People's Republic of China

FY 2019 Ex-Post Evaluation of Japanese ODA Loan Project

"Qinghai Ecological Environmental Improvement Project"

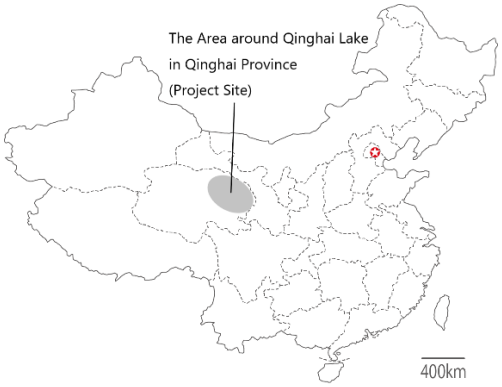
External Evaluator: Toshihiro Nishino, International Development Center of Japan Incorporated

0. Summary

The objective of the Project is to improve the forest coverage ratio and rate of vegetation cover through the improvement of degraded grassland, prevention of desertification, afforestation and soil/water conservation measures in areas around Qinghai Lake in Qinghai Province, thereby contributing to the restoration of the multiple functions of forests and grassland and the prevention of desertification.

The Project advanced the restoration of the multiple functions of forests and grassland and the prevention of desertification through afforestation work, grass planting and construction of facilities to implement soil/water conservation measures in line with the policy of the central government of China and Qinghai Provincial Government to improve the ecological environment. As such, the Project conforms to the development needs of improving the ecological environment in Qinghai Province and Japan's ODA policy. Therefore, the relevance of the Project is high. In the case of the project efficiency, although the outputs were achieved generally as planned or even better with the project cost being within the plan, the project period exceeded the plan. Therefore, the efficiency of the Project is fair. As a result of the materialization of afforestation work, grass planting work and construction of facilities to implement soil/water conservation measures, the target figures for the quantitative indicators (rate of vegetation cover, planted tree survival rate, etc.) set at the time of appraisal were generally achieved at the time of project completion. In addition, wide-ranging qualitative effects of the Project, including (i) acceleration of the growth as well as increased production of pasture grass and (ii) improvement of environment for stock raising, are confirmed as a result of the "improvement of the forest coverage ratio and rate of vegetation cover." Also highly noticeable are the impacts of "the restoration of the multiple functions of forests and grassland" ((i) increase of the water volume usable for farming, etc., (ii) improvement of the frequency and situation of sandstorms, flooding and debris flow and (iii) increased income of stock farmers and farmers due to the vitalization of stock farming). Accordingly, the effectiveness and impacts of the Project are high. The sustainability of the Project is also high as there are no problems regarding the institutional, technical and financial aspects of the Project with confirmation of the good operation and maintenance conditions of the facilities and equipment. In the light of the above, the Project is evaluated to be highly satisfactory.

1. Project Description



Project Location Map

An afforestation site of the Project

1.1 Background

While the Government of China had long adopted afforestation of the national land as one of its basic policies, the ratio of forest area to national land area (the forest coverage ratio) had been well below the international average because of the vastness of its land area, severity of the natural conditions and excessive logging to meet the increasing timber demand. Moreover, desertification was progressing due to such man-made factors as over-grazing and excessive logging. Against this background, the Government of China announced the *National Ecological Environment Construction Plan* in 1999, clearly showing its determination to place greater emphasis on environmental policies. In this plan, concrete target figures were set for the prevention of soil erosion, prevention of desertification, forest area, forest coverage ratio and improvement of degraded grassland. The plan also designated areas to be prioritized by 2010 and priority agendas in each area.

Qinghai Province is located in northwestern China and most of the provincial land is highland with a provincial average elevation of 4,058 m or more. The forest ratio in this province of 4.4% was far lower than the national average of 18.2% due to the harsh natural conditions, including a relatively cold and dry climate, coupled with the excessive use of forests. Some parts of the Project Area lying to the east and south of Qinghai Lake were experiencing a significant decline of the water resource recharging function and soil/water retention capacity due to the excessive logging of trees and resulting soil erosion. Flood damage attributable to soil erosion occurred every year. In 2005, 40,000 people suffered flood damage with the damage amount as high as 4.5 billion CNY. Meanwhile, in areas lying to the west and south of Qinghai Lake constituting part of the Project Area, the process of desertification was ongoing, threatening the habitation of local residents. In addition, the degradation of grassland was also progressing to the extent that 220,000 ha of grassland out of 4.67 million ha of land which could have been used as grassland became bare ground. Accordingly, there was an urgent need for the prevention of desertification, recharging of water sources and improvement of the soil/water retention capacity and degraded grassland in these areas.

1.2 Project Outline

The objective of the Project is to improve the forest coverage ratio and rate of vegetation cover through the improvement of degraded grassland, prevention of desertification, afforestation and soil/water conservation measures in areas around Qinghai Lake in Qinghai Province, thereby contributing to the restoration of the multiple functions of forests and grassland and the prevention of desertification.

Loan Approved Amount / Disbursed Amount	6,300 million yen/5,879 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	December, 2007/December, 2007
Terms and Conditions	Interest Rate: 0.65% Repayment period: 40 years (Grace Period: 10 years) Conditions for Procurement: General untied
Borrower/Executing Agencies	Government of the People's Republic of China/Qinghai Provincial People's Government
Project Completion	July, 2017
Main Contractor (Over 1 billion yen)	-
Main Consultant (Over 100 million yen)	-
Related Study	Feasibility Study by Qinghai Project Advice Centre (April, 2007)
Related Projects	-

2 Outline of the Evaluation Study

2.1 External Evaluator

Toshihiro Nishino, International Development Center of Japan Incorporated

2.2 Duration of Evaluation Study

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

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

Duration of the Field Survey: December 15 – December 31, 2019

2.3 Constraints during the Evaluation Study

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

There was an outbreak and spread of the new infectious coronavirus disease (COVID-19) in China after the first field survey of this ex-post evaluation and the planned second field survey could not be conducted because of introduction by the Government of China of such measures as (i) suspension of the already issued visa for a specified period and (ii) compulsory quarantine observation period of two weeks for foreign nationals arriving in China. As a result, it became difficult to conduct (i) field reconnaissance and fact-finding work in some areas and (ii) an interview survey with some project-

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

3 Results of the Evaluation (Overall Rating: A[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Consistency with the Development Plan of China

The development plan of the Government of China at the time of project appraisal clearly indicated such directions as the protection of forest resources, improvement of degraded grasslands and prevention of desertification in the upper and middle reaches of Yellow River, indicating the emphasis on the ecological environmental issue as one of the priority policy fields as evidenced by the *National Ecological Environment Construction Plan* (1999 – 2050) and the *Summary of the 11th Five Year National Plan for Economic and Social Development* (2006 – 2010). Particular emphasis was placed on the implementation of proactive efforts for the prevention of soil erosion, prevention of desertification, increase of the forest area and improvement of degraded grassland. Concrete quantitative target figures were set for these objectives with a relevant timeline. Improvement of the ecological environment has been continually stressed in subsequent five year plans. The plan and policy at the time of ex-post evaluation, including the *13th Five Year National Plan for Economic and Social Development* (2016 – 2020), call for "relative improvement of the quality of the ecological environment" as one of the main goals to achieve "moderately prosperous society" and to promote the further advancement of the relevant efforts while improving the related indicators through a review of standards, etc.

In accordance with such policy and plan of the central government, the Qinghai Provincial Government has been advancing the improvement of the ecological environment. Its *13th Five Year Plan for Qinghai Province* (2016 – 2020) promotes protective measures for the ecological environment centering on the prevention of desertification, protection/improvement of grasslands and soil/water conservation and aims at achieving concrete numerical targets for the rate of vegetation cover, forest coverage ratio, achievement ratios of water quality standards, etc.

[1] A: Highly satisfactory; B: Satisfactory; C: Partially satisfactory; D: Unsatisfactory
[2] ③: High, ②: Fair, ①: Low

Table 1 Principal Targets of Development Plans Related to the Project

Category	At the Time of Appraisal	At the Time of Ex-Post Evaluation
National Development Plan	*11th Five Year National Plan for Economic and Social Development* (2006 – 2010) • The plan identified priority programs concerning the protection of the ecosystem identified such targets as the protection of natural forest resources, improvement of degenerated grasslands, prevention of desertification among others in the Upper and Middle Yellow River. • The Government of China planned the injection of 17 trillion JPY over a period of five years for environmental protection. (Principal goals) (i) suppression of outbreaks of new environmental pollution, (ii) suppression of destruction of the ecological environment, (iii) improvement of the environment in designated priority areas for environmental conservation and urban areas and (iv) conservation of the ecological environment at nature reserves. etc.	*13th Five Year National Plan for Economic and Social Development* (2016 – 2020) • The plan targets the achievement of "moderately prosperous society" and the goal related to the Project is "the overall improvement of the quality of the ecological environment." • Part X: Ecosystems and the Environment states that "to improve the quality of the environment and resolve serious ecological and environmental problems, we will step up ecosystem and environmental protection efforts ….. and simultaneously help the people become prosperous, help the country grow strong and build a Beautiful China."
National Policy for the Environment Sector	*National Ecological Environment Construction Plan* (1999 – 2050) • The plan further emphasizes environmental measures and presents the national framework for 50 years for afforestation, water utilization, agriculture and environmental protection. • For afforestation, the plan sets forth concrete numerical targets for short-, medium- and long-term soil erosion prevention, prevention of desertification, forest area, forest coverage ratio and improvement of degraded grassland.	*13th Five Year National Plan for Environmental Protection* and *National Afforestation and Greening Plan* (both 2016 – 2020) • Both plans adopt a policy of "accelerating the greening of the national land, strengthening forest management based on the law and enhancing the basic safeguards". • Numerical targets are set for afforestation, forest coverage ratio, growing stock of forests, etc. up to 2020.
Qinghai Provincial Policy for the Environment Sector	*11th Five Year Plan for Qinghai Province* and *Qinghai Province Ecological Environment Construction Plan* (both 2006 – 2010) • These plans clearly indicate the commitment to prioritize the protection and comprehensive management of the ecological environment in the watershed of Qinghai Lake. • These plans set quantitative targets to be achieved by 2010 concerning the suppression/prevention of soil erosion, afforestation/grass planting, improvement of grassland and	*13th Five Year Plan for Qinghai Province* (2016 – 2020) • The plan sets forth the policies of "strengthening inputs in the ecosystem protection field" and "implementing projects designed to restore and/or improve the ecosystem through the prevention of desertification, improvement of grassland, soil/water conservation, etc." *13th Five Year Environmental Protection Plan for Qinghai Province* (2016 – 2020) • The plan sets forth the policy of "comprehensively improving the stability

	prevention of desertification.	and ecological function of the natural ecosystem, targeting such prioritized areas as the Sanjiangyuan Region, through enhancement of the outcomes of ecological improvement efforts."

Sources: Materials provided by JICA and various plan documents.

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

3.1.2 Consistency with the Development Needs of China

As described above, Qinghai Province was experiencing serious deterioration of the ecological environment in the Project Area around Qinghai Lake at the time of appraisal with adverse impacts on civic life although the nature of the problems varied depending on the area. In parts of the Project Area lying to the east and south of Qinghai Lake, the water sources recharging function and soil/water retention capacity were declining due to a decrease of forests, causing much soil erosion and flood damage. Meanwhile, areas lying to the west and south of Qinghai Lake were experiencing the advancement of desertification and degradation of grassland. Accordingly, there was an urgent need for the implementation of afforestation, improvement of degraded grassland and soil/water conservation measures to improve the ecological environment and environment for civic life. As such, the consistency of the Project with the development needs of Qinghai Province was high.

In the interview survey conducted as part of the ex-post evaluation with project-related personnel at the executing agency, such positive comments were made as "the forest and grassland areas have increased," "soil/water conservation measures, such as the improvement of related facilities, have made progress" and "the number of disasters caused by deterioration of the ecological environment has decreased," illustrating a certain improvement of the ecological environment in the target areas and of the level of damage. Around Qinghai Lake, however, there is still a vast area of wasteland, etc. (such as arid land, abandoned cropland, etc.) requiring afforestation and grass planting. Even though positive outcomes of soil/water conservation measures have emerged, the current situation still calls for further strengthening of related projects to continue the suppression of flood damage, etc. As the level of the ecological environment envisaged by the public is becoming higher every year, there is still a strong need for improvement of the ecological environment, making further improvement necessary.

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

3.1.3 Consistency with Japan's ODA Policy

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

3.1.4 Appropriateness of the Project Plan and Approach

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

This Project has been highly relevant to the China's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The planned outputs at the time of appraisal and actual outputs of the Project are shown in Table 2. The principal outputs of the Project are (i) grass planting, construction of fencing to keep livestock out and measures to control rodents and pests for "the improvement of degraded grassland," (ii) silviculture and grass planting and control work to present sand dunes from moving for "the prevention of desertification," (iii) creation of water resource recharge forests or soil/water retention forests and forest protection and management for "afforestation," (iv) construction of small-scale sand-trap dams, bank protection work and development of forest land irrigation facilities as "soil/water conservation measures" and (v) training.

The actual outputs generally achieved the planned outputs or were even higher than planned. In the case of those planned outputs which were not fully achieved, most of them showed an achievement rate of 85% or higher. While multiple bodies were involved in the implementation of the Project, the competent administrative body in each field played a leading role in project operation and management. In each county, the deputy governor or a similar high ranking administrator led a command team to manage the Project. As a result, no problems occurred regarding the project

operation and management system and relevant capacity with no negative impacts on the outputs.

By project component, in regard to (i) "the improvement of degraded grassland," the actual outputs for grass planting, rodent and pest control measures and construction of livestock sheds exactly matched the planned outputs. In the case of (ii) "the prevention of desertification" and (iii) "afforestation," although the actual outputs for "desert closure" and "water resource recharge forests" experienced a slight shortfall compared to the planned outputs, the achievement rate was almost 100%, indicating achievement of the planned outputs in general. According to the findings of the interview survey with project-related personnel at the executing agency, the Project was one of three major projects related to improvement of the ecological environment which were implemented at the same time around Qinghai Lake and the scale of afforestation under the Project accounted for some 10% of the total volume of the three projects. Meanwhile, the actual outputs of bank protection work and procurement of equipment (vehicles and monitoring/office equipment) in the component of (iv) "soil/water conservation measures" was lower than the planned outputs. Similarly, the actual outputs were lower than the planned outputs for the "training in Japan" and "acceptance of experts" in the (v) "training" component. The interview survey mentioned above found several reasons for such under-achievement as shown in Table 3.

Revetment protection work under the Project

Vegetation cover work under the Project

Table 2　Planned and Actual Outputs

	Description	Planned (at the time of appraisal)	Actual	Achievement Ratio
(i) Improvement of degraded grasslands	Grass planting/construction of fences to keep livestock out (ha)	48,054	48,054	100%
	Breakdown: (ha)			
	•Grass planting (Improvement of severely degraded grasslands)	3,916	3,916	100%
	•Grass planting (Improvement of moderately degraded grasslands)	8,310	8,310	100%
	• Construction of fences to keep livestock out	35,828	35,828	100%
	Rodents and pest damage control measures (ha)	950,410	950,410	100%
	Breakdown: (ha)			
	・Measures to control rodents using rodenticide	334,196	334,196	100%
	・Mechanical means to capture rodents	356,840	356,840	100%
	・Measures to control pest damage	259,374	259,374	100%
	Construction of livestock sheds (units)	3,000	3,000	100%
(ii)Prevention of desertification	Desert closure (ha)	37,000	36,651	99%
	Forests for wind/sand protection (ha)	3,823	4,262	111%
	Control work to present sand dunes from moving (ha)	2,500	2,500	100%
(iii)Afforestation	Afforestation for water resource recharge and water/soil retention (ha)	16,000	15,824	99%
	Breakdown: (ha)			
	•Afforestation forests for water/soil retention	14,913	15,246	102%
	•Afforestation for water resource recharge	674	578	86%
	Afforestation for forest protection and management (ha)	24,000	24,289	101%
(iv)Water/soil conservation measures	Small-scale sand-trap dam(sites)	715	726	102%
	Bank protection work (km)	36	25	69%
	Erosion protection walls (sites)	345	334	97%
	Forest land irrigation facilities (ha)	4,567	4,567	100%
	Patrol/work vehicles (vehicles)	17	11	65%
	Monitoring/office equipment (sets)	236	71	30%
	Ecology observation equipment (sets)	10	25	250%
(v)Training	Training in Japan (person)	60	45	75%
	Acceptance of experts (person)	5	0	0%
	Training in China (person)	8,320	13,360	161%
Other	Number of participating cities and counties	10	10	100%
	Number of participating farmers and stock farmers in the Project (thousand person)	-	1,170	-

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

Table 3 Factors for Non-achievement of Outputs

Type of Work	Description	Factors for Under- or Non-achievement
(iii)Afforestation	Afforestation for water resource recharge	• Some of the planned afforestation sites were removed from the scope of the Project because of poor conditions.
(iv)Water/soil conservation measures	Bank protection work	• At some of the planned sites, construction work was implemented using domestic funds.
	Erosion protection walls	• At some of the planned construction sites, the work was judged to be difficult to implement because of topographical and other reasons.
	Patrol/work vehicles	• Some adjustments were made following a change of the Chinese official rules governing official vehicles.
	Monitoring/office equipment	• Part of the procurement was conducted using domestic funds.
(v)Training	Training in Japan/ Acceptance of experts	• Some adjustments were made to reflect the actual needs and demands.

Source: Findings of the interview survey in Qinghai Province.

As described above, the actual outputs mostly achieved the planned outputs or surpassed them. All of the changes and under-(or non-) achievement of the planned outputs were a reflection of the changing situation or need under the Project. No problems were observed here as the procedure for such change, etc. was properly followed.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The actual project cost was 8,168 million JPY, falling by 3% from the planned cost of 8,453 million JPY as shown in Table 4. The reasons for the actual project cost being within the planned cost were (i) many of the successful bids in the competitive tender for the procurement of equipment, etc. were lower than the target prices, resulting in a lower overall procurement cost than planned and (ii) the scale of the Project was reduced for some components, including the procurement of equipment, as described earlier. While the actual costs for such principal components as the prevention of desertification, afforestation and soil/water conservation measures slightly exceeded the planned costs, the excess was small enough to be covered by the reserve fund, partly because of the contribution of the competitive tender outcomes for procurement, thereby resulting in an actual project cost which was within the planned cost.

Table 4 Planned and Actual Project Costs

Unit: million JPY

	Planned (at the Time of Appraisal)			Actual		
	ODA Loan Portion	Chinese Contribution Portion	Total	ODA Loan Portion	Chinese Contribution Portion	Total
Improvement of degraded grasslands	1,268	971	2,239	1,050	1,012	2,062
Prevention of desertification	1,139	0	1,139	1,165	115	1,280
Afforestation	1,428	428	1,856	1,679	568	2,247
Water/soil conservation measures	1,961	139	2,100	1,868	339	2,207
Equipment procurement, etc.	291	0	291	35	2	37
Training, etc.	158	0	158	59	5	64
Price escalation	8	0	8	0	0	0
Reserve fund	23	343	366	0	0	0
Interest during construction	0	200	200	0	234	234
Commitment charge	24	0	24	23	0	23
Administration cost, etc.	0	72	72	0	14	14
Total	6,300	2,153	8,453	5,879	2,289	8,168

Source: Materials provided by JICA and replies to the questionnaire survey with the executing agency.
Notes: Foreign exchange rate: planned rate at the time of appraisal: 1 CNY = 15.6 JPY (June, 2007); actual rate: 1 CNY = 15.2 JPY (mean exchange rate for the IFS period from 2007 to 2017)

3.2.2.2 Project Period

The actual project period of 119 months (from December, 2007 to October, 2017) greatly exceeded the planned project period of 84 months (December, 2007 to November, 2014) (by 142% or 35 months against the planned period). By project component, prevention of desertification and afforestation were especially delayed. The reasons for such an extended project period were (i) the domestic administrative procedure (preparation of the final F/S report, approval of the Project by the National Development and Reform Commission, etc.) took a long time to complete, making the full-scale implementation of the Project delay by approximately 9 months and (ii) in some of the targeted counties, it took a long time to secure domestic funding which was necessary for the implementation of the Project.

Table 5 Planned and Actual Project Periods

	Planned (at the Time of Appraisal)	Actual
Signing of the Loan Agreement	December, 2007	December, 2007
Entire Project	December, 2007 - November, 2014 (Project period: 84 months)	December, 2007 - October, 2017 (Project period: 119 months)
Improvement of degraded grasslands	March, 2008 - October, 2012	January, 2009 - December, 2013
Prevention of desertification	April, 2008 - July, 2012	January, 2009 - October, 2017
Afforestation	April, 2008 - July, 2012	January, 2009 - October 2017
Water/soil conservation measures	March, 2008 - October, 2012	March, 2009 - December, 2012
Training	May and September, 2008 and May, 2009	December, 2014; September, 2016
Acceptance Inspection	August, 2008 - November, 2014	August, 2009 - October, 2017

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

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

Financial Internal Rate of Return

As the economic internal rate of return (EIRR) was calculated to be 8.2%[3]at the time of appraisal, it was planned to recalculate in the ex-post evaluation. However, this recalculation did not take place because necessary data for recalculation (benefits of restoration of grassland, prevention of desertification, silviculture, prevention of flooding, etc. were not accumulated or forecast at the executing agency and other stakeholder organizations..

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

3.3 Effectiveness and Impacts [4] (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

The situation of the quantitative indicators which were set at the time of appraisal and ex-post evaluation regarding “improvement of the forest coverage ratio and the rate of vegetation cover” is shown in Table 6. Although data for many indictors is unknown, the judgement is made based on the available indicator data.

[3] Costs: Project cost and operation and maintenance cost, Benefits: restoration of grassland, prevention of desertification, silviculture and prevention of flooding. The project life used for calculation is 40 years.

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

Table 6　Changes of Quantitative Indicators

Indicator	Reference Figure	Target Figure	Actual (Achieved) Figure		
	2005	2012	2012	2017	2019
	Reference Year	At completion of the Project	At completion of the originally planned Project	At completion of the Project	Two year after the completion of the Project (At the time of ex-post evaluation)
【Grass planting (Improvement of severely degraded grasslands)】 Rate of vegetation cover after 2 years (%)	≤25	50-60	Unknown	68	69
【Grass planting (Improvement of moderately degraded grasslands)】 Rate of vegetation cover after 2 years (%)	50-60	70	Unknown	76	76
【Construction of fences to keep livestock out】 Rate of vegetation cover after 3 years (%)	60-70	85	Unknown	89	91
【Measures to control rodents using rodenticide】 Reduction rate of burrows after implementation (%)	Unknown	≥90	Unknown	90	90
【Mechanical means to capture rodents】 Reduction rate of burrows after implementation (%)	Unknown	≥90	Unknown	89	91
【Measures to control pest damage】 Reduction rate of pests after implementation (%)	Unknown	≥90	Unknown	92	92
【Forests for wind/sand protection】 Survival rate after 1 year (%) Survival rate after 3 year (%)	Unknown Unknown	≥70 ≥65	Unknown Unknown	79 73	79 70
【Afforestation (forests for water /soil retention)】 Survival rate after 1 year (%) Survival rate after 3 years (%)	Unknown Unknown	≥70 ≥65	Unknown Unknown	76 76	76 73
【Afforestation (forests for water resource recharge】 Survival rate after 1 year (%) Survival rate after 3 years (%)	Unknown Unknown	≥70 ≥65	Unknown Unknown	77 81	77 79
Forest area (thousand ha)	763 (2007)	-	Unknown	778	780
Forest coverage ratio (%)	7.7 (2007)	-	Unknown	7.9	8.0
Growing stock of forests （㎥/ha）	Unknown	-	Unknown	Unknown	Unknown
Area of cropland returned to forests (thousand ha)	79 (2006)	-	Unknown	Unknown	Unknown
Grassland area (‘000 ha)	5,795 (2007)	-	5,795	5,795	5,795
- Of which man-made grassland area (thousand ha)	43 (2007)	-	58	58 (2014)	Unknown

Rate of vegetation cover (%)	59 (2007)	-	Unknown	66	67
Area of degraded land (thousand ha)	4,100 (2007)	-	Unknown	4,100 (2014)	4,100
Desertified area (thousand ha)	1,759(2009)	-	Unknown	1,750 (2014)	1,750
Area of livestock sheds (thousand m^2)	205.5 (2009)	-	Unknown	237.8 (2014)	258.0

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

All of the quantitative indicators for which a target figure was set at the time of appraisal achieved the respective target figure based on their performance at the completion of the Project (2017) except that for "reduction rate of burrows after implementation" for which the actual figure fell slightly short of the target figure. The rate of vegetation cover exceeded the target figure by 4 – 8 points, showing the successful achievement of the target figure. The survival rate of the planted seedlings far exceeded the target figure. For some indicators, the actual figure considerably exceeded the target figure by more than 10 points. Based on these outcomes, it can be judged that the afforestation and grass planting work under the Project led to the sound growth of trees and pasture grass as planned. The reasons for the achievement of the target figures for the rate of vegetation cover and survival rate were (i) the selection of tree species which were expected to achieve a high survival rate because of their physiological characteristics of "deep and spread of roots and drought-resistant" in view of the conditions of the afforestation sites, (ii) employment of sufficient measures to assist successful afforestation, including the proper preparation of the afforestation sites in advance, use of a water retention agent, etc., (iii) sufficient arrangements to supply water which is an important factor to increase the survival rate (introduction of an irrigation system, watering with hoses, etc.), (iv) enhanced monitoring and management after afforestation or grass planting and adequate arrangements for supplementary tree or grass planting when problems occurred and (v) strengthening of the control of grassland conservation and improvement of livestock raising methods. The rodent and pest control measures generally achieved the target figures. The interview survey with project-related personnel at the executing agency and beneficiaries found a prevailing opinion that the number and damage to pasture grass by rodents significantly declined due to the introduction of various control measures. Many other quantitative indicators (from "forest area" downwards in Table 6) for which target figures were not set at the time of approval also show improvement when compared to the pre-project period. Improvement is highly noticeable for the man-made grassland area, rate of vegetation cover and area of livestock sheds. In regard to the area of livestock sheds, the interview survey with project-related personnel at the executing agency found that the construction of such sheds was progressing using domestic funds following the achievement under the Project, resulting in a large increase of their total area. Two year after the completion of the Project (2019 at the time of Ex-post evaluation), the performance of each indicator has also maintained its improvement. Based on these achievements, the effects of the Project to improve the ecological environment is judged to be high.

3.3.1.2 Qualitative Effects

(1) Effects of Improved Forest Coverage Ratio and Rate of Vegetation Cover

As described earlier, the implementation of the Project achieved improvement of the forest coverage ratio and rate of vegetation cover. It has been confirmed that these positive effects produced the qualitative effects described below.

Acceleration of the growth as well as increased production of pasture grass

According to the findings of the field reconnaissance and interview survey with beneficiaries, the growth of pasture grass has been facilitated and the production volume of pasture grass has substantially increased as a result of the implementation of degraded grassland improvement measures, including grass planting, construction of fencing to keep livestock out and control of rodents and pests.

In the area where the field reconnaissance took place, the positive situation was confirmed of a considerable improvement of the height of pasture grass from some 10 cm to more than 50 cm and an increase of the production volume (per unit area) of pasture grass required to raise livestock more than fivefold. There were cases where once difficult situation to graze livestock and to secure the supply of pasture grass because of the low rate of cover by pasture grass was sufficiently improved to make stock raising possible, where an increase of the number of livestock raised became possible because of the increased production of pasture grass and where the sale of pasture grass commenced because of the increased production of pasture grass.

Improvement of the environment for the raising of livestock

According to the findings of the field reconnaissance and interview survey with beneficiaries, the raising environment for such livestock as cattle, sheep, etc. has greatly improved as a result of the construction of livestock sheds.

Before the improvement by the Project, although there are differences between regions, many livestock died during the severely cold winter nights as they were kept in a simple shed or at a site with no roof nor walls. The livestock mortality rate in winter has been drastically lowered as a result of the construction of highly cold-resistant livestock sheds with a roof and walls. The field reconnaissance found a case where the mortality rate of lambs had been greatly reduced from 50% to 10% due to the cold-resistance function of livestock sheds. There was also a case where the milk volume of mother animals increased due to the cold-resistant environment, facilitating the growth of offspring. As indicated by these cases, the construction of livestock sheds has had a particularly great effect on facilitating the growth of young livestock. Another positive outcome of the construction of livestock sheds is elimination of the work for livestock farmers to monitor livestock at night and to deal with injuries and diseases caused by the past situations of “wild wolves attacking sheep at night on pasture land” and “the tendency for a break out of disease among livestock in winter.” As a result,

the overall work burden on livestock farmers has been reduced.

(2) Effects of Training in Japan

As mentioned earlier, training was conducted in Japan for project-related personnel. Interviews with the participants found that many of them shared such positive opinions as "the training was practical as it included training featuring improvement of the ecological environment of Huangtu Plateau (loess plateau)" and "the training in Japan made it possible to widely learn about the experience of Japan and other advanced countries and to acquire useful reference materials." Moreover, the following qualitative effects (improved capacity of the participants and application of the training contents to the actual work) were confirmed as a result of the training in Japan. However, as far as the application of the training outcomes is concerned, while there have been cases of such application, they tend to be the result of individual rather than organizational efforts as the number of participants per county was small due to the involvement of as many as 10 counties in this training.

Improvement of planting and silviculture techniques

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

- Because the target areas of the Project are dry, the method introduced for planting and silviculture involves the digging of planting holes before actual planting so that water and nutrients are directed to the planted seedlings.
- The planting density and growth stage of the seedlings to be planted were altered to ensure effective and efficient afforestation utilizing the results of the training in Japan.

Promotion of concrete approaches, including the silviculture of multiple species, to ensure the diversity of forests

The importance of establishing forests composed of multiple tree species has been pointed out from the viewpoint of "restoring the multiple functions of forests" which is an expected goal of the Project and which is also adopted as an official policy of the Government of China. However, the compatibility of the creation of forests composed of multiple species and improvement of the survival rate has been a challenging issue in areas around Qinghai Lake where the habitat for trees is harsh. Following the relearning of "viable approaches to ensure the diversity of forests" in the training in Japan, concrete approaches to ensure the diversity of forests have been promoted and intensified.

These approaches include the planting and silviculture of multiple tree species in urban greening areas.

Promotion of afforestation led by citizens

In China, enterprises and some organizations have been actively leading afforestation efforts. Meanwhile, examination has been in progress to check the viability of enhanced afforestation activities led by citizens based on the new knowledge learned in Japan that there are cases in Japan of ordinary citizens leading afforestation efforts on their own initiative with the support of the administration.

3.3.2 Impacts

3.3.2.1 Intended Impacts

(1) Improvement of the Living Environment for Residents and Prevention of Desertification due to Restoration of Multiple Functions of Forests and Grasslands (Quantitative Effects)

The situation of the various indicators set at the time of appraisal and ex-post evaluation to indicate the qualitative effects of the Project on “improvement of the living environment for residents and prevention of desertification due to the restoration of the multiple functions of forests” is shown in Table 7 below. Although data for many indicators is unknown, the judgement is made based on the available data.

Table 7 Changes of Indicator Figures

Indicators	Reference Figure	Target Figure	Actual (Achieved) Figure		
	2005	2012	2012	2017	2019
	Reference Year	At completion of the Project	At completion of the originally planned Project	At completion of the Project	Two year after the completion of the project (At the time of ex-post evaluation)
Number of beneficiaries (thousand person)	-	1,920	Unknown	Unknown	Unknown
Reduction of soil erosion volume (thousand t)	222	-	Unknown	666	740
Soil erosion area (㎢)	Unknown	-	28,464	27,058	26,635
Number of sandstorms (times)	Unknown	-	Unknown	Unknown	Unknown
Area damaged by rodents (thousand ha)	1,784 (2009)	-	Unknown	1,115 (2014)	Unknown
Area damaged by pests (thousand ha)	5,194 (2009)	-	Unknown	2,250 (2014)	Unknown
Number of livestock animals raised (thousand heads)	5,298 (2009)	-	Unknown	4,928 (2014)	Unknown
Average annual net income of local farmers (CNY)	2,633	-	6,502	10,579 (2016)	Unknown
Average annual income of residents participated in the Project (CNY)	Unknown	-	8,109	10,304 (2016)	Unknown
Average annual income of residents in the Project area (CNY)	4,030 (2009)	-	7,177	10,864 (2016)	Unknown

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

Although the target figure for the number of beneficiaries of the Project was set at the time of appraisal, the actual number was consistently unknown. According to project-related personnel at the executing agency who were interviewed during the field survey for ex-post evaluation, the Project was implemented in the planned areas, suggesting the reasonable achievement of the target figure. The population of Qinghai Province is approximately 5.7 million and the number of beneficiaries of the Project accounts for some 34% of the provincial population.

According to the quantitative indicators relating to improvement of the living environment for residents, the reduction of the soil erosion volume at the completion of the Project (2017) had trebled compared to the volume before the implementation of the Project (2005). Another improvement is observed with the soil erosion area. The occurrence of soil erosion used to frequently cause significant damage to cultivated land, housing and community infrastructure in nearby areas. During the field reconnaissance, it was often pointed out that the significant reduction of the soil erosion volume had led to a considerable reduction of the damage. In contrast, no data was obtained for the number of sandstorms. However, the interview survey with local residents found that the frequency had been reduced and the situation of sandstorm damage had been improved, confirming the trend of improvement as described later. The area damaged by rodents or pests has been drastically reduced. The area damaged by pests in particular has been reduced to less than half of the pre-project area.

A noticeable improvement has been achieved regarding the "increased income of residents", another expected impact of the Project. While such an income increase may well be largely attributed to the high economic growth of China during the project implementation period, it is fair to say that the Project made a certain contribution in this aspect as shown by those cases where the income of local residents increased as a result of new employment opportunities provided by the implementation and subsequent management of the Project and where the Project provided opportunities for new sources of income.

(2) Improvement of the Living Environment for Residents and Prevention of Desertification due to Restoration of Multiple Functions of Forests and Grasslands in the Project Area (Qualitative Effect)

As mentioned earlier, the implementation of the Project led to improvement of the forest coverage ratio and rate of vegetation cover. As a result, the following positive impacts relating to improvement of the living environment for residents and the prevention of desertification were confirmed through the restoration of the multiple functions of forests and grassland in the Project Area.

Increase of the volume of usable water for agriculture, etc.

As a result of the improved forest coverage ratio and increased water resource recharging capacity of forests due to the afforestation of wasteland, many areas now enjoy an increased as well as steady water supply for agriculture and daily life compared to the pre-project period.

The field reconnaissance and interview survey with beneficiaries found that in Wulan County, insufficient water supply from rivers, boreholes, etc. before the implementation of the Project meant a prevailing situation of an inadequate water supply for irrigation, causing conflict between farmers and other residents over the use of water for irrigation. As the Project has increased the volume of usable water, making a sufficient volume of water available for irrigation, there is no longer conflict between farmers and other residents over irrigation water. Moreover, the improved forest environment and increased volume of usable water have made it possible to newly cultivate such highly profitable crops as wheat, maize, mushrooms, etc., diversifying the sources of income and increasing the income of farming households in some areas.

Improvement of the frequency and situation of sandstorms, flooding and debris flow

Before the implementation of the Project, wasteland and grassland in Qinghai Province frequently caused sandstorms, especially in spring when the existence of grass was low. The interview survey with beneficiaries found that as a result of the afforestation and grass planting under the Project, the frequency of sandstorms has been reduced and the severity of sandstorms has been mitigated even if they do occur. In the pre-project period, it was essential to wear a face mask outdoors when a severe sandstorm occurred, causing health concerns for children and the elderly. Many interviewed

beneficiaries expressed the opinion that the situation improved after the implementation of the Project, greatly benefiting children and the elderly in particular.

The effect of soil/water conservation measures to reduce flooding and debris flow can also be confirmed. Before the implementation of the Project, heavy rain often caused flooding and/or debris flow. Today, flooding or debris flow seldom occurs as evidenced by the fact that torrential rain in 2018 after the implementation of the Project did not lead to flooding or debris flow in those areas subject to the implementation of soil/water conservation measures under the Project. The occurrence of flooding or debris flow often caused serious damage to cultivated land, housing and community infrastructure in nearby villages but the significant reduction of the occurrence of flooding and debris flow has led to a highly noticeable reduction of related damage.

Increased water volume and improved water quality of Qinghai Lake and major rivers

As mentioned earlier, afforestation and soil/water conservation measures were implemented at wasteland. As a result, the water resource recharging capacity of forests has been improved, greatly reducing soil erosion. The resulting major decrease of the discharge volume of eroded soil into rivers has led to the improved water quality and increased water volume of Qinghai Lake and major rivers. At the dam located in Datong County which is a key source of water supply for Xining City, the capital of Qinghai Province, the water quality[5] has greatly improved from Grade III (slightly contaminated) to Grade I (drinkable). In addition, the volume of inflowing sediment has been reduced while the inflowing water volume to the dam has increased.

Increased income of stock farmers and farmers due to the vitalization of stock farming

The introduction of grass planting, rodent and pest control measures and the construction of livestock sheds under the Project has led to (i) an increase of the number of livestock raised due to an increased volume of pasture grass to feed livestock and improvement of the raising environment for livestock (the number of livestock is kept in line with the available volume of pasture grass) and (ii) a shift towards more profitable livestock, increasing the income of stock farmers. There are also cases of an increase of the income of farmers through the sale of fresh or processed wolf-berries (goji berries), walnuts and fruit harvested from trees planted under the Project.

Stock farmers in Hudesheng Township in Wulan County where the field reconnaissance was conducted planted grass over an area of some 2,000 mu[6] (managed pasture land: 10,000 mu) and constructed livestock sheds. The existence of livestock sheds has led to facilitation of the growth of sheep before shipping (in summer), reduction of the number of deaths among lambs in winter(the mortality rate dropped from 50% to 10%), facilitation of the general growth of sheep and increase of the production volume of pasture grass (approximately a fourfold increase). The resulting increase of

[5] Based on the “Environmental Standards for Surface Water” in China.
[6] 1 mu is approximately 6.67 ares.

the number of livestock raised (from 300 to 700) has more than doubled the income from stock raising. The positive outcome of the livestock sheds constructed under the Project has prompted villagers to construct similar sheds with their own money, resulting in an increase of the ratio of stock farmers using sheds and also an increase of the income from stock raising.

Increase of rare wild animals and birds

The opinion has frequently been expressed that afforestation and vegetation cover under the Project has led to improvement of the ecological environment and habit for wild animals as an increase of rare wild animals and birds (wolves, foxes, pheasants, etc.) has been witnessed. Although the height and density of many of the planted trees and targeted stands under the Project are insufficient at the time of ex-post evaluation, the Project is believed to have had a significant impact on the habitat for rare wild animals and birds even under such circumstances.

Urban greening and improving of the living environment due to the promotion of related projects, including parks for the public

Following the improvement of the ecological environment due to the implementation of afforestation work and riverbank protection work, etc. under the Project, several related projects have been implemented with domestic funding. One such project involves the construction or improvement of public parks and wetland parks along urban rivers. According to the findings of the interview survey with beneficiaries, many people had the impression that urban greening and improvement of the living environment had greatly advanced as a result of much improvement of the ecological environment. Prior to the Project, sufficient consideration was not necessarily given to the ecological environment along urban rivers and, therefore, waterfronts did not have much appeal as recreational sites for the public. The construction of “wetland parks” and “footpaths” and the improvement of related facilities and infrastructure have had the positive effect of making riverside parks along major rivers popular recreational sites for the public at the time of ex-post evaluation. The field reconnaissance as part of ex-post evaluation observed many citizens enjoying their leisure at these parks. As a result of such improvement, Xining City has been designated a model city for the national greening drive.

3.3.2.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

The Project was considered to fall under the Category B in the Japan Bank for *International Cooperation (JBIC) Guidelines for Confirmation of Environmental and Social Considerations* (April, 2002) as its potential adverse environmental impacts were judged to be not severe in view of the characteristics of the sector, project and area as explained in the Guidelines. No negative impacts on the natural environment were found by the ex-post evaluation. The interview survey with project-

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

Because of the implementation of adequate measures, no negative impacts on the natural environment have occurred by the time of this ex-post evaluation. Therefore, it can be judged that negative impacts of the Project on the natural environment was kept to minimum.

(2) Resettlement and Land Acquisition

Although some parts of the afforestation and vegetation cover work took place at land managed by farming households, the Project did not necessitate any resettlement or land acquisition. Planting of trees and grass on lands managed by farming households was conducted with the consent of those managing the lands in question in accordance with the relevant domestic law.

(3) Promotion of Tourism Utilizing the Ecological Environment in Rural Areas

Some areas have grown as tourist destinations as a result of the improved ecological environment, scenery and basic infrastructure in and around such areas as a result of the Project. Cases of promoting tourism utilizing the improved ecological environment are confirmed in many counties targeted by the Project (see Box 1).

Box 1: Promotion of Tourism by the Improvement of Ecological Environment of the Village

In Bianmagou of Shuobei Tibet Village in Datong County (population of 612 with 162 households), the improved ecological environment due to the Project, etc. has led the government to promote tourism to experience the ecological environment and rural life since 2015 with the introduction of such related facilities as farmhouse accommodation to experience living in a forest (participated by 60 village households), cottages and a garden park.

As a result of these efforts, the area has grown to become a major tourist spot with annual visitors of half a million, mainly individuals and families, including those from other provinces. Tourists can enjoy the natural environment by hiking, etc., rural life and local meals. The promotion of tourism has led to such favorable impacts as (i) an increase of the production and sales volumes of souvenirs (tea, Chinese medicine, etc.) for tourists, (ii) elimination of the need to seek work outside the village due to increased employment related to tourism in the village and (iii) increase of the average annual income of a villager from 2,000 CNY in 2013 to 14,000 CNY in 2019. The afforestation and related work under the Project have been established as great forces to support the promotion of tourism through improvement of the local

ecological environment.

Accommodation facility for tourists

Sightseeing facility: Garden Park

(4) Social Advancement and Increased Income of Women

According to the findings of the interview survey with beneficiaries, the role of women in livestock raising was restricted to production activities for self-consumption, etc. before the implementation of the Project, making it difficult for women to make an economic contribution or social advancement in some areas. The implementation of the Project provided the momentum for women to get involved/participated in planting and post-planting management work, the cultivation of seedlings for planting, etc., creating great opportunities for the social advancement of and increased income for women. A similar benefit has been enjoyed by poor people as they were actively encouraged to seek employment for the implementation and management of the Project (600 people were employed on a long-term basis for operation and maintenance of the afforestation work with a monthly salary of between 1,000 CNY and 3,000 CNY in Xining City). There is a case of the Project offering the opportunity for women to expand their role in farming as well as stock raising, achieving an increase of their income (see Box 2).

Box 2: Expanded Roles and Increased Income of Women through Vitalization of Stock Farming

Shala Village of Manggu Township in Guinan County has a population of 1,373 (341 households) and agriculture and stock farming are the main local industries. In this village, 20 livestock sheds (120 m^2) were constructed under the Project. In the pre-project period, villages had very simple livestock sheds and the resulting high mortality rate of livestock in winter made it impossible to increase the number of livestock raised. With the use of the livestock sheds constructed under the Project, the principal livestock raised was changed from sheep focus to diversification into sheep and pigs in an effort to diversity of stock raising, enabling an increase of the number of livestock raised (cultivation of grain, etc. to feed livestock) to increase the income from stock farming in harmony with the ecological environment protection measure (prohibition of stock farming on most of the pasture grass lands in the village). As a result of such positive outcomes of the Project, almost all households in the village now possess a livestock shed (total of some

300) at the time of ex-post evaluation, partly with assistance under other projects. The number of pigs raised in the village has massively increased from 400 to 2,200 and the annual income per stock farming household has increased to 12,000 CNY.

An especially notable contribution of the Project is the expansion of women's roles (women earn their own income) in addition to increased income from stock farming. Most men in this village used to work away from home and farming and stock raising were conducted by women. However, the local farming and stock raising were primarily for self-consumption and the actual cash income earned by women from farming and stock raising was small. With the implementation of the Project and its spin-off benefit, women now earn a sizable income from stock farming.

Animal shed constructed under the Project

Pigs reared inside the animal shed

(5) Restoration of Habitable Conditions by Preventing the Advancement of Desertification

There are cases in the Project Area where the advancement of desertification has been halted, partly because of the positive effect of afforestation under the Project, restoring the viability of local life (see Box 3). In view of such concrete cases, it can be judged that the Project has made a certain contribution to the development of local communities.

Box 3: Recovery of a Township through Prevention of Desertification by Afforestation

In Guinan County, afforestation under the Project mainly targeted the Huangshatou and Mugetan areas where the process of desertification was prominent. In the past, the targeted areas were grassland or pastureland. The progressive incursion of sand, which accelerated the process of desertification, led to the large-scale migration of residents to other areas because of the difficulty of sustaining stock farming and their own lives. In response to this situation, the local government began a project to prevent desertification, incorporating afforestation and other measures, but could not achieve much due to (i) the small scale of afforestation and (ii) the reliance of silviculture on rainwater due to the difficult local environment for the introduction of irrigated afforestation.

Under these circumstances, tree planting and desertification control measures were implemented in 2009 through 2011 under the Project, targeting those areas suffering from desertification. As a result of

large-scale afforestation and the subsequent proper management of the afforestation sites under the Project, the advancement of desertification has been halted in the targeted areas since 2014 with the revival of grassland in some areas. Improvement is also observed in terms of the frequency and severity of sandstorms. Such improvement of the ecological environment has made it possible to conduct stock raising and to dwell in these areas and some 3,000 former residents of 600 households have returned to their original dwelling areas from their relocated areas. In view of such positive outcomes, these areas have been designated pioneering collectiveness for national sand prevention and control in 2017. These areas have also seen the accelerated construction of government buildings, hospitals and schools, etc., illustrating the rapid progress of the restoration of town functions.

Afforestation work under the Project

Town recovered by the improvement of ecological environment

(6) Improvement of Environmental Awareness among the Residents and Spread of Environment – Friendly Stock Raising Method

In the interview survey with project-related personnel at the executing agency and beneficiaries, many of the interviewees shared the opinion that improvement of the ecological environment through the implementation of the Project led to increased environmental awareness among residents, farmers and stock farmers, in turn leading to the accelerated introduction of more environment-friendly stock raising methods. The Project is believed to have made a certain contribution to the establishment of a virtuous cycle where improvement of the ecological environment leads to increased awareness of the environment among residents, in turn leading to further improvement of the ecological environment.

In grassland areas where stock farming is the main production activity, the increased production volume of pasture grass per unit area due to improvement of the ecological environment has enhanced the awareness of the importance of stressing the ecological environment and the resulting advantages among many stock farmers. As a result, livestock raising methods with a small environmental load, such as the drylot stock raising method (a sufficient area for exercise by livestock is secured for an outdoor enclosure and grazing is withdrawn), have been smoothly as well as rapidly expanded while reducing grazing which has a high load on the ecological environment.

In the targeted counties of the Project, there was a tendency for such activities showing poor environmental awareness on the part of local residents as the cultivation of crops on wasteland which was not managed by anyone, etc. to be often observed. These problematic activities by residents have greatly declined as afforestation work and the improved ecological environment have produced positive outcomes for residents.

(7) Spread of Environment-Friendly Construction Method Adopted by the Project

For the implementation of bank protection work along rivers under the Project, a new construction method utilizing stones and tree planting instead of concrete was actively employed in consideration of the environment. As this method proved its significantly positive effects on the environment, including the notable improvement of the landscape around rivers, it is now actively employed throughout Qinghai Province. As such, the Project is believed to have made a certain contribution to the spread of an environment-friendly construction method.

Based on the above, the effectiveness of the Project is judged to have reached the level where the target figures for the quantitative indicators have been generally achieved at the time of project completion along with positive qualitative effects relating to the facilitation of growth of pasture grass and improvement of the environment for stock raising, etc. In regard to the impacts of the Project, improvement of the living environment for residents of the Project Area and other positive impacts of the Project are confirmed in terms of both the quantitative effects and qualitative effects. The Project has largely achieved its objectives and, therefore, the effectiveness and impacts of the Project are high.

3.4 Sustainability (Rating: ③)

3.4.1 Institutional/Organization Aspect of Operation and Maintenance

The operation and maintenance system for the forest land, grassland and various facilities which were developed or constructed under the Project has been established as planned at the time of appraisal with the administrative organizations responsible for project-related work and farmers/stock farmers performing the central roles as shown in Table 8. The principal body for the maintenance of the afforestation sites in general and the planted trees in particular may be either a county, township or village body or a group of farmers assigned to manage an afforestation site depending on specific conditions, including ownership of an afforestation site (either local farmers or a village), management facilities which were constructed (irrigation facility, etc.), etc. of each area.

Table 8 Operation and Maintenance System

Type of Work	Responsible Organization(s)
Overall Management	Qinghai Provincial Bureau of Administrative Management; Qinghai Provincial Bureau of Forestry and Grassland; County Bureau of Administrative Management; County Bureau of Forestry and Grassland
Improvement of Degraded Grasslands	Qinghai Provincial Bureau of Agriculture and Livestock Farming; County Bureau of Agriculture and Livestock Farming; County Grassland Monitoring Station (monitoring and guidance for stock farmers); stock farmers; villagers assigned to manage grassland
Prevention of Desertification and Forest Land Management	Qinghai Provincial Bureau of Forestry and Grassland and County Bureau of Forestry and Grassland (control of illegal logging); forest rangers; farmers/villagers assigned to manage afforestation sites and county forest fire control organizations (prevention and control of forest fires); county organization for forest disease and pest damage prevention and quarantine (disease and pest control measures)
Soil/Water Conservation	Qinghai Provincial Bureau of Water Utilization; County Bureau of Water Utilization

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

The operation and maintenance system for facilities, etc. improved under the Project is basically the same as the system employed in other cities in China and those organizations responsible for operation and maintenance are also responsible for similar facilities constructed under different projects in their respective counties. Guidance for farmers and stock farmers has been adequately provided and the operation and maintenance of the facilities, etc. constructed under the Project have been smoothly implemented. As such, no special problems have occurred regarding the institutional/organizational aspect of the operation and maintenance.

3.4.2 Technical Aspect of Operation and Maintenance

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

3.4.3 Financial Aspect of Operation and Maintenance

The operation and maintenance of the facilities, etc. constructed or improved under the Project are

funded by the budget of the provincial or county government. The financial situation of the organizations responsible for the operation and maintenance of the project-related facilities, etc. is shown in Table 9. According to the results of interviews with project-related personnel at the executing agency and Table 9, the amount of fiscal expenditure related to the ecological environment has shown an increasing trend since the announcement of "the Policy to Emphasize the Construction of an Ecological Civilization" at the 18th National Congress of the Communist Party of China in 2012. According to the results of the interview survey conducted at the time of ex-post evaluation with project-related personnel at the executing agency and those officials of township or village governments, the necessary budget has been secured as a result of continual enhancement of support related to ecological environment by the central and provincial governments and no financial problems regarding operation and maintenance are observed, suggesting that the necessary budget for operation and maintenance will be secured in the future. Based on the above, there are no problems regarding the financial aspect of operation and maintenance.

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

Unit: million CNY

Organization	Expenditure	2017	2018	2019
Central Government	Environment	13,400	12,800	14,000
	Ecological environment	10,300	13,000	12,800
Qinghai Provincial Government	Environment	190	260	190
	Ecological environment	10	10	10

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

3.4.4 Status of Operation and Maintenance

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

The utilization rate of individual facilities is high and no major operational problems have

occurred during the period from the commencement of their operation to the time of ex-post evaluation. The field reconnaissance conducted by the evaluator confirmed that (i) the conditions of the principal facilities are generally good and they are functioning as initially planned, (ii) the planted trees and seeded grass have been growing without any problems and (iii) supplementary planting has been conducted when the initially planted seedlings have died. However, although some small-scale sand-trap dams, erosion protection walls are still functioning at present, some have already seen the large deposit of sand, making additional improvement work necessary.

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

4. Conclusions, Lessons Learned and Recommendations

4.1 Conclusion

The objective of the Project is to improve the forest coverage ratio and rate of vegetation cover through the improvement of degraded grassland, prevention of desertification, afforestation and soil/water conservation measures in areas around Qinghai Lake in Qinghai Province, thereby contributing to the restoration of the multiple functions of forests and grassland and the prevention of desertification.

The Project advanced the restoration of the multiple functions of forests and grassland and the prevention of desertification through afforestation work, grass planting and construction of facilities to implement soil/water conservation measures in line with the policy of the central government of China and Qinghai Provincial Government to improve the ecological environment. As such, the Project conforms to the development needs of improving the ecological environment in Qinghai Province and Japan's ODA policy. Therefore, the relevance of the Project is high. In the case of the project efficiency, although the outputs were achieved generally as planned or even better with the project cost being within the plan, the project period exceeded the plan. Therefore, the efficiency of the Project is fair. As a result of the materialization of afforestation work, grass planting work and construction of facilities to implement soil/water conservation measures, the target figures for the quantitative indicators (rate of vegetation cover, planted tree survival rate, etc.) set at the time of appraisal were generally achieved at the time of project completion. In addition, wide-ranging qualitative effects of the Project, including (i) acceleration of the growth as well as increased production of pasture grass and (ii) improvement of environment for stock raising, are confirmed as a result of the "improvement of the forest coverage ratio and rate of vegetation cover." Also highly noticeable are the impacts of "the restoration of the multiple functions of forests and grassland" ((i) increase of the water volume usable for farming, etc., (ii) improvement of the frequency and situation of sandstorms, flooding and debris flow and (iii) increased income of stock farmers and farmers due to the vitalization of stock farming). Accordingly, the

effectiveness and impacts of the Project are high. The sustainability of the Project is also high as there are no problems regarding the institutional, technical and financial aspects of the Project with confirmation of the good operation and maintenance conditions of the facilities and equipment. In the light of the above, the Project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

None

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Importance of implementing all-inclusive improvement of the ecological environment, incorporating project contents which offer direct advantages for residents of the project area

For the implementation of such projects as afforestation and improvement of the ecological environment where it is generally difficult to expect direct and clear advantages for residents of the project area, it is important for JICA to examine the incorporation of related projects (such as a soil/water conservation project, a project to support agriculture and stock raising, etc.) in the main project at the project planning stage. By doing so, it becomes possible to facilitate the understanding of the project on the part of residents and their participation, enabling the realization of smooth project implementation and expansion of the project effects. Such work is particularly important in areas where the planting of fruit trees, etc. is difficult due to the climate and ground conditions although the use of such tree species as fruit trees which can be expected to increase the income of residents may constitute an important element in facilitating the understanding and participation of residents.

As improvement of the ecological environment does not often offer any direct, clear and swift advantages for residents of a targeted area, it was difficult at the onset of the Project to obtain sufficient understanding of and cooperation for the Project on the part of residents. However, such understanding and cooperation became possible by explaining that the Project included components offering direct and clear advantages for residents, including “an increase of the number of livestock raised and increased income due to grass planting and the construction of sheds,” “reduction of damage due to a decrease of the discharged volume of eroded soil” and “improvement of the living environment due to the reduction of frequency and mitigation of the severity of sandstorms,” resulting in the smooth implementation of the Project and expansion of the project effects. It is, therefore, important to fully recognize such positive outcomes of the approach described above and to make the best use of such approach in the planning of similar projects in the future.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs	[Improvement of degraded grasslands] 1) Grass planting and construction of fences to keep livestock out: 48,054 ha 2) Rodents and pests control measures: 950,410 ha 3)Construction of livestock sheds: 3,000 sheds [Prevention of desertification] 1)Desert closure: 37,000 ha 2)Wind/sand protection forest: 3,823 ha 3)Control work to present sand dunes from moving: 2,500 ha [Afforestation] 1)Water resource recharge forest and water/soil retention forest: 16,000 ha 2) Forest protection and management: 24,000 ha [Water/soil conservation measures] 1)Small-scale sand-trap dam: 715 sites 2)Bank protection work: 36 km 3)Erosion protection walls: 345 sites 4)Development of forest land irrigation facilities: 4,567 ha 5)Patrol/work vehicles: 17 vehicles 6)Monitoring and office equipment: 236 sets 7)Ecology observation equipment: 10 sets [Training] 1)Training in Japan: 60 trainees 2)Acceptance of experts: 5 experts	[Improvement of degraded grasslands] 1) Grass planting and construction of fences to keep livestock out: 48,054 ha 2) Rodents and pests control measures: 950,410 ha 3)Construction of livestock sheds: 3,000 sheds [Prevention of desertification] 1)Desert closure: 36,651 ha 2)Wind/sand protection forest: 4,262 ha 3)Control work to present sand dunes from moving: 2,500 ha [Afforestation] 1)Water resource recharge forest and water/soil retention forest: 15,824 ha 2) Forest protection and management: 24,289 ha [Water/soil conservation measures] 1)Small-scale sand-trap dam: 726 sites 2)Bank protection work: 25 km 3)Erosion protection walls: 334 sites 4)Development of forest land irrigation facilities: 4,567 ha 5)Patrol/work vehicles: 11 vehicles 6)Monitoring and office equipment: 71 sets 7)Ecology observation equipment: 25 sets [Training] 1)Training in Japan: 45 trainees 2)Acceptance of experts: None
2. Project Period	December, 2007 – December, 2015 (84 months)	December, 2007 – October, 2017 (119 months)
3. Project Cost Amount Paid in Foreign Currency Amount Paid in Local Currency Total ODA Loan Portion Exchange Rate	 359 million yen 8,094 million yen (519 million CNY) 8,453 million yen 6,300 million yen 1 CNY = 15.6 JPY (as of June, 2007)	 123 million yen 8,045 million yen (529 million CNY) 8,168 million yen 5,879 million yen 1 CNY = 15.2 JPY (mean for 2007 through 2017)
4. Final Disbursement	September, 2017	