisted of an ordinary budget of 13.63 million yuan, grants from the regional government of 20.76 million yuan, and grants from the national government of 40 million yuan, for a total of 74.39 million yuan (roughly 1.5 billion yen). As for the budgetary requests for FY2016, for the ordinary budget the plan is to request 13.62 million yuan, with a planned operating budget using grants from the local and national governments as financial resources of 100 million yuan. The counties have requested an increase in the operating budget for the future, and are planning further afforestation and vegetation cover projects and environmental improvement projects.

The counties have requested an increase in the operating budget for the future, and are planning further afforestation and vegetation cover projects and environmental improvement projects.

(2) Financial Status of the Project Implementers

At the project implementer level, the financial operating structures differ depending on the type of target forest land. However, this basically takes the shape of subcontracting agreements involving maintenance concluded by the Forestry Bureaus from each region with large-scale farm operators, private companies, and others in the target regions. The status for each respective item is described below (see Attached Document 2 at the end of the report for details).

- Shelterbelt: The structure by which these are sustainably managed involves concluding agreements over afforestation and planting vegetation cover between the Forestry Bureaus of each county (banner) and large-scale farm operators and private companies, and using the subsidies and sales revenue obtained from the afforestation and vegetation cover for the said maintenance. Based on existing laws, subsidies of between 150 and 250 yuan are paid per hectare every year for shelterbelt maintenance. These subsidies account for the bulk of the financial resources at present. As for the sales

revenue from forest resources, this has not reached the point where the majority of the forest land can be used as thinned wood, so no economic earnings have been received from this.

- Enclosure forests: These are maintained by the state-run farm. Just like with the shelterbelt above, this manages public benefit forests that are eligible for subsidies, and so maintenance is performed based on government subsidies.

- Seed/seedling production sites, etc.: These are operated by private companies that have concluded agreements with the Forestry Bureaus, with revenue from the sale of the seeds and seedlings being used to cover their operating and maintenance costs. If they are not profitable, then the Forestry Bureaus provide financial support so that they can maintain stable operations.

Based on the above, when it comes to the status of budget usage by the autonomous region and the counties, fluctuations in the amount of forestry investments were seen in each fiscal year. However, they can be evaluated as being largely secured at the necessary levels regarding their ordinary budgets. As was previously mentioned in the section on relevance, the political importance of desertification countermeasures in the autonomous region is clear, and subsidies for things like the maintenance of shelterbelt and public benefit forests have been established. In addition, afforestation projects have been carried out in an ongoing manner, including those by other donors, such as the Sustainable Forest Development Project (2002–2009, Global Environment Facility / World Bank) and the Regional Monitoring and Early Warning Network for Dust and Sandstorms (2003–2005, ADB). Considering the status in which fiscal inputs continue to be made for the afforestation sector in a stable manner, it is hard to conceive of a scenario in which major obstacles would appear in a financial sense. What is more, from interviews with the participating farmers, it was noted that the operating status is stable in the sense that there are no problems with the maintenance costs for shelterbelt being paid, and so on. Therefore, the project's sustainability in a financial sense is deemed high.

3.5.4 Current Status of Operation and Maintenance

The operation and maintenance status for the forest land targeted by this project is summarized below.

(1) Operation and maintenance is being carried out without any problems. The maintenance activities center mainly on monitoring for diseases and insect damage and preventing forest fires. Diseases and insect damage were hardly seen at all because of the schemes and maintenance activities from when the afforestation was carried out, and procedures for reporting to the Forestry Bureau have been set in place in case diseases and insect damage do appear. In addition, there have been no outbreaks of large forest fires.

(2) Under the project, tree species that do not need to be watered after they take root were primarily selected, which has served to prevent salt accumulation as a result of excessive irrigation or the pumping up of groundwater.

(3) Irrigation facilities and nursery facilities were installed primarily in grass, shrub seeds, medicinal plant, and seed/seedling production sites that need nurturing. Specifically, equipment and facilities like wells, sprinklers, water pumps, tractors for transporting seedlings, and greenhouses were installed. The private companies and large-scale farm operators managing the sites are in charge of maintenance, with the revenue from the sales of sapling trees, trees, and vegetation being used to cover the maintenance expenses. Maintenance is being carried out on the equipment and facilities that were introduced in an ongoing manner and the necessary replacement parts and consumable goods and so forth are being procured. As a result, everything is functioning without any problems.

As the above shows, no major problems have been observed in the institutional, technical, and financial aspects of the operation and maintenance system of the project. Therefore, sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project carried out afforestation and planted vegetation cover in the Yellow River Basin of the southern part of Inner Mongolia. Through this, it aimed to improve the living environment by improving the rate of forest cover and vegetation cover in the region, as well as preventing desertification in the region and the surrounding areas, thereby contributing to social and economic stability in the region.

This project has remained relevant to the development plan and needs in China at the national and provincial levels from the time of the appraisal through to the present, and it is therefore highly relevant. Both the forest land and production sites that were established through this project are showing favorable growth, and progress was made in establishing forest land. As a result of the afforestation and vegetation cover initiatives including the project, the forested area in the autonomous region increased to nearly twice what it was before the implementation of the project, while there was a fall in the share of degraded land, which is a contributor to desertification. As a result, the damage from yellow sand and other problems has been mitigated and this has led to improvements in the living environment for the local residents. Thus, the effectiveness and impact of the project are high. While the project cost was lower than planned, the project period was longer than planned. Therefore, efficiency of the project is fair. There are no major problems with the project's sustainability. Inner Mongolia has many years' experience with implementing afforestation projects using aid and funding from within the region and without, and so no major problems were observed with its institutional and technical aspects of operation. In terms of the project's financial aspect, the fact that afforestation projects continue to be regarded as important has not changed, so the expectation is that stable operations can be maintained for the time being.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

None

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Incorporating coordination between organizations into the project plan

This project can be evaluated as having achieved highly satisfactory effects. The greatest contributing factor behind this has been the establishment of a method of project administration involving multiple organizations and stakeholders.

The executing agencies, centered on the Inner Mongolia government, incorporated exchanges between municipalities into their programs during the project implementation period, and used these programs for project supervision and to enhance its effects. For example, the project achieved effects by promoting technical sharing between projects, such as using successful case examples from preceding afforestation and vegetation cover projects, as well as those from the Chinese government,

other donors, NGOs, and other private sector players (such as water retention and desiccation countermeasures, etc.). The elements in the background that probably made such results possible are: (1) structures for performing coordination and exchange between projects were incorporated from the start of the project planning; (2) these initiatives maintained interorganizational and interpersonal connections in a continuous manner throughout the implementation period; and (3) operating guidelines and manuals were uniquely prepared to ensure organizational coordination. Moreover, as was mentioned in the section on effectiveness, flexible plan alterations in the plan during implementation such as efforts like proactively incorporating new water retention and desiccation countermeasures from afforestation project of other project sites carried out concurrently over the project implementation period also contributed to the effectiveness of the Project. Furthermore, the project established a system for securing inputs for afforestation in a sustainable manner following the implementation of the project, such as by obtaining independent support from the private sector for the target region by publicizing the project's results.

The enormous inputs like those from ODA Loan projects can serve as valuable opportunities to promote coordination between such organizations and to establish sustainable structures. Following initiatives are considered effective in planning ODA Loan projects: incorporating structures for coordination and exchange between the various governmental levels, such as autonomous regions, cities, and counties, in the project implementation structure as part of the inputs; granting those at the field the discretion to flexibly alter the project scope and make decisions through exchanges; allocating a personnel with ample personal connections and understanding of the local circumstances to a responsible position at the division for coordination between organizations; adopting structures for clearly stipulating this coordination in documents, such as the guidelines and manuals for sharing such experiences between organizations.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
(1) Project Outputs		
1) Afforestation and vegetation cover		
Forest and grassland enclosures	106,175 ha	112,718 ha
Shelterbelt	64,281 ha	68,822 ha
Grass production sites	1,533 ha	As planned
Shrub seed production sites	2,247 ha	1,200 ha
Medicinal plant cultivation sites	1,000 ha	As planned
Seed/seedling production sites	6,737 ha	4,303 ha
2) Related facilities and equipment		
Irrigation facilities	79.8 km	As planned
Water pumping facilities	1 location	As planned
On-farm irrigation facilities	2,974 sets	2,189 sets
Wells dug	2,974 locations	1,605 locations
Power supply facilities	320 locations	224 locations
Roads installed	466.4 km	469.2 km
3) Training		
Training (for farmers)	4,124 people	4,172 people
(2) Project Period	March 2003 - December 2009 (82 months)	March 2003 - December 2013 (130 months)
(3) Project Cost		
Amount paid in foreign currency	612 million yen	1,099 million yen
Amount paid in local currency	19,468 million yen (1,298 million yuan)	18,831 million yen (1,272 million yuan)
Total	20,080 million yen	19,930 million yen
Japanese ODA Loan portion	15,000 million yen	14,999 million yen
Exchange rate	1 yuan = 15 yen 1 USD = 121 yen (As of September 2002)	1 yuan = 14.8 yen (Average from January 2005 - December 2015)

Attached Documents

Supplementary Documents for “(2) Technical Transfers via Training” of “3.5.2 Technical Aspects of Operation and Maintenance”

Attached Document 1. Overview of the Training and Implementation Structures for Participating Farmers

Eligible participants	Overview of the training and implementation structures
County (banner) government officials	<p>Engineers from the Forestry Bureaus involved in the project implementation received classroom trainings and onsite trainings so that they could train the participating farmers and provide onsite technical instruction. The training included explanations of the project’s implementation guidelines and laws and ordinances related to forestry, as well as afforestation and vegetation cover planting techniques and maintenance techniques. It also provided instruction on successful case examples of and lessons for afforestation and vegetation cover projects that had been implemented in the past in Inner Mongolia, such as the Inner-Mongolia Loess Plateau Afforestation Project (March 2001).</p>
Participating farmers	<ul style="list-style-type: none"> • Training implementation structure: Farmers who concluded direct agreements with the Forestry Bureaus were obligated to take part in the training. Moreover, when the participating farmers were selected, farmers with a basic level of afforestation and vegetation cover planting skills were selected to ensure a basic technical level among the participants. All of the respondents from the beneficiary survey mentioned above took part in the training. On average, they took part in 4.2 training sessions, with 90% learning afforestation and vegetation cover planting techniques, 80% learning maintenance techniques, and 70% learning irrigation and erosion control techniques. • Training dissemination structure: A structure was adopted in which the participating farmers formed farmer groups with anywhere from a few people to a few dozen people, with each group electing a representative to serve as the contact point for the group. In addition, these representatives underwent the training hosted by the executing agency, then provided secondary training to the other participating farmers. Through this, a large number of participating farmers were effectively managed, and this is thought to have ensured quality on the technical side. • Main subjects of the training: According to the participating farmers who carried out the afforestation and planting of vegetation cover in Dalad Banner, through the training and onsite instruction they learned techniques for water retention and desiccation countermeasures. Specifically, they learned things like a water retention method of soaking sapling trees in water for ten days prior to afforestation, a method for digging trenches for planting seedlings, as well as the angle and depth for planting trees. Based on the results of the beneficiary survey, techniques for water retention and desiccation countermeasures such as the method for potted sapling afforestation and the water retention techniques were mentioned as particularly helpful subjects of the training. • Training after the project’s completion: Operation and maintenance after the project’s completion have been mainly undertaken by the local farmers hired as forest protection workers. Training on maintenance techniques has been provided to the participating farmers, who were instructed on techniques necessary for maintenance such as methods for monitoring for diseases and insect damage and preventing forest fires.

Supplementary Documents for “(2) Financial Aspects of the Project Implementers” of “3.5.3 Financial Aspects of Operation and Maintenance “

Attached Document 2. Financial Status for Each Type of Forest Land

Types of forest land	Financial overview and status
Shelterbelt	<ol style="list-style-type: none"> 1. These are sustainably managed by having the Forestry Bureaus of each county (banner) conclude subcontracting agreements over afforestation and planting vegetation cover with large-scale farm operators and private companies, and using the subsidies and sales revenue obtained from the afforestation and vegetation cover for said maintenance. In China, fixed subsidies are paid per unit of area for forests that are used for public use pursuant to the Division and Demarcation Regulations for State-level Public Benefit Forests. For the shelterbelt established through the project, between 150 - 250 yuan is paid per 1 ha every year in the form of subsidies. At present (2015), the majority of the forest land has not reached the point where it can be used as thinned wood, so no direct economic earnings have been received through the forest resources. The primary revenue sources at present consist of the consigned costs for the maintenance work through these subsidies. 2. Example from Horinger County: According to the interviews held with the farmers carrying out the maintenance work as forest protection workers in Horinger County, five households performed afforestation on roughly 500 ha of land. These households are also currently involved in the maintenance work such as monitoring for diseases and insect damage and preventing forest fires. The areas under their oversight have been designated as priority afforestation and vegetation cover planting regions through national policies, and subsidies are paid by the state for the afforestation, planting of vegetation cover, and maintenance activities. They received wages of 102 yuan / ha when the afforestation was completed in 2005, and 153.75 yuan / ha in 2015. These forest protection workers were previously the farmers who owned 2 ha of farmland. However, their income has increased through their participation in this project, and they show a certain degree of satisfaction still to this day.
Forest enclosures	<p>Roughly one-third of the afforestation and vegetation cover area for this project consisted of the forest enclosures established in Hanggin Banner, in which a state-run farm had been set up. Maintenance is carried out by the state-run farm, and just like with the shelterbelt mentioned above the establishment of this public benefit forest is eligible for subsidies. Therefore, maintenance for this is carried out based on government subsidies.</p>
Seed/seedling production sites, etc.	<ol style="list-style-type: none"> 1. The seed/seedling production sites are operated by private companies that have concluded agreements with the Forestry Bureaus, with revenue from the sale of the seeds and seedlings being used to cover their operating and maintenance costs. The production sites visited during the field study were in a seed/seedling production phase for several years after they were established, and so in some of those years their operating and maintenance costs were in the red. However, at the time of the ex-post evaluation, their production output had stabilized, and they were covering their operating and maintenance costs with the revenue from the sale of the seeds and seedlings. If they are not profitable, then the Forestry Bureaus provide financial support so that they can maintain stable operations. 2. Reference: The Scots pine nursery center in Horinger County currently sells 600,000 trees per year. The sales price for Scots pines in 2012 was 1.5 yuan for

<p>saplings of less than 0.5 m, and 17 yuan for saplings over 1 m. The increased supply of such trees on the market is putting downward pressure on the sales price. The center was in the process of growing the saplings for several years after it was established, and its sales were between 3 and 6 million yuan per year. Currently its production output is stable, and its sales are around 10 million yuan (180 - 200 million yen) per year. This fiscal year it covered its operating and maintenance costs of this year with its sales. However, while its annual balance is in the black, its initial investment costs for equipment and facilities were expensive, and it is currently still repaying these.</p>
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