



Inside
Wangyedian Forest Farm
Exploring Sustainable Forestry with APFNet

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Context of China's Forestry

In the past decades China has made a name for itself as one of the economies with the largest reforestation programs worldwide. Especially considering its development status when many of these programs started, this is very impressive. In many ways, however, it was also a necessary response to the historic environmental degradation that left many hills barren and formerly forested areas as large wastelands. While the re-establishment of green cover in China is not finished, it is time to look beyond just planting trees. Both historical conditions and the limited availability of knowledge and technologies have hindered the silvicultural sophistication of forest re-establishment. As a result, currently China's planted forests largely consist of monocultures, with impeded ecosystem functions and limited biodiversity. APFNet, together with the Wangyedian Forest Farm, set out to introduce new forestry concepts, such as multi-functional forestry, close-to-nature forest management and mixed species reforestation, but also many means to improve local livelihoods, like a new form of forest farm and community co-management system, energy saving stoves for villages, community nurseries and non-timber forest products (NTFPs), such as a mushroom growing enterprise. Through collaboration, Wangyedian has transformed into a model for modern forestry.

Inner Mongolia

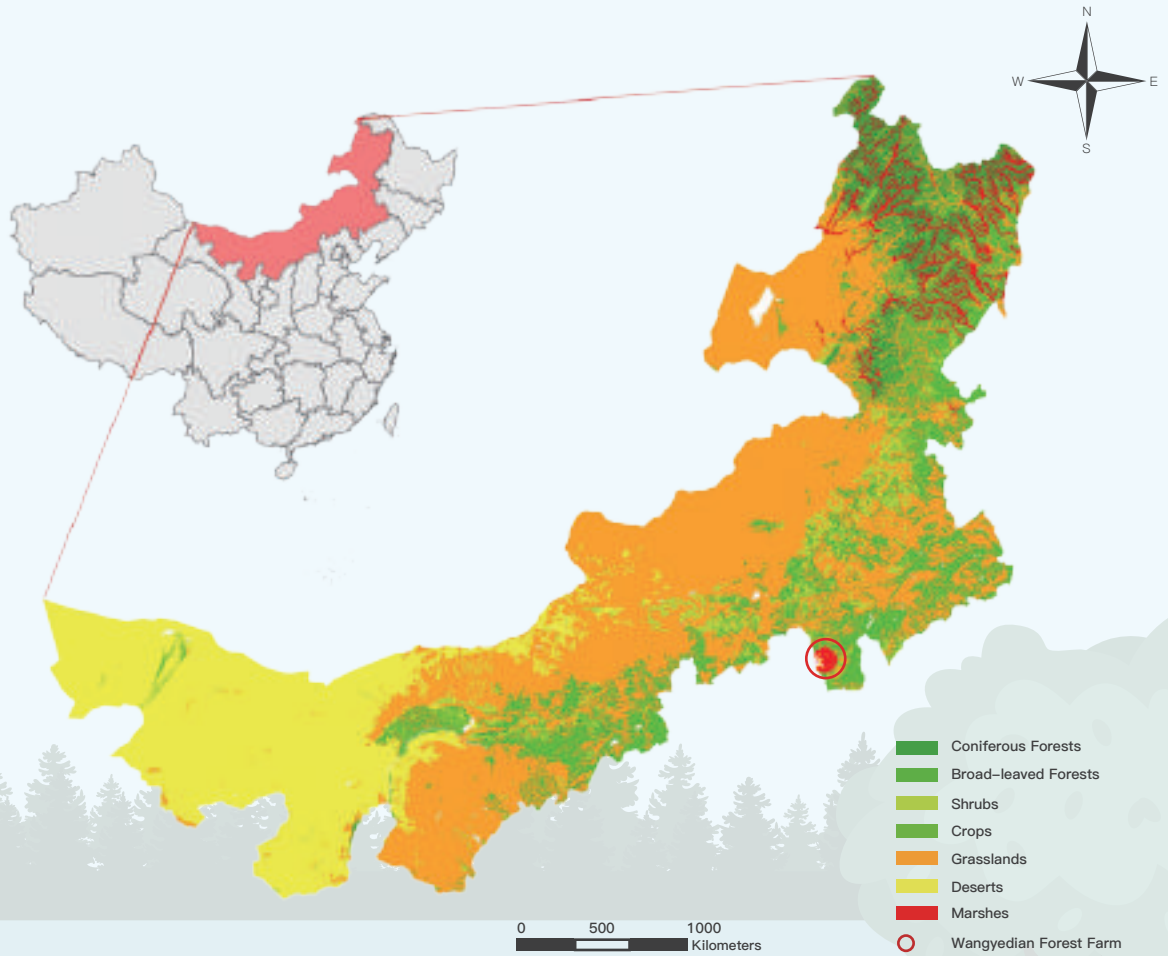
Inner Mongolia may be the province in China that is most closely associated with wide-ranging grasslands and a nomadic culture celebrating the freedom only found under an endless sky.

This, however, is only part of the picture. While large parts of the province are indeed defined by grasslands, this is far from the only landscape to be found. As the annual precipitation in Inner Mongolia ranges from 80–600mm, shrublands and even forests are not entirely uncommon, covering 21.03% of the province. In fact, that is 24.87 million ha of forests, which is the largest area of forests in the entire economy.

Chifeng, directly bordering Hebei province, is on the higher end of the humidity scale. It has a four-season, monsoon-influenced, continental steppe climate and with an average of 371mm of rainfall per year, both grasslands and boreal forests can be found.

In the past decades, the government of China has initiated six major forestry programs (see box “China's Six Key Forestry Programs”). All of these have involved parts of Inner Mongolia, although four programs, *the Natural Forest Protection Program (NFPP)*, *the Three-North Program*, *the Desertification Combatting Program around Beijing and Tianjin (DCBT)* and *the Sloping Lands Conversion Program (SLCP)* have had the greatest influence on the region. The programs are driven by a variety of factors, namely that the threat of desertification is taking up parts of the province due to low rainfall and the expansion of the Gobi Desert. The Three-North Shelterbelt Program (and to an extent the DCBT) has been focusing on establishing tree shelterbelts and vegetation to fix wandering dunes around human settlements, to stabilize the soil and slow down local winds. The SLCP (also known as the “Grain for Green” program) has been encouraging farmers through monetary incentives to turn their unproductive (and erosion-threatened) farmland into forests, which generally are more effective at preventing erosion.

Through the efforts of these programs, desertification in Inner Mongolia has slowly reversed, bringing forests and grasslands back to the landscape.



Map of Inner Mongolia's Vegetation Cover Types and Location of Wangyedian Forest Farm

China's Six Key Forestry Programs

Program	Duration	Content
Natural Forest Protection Program (NFPP)	Phase I: 2000–2010 Phase II: 2011–2020 Phase III+: 2021–2050	Aiming to reverse forest degradation through protection: stopping commercial logging in natural forests, reducing timber output of key state-owned forest areas in the regions of the Yangtze and Yellow rivers, northeast China region and Inner Mongolia
Sloping Lands Conversion Program (SLCP, or “Grain for Green”)	1999–present	Unproductive sloping cropland (>25°) is converted into forests through Payments for Ecosystem Services (PES), either in cash or through e.g. grain subsidy in 25 provinces
Three–North Shelterbelt Program	1978–2050	Aims to curb soil erosion, fight desertification by planting shelterbelts and increasing forest coverage in the northern 13 provinces from 5.05% to 14.95% by 2050
Desertification Combatting Program around Beijing and Tianjin (DCBT)	2000–present	Restoring vegetation around Beijing and Tianjin; solving the problem of sand storms through afforestation in sandy areas
Wildlife Conservation and Nature Reserve Program (WCNR)	2001–2050	Focusing on the preservation of species and genetic resources, as well as nature conservation; covers typical and representative natural ecosystems and habitats. Developing tools such as: establishment of nature reserves, wildlife rescue, reproduction and breeding bases
Industrial Timber Plantation Program (ITPP)	Phase I: 2002–2005 Phase II: 2006–2010 Phase III: 2011–2015	Aims to accelerate the cultivation of plantations to increase the effective supply of forest resources and timber to meet the increasing domestic demand for wood. Phase I: Construction of an industrial raw material forest industry belt with a focus on the South Phase II & III: Extend high–yield timber industry belt to the north

Wangyedian Forest Farm

Wangyedian Experimental Forest Farm, located at the outskirts of Chifeng city, Inner Mongolia, is a state-owned forest farm with about 25,000 ha of forests and 93% forest cover. The main forest types include larch (*Larix principis-ruprechtii* & *Larix olgensis*), Scots pine (*Pinus sylvestris*) and Chinese pine (*Pinus tabulaeformis*) plantations. In addition, there are natural secondary broad-leaved forests of Mongolian oak (*Quercus mongolica*), Poplar (*Populus davidiana*), Dahurian birch (*Betula dahurica*), Asian white birch (*Betula platyphylla*) and other species. While originally these forests were envisioned to mainly produce timber, they are now also recognized for conserving water resources and providing non-timber forest products, such as wild mushrooms or medicinal herbs. They have contributed to the economic development of communities since the forest farm's establishment in 1956. In the past decades the forest farm has made significant progress in sustainably managing forests to balance sustainable timber supply with biodiversity conservation and other forest functions. The farm now ranks as one of the **top ten** state-owned forest farms in China in terms of conservation, and the most ecologically valuable part has been set aside as a National Forest Park in 2003. While the National Forest Park is still managed by the forest farm, there is no logging there.



Wangyedian Forest Farm

Since August 2016, Mr. Zhao Hui (赵辉) has been the director of the forest farm after Mr. Wang Baoxiang (王宝祥) retired. The Forest Farm employs 103 staff, most of which are responsible for daily forest management tasks, such as tree planting, thinning, harvesting or producing seedlings at the farm's nursery.

State-owned Forest Farm

China's state-owned forest farms were established through government investments shortly after the People's Republic of China was founded in 1949. Forest farms aim to manage and cultivate forest resources while also protecting and improving the natural environment. State-owned forest farms operate as public institutions in China, and play an important role in China's forestry system. After more than 50 years of development, there are now 4,507 forest farms managing 40 million hectares of forests, which is about 23% of the total forest area in China.

Introducing Wangyedian

Ma Chenggong

Mr. Ma Chenggong, the director of the APFNet Project Management Office in Wangyedian Forest Farm, has experienced quite a number of changes throughout the 20+ years he's been working for the forest farm.

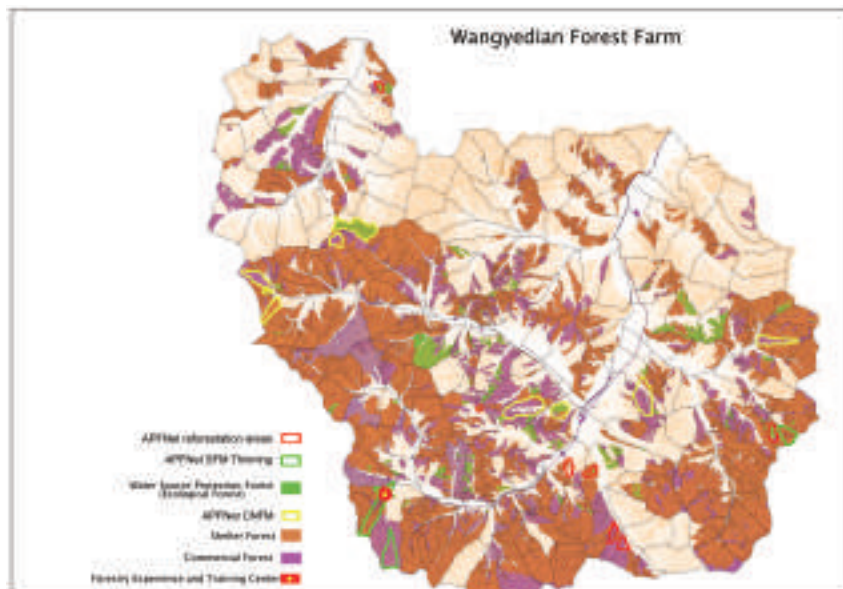
"When I started, even though as a technical staff I was responsible for both reforestation and harvesting, it was really all about the economic benefits we could obtain from the forest. Thus, I was mostly busy with figuring out where to get timber next. It makes sense, considering that the forest farm currently employs over 100 people and if the only source of income for their salaries is timber harvests, then economic considerations dominate. However, when APFNet started working with us, priorities shifted. The project introduced multifunctional forestry to the farm, which provided new sources of revenue. Through being a multi-functional and close-to-nature forestry demonstration site, our ecotourism and NTFP collection activities, coupled with the structural reform for forest farms throughout the economy, have allowed us to re-direct



Ma Chenggong explains characteristics of Korean pine cones to visitors

our focus and make our staff salary less dependent on timber harvests. Nowadays, restoring forest ecosystems is equally if not even more important than sustainable forest management and harvesting. You could say my responsibilities have gone full circle, because now my job is to give back to the forest, not take from it."

In recognition and support of his long-term commitment to SFM and restoration, APFNet has sponsored Mr. Ma Chenggong to complete a master's program at the Beijing Forestry University, where he obtained his degree in July 2018.



Map of Wangyedian Forest Farm, its different forest types and APFNet project sites

APFNet Projects, Goals and Main Topics of the Project

APFNet has a long-standing engagement with Wangyedian Forest Farm. In fact, it's APFNet's oldest project in China. In 2011, APFNet launched the first phase of the project: "Construction of Multifunctional Forest Management Demonstration" in Wangyedian Forest Farm, demonstrating a multi-functional forest management approach and exploring how economic, social and environmental benefits can be balanced and enhanced, both at the site and in the wider region. The project furthermore tested sustainable forest management in close cooperation with local communities, developed forestry training & education and boosted forest recreation.

The project had to redefine how forestry should be practiced. Such efforts generally start at the planning level. In its first phase, the project developed a forest management plan incorporating close-to-nature forest management (CNFM) principles and extended the planning phase from five to ten years. Additionally, a separate management plan for non-timber forest products was developed. Next, plots were selected to be managed under multi-functional close-to-nature forest management while employing co-management mechanisms for the forest farm and the local community. In order to ensure the success of this cooperation, capacity building for the local communities was offered.

In its second phase, which started in 2016, the objectives were expanded to demonstrate multifunctional forest restoration on a wider range of sites than before, including clear-cut forests and also young and middle-aged natural secondary forests. It also aims to test close-to-nature management on mature forests (previously done mostly in young and middle aged forests), focusing especially on soil and water conservation and increasing the overall carbon storage capacity of the forests.



Based on these experiences, technical guidelines for CNFM and converting larch and Chinese pine forests based on CNFM principles are to be prepared and disseminated. These are based on experiences from phase 1 and also the new insights of phase 2. The second phase also aims to establish forest recreation areas and a forestry experience and training center, where education on multi-functional management, CFNM and forest rehabilitation can be provided. These facilities can be used to improve the capacities of local communities and forest farm employees on sustainable forest management, and also provide a space for learning for an international audience. Workshops that have been held include "Forest Rehabilitation in China" and the "International Conference on Smallholder Forestry and Forestland Fragmentation: Sharing Lessons and Experiences between East Asia and Europe".

Forestry Planning

Ten-year Forest Management Plan

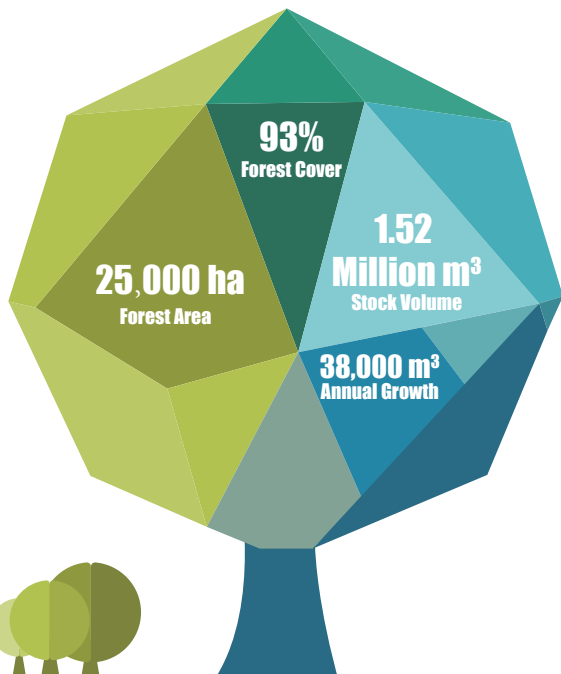
Good forest management is the result of thorough and comprehensive planning. Forests, as long-living and slow-growing as they are, require a long-term vision to ensure that the right measures are applied early on.

In China, in line with the planned economy and its five-year plans, forest management plans (FMPs) have followed the same framework and are usually produced with a five-year horizon in mind. While in western economies plans include considerations for several decades, it should still be considered a breakthrough for Wangyedian Forest Farm to have developed stand-level operational ten-year forest management plans.

Before these plans could be developed though, a baseline survey had to be conducted. Based on GIS data and on-the-ground sampling plots, important information was obtained, such as the overall forest area of the farm (25,000 ha), forest cover (93%), stock volume (1.52 million m³) and annual growth (38,000 m³).

The resulting ten-year FMP for 2013 to 2022 had, aside from incorporating SFM principles and NTFP production, the following five sub-objectives:

- 1 For ecological forests: Improve forest ecosystem services, focusing on improving the water conservation ability of the forests and ability to withstand and break strong winds
- 2 For commercial forests: Create uneven-aged, multi-species forests that provide a reliable and regular flow of timber
- 3 Establishing a 275.3 ha seed orchard (*Larix principis-ruprechtii*, *Larix olgensis*, *Larix kaempferi*, *Pinus sylvestris*) able to provide about 750kg of seeds annually and a nursery that produces superior seedlings, with a production capacity of 8 million seedlings
- 4 Enhance forest health by establishing a ground-level forest fire prevention and management system and strengthening forest pest prevention
- 5 Promote forest recreation



Long-Term Forest Management Plan

Based on the successful development of ten-year FMPs for the entire farm, the team wanted to test, on select plots, how a real long-term forest management plan could be designed. For over 650 ha a 100-year FMP (2018–2118) will be developed, taking into consideration long-term trends like climate change and also new demands from ecotourism to integrate more “colorful” species into the landscape and transforming monocultures into more resilient natural mixed forests. The plan is a new part of APFNet’s Wangyedian Project and is scheduled to be finalized by the end of 2018.

Forest Classification in China

Based on the Forest Law issued in 1984, forests in China are classified into **five categories** according to their main functions:

- (1) **Shelter forests:** forests, woods and clusters of bushes with protection as the main purpose. This is subcategorized into water source conservation forests, water and soil conservation forests, shelter forests against wind and for fixing sand, farmland and cattle farm shelter forests, riparian forests and highway/railway protection forests;
- (2) **Timber forests:** forests and woods with timber production as the main purpose, including bamboo groves;
- (3) **Economic forests:** woods with the production of fruits, edible oils, drinks, flavorings, industrial raw materials and medicinal materials as the main aim;
- (4) **Fuel forests:** woods with the production of fuel as the main aim; and
- (5) **Special-use forests:** forests and woods with national defense, environmental protection and scientific experiments as the main aim. This is subcategorized into transboundary shelter forests, experimental forests, mother tree forests, environmental protection forests, ornamental forests, woods at ancient and historical sites and revolutionary memorial places and forests in nature reserves.

In 1998 these five categories of forests were reclassified by the revised forest law into two categories: ecological forests (consisting of former shelter forests and special-use forests) and commercial forests (comprising the former timber forests, economic forests, and fuel forests). Regulations on management, funding and exploitation are different for these two categories of forests. Commercial forests basically follow market rules, while ecological forests mostly remain government-funded.

While not yet part of the forest law, in the National Forest Management Plan 2016 to 2050 a third category has been introduced: **multi-functional forests**.

Forest Management

🌿 Mother Tree Forests and Seed Orchards

For decades, Wangyedian Forest Farm has been considered a national key stone for high-quality seed production. In the 1960s the forest farm established its first mother tree forests for four species: Prince Ruprecht's larch (*Larix principis-ruprechtii*), Olgan larch (*Larix olgensis*), Japanese larch (*Larix kaempferi*) and Scotch pine (*Pinus sylvestris*) and for the same species (except *L. principis-ruprechtii*) established seed orchards in the 1970s.

While both mother tree forests and seed orchards produce seeds, the main difference between the two is that mother tree forests (while being planted forests) use unimproved trees and select especially vigorous and superior trees for seed production. Often the best offspring of these forests is then used for seed orchards.

Seed orchards, on the other hand, use material that is already genetically improved for mass-multiplication. To ensure consistency and superior genetic quality, they often use genetically identical grafts to establish the seed-producing trees.

In 2009, Wangyedian Forest Farm was identified at a key national forest seed base.



Reforestation

Deforestation History and Traditional Reforestation

Wangyedian has a longer history of deforestation than commonly assumed. While many parts of China only experienced the main impacts of deforestation in the 20th century, Wangyedian has been affected for much longer.

It was during the Qing Dynasty (1644–1912) that most of the changes happened. In the early period of the Qing dynasty natural forests still dominated, as Wangyedian's forests were under the jurisdiction of a Mongolian prince, who put the forests under strict protection. The area was also populated by the (mostly) nomadic Mongolians, who had little interest in agriculture that would have required the cutting of forests.

In the late period of the Qing Dynasty, however, the restrictions on the use of the forests were removed and farmers immigrating into the area cleared the forests for farming. Furthermore, during the war, they burned the forests on the mountains, ultimately creating a barren wasteland that was the polar opposite of the lush landscape that previously occupied the region.

Since the founding of Wangyedian Forest Farm, reforestation has been a key focus. As early as 60 years ago the first trees were planted. Due to the situation at the time, including limited knowledge and technology, however, reforestation was done quite traditionally. Afforesting nearly 75,000ha of land consisted of planting large monocultures of mostly native but non-locally adapted versatile conifers, such as larch or Chinese pine. While the landscape became green again, it was much more homogenous than it was historically, with monocultures occupying nearly 50% of the area. Additionally, these plantations tended to be more vulnerable to pest attacks and have lower biodiversity.

Mixed Species Reforestation

Reforestation can be done in many different ways, depending on the goals, knowledge, tools and funding available. Under the APFNet project in Wangyedian between 2016–17, three different approaches have been tried on 66.7 ha of land:

1

Reforestation with a mix of coniferous and local broad-leaved species, with the main purpose of producing high-quality timber

Species include:

Chinese Pine (*Pinus tabulaeformis*), Mongolian Spruce (*Picea mongolica*), Mongolian Oak (*Quercus mongolica*), Mongol Linden (*Tilia mongolica*), and Manchurian Walnut (*Juglans mandshurica*)



Forest restoration from bare land to green

2

Reforestation 1) combining nut trees with timber trees to provide products both in the short and long term and 2) “recycling” seedlings by planting small seedlings very densely initially to achieve better growth and then later, instead of thinning them out, transplanting some to other reforestation sites

Species include: Korean pine (*Pinus koraiensis*) for edible pine nuts and timber, Mongolian oak (*Quercus mongolica*) for fodder and timber



Reforestation using nut and timber trees
Top: the bare site, Left: *Pinus koraiensis*

Right: *Quercus mongolica*

3

Reforestation focusing on maximizing recreational and landscape values by using colorful coniferous and broad-leaved species, as well as flowers

Species include: Painted maple (*Acer pictum*) for its intense yellow and red leaves, Chinese tree lilac (*Syringa reticulata*) for its beautiful flowers and the excellent honey that can be produced from them and Williams Elder (*Sambucus williamsii*)



Reforestation to maximize landscape values, from the bare site (left) to a forest with a beautiful meadow (right)

Mixed-Species Reforestation with Pines and Broad-Leaved Species

Location	Forest division 170, stand 4
Goal	Landscape Forest
Geography	Northwestern slope, lower hills
Area	8.6 ha
Year established	2017
Trees Species	Mongolian Scotch Pine (<i>Pinus sylvestris var. mongolica</i>) (40%), Chinese Pine (<i>Pinus tabuliformis</i>) (30%), Asian White Birch (<i>Betula platyphylla</i>) (10%), Painted Maple (<i>Acer pictum</i>) (20%)
Planting density	3,330 trees/ha
Tending	5 times in the first 3 years
Planting hole size	60*60*40 cm
Seedling age	<i>P. sylvestris var. mongolica</i> : 5 years, <i>P. tabuliformis</i> : 4 years, <i>B. platyphylla</i> : 3 years, <i>A. pictum</i> : 3 years

Most importantly, each of these reforestation approaches will ensure better forest health and higher biodiversity in the newly created forests. That being said, the form of management afterwards is crucial. Here, Wangyedian Forest Farm has introduced new concepts as well.

Sustainable Forest Management

Traditional Forest Management

Traditional forest management is rooted in the belief that a forest has a singular primary purpose: to produce timber. Thus, timber production and yield are the only management criteria worth considering, often with a short-term focus at that. Any management subsequently done under such a regime relies on even-aged monocultures that are clear-cut and replaced with a new generation of the same species. In this way the land is slowly degraded, biodiversity remains low and while timber quantity may be sufficient, timber quality is often not optimal. In fact, in just a few generations even the forest yield may decline as soil nutrients are washed out after each clear-cutting event.

This form of forest management was largely practiced at Wangyedian (combined with a general neglect of naturally regenerated secondary forests), until the concepts of multi-functional forestry and close-to-nature forest management were introduced.



Traditional skidding with horses



Multi-Functional Forestry

Forests, despite historical conceptions, are not limited or meant to do just one thing. In fact, multi-functionality is deeply embedded in the nature of forests, as no forest just cleans water without providing timber or just provides oxygen without also providing habitat for local flora and fauna. While some of these functions may to a degree conflict with each other (for example, a forest maximized for timber production is rarely the most structurally diverse habitat), they are all represented.

Multi-functional forest management (MFM) is guided by the principles of sustainable forest management. The conceptual and practical development of MFM started in North America and Europe. Nix (2012) referred to it as:

“the management of land or forest for more than one purpose, such as wood production, water quality, wildlife, recreation, aesthetics, or clean air”. It is “a concept of forest management that combines two or more objectives, such as production of wood or wood-derivative products, forage and browse for domestic livestock, proper environmental conditions for wildlife, landscape effects, protection against floods and erosion, recreation, and protection of water supplies”.

However, there is still some argument on the scope and definition of MFM. Some researchers and practitioners believe that the multiple demands on forests can be best met at the landscape level by spatially segregating production and conservation objectives, with forest units specialized in single dominant uses such as the production of timber and NTFPs, ecotourism and ecosystem services. Others argue that multiple goods and services can be produced efficiently within individual management units or at the “stand level” .

For now, Wangyedian has opted for a hybrid approach. As the Chinese legal forest classification system (see box “Forest Classification in China”) already classifies forests by function, large parts of the farm are managed under a landscape-based multi-functional management approach with different areas focusing on the main provision of one service. Some areas, however, are to be managed under close-to-nature forest management (CNFM), where in one stand the maximization of multiple functions is the management goal. The selection of the functions is stand-specific.

Korean Pine Nut-Timber Dual-Use Forest

Location	Gulin forest management area, forest division 23, stand 13
Forest area	20ha
Year established	1975
Trees Species	Korean pine (<i>Pinus koraiensis</i>)
Stocking	1650 trees/ha
Average DBH	16cm
Seed yield	70000 kg/year
Tree height	22m
Stock volume	222 m ³ /ha

This forest has the earliest Korean pine trees established in Inner Mongolia. It is also the largest Korean pine forest. The goal is to produce both timber and nuts in a multi-functional dual-use forest. It has been thinned three times. The total average annual output of Korean pine cones is more than 30,000.

Close-to-Nature Forest Management

Close-to-Nature Forest Management (CNFM) originated in Germany and is based on the idea of managing a forest by working with nature instead of against it. It respects the natural constraints of the forest and manages it in accordance with its ecology to achieve high-quality forest stands. The results are mixed, structurally diverse forests that are in a much better position to deliver a multitude of forest ecosystem services such as water filtration, timber and non-timber forest products.

CNFM can be applied in any forest type, but due to the history of Wangyedian, it is largely applied in monocultures with the goal of forest transformation. These monocultures consist largely of larch (*Larix principis-ruprechtii*) and Chinese Pine (*Pinus tabulaeformis*) plantations. By applying different CNFM techniques, such as target tree selection, cutting competitor trees, assisted natural regeneration or enrichment planting with local species, the forest can be slowly converted into a multi-aged, diverse forest with a structural and species composition mimicking that of a natural forest in later successional stages.

A smaller part of Wangyedian's forests consists of natural secondary forests, dominated largely by early successional birch (*Betula platyphylla*) and poplar (*Populus davidiana*) due to its comparatively young age. These forests, while structurally more diverse, often only grow timber of inferior quality. Thus, in order to speed succession and introduce high-value timber, CNFM can be used to thin out the stand and give the late successional species waiting in the understory a chance to achieve dominance.



Before (2011) and after (2014) treatment of *Betula platyphylla* with close-to-nature management which as a result, *Pinus koraiensis* regenerated well

In the project three different forest types were treated with different forest management methods, specifically:

Forest type	Area	Age
Prince Ruprecht's larch (<i>Larix principis-ruprechtii</i>) plantations	226.7 ha	young to mature
Chinese Pine (<i>Pinus tabuliformis</i>) plantations	173.3 ha	young to mature
Asian white birch (<i>Betula platyphylla</i>) natural secondary forest	100 ha	middle aged to mature

Planted Chinese Pine under close-to-nature forest management

Location	Gushan forest management area, forest division 31, stand 14
Forest area	16ha
Year established	1979
Trees Species	Chinese pine (<i>Pinus tabuliformis</i>)
Average DBH	24.4 cm
Tree height	16.5 m
Stock volume	13.53 m ³ /mu (203 m ³ /ha)

The natural regeneration in this forest is very good after treatment. The main objective for this forest is timber production, but in accordance with CNFM other purposes were targeted as well. The target tree species composition is an uneven aged, multi-layered mixed Chinese pine-broadleaved tree species forest. The management includes: identifying and marking "goal trees", liberation from competition of those trees through thinning (e.g. crown thinning), supplemental plantings of broad-leaved species and artificial scarring of the soil in order to promote natural regeneration. The final spacing should be about 150 trees/ha, the target diameter is 38cm.

Techniques

As mentioned earlier, CNFM has a number of tools at its disposal, which can and should be used flexibly. That being said, when it specifically comes to the transformation of monocultures into natural forests, there is a series of steps commonly applied, which is introduced in this section in logical order.

Tree Marking and Target Tree Selection

CNFM is generally applied with the goal of producing, at least partially, high quality timber that can be sold at higher prices than, for example, mass-grown, lower quality wood from commercial plantations. Such high-quality trees, however, don't just "grow" by themselves. They have to receive optimal conditions in order to achieve the desired quality.

But what are these optimal conditions? Generally, there are four major factors contributing to timber quality: the history of a given tree (what kind of management it received when it was young), the site conditions, the growing space and the light that the tree has received and its inherent genetics. Only one of these factors can be changed at present: the growing space. But choosing a tree that has experienced a favorable history and shows superior genetics is even more essential. Thus, the practice of target tree marking and selection are crucial.

Target trees

Target trees (also called Z trees) are defined as well-growing, good quality, long living and high-value trees that play an important role in stand stability and productivity and can be harvested after reaching maturity. Unless damaged after selection, they usually remain target trees until their harvest. While there is no hard limit, they make up about 150 trees/ha (or 10–15%).

Competitor trees

Trees competing for Z trees' crown space are usually removed. These trees are called competitor trees. Compared to Z trees they are of inferior quality and often show a smaller crown, a main stem with many side branches or even forks or other damages.

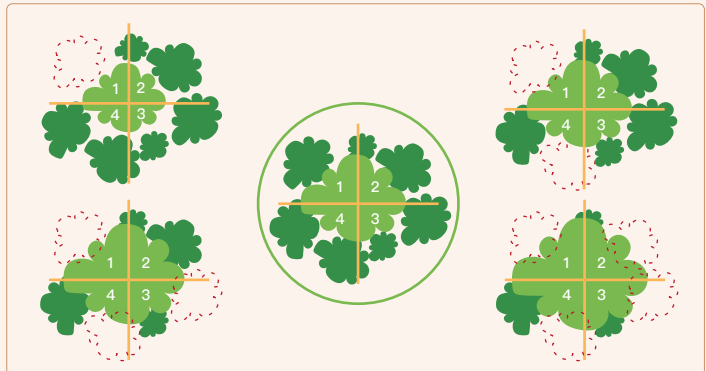
Other Target Tree Types

Other types of target trees are promoted in a similar fashion to Z trees (which, if not specifically mentioned, usually refer to target trees for timber purposes). The main difference is the selection criteria for these other target trees. These types of trees are retained due to their importance for the forest ecosystem either by ensuring a specific species mix, having a higher water conservation value, adding to a visually appealing landscape or by contributing to structural diversity. Thus, they are often rare local species, old trees or "damaged" trees that have high habitat value. Depending on the main purpose of the forest there can be more Z or other types of target trees, although traditionally Z trees dominate and other Z tree types fill in space.



Thinning out Competitor Trees

Once competitor trees have been identified, they are thinned out. It is important to note, however, that not all trees next to Z trees are considered competitor trees. If the crown cover is reduced too much, the timber quality of the target trees suffers, thus only trees threatening the vitality of a Z tree (usually two trees surrounding one at most) are selected. Under CNFM, inferior trees not competing with Z trees will not be thinned. That way different densities and structures can be achieved. Usually the competing trees are removed from at least two to three quadrants to release space for the target trees to grow (see right graphic). After felling the disturbing trees, the canopy density should be above 0.6.



Thinning disturbing trees from an increasing number of quadrants as the tree grows



Thinning of a Z tree from disturbing trees

Assisted Natural Regeneration (ANR)

Thinning of target trees is, of course, a form of ANR. In order to encourage a diverse and healthy regeneration, however, there are several other tools available besides planting seedlings. These include everything that accelerates natural successional processes, such as soil scarring, weeding out competing species (especially shrubs and grasses), prescribed burning and grazing.

Enrichment Planting

At times and often due to a lack of natural seed source of later successional or rare species, it is necessary to actually manually re-introduce specific species through enrichment planting. Other reasons for using enrichment planting are to improve the site or soil conditions (e.g. through using nitrogen fixing species), providing short-term livelihood alternatives like fruit or increasing the overall economic value by introducing high-value timber species. Species used for enrichment planting in Wangyedian include:

- *Quercus mongolica*
- *Tilia mongolica*
- *Sorbus pohuashanensis*
- *Pinus koraiensis*
- *Picea asperata*
- *Acer pictum*

Target Diameters and Final Harvest

Thinning of competitor trees should be done two to three times throughout the life cycle of a Z tree. The final harvest of the Z tree should be done once it reaches its target diameter or target diameter range. Removing the Z trees fully releases the developing understory. A few years later new Z trees can be selected.

The forest farm and community co-management system

One of the most enduring lessons in forestry in the past years is that forests and people cannot be separated. While the forests in Wangyedian are formally state-owned, many local communities depend with their livelihoods on them. Be it the harvest of small-scale timber for firewood or the collection of wild mushrooms and other NTFPs — local people depend on and interact with the forest. As such, it is in the interest of both the forest farm and the local people to jointly work together to sustainably use the forest's resources.

Wangyedian hosts about 18 villages and 35,000 people. The majority of the villagers residing here are Han people and about 20% belong to minorities, such as the Manchu or Hui people.

For the first time since its establishment, Wangyedian Forest Farm, together with APFNet, attempted to establish a forest farm and community co-management system. For this **Andangou** (按丹沟), a village with about 2,800 people, was selected as a demonstration village. The village was composed of 70% Han, 20% Manchus and 10% Huis.

Initially, a village co-management and coordination committee was established. This committee is responsible for the coordination between the farm and the village and weighing in on decisions on forest-related issues. The village committee (including its directors) are directly voted by the village people and serve three years per term.

Based on a socio-economic and forest resource survey previously done, a **ten-year village-level co-management plan** was developed together. As the parts of the forest land belonging to the villagers are under their full jurisdiction, the plan for those parts was based on their management goals with the help and consultation of the forest farm. Overall, the forest area managed under this plan covers 1,200ha and is divided into 15 management units. Forest rangers from the forest farm and villages patrol and manage those forests together.

As such, the plan has 4 objectives:

Protection of forest resources

Mainly to protect the forest from illegal logging, hunting and grazing.

Forest Fire Prevention

October to March is the fire season in Wangyedian, so the forest farm patrols together with the fire risk crew.

Pest and Disease Control

Against often invasive pests, such as the bark beetle (*Dendroctonus valens*), Siberian silk moth (*Dendrolimus superans*) and European gypsy moth (*Lymantria dispar*).

Livelihood Improvement

Livelihoods will be improved through NTFP development and the promotion of ecotourism.

The Forestry Worker Team



In order to increase the amount of labor available to conduct many forest field activities and involve more villagers in the management of the forests, about 100 villagers with a comparatively low workload from Andangou (60 men, 40 women, average age of 49) were trained by the forest farm to do part-time work as forest workers. The tasks that they were trained in largely involves general forestry labor such as reforestation, weeding, thinning and harvesting (under the guidance of a forester)

and seed collection. Through employment as forestry workers, each villager's annual income increased by more than USD 1,200.

Training, Support and Capacity Building at Andangou Village

While forestry workers received more specialized training, it was a project goal to improve livelihoods for the entire village. As such, trainings and capacity building sessions for villagers on a variety of topics were held. These include workshops focusing on NTFP development and sustainable utilization, such as producing edible mushrooms, identifying and collecting new species of edible wild mushrooms without damaging the mycorrhizae or collecting and drying fruits and nuts in the surrounding areas.

Additionally, in order to reduce the local demand for fire wood and thus the pressure on forests, energy saving stoves that connect the hearth in the kitchen with the heating system for the living room, also called the Kang bed system, were installed in 20 households. This will reduce the use of fuel wood from about 16kg per household per day to about 10.5kg.



Old (top) and new (bottom) stove



Silvopasture

Perhaps the oldest agroforestry system in the temperate world, silvopastoral systems are characterized by integrating trees with forage and livestock production. This can range from creating woodlands with actual pasture to using forests for their forage supplies. While this has been traditionally done for a long time in Wangyedian, a more sustainable form of silvopasture in forests was introduced. This way the use of understory space and NTFPs can be maximized.

To facilitate the new system, a contract was signed between the forest farm and farmers. Each farmer rents a certain amount of forest area where they let their livestock graze. At the same time, they are responsible for preventing forest fires, protecting the forest and ensuring a sustainable use of the forest resources. The forest farm, in turn, provides funds for constructing necessary facilities, like a chicken house to shelter the animals at night.

For the demonstration phase, two households were selected, one to raise chickens and one to raise pigs. The chicken raising can earn about USD 1,440 annually, while pig raising can earn as much as USD 7,200 per year.



Forest Fire Prevention and the Forest Fire Crew

While Wangyedian is significantly more humid than other parts of Inner Mongolia, each winter it still faces the threat of forest fires. Due to the monsoonal climate in the area, which brings about 80% of the annual rain between June and August, Northern China's winters are extremely dry. Often all it takes is a cigarette bud carelessly thrown away to ignite an inferno.

In order to effectively prevent and control forest fires, the forest farm set up the **Forest Fire Crew**, a team of forest fire rangers monitoring the forest farm, divided into six sub-areas. This crew consists of employees from the forest farm and people from local communities, together creating a semi-professional firefighting and prevention team. The project supported 30 sets of wind-force fire extinguishers to equip the Forest Fire Crew.

The project also supported the establishment of 30km of fire lines and co-financed a camera surveillance system to monitor for forest fires.

Fortunately, so far the forest farm has never experienced large-scale fires (the largest fire affected 13ha in 2003). Usually fires stay below a hectare when they occur, thus only necessitating the use of smaller tools.



Forest fire crew with wind-force fire extinguishers

China's National Forest Fire Prevention System and Wangyedian

In China, forest fire prevention activities are under the responsibility of the administrative chiefs of local governments. Governments and departments at different levels must establish and maintain forest fire prevention systems to proactively implement the guideline of “prevention first, effective suppression second”.

As prescribed in the *Regulations on Forest Fire Prevention*, governments at the local and county level (and above) set up, supervise and manage forest fire prevention command centers, responsible for organizing, coordinating and directing all forest fire prevention activities in the administrative region. Forestry administrations of local governments assume the day-to-day duties of forest fire prevention command centers. The authorities of other local governments provide help as needed.

The organization system of forest fire prevention in China



In the case of Wangyedian, three levels unite together for fire prevention and control: Meilin town, the forest farm and the villages. They will develop the predetermined precept, regulations and rules for fire prevention and control, and all levels share the risk and responsibilities together.

Everybody, including normal villagers, are responsible for forest fire prevention whenever they go into a forest. The three levels put up posters and use cars going through villages for warning or awareness raising. The fund for forest fire prevention is mainly supported by local governments.

Community Nurseries

Nurseries are the foundation to ensure that genetically superior trees will be planted in the forest. While, as mentioned before, this is not necessary everywhere and for every species given that natural regeneration can replace that need and lower costs, often the overall economic value of the forest can be increased by using high-value timber species in the mix.

In addition to the existing nursery and an integrated chicken rearing-tree seedling nursery supported by the project, Wangyedian Forest Farm cooperated with Dalaisen Seedlings Co. Ltd. and the local villagers to establish a nursery. Each party had different roles: the forest farm provided technical support to the nursery in the beginning, while the villagers (about 30 households), provided the land (10ha) in return for shares in profit and work on the nursery. The company owns the nursery, meaning it produces the seedlings and sells them back to the forest farm if the farm does not produce enough seedlings in their own nurseries.

Each year around 200,000 seedlings are produced, earning about USD 430,000 with a profit of around USD 86,000. These seedlings are sold in wider Northern China, including Beijing, Tianjin, Hebei, Shanxi, Liaoning and other areas in Inner Mongolia.



Non-Timber Forest Products (NTFPs)

NTFPs are useful resources, materials and/or commodities obtained from forests and do not require the logging of trees. In short, they include most things that can be found in a forest aside from timber. This includes mushrooms, oils, plants (for food and medicine), game animal (for meat and fur), nuts and seeds, berries, fuelwood, fish and spices.

Common Bracken *Pteridium aquilinum*



The common bracken (*Pteridium aquilinum*), also known as eagle fern, is a species of fern occurring in temperate and subtropical regions. Common bracken is an herbaceous perennial plant, deciduous in winter. The large, roughly triangular fronds are produced singly, and grow to one to three meters tall.

Edible Uses

The root, once cooked, can be dried and ground into a powder. The root is very fibrous so traditionally it was baked after being dried, the outer skin is peeled off and the roots pounded into a powder so that the inner fibres could be removed. The dried root can be stored for years. This powder can e.g. be used for making dumplings.

Young shoots, known as croziers, are harvested when the fern is still unfurling and can be eaten raw or cooked. They can be used like asparagus or spinach and taste somewhat flavorless, though they are considered a delicacy in Japan. The fronds should be used when less than 20cm long, as longer ones have a terrible taste.

Communities' participation and local livelihood improvement

Wild NTFPs

Wangyedien itself has a range of NTFPs, considering that 741 species of vascular plants and 162 species of macro fungi (including both edible and medicinal fungi) can be found on the farm area. Some of the most common NTFPs are:



Bugbane *Cimicifuga dahurica*



Bugbane (*Cimicifuga dahurica*) is a perennial herb growing to 1.5m by 0.8m. It flowers from August to September, and the seeds ripen from September to October. It can be toxic if not used appropriately, but has many medicinal uses.

Medicinal Uses

This plant is an anti-inflammatory herb that lowers fevers and reduces pain. The root is pain-relieving, antibacterial, antiviral, detoxifying, fever-reducing and sedative. It is used internally in the treatment of coughs, colds, headaches, gum diseases and feverish infections such as measles. The root is harvested in the autumn and used fresh or dried.

Wide-leaved Nettle *Urtica laetevirens*



The wide-leaved nettle (*Urtica laetevirens*) is a perennial plant growing to one meter. It flowers from June to August, and the seeds ripen from August to October.

Edible Uses

Young leaves, when cooked, are a very nutritious food that is high in vitamins and minerals. It makes an excellent spinach substitute and can also be added to soups and stews. Only the young leaves should be used, and gloves are worn when harvesting to prevent from getting stung. Although the fresh leaves have stinging hairs, thoroughly drying or cooking them destroys these hairs. Nettle beer is brewed from the young shoots.

Communities' participation and local livelihood improvement

Brown Slimecap

Chroogomphus rutilus



Chroogomphus rutilus, commonly known as the brown slimecap or the copper spike, is a species of fungus in the Gomphidiaceae family. The fungus lives beneath pine trees, with which it forms ectomycorrhizae. The copper-brown cap of this attractive fungus is slimy when wet and dries to a bright glossy copper sheen. This mushroom is one of the most common edible wild mushrooms in Wangyedian, eaten fresh or after drying. It has no peculiar smell and is easy to preserve after drying. The texture is like fresh liver, soft and delicious, and in soup it is also fresh and delicious. Medicinally used it can cure neurodermitis.

Honey Mushroom

Armillaria gallica



Armillaria gallica is a species of honey mushroom in the family Physalacriaceae. The species is a common and ecologically important wood-decaying fungus that can live as a saprophyte, or as an opportunistic parasite in weakened tree hosts to cause root or butt rot. It is found in the temperate regions of Asia, North America and Europe, and is a high-quality wild edible fungus with medicinal uses. It usually grows in late summer and early fall on a variety of needles, broad-tree roots, fallen wood, decaying and cut stumps and occasionally on the ground.

Jersey Cow Mushroom

Suillus bovinus



Suillus bovinus, also known as the Jersey cow mushroom or bovine bolete, is a pored mushroom in the family Suillaceae. It's a common fungus native to Europe and Asia. The fungus grows in coniferous forests and pine plantations. It is edible and can be easily collected and sold in summer and autumn. This species also has anti-carcinogenic properties.

Manchurian Hazelnut

Corylus mandshurica



Corylus mandshurica is a shrub growing up to 4.5m tall, usually forming several high branching stems. The bark is dark gray and fissured. It grows at an elevation between 400m and 2,600m in temperate forests (mixed and coniferous) as under-growth and occasionally forms thickets.

The edible nuts grow in clusters of three or four and have a rich nutritional value. It is also known as the “King of Nuts”, one of the most popular nuts in Northern China.

Korean Pine

Pinus koraiensis



Pinus koraiensis is a species of pine known commonly as the Korean pine. It is native to East Asia (Korea, northeastern China, Mongolia and central Japan) and even found in the temperate rainforests of the Russian far east. In the north of its range, it grows at moderate altitudes, typically 600m to 900m, whereas further south, it is a mountain tree, growing at 2,000m to 2,600m altitude in Japan. Korean pine nuts are edible and sold commercially. It is in fact the conventional pine nut found in most markets. Korean pine is also an excellent source of timber, the wood is versatile and very useful for construction. It is light, with straight grains, and easy to work. It is used for a great variety of products, including telephone poles, railroad ties, bridges, boats, plywood and flooring, furniture, sports equipment and musical instruments.

Siberian Apricot

Prunus armeniaca



The Siberian apricot (*Prunus armeniaca*) is the most commonly cultivated apricot species. Its native range is somewhat uncertain due to its extensive prehistoric cultivation, though it almost certainly originates from somewhere in Asia. It is cultivated extensively in many economies and has escaped into the wild in many places. The fruit can be eaten raw, cooked or dried. The best forms are soft and juicy with a delicious rich flavor. Wild trees yield about 47.5kg of fruit per year. The fruit is about 5cm in diameter and contains one large seed. The seed can be consumed raw or cooked. Bitter seeds should be eaten in strict moderation, but sweet ones can be eaten freely. The bitter seeds can be used as a substitute for bitter almonds in making marzipan and other foods. An edible gum is obtained from the trunk. The seed contains up to 50% of an edible semi-drying oil.

Mushroom Farming

Collecting mushrooms from the forest is an excellent way to subsidize one's income. Those mushrooms, however, are generally very seasonal and the amount that can be sustainably harvested is limited. Given the high domestic demand for edible fungi, this presents a large gap and an even larger opportunity.

In 2008, Aromatic Fungi Ltd. was established and built its first mushroom production facility in 2009. Since 2012 it has been producing edible fungi and is considered one of APFNet's earliest partners. Soon after, due to the success of Aromatic Fungi, other mushroom farming enterprises sprung up with varying business models and species grown. Most of these work with the forest farm to obtain base material.

One could say the forest farm, local communities and the businesses and cooperatives form a type of "symbiosis": the forest farm provides thinning and logging slash of suitable species to the mushroom farm and local communities. This type of slash is necessary for making mushroom spawns, on which the mushrooms grow. For the local communities the company is an important employment opportunity, in the case of Aromatic Fungi Ltd. employing 20 people as full-time staff and about 85 cooperative members who are involved in managing various aspects of mushroom growing or collecting wild mushrooms. In other cases people partially own the cooperative and get a share of its profits.



Nameko mushrooms growing out of sawdust bags

Communities' participation and local livelihood improvement

The different mushroom farms grow a range of different mushroom species, such as the hedgehog fungus (*Hericium erinaceus*), morel (*Morchella esculenta*), black wood ear (*Auricularia auricular*), shiitake (*Lentinus edodes*), oyster mushroom (*Pleurotus ostreatus*) and the nameko mushroom (*Pholiota nameko*). For example at Aromatic Fungi Ltd. every year, around 1,000 tons of frozen fungi, 100 tons of salted fungi and 50–60 tons of dried fungi are produced (including produced and picked wild mushrooms). Products are mainly sold in China, but some are even exported to other economies like Russia, Japan and Korea. Due to their success mushroom farms are now an essential income source for over 70% of the 11,000 households in Wangyedian. Each household increased their average annual income by 1,000RMB. Counting the wider mushroom-related work, over 2,000 people are directly employed by Aromatic Fungi Ltd. and other companies in this field in Wangyedian.



High value medical NTFP planting

The forest farm is exploring the sustainable use of NTFPs of medicinal or nutritional value, such as Chinese angelic tree (*Aralia elata*) and the umbrella polypore (*Polyporus umbellatus*).

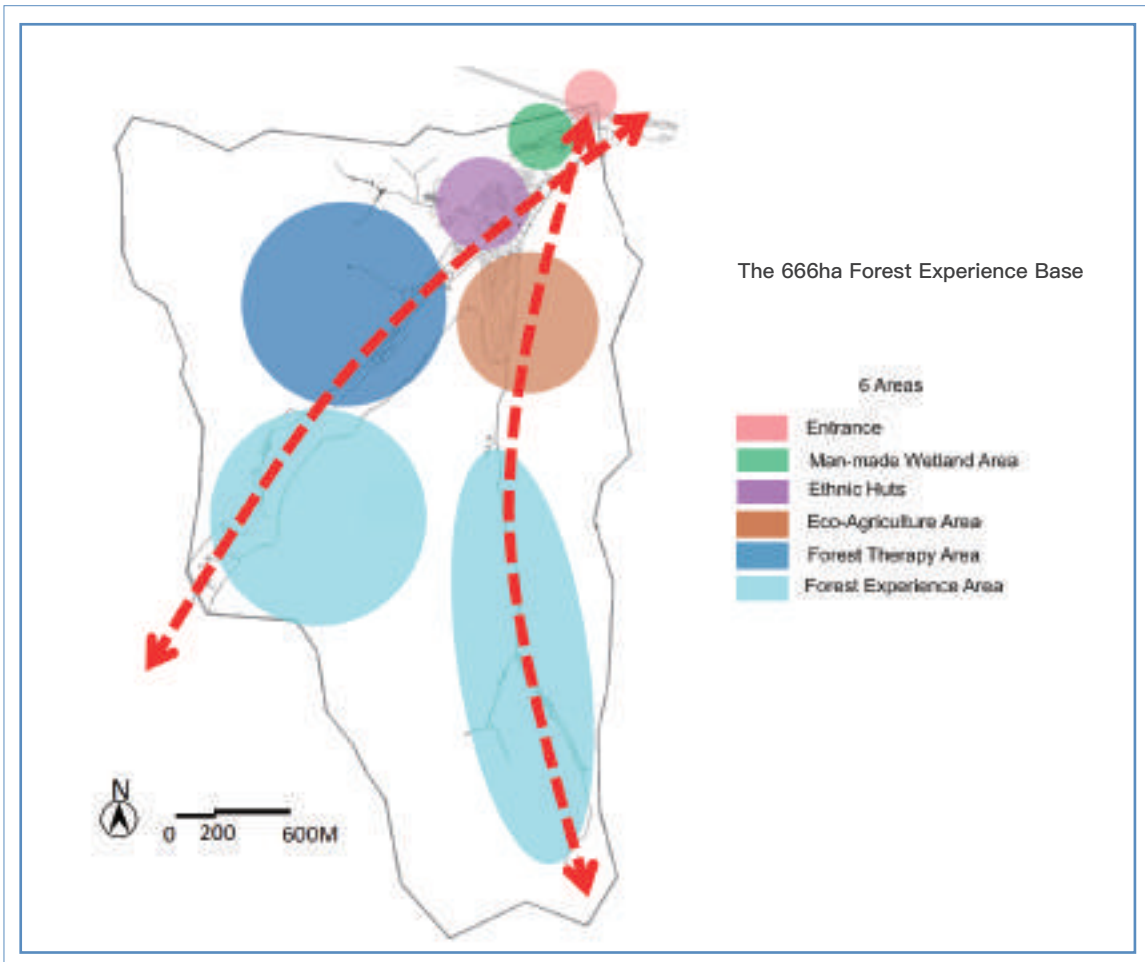
The umbrella polypore, for example, contains bioactive compounds with immune system activating, anticancer, anti-inflammatory and liver protecting properties. So far, one hectare of this mushroom, around 5,000 mushroom spawns, have been planted in the forests. It takes about two to three years until they are ready for harvest.



Forest Training and Education

The Forest Experience Base

Forestry is, perhaps against first intuition, much more complicated than it seems. Many different concepts, such as multi-functional forestry or close-to-nature forestry have sprung up in the past decades. Forests are increasingly appreciated for their multiple functions. New ways to use forests, for example through ecotourism, are emerging. However, to really teach visitors about all of this an immersive experience has to be created – enter the 666ha Forest Experience Base. Visitors will be able to go to different parts of the base to learn everything there is to learn about forests and forestry. In the center is the **APFNet Multifunctional Forest Experiment and Training Center** which also a central education hub.



APFNet Multifunctional Forest Experiment and Training Center



The APFNet Multifunctional Forest Experiment and Training Center

The APFNet Multifunctional Forest Experiment and Training Center, established in 2014, presents a major milestone in APFNet’s goal to enhance its capacity building efforts in Northern China. Only four hours away from the APFNet headquarter, it presents an ideal location — both immersed in nature and forests, but also close enough for international participants — to conduct workshops and conferences. The center, which can also provide limited accommodation, serves both as an outreach and educational platform to share best practices and lessons learned.

Some of those workshops include:

- **“Forest Rehabilitation in China and APFNet Project Achievements–Sharing Session”**: 28 participants responsible for six different APFNet projects participated in the meeting to share experiences gained through APFNet projects on topics like forest restoration, desertification mitigation and remediation, watershed management, ecotourism, multi–functional forestry and sustainable forest management.



- **“New Concepts of China’s Forestry Development and University Program Cooperation”**: This workshop was co–organized by APFNet and the Beijing Forestry University. It promoted dialogue and cooperation among forestry universities in China and Thailand, and put forward practical and feasible suggestions for future cooperation.



- **“International Conference on Smallholder Forestry and Forestland Fragmentation: Sharing Lessons and Experience between East Asia and Europe”**: Co–organized by the Food and Agriculture Organization (FAO), the National Forestry and Grassland Administration (NFGA), APFNet and the Renmin University of China, this international conference identified better policy practices and interventions to address forest fragmentation related to smallholder forestry. Experiences from Austria, Cambodia, China, Germany, Portugal, South Korea, Sweden and Thailand were shared.

Forest culture development

The Wangyedian Arboretum

Experiencing the full diversity of Wangyedian's flora in a short period of time can be difficult for visitors. Thus, the arboretum of Wangyedian collects and showcases the main species present in Wangyedian on only 8ha. No less than 100 species, including trees, shrubs and herbs are displayed here with easily readable name plates. The even more curious can scan the displayed QR codes for more information.

- | | |
|-------------------------------|----------------------|
| ① Entrance | ⑫ Pavilions |
| ③ Pond Viewing Platform | |
| ④ Flowers & Herbaceous Plants | |
| ⑤ Shrubs | ⑥ Landscaping Trees |
| ⑦ Other Trees | ⑧ Local Plants |
| ⑨ Aquatic Plants | ⑩ Walking Path |
| ⑫ Old Larch Stand | ⑪ Information Center |



The APFNet Arboretum

Forest Recreation and Ecotourism

With increasing prosperity, the immaterial benefits forests can bring are becoming increasingly important. Therefore forest recreation and ecotourism do not only present new ways that forests can benefit people, but also new sources of income and livelihoods. While ecotourism has existed in many tropical economies for a while, China still benefits mostly from its domestic travelers. Thus, only in the past few years has ecotourism emerged as a new opportunity.

Forest Experience and Forest Therapy Trail

In Wangyedian, ecotourism opportunities were recognized early on. While basic facilities were already present, in 2013 a 2.2km long forest trail next to the headquarters of the forest farm was transformed into an educational and therapeutic forest experience trail. The trail is sub-divided into different themes, such as reforestation, forest biodiversity, forest products, close-to-nature forest management and forest therapy. In each theme, different facilities help tourists understand forests at a deeper level. For example, different plants with their Chinese and Latin names are marked along the path.

To help children understand forest biodiversity in a fun way, underground animal homes were artfully recreated and integrated into a playground. Other ways to “discover” nature include games to guess trees by their bark.



Underground animal homes



Forest therapy facilities

Forest therapy, a concept that originated in Japan and was inspired by German practices, incorporates elements of mindfulness, a deepened communication with nature and the aim to experience one's surroundings with all senses.

Barefoot walking, forest meditation and yoga, but also simple breathing exercises during walking are not uncommon. There is no strict set of actions one must do, rather as long as the activities allow the practitioner to slow down and reconnect with nature, it is deemed useful. Part of the trail in Wangyedian's forest was designed to experience the forest with all five senses. Special barefoot walking areas have been created, but also designated spots for meditation and breathing exercises.

The Cabins in the Woods

“Forest experience” can of course be achieved by simply stepping inside a forest. Depending on the season and type it can draw visitors in immediately. At times, the setting for this experience can be enhanced, however. Forests, for one, are often also cultural spaces. A creaky hanging bridge over a river, an abandoned water well, a lonely cabin in the woods — these are things people connect to forests as much as the trees that make up the forest themselves. To create such an enhanced forest experience, APFNet created a number of facilities on a “forest recreation demonstration site”. This area is meant to be explored and discovered by tourists that chance upon it — like a surprise they did not expect.



Bridges and houses at the cabin in the woods

APFNet Around the World – Ethnic Huts

APFNet works in economies all over Asia–Pacific and therefore what better way to showcase this than offering visitors the opportunity to experience the economies’ culture and architecture through different huts, each designed according to the style of traditional houses in that economy?

Initiated in 2018, 24 new ethnic huts contribute to the ecotourism potential of Wangyedian Forest Farm and provide commercial accommodation that can be booked online. While previously only a limited amount of accommodation was available in the experience center, with these huts more tourists than ever have access to the ecotourism sites. Each hut has an area of about 60m², with a living room, bedroom and bathroom that can accommodate up to two people. The Chinese hut is 120m² and features one living room, two bedrooms and a bathroom, accommodating up to four people. Each hut has a queen–size bed and a TV, as well as an air conditioner.

Economies Available

Australia, Bangladesh, Cambodia, Canada, China, Fiji, India, Indonesia, Lao PDR, Malaysia, Mexico, Mongolia, Myanmar, Nepal, New Zealand, Papua New Guinea, Peru, Philippines, Singapore, Sri Lanka, Thailand, USA, Viet Nam



Training of Locals for Ecotourism

Ecotourism is still a new field for locals in Wangyedian. Typical employment opportunities, like working in hotels, as tourism guides or selling local products are not necessarily within the experience of the local communities. Thus, APFNet and Wangyedian Forest Farm are conducting trainings to teach locals about forest therapy, ecotourism and hotel management. This way the ecotourism industry in Wangyedian can be sustained in the long term beyond APFNet's direct involvement.







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