Asia-Pacific Network for Sustainable Forest Management

and Rehabilitation

COMPLETION REPORT

Rehabilitation and Management of Degraded Forests in Miyun Reservoir Watershed, Beijing

07/2015-06/2018

Beijing Forestry Society (BFS)

October 2018

BASIC INFORMATION

Project Title(ID)	Rehabilitation and Management of Degraded Forests in Miyun Reservoir Watershed, Beijing
Supervisory Agency	Beijing Municipal Bureau of Forestry and Parks
Executing Agency	Beijing Forestry Society (BFS)
Implementing Agency	BFU, CAF, BFPIC

Date of Project Agreement: [06/2015]			
Duration of implementation: 07/2015 – 06/2018, 36 months			
Total project budget(in USD)	696,300	APFNet assured Grant (in USD)	491,100
Actual project cost(in USD)	719,000	APFNet disbursed Grant(in USD)	441,000

Disbursement Status	Date of disbursement	Amount (in USD)
Initial disbursement	11/2015	165,000
Second disbursement	01/2017	174,000
Third disbursement	12/2017	102,000
Balance to be disbursed	/2018	46,500
Reporting Status	Schedule [1]implementation	Project progress status[2]
First reporting (period covered: 07/2015-06/2016)	On track	Satisfactory
Second reporting (period covered: 07/2016-06/2017)	On track	Satisfactory
Final reporting (period covered: 07/2015-06/2018)	On track	Satisfactory

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[1] Schedule [1]implementation status could be on track/behind/ahead of schedule
[2] Project progress status could be ranked as satisfactory, dissatisfactory, moderately satisfactory, moderately dissatisfactory

List of Project Steering Committee (PSC)

Name	Institution	Position	Role in PSC
Gan Jing	Beijing Forestry Society	Deputy Director	Chair
Wang Xiaoping	Beijing Municipal Bureau of Forestry and Parks	Deputy Director	Member
Zhang Guotian	Miyun County Bureau of Forestry and Parks	Deputy Director	Member
Qin Yongsheng	Beijing Forestry Society	Deputy Secretary-general	Member
Yu Xinxiao	Beijing Forestry University	Professor	Member

List of Project Team

Name	Role	Responsibilities
Qin Yongsheng	Project director	Overall project management and supervision
Wang Yongchao	Project manager	Project implementation
Shen Qianqian	Project coordinator	Assist the project manager in all aspects of project implementation
Xia Lei, Shao Dan, Wei Yafen, Han Yueming, Zhao Anqi	Project support staff	Organization of field activities, training sessions, education programs and meetings
Zhang Yao	Admin/finance staff	Administration and financial control, to ensure that activities were implemented according to APFNet financial requirements
Wang Hailong, Pei Chuan, Wang Huabing,Shi Yu	Miyun local coordinator	Coordination of project issues and relevant stakeholders in 3 project sites
Zhang Chunman	Shichangyu local coordinator	Coordination of project issues and relevant stakeholders in Shichangyu village
Guo Tianwen	Shitanglu local coordinator	Coordination of project issues and relevant stakeholders in Shitanglu village
Ren Fengchao, Liu Luyun	Maoshigou local coordinator	Coordination of project issues and relevant stakeholders in Maoshigou village

Executive Summary

Beijing, China's capital and a megacity with a population of more than 2 million people, is rapidly expanding. The city is one of the most water-scarce cities in the world: the per capital availability of water is only 1/30 of the world's average. Water, in that sense, is one of the most valuable resources and efforts are needed to enhance water source protection for the city. The Miyun Reservoir is the main reservoir for providing surface drinking water for the city.

Forests in the Miyun Reservoir Watershed are important for water conservation in the watershed. Efforts have been made in the past 30 years to plant trees in the watershed. However, monocultures have taken hold. The lack of diverse structures and high density have hindered forests' ability to protect the water source. Better management is urgently needed to improve the forests' water conservation and other multiple functions. This was the idea behind the APFNet supported project Rehabilitation and Management of Degraded Forests in Miyun Watershed, Beijing, which was implemented by the Beijing Forestry Society (BFS).

The APFNet funded project was implemented from July 2015 to June 2018. The project restored around 283 ha of forest stands in three project sites in the Miyun Reservoir Watershed to a more natural state. Key management measures included thinning according to close-to-nature forest management standards, and enrichment planting. By thinning out competitor trees, the forest's water use decreases, while also ensuring that in the long term other species have space to grow, slowly converting it into a more natural mixed forest. Natural regeneration has occurred after forest thinning, and this together with enrichment planting in gaps leads to mixed forests and ensure more effective and sustainable water source protection. The project also demonstrated eco-orchard management, by introducing better quality orchard varieties as well as training on better management.

Along with forest management to improve forests' water conservation capacity and protecting integrity of forest landscape, the project also developed eco-tourism for one of the project sites, improving forests' cultural and recreational functions, to provide urban citizens' with access to forest therapy, forest education and experience, etc. The effort aimed to improve livelihoods of local forestry communities. The project executing agency has a lease of 30 years for the eco-tourism project site, and will continue to put investments and make efforts in further developing and improving the site, providing direct and indirect employment opportunities for local forestry communities in and near the project site.

CONTENTS

1. BACKGROUND AND INTRODUCTION
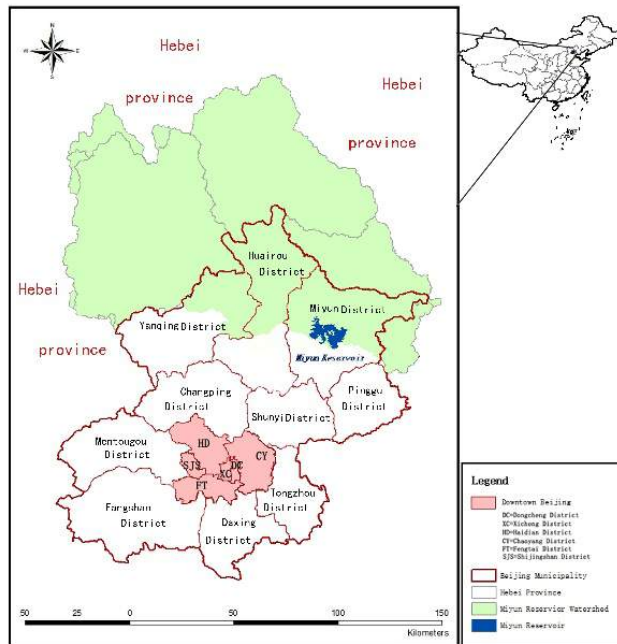
1.1 Project context

The water shortage in Beijing has reached a crisis level. Water supply for Beijing depends on surface water, underground water and water diverted from the outside. The water table also dropped rapidly in part of Beijing, and it is impossible to use more underground water. Though the city is now receiving water from the South-to North Water Diversion Project, it still faces challenges of meeting the demand for more water.

The Miyun reservoir, the largest of its kind in northern China, is an important surface source of drinking water for Beijing residents. This project experienced the changing conditions in which the importance of surface water for the city has diminished as more water is supplied by the South-to- North Water Diversion Project. Nevertheless, the Miyun Reservoir and its watershed is still very important for the city of Beijing and residents living in the watershed.

Map of the Miyun Reservoir and City of Beijing

Accounting for nearly 70% of the total area of the watershed where the reservoir is located, forests play an important and irreplaceable role in conserving water and protecting the reservoir and safeguarding the quality of water running into the reservoir. With respect to the multiple functions of the forests, especially for conserving water, there are considerable deficiencies due to lack of wise management. About 75% of the forests in the Miyun Reservoir Watershed are categorized as "sub-healthy", meaning the forest ecosystems are unstable and have a low water conserving capacity.

In addition, traditional management practice of orchards, especially application of fertilizer, produces pollution on surface water before running into the reservoir, posing a threat to the quality of drinking water of Beijing residents.

Meanwhile, the contradiction between livelihood improvement of forest dependent communities and protection of forest resources is challenging as extremely stringent water conservation regulations lay restrictions on industrial development, and land use in upper watershed areas has limited local residents' access to forest resources and exacerbated their poverty.

All these issues, having direct or indirect impacts on water, shall be addressed properly. For a sustained supply of high quality water from the reservoir, a long term forest management plan in the watershed is needed, taking into account of forest management, livelihood improvement and water quality and with a focus on increasing water conserving capacity of forests, reducing pollution from unwise forest management, improving livelihood of forest dependent communities and capacity building of relevant stakeholders in forest management. Therefore, the project was proposed to demonstrate how to manage monoculture plantations of *Pinus tabuliformis* and *Platycladus orientalis (Linn.)Franco*, in three sites in the Miyun Reservoir Watershed, to demonstrate how to improve management of orchards to reduce pollution and how to improve the livelihood of local communities by wisely using forest resources.

Location of three project sites

1.2 Project goal(s) and objectives

This project addressed the issue of forest management in the Miyun Reservoir Watershed, Beijing, China, with the goal to safeguard the water quality of the watershed by applying integrated forest management approaches.

The project focused on transforming monoculture plantations of Chinese Pine (*Pinus tabuliformis*) and Chinese Arborvitae (*Platycladus orientalis*) into mixed forests with broad-leaved tree species by applying close-to-nature forest management, improving management approaches of the existing orchards of Common Walnut (*Juglans regia)* and Chinese Chestnut (*Castanea mollissima)*, promoting development of eco-tourism, strengthening capacity building of relevant stakeholders and summarizing best practices to guide long-term forest management in the watershed.

2

The objectives of the projects are as follows:

a) To improve the water conservation capacity of the forests in three sites of the project by applying close-to-nature management approach;

b) To reduce water pollution caused by fertilizer application in the orchard selected;

c) To improve the livelihood of the local community selected by promoting the development of forest recreation;

d) To enhance the capacity of relevant stakeholders in forest management in an environment-friendly manner;

e) To produce best practice models for better long-term forest management in the watershed.

1.3 Project outputs and outcomes

The outputs and main activities are as follows:

Output 1. Monoculture plantations of *Pinus tabuliformis* and *Platycladus orientalis* of more than 280 hectares in three project sites managed in a close-to-nature approach;

Output 2. The livelihood of local community improved by promoting eco-tourism;

Output 3. Capacity of relevant stakeholders in managing forest and eco-tourism improved;

Output 4. Experience and lessons learned summarized and disseminated

2. PROJECT IMPLEMENTATION

2.1 Project schedule and implementation arrangements

Project initiation in 2015

The project activities were implemented following the Project Proposal, the Project Document and the Agreement signed between the executing agency and APFNet in June of 2015.

A team of international and domestic consultants was formed after the project initiation. The Project Steering Committee was also established, including members from the Beijing Municipal Bureau of Forestry and Parks, Beijing Forestry University, Miyun County Bureau of Forestry and Parks and Beijing Forestry Society, to provide guidance and decision-making for the project.

Project outputs and activities are described as follows.

Output 1: Monoculture plantations of *Pinus tabuliformis* and *Platycladus orientalis* of more than 280 ha in 3 project sites were managed in a close-to-nature approach.

Activity 1.1 Development of 5-year forest management plans of project sites
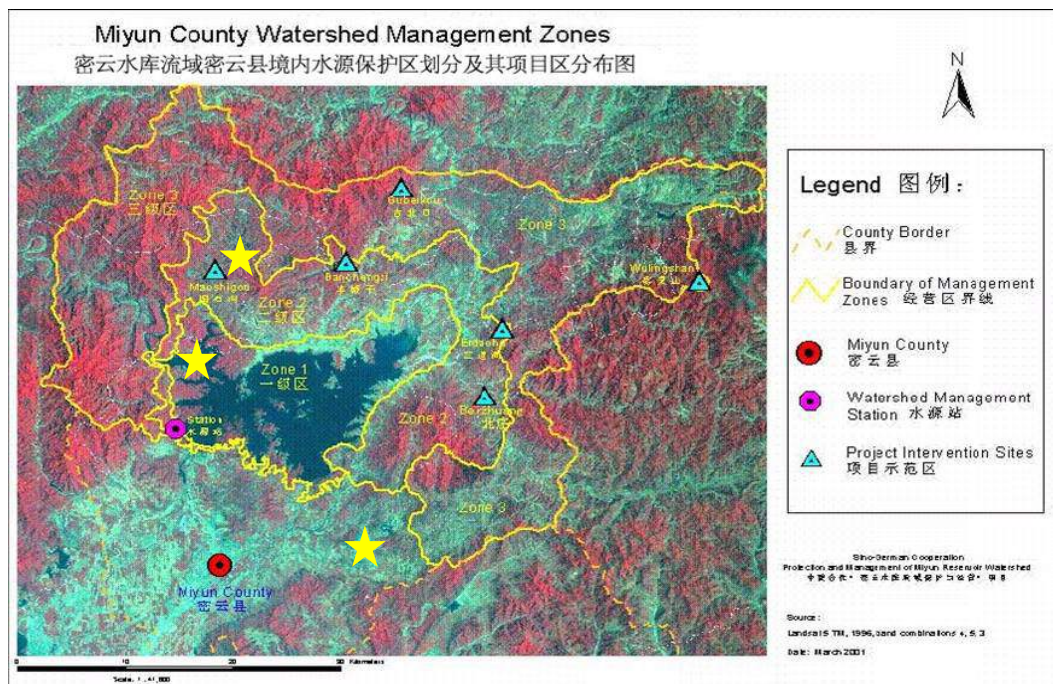
Map of different protection zones of the Miyun Reservoir in Beijing, yellow stars indicating APFNet project

Three 5-year forest management plans were developed for the three project sites. The Shitanglu project site was located within the 1st-level protection zone (Zone 1, directly surrounds the Reservoir, with strict regulations, for example on certain human activities) of the Miyun Reservoir, and the Maoshigou project site within the 2nd-level protection zone (Zone 2, outside of Zone 1) of the Reservoir. The Shichangyu, also called the Long Mountain Valley, project site is also within the greater conservation area of the Miyun Reservoir.

Biophysical baseline survey

Participatory land use planning
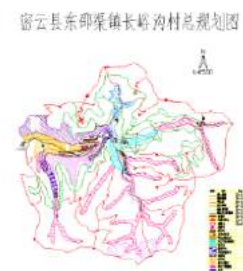
In the first project year, the project team gathered available literature on forest management, and conducted bio-physical and socio-economic baseline surveys on the project sites. Data on vegetation, soil, land ownership and other information were obtained. Boundaries for forest management for the three project sites were identified. A participatory land use planning was later conducted in three project sites. Current land use conditions were investigated. Based on the survey

Socio-economic baseline survey

results of the baseline surveys and the participatory land use planning, 3 forest management plans for the three project sites were developed.

The forest management plans were developed according to relevant national and municipal technical requirements on forest management, and also adopting concepts and techniques of close-to-nature forest management (CFM).


5-year forest management plans

The following principles were considering during development of the forest management plans: sustainability, science-based management, easy operation, people-oriented (local people participation), stable forest structure and biodiversity, improved landscape value, coordinated conservation and management, efficiency.

Activity 1.2 Transforming monoculture plantation of *Pinus tabuliformis* and *Platycladus orientalis* into mixed forests with broad-leaved species.

Common problems in the three sites included unfavorable forest structure (most forests were monoculture consisting of one main tree species), high stand density (especially coniferous forests, density is usually more than 1200 trees/ha (80 trees/mu, mu is measurement unit commonly used in China which equals to 1/15ha) , with high risks of pests, diseases and snow damage), evenness in forest age structure (around 80% are middle and young-aged stands), lack of multiple functions (cultural functions, etc.), lack of science-based forest management.

The APFNet project adopted close-to-nature forest management (CFM) concepts, through thinning of competitor trees, to promote growth of target trees and desired naturally regenerated young trees, and to improve forest health. It also took replanting, reseeding and other tending measures to foster a multiple-layer uneven-aged conifer broad-leaved mixture structure of water protection forests. A total forest area of 283 ha was managed according to close-to-nature forest management.

The project demonstration area in the Shichangyu site covers a total area of 101.6ha of 9 non-commercial forest stands, including 46.1ha of *Pinus*
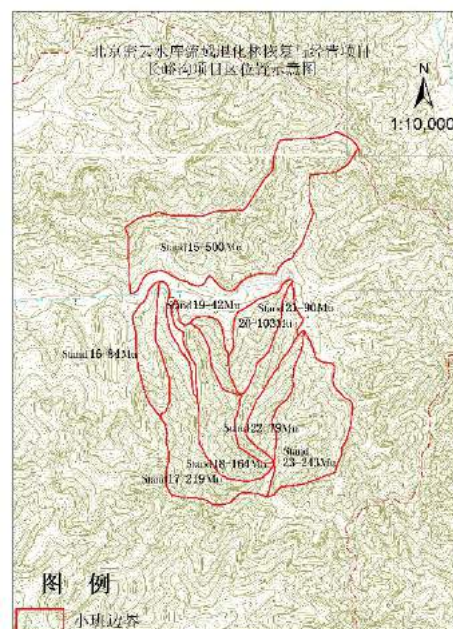
Demonstration stands in Shichangyu

tabuliformis plantations and 55.5ha of shrubland.

Planting in shrubland in Shichangyu

Replanted *Quercus variabilis and Pinus densiflora* var.zhangwuensis in Shichangyu

Main management activities in *Pinus tabuliformis* plantations include marking of target trees and competitor trees as well as thinning of competitor trees; in shrubland, indigenous broad-leaved tree species, such as Chinese Cork Oak (*Quercus variabilis)* and Purpleblow Maple (*Acer truncatum)* as well as conifer species like Korean Red Pine (*Pinus densiflora var. zhangwuensis*) were replanted; a total of forest operation paths of 8km was built to facilitate forest management activities.

Thinning in *Pinus tabuliformis* plantations in Shichangyu

Reduced crown closure, increase of gaps and natural regeneration of *Pinus tabuliformis* plantations in Shichangyu

At the Shitanglu project site, forest management was mainly done in *Pinus tabuliformis* and *Platycladus orientalis* plantations. The total management area is 151.2 ha.

Management measures include singling, pruning, building of ramps around tree bottoms, and replanting of indigenous broad-leaved trees such as Mongolian Oak (*Quercus mongolica)*, Pubescent Smoke Tree (*Cotinus coggygria)* and Purpleblow Maple (*Acer truncatum)*.

Demonstration Stands in Shitanglu

Replanting of indigenous broad-leaved tree species (*Cotinus coggygria* and *Acer truncatum*) in Shitanglu

Pruning and building ramps around trees in Shitanglu, to reduce water consumption and enhance water conservation

Forest management in Maoshigou project site was mainly for *Pinus tabuliformis* plantations, include marking of target trees and competitor trees as well as thinning of competitor trees, and pruning; 1km of forest operation paths were built. In the Maoshigou project site, total forest management area is 30.68ha.

Demonstration stands in Maoshigou

Forest thinning in Maoshigou

Reduced crown closure, increase of gaps and natural regeneration in *Pinus tabuliformis* plantations in Maoshigou

Forest operation path in Maoshigou

Stem from forest management for path

Juglans regia and *Castanea mollissima* are the two main economic tree species on the projects sites. Traditional management of these two species involved using pesticides and herbicides, which causes water quality problems for surface water. The project demonstrated eco-orchard management, by introducing better quality seedlings and grafting techniques as well as training on better management. In the Shichangyu project area, 2800 *Juglans regia* seedlings of new varieties already grafted were planted.

New varieties of *Juglans regia*


Bio-physical Monitoring and Evaluation Plan

Bio-physical monitoring and evaluation of project impacts at 3 project sites

Experts were also invited to develop a bio-physical monitoring and evaluation plan for the three project sites, and to monitor and evaluate the biophysical impacts of the project implementation.

The final biophysical assessment of impacts of the project's forest management activities was conducted in three project sites in May of 2018. The assessment results show positive impacts on biodiversity (especially diversity of shrub and herbaceous plants), biomass of shrub and herbaceous plants, soil's water storage, debris' water retention capacity, etc.

Output 2: The livelihood of local community improved by promoting eco-tourism

Activity 2.1 An eco-tourism plan developed
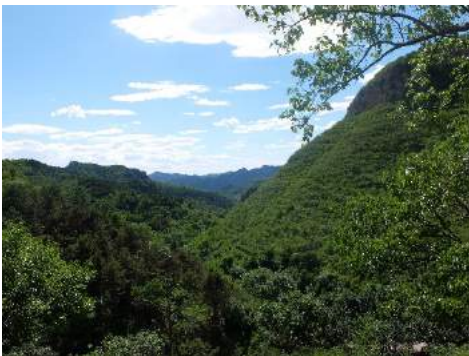
Long Mountain Valley

Long Mountain Valley (a small natural village) is located within the Shichangyu project site in Miyun District. It is easily accessed by highway. There are only 11 residents left in the village, and most of them are seniors with limited income options. The village has rich forest resources and a very unique natural landscape. The village still maintains traditional local country characteristics, with very special stone buildings and stone walls.

Domestic and international experts were involved to develop the eco-tourism plan for Long Mountain Valley. Repeated on-site investigations and research, consultations and discussions were conducted.

Domestic and international experts working together on eco-tourism planning

The municipal governments have been emphasizing harmony between nature and human beings, as well as valuing and protecting nature. Improving rural development and local livelihoods has also been high on the agenda of the Beijing Municipal Government. In developing eco-tourism in Long Mountain Valley, the project executing agency has always been bearing in mind the importance of protecting the integrity of the local landscape.

The following principles were considered during development of the plan.

Locality. Utilize the local landscape in a reasonable way without causing damage to landscape integrity, and also respect and explore local culture, to build a demonstration area for forest therapy, experience, education, etc.

Eco-tourism Plan for Long Mountain Valley in Shichangyu project site

Sustainability. Science-based use of current resources, by protecting and restoring local resources.

People-oriented. Introduce concepts of forest education and forest therapy, etc. to improve human beings' relationship with nature, and improve forests' multiple functions for human beings.

The plan divides the area into four zones and functions, namely forest therapy, forest education and experience, agricultural farming practice, and forest research and demonstration.

Activity 2.2 Development of tourism infrastructure

According to the plan and the four main functions, relevant infrastructure and facilities for forest therapy, forest education and experience, farming practice, etc. were built in Long Mountain Valley.

Trails of different materials and levels for forest therapy and forest experience

For forest therapy, trails of different levels, yoga and Tai Chi platforms, and together with other supporting facilities were established. For forest education and experience, a 200m^2 forest Culture Exhibition Center was build. The main structure of this building was completed, but due to regulatory issues the furnishing of the building will be done post this project and funding has been secured already.

In addition, a Hawthorn platform, persimmon garden, forest classroom, rest and recreation areas, and education signs and boards were also established. For agricultural farming practice, an abandoned local farmhouse and yard were restored, and also added up traditional stone mills, cellar and garden plots, which together with a number of terraces along main education and experience trails, form the basis for agricultural experience for urban citizens.

Forest culture experience center

Yoga platform

Recreation area

Hawthorn platform

Viewing platform

Persimmon garden

Restored farmhouse

Tai Chi platform

Education sign

Activity 2.3 Marketing in Beijing & Activity 2.4 Development of eco-tourism management plan

Based on the eco-tourism plan, an Eco-tourism Marketing & Management Plan was developed for Long Mountain Valley.

In the plan, the part about management details designed activities for different functions, management requirements, staffing, coordination, involvement of volunteers, financial management, income and expenditure, etc.

The marketing part details ways of marketing, different strategies for different target groups, etc. Based on the marketing plan, brochures, booklets and relevant social media platform were developed.

Eco-tourism Management & Marketing Plan
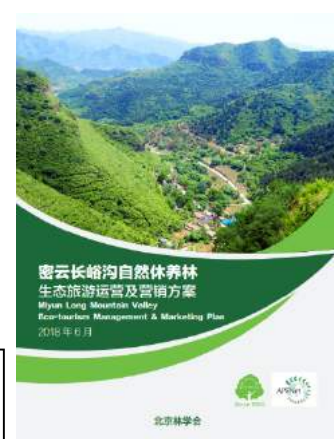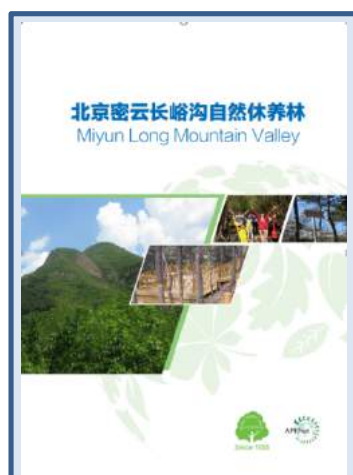
Eco-tourism booklet

Eco-tourism brochure (English)

Eco-tourism brochure (Chinese)

Brochure for Hawthorn Adoption Initiative

Social media (WeChat) promotion pages

Output 3: Capacity of relevant stakeholders in managing forest and eco-tourism improved.

Activity 3.1 Training manuals development

Training manuals on forest management, forestry community development and eco-tourism were developed to improve residents' livelihood in the Miyun Reservoir Watershed, to enhance residents' awareness to protect the environment and to better manage local forests as well as to enhance forests' ecological, economic and social benefits.

Specifically, the manual on forest management covers sustainable forest tending and management related planning, development of plans, implementation, technical measures and operation standards as well as management techniques for main forest types in Beijing; the manual on forestry community development includes sustainable timber collections, energy-efficient brick-beds (Kangs), management of *Juglans regia* and *Castanea mollissima*, treatment of wastewater and garbage classification, etc.; the manual on eco-tourism elaborates on tourism service etiquette, dining service, accommodation,

Training manuals on forest management, forestry community development, and eco-tourism

sanitation, souvenirs & special products and transportation, requirements for employees and three international and domestic case studies, etc.

Activity 3.2 Training local forest practitioners in the implementation of a long-term forest management plan

The project adopted close-to-nature forest management concepts and techniques which are not very familiar to local forestry practitioners. More than 10 indoor and outdoor on-site training

Training on forest management

sessions helped forestry practitioners and local residents who were involved in forest management activities of this project to gain a better understanding of CFM as well as pruning, ground preparation, seeding and planting, etc.

Training on management of *Juglans regia*

Trainings on community development, such as the management of *Juglans regia* and *Castanea mollissima* were organized in and around project sites, and were very popular among local residents.

Activity 3.3 Training local farmers involved in eco-tourism

Trainings were organized for villagers who are employed to manage the recreation infrastructure in the forests and are in charge of patrolling, in order to increase their capacity to keep the infrastructure in good shape, take care of the environment and reduce the risk of accidents such as forest fires and injuries.
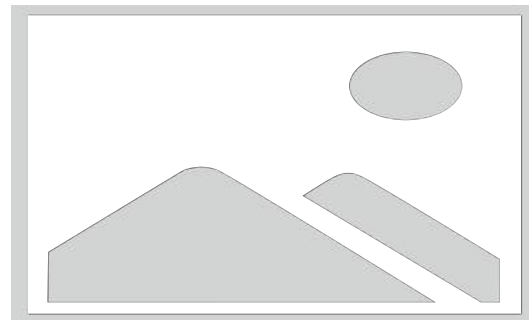
Training on eco-tourism

Based on the training manual on eco-tourism (forest therapy, forest education and experience) developed by the project, training sessions were also organized for local residents to enhance their awareness of the eco-tourism planning in Long Mountain Valley and improve their knowledge and capacity of eco-tourism.

Activity 3.4 Organization of domestic and international study tours

During implementation of this project, a number of study tours for project staff and relevant consultants were conducted to domestic water source areas, such as Chengdu, Changsha, Xiamen, Danjiangkou, Wuhan, to learn best management practices and gain experience in forest management and watershed conservation.

Study tours to domestic water source area in Danjiangkou

Ms. Shen Qianqian, coordinator of this project was sent to Canada's eastern province of New Brunswick to learn about forest management, watershed management, public involvement and payments for ecosystem services, forest recreation, etc. Her experience to learn from and exchange information with scientists and researchers in New Brunswick resulted in a report on public involvement and payment for watershed services in the Miyun

Discussion with researchers in Canada

Visit to forest management sites in Canada

Reservoir Watershed, better understanding of watershed management and improved capacity for implementing this project.

Output 4: Experience and lessons learned summarized and disseminated

Activity 4.1 Establishment of a knowledge hub

Domestic and international consultations and discussions were involved in the development of the knowledge hub. The knowledge hub was developed on the executing agency's English website, gathering best management practices, experiences gathered from previous BFS projects regarding forestry management and watershed management related topics such as establishment of a water fund, eco-tourism etc.

Discussion on Knowledge Hub
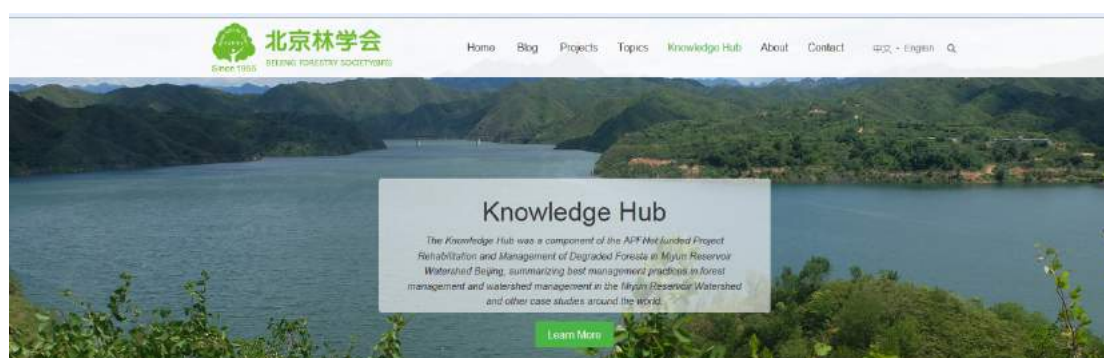
Knowledge Hub website

Activity 4.2 Development of Integrated Forest Management in Miyun Reservoir Watershed

Based on project implementation and experience, the Integrated Forest Management in Miyun Reservoir Watershed book was written and translated into English. The book details close-to-nature forest management of different types in the Miyun Reservoir Watershed and introduces experiences in forest management and eco-tourism development and lessons-learned. It can be a reference for local policy makers and forest practitioners. The Chinese version was distributed to participants of the project workshop.
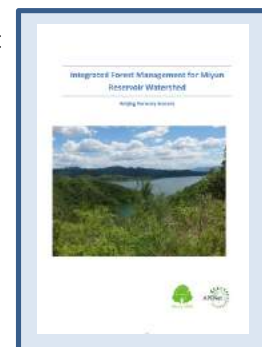
Integrated Forest Management in Miyun Reservoir Watershed

Activity 4.3 Organization of workshops

The project organized two workshops in 2016 and 2018.

The first workshop was held during the 6th Beijing Forest Forum in October 2016, with the theme of "Forest Therapy and Healthy China". The workshop targeted policy-makers, experts and technical staff from 13 provinces in China, including Beijing, Tianjin, Sichuan, Hunan and other cities, to disseminate project practices related to forest therapy, eco-tourism, etc. At the same time, international experts from Canada, Japan and South Korea gave presentations on the topic. Over 220 participants attended the forum.

APFNet Chair of Board of Directors, Mr. Zhao Shucong attended the workshop in 2016

Domestic experts from provinces in China, and international experts from Japan, South Korea and Canada, also introduced the experience of forest therapy and eco-tourism development, and provided recommendations and suggestions for development of eco-tourism in Miyun Long Mountain Valley.

In June 2018, the project organized an international workshop in Beijing, inviting international experts from Greece, Japan and the Netherlands, as well as domestic experts and participants, to share experience of eco-tourism, especially forest therapy and natural education and experience, of the APFNet project in Miyun. Outputs and relevant technical documents of this project were distributed during the workshop. An invitation to present project experience at the workshop named Forest Therapy and Human Health to be held in Greece in the next year was received from the workshop organizers.


Workshop in 2018

International experts discussing road system in Long Mountain Valley

Activity 4.4 Preparation and submission of policy recommendations to local and Beijing municipal government agencies.

Based on the project's implementation and outputs, an expert group was invited to summarize project experiences and prepare a policy proposal detailing how forests are managed in the Miyun Reservoir Watershed, with an emphasis on how to balance the relationship between forest conservation and rural community development and how to improve the water conservation capacity of forests. The key policy recommendations developed by this project mainly include two aspects, forest management and eco-tourism. The forest management part focuses on the procedures on applying for the logging quota, the importance of forest management planning and the need to subsidize forest management. The eco-tourism part focuses on cross-sectoral cooperation, regional eco-tourism planning, demonstration, capacity building and publicity. The policy recommendations developed have been submitted to the Beijing Municipal Bureau of Science & Technology for further submitting to the Municipal Government.

Policy recommendations
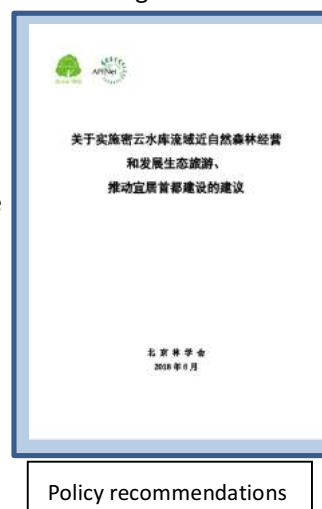
2.2 Project resources and costs

After the project grant was received from APFNet, an account was opened and the grant has been managed separately by the executing agency's financial staff Ms. Zhang Yao. All expenses were managed according to the project budget.

According the audit report covering June 2015-June 2018, as of June 30 of 2018, a total APFNet funding of $487,500 (99.27% of the total APFNet budgeted amount) was used, and the unused funding is $3,600. The project received a total counterpart contribution of $231,500 from other projects implemented by the executing agency. The audit report is attached and a paper copy of the report was received by APFNet.

Annex B of this report also details actual project costs by category and by activity for the AFPNet grant and counterpart contribution by the project executing agency. There is a little difference in terms of the total expenses listed in the audit report and that of Annex B, as the report uses the unit of USD 10,000, while in Annex B, the unit is 1 USD and is correct to two decimal places.

As of June 30 of 2018, a total of $441,000 was disbursed by APFNet and received by BFS. The funding paid by APFNet were disbursed in three installments. $165,000 was received on November 30 of 2015 on which day the US Dollar to Chinese RMB exchange rate was 6.389297; USD 174,000 was received on January 31 of 2017 on which day the US Dollar to Chinese RMB exchange rate was 6.9763; USD 102,000 was received on December 31 of 2017 on which day the US Dollar to Chinese RMB exchange rate was 6.5416. The executing agency received the three installments in RMB from its bank, and all expenditures were made in RMB. In the audit report and Annex B, expenditures are converted back into USD using the exchange rates of the year when the expenditures occurred.

Explanations for major cost variance by category against approved project budgets are as follows:

For the APFNet grant, there is 18.84% underspending for travel and related costs. The main reasons for this include lower international flight ticket price than expected, and lower cost by use

of trains instead of flights for certain domestic travel; there is 13.38% underspending for meetings, as the actual cost (venue and expert fees) for the kick-off meeting is lower than expected. Training cost is 15.24% lower than expected, but this is nearly complemented by the overspending of 73.05% of the planned counterpart contribution for training; for field activities, there is an overspending of 17.7% against the approved budget mainly for development of eco-tourism.

2.2.1 Additional explanations for Costs by Activity for Project Year 3

There is an overspending of 22% for Activity 1.2.3 in Year 3 as the actual cost was higher than expected; for Activity 1.2.5 there is an overspending of 51% in Year 3 as some of the costs were covered by the unused budget of the first two years, and overall for three years, the costs do not exceed the approved budget; for Activity 3.4.1, the actual cost was higher than expected; for Activity 4.2.3, the cost is 25% higher than expected as both translating and editing were involved, but the total cost for Activity 4.2 in Year 3 do not exceed the approved budget; for salary and allowance for project staff and management personnel, there is an overspending of 19% in Year 3, as there was more staff time this year, but overall for three years the variation between actual costs and the approved budget of this category is less than 10%; Miscellaneous for Year 3 is overspent by around 3150 USD, as some of the costs were covered by the unused budget of Year 1, but overall for three years variation between actual costs and the approved budget of this category is less than 10%.

2.3 Procurement and consultant recruitment

According to project budget and project implementation needs, a camera (for recording project activities), a laptop (for staff work), a pedicab (for workers' use on site for building roads, etc) and a pump (for irrigating planted seedlings) were purchased after comparison of prices and within project budget limits. The equipment has been well managed by project staff and workers. The procured items have only been used for this project to contribute to the achievement of the project's goals and objectives.

List of Main Consultants Involved:

Outputs	Expertise	Consultant	Position and Organization	Nationality
Five-year forest management plan	Forest management	Bruce Pendrel	Former Acting Director General of Canadian Forest Service (retired)	Canadian
	Water & soil conservation	Yu Xinxiao	Professor, Beijing Forestry University	Chinese
	Forest hydrology, forest ecology, soils	Wang Yanhui	Senior researcher, Chinese Academy of Forestry	
	Forest inventory & bio-physical monitoring plan	Wang Jinzeng	Chief-engineer, Beijing Forest Inventory Department	
	Forest hydrology, forest ecology, soils	Yang Xiaohui	Chinese Academy of Forestry	

Participatory land use planning	Participatory land use planning, social sciences	Liu Jinglan	Professor, Beijing Forestry University	Chinese
Biophysical monitoring plan and surveys	Forest hydrology, forest ecology, soils	Yu Xiaoxiao	Professor, Beijing Forestry University	Chinese
	Forest monitoring	Peter Street	Manager, Edge Forestry Consulting Ltd	Canadian
	Forest silviculture and forest management	Zhang Xinna	Teacher, Beijing Forestry University	Chinese
Socio-economic monitoring plan and surveys	Participatory land use planning, social sciences	Liu Jinglan	Professor, Beijing Forestry University	Chinese
Eco-tourism plan	Development of eco-tourism management plan	Cheng Jia	Deputy Director, Jingdufengjing Ecotourism Planning and Design Institute	Chinese
	Environmental education	Zhang Siying	Independent Consultant and Founder of local NGO for Environmental Education	
	Eco-tourism planning	Kim Seong il	Seoul National University	South Korean
	Eco-tourism planning	Wang Qingchun	Associate Professor, Beijing Forestry University	Chinese
	Eco-tourism and natural education	Zhao Minyan	Associate Researcher, Chinese Academy of Sciences	Chinese
Eco-tourism management and marketing plan	Eco-tourism design	Wang Peiyong	Professor, Beijing Forestry University	Chinese
Training manuals development	Facilitation of training sessions for local foresters	Zhi Xin	Professor, Beijing Forestry and Parks Department of International Cooperation (BFPIC)	Local
Knowledge Hub	Expert on online platforms	Anna Finke	Master of Forestry, Yale University	Germany
	Forest management	Bruce Pendrel	Former Acting Director General of Canadian Forest Service (retired)	Canadian
	Environmental sciences	Laura Schröder	MSc, Wageningen University	Germany
Integrated Forest Management in	Close-to-nature forest management	Yan Haiping	Senior engineer, Beijing Xishan Forest Farm	Chinese

Miyun Reservoir Watershed				
Policy Recommendation	Forest management, eco-tourism	Zou Dalin	Beijing Xinghe Forestry Landscape Ltd.	Chinese

2.4 Monitoring, evaluation and reporting

Monitoring and evaluation have been conducted during project implementation and after project completion. During project implementation, there has been a three-level monitoring and assessment, covering a self-assessment of the project site, an inspection by consultants recruited by the project's executing agency, and an inspection by APFNet staff and recruited consultants, to ensure that the project achieves the designed objectives and outputs. Recommendations and suggestions from APFNet staff and external consultants were well responded and followed. There have been regular communications among the executing agency and APFNet as well as relevant stakeholders to update project progress and implementation.

Mid-term evaluation by APFNet staff and consultant

Project check by consultants recruited by the executing agency

2.4.1 Response to Recommlike**ions provided by** Mid-term **evaluation c**onsultant

In May 2017, Mr. Preecha Ongprasert was hired by APFNet to conduct a mid-term evaluation (MTE) of the project. The consultant provided a number of recommendations for the project which the executing agency responded to and followed.

The Chinese medicinal herbs are now collected by local residents for their own use or as an extra income; NTFP products are now promoted in Long Mountain Valley. For example, the executing agency has initiated the Hawthorn Adoption Initiative, and corns and other leftover from forest management activities are now being used in forest education and experience activities; for promoting and marketing Long Mountain Valley, the executing agency is attracting more visitors through tree-planting events, etc.; extra-curricular programs could be now designed and provided for primary and middle school students; exchanges with APFNet funded projects with similar topics

were conducted through opportunities provided by APFNet.

2.5 Dissemination and knowledge sharing

During the implementation of the project, important activities and achievements at different stages were recorded, lessons learned and practices were disseminated to the general public and stakeholders educated through workshops, the executing agency's international and domestic network, tree planting and forest education events organized in the project sites, and through website and social media, etc. A number of officials and staff from Beijing, other provinces, other countries and international organizations (such as IUCN and UNDP) visited the project sites, and learned about the project.

In addition, project staff attended a number of domestic and international workshops and conferences organized by APFNet and other organizations, and presented and shared with other participants experiences of this project.

Dr. Zhi Xin presenting at FAO organized event on natural regeneration

Dr. Zhi Xin and project staff attending the Project Exchange Workshop organized by APFNet

3. PROJECT PARTNERES' PERFORMANCE

3.1 Performance of the supervisory agency

The project supervisory agency, the Beijing Municipal Bureau of Forestry and Parks, has provided policy and administrative guidance and supported the implementation of this project. They were especially very helpful for the project executing agency when it was applying for the logging quota etc.

3.2 Performance of the executing agency

The executing agencies, the Beijing Forestry Society, under the guidance of APFNet, the supervisory agency and the project steering committee, was responsible for managing and implementing the project, including, conducting of site activities, organizing of workshops and training, etc. The executing agency has fulfilled its responsibilities and tasks according to the project agreement and project documents.

3.3 Performance of implementing agency

and consultants (technical assistants), contractors, and suppliers

The main project implementing agency, the Beijing Forestry University (BFU), Chinese Academy of Forestry (CAF), and Beijing Forestry and Parks Department of International Cooperation (BFPIC), fulfilled their responsibilities and tasks satisfactorily. They mainly provided professional expertise and administrative support at various degrees to the project.

3.4 Performance of APFNet

APFNet has been very supportive and helpful for the executing agency in implementing this project. APFNet staff have been providing support and guidance for the project in a very timely and efficient manner.

There have been regular and frequent communications between the executing agency's staff and APFNet's project managing staff and project director, through email, telephone, social media (WeChat), etc. The project grants have been disbursed in a timely manner. APFNet staff have regularly visited the project sites and provided constructive suggestions for improving project implementation.

APFNet staff visiting project site

APFNet has engaged the executing agency in many events it organized (such as APFNet 10-year Anniversary, a project exchange workshop, etc.), to provide opportunities for the executing agency to learn from other projects and share their own project experience. The mid-term evaluation consultant recruited by APFNet also provided valuable suggestions for the project.

4. PROJECT PERFORMANCE

4.1 Project achievements

The project implemented close-to-nature forest management for an area of 283 ha in three project sites in the Miyun Reservoir Watershed, demonstrating the transformation of monoculture forests into mixed forests in three different protection priority areas and improved the water conservation capacity of the forests in three sites.

Recently in September, one of the project sites, Shichangyu was recognized as a Demonstration Site for Multi-Functional Forests and Close-to-nature Forest Management by the Beijing Municipal Bureau of Forestry and Parks and the Beijing Agriculture College.

Plate for Demonstration Site for Multi-Functional Forests and Close-to-Nature Forest Management

The project demonstrated wise management of

orchards which are considered a main source of pollution in the watershed by introducing new species varieties and grating techniques.

The project improved the livelihoods of the local community in and around the project sites by promoting the development of forest recreation and eco-tourism and involving local residents in forest management activities, and enhanced the capacity of relevant stakeholders in forest management and forestry development capacity.

The project demonstrated development of eco-tourism in a less developed forestry area in the Miyun Reservoir Watershed, providing a model for similar areas in the watershed, and produced best practice models for integrated forest management and eco-tourism.

4.2 Project impacts

4.2.1 Impacts on local forests

Management of the low-efficiency shrubland and the *Pinus tabuliformis* and *Platycladus orientalis* plantations in the three project sites in the Miyun Reservoir Watershed has improved stand structure and forests' water conservation capacity. Biodiversity also improved as on-site monitoring shows that there is more natural regeneration of indigenous species, etc.

4.2.2. Impacts on local communities

According to the socio-economic evaluation conducted in three project sites in May 2018, forest management has facilitated growth of certain medicinal herbs (for example *Bupleurum chinense*, and *Dendrobium officinale Kimura et Migo*, etc.). Building of road systems have improved access to those plants, and local residents are now able to collect those plants for use by themselves or selling to others.

Socio-economic impact evaluation in three project site

Road systems and facilities built in Long Mountain Valley have eased local farming and provided local residents with more leisure opportunities.

Forest management and other activities in the three project sites provided local forestry community residents with direct and indirect work opportunities. Forest management has improved local landscape and eco-tourism and employment opportunities. Some local residents now get more income by providing accommodations to urban residents who are coming especially to Long Mountain Valley.

The participatory process in the forest management planning period, the involvement of local residents' in forest management and the development of eco-tourism activities, and relevant training have improved local residents' awareness and capacity and have led to behavior change among local residents to protect and value forest resources and landscape.

4.2.3 Impacts on urban residents

The project's development of eco-tourism in Long Mountain Valley has benefited urban citizens, by providing a site for urban citizens to experience nature, for kids to get natural education. Primary and middle schools in Beijing are required by governments to have extra-curriculum programs each year, and Long Mountain Valley has been recognized by governments as a qualified site for such programs.

(refer to http://bjssc.bjedu.cn/zydwjs/gongyuanlei/beijingmiyunchangyugouziranxiuyanglin/).

Based on existing resources and facilities, a number of forest therapy, forest education, and faming practice experience events and activities, have been organized in Long Mountain Valley, with an audience of over 1,000.

Forest therapy, forest education, and farming practice experience activities organized in Long Mountain Valley

4.2.4 Impacts on policy-makers and local foresters

Close-to-nature forest management has been better understood by local forestry practitioners and policy makers. The local forestry authority in Miyun facilitated the application for the logging quota for this project. There has been much discussion among forestry practitioners to ease the application process for the logging quota for forest thinning.

The project's development of eco-tourism has gained much attention in Beijing, in other provinces in China and internationally. Especially, the concept of forest therapy, developed and practiced in Long Mountain Valley in Shichangyu project site has been spread across China. Long Mountain Valley has been listed as a demonstration area for forest therapy in Beijing, along with Songshan Nature Reserve and Badaling National Forest Parks. There have been efforts from the Beijing Municipal Bureau of Forestry and Parks to further develop forest therapy in the city.

4.3 Sustainability

The project development long-term forest management for the three project sites, and the executing agency will continue to cooperate with the local forestry authority to carry out follow-up management in the forests, and strive to find other partners to work on these sites to further develop them into an even better model for forest management. Considering that forest management is a long-term task, we will also work to conduct long-time monitoring to provide

long-term data for further assist policy-making.

The project executing agency has a lease of 30 years for Long Mountain Valley Shichangyu project site, and has planned follow-up investments in this site on forest management and eco-tourism. We will strive to make this site a learning center for forest management and eco-tourism.

Eco-tourism is a focus of the executing agency in Long Mountain Valley of the Shichangyu project site. The project executing agency has a long-term plan for eco-tourism in Long Mountain Valley for further improving infrastructure and developing forest therapy and forest experience programs, and will try its best to work with APFNet and other potential partners on this site in the future. The executing agency has a team experienced in developing and implementing forest education and experience programs.
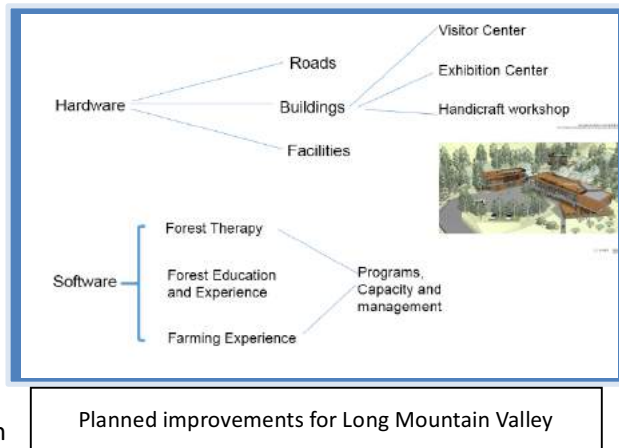
Forest therapy is a concept originated from Germany, and further developed in Japan and South Korea. The practice of forest therapy is believed to improve people's mental and physical health by combining forest environment and certain guided activities. The concept was introduced to Beijing in 2011, the executing agency is now working with partners on evidence-based research. The secretariat of the Chinese Forest Therapy Committee (initiated early this year) is set up at the project executing agency, and we now have a new staff working on forest therapy. Forest therapy will be further promoted in Long Mountain Valley.

Planned improvements for Long Mountain Valley

5. CONCLUSION, LESSONS LEARNED AND RECOMMENDATIONS

5.1 Conclusion

After three years of hard work, and with the support of APFNet and all relevant stakeholders, the project activities have been fully completed, and outputs and objectives have been achieved as expected and planned. The Beijing Forestry Society gratefully appreciate the support of APFNet, and contribution by APFNet staff.

5.2 Lessons learned and recommendations

The project implementation has been a very complicated process and there have been challenges due to changes of project managers on the executing agency and on the APFNet side, and it has been a learning process for the project team in terms of project management and implementation of site activities. For example, the project team was very familiar with the concept of close-to-nature forest management, but it was through repeated site investigations and consultation that they could better adapt close-to-nature forest management better to the local site conditions.

There have been common topics and interests among different projects funded by APFNet in China

and in other Asia-Pacific economies. For example, there are a few projects in China involving close-to-nature forest management. In the future, more summarization of models and exchange between different projects could be further facilitated through the APFNet network. The project executing agency would be glad to be involved in this process.

Development of eco-tourism is a special aspect of this project. In particular, forest therapy has been very popular since it was introduced to China in 2011. Developing forest therapy has many benefits, such as enhancing forests' multi-functions. The executing agency is happy to exchange and cooperate further with APFNet and other partners in this topic, for example to work with APFNet to translate forest therapy related publications and publicize this concept to a larger audience, etc.

Annexes

A. Project Implementation status

B. Financial statement (including balance sheet, source and use of Funds statement, and expenditure details) by both category and activity

C. Project audit report

D. Project outputs, such as technical reports, key project documents (workshops, field visits, technical visits, trainings etc.), publications, brochures, webpages, etc.

E. 2-3 Feature stories from the project for promotion

F. Photos, media cliffs and other materials used/available for project outreach

Annex A Implementation status (scheduled versus actual)

Project Objective/Outputs/Activities (in line with PD/AWPs)	Indicators (in line with PD/AWPs)	Baseline of activities	Progress made (%completion of activities and degree of output/objective achievement)	Appraisal time	Actual time
Objectives include: a) to improve the water conservation capacity of the forests in three sites of the project by applying close-to-nature management approach; b)to reduce water pollution caused by fertilizer application in the orchard selected; c)to improve the livelihood of the local community selected by promoting the development of forest recreation; d)to enhance the capacity of relevant stakeholders in forest management in an environment-friendly manner; e)to produce best practice models for a better long-term forest management in the watershed.					
Output 1: Monoculture plantations of *Pinus tabuliformis* and *Platycladus orientalis* of 280 hectares in three project sites are managed in a close-to-nature approach.	Around 283 ha of monoculture plantations in three project sites were managed according the close-to-nature forest management		100%		
Activity 1.1 Development of five-year forest management plans for the demonstration areas.	Three five-year forest management plans for the three project sites were developed	No plans before	100%	12/2016	12/2016
Activity 1.2 Transforming monoculture plantation	283 ha of monoculture plantations in three project sites were managed. There is natural	No manage	100%	6/2017	5/2018

of *Pinus tabuliformis* and *Platycladus orientalis* into mixed forests with broad-leaved species	regeneration or replanting of broad-leaved tree species. Biophysical monitoring plan was developed and monitoring conducted and report submitted; There has been demonstration of eco-orchard management. Socio-economic monitoring plan developed and survey conducted	ment before			
Output 2 The livelihood of local community improved by promoting eco-tourism	Local residents received income from forest management activities; Forest management has facilitated growth of certain medicinal herbs which local residents collect for use by themselves or selling to others; Forest management has improved local landscape and eco-tourism and employment opportunities.		97.5%		
Activity 2.1 An eco-tourism plan developed	Eco-tourism plan developed	No plans before	100%	12/2017	5/2018
Activity 2.2 Development of infrastructure	20km of trails built, Forest Culture Experience Center built (inner furnishing to be finished soon); Yoga and Tai Chi Platforms built, viewing platform built; other forest therapy, forest education and agriculture practice facilities built.	No facilities before	90%	6/2017	10/2017
Activity 2.3 Marketing in Beijing	A Management and Marketing Plan was developed; brochure and booklet developed	No plans before	100%	6/2017	5/2018
Activity 2.4 Development of eco-tourism management plan	A Management and Marketing Plan was developed; forest therapy and forest experience activities and events organized, for an audience of more than 1,000.	No plans before	100%	6/2017	5/2018

Output 3 Capacity of relevant stakeholders in managing forest and eco-tourism improved	Training sessions on forest management, eco-tourism and forestry community development were organized for an audience of 400 persons/time.		100%		
Activity 3.1 Training manuals development	Three complete training manuals were developed (forest management, forestry community development, and eco-tourism management)	No manuals before	100%	10/2015	06/2016
Activity 3.2 Training local forest practitioners for implementation of the Long-term Forest Management Plan	More than 10 training sessions were organized for local forestry practitioner and residents involved in forest management	Training on forest management conducted before	100%	12/2016	6/2017
Activity 3.3 Training local farmers involved in eco-tourism	4 training sessions on forestry community development and eco-tourism were organized. Training presentation developed	No training before	100%	6/2018	5/2018
Activity 3.4 Organization of domestic and international study tour	Domestic study tours organized to water source areas and international study tour organized to Canada	No tours to those areas before	100%	1/2018	5/2018
Output 4 Experience and lessons learned summarized and disseminated	Project experiences were disseminated to the general public and stakeholders through workshops, the executing agency's international and domestic network, etc.		100%		

Activity 4.1 Establishment of knowledge hub	Knowledge hub established	No website before	100%	6/2018	6/2018
Activity 4.2 Development of Integrated Forest Management in Miyun Reservoir Watershed	Integrated Forest Management in Miyun Reservoir Watershed developed and disseminated	No such work before	100%	6/2018	6/2018
Activity 4.3 Organization of project dissemination workshops.	Two workshops organized	No workshop before	100%	6/2018	6/2018
Activity 4.4 Preparation and submission of policy recommendations to local and Beijing municipal government agencies.	Policy recommendation on forest management and eco-tourism developed and submitted	No recommendations before	100%	3/2018	6/2018