GIAHS Proposal

Shexian Dryland Stone Terraced System

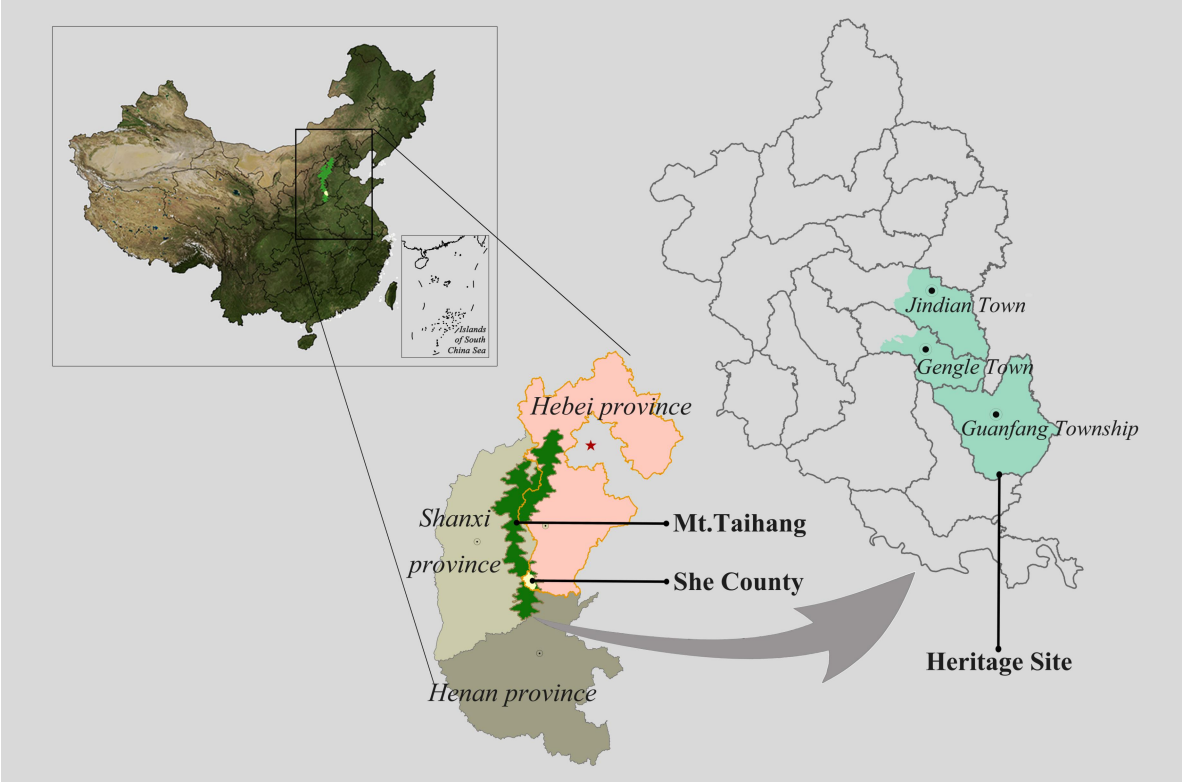
The People's Government of Shexian County,

Hebei Province, P. R. China

May, 2022

Contents

1 Summary Information

Name/Title of the Agricultural Heritage System: Shexian Dryland Stone Terraced System
Requesting Agency/Organization: The People's Government of Shexian County, Hebei Province, China
Responsible Ministry (for the Government): Ministry of Agriculture and Rural Affairs of the People's Republic of China
Location of the Site:    Shexian is located in the eastern foothills of Mount Taihang, southwest of Hebei Province and west of Handan City. It is located at the junction of Shanxi, Hebei and Henan provinces. It is bordered between 36°17′-36°55′ north latitude and 113°26′-114°00′ east longitude. The Shexian Dryland Stone Terraced System is located in the towns of Jingdian, Gengle and Guanfang on the southeastern end of Shexian where the largest and most representative stone terraced fields are distributed.
Accessibility of the Site to Capital City or Major Cities: Shexian is 93 km away from the Handan East High-speed Railway Station, 84 km and 107 km away from the Handan Airport and the Changzhi Airport respectively. The Handan-Changzhi Railway and the Qingdao-Lanzhou Expressway span the whole county. The

Mount Taihang Expressway and the Qingdao-Lanzhou Expressway meet at Shexian, and the expressway exit is only 10 km from the heritage site.
Area of Coverage: Shexian covers an area of 1,509 km^2. The total area of the heritage site is 204.35 km^2, of which the area of stone terraced fields is 27.68 km^2 (about 2,768 ha).
Agro-Ecological Zones (for Agriculture, Forestry and Fisheries): Agroforestry ecological zone in mountainous areas
Topographic Features: Shexian is a transitional zone between the Loess Plateau and the North China Plain. The terrain slopes from the northwest to the southeast. The elevation of the heritage site is between 350 and 1150 m above the sea level and the maximum slope is up to 66 . The landforms of the heritage site are mainly mountains, including high mountains, low mountains and valleys.
Climate Type: Shexian is a temperate continental monsoon climate with cold and dry winters, hot and rainy summers, and dry and rainless spring and autumn. The annual average temperature of the heritage site is 12.5 ℃, the annual sunshine hours are 2478.7 hrs, and the annual average precipitation is 540.5 mm of which 70% is concentrated in the summer.
Approximate Population (Beneficiary): In 2021, the total population of Shexian was 432,754; The registered population of the heritage site was 40,127, and the resident population was 26,141.
Ethnicity/Indigenous population: Shexian is dominated by the Han nationality, which accounts for more than 99% of the total population. There are also 22 ethnic minorities such as Mongolian, Zhuang, Tibetan and Yi, accounting for less than 1%.
Main Source of Livelihoods: In 2021, the income from migrant workers in the heritage site accounted for about 69% of the total income, that from the production of agricultural products was about 23%, and that from the processing and sales of agricultural products, tourism services and other sources accounted for about 8%.

Executive Summary (one page approximately):

Shexian Dryland Stone Terraced System is a rain-fed agricultural system in mountains, developed by the local ancestors through adapting to and transforming the harsh natural environment and inherited from generation to generation. It can be traced back as late as to the 27th year of Zhiyuan (a reign title of Kublai Khan) of the Yuan Dynasty (1290). In the vulnerable ecological environment, the local people realized a long-term co-evolution of the growing population, the gradually opened terraces and the intelligent farming techniques through the conservation of biodiversity and the inheritance of cultural diversity. In this way, they achieved a regional sustainable development in the northern limestone mountainous area lack of soil and rain.

Shexian is well-known for walnut and Chinese prickly ash in China. Their qualities are famed far and wide. In addition to walnut and Chinese prickly ash, millet, corn, soybean, black jujube and other agricultural and forestry products are also yielded in the terraces. After a long period of evolution, terraces on the hillside, forests and shrubs on the top, and villages and rivers in the valley have formed a complex ecosystem that does not only provide local people with rich and varied food sources, but also has important ecological functions such as soil and water conservation, biodiversity conservation, and nutrient cycling. By taking full advantage of local diversified crop and variety resources, the local people have developed farming techniques of “storing the grain productivity in the farmland”, storage techniques of “keeping food in the cellar” and survival skills of “saving food from the mouth”, which has effectively guaranteed their food security, livelihood security and social well-being.

Shexian Dryland Stone Terraced System has witnessed the development of dryland farming in Northern China, and left a strong cultural imprint in Mount Taihang and even Northern China. In production and life, the local people have created unique farming techniques and formed rich and diverse cultural customs, which has made the heritage system be dynamically inherited for hundreds of years, and never be interrupted in history. The value system of the heritage system is full of the wisdom of traditional agriculture, representing the essence of dryland farming culture in Northern China, and has important practical significance for the construction of ecological civilization, sustainable development of agriculture, and rural revitalization in the modern society.

2 Description of the Agricultural Heritage System

2.1 Significance of the Proposed GIAHS Site

2.1.1 Location and Description of the Heritage Site

(1) Geographical Location

Shexian Dryland Stone Terraced System is located in Jingdian Town, Gengle Town and Guanfang Town in the southeast of Shexian in Hebei Province, China. It is comprised of 15 administrative villages from Jingdian Town, 15 administrative villages from Gengle Town and all 16 administrative villages of Guanfang Town, making for a total of 46 administrative villages (Fig. 2.1.1). The total area of the heritage site is 204.35 km^2, among which stone terraced fields cover 27.68 km^2 (approximately 2,768 ha).

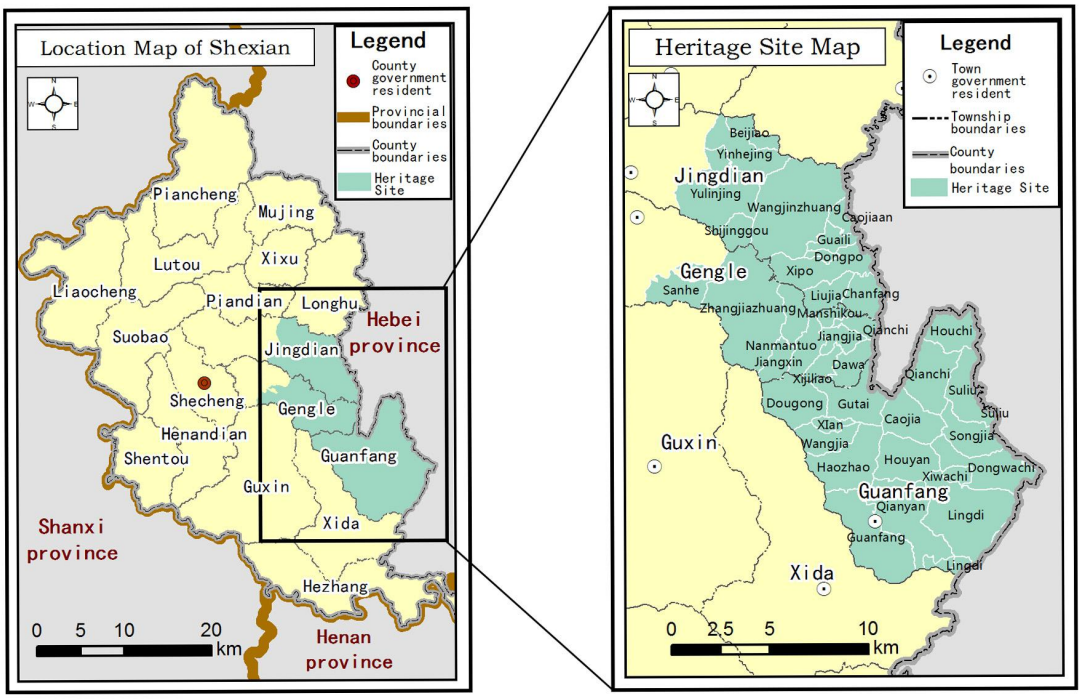


Fig. 2.1.1 Location of the Heritage Site

(2) Natural Environment

The four seasons are distinct in the heritage site, with concentrated rainfall in the hot seasons, and dry climate during the cold seasons. Average annual precipitation is

540.5 mm, but as 70% of that is concentrated in the summer, there is a shortfall in local water resources on one hand, while floods are common in July to August on the other. The heritage site has an elevation between 350 to 1150 m above sea level, with a slope gradient up to 66° at its steepest, featured by landform such as mountains, hills and valleys (Fig. 2.1.2). The bedrock is mostly limestone and thus easily eroded. Soluble substances within have mostly been dissolved and eroded by water, with merely 5% left to form soil. The soil-retention capacity of the bedrock under soil is relatively low and soil is easily washed away, causing the soil layer to be thin and discontinuous. Along with the large amount of cracks present in the bedrock, signs of seepage are serious. Therefore, the nature environment of the heritage site can be characterized as “high mountains and steep slopes, more mountainous than flat land, more rock than soil, arid and dry”.

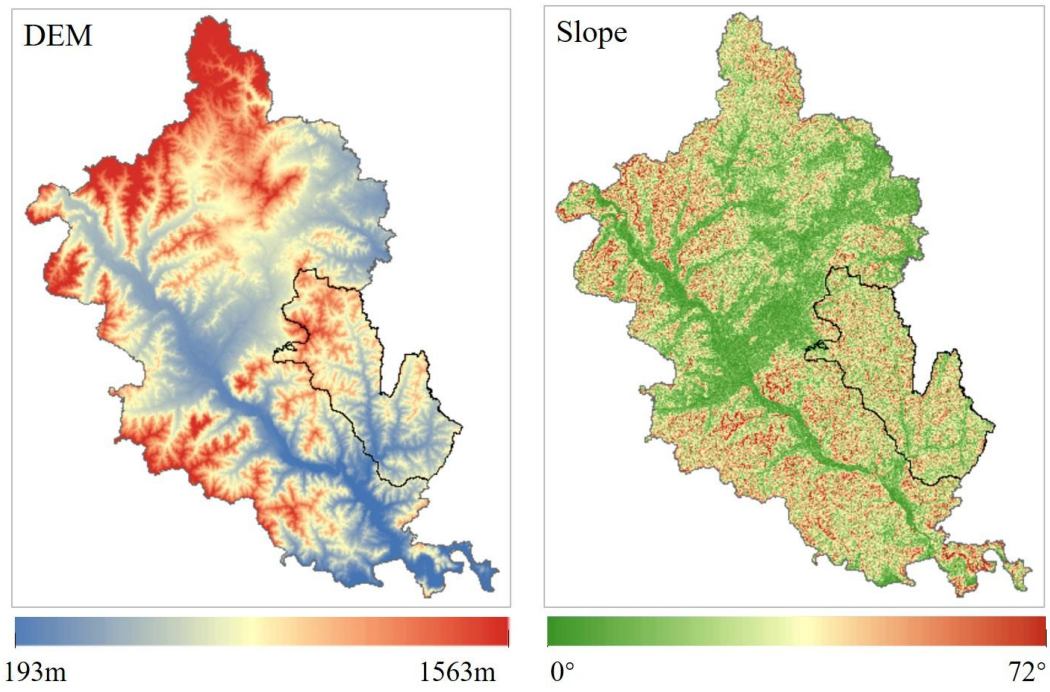


Fig. 2.1.2 Topographical Characteristics of Shexian (heritage site framed in black)

In order to reduce the loss of soil and water and gain as much arable land as possible, the locals constructed large numbers of stone terraced fields along the steep mountains (Fig. 2.1.3). The stone terraced fields in the heritage site can be characterized as “orderly, crowded, grand”, and are an outstanding representative of the terraces in Mount Taihang in particular and Northern China in general.

Fig. 2.1.3 Stone Terraced Fields in the Heritage Site

(3) Demographics and Economy

In 2021, the total population of the heritage site was 40,127. The total labour force was 23,633, equivalent to 58.2% of the total population. The agricultural labour force had 17,235 members, making up 57.2% of the total labour force. The agricultural labour forces of Jingdian Town, Gengle Town and Guanfang Town were 7,708, 3,183 and 6,344 respectively, corresponding to 62.8%, 57.2% and 51.5% of their local labour forces (Fig. 2.1.4). Among the three towns, Guanfang had the largest agricultural labour force in both proportional and absolute terms.

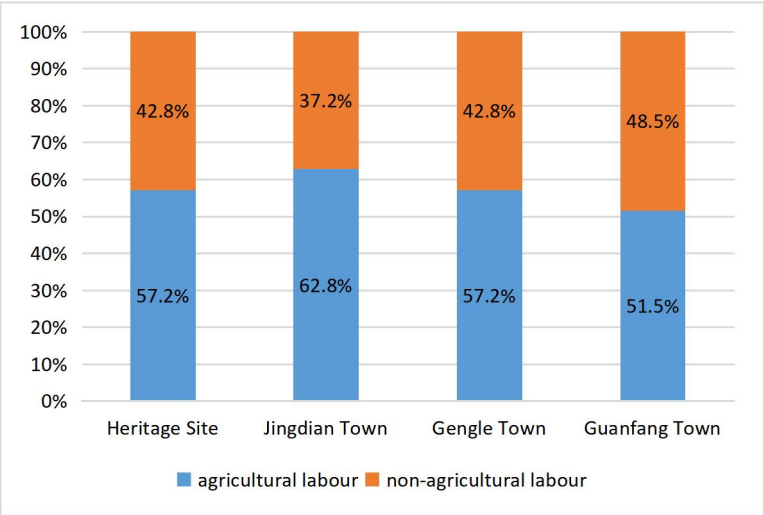


Fig. 2.1.4 Composition of Labour Forces in the Three Towns (2021)

The agricultural added value of the three towns in 2021 was 232.57 million CNY, with crop plantation contributing 47.9% to the total, followed by animal husbandry (31.7%) and forestry (18.5%). From Fig. 2.1.5, it can be seen that crop plantation and animal husbandry make up the bulk of the agricultural industry in the heritage site, contributing 79.6% to the total added value.

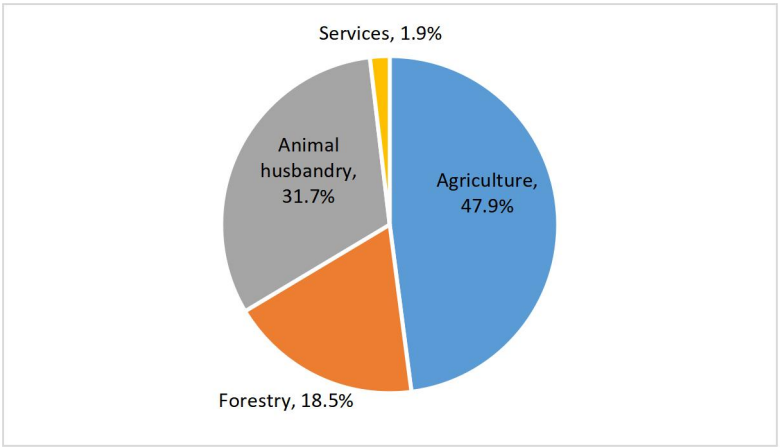


Fig. 2.1.5 Composition of Agricultural Added Value in the Three Towns (2021)

2.1.2 Historical Background and Significance

(1) Historical Provenance

The Mount Taihang region is one of ancient Chinese civilization origins. Shexian, located deep in the Mount Taihang, has a long history of over 1000 years. In 2005, the China branch of the UNGEGN awarded Shexian "An Ancient County of Thousand Years' History", an honorary title of the historical-cultural heritage of geographical names of China (Fig. 2.1.6).

Fig. 2.1.6 Shexian's Honorary Title of "An Ancient County of Thousand Years' History"

The *Shexian Records* (*Shexianzhi*), compiled in 1799 during the reign of the Qing dynasty Jiaqing Emperor, recorded that "Xiaozhaigou, located in the northeast of Gengle Village, is the place where Zhao Jianzi hid from enemies in the Warring States period (475 BC - 221 BC)". At that time, due to the need of stationing soldiers and immigration, ancient people initiated primitive agricultural production on the dryland of foothills far away from the Zhang River. Thus, it is deduced that human activities near stone terraced fields can be reliably traced back to the Warring States period more than 2500 years ago.

From the Warring States period to the Song and Yuan dynasties (960 – 1368 CE), successive wars drove refugees to deep Mount Taihang. They built mountain strongholds and dug stone terraced fields. Such ancient strongholds as the Kangya Stronghold in Wangjinzhuang Village were mostly built during the early years of the

southern Song dynasty, that can still be found in Shexian. These ancient mountain strongholds prove that large numbers of people lived in remote mountain regions and mature “stone piling” techniques already existed at that time.

According to historical research on the villages near the stone terraced fields, permanent settlements had already begun to appear in this area since the Yuan dynasty (Table 2.1.1). Wangjinzhuang Village was one of the earliest villages that were established based on stone-ridge terrace farming, and its stone terraced fields can be traced back as late as to the 27th year of Zhiyuan (a reign title of Kublai Khan) of the Yuan Dynasty (1290).

Table 2.1.1 The Establishment of Villages Based on Stone Terraced Fields in Shexian throughout History

Period	Number of Newly Built Villages	Area of Newly Reclaimed Terraced Fields (mu[1])	Newly Increased Population
1271 - 1368	7	7,600	6,896
1368 - 1457	75	68,712	53,991
1457 - 1505	19	13,933	11,484
1506 - 1565	23	16,404	14,507
1566 - 1620	13	8,450	6,398
1616 - 1661	19	9,907	8,563
1661 - 1735	32	18,762	16,156
1735 - 1795	33	11,114	9,214
1796 - 1850	74	9,950	5,566
1850 - 1911	98	11,579	8,999
1911 - 1961	21	1,327	1,156

Although the natural environment and living conditions were harsh in Shexian, there was still a certain amount of soil and rainfall that enabled people to conduct agricultural production. Besides, people who came from the central plains had accumulated mature farming technologies. Therefore, they could maintain their basic livelihood by building terraces on dryland and planting drought-tolerant crops.

[1] 1 ha = 15 mu

Through the long-term agricultural practice, the local people also developed a deep attachment to the terraces. More and more people were willing to stay here, reproduce their children and live and work in peace and contentment.

(2) Historical Evolution

Migration was the main force driving the expansion of stone terraced fields. The numbers of new villages founded upon stone-ridge terrace farming, the amount of newly reclaimed farmland and increases in permanent population displayed various characteristics during different historical periods (Table 2.1.1). Generally speaking, the evolution of the dryland terrace system of Shexian underwent an initial period of development in the late Yuan and early Ming dynasties, an expansionary period in the mid to late Qing dynasty, a quality enhancement period lasting from the establishment of the PRC to the "Learn from Dazhai in Agriculture" movement of the 1960s, and the current threats and challenges period against a backdrop of modern urbanization (Fig. 2.1.7).

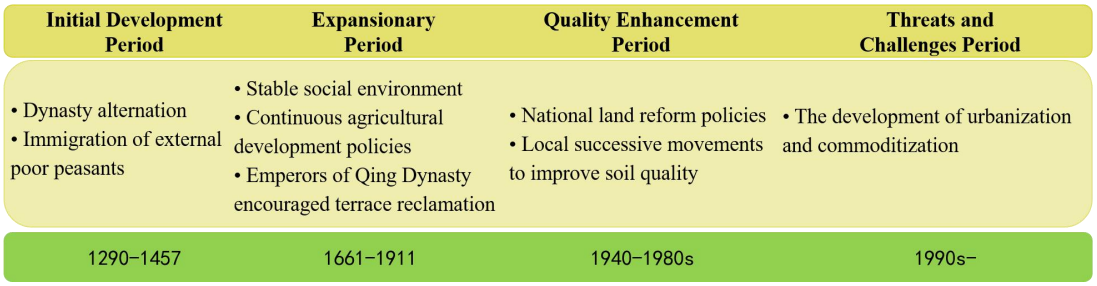


Fig 2.1.7 Timeline of the Historical Development of the Stone Terraced Fields of Shexian

Initial Development Period (1290 to 1457): The social upheaval caused by the collapse of the Yuan dynasty and the subsequent rise of the Ming dynasty drove many refugees in northern China to swarm into the Mount Taihang region in search of livelihood, which caused a rise in the number of villages and the permanent population of the region, and led to a significant increase in the acreage of stone terraced fields.

Expansionary Period (1661 to 1911): The rulers of Qing dynasty provided a stable social environment and relatively continuous agricultural development policies for the

development of stone terraced fields. The continued influx of migrants ensured that the acreage of terraces and the number of villages continued to increase.

Quality Enhancement Period (1940 to 1980s): From the last years of the Republic of China to the 1980s, under the influence of national land reform policies, Shexian launched successive movements to reclaim and repair the terraces, thicken the soil layer, and increase the soil fertility, which considerably enhanced the soil quality of the terraces and the vegetation cover of the mountain peaks.

Threats and Challenges Period (1990s to date): The development of urbanization and commoditization has brought many threats and challenges to the conservation of the stone terraced fields, such as the significant decreases in the number of natural villages, acreage of arable land, and soil fertility.

(3) Important Historical Roles

For many years, the Shexian Dryland Stone Terraced System has represented the history and accomplishments of the development of dryland farming in the mountain regions of northern China. On one hand, the dryland terrace system has absorbed large numbers of migrants driven to the region by government policies, war and famine, and provided them an important space to make a living. Through long periods of agricultural production, the locals selected and bred traditional dryland crop varieties, formed a traditional knowledge and technology system as well as an accompanying agricultural folk culture, which has played a key role in resisting external interfering forces, thus protecting the stability and sustainability of the livelihood of the local communities.

On the other hand, the dryland terrace system has protected the ecological environment of the mountain region for hundreds of years, and is a model for the ecological management in mountainous areas of northern China. Through long-term adaptation to the natural environment, the locals have effectively prevented the loss of arable soil due to steep slope gradients in the Mount Taihang region and reduced the risks of natural disasters such as landslides and debris flow by using measures such as

building terraces and trimming slope surfaces, planting Chinese prickly ash trees next to stone ridges and increasing vegetation cover on the mountain peaks.

2.1.3 Global Significance of the Heritage System

(1) Structure and Functions

The Shexian Dryland Stone Terraced System is jointly comprised of forests and shrubs in the mountain peaks, the stone terraced fields that wind up the mountains, the villages and rivers/river beaches in the valleys (Fig. 2.1.8).

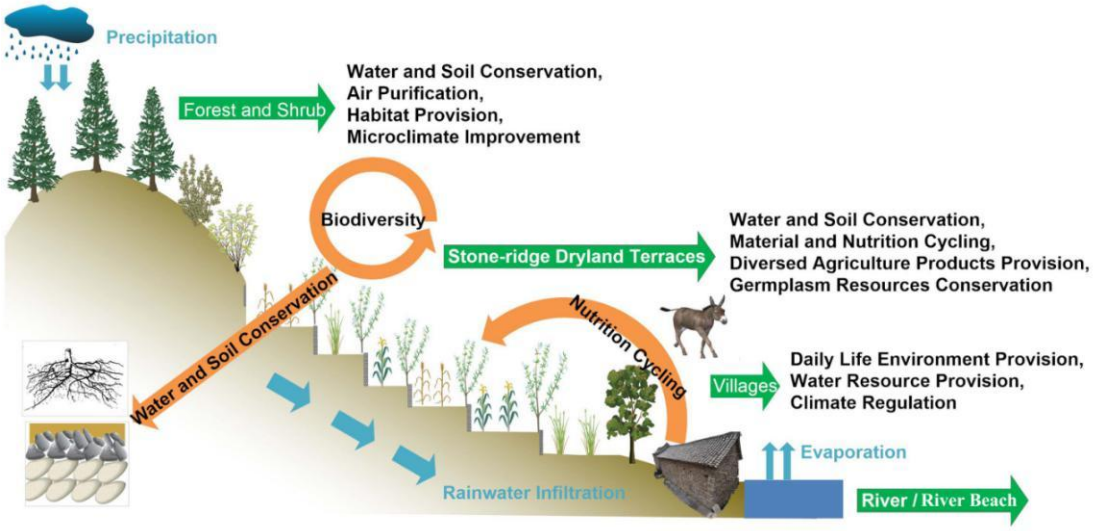


Fig. 2.1.8 Spatial Structure and Important Functions of the Heritage System

The forests and shrubs at the top of the mountains can reduce the soil erosion, improve the microclimate of local regions, provide habitats for flora and fauna and purify the air. By intercepting rainfall and increasing subsurface runoff, the forests and shrubs effectively reduce soil erosion and maintain soil moisture levels. Thick forest canopies block solar radiation, moderating the local microclimate. In the forests it is cool in summer and warm in winter, and temperatures remain stable between day and night, which is conducive to vegetation growth under trees and also makes forests become important habitats to animals. The vegetation in the forests and shrubs not only absorbs carbon dioxide, but also absorbs, to a certain extent, harmful gases such as sulphur dioxide, chlorine and hydrogen fluoride.

The stone terraced fields are able to maintain soil and water, achieve the cycling of nutrients and other materials, provide abundant agricultural products and protect germplasm resources. The building structure and maintenance processes of the stone

terraced fields are able to effectively reduce soil erosion and maintain soil moisture levels, thus playing a key role in conserving the natural environment. Various grains, cash crops and economic tree species are cultivated in stone terraced fields, not only providing locals with a diverse range of foods, but also significantly improving the biodiversity of the dryland terrace system. The local farmers return straw to the field for a long time, not only considerably increasing soil fertility, but also effectively improving soil structure, thus achieving the important function of organic material and nutrient cycling.

The villages not only provide locals with a good living environment, but also play important roles in harvesting rainfall to replenish water supplies and intergenerational cultural transmission. In order to ensure water supplies for production and daily life, the locals have built a series of rainfall harvesting facilities, and established an order of water use according to usage category, thus realizing the sustainable use of water resources. A farming culture focused on folk culture, food culture, architectural culture and donkey culture has been passed on for generations, with villages as its medium of transmission, making the dryland terrace system of Shexian a typical representation of dryland farming culture in northern China.

The river beaches are relatively flat and provide a certain area of arable land for the local population, therefore having a certain capacity for agricultural production. Seasonal river flows not only provide the local population with water during the rainy seasons, but also regulate the local microclimate through evapotranspiration.

(2) Values and Contemporary Relevance

1) Multiple Values

The Shexian Dryland Stone Terraced System bears livelihood, ecological, cultural, and landscape values (Fig. 2.1.9). The system bears food and livelihood values by producing not only grains such as millet, maize and beans, but also cash crops such as Chinese prickly ash, black jujubes and persimmons, not only ensuring the local population's food security, but also their basic nutritional needs. The processing and branding of these products has also realized the transformation of economic value, effectively enhancing farmers' incomes and regional development.

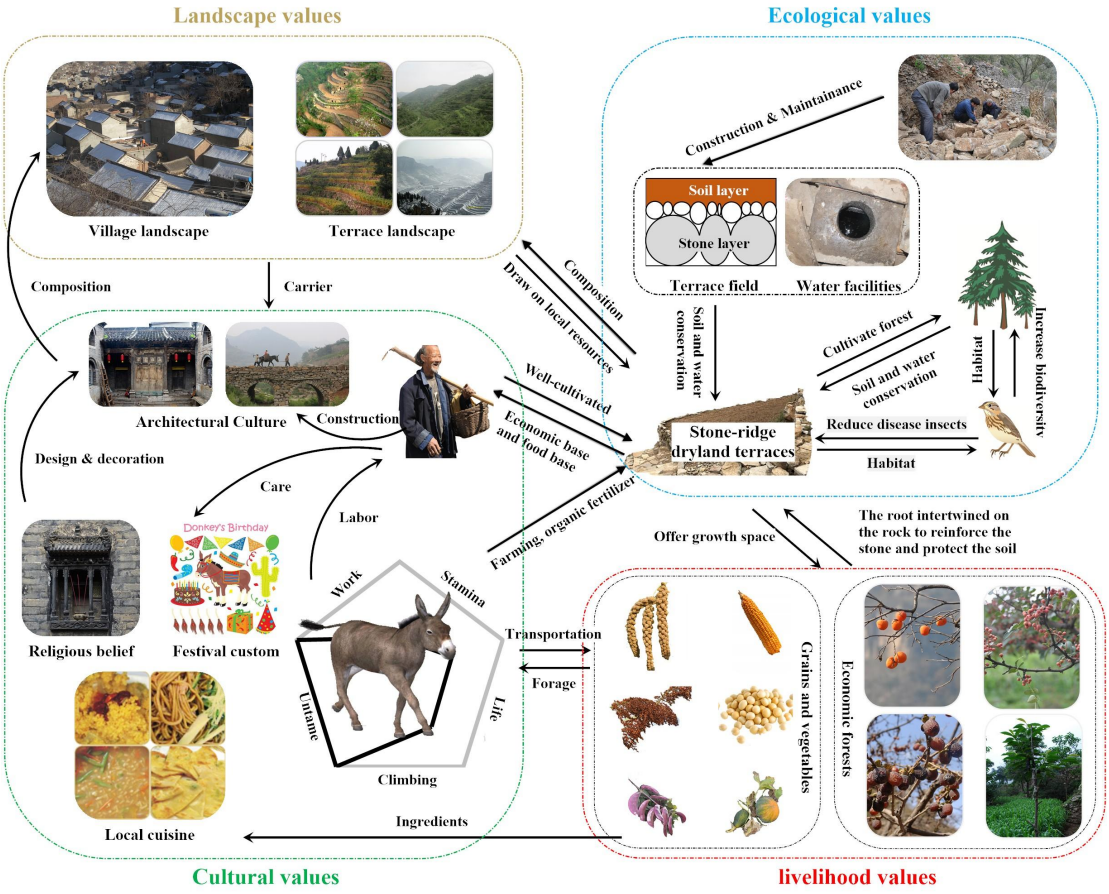


Fig. 2.1.9 Interaction of Different Elements in Heritage Value Systems

The heritage system is ecologically significant as it plays the important roles in soil and water conservation, biodiversity conservation and nutrient cycling. The construction and maintenance of stone terraced fields has effectively realized the modification of the slope surface and soil and water conservation; the building of such rainfall harvest and storage facilities as water tanks, water cellars and reservoirs has mitigated seasonal differences in precipitation levels and enhanced the system's ability to deal with floods and droughts. The forests in the mountain peaks have provided good habitats for wild flora and fauna, and the terraces on the mountainsides have greatly increased agro-biodiversity, while traditional farming techniques have adequately realized nutrient cycling.

Cultural values can be found in the cultural symbols and cultural practices inspired by such key cultural elements as donkeys, crops and stones and passed on for generations. The domestication of donkeys has provided an important source of organic fertilizer

for agricultural production in the terraced fields, while the highly intelligential donkey is also genuinely loved by the locals. The food culture borne in the harsh natural environment also fully reflects the dietary habits of the locals, which is centerd on the consumption of coarse grain. The locals' optimistic hopes for good weather favourable to farming have also evolved into religious practices that pray for blessings and drive away misfortunes.

The value of the landscape is reflected in its spatial structure, which can be described as "forests/shrubs – stone terraced fields – villages – rivers/river beaches", the different landscapes of the terraces in each of the four seasons, and breathtaking stone villages. Ancient villagers made ingenious use of local rich stone resources, and not only built spectacular stone terraced fields, but also unique stone villages. From the houses to the streets, from the windows to the furniture, the entire village looks like a natural stone museum.

2) Contemporary Relevance

The outstanding values of the dryland terrace system in aspects such as livelihood, ecology, culture and landscape bears important contemporary relevance to the civilized construction of the heritage site, the sustainable development of its agricultural sector and the revitalization of its villages.

The dryland terrace system has outstanding soil and water conservation abilities. The conservation and development of the heritage system bears important significance to the promotion of civilized ecological development in the heritage site, not only reducing the occurrence of natural disasters such as soil erosion, landslides and debris flow, but also providing a quality environment to the locals for daily life and economic production.

The dryland terrace system serves as a model for sustainable, cyclical agriculture. The conservation and development of the heritage system shall further promote the sustainable development of the agriculture in the heritage site. This not only aids the realization of long-term stability and diversity in food production, thus safeguarding the food security and nutritional needs of the local population, but also plays

important roles in the resource utilization and sustainable development of the heritage site.

The dryland terrace system is highly representative of multifunctional agriculture. The conservation and development of the heritage system shall play an important part in the revitalization of the villages of the heritage site. It will not only launch the production and processing of organic, green agricultural products, promoting the establishment of local brands and the value of local products, but also develop recreational farming and sustainable tourism, boosting farmers' incomes of the heritage site and developing the regional economy.

(3) Uniqueness and Significance

1) Uniqueness

Compared to other terraced systems in the world, the Shexian Dryland Stone Terraced System has its unique characteristics (Table 2.1.2).

Table 2.1.2 Comparison among Different Terraced Systems of GIAHS

	Hani Rice Terraces	Ifugao Rice Terraces	Olive Groves of the Slopes between Assisi and Spoleto	Shexian Dryland Stone Terraced System
Geographical Location	22°55′ N, 102°59′ E	16°84′ N, 121°00′ E	46°48′ N, 12°83′ E	36°38′N, 113°65′ E
Altitude	680-2000 m	800-1500 m	200-600 m	400-1200 m
Climate Characteristics	Subtropical monsoon climate with the average annual precipitation of 800 – 1300 mm and the average annual temperature of approximately 15℃	Tropical rainforest climate with the average annual precipitation of 2000 – 3000mm and the average annual temperature of approximately 27℃	Mediterranean climate with the average annual precipitation of 800 – 1100mm and the average annual temperature of approximately 13℃	Temperate continental monsoon climate with the average annual precipitation of 540mm and the average annual temperature of approximately 12.3℃
Historical Length	Approx. 1300 years	Approx. 2200 years	Approx. 1100 years	Approx. 750 years
Ridge Type	Mud	Mud	Mud and Stone	Stone
Crops Cultivated	Mainly irrigated crops, such as rice, banana, rubber, sugar cane, etc.	Mainly irrigated crops, such as rice, peas, mango, madder, etc.	Mainly irrigated crops, such as olives, grape, black celery, etc.	Mainly dryland crops, such as millet, maize, Chinese prickly ash, beans, etc.

Irrigation	Mainly relying on precipitation and forests on mountain tops to conserve water, thus forming a multi-step irrigation and drainage system that flows from high-elevation to low-lying areas	Mainly relying on precipitation and mountain springs, thus forming a multi-step irrigation and drainage system that flows from high-elevation to low-lying areas	Mainly relying on precipitation, thus forming a rainfall harvest and storage system that includes reservoirs, water tanks, water cellars and soil to store water

Most prominently, the system is built in a limestone mountain range with an annual precipitation level of less than 550 mm. “High mountains and steep slopes, more mountainous than flat, more rock than soil, arid and dry” are the main characteristics of the local natural environment. Thus, the locals built stone terraced fields to conserve soil and water, with the Chinese prickly ash trees to stabilize the stone ridges. Dryland crops with high adaptability and potential for large-scale production such as millet and maize are cultivated, and agricultural varieties bred to be strongly resistant to drought, disease and stress were developed. Facilities to harvest rainfall such as water tanks, water cellars and reservoirs, and traditional farming techniques that preserve soil moisture are used to deal with the common floods and droughts. Donkeys are important beasts of labour as they have high endurance and are adept at scaling hilly slopes, and their manure maintains the soil fertility by returning the digested straw to the field.

2) Global Significance

The global significance of Shexian Dryland Stone Terraced System can be summarized into three points as below. The heritage system can also contribute towards the realization of the UN’s sustainable development goals (SDGs), such as the eradication of poverty, the elimination of hunger and the sustainable development of cities and communities.

① A global model for the use of soil and water resources in mountainous areas

Located deep in the Mount Taihang, the dryland terrace system of Shexian has endured for hundreds of years. The rational utilization of soil and water resources is the epitome of the locals’ survival wisdom. The construction and maintenance of stone terraced fields and the building of rainfall harvest and storage facilities provide important logistical safeguards for the heritage system. Through the adoption of the traditional farming techniques characterized by “water and soil conservation, soil

nurture and use", the system is able to ensure the fertility of the fields not to deteriorate while conserving soil and water resources, therefore effectively solving the problems of seasonal rainfall fluctuations and local soil and water poverty.

② A global model for sustainable, ecological agriculture

The dryland terrace system is a typical rain-fed agricultural system in mountains. By breeding diverse species and varieties to resist disease and pests, the locals are able to attain stable income from agriculture, enjoy a range of foods and satisfy their nutritional needs. Through the use of nutrient cycling techniques such as returning straw to the fields, the locals are able to use the resources of the terraces in a sustainable way and ensure the fertility of the soil effectively, thus assuring the sustainable production of the crops in the terraces. To date, stone terraced fields still play important roles in agricultural production, provide the locals with a stable livelihood, and serve as a model for sustainable, ecological and cyclical agriculture.

③ A representative of dryland farming culture in northern China

The dryland terrace system has a profound farming culture which is branded deeply both in production techniques and daily life, and has left a pronounced cultural imprint on the Mount Taihang region and northern China. The locals created unique farming techniques during agricultural production and formed rich and diverse cultural practices, enabling the heritage system to be passed on as a dynamic system for hundreds of years without interruption. The value system of the heritage system is filled with the wisdom of traditional agriculture, and represents the essence of the dryland farming culture in northern China.

2.2 Characteristics of the Proposed GIAHS Site

2.2.1 Food and Livelihood Security

(1) Important Food Sources

Rich and diverse grain crops, cash crops and economic fruit trees are cultivated in the dryland terrace system of Shexian, not only providing ample food for the local population, but also preserving large amounts of valuable local varieties. The wide range of food and varieties have given the locals more choices in the face of natural disasters such as drought and floods, thus ensuring the food security of the heritage site and the livelihood security of the local population.

1) Grain and Cash Crops

The most important grain crops in the dryland terrace system are millet, maize and soybean. Other grain crops include wheat, sorghum, beans such as mung bean, adzuki and black bean, and tubers such as potato and sweet potato. Cash crops include oil-seed crops such as peanut, rapeseed and sesame, fibre crops such as cotton and hemp, vegetables such as long bean, carrot and pumpkin, and Chinese herbs such as Chinese thorowax root, red sage and weeping forsythia.

As it is drought-resistant, not picky about soil quality, highly adaptable and stress-resistant, millet is widely cultivated in the heritage site (Fig. 2.2.1). It is the local staple grain, and ranks second in terms of sowing area among autumn harvest crops. Local millet is harvested only once a year due to its long growing season, and it is cultivated using traditional methods. In each growing season, weeding is carried out by hand thrice, and only organic fertilizers are used. Thus, the local millet is of high quality, and the processed grain has a fine colour and flavour.

Fig. 2.2.1 Millet – An Important Grain Crop in the Heritage Site

Maize is a highly adaptable and productive grain crop, and thus widely cultivated in the heritage site. It is the largest crop harvested in autumn in terms of sowing area (Fig. 2.2.2). Local varieties such as "Golden Queen" and "White Horse Teeth" are still preserved and cultivated by the villagers using the "*yisuichuan*" method (breeding by selecting desirable progenitors) due to their high quality and good taste.

Fig. 2.2.2 Maize – An Important Grain Crop in the Heritage Site

2) Economic Fruit Trees

Shexian is home to Chinese prickly ash and walnut. Together with persimmon, they are known as "three treasures of Shexian". "Shexian walnut", "Shexian Chinese prickly ash" and "Shexian black jujube" have been successively designated as a China

Geographical Indication Protected Product. Besides Chinese prickly ash, walnut, persimmon and black jujube, main economic fruit trees planted in the dryland terrace system of Shexian also include Chinese pistache, apricot, pear, apple and peach.

Chinese prickly ash is resistant to cold, drought and disease, and especially suitable for cultivation in arid slopes or terraces. Shexian is a suitable area for the growth of Chinese prickly ash, and the heritage site is a core region for its cultivation. The production of Chinese prickly ash in Shexian accounts for about 20% of the total amount of national production. Shexian is the distribution centre for Chinese prickly ash in China, through which large amounts of Chinese prickly ash are distributed every year. Locals have planted Chinese prickly ash for over 700 years. Shexian Chinese prickly ash is known far and wide for high quality and yield, with seeds that are evenly-sized, brightly-coloured and extremely tongue-numbing, earning it the reputation of "Ten Mile Fragrance" (Fig. 2.2.3). Shexian is called the Home of Prickly Ash in China with rich germplasm resources. Local varieties of Chinese prickly ash include "*dahongpao*", "*xiaohongjiao*" and "*goujiao*", among which "*dahongpao*" is the most widely-cultivated variety in the heritage site, accounting for 95% of the total area. The yield of "*dahongpao*" is high and stable, and it is beloved by consumers for its thick husk, fragrance and rich oil content.

Fig. 2.2.3 Chinese Prickly Ash – An Important Economic Fruit Tree in the Heritage Site

Black jujube is a common economic tree species found in stone terraced fields, and are highly resistant to drought, disease and pest. Its yield is also relatively stable.

Black jujubes can be eaten as they are, or processed into noodles that are suitable for storage. These noodles were a main food source in the past famine years for the local population. Black jujube is classified into seed and seedless varieties. Black jujubes with seeds are produced by planting seeds and then grafting the saplings onto the rootstock of the Chinese wingnut. Seedless black jujubes originate from naturally induced chromosomal variation. Black jujube trees are usually planted in the center of the terraced fields, as its wide canopy provides shade. The trunk of the black jujube tree is stronger and harder than that of the Chinese prickly ash, and can be used as makeshift poles to leash donkeys (Fig. 2.2.4).

Fig. 2.2.4 Black Jujube – An Important Economic Fruit Tree in the Heritage Site

(2) Food Production and Processing

According to surveys, the sown area of millet, maize, soybean and sweet potato in 2021 was respectively 414 ha, 711 ha, 217 ha, and 135 ha (Table 2.2.1), making for a total sown area of 1,477 ha, equivalent to 12.8% of the total sown area in the county (11,555 ha). In 2021, the heritage site produced a total of 940 tonnes of millet, 2,864 tonnes of maize, 416 tonnes of soybeans and 4680 tonnes of sweet potato, respectively 30.3% of total millet production (3,099 tonnes), 8.1% of total maize production (35,531 tonnes), 24.0% of total soybean production (1,733 tonnes) and12.7% of total sweet potato production (36,875 tonnes) in the county.

Table 2.2.1 Production and Direct Sales of Important Grain Crops in the Heritage Site (2021)

Grain Crop	Sown Area (ha)	Yield (ton)	Sale Percent	Sales (CNY)
Millet	414	940	30.3%	2,482,000
Maize	711	2,864	8.1%	6,614,000
Soybean	217	416	24.0%	2,577,000
Sweet potato	135	4,680	12.7%	1,979,000

In proportion terms, maize enjoyed the greatest sales; 81.9% of maize was sold directly, at a total value of 6.61 million CNY. Soybean came next at 62.3%, with direct sales of 2.58 million CNY.Then, it is Millet at 42.4%, with direct sales of 2.48 million CNY. Sweet potato came last, with only 30.6% sold, though sales value greatly exceeded soybean at 1.98 million CNY. In 2021, the total sales of millet, maize, soybean and sweet potato amounted to 13.65 million CNY, constituting an important income source for the agricultural sector in the heritage site. Among the four, income from maize and soybean amounted to 67.3% of the total, a highly significant contribution to the agricultural income of the heritage site (Fig. 2.2.5).

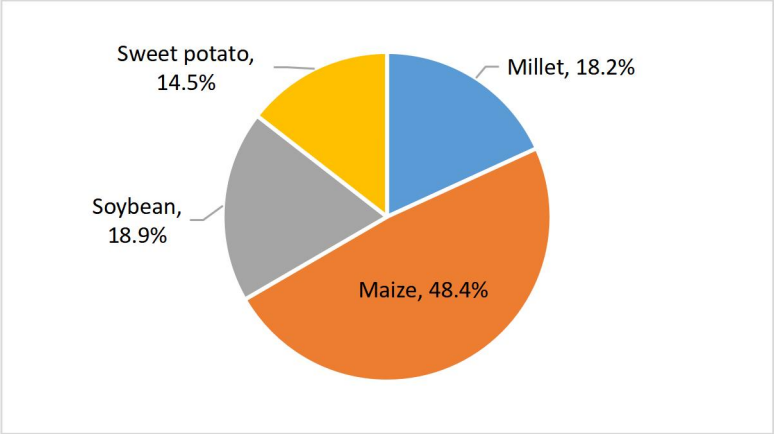


Fig. 2.2.5 Proportion of Income from Important Grain Products in the Heritage Site (2021)

According to surveys, the heritage site produced a total of 486 tonnes of Chinese prickly ash, 909 tonnes of black jujube and 1080 tonnes of walnut (Table 2.2.2),

registering respectively 30.2% of total Chinese prickly ash production (1,607 tonnes), 13.8% of total black jujube production (6,564 tonnes) and 14.4% of total walnut production (7,497 tonnes) in the county. It can be readily observed that the heritage site is a core region for the production of Chinese prickly ash in Shexian.

Table 2.2.2 Production and Direct Sales of Important Fruit Crops in the Heritage Site (2021)

Fruit Crop	Yield (ton)	Sale Percent	Sales (CNY)
Chinese Prickly Ash	486	97.8%	36,587,000
Black Jujbue	909	97.7%	3,903,000
Walnut	1,080	99%	7,560,000

More than 90% of Chinese prickly ash, black jujube and walnut produced in the heritage site were sold, with a total sales of 48.05 million CNY, equivalent to 3.5 times the total revenue from grain crops. This indicates that local farmers cultivate Chinese prickly ash, black jujube and walnut mainly for sale, which are an important source of income for the agricultural sector in the heritage site. In 2021, sales revenue from Chinese prickly ash, black jujube and walnut were respectively 76.1%, 8.1% and 15.7% of the total (Fig 2.2.6), indicating that Chinese prickly ash contributes greatly to agricultural income in the heritage site.

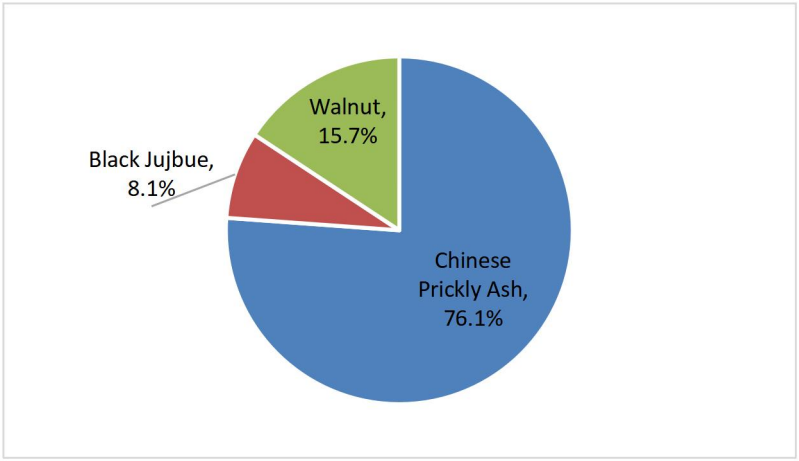


Fig. 2.2.6 Proportion of Income from Important Fruit Products in the Heritage Site (2021)

As the economy develops, living standards gradually improve, and notions of diet evolve from simple subsistence to wholesome nutrition. Coarse cereals such as millet, corn, beans become indispensable to the dinner table as they are highly nutritious and contain many nutrients beneficial to the human body. The famous “Wohuang Palace”

brand coarse cereal in Shexian was recognized as a “Superior Product” during the 8th China Agricultural Trade Fair. Shexian millet has also been processed into products such as millet vinegar and millet wine (Fig. 2.2.7).


Millet


Soybean


Adzuki Bean


Corn Grits


Black Bean


Mung Bean


Millet Vinegar


Millet Alcohol

Fig. 2.2.7 Processed Products of Important Grain Crops in the Heritage Site

The husk of the Chinese prickly ash is mainly used as seasoning, but can also be used in traditional Chinese medicine, while its seeds can be pressed to obtain oil. Processed products obtained from the Chinese prickly ash are well-received by consumers. Apart from Chinese prickly ash, walnut, black jujube and persimmon are also processed into various products in Shexian (Fig. 2.2.8). In recent years, Shexian has been working on the development of characteristic agricultural products and building its own brand. For example, Shexian has held the Cultural Festival of Terraced Millet for two years to promote its characteristic agricultural products. Nowadays, these agricultural products are increasingly popular with consumers in surrounding cities like Shijiazhuang, Zhengzhou, Shanghai and Beijing.


Dried Chinese Prickly Ash


Chinese Prickly Ash Oil


Black Jujube


Dried Persimmon




Walnut Kernel　　Walnut Oil　　Honey　　Chinese Chive Paste

Fig. 2.2.8 Processed Products of Important Fruit Crops in the Heritage Site

(3) Role in Livelihood Maintenance

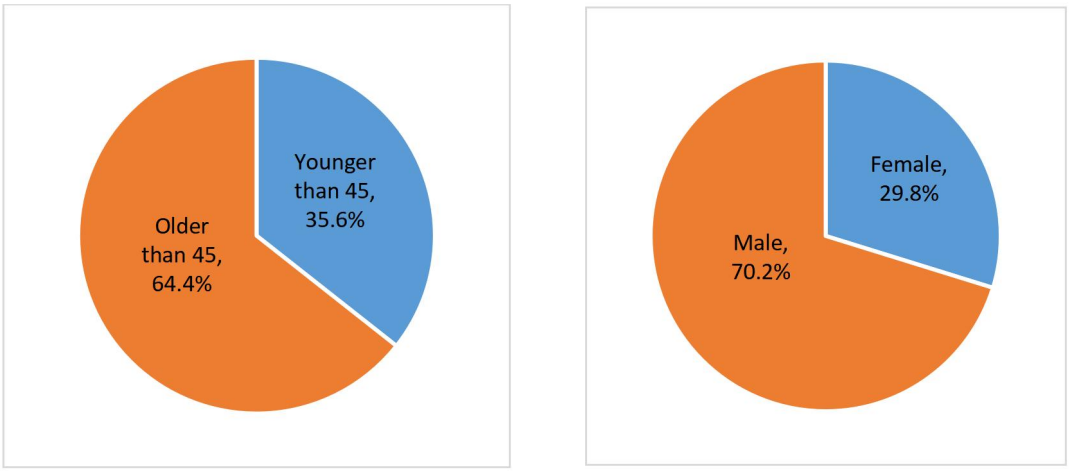
1) Promoting Labour Employment

Shexian Dryland Stone Terraced System does not only allow locals to produce and process agricultural products such as millet and Chinese prickly ash, but also provides a base for the development of the local tourism industry, thus playing an important role in boosting the employment of the local labour force. According to surveys, a total of 18,823 people were employed in the sectors related to agricultural heritage in the heritage site, accounting for 72.0% of the resident population (Table 2.2.3).

Table 2.2.3 Labour Employed in Sectors related to Agricultural Heritage (2021)

Sector	Total Employment	Local Farmers		
		Total	< 45 Years of Age	Female
Production of Agro-products	17,235	17,235	6,149	4,891
Processing and Sales of Agro-products	657	657	212	261
Tourism Services	470	470	204	241
Inheriting of Traditional Culture	97	97	23	57
Other Sectors	364	364	118	153
In Total	18,823	18,823	6,706	5,603

Agricultural heritage also attracted youths and females, who has played an important role in its conservation and management. Table 2.2.3 showed that among those employed in related sectors, 6,706 individuals were below 45 years of age (35.6%); 5,603 individuals were female (29.8%) (Fig. 2.2.9).



Age Structure Gender Structure

Fig. 2.2.9 Age and Gender Structure of Labour Employed (2021)

The production of agricultural products (grain and fruit combined) is the biggest driver of labour force employment locally. In 2021, this sector employed 17,235 individuals (91.6% of the total), while a further 657 people were employed in the sector of agricultural product processing and sales (3.5% of the total), and 470 persons (2.5% of the total) were employed in the tourism services sector (Fig. 2.2.10)

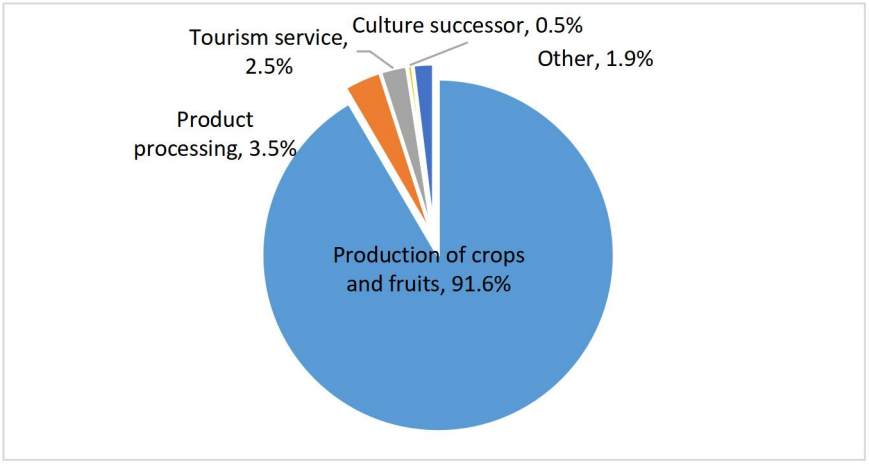


Fig. 2.2.10 Sector Structure of Labour Employed (2021)

2) Promoting Economic Development

Relying on the dryland terrace system, Shexian people engage in agricultural production, processing and sales, and gradually develop leisure tourism and rural tourism, which has played an important role in boosting the development of the local economy and maintaining social harmony.

According to surveys, the total rural income in the heritage site was 364.48 million CNY (Table 2.2.4). Remittances from working outside accounted for 68.6% (249.95 million CNY), followed by the production of fruits (57.11 million CNY) and crops (20.73 million CNY), the latter two comprising 21.4% of the total rural income (Fig. 2.2.11). This indicates that the production of grain and fruit crops are important sources of rural income in the heritage site.

Table 2.2.4 Rural Income in the Heritage Site (2021) (million CNY)

Town	Total Income	Working Outside	Crop Production	Fruit Production	Livestock Raising	Business
Jingdian	135.10	86.35	8.27	23.67	4.28	12.53
Gengle	81.23	44.81	3.16	24.05	2.35	6.85
Guanfang	148.15	118.79	9.30	9.39	0.74	9.94
In Total	364.48	249.95	20.73	57.11	7.37	29.33

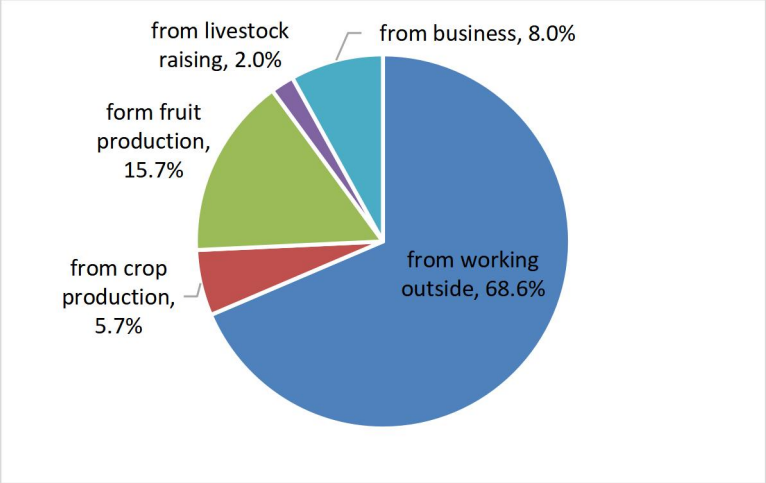


Fig 2.2.11 Rural Income Structure in the Heritage Site (2021)

As a proportion of total rural income, remittances from working outside were highest in Guanfang Town at 80.2%, while crop production and livestock raising combined made up less than 15.0% of the total. Remittances contributed 63.9% and 55.2% to the economy of Jingdian Town and Gengle Town respectively, while crop production and livestock raising combined contributed around 40.0%. The difference is that the income from crop production contributed 6.1% to the rural income in Jingdian Town, significantly higher than the 3.9% in Gengle Town, whereas that from fruit

production made up 29.6% of the rural income in Gengle Town, highest among the three towns in terms of proportion.

3) Increasing Rural Income

The dryland terrace system of Shexian plays an important role in increasing the rural income of local people. According to surveys, per capita rural income in 2021 was 9,124 CNY. Remittances accounted for 6,257 CNY, production of crops 519 CNY, production of fruits 1,429 CNY, and others (including engaging in agricultural product processing, tourism services, cultural heritage) 919 CNY (Table 2.2.5), equivalent to 68.6%, 5.7%, 15.7% and 10.1% respectively (Fig. 2.2.12). Work outside is still the main source of income for farmers in heritage sites, but relying on local agricultural cultural heritage resources to develop income from services such as agricultural product processing, tourism services, and cultural inheritance is becoming another effective way to increase farmers' income.

Table 2.2.5 Per Capita Rural Income in the Heritage Site (2021) (CNY)

Town	Per Capita Income	Working Outside	Crop Production	Fruit Production	Others
Jingdian	9,484	6,061	580	1,662	1,180
Gengle	9,628	5,311	375	2,850	1,091
Guanfang	8,581	6,880	538	544	619
In Total	9,124	6,257	519	1,429	919

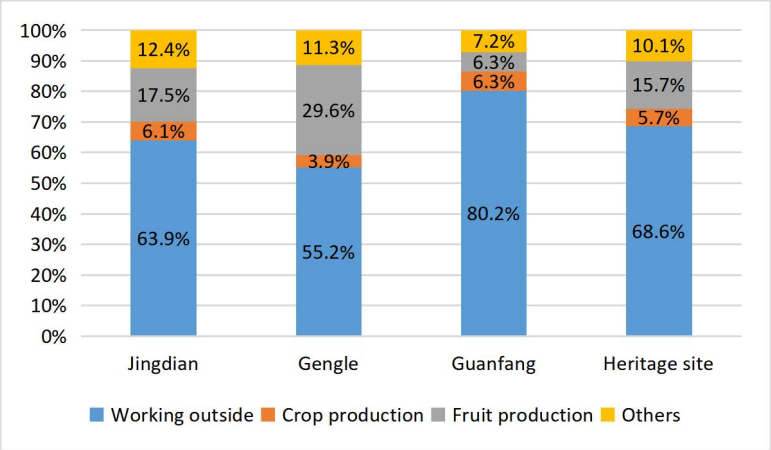


Fig. 2.2.12 Per Capita Income Structure in the Heritage Site (2021)

2.2.2 Biodiversity and Ecological Functions

(1) Agro-biodiversity

The dryland terrace system of Shexian is extremely rich in agro-biodiversity. According to surveys, grain (staple) crops in the stone terraced fields include 5 kinds of grain, 3 kinds of legumes and 2 kinds of tubers. Cash crops include 6 kinds of oil-seed crops, 1 kind of fibre crops, 9 kinds of Chinese herbs and over 30 kinds of vegetables. Fruits include 1 kind of dry fruits, 8 kinds of fresh fruits and 2 kinds of others. Eight kinds of livestock and one kind of fowl are domesticated in the villages (Table 2.2.6, Fig. 2.2.13).

Table 2.2.6 Agricultural Species in the Heritage System

Category	Sub-category	Species
Staple Crops	Grain	*Wheat, Maize, Millet, Sorghum, Broomcorn Millet*
	Legumes	*Soybean, Mung Bean, Adzuki Bean*
	Tubers	*Potatoes, Sweet Potatoes*
Cash Crops	Oil-seed Crops	*Peanut, Rapeseed, Sesame, Sunflower, Perilla, Castor*
	Fibre Crops	*Hemp*
	Chinese Herbs	*Chinese Thorowax Root, Red Sage, Weeping Forsythia, Catnip, Chrysanthemum, Belamcanda Chinensis, Chinese Skullcap, Anemarrhena*
	Vegetables	*Cabbage, Radish, Carrot, Long Bean, Cowpea, Hyacinth Bean, Pumpkin, Wild Cabbage, Scallion, Chinese Chives, Tomato, Brinjal, Cucumber, Squash, Garlic, Spinach, Celery, Rape, Coriander, Chinese Mustard, Asparagus, Celtuce, Orange Daylily, Calabash, Chilli Pepper, Wintermelon, Loofah, Chrysanthemum Coronarium L., Lettuce, Cherry Tomato, green pepper, etc.*
Fruits	Dry Fruits	*Black Jujube, Walnut*
	Fresh Fruits	*Persimmon, Apple, Pear, Peach, Apricot, Grape, Pomegranate*
	Others	*Chinese Prickly Ash, Chinese Pistache*
Domesticated Animals	Livestock	*Ox, Horse, Donkey, Mule, Hog, Sheep, Goat, Rabbit*
	Fowl	*Chicken*

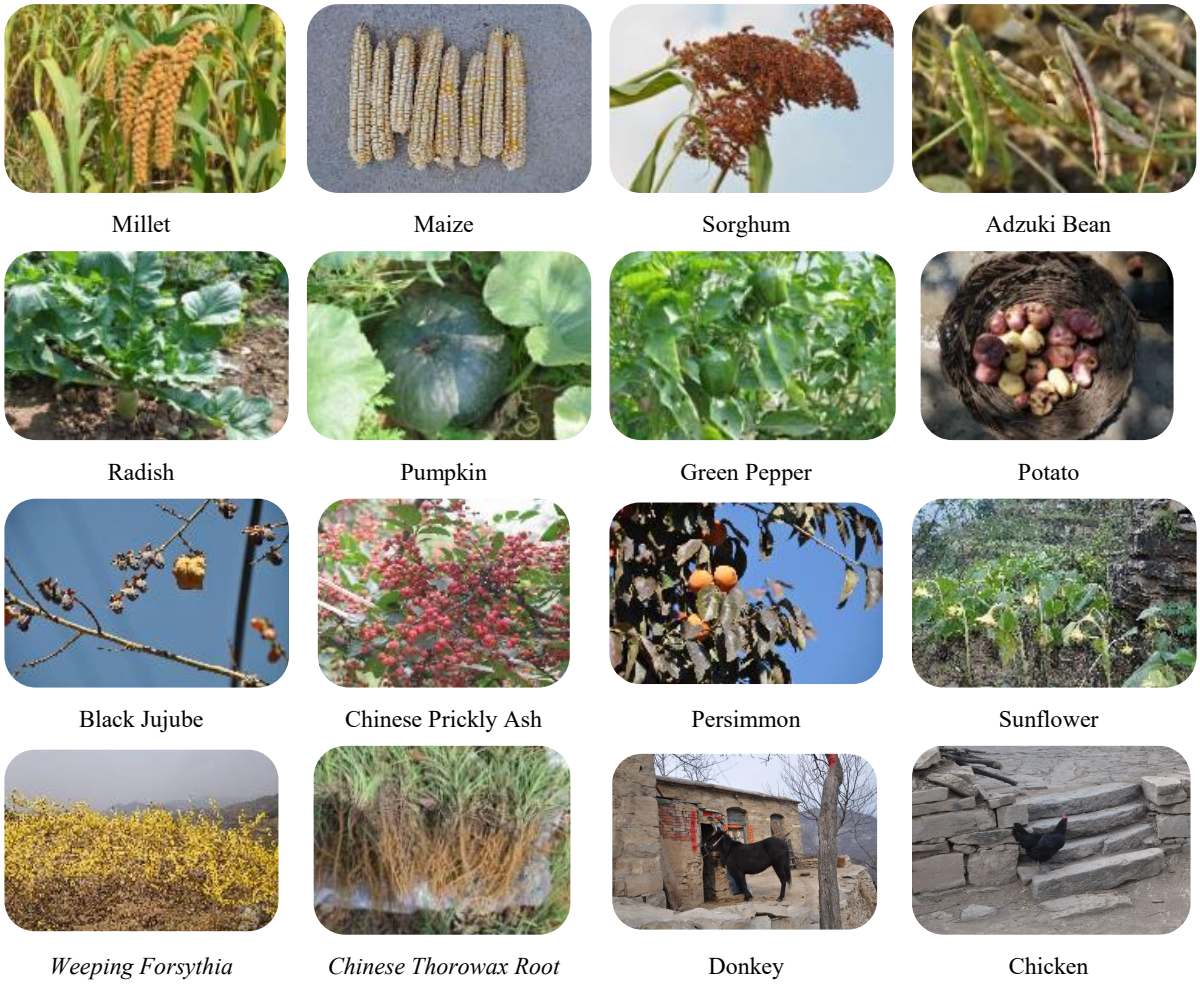


Fig. 2.2.13 Some Agricultural Species in the Heritage System

The dryland terrace system of Shexian is not only extremely rich in agricultural species, but also in agricultural varieties (Table 2.2.7). According to surveys, the local varieties still cultivated and used in the system include 29 varieties of millet, 4 varieties of maize, 7 varieties of soybean, 12 varieties of long beans, 6 varieties of pumpkin, 5 varieties of Chinese prickly ash, 5 varieties of black jujubes and 10 varieties of persimmons (Fig. 2.2.14, Table 2.2.8).

Table 2.2.7 Main Local Varieties in the Heritage System

Species	Local Varieties
Millet	*Laiwuxian*, Majizui*, Qinggu (Qingmi)*, 60-day harvest*, Laolaibai*, Liuyuexian, Luohuahuang*, Sanbianchou*, Yatalou*, Datougu*, Honggu, Xiaohonggu*, Xiaohuangchao*, Yidianhong*, Jiugu*, Shuzi,* Qianjinhuang, Wuguli*, Baimiaowaguli (Wafuju)*, Xiaohuangcao*, Guandonggu, Erzhihong*, Huanggu*, Matuojiang, Henggu, Dahuanggu*, Maogu, Midahuang**

Maize	*Golden Queen, White Horse Teeth (Ermaya), Old White Corn*, Old Yellow Corn**
Sorghum	*Suma*, Daluochui (Shuama, Shuazi)*, Yellow Umbrella (Broom, Whisk Broom)**
Soybean	*Big Yellow, Second Yellow*, Little Yellow*, Big Black, Little Black*, Big Green*, Little Green**
Mung Bean	*Glossy Green*, Furry Green*, Big Green, Little Green**
Adzuki Bean	*Red Adzuki, Yellow Adzuki*, Black Adzuki*, Little South*, Civet adzuki**
Potato	*Purple Yam Egg (Yiwohong)**
Carrot	*Yellow Carrot*, Red Carrot*
Long Bean	*Baibulao, Liuyuexian, Huadoujiao*, Huapidou*, Huangmeisi*, Hongmeisi*, Heimeisi*, Qingmeisi*, Qingdoujiao, Short Purple*, Long Purple**
Hyacinth Bean	*White Meidou*, Purple Meidou*, Zijing Meidou*, Green Meidou*
Pumpkin	*Niutuigua, Round Pumpkin, Long Pumpkin, Laolaiqing*, Yellow Pumpkin*, Binggua*
Chinese Prickly Ash	*Dahongpao (Lionhead, Dahongjiao, Getajiao), Dahuajiao (Youjiao, Erhongpao, Erxingzi)*, Xiaohongjiao (Xiaohongpao, Xiaojiaozi)*, Baishajiao, Goujiao (Choujiao)**
Walnut	*Local Jia Walnut*, Local Mian Walnut**
Black Jujube	*Dabaili*, Little Black Jujube, Niunaitou, Pitted Black Jujube*, Guaizaoshu*
Persimmon	*Fushanmian Persimmon (Damianshi, Mianrangshi, Lamb Persimmon, Mianshi)*, Mantianhong, Dafangshi (Fangshi), Mopanshi (Damopan, Dagaishi, Heshi, Water Persimmon, Mantianhong)*, Ox Horn Persimmon (Ox Heart, Big Red)*, Black Persimmon (Hualianshi)*, Damianshi (Dashuishi, Mantianhong), Xiaomian Persimmon (Little Persimmon)*, Xiaofang Persimmon (Fanggeda)*, Xiaoyang Persimmon*

*Note: * marks the endemic varieties while others, though not endemic, are locally cultivated over 30 years.*

Millet

Qinggu

Majizui

Erzhihong

Huanggu

Honggu

Matuojiang

Dahuanggu

Maogu

Laiwuxian

Laolaibai

Midahuang

Laoguzi

Maize

Fig 2.2.14 Some Local Varieties in the Heritage System

Table 2.2.8 Local Varieties of Chinese Prickly Ash

Variety	Main Characteristics	Photo of Trees	Photo of Fruits
Dahongpao	This variety has large, red fruits, thick and dark-coloured leaves, and it is harvested one month after autumn begins		
Dahuajiao	It is a variety that ripens early, with a faint fragrance, a pure tongue-numbing taste, thick husks, uniformly large fruits and rich oil content.		
Xiaohongjiao	This variety has small, tasty fruits, thin and light-coloured leaves, and it is harvested one month after autumn begins.		
Baishajiao	This variety has ox-horned shape fruits that are light yellow, mildly spicy, with crisp and tender, and bring a delightful taste.		

Goujiao	The thorns of this variety are concentrated on the bottom of the tree. It has a longer growing season and is harvested one month late.		

(2) Related Biodiversity

Shexian is rich in botanical resources, which span 4 phyla, 166 families, 576 genera and 1,509 species (including crops, Annex 1). These resources include 18 species of *bryophyta* which span 11 families and 17 genera; 42 species of *Pteridophytes* which span 16 families and 21 genera; 21 species of *Gymnospermae* which span 6 families and 11 genera; and 1,428 species of *Angiospermae* which span 133 families and 527 genera (1,162 species of *Dicotyledons* spanning 110 families and 492 genera while 266 species of *Monocotyledons* spanning 23 families and 35 genera). See Fig. 2.2.15 for part of wild flora.

Euphorbia Esula

Lilium Pumilum

Allium Thunbergii

Kalimeris Lautureana

Sageretia Paucicostata

Peucedanum Terebinthaceum

Rhamnus Davurica

Ziziphus Jujuba

Clematis Kirilowii

Cuscuta Chinensis

Ampelopsis Aconitifolia

Thalictrum Tenue

Iris Dichotoma

Gleditsia Microphylla

Leonurus Japonicus

Viola Prionantha

Amaranthus Lividus

Xanthium Sibiricum

Leptodermis Oblonga

Grewia Biloba

Clematis Heracleifolia

Serratula Polycephala

Cynanchum Chinense

Sedum Stellariifolium

Sedum Aizoon

Periploca Sepium

Albizia Julibrissin

Indigofera Tinctoria

Polygonum Orientale

Sonchus Asper

Agrimonia Pilosa var. Nepalensis

Vitex Negundo var. Heterophylla

Lilium Lancifolium

Patrinia Heterophylla

Adenophora Trachelioides

Rubia Cordifolia

Anemarrhena Asphodeloides

Schisandra Chinensis

Clematis Florida

Ricinus Communis

Majibing *Pyrus Betulifolia* *Vitex Negundo var. Cannabifolia* *Adenophora Stricta*

Fig. 2.2.15 Part of Common Wild Plants

Shexian has 20 national key protected plant species, including 3 first-grade protected wild plant species that are *Cycas Revoluta, Ginkgo Biloba* and *Metasequoia Glyptostroboides*. They were also the first plant species from Shexian to enter the list of national key protected wild plant species (Table 2.2.9).

Table 2.2.9 List of National Key Protected Plant Species Found in Shexian

Species	Batch	Protection Classification	IUCN Classification
C. revolute Thunb	1	I	CR
G. biloba L.	1	I	CR
M. glyptostroboides Hu et Cheng	1	I	EN
E. equisetina Bge.	2	II	LC
E. sinica Stapf	2	II	NT
Juglans regia L.	2	II	VU
N. nucifera Gaertn	1	II	DD
P. suffruticosa Andr	2	II	VU
R. rugosa Thunb.	2	II	EN
G. uralensis Fisch.	2	II	LC
Actinidia kolomikta	2	II	LC
Actinidia arguta	2	II	LC
Actinidia chinensis Planch.	2	II	LC
A. senticosus Harms	2	II	LC
C. smyrnioides Woloff	2	II	VU
Fraxinus mandshurica Rupr.	1	II	VU
H. monorchis R. Br.	2	II	NT
Gastrodia elata Blume	2	II	DD

Liparis japonica	2	II	DD
Spiranthes sinensis Ames	2	II	LC

Shexian is also abundant in animal species. Those recorded in *Agricultural Records* (inclusive of important subspecies) span 4 phyla, 307 families, 791 genera and 1080 species (Annex 2). These include 320 species of farming-related animals which span 106 families and 230 genera, including 31 animal species of economic value which span 13 families and 24 genera; 5 soil "improvement" animal species from 1 family and 4 genera; 12 pollinator species from 6 families and 9 genera; 40 parasitic species from 11 families and 35 genera; 232 pest predator species from 75 families and 142 genera; 588 pest species from 138 families and 455 genera. See Fig. 2.2.16 for part of wild animals.

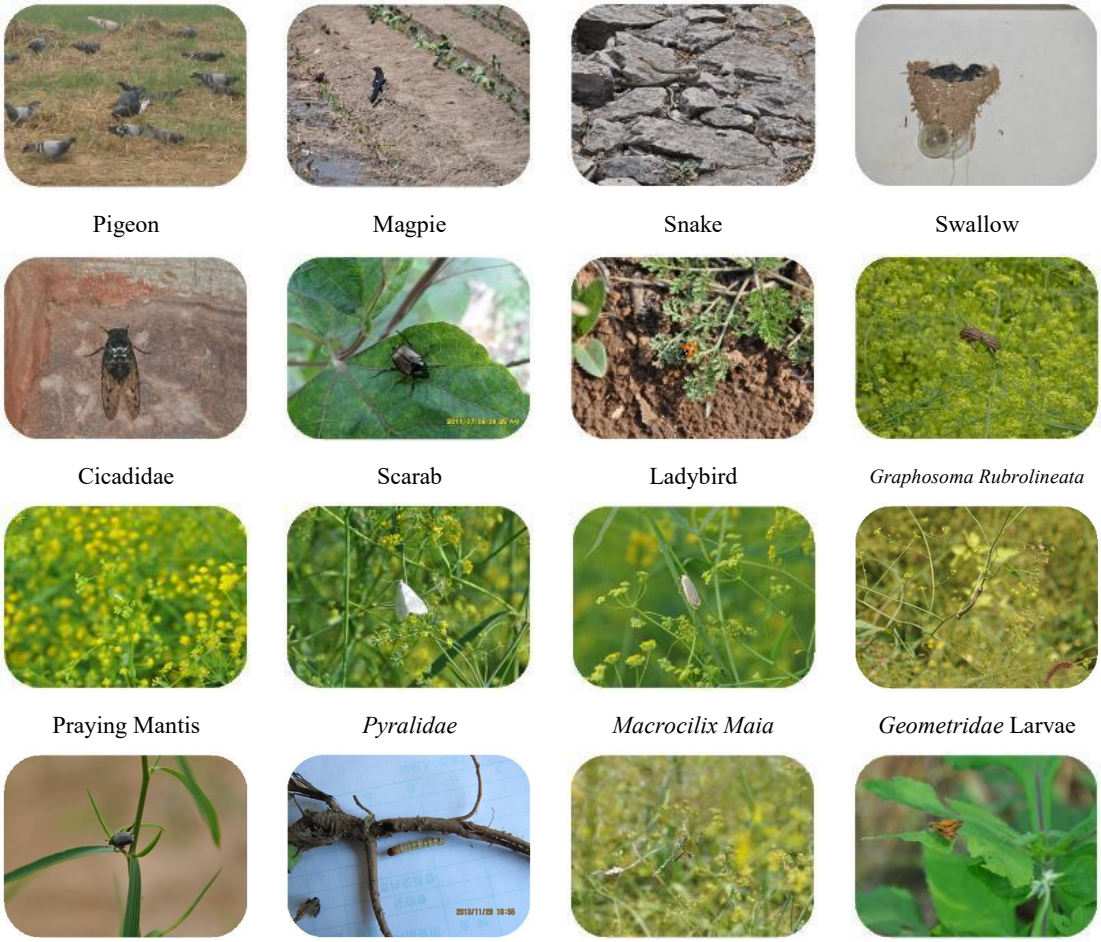


Fig 2.2.16 Part of Wild Animals

There are 15 second-grade national protected wild animal species in Shexian, which span 5 families and 8 genera, including 1 *Anatidae*, 3 *Accipitridae,* 6 *Faconidae,* 4 *Strigidae* and 1 *Felidae* (Table 2.2.10).

Table 2.2.10 List of National Second-Grade Protected Wild Animals in Shexian

Family	Species
Anatidae	Mandarin Duck
Accipitridae	Northern Goshawk, Eurasian Sparrowhawk, Black Kite
Faconidae	Saker Falcon, Merlin, Peregrine Falcon, Eurasian Hobby, Common Kestrel, Red-footed Falcon
Strigidae	Little Owl, Long-eared Owl, Short-eared Owl, Eagle Owl
Felidae	Lynx

(3) Important Ecological Functions

1) Soil and Water Conservation

The Shexian Dryland Stone Terraced System has outstanding soil and water conservation capabilities. Forests and shrubs on the mountain peaks are able to capture precipitation, protecting the soil from rain splashes and surface runoff, thus effectively reducing soil erosion. Precipitation captured by forests and shrubs seeps into the soil and increases soil moisture content.

The terraced fields located on the mountainsides are usually constructed in 30-50° reverse-slopes according to the terrain, and are able to effectively reduce soil erosion caused by rain wash, thus enhancing the ability of the terraces to store water and retain soil.

The borders of the terraced fields are protected by two layers of stone ridges, and are planted with trees of Chinese prickly ash at a certain density. The roots of the Chinese prickly ash coil around the gaps in the stone ridges, forming an “iron fence” that holds the stone ridges in place, thus effectively reducing soil erosion. Economic tree species such as the Chinese prickly ash, black jujube and walnut that are cultivated in the

terraced fields can also retain rainwater and prevent soil erosion caused by rain, and their fallen branches and leaves can also reduce surface runoff.

Layers of rock can be found below the terraced fields, from bottom to top respectively large rocks, medium rocks and small rocks. Under vertical pressure, the soil is closely compact with the rock. The gaps between the rocks can also store moisture, thus considerably conserving soil and water (Fig. 2.2.17).

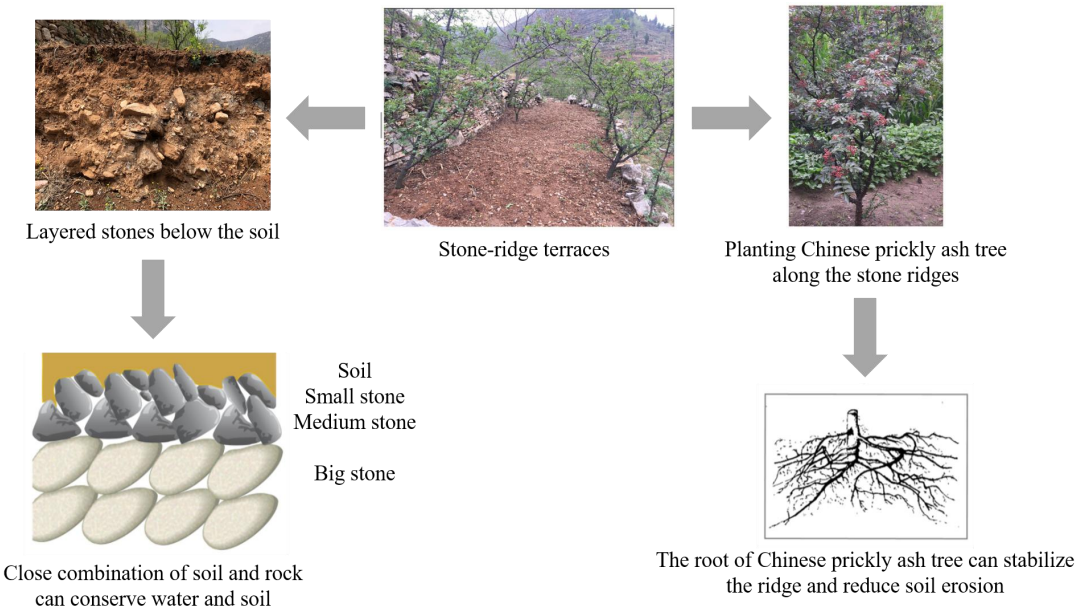


Fig 2.2.17 Illustration of Soil and Water Conservation Capabilities of Stone Terraced Fields

Research indicated that the degree of soil erosion in stone terraced fields was far lower than other types of land, bringing that the amount of soil conserved by stone terraced fields was considerably higher than other types of land (Fig 2.2.18). It was estimated that each unit of terraced field could conserve 4 times as much soil as a non-terraced field. As for the value of soil loss, that of non-terraced field was 8.8 times that of terraced field on a per-unit basis.

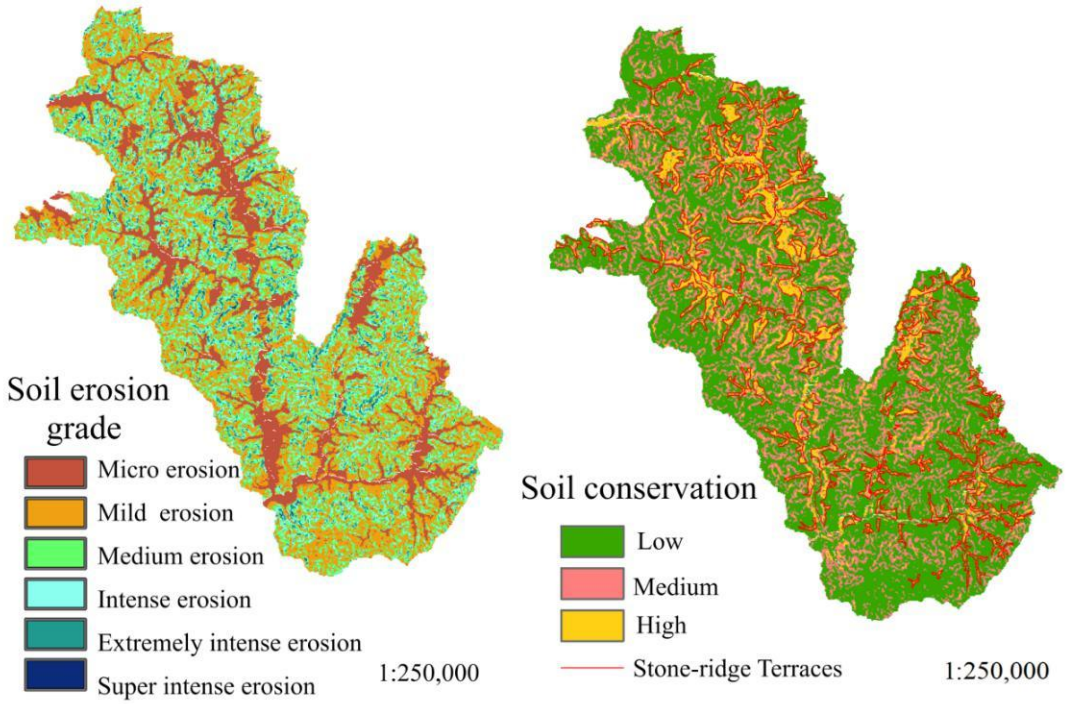


Fig. 2.2.18 Spatial Distribution of Soil Erosion Degree and Soil Conservation Amount in Heritage Site (2017)

2) Biodiversity Conservation

The dryland terrace system of Shexian serves important biodiversity conservation functions. A rich variety of grain crops, cash crops and economic tree species are cultivated in the stone terraced fields, not only significantly enhancing the agro-biodiversity of the system, but also playing an important part in the conservation of related biodiversity. Research indicated that the species richness indexes (the Simpson index, the Shannon index and the evenness index) displayed such a characteristic: mountainside terrace > mountaintop forest > foothill river-beach (Fig. 2.2.19).

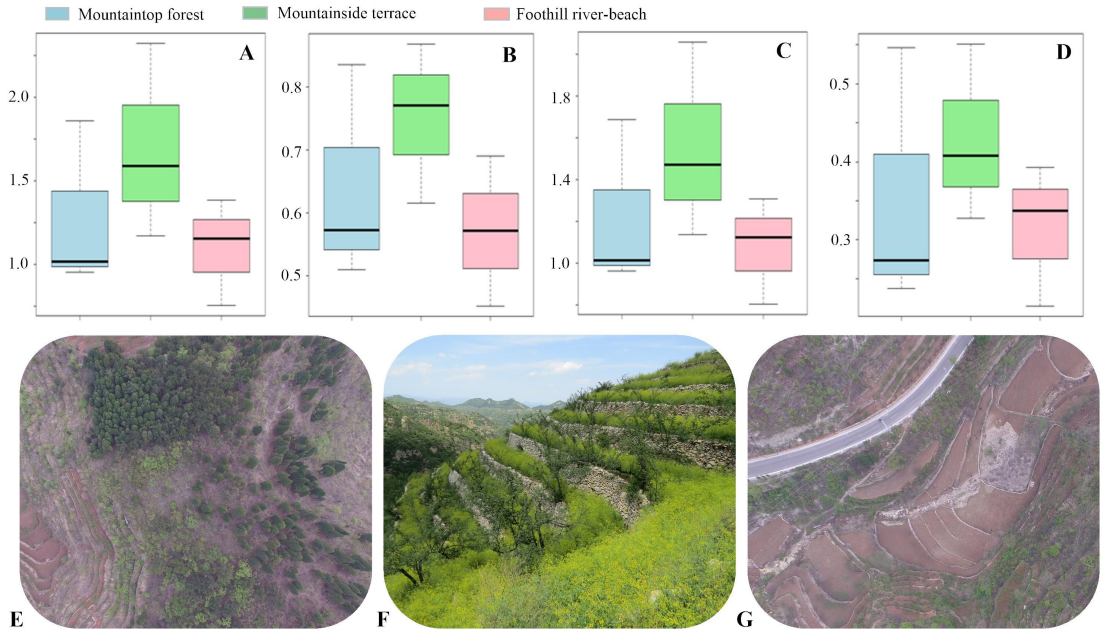


Fig 2.2.19 Differences in Related Biodiversity in Different Types of Land (2017)

Note: A-D respectively represent the species richness index, the Shannon index, the Simpson index and the evenness index; E-G are (in order) photographs of mountaintop forests, mountainside terraces, foothill river-beaches taken on-site.

Although the mountain top has a higher degree of vegetation cover, it is not as diverse in terms of species. The river beach has a relatively flat terrain, but it is not biodiverse in per-unit terms even though it is used as farmland and has relatively large acreage. The grain crops, cash crops and economic tree species in the stone terraced fields have formed a composite agroforestry structure, thus considerably increasing the related biodiversity, and extremely enhancing the stability of the entire system.

The stone terraced fields also contain diverse soil microorganisms. Research indicated that the diversity of soil microorganisms in terraces was significantly higher than bare land (Fig 2.2.20). This could be due to the fact that stone terraced fields can effectively reduce the loss of water and nutrients and enable the soil to have greater amounts of water and nutrients, thus creating favourable conditions for the survival and reproduction of soil microorganisms. From Fig. 2.2.21, it can be seen that bacteria made up the bulk of soil microorganisms in both terraces and bare land, including *Bacteroidales, Firmicutes,* and *Proteobacteria,* but bacteria species were more evenly distributed in terraces.

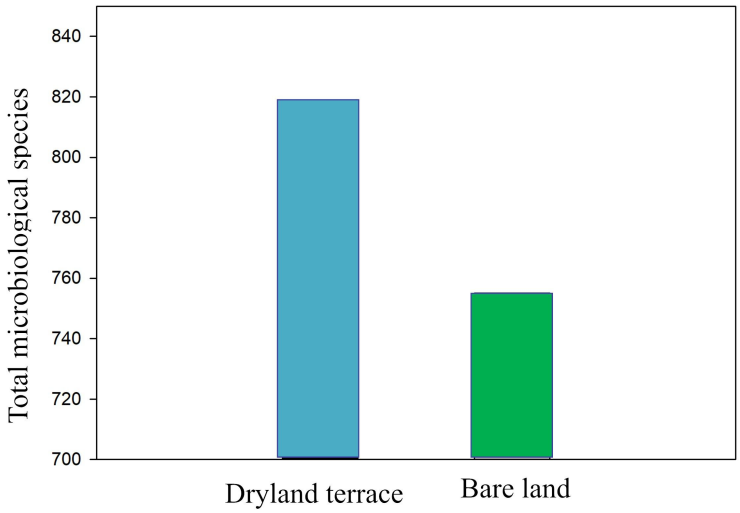


Fig. 2.2.20 Differences in Diversity of Soil Microorganisms Between Terraces and Bare Land (2017)

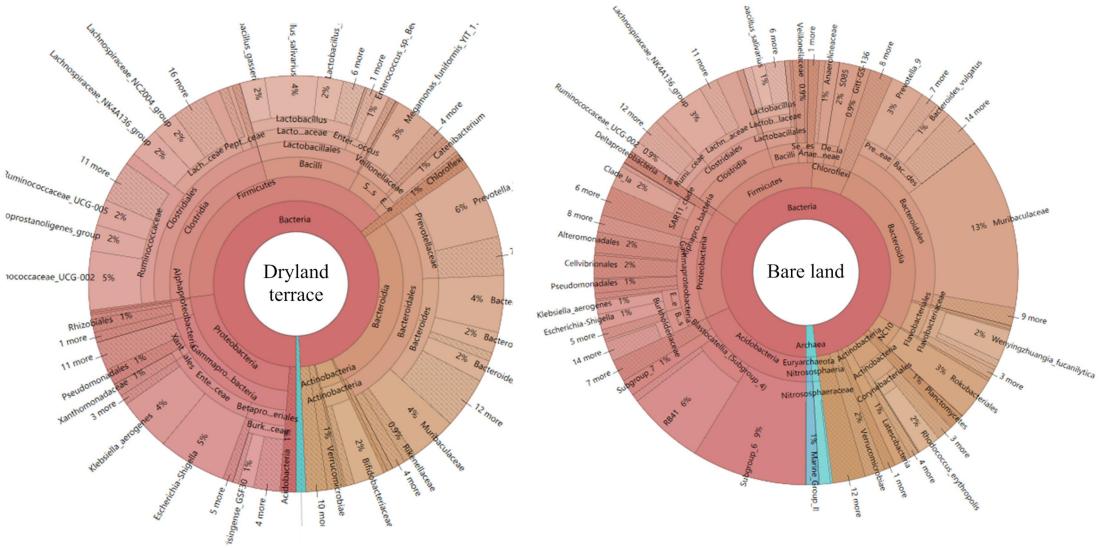


Fig 2.2.21 Hierarchical Graphs of Soil Microorganisms in Terraces and Bare Land (2017)

3) Nutrient Cycling

The dryland terrace system of Shexian has important nutrient cycling functions. Local farmers regularly feed the straw (stalks and stems of crops) to donkeys and return the organic fertilizer made from the fermentation of a mixture of straw and donkey manure to the fields. At the same time, some straw is returned directly to the field (Fig. 2.2.22). According to surveys, the utilization of digested straw, fermented straw and straw directly incorporated, in proportional terms, is roughly 50%, 20% and 30%.

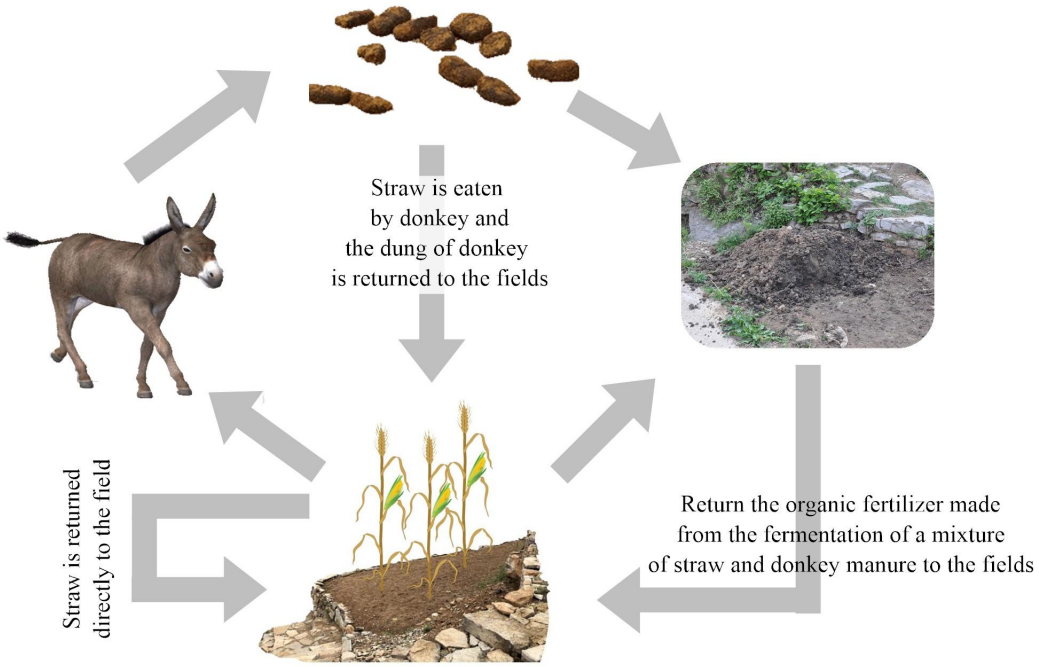


Fig 2.2.22 Illustration of Nutrient Cycling in the Heritage System

Long-term returning of straw to the land can significantly enhance the soil fertility and improve the soil structure, not only ingeniously solving the problems of nutrient conversion and soil fertilization, but also realizing nutrient cycling within the terraced fields. Furthermore, planting economic tree species such as Chinese prickly ash and black jujube in the stone terraced fields increases soil fertility as their fallen leaves and branches are converted to organic material by microorganisms.

Research showed that the average organic content, average total carbon content and average total nitrogen content of the soil of the stone terraced fields were significantly (p<0.05) higher than bare land. The average ammonium content, average nitrate content and average rapidly-available phosphorus content of the soil of the stone terraced fields were also higher than bare land (Fig 2.2.23).

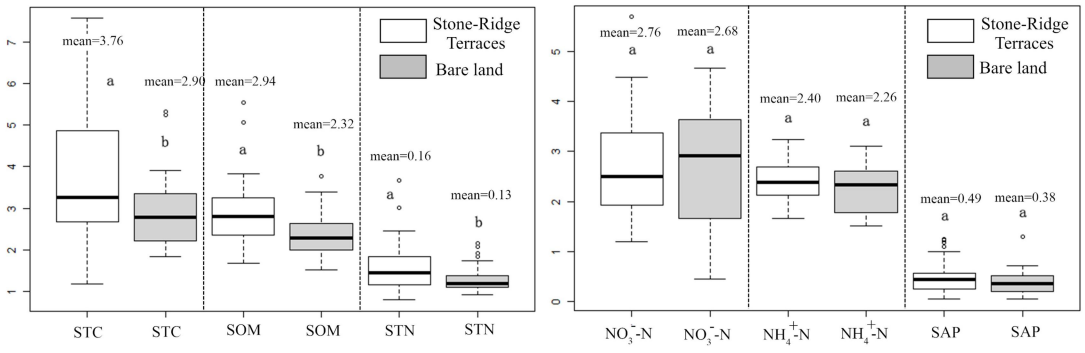


Fig 2.2.23 Nutrient Differences Between Stone Terraced Fields and Bare Land (2017)

2.2.3 Local and Traditional Knowledge Systems

The Shexian Dryland Stone Terraced System embodies the rich life and production experiences of the local people, forming a traditional knowledge and technology system with local characteristics (Fig. 2.2.24). On the scale of the terrace system, a series of water and soil resource utilization technologies centered upon construction and maintenance of terraces and rainfall harvest and storage have formed. On the scale of the farmland, agricultural cropping modes such as inter-cropping, rotation and mixed cropping are employed, forming a complete farming system which includes seed selection, tilling, sowing, fertilization, thinning, weeding, pest control, irrigation and harvest. On the scale of villages, techniques such as grain storage and stone house construction have played important supporting roles.

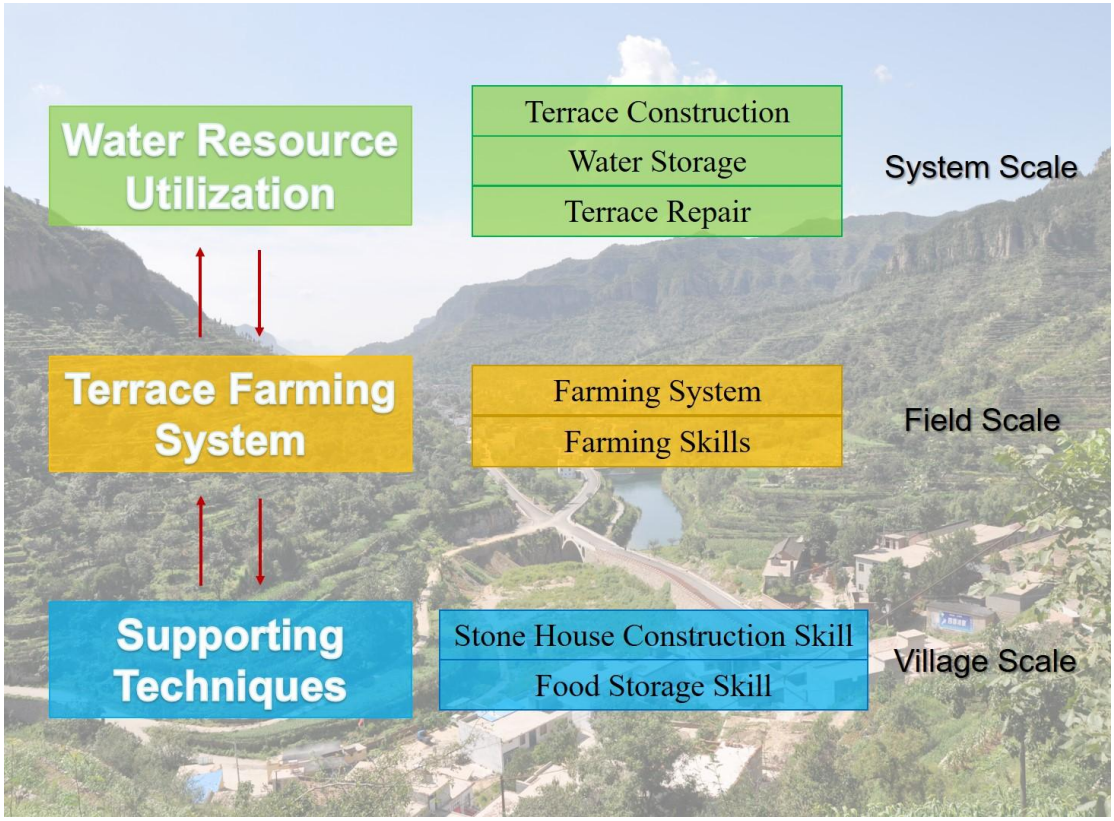


Fig 2.2.24 Illustration of the Traditional Knowledge and Technology System

(1) Water and Soil Resource Utilization

1) Dryland Terrace Construction

The process of building stone terraced fields includes constructing stone shelters (known as *Shi'anzi*), piling stone ridges and backfilling soil in three phases, which is an epitome of how locals fully utilize soil and stone resources.

Phase 1: Constructing Stone Shelters

Before constructing stone terraced fields, a stone shelter (*shi'anzi*) on the slope must firstly be built in the selected region, in order to provide those constructing the terrace places to rest and shelter from rain (Fig. 2.2.25). After the construction of the terraces, the stone shelter would be left in its original location, and become an important venue for the storage of production inputs such as farming tools and for farmers to rest during farm breaks. Stone shelters are usually squarish, approximately 2 m in height and width. They are built by piling trimmed stones, which takes about ten days.

Fig. 2.2.25 A Stone Shelter (*Shi'anzi*)

Phase 2: Building Stone Ridges

After the construction of the stone shelter, the gravel in the foundations of the terraces is first dug out and placed aside, and then the construction of stone ridges begins. Stone ridges are built from overlapping vertical blocks, with larger rocks at the bottom and smaller rocks at the top, forming an interlayer mosaic structure (Fig

2.2.26). Stacking of the stone layers in the plots and construction of the stone ridges are carried out at the same time, similarly following the “large rocks at the bottom, gravel on the top” principle, and leaving space at the top for soil backfill.

Fig 2.2.26 Side View (Left) and Top View (Right) of Stone Ridges

Phase 3: Backfilling Soil

After the construction of stone ridges is complete, soil would be backfilled onto the uppermost stone layer of the plot. As the soil is scarce locally, people would collect soil from the slopes or from neighbouring regions with flatter terrain using shoulder poles, and deposit it on the gravels enclosed by the stone ridges, eventually forming an arable plot (Fig 2.2.27).

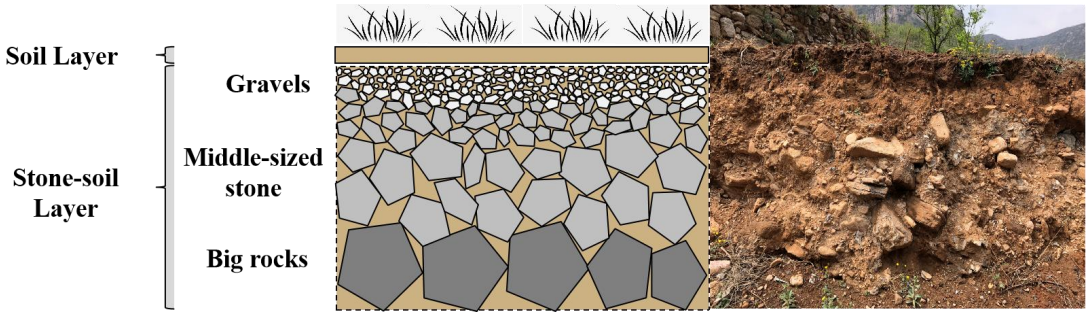


Fig 2.2.27 Cross-Section of the Enclosed Plot

2) Dryland Terrace Maintenance

① Planting Chinese Prickly Ash Trees along the Stone Ridges

Through long-term agricultural production, local farmers discovered that planting Chinese prickly ash trees along the stone ridges, thus forming a “green fence” around the terraces, plays an important role in the maintenance of the terraces. The extension

and coiling of the root systems of Chinese prickly ash trees not only significantly increases the structural stability of the stone ridges, but also conserves and accumulates soil, and reduces the loss of soil and water (Fig. 2.2.28).

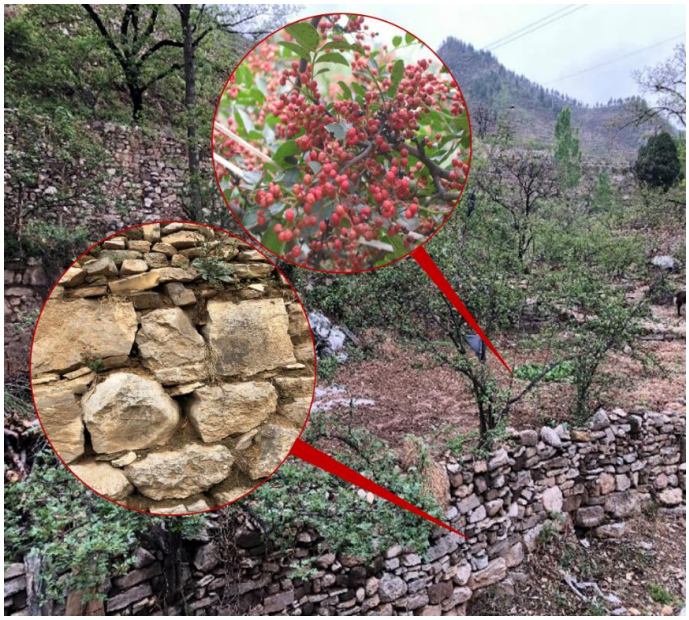


Fig. 2.2.28 Planting Chinese Prickly Ash Trees along the Stone Ridges

② Pruning Vines from Stone Ridges

Local farmers prune the vines growing along the stone ridges biennially to prevent them from competing with crops for water and nutrients. They dig a ditch 50 cm to 1 m deep along the inside of stone ridges, and clear the vines before filling the ditch with soil and gravels.

③ "Suspended Arch Mosaic" Structure

Stone terraced fields are divided into relatively narrow plots, and stone ridges are prone to collapse during tillage. Furthermore, floods occur frequently from July to August, and it is common for stone ridges to be washed away by the deluge. In order to repair damaged stone ridges, locals creatively invented the "suspended arch mosaic" structure.

When repairing damaged stone ridges, a suspended arch is first set up. A stone ridge is then built on the arch. As the situation requires, one has the option of backfilling

gravels and soil under the arch, or leave it empty as a field storage space or a resting space for people and livestock (Table 2.2.11, Fig. 2.2.29).

Table 2.2.11 "Suspended Arch Mosaic" Structure Construction Phases

Phase	Content
Clearing the Area	Clearing the area surrounding the collapsed stone ridge, collecting rocks
Digging to Foundations	Clearing the soil from the two sides of the collapsed area, exposing the bottom of the stone ridge
Building the Arch	Building an arch using small rocks as a scaffold
Closing the Arch	Placing square-shaped rocks into the middle of the arch
Building the Top of the Arch	Restoring the stone ridge to its original height
Backfilling	Backfilling gravels and soil under the arch

1: Clearing the Area

2: Digging to Foundations

3: Building the Arch

4: Closing the Arch

5: Building the Top of the Arch

6: Backfilling

Fig 2.2.29 The Construction of "Suspended Arch Mosaic" Structure

The "suspended arch mosaic" structure is a representative of the techniques used to restore stone terraced fields. It not only ensures the firmness of the stone ridge, but also fully utilizes local rock resources. The "suspended arch mosaic" structure is also used in the construction of stone arch bridges (Fig. 2.2.30).

Fig. 2.2.30 Arch Bridge of "Suspended Arch Mosaic" Structure

3) Rainfall Harvest and Storage

In the heritage site, water used in agricultural production and daily life originates entirely from precipitation, while rainfall is typically concentrated in the summer. In order to solve the conflict between uneven rainfall throughout the year and the water need for production and daily life, the locals have always paid attention to the harvest and storage of rainwater. They employ traditional farming methods that conserve

water and soil, and construct a series of facilities to collect rain and store water (Fig. 2.2.31). Shexian has four water conservancy construction projects with four big canals which provide water to some parts of terraces. But the pools, tanks and cellars are bigger sources of water for terraces. People use them to collect water in summer and use water in autumn and winter. Soil is also the key storage space for water, which directly stores atmospheric precipitation in terraces ensuring water needs of crops.

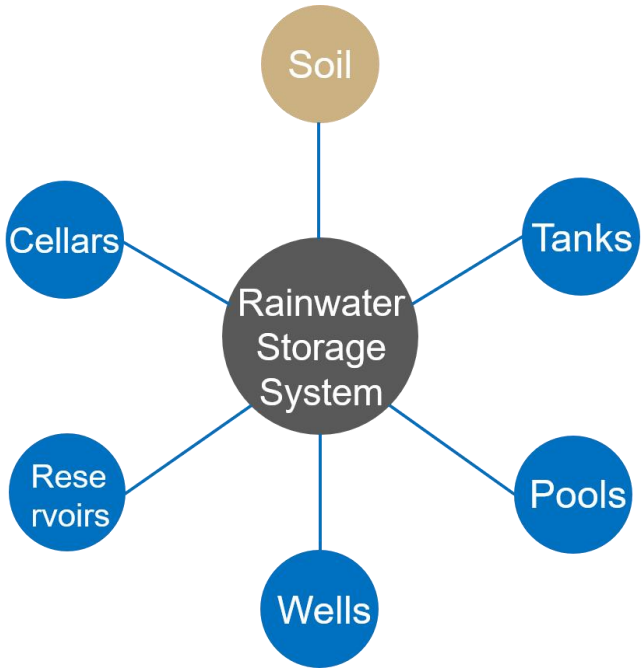


Fig. 2.2.31 System for Collecting and Storing Rainwater

① Water Cellars

Water cellars have a long history, and are known as "family heirlooms" (*chuanjiabao*). Some are built in villagers' courtyards (Fig. 2.2.32) while some are built in wider areas of streets and alleys. Normally, locations with a low-lying terrain are chosen for water cellars. Rocks are firstly used to build an underground space to store water, and then suitable locations on the surface are chosen to build a narrow opening for water inflow and a wide opening for water extraction. When using water cellars, pails are lowered with ropes into the wide openings and rainwater that has been left to settle is drawn.

Inflow Opening

Extraction Opening

Pail

Fig. 2.2.32 Composition of a Water Cellar

② Wells

As the local annual precipitation varies greatly seasonally, groundwater is the water resource that local residents rely upon when there is a shortfall of rain. As well-drilling activities are carried out, wells gradually appeared next to the main streets of the villages, providing public water resources to the villagers (Fig. 2.2.33).

Fig. 2.2.33 A Well in a Village

③ Water Pools

Water pools are divided into ancient pools and modern pools. It is unclear when ancient pools were built, but they are mostly found outside the villages or in open spaces of the villages, and used to collect rainwater, providing villages with water for washing, production and consumption (both by people and livestock). Some ancient

pools were converted to modern pools after the 1970s, mainly used for sowing during droughts.

④ Water Tanks

There are two types of water tanks in the heritage site: one is built in villagers' yards, mainly used to store running water and rain/snow, providing water for daily life, akin to a water cellar with a larger capacity; the other is a large-capacity tank collectively built by one or more villages, situated on the mountainside or the mountain summit (Fig. 2.2.34), capable of storing larger amounts of water and providing a convenient water source during agricultural production.

Fig. 2.2.34 Water Tanks on the Mountainside

⑤ Reservoirs

Reservoirs are the central part of the ecological water network in moutainous areas. Reservoirs were built using government funds in recent years, and serve such functions as guarding against floods and storing water.

Fig. 2.2.35 Moon Lake Reservoir in Wangjinzhuang Village

In order to realize the sustainable use of water resource, the locals classify daily water consumption into different uses (Table 2.2.12). Water stored in different facilities is given different priorities according to the uses. For instance, the water stored in the water cellars in villagers' yards is used mainly for drinking, while that in the water tanks and reservoirs is used mainly for irrigation. The water in the pools are mainly used to wash clothes and vegetables, and in construction. Water from reservoirs and pools serves as the main emergency reserves.

Table 2.2.12 Classification of Water Usage in Daily Life

Usage	Priority			
	1	2	3	4
Drinking	Water Cellar	Well	Mountain Spring	Water Pool
Agricultural Production	Water Tank	Reservoir	Stream	Water Pool
Washing	Water Pool	Well	Stream	-
Construction	Water Pool	Well	-	-
Emergency Reserves	Reservoir	Water Pool	-	-

(2) Farming System and Technologies

1) Farming System

The dryland terrace system of Shexian once bore two harvests a year, mainly wheat – millet, wheat – maize, and wheat – soybean. Affected by changes in cropping

structure, the terraces currently bear one harvest each year, and are mainly cultivated with autumn crops such as maize, millet and soybean. Wheat is rarely cultivated.

The stone terraced fields are built on the mountains, and temperature, sunlight, moisture and soil differences can vary greatly depending on altitude and geographical location. Thus, suitable crop species, varieties and farming techniques vary from place to place. Over the years, the locals have obeyed the principle of "acting according to place, time and crop type", forming the cropping patterns suited to the local climate and geographical conditions (Table 2.2.13).

Table 2.2.13 Main Cropping Patterns in the Stone Terraced Fields

Cropping Pattern	Example
Mixed Cropping	Mixing of Various Vegetables
Row Intercropping	Sorghum – Maize, Sorghum – Millet, Maize – Bean, Maize – Tuber, Maize - Vegetables
Relay Intercropping	Maize – Long Bean, Maize – Pumpkin
Rotation	Maize – Millet, Maize – Soybean, Millet – Bean, Rotation of Different Millet Varieties

The locals take advantage of different crops with similar growing seasons, and carry out row and relay intercropping, such as maize – sorghum row intercropping, millet – sorghum row intercropping, maize – long bean relay intercropping and maize – pumpkin relay intercropping, to increase per-unit surface area yield (Fig. 2.2.36). The locals also use crop rotation to maintain soil fertility and reduce the occurrence of pest damage. Maize and millet rotation is very common, and effectively avoids the problem of yield decline brought about by continuous cropping. Some farmers also rotate different millet varieties to guard against pest damage.

Fig. 2.2.36 Maize – Pumpkin (Left), Maize – Long Bean (Right) Relay Intercropping

The locals also take advantage of different growing seasons between different varieties of the same crop or between different crops to adapt to a typical seasonal weather. For instance, when the rainy season arrives early, millet varieties with long growing seasons such as "*Laiwuxian"* and "*Dahuanggu*" can be sown. When the rainy season arrives late, varieties with a shorter growing season such as "60-day harvest" or the broomcorn millet can be sown.

Also, the locals cultivate Chinese prickly ash trees along the stone ridges, and cultivate trees such as black jujubes, walnuts, persimmons and Chinese pistache inside the plots. These economic tree species form a composite agroforestry structure with the grain and cash crops, which has not only strengthened the soil and water conservation capabilities of the terraces, improved its biodiversity, but also realized the full utilization of land area and increased the per-unit surface area yield of the terraces. Furthermore, the volatile compounds given off by the Chinese prickly ash trees act as sterilization and insect repellents, reducing to a certain degree the occurrence of pest and weed damage to crops.

2) Farming Technologies

The dryland terrace system of Shexian has inherited the essence of traditional agriculture in China, and formed agriculture techniques characterized by intensive cultivation, soil and water conservation, and the use of land while maintaining its fertility.

① Seed Selection

Locals choose to cultivate adaptable and potentially high-yielding grain crops such as millet and maize as well as economic tree species such as Chinese prickly ash in stone terraced fields according to local climate and geographical conditions. Through the long-term practice, the locals have bred diverse agricultural varieties resistant to drought, disease and stress.

The ear selection method is the main tool by which locals breed improved varieties. When crops mature, locals choose varieties to keep for breeding by observing if the seeds in the ears are round, plump and brightly coloured. The ear selection method was standardized and popularized in the 1960s (Fig. 2.2.37). Up to now, many maize varieties such as “Golden Queen” and “White Horse Teeth” are still selected by the locals in this way.

Fig. 2.2.37 Selecting Maize Varieties in the 1960s

② Tillage

In order to adapt to the local natural environment, local farmers developed a “three till, two rake” farming method (till: turning over the soil, rake: smoothing the soil). See Fig. 2.2.38.

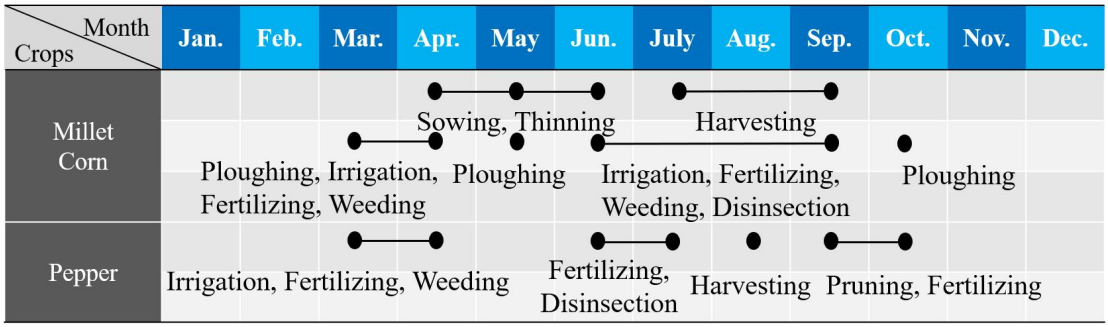


Fig. 2.2.38 Farming Timetable for Stone Ridge Terraces

"One till one rake" before sowing (spring tilling): is usually carried out in March to April, mainly to sever soil capillaries, reduce the evaporation of soil moisture, and maintain the soil water content. When tilling, the fertilizer and soil is fully mixed together, prepared for sowing (Fig. 2.2.39).

"One till one rake" after sowing (middle tilling): is usually carried ou in May with the main purposes to enhance the water retention rate of the soil, thus conserving soil and water.

"One till, no rake" after harvest (autumn tilling): is usually carried out in October, mainly to take advantage of the cold weather to kill harmful bacteria and pests, and allow snow and rain to seep into the soil to increase its moisture content.

Fig. 2.2.39 Spring Tilling

③ Sowing

Autumn grain crops such as millet and maize are usually sown in April to May while the exact date depends on temperature and rainfall. Constrained by the terrain of stone terraced fields, most farmers currently still use traditional sowing methods such as *loubo* (plough sowing) and *goubo* (furrow sowing). In plough sowing, a wooden seeder pulled by mules and donkeys completes the sowing at the same time of plowing; while in furrow sowing, the field is first cultivated by mules and donkeys or manpower, and then sown by manpower (Fig. 2.2.40).

Fig.2.2.40 *Loubo* (Left) and *Goubo* (Right)

④ Fertilization

Over long periods of farming, the locals have used farmyard manure to maintain soil fertility, realizing nutrient cycling utilization while preventing excess soil fertilization. There are many different kinds of farmyard manure, including toilet manure, stables manure, straw compost, foliage compost, burnt straw, burnt grass, *kang* residue, caked Chinese prickly ash and etc.

The locals return straw to the fields with three methods: (1) digestion by donkeys, whereby straw is converted from donkey feed to manure, and can be directly used in the terraces; (2) fermentation, where villagers clean donkey cribs approximately once a month, collect straw, donkey manure and human faeces to mix for fermentation, and then use the fermented mix as premium farmyard manure (Fig. 2.2.41); (3) direct incorporation, whereby straw is burned in the fields after the autumn harvest, and the ash is returned to the soil during the autumn tilling. According to surveys, the

utilization of digested straw, fermented straw and straw directly incorporated, in proportional terms, is roughly 50%, 20% and 30%.

It's estimated that about 30 tons of organic fertilizer is needed for a hectare of terraced fields per year. A donkey can produce 10 tons of donkey dung and stable dung per year. Together with human feces, urine and others, one donkey can provide organic fertilizer for 0.33 ha of terraced fields. According to surveys, the organic fertilizer from donkeys provide 50% of fertilizers for terraced fields, while other types of organic fertilizers provide 35% including composting crops accounting for 15% and chopping up the crops accounting for 20%. In addition, urea and compound fertilizers account for 15% of fertilizers for terraced fields.

Fig. 2.2.41 Straw and Manure Mix for Fermentation

Autumn crops such as millet and maize usually require three times of fertilization, one before sowing and two after sowing. The base fertilizer is usually farmyard manure, and spread during the spring tilling. The locals would spread fertilizer on the surface of farmland before tilling begins, and incorporate fertilizer into the soil when tilling. Alternatively, they may till the land first, and spread fertilizer into the furrows, and then fill them with soil and sow seeds. In the past, the locals commonly used diluted human faeces for top dressing, while they now use moderate amounts of chemical fertilizers. Specifically, the chemical fertilizer is not used for millet, but urea and compound fertilizers are used for corn, with an amount of 150 kg/ha. The first top

dressing is carried out after thinning, while the second is carried out before ear sprouting. The top dressing is mainly done by spreading.

Chinese prickly ash trees also require 3 times of fertilization in a year. The first is usually carried out at the same time with the spreading of the base fertilizer on farmland; the second usually with the first top dressing of crops, with additional foliar feeding; the third is carried out after the harvest when the trees are pruned.

⑤ Thinning

When millet and maize grow to 10 cm tall, thinning must be carried out to ensure that seedlings have enough living space and soil nutrient area. Timely uprooting some weaker seedlings and leaving the stronger ones behind can ensure that air circulates between the young plants and they receive adequate sunlight (Fig. 2.2.42).

Fig. 2.2.42 Millet Thinning

⑥ Weeding

In an environment short of water and soil, weeds pose a relatively large threat to the growth of crops. Hence, the local farmers have developed a habit of weeding the fields during lull periods. Autumn crops such as millet and maize have to be weeded

at least thrice during their growing season. The first weeding is carried out shortly after sprouting, the second is carried out when crops are 50 cm tall (around late June), and the third is in early August before ears sprout. Weeding is also one of the important tasks to be carried out during the spring tilling and autumn tilling (Fig 2.2.43).

Fig. 2.2.43 Weeding the Fields

⑦ Pest Control

Over the years, the locals have effectively reduced the occurrence of pest damage through cropping methods such as row intercropping, relay intercropping, crop rotation, mixed cropping. The Chinese prickly ash trees planted along the stone ridges also adequately repel pests. Since the 1990s, as pesticides became popular, farmers have also gradually begun to use low-concentration pesticides to repel and guard against pests. Pest control (eradication) work for autumn crops such as millet and maize are usually carried out along when weeding, while that for Chinese prickly ash depends on the situation. Appropriate amounts of pesticides are sprayed if pests appear.

⑧ Irrigation

Due to the lack of water sources, farmers utilize water storage facilities such as water tanks and water pools distributed throughout the terraces during the spring sowing

period and collect water for irrigation through methods such as carrying water in pails on shoulder poles to the fields, using donkeys to transport water and water diversion. Irrigation after sowing is mainly dependent on atmospheric precipitation. If droughts occur, water from storage facilities will be used.

⑨ Harvest

Over the years of agricultural production practice, the locals have summarized experiences from the harvest of autumn crops such as millet and maize. All phases, from harvest, transport to storage, embody infinite wisdom, treasuring every single grain.

The harvest of millet is comprised five steps. First, bundling: the locals would first cut the millet ears and tie them into bundles (Fig. 2.2.44), and then transport them to open spaces (such as amphitheaters, small town squares) by donkey. Second, threshing: after sunning the millet ears, the locals would drive donkeys to pull stone wheels to thresh the grain. Third, winnowing: tossing grain into the air with wooden rakes, separating out the lighter millet bran, or using blowers to separate grain and bran. Fourth, milling: driving donkeys to pull stone grinders to mill the grains into edible millet (Fig. 2.2.45). Finally, returning to the land: a portion of straw would become donkey feed, while the rest would be brought back to the fields by donkeys and mules for fermentation or direct incorporation.

Fig. 2.2.44 Harvesting Millet

Fig. 2.2.45 Milling Millet

The steps involved in the harvest of maize are less complicated. Corncobs are collected by hand in the fields, and piled into large wicker baskets for the donkeys and mules to carry home (Fig. 2.2.46), while the straw is left in the field, to be managed during the autumn tilling.

Fig. 2.2.46 Harvested Corncobs

Chinese prickly ash ripens in mid-August, and its fragrance meanders throughout the mountains. As the trees are planted along the stone ridges and covered with thorns, and the fruit is very small, Chinese prickly ash has always been harvested by hand. The locals have various home-made nets that are hung below the branches to collect the fruit (Fig. 2.2.47). The labour intensity involved in harvesting Chinese prickly ash is greatest among all crops.

Picking the Fruit

Home-made Nets

Fig. 2.2.47 Harvesting Chinese Prickly Ash

3) Farming Tools

Over the years of farming, the locals have fully utilized local natural resources to make farming tools (Fig. 2.2.48) to satisfy diverse needs. The traditional farming tools used for generations embody the survival wisdom of the locals.

Sickle (used in harvest and weeding)

Rake (used in sunning crops and clearing fallen leaves)

Juetou (used in digging soil and rocks)

Hoe (used to turn over the soil)

Leveller (to level the land)

Hay Cutter (to dice dry straw)

Plough (pulled by animals to sow seeds)

Luotou (wicker baskets mounted on shoulder poles for transportation)

Fig. 2.2.48 Part of Traditional Farming Tools

(3) Supporting System in Villages

1) Grain Storage

The ancient teaching of "grain at home equals peace of mind" constantly reminds the locals to be prepared for danger even in times of safety, and prepare early for years when grain is short. Over the years, they have invented a unique method of grain storage, namely "storing millet in *xuan* and vegetables in cellars". "*Xuan*" is dedicated to the storage of millet, and each *xuan* can store more than 500 kg of millet, enough for a family of 4 to 5 members to safely get through a year of famine. In households with *xuan*, the locals would dig a stone cellar under the central hall to store vegetables (Fig. 2.2.49). These cellars are constantly humid and temperate by nature, and can preserve vegetables such as carrots, potatoes and sweet potatoes well, allowing the family to maintain a balanced diet even during the winter shortfall.

Fig. 2.2.49 *Xuan* (Left) and Cellar (Right)

2) Stone House Construction

As there is more rock than soil in the natural environment, the locals use rock such as *qingshi* and *huangliushi* as materials to construct magnificent stone villages. The basic steps are:

First, leveling the foundation and laying a layer of stone. At the chosen site, one digs to the underlying rock, and lays a layer of stone after leveling the foundation, and leave water inlets and drainage outlets for water cellars, which serves the functions such as supporting buildings, elevating the yard and water drainage.

Next, constructing walls. Stone houses are mostly built on the mountains, and the "three-seven soil" method is used to fill the gap between the back wall and the mountain, preventing water seepage from damaging the main structure of the building. Constructing walls is carried out from outside to inside, from the main structure to the east, west and south structures.

Finally, allocating the space. Local yards usually take on the shape of a square inside a square (Fig. 2.2.50). The main door is located at the southeast corner, and the south house and north house are usually residential spaces (the south house may also be used to store farm tools if there are less residents). The local farmers even build dedicated rooms for donkeys and mules which stand alone and are comparatively wide.

Fig. 2.2.50 Traditional Residential Courtyards

2.2.4 Cultures, Value Systems and Social Organizations

(1) Cultures

1) Folk Culture

① Festive Customs

After the 20th day of the last month of the lunar year, every household would start making millet pancakes. Villagers would always make large amounts of millet pancakes every year when celebrating the Lunar New Year. Millet pancakes are eaten till the 15th day of the first month of the Lunar New Year. After breakfast on the first day of the Lunar New Year, locals would proceed to the ancestral halls with incense and tributes to worship their ancestors, while older villagers would even go to the Dragon King Temple (*Longwangmiao*) to pray for good weather, to the Grandmother Temple (*Nainaimiao*) to pray for sons and blessings and to the Horse King Temple (*Mawangmiao*) to pray for the health of their donkeys. During the New Year festivities, the whole village would organize lively parades, featuring dragon dances, street performances and yangko dances to celebrate the coming of the new year.

During the Dragon Boat Festival, children would carry five-colour strings to ward off evil and wear a fragrance pouch around their necks. The pouch is made of a clove of garlic and some Chinese herbs wrapped in red cloth, and it can be smelt from afar. Some pouches are sewn into little tigers or dolls, a unique local specialty. The locals love their donkeys dearly, and would put five-colour strings on them to pray for their safety.

During the annual autumn harvest, the locals would organize the village troupe (or invite one from outside the village) to perform a locally unique opera known as *pingdiao luozi*. Elders would beat gongs and drums, and the villagers would sit around the stage, expressing their joy at a bountiful harvest through opera (Fig. 2.2.51).

Fig. 2.2.51 Troupe Organized by Village Elders

Folk dances such as donkey dances (*paolü*), boat dances (*paohanchuan*) and bamboo horse dances (*paozhuma*) are also common performances when celebrating a bountiful harvest (Fig. 2.2.52). Villagers would dress up as donkeys and dance jovially to percussions as a way of thanking donkeys for their hard work, as well as symbolizing their hopes for family harmony and prosperity. Lion dance performances are usually the climax of the bountiful harvest ceremony, symbolizing hopes for plentiful harvests year after year.

Fig 2.2.52 Boat Dance (Left) and Lion Dance (Right)

The locals take the winter solstice to be their donkeys' birthdays. On this day, they not only give their donkeys the best feed as a treat, but also wake up very early to cook a wok of vegetarian gruel from pumpkin, millet, various beans and wheat flour noodles to thank their donkeys for a year of hard labour. This ritual also embodies their gratitude to the Horse King (*Mawangye*) (Fig. 2.2.53).

Fig. 2.2.53 Locals Celebrating Donkeys' Birthdays

② Farming Idioms

Over the long years of farming, the locals have used simple language to pass on experiences of farming in accordance to natural laws. For example, the farming idiom of "sowing at the start of rain, growing during the rain and harvesting at the end of rain" reflects the optimal utilization of precipitation to develop rainfall-dependent agriculture, which still plays an important guiding role today. The locally unique "24 solar terms song" is another reflection of such agricultural wisdom.

③ Tales

Legend about *Dahongjiao* (a variety of Chinese prickly ash):

According to legend, the Chinese prickly ash was originally white. Later on, a maiden named *Hongjiao* climbed up a tree of the Chinese prickly ash to pick its fruit. In her haste, her finger was pricked by a thorn of the tree and the bright red blood splattered onto the fruit. Ever since then, the Chinese prickly ash has been vibrantly red. The fruit absorbed all of the maiden's blood, and she was buried under the tree. To honour her, this variety of Chinese prickly ash became known as the *Dahongjiao*.

Legend about the Mouse:

According to legend, locals have to find wives for the mice living in their houses on the 10th day of the first month of the Lunar New Year, to ensure that the mice won't steal grain. Thereafter, a custom of eating millet *laofan* (a form of stewed millet) to honour mice on that day was formed.

Legend about the Sparrow:

A long time ago, there was no millet in Shexian. Sparrows carried millet from afar, and dropped it into the ground. Hence, on the 8th day of the last month of the lunar year, locals enjoy a meal of bean porridge, made from millet, peanuts, jujubes and beans. Before the meal, some porridge is ceremonially splashed at the doorway, stairs and on the roof for sparrows to partake in. Another version of the legend says that the porridge was used to "glue" sparrows' mouths shut, so that in the following year they won't feed on the crops growing in the fields.

2) Food Culture

The dryland terrace system of Shexian is located in a mountainous region, with a harsh natural environment and a shortage of food variety. Hence, the locals have developed a food culture centerd around coarse cereals.

① Ways of Consuming Millet:

Millet is the local staple grain. Hence, many ways of consuming millet have been developed, such as millet *menfan* (a form of stewed millet), millet pancakes (pancakes made from millet flour), and millet *laofan* (another form of stewed millet).

Millet *Menfan*:

First, millet is washed and poured into a clay or steel pot. Then, pumpkin, sweet potato and long bean are added. Some households would add scallion for extra flavor. Water is added to a height of two fingers, and then brought to boil. After reaching boiling temperature, the pot is left to stew for about half an hour. The dish is then ready to be served, along with sides of fermented beancurd, chive flowers and sour beans (Fig. 2.2.54). As millet is rich in protein, fat and vitamin, along with rich

nutrients from vegetables, this dish provides villagers with enough energy for a hard day's work in the fields.

Fig. 2.2.54 Millet *Menfan*

Millet Pancakes:

Millet flour and wheat flour is mixed together. After fermentation, it is rolled into a thin pancake. A pinch of oil is added to a saucepan, and the pancake is placed inside to fry for two to three minutes. The millet pancake is eaten together with pickles made of radish pieces, radish strips and dried long beans (Fig. 2.2.55).

Fig. 2.2.55 Millet Pancakes (left) and *Hele* (right)

② Ways of Consuming Maize:

Maize is the largest local cereal crop by sown area, and naturally became one of the most important local staples. The locals usually grind it into corn flour before mixing it with other ingredients to create various delicacies, such as *minjie, hele, kangwotou, kulei* and baked corn pancakes.

***Hele*:**

In the past, locals usually made this dish using dough made from the flour of dried elm bark and corn flour with a specially crafted tool. This tool was usually made from metal, and was roughly half as tall as an average person. A cylindrical hollow container stood on three legs, with lots of round holes at the bottom and a round metal cover at the top. The cover had a lever. After the dough is placed inside, by manipulating the lever, the cover would be pressed down. Then, the dough would be pushed through the round holes at the bottom, thus forming round *hele*. After the *hele* noodles are ready, they would be boiled in water along with vegetables (Fig. 2.2.55).

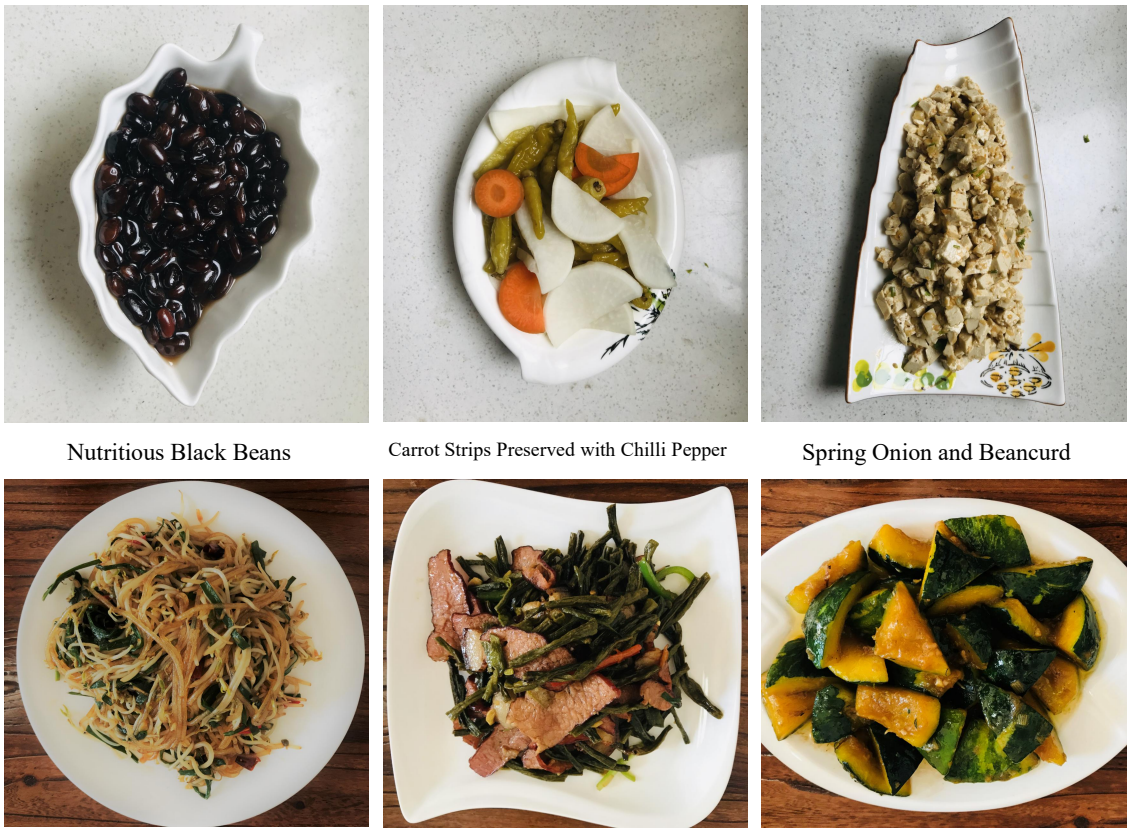
***Minjie*:**

Minjie is a locally loved dish (Fig. 2.2.56). Bean flour, corn flour and a pinch of wheat flour are kneaded into dough. A metal sheet studded with small holes mounted on a wooden frame is known as the *minjie* bed. Dough is pushed through the holes on the *minjie* bed into the wok and cooked in boiling water with vegetables such as carrot strips and dried bean strips. Add scallion and salt into hot oil, pour them into the wok, and then *minjie* is ready to serve,

Fig. 2.2.56 *Minjie* (Left) and *Minjie* Bed (Right)

③ The Consumption of Vegetables

The diversified vegetables cultivated in the terraces are mainly subsistence crops reserved for private consumption. They not only enrich the dishes on the locals' dinner table, but also meet the nutritional needs of the locals (Fig. 2.2.57). For instance, dishes made from black beans, soybeans and long beans are important sources of protein; dishes made from carrot, pumpkin and chives are important sources of vitamins. Every spring, when trees of Chinese prickly ash sprout, the locals would pluck out the weaker shoots, and include them in their dishes. A typical dish is fried eggs with shoots of Chinese prickly ash (Fig. 2.2.58). Furthermore, villagers would often make vegetable paste such as mountain chive paste and tomato paste which are convenient to store.



Nutritious Black Beans | Carrot Strips Preserved with Chilli Pepper | Spring Onion and Beancurd

Beansprouts and Vermicelli Fried with Chive | Beans Fried with Ham | Braised Pumpkin

Fig. 2.2.57 Dishes in Local Villages

Fig. 2.2.58 Shoots of Chinese prickly ash Fried with Eggs

④ Food Made against Famines

The locals also fully utilize other crops to create various delicacies, such as using soybeans to make soybean milk. To guard against famines caused by natural disasters, the locals have had the habit of making and storing fried flour for a long time. Fried flour made from black jujubes, sweet potatoes or persimmons can be stored for long periods. During periods in history when grain was short, the fried flour acted as important “relief food”. Till today, many rural households still keep decades-old fried flour.

⑤ Cooking in the Wild

Cooking in the wild is a special food culture in the heritage site (Fig. 2.2.59). As the farmland relatively spreads out on steep slopes high in the mountains far from their homes, local farmers have the habit of bringing kitchenware to the fields. They would cook in the wild on simple hearths built in the stone shelters (*shi’anzi*) next to the fields. When locals cook in the wild, they would usually stew grain and vegetables in the pot together, such as making millet *menfan*. Because the steps involved are simple, the meal is filling and provides a balanced diet, cooking in the wild has been passed down as a dietary habit.

Fig. 2.2.59 Local Farmers Cooking in the Stone Shelters

3) Architectural Culture

In the dryland terrace system of Shexian, many stone villages with unique characteristics have been preserved. Stone houses of various heights are built along the mountains, extend outward in two directions from the bottom of the valleys and form many layers along the mountain slopes. In the village, stone houses from various eras can be seen everywhere. Some older houses are still well-preserved despite being hundreds of years old, and display the stone architecture style of the Ming and Qing dynasties. There are stone corridors, stone screens, stone Buddha altars and stone hearths. The streets and alleys, houses and yards, buildings and pavilions, stairs and fences, tables and chairs, mills and grinders, doors and windows are all stone. Stone is everywhere, stone is in every household, making the villages seem like a huge natural stone museum (Fig. 2.2. 60).

Fig. 2.2.60 Stone Village Scenery

When nearing a stone house, one would be drawn strongly to the decorations at the top of the doors. Study halls (*shu'ting*) are an embodiment of the locally unique architectural culture. A couplet carved in stone flanks the main door on either side, and a horizontal scroll graces the top of the door, forming a *shu'ting*, bearing deep clan education significance (Fig. 2.2.61). Also, the gate stone and stone lions used as decorations, as well as the stone cisterns, stone mortars, stone mills and stone arches used in daily life, are all vibrant symbols of stone houses.

Fig. 2.2.61 A Locally Unique *Shu'ting*

The locals fully utilize their rich stone resources, and created diverse wares from stone (Fig. 2.2.62), on one hand fulfilling the needs of daily life and economic production, and fulfilling spiritual needs on the other. As stone-craft improved and people's demands increased, professional stonesmiths began to provide stone carving services. In the traditional villages of the heritage site, stone structures that "ward off evil" known as *zhenzhaishi* and archstones can be seen everywhere recording the unique cultural character of the locals.

Stone Mill (to thresh and mill grains)

Stone Mortar (to grind ingredients)

Stone Cisterns (to feed chickens and donkeys)

Archstone (to strengthen building structures)

Stone Boards (for leisure and recreation)

Stone Ring (to temporarily leash livestock)

Door Stone (for decoration)

Shigandang Stone Tablet (ward off evil)

Stone lion (ward off evil)

Fig. 2.2.62 Some Stone Items and Wares

As a unique form of architecture in the heritage site, the stone shelters (*shi'anzi*) scattered among the terraced fields are proof of the rich history of the stone terraced fields. Era names such as "Guangxu" and "Daoguang" are carved on the stones of many stone shelters, direct proof of the construction period of these stone shelters and stone terraced fields. Till today, *shi'anzi* still provide shelter for people, donkeys and mules as well as considerable storage space, and give important logistical support to local agricultural production (Fig. 2.2.63).

Fig. 2.2.63 A *Shi'anzi* in Winter

4) Donkey Culture

The harsh natural environment made the locals to choose their livestock very rigorously. Five standards are taken into consideration holistically: endurance, lifespan, ability to climb slopes, capacity for labour and difficulty of domestication. With these standards in mind, ancient villagers selected donkeys to be the main beast of labour in terrace agricultural production. Though horses and buffaloes were once used, but they were ultimately replaced. Mules are used only by a minority of villagers as they are somewhat inferior to donkeys.

The donkey in Shexian is a species with a long history, which is called Hebei Taihang Donkey, a local breed of Huabei Donkey (*Equus africanus asinus*). Donkeys play many important roles in terrace agriculture. In the steep slopes of the stone terraced fields, the locals depend on donkeys to transport loads such as farm tools, fertilizers, grain and straw (Fig. 2.2.64). Donkey participate in many phases of the agricultural production, including ploughing, sowing, fertilizing and the harvest. Donkey manure is a first-rate farmyard manure. Straw returned to the field through digestion by donkeys or fermentation with donkey manure effectively improves soil structure and fertility. Over the years, the local farmers have developed a set of techniques to raise and tame donkeys, allowing them to work in the fields with people efficiently.

Fig. 2.2.64 Donkeys Used in Transporting Loads

When donkeys are five to six months old, the locals would start to teach them to walk and carry loads, as well as familiarizing them with verbal commands. Training usually lasts a year before donkeys are able to fulfil basic tasks. As for male donkeys, the locals would neuter them sometime after they reach their first birthday, to soften their temperament. After they are familiar with the donkey's temperament, the locals would gradually increase their workloads, thus developing their tolerance and instilling good work habits. Trained donkeys are seen as "intelligential", and could develop tacit understanding with people, carrying loads proactively, tilling the lands on their own and even knowing the way home (Fig. 2.2.65).

Fig. 2.2.65 An Intelligential Donkey

As donkeys are a key element of the dryland terrace system, the love that locals have for their donkeys is reflected in every aspect of agricultural production and village life (Fig. 2.2.66). They would clear space in their yards just to set up donkey stables, build "donkey lanes" for donkeys in the villages, and specially prepare vegetarian noodle gruel during the winter solstice to reward them for a year of hard work. Locals do not eat donkey meat. If the donkey dies of natural causes, they will find a place to bury it deep. Over long years of interaction with donkeys, professions such as veterinarians and donkey traders gradually came into being. People also carry out ceremonial activities in special religious spaces such as the Horse King Temple to pray for the health and well-being of their donkeys.

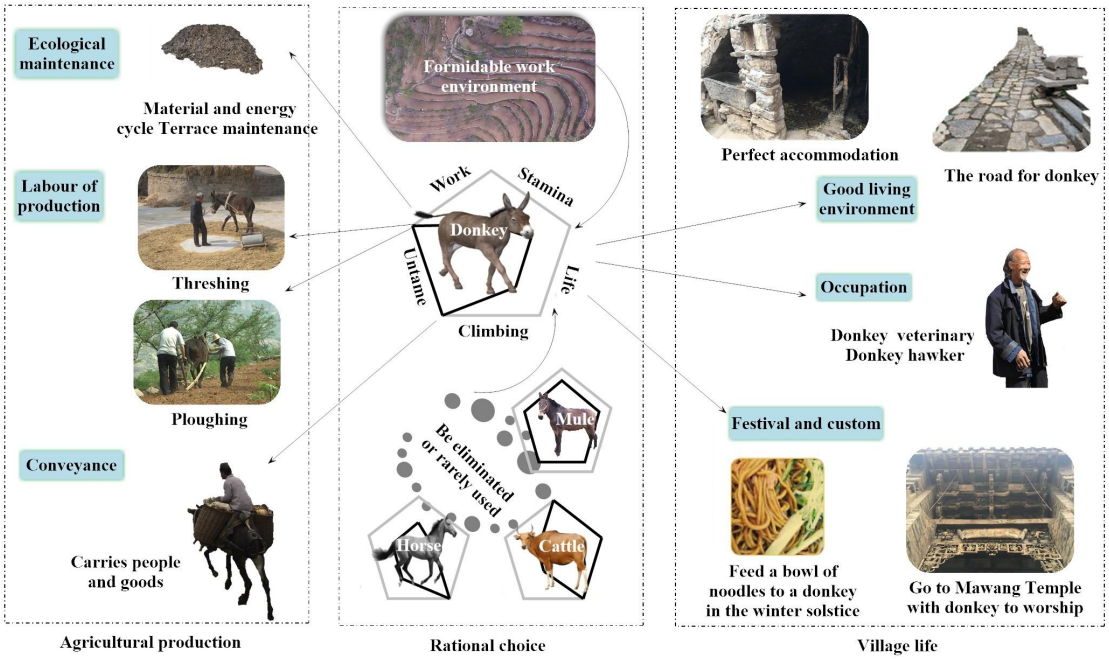


Fig. 2.2.66 Donkeys' Roles in Production and Culture Inheritance

(2) Value System

The heritage site has more rock than soil, with barren land and little rainfall, which makes for very harsh natural conditions. To survive and prosper, the locals are undaunted by hardship, and rely on their industrious hands to build daunting stone walls and ridges, winding stone streets and alleys, orderly stone yards and houses, intricately-carved stone doors and windows, thick and stocky stone mills and grinders, using only very primitive tools and rich local sources of rock. These structures all embody their indomitable spirit, outstanding workmanship that rivals nature herself, and the extraordinary wisdom to adapt to nature.

Ever since ancient villagers began building terraces in the Song and Yuan dynasties, the locals have passed on a philosophy of "treasuring soil like gold, treasuring water as oil" generation after generation. Whenever they leave the terraced fields, they would take off their shoes and knock them on the stone ridges, just so that they would not take away even the tiniest bit of soil. The locals built a rainfall harvest and storage system, bred crop varieties resistant to drought and able to thrive in barren land, created the "three till, two rake" farming technique, all of which reflect how much they cherish and efficiently utilize water and soil resources.

Due to the unique geographical environment and frequent natural disasters, the locals maintain high crisis awareness at the back of their minds even during a bountiful harvest year. The ancient teaching “grain at home makes peace of mind”serves as a constant reminder to them. Over the years, they have developed farming techniques of “storing the grain productivity in the farmland”, storage techniques of “keeping food in the cellar” and survival skills of “saving food from the mouth” (literal translation of local agricultural proverbs). These traditional knowledge and value systems as well as the philosophy of cherishing food have ensured local food and livelihood security and social prosperity.

① “Storing the grain productivity in the farmland” is describing the wisdom of agricultural productivity promotion by means of conducting diversified planting methods, such as intercropping to increase the total output of per unit area, rotation to keep the productivity of the farmland, and etc.

② “Keeping food in the cellar” means to make special storage room for harvested agricultural products to extend their duration especially in case of challenges during famine yeas. Wooden xuan and cellars used for storage can be found in every household’s yard, while the recipes for making fried black jujube flour have also been passed on for generations by villagers.

③ “Saving food from the mouth” shows the tradition of saving food in daily diet, which is an important rule every villager has been educated since they were young. Besides, local villagers add wild fruits and wild herbs to their diet, so the grains can be economized to some extent. In famine years, local villagers tend to change the food distribution among family genders as well as labour divisions, in order to save food to the largest extent.

(3) Social Organization

As a classical sociological concept, social organization can be generally classified according to the criteria of institutional authorization. Based on this understanding, there are three categories of social organizations in the proposed heritage site: villager committees, community organizations and patriarchal clans (Table 2.2.14).

Table 2.2.14 Categories of Social Organizations

	Villager Committees	Community Organizations	Patriarchal Clans
Nature	Formal	Formal	Informal
Function	Agricultural production, infrastructure construction, agricultural technology training, disaster prevention, etc.	Cultural activities performance, local varieties collection, characteristic agricultural products sales etc.	Social order maintenance, traditional culture inheritance, etc.

Villager committees are formal social organizations, established nationally in 1988 according to *the Organic Law of the Villager Committees of People's Republic of China*. Community organizations are authorized by related local government departments such as bureau of civil affairs and bureau of culture. Patriarchal clans are informal but traditional organizations established by extended family members, based on the links of kinships and clientage.

The villager committees are not authorized to have administrative power on community organizations as well as patriarchal clans, but to make recommendations as guidelines of daily activities. The community organizations normally execute work plans independently and collaborate with villager committees and patriarchal clans. As for patriarchal clans, they are regarded as positive and significant roles in daily conservation and development work of the other two organizations.

1) Villager Committee

The grass-root democratic self-governance system is implemented in rural areas of China, forming a three-layer organizational structure of "villagers committee - villagers' group - specialized sub-group". The villagers committee is formal grass-roots governance organization of villages in heritage sites. In general, the organization is composed of three to seven people, which shall include a certain number of women members; the villagers' group carries out relevant works under the management and guidance of the villagers committee; the sub-group mainly carries out relevant works

for specific groups (women, youth, etc.). The villagers' group in the heritage site is responsible for works such as agricultural production, infrastructure construction, and drought and flood prevention, while the sub-group such as the women's group is responsible for donkey domestication, crop variety collection, etc.

2) Community Organization

Since the construction of terraced fields in Mount Taihang, community organizations, spontaneously formed by villagers and officially authorized by specific government departments, have played an important role in maintaining agricultural production and stabilizing the rural society. The villagers spontaneously set up theatrical troupes and chorus, which have become an important part of the cultural life of the heritage site. In addition to performing *Shehuo* (a folk festival) and harvest celebration during the Spring Festival, villagers also perform on the village stage from time to time. In the late Qing Dynasty, villagers spontaneously established *Wushu* teams to defend against enemies and protect terraced fields from wars. The concentrated *Wushu* training for young and middle-aged male villagers was helpful to fortify their health and protect the homeland. Today, there are still several *Wushu* teams in the heritage site. The team members serve as the "mobile monitoring station", mainly responsible for the regular patrol and protection of stone terraced fields, timely finding and reporting the collapse point.

After being accredited by the Civil Affairs Bureau of Shexian, Shexian Dryland Terraces Conservation and Utilization Association was founded in Wangjinzhuang Village in 2008, which is the first community organization for the conservation and management of the agricultural heritage, initiated by five local villagers and collaborated with 50 warm-hearted people from all walks of life. The association has widely mobilized various stakeholders like local villagers, town-level governments, relevant enterprises, scientific researchers, mass media and social enthusiasts, and carried out many fruitful works under the guidance of the Agriculture and Rural Affairs Bureau of Shexian, such as the establishment of villagers' lecture hall, collection of traditional crop varieties, etc. In the future, the association will make cooperation with other villager committees nearby covering the entire heritage area.

3) Clan Management

In remote mountain regions, villages were developed by migration. An extended family with a shared ancestor would live together. The members would form a social hierarchy based on family seniority, qualifications and experience as well as assets, thus forming a clan marked by geographical affinity and familial relations. Such informal clans founded on geo-affinity play a very important role in maintaining village social order.

The security of the village is a large problem due to the harsh local ecological environment, poor farming methods, barren fields that have more rock than soil and only rely on natural rainfall, as well as constant conflict and frequent wars. Firstly, by living together to form a large village, the villagers strengthen their ability to defend against man-made disasters. Secondly, the clan can also amass the strength of each villager to carry out the construction of public roads, water conservancy facilities, wells, buildings in the village and terraced fields. It became a common rule in clans that villagers should assist one another in economic production and daily life. When building stone terraced fields, the coordination of each plot is far beyond the capability of any one family. The entire construction process embodies a high degree of social organization, and is an embodiment of the harmony and mutual assistance between local villagers.

The deep clan philosophies of the heritage site have allowed stone terraced fields to be preserved and passed on for generations as an important site for economic production and daily life. Today, the locals still cooperate and assist one another in every stage of agricultural production, through actions such as renting of land, collective selection of seeds, collective use of donkeys, group sales, and patrolling the terraces, thus promoting the dynamic conservation and efficient utilization of the terraces.

2.2.5 Landscapes and Seascapes Features

(1) Representativeness of the Landscape

There are two main types of terraced fields in China: rice terraced fields and dryland terraced fields. Rice terraced fields are distributed in the southern hilly and mountainous areas with thick soil layer, with an altitude of 200-2000 m; the climate type of such areas is subtropical monsoon climate with abundant rainfall; rice is mainly planted and the fields are covered by water during the growth period of rice. Thanks to sufficient water and soil resources, the ridges of rice terraced fields are mainly made of soil, although those in a few areas such as Qingtian rice-fish terraces in Zhejiang Province and Longji terraces in Guangxi Province are made of soil-rock mixtures. Compared with rice terraced fields, dryland terraced fields are mainly located in the northern area of China, which belongs to the temperate climate zone with relatively less rainfall, so drought resistant crops are mainly planted.

Among the dryland terraced fields in Northern China, the dryland stone terraced fields in Shexian, Hebei Province and the loess terraced fields in the Loess Plateau are very representative (Table 2.2.15). The dryland stone terraced fields in Shexian are located at an altitude of 200-1600 m, belonging to the temperate continental climate zone. Due to lack of water and soil, the soil layer in the field is thin and is generally mixed with rocks, and the ridge of terraced fields is piled with limestone. Loess terraced fields distributed in the Loess Plateau, such as terrace fields in the Guanchuan River Basin in Gansu Province and Zhuanglang terraced fields in Gansu Province, are located in the temperate semi-arid climate zone, with an altitude of 1500-2000 m. Due to the abundant loess resources, the ridge is mainly made of soil and integrated with the fields, with complete and continuous terraced arcs.

Table 2.2.15 Comparison between Different Dryland Terraced Fields

	Dryland stone terraced fields in Shexian	Loess terraced fields in the Loess Plateau
Location	Mount Taihang	Loess Plateau
Altitude	200-1600 m	1500-2600 m

Climate type	temperate continental climate zone	temperate semi-arid climate zone
Resources	less soil, less water	more soil, less water
Ridge	made of stones	made of soil
Soil	thin soil mixed with stones	thick soil
Crop type	drought resistant crops, such as millet, maize and beans	drought resistant crops, such as millet, maize, potatoes and flax
Landscape		

Dryland stone terraced fields are also distributed in other areas of northern China besides Shexian, Hebei Province. For example, over 400 hectares of stone terraced fields were built in Dazhai, Shanxi Province in the 1960s and 1970s, and stone terraced fields are also scattered in Mentougou, Beijing Municipality. However, these stone terraced fields are constructed in recent decades and the scale is small, some of which can no longer be used for agricultural production. In contrast, the dryland stone terraced fields in Shexian, Hebei Province have a larger scale and a longer history, therefore becoming the most representative dryland stone terraced fields.

In effect, there are two types of terraced fields in Shexian: stone terraced fields and soil terraced fields (Figure 2.2.67). The soil terraced fields are mainly distributed in the northeast and southwest of Shexian (Figure 2.2.68), with relatively low altitude, gentle terrain and large plot area. Due to relatively abundant soil resources, the ridge of soil terraced fields is mainly made of soil, and the soil layer is relatively thick (Table 2.2.15). The stone terraced fields are mainly distributed in the northwest and southeast of Shexian (Figure 2.2.68). The stone terraced fields in the northwest are generally distributed between wide valleys, with large plot area, quite closer to the form of the soil terraced fields, but they have small scale and poor continuity. In

contrast, the stone terraced fields in the southeast (where the heritage system is located) are more representative due to their large scale and complete and continuous stone ridges (Table 2.2.16).

Figure 2.2.67 Stone Terraced Fields (Left) and Soil Terraced Fields (Right) in Shexian

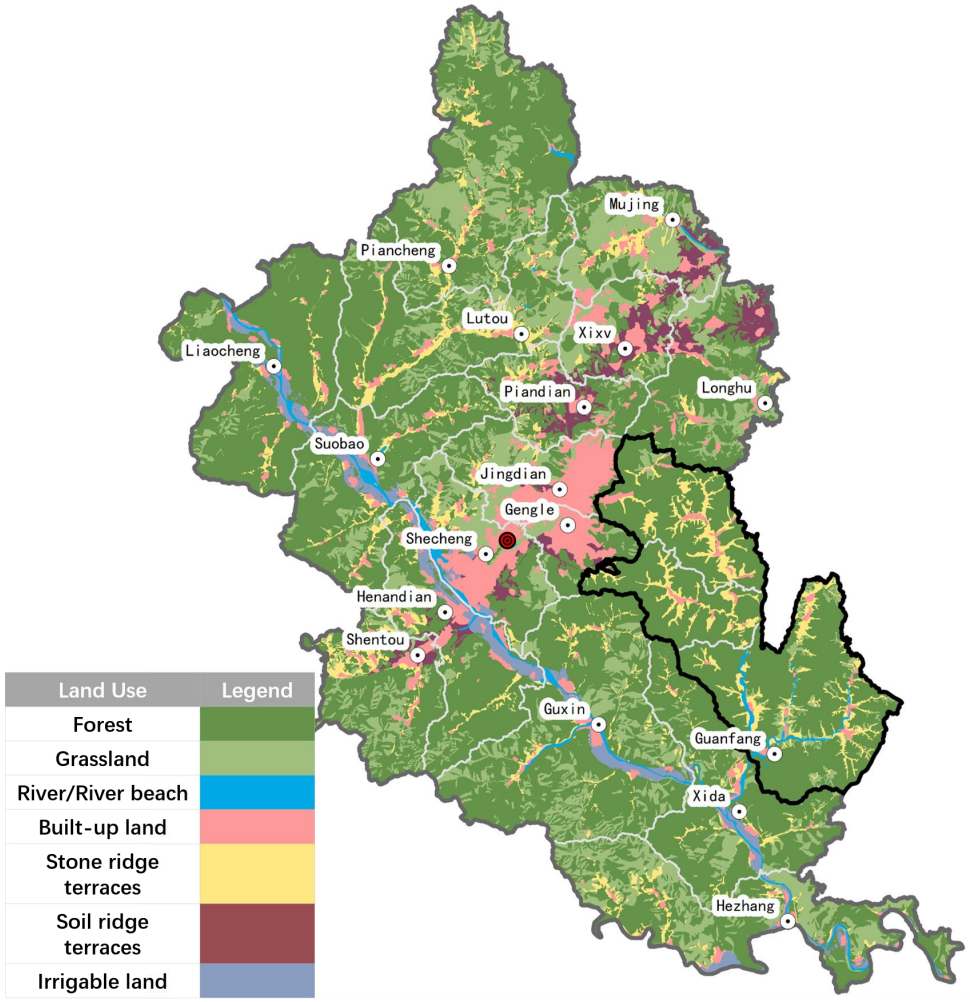


Fig 2.2.68 Land Use Map of Shexian (2017) (heritage site framed in black)

Table 2.2.16 Topographic Features of Stone and Soil Terraced Fields in Shexian

	Stone terraced fields		Soil terraced fields	
	Altitude (m)	Slope (°)	Altitude (m)	Slope (°)
Min.	193	0	415	0
Median	737	19	575	7
Max.	1561	72	865	56

(2) Distribution Characteristics of the Landscape

The farmland in Shexian can be divided into three categories according to the differences in landform and irrigation conditions: stone terraced fields; soil-ridge terraces; and irrigable land. The farmland in the heritage site belongs to stone terraced fields. Landsat remote sensing image in 2017 showed that the stone terraced fields in the heritage site had an area of 27.68 km^2 (approximately 2,768 ha), mainly distributed in the slopes along the river valley (Fig. 2.2.68). The main types of land cover in the heritage site were forests and stone terraced fields, accounting for 77.4% and 13.6% respectively of the total surface area; grassland, built-up land and rivers/river beach respectively made up 4.6%, 2.8% and 1.6% (Table 2.2.17).

Within the heritage site, the scale of stone terraced fields in Jingdian Town was the largest, with a total area of 9.17 km^2 (approximately 917 ha). Gengle Town had 6.55 km^2 (approximately 655 ha) of stone terraced fields, while the stone terraced fields of Guanfang Town occupied an area of 11.96 km^2 (approximately 1,196 ha) (Table 2.2.17).

Table 2.2.17 Land Cover Acreage and Proportion in the Heritage Site (2017)

Town	Indicator	Stone-ridge Terrace	Forest	Grassland	River/ River Beach	Built-up Land	Total
Jingdian	Area (km^2)	9.17	44.62	1.38	-	2.68	57.85
	Proportion	15.9%	77.1%	2.4%	-	4.6%	-
Gengle	Area (km^2)	6.55	33.73	0.08	-	1.07	41.43

	Proportion	15.8%	81.4%	0.2%	-	2.6%	-
Guanfang	Area (km^2)	11.96	79.85	7.99	3.20	2.07	105.07
	Proportion	11.4%	76.0%	7.6%	3.0%	2.0%	-
Heritage Site	Area (km^2)	27.68	158.20	9.45	3.20	5.82	204.35
	Proportion	13.6%	77.4%	4.6%	1.6%	2.8%	-

Google Earth metre-scale high resolution images showed that the stone terraced fields of the five villages of Wangjinzhuang in Jingdian Town and the five villages of Zhangjiazhuang in Gengle Town were the most dense and continuous (Fig. 2.2.69). The stone terraced fields of Guanfang Town were scattered along the valleys, and mainly found in Houchi Village and Qianchi Village in the northeast, as well as Lingdi Village in the southeast (Fig. 2.2.70).

Statistics showed that the stone terraced fields of the five villages of Wangjinzhuang had a surface area of 364 ha, consisting of over 46,000 plots of fields, the smallest of which was less than 1 m^2. The total length of the stone ridges was close to 5000 km, and over 150 layers of terraces were distributed tier upon tier on a slope higher than 250 m. The terraces extend into the clouds with the mountains, and rise tier by tier into the mountain summit. Except for 90° cliffs, more than 70% of slope areas have been fully utilized, with certain slope areas reaching a cultivation rate of 90%[1].

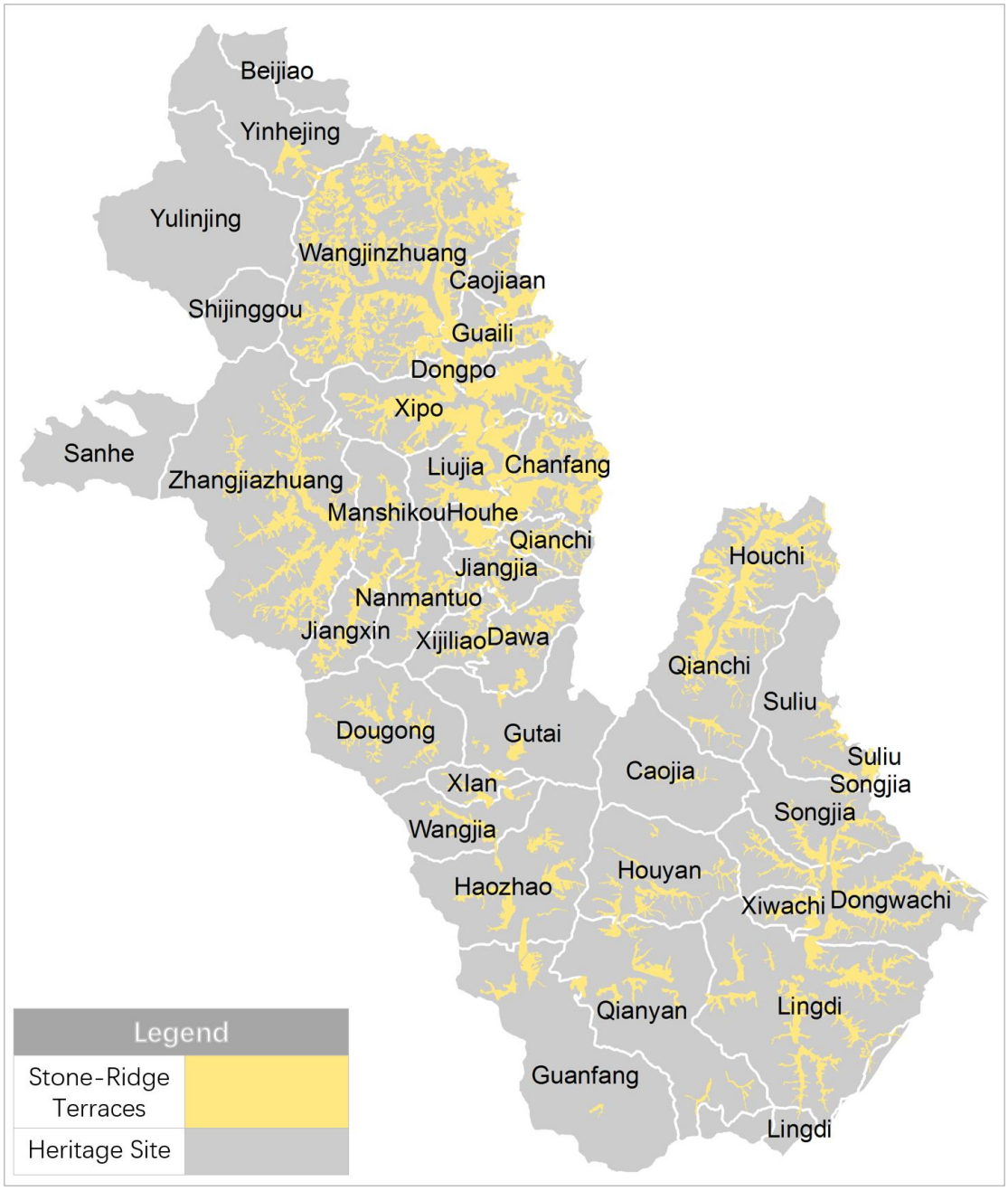


Fig. 2.2.69 Distribution of Stone Terraced Fields in the Heritage Site

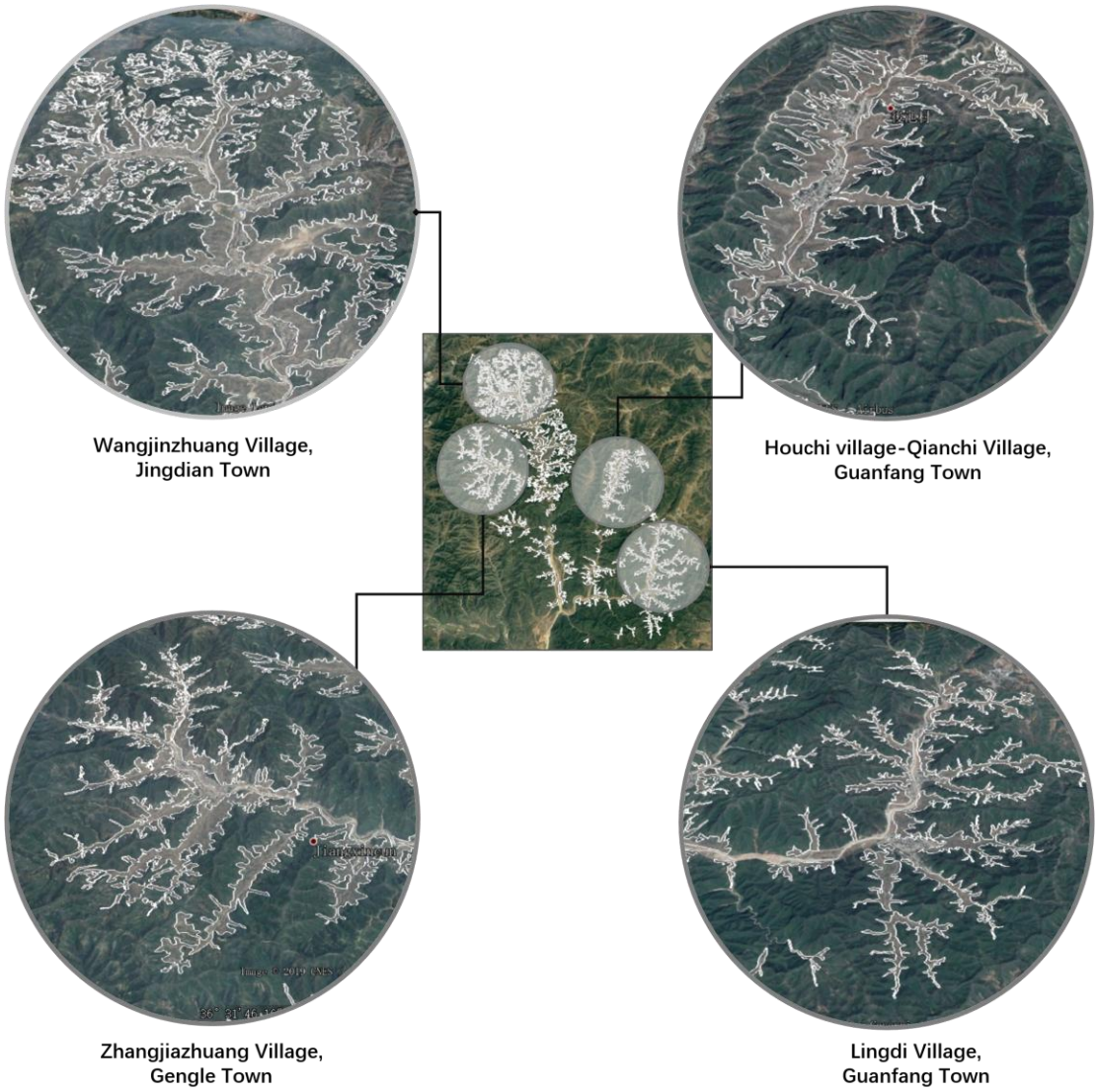


Fig. 2.2.70 Distribution of Stone Terraced Fields in Typical Villages of the Heritage Site

(3) Spatial Structure of the Landscape

Through long-term adaptation to and enthusiastic modification of the natural environment, fully utilizing limited soil and water resources and rich limestone resources, the locals have creatively cultivated large-scale stone terraced fields. After a long evolution, stone terraced fields have formed distinct landscape features along with forests and shrubs on the mountain peaks, as well as villages and rivers/river beaches in the valleys (Fig. 2.2.71).

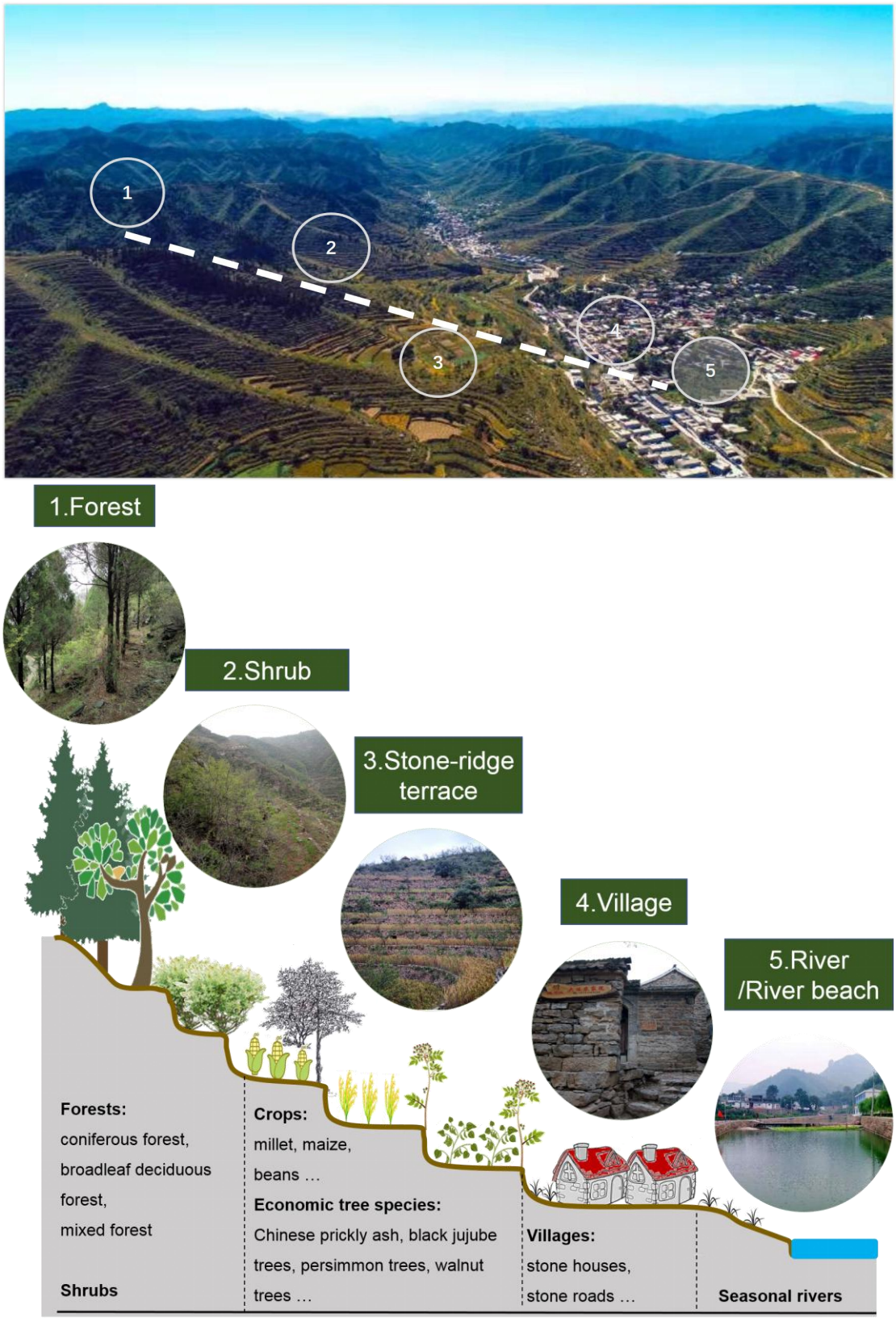


Fig. 2.2.71 Spatial Structure of the Landscape in the Heritage Site

The villages are distributed along the valleys where the terrain is flat and water sources are close by, with an average elevation of 607 m above sea level, an average slope gradient of 25°. Stone terraced fields extend towards high mountains along the edges of the villages, with the highest reaching up to a summit with an elevation of over 1000 m and a slope gradient of more than 50° (Table 2.2.18). The elevation of the summit is usually as high as 1142 m, with an even steeper terrain. It is unsuitable for cultivation, and usually features forests and shrubs, which play the roles of conserving soil and water.

Table 2.2.18 Distribution Characteristics of Landscape Elements

	Forest/ Shrub		Stone-ridge Terrace		Village		River/ River Beach	
	Elevation (m)	Slope (°)	Elevation (m)	Slope (°)	Elevation (m)	Slope (°)	Elevation (m)	Slope (°)
Maximum	1142	66	1036	52	844	51	697	50
Average	750	33	678	26	607	25	456	24
Minimum	361	0	364	0	369	0	348	0

Taking the five villages of Wangjinzhuang as an example, the entire landscape is distributed 617 – 1010 m above sea level. From the valley to the peak, the landscape features in order village – stone terraced fields – forests/shrub (Fig. 2.2.72).

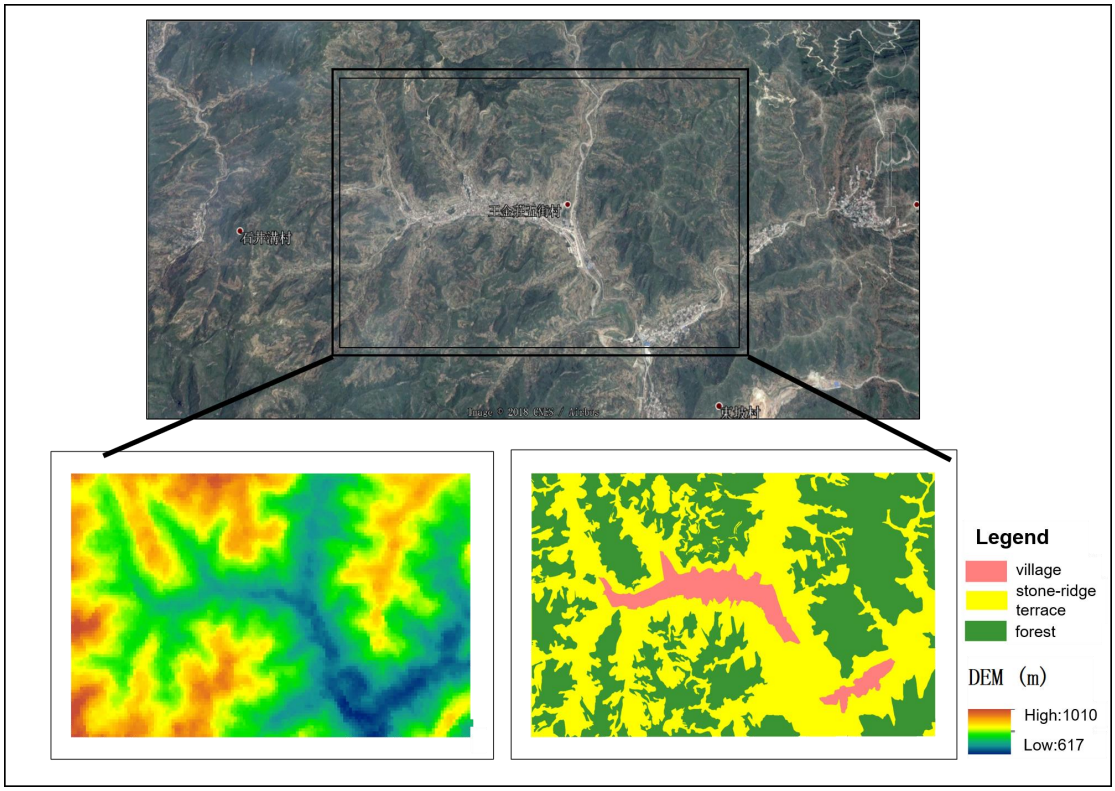


Fig. 2.2.72 Distribution Characteristics of Landscape Elements in Wangjinzhuang

(4) Seasonal Changes in the Landscape

The Shexian Dryland Stone Terraced System not only plays an irreplaceable role in local agricultural production, but also has high landscape and aesthetic values. Tier upon tier of stone terraced fields extend from the foothills to the summits; criss-crossing stone ridges stretch for nearly ten thousand miles, like a huge dragon meandering among the mountains and valleys while rising and falling. As the seasons change, the entire system forms different picturesque views, displaying a natural artistic landscape that stops one in his tracks.

In the spring, the Chinese prickly ash trees by the stone ridges sprout new leaves, adding an exuberant touch of spring to the terraces (Fig. 2.2.73). In the summer, the crops in the fields are full of pleasing growth momentum, and lush patches fill the eye from the foothills to the summits. Luxuriantly green vegetation and grey stone ridges form an intricate patchwork (Fig. 2.2.74). In the autumn, crops such as millet, maize and soybeans reach harvest, and the golden terraces of the mountains form a stark contrast to the stubbornly verdant forests and shrubs of the summits (Fig. 2.2.75). In the winter, the terraces are draped in a layer of snow, winding from the foothills to the

peaks. Layers of tiny hills and towering mountains are scattered randomly across the landscape, their unevenness pleasing the eye (Fig. 2.2.76).

Fig. 2.2.73 Terraced Fields in Spring

Fig. 2.2.74 Terraced Fields in Summer

Fig. 2.2.75 Terraced Fields in Autumn

Fig. 2.2.76 Terraced Fields in Winter

3 Action Plan for the Proposed GIAHS Site

3.1 Threats and Challenges

3.1.1 Current Threats

(1) Frequent Floods

Shexian has a typical temperate continental monsoon climate. As rainfall is concentrated in the summer, floods are frequent from July to August. Shexian would enter a flood period when precipitation levels are highest and storms with a precipitation greater than 50 mm appear at least once or even multiple times (Fig. 3.1.1). Storms may give rise to floods or mudslides, causing damage to the stone-ridges terraces around the gullies and rivers (Fig. 3.1.2).

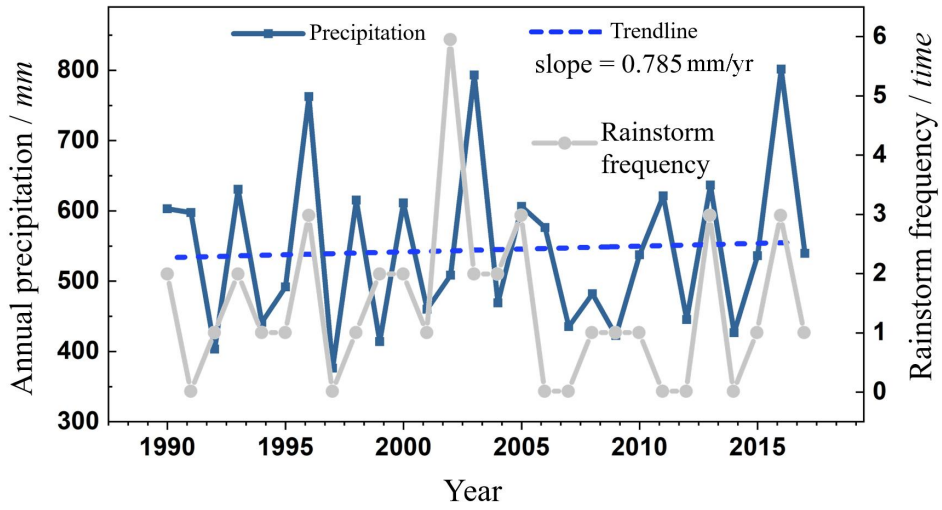


Fig. 3.1.1 Changes in Precipitation Levels and Storm Frequency of Shexian since 1990

Fig. 3.1.2 Stone Ridges Damaged by Flooding

Although locals have creatively invented the “suspended arch mosaic” structure, the reconstruction of collapsed stone ridges still incurs large costs in terms of manpower and time. As a large amount of younger population leave their villages, damaged stone ridges risk not being repaired in time, and may gradually turn into grassland or shrubland, and lose their capacity for agricultural production.

(2) Exodus of Young Labour Force

In the current market economy, cultural education in rural villages is comparatively lacking, and the young are not as emotionally attached to the terraces as their elders and forefathers. In addition, relatively backward living conditions, heavy manual labour, and lower profits from agriculture compared to other trades have made the terraces less and less attractive to the younger generation of farmers. Most youths do not wish to inherit traditional farming, and the majority choose to work in the cities or in other provinces. As income from jobs outside the villages are far higher than that from terrace farming, young farmers have even less feeling for the land.

Statistics showed that since 1990, the labour force structure of the heritage site has changed prominently, i.e. the proportion of those employed in non-agricultural sectors have increased considerably, while that of the agricultural sector has seen a corresponding drop (Fig. 3.1.3). Among those employed in the agricultural heritage sector in the heritage site in 2021, those below 45 years of age made up approximately 35.6%.

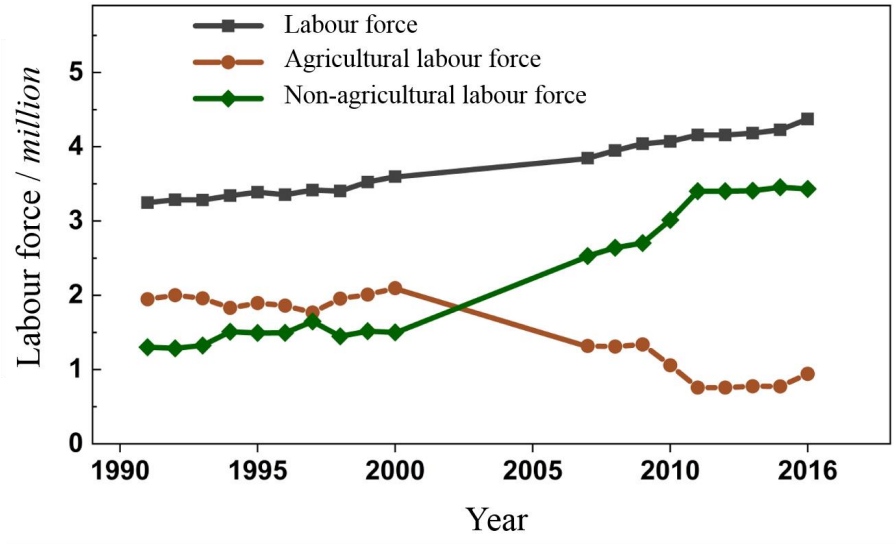


Fig. 3.1.3 Changes in Labour Force Structure of the Heritage Site since 1990

According to surveys, 15,792 people left the heritage site in 2017, approximately 40% of the registered population. Among the three towns, Guanfang saw the largest outward flow (8,495), as much as 50% of the registered population; Gengle saw the smallest outward flow (2,473), only 30% of the registered population. However, Guanfang Town saw the largest number of people return (to help family members) during the harvest season, a proportion of 45%. In contrast, Jingdian Town saw only 3,478 people returning, but the proportion reached 72% (Table 3.1.1).

Table 3.1.1 Demographics of the Heritage Site (2017)

Town	Registered		Resident				Outward	
	Household	Population	Total Household	Total Population	Non-local Household	Non-local Populatio	Popula tion	Harvest Return
Jingdian	4,501	13,782	4,372	13,235	3	11	4,824	3,478
Gengle	2,739	8,300	1,811	6,064	31	66	2,473	1,491
Guanfang	5,253	17,156	3,628	8,498	14	41	8,495	3,833
Total	12,493	39,238	9,811	27,797	48	118	15,792	8,802

(3) Impact of Modern Agricultural Technologies

The repair and maintenance, ploughing and sowing, harvest and processing in the heritage site mainly relies on human labour, beast labour, and is highly labour-

intensive. The local farmers continue to use donkey manure and straw to make farmyard manure, to solve the nutrient conversion and soil fertility problems. A large-scale exodus of young labour has caused these traditional techniques land in the awkward situation of being “heirless”.

With the exodus of young labour, donkey raising has continued to decline in recent decade. Taking Wangjinzhuang village as an example, the number of donkeys in 2012 was about 750, but now it is around 500, which has decreased more than 30% compared to the peak period. Currently, the total number of donkeys in the heritage site is more than 4,000, and one donkey is raised per three households on average. The decrease in the number of donkeys has increased the risk of unsustainable development of the terraced system.

At the same time, modern farming technologies, as represented by mini tillers, chemical fertilizers and pesticides, improved varieties have gradually begun to appear in the stone terraced fields. Since the first one appeared in Wangjinzhuang village in 2010, mini tillers have been more and more popular among farmers. However, although mini tillers to some extent can replace donkeys for their functions of transportation and production, they can never replace donkeys for their ecological function, which is the function of converting crop straw into organic fertilizer by digestion. The large-scale use of chemical fertilizers and pesticides will damage the soil environment that crops depend on to grow, and affect the quality and yield of such traditional superior products as Chinese prickly ashes and walnuts. The introduction and promotion of foreign crop varieties will have a large impact on the cultivation and production of local varieties. The trend of commoditization can easily cause local varieties to become extinct, along with traditional knowledge such as the breeding, cultivation and management of local varieties.

3.1.2 Main Challenges

(1) Increase Agricultural Profits while Conserving the Heritage

The heritage site features high mountains and steep slopes, contains more mountain land than flat land, more rock than soil and has poor water resources. Such harsh environmental conditions mean that it is difficult to substantially increase land productivity in the stone terraced fields. Highly inconvenient transport conditions and extremely intensive farming techniques also constrain any increase in agricultural productivity to a large extent. Statistics from 2017 showed that, compared to the 277 kg per *mu* for the entire county, the average yield of autumn crops in the heritage site was only 269.9 kg per *mu*. Only Jingdian Town achieved an average autumn crop yield (303.4 kg per *mu*), while Gengle Town (273.7 kg per *mu*) and Guanfang Town (232.6 kg per *mu*) both had yields lower than the average county level.

Local farming income is derived mainly from the sale of fruit products such as Chinese prickly ash and black jujube, as well as non-farm work outside the villages, and remains relatively low overall. According to surveys, the rural per capita income in the heritage site was only 9,124 CNY in 2021, among which income from non-farm work in other regions contributed 6,257 CNY, sales of grain products 519 CNY, and fruit products 1,429 CNY. It is clear that more than half of local farmers' incomes come from non-farm work. Surveys also showed that more and more young workers tended to increase their incomes in this way.

Hence, the farmers of the heritage site fervently hope to increase agricultural productivity and agricultural income. This hope manifests itself, at a certain level, in the substitution of donkeys with mini tillers, using chemical fertilizers to replace farmyard manure, introducing high-yield crop varieties to replace local varieties and the increased cultivation of cash crops instead of grain crops. Even though these measures can reduce labour intensity and increase agricultural income to a certain extent, they may not promote the sustainable development of the heritage site in the long term, and may even risk the conservation and inheritance of the agricultural heritage. Thus, managing the relationship between the dual goals of increasing agricultural productivity and income while conserving the heritage is a huge challenge

that Shexian is faced with in the conservation and development of the dryland terrace system.

(2) Adjust Planting Structures while Conserving the Heritage

Local farmers' urgent need to increase agricultural productivity and incomes also results in their replacing grain crops with economic tree species. For instance, for the sake of local economic development, some villages plant large areas of economic tree species such as walnut, pear and apple in the terraces. It has actually long been clear if such changes in planting structure characterized by "pooling water to plant trees" (Fig. 3.1.4) are beneficial to the conservation of the dryland terrace system.

Fig. 3.1.4 "Pooling Water to Plant Trees" in Terraces

Since the 1990s, following the promotion of urbanization and farmland reforestation policies, some stone terraced fields that were previously cultivated were abandoned, and some were converted to forest or land for construction. Landsat satellite imaging showed that from 1990 to 2017, the surface area of the stone terraced fields in the heritage site has continuously decreased (Fig. 3.1.5), and that the rate of decrease picked up significantly after 2000. At the same time, forest area has considerably increased, grassland area declined markedly, and residential area continuously expanded.

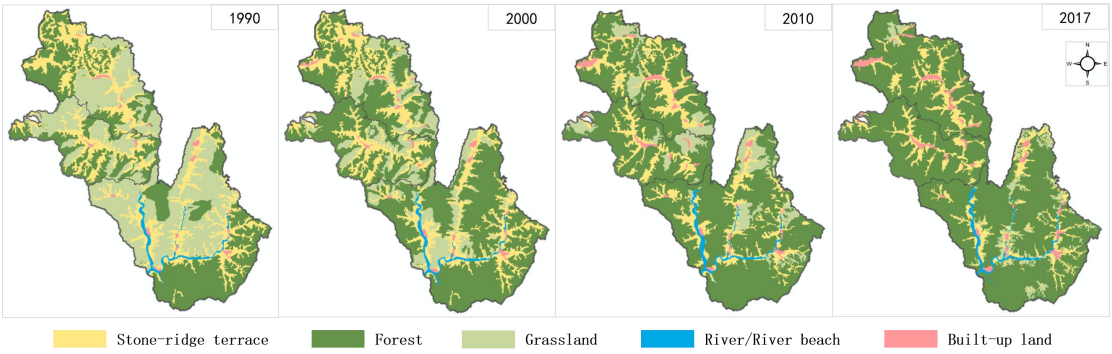


Fig. 3.1.5 Land Use in the Heritage Site During Different Periods

Surveys showed that from 2000 to 2017, the surface area of the stone terraced fields in the heritage site was reduced by 1024 ha, among which 42.2% (approx. 503 ha) were abandoned, 53.7% (approx. 640 ha) converted to reforested, and 4.1% (49 ha) used for road construction and others (Fig. 3.1.6). It can be seen that farmland reforestation is an important reason behind the reduction in the area of stone terraced fields in the heritage site.

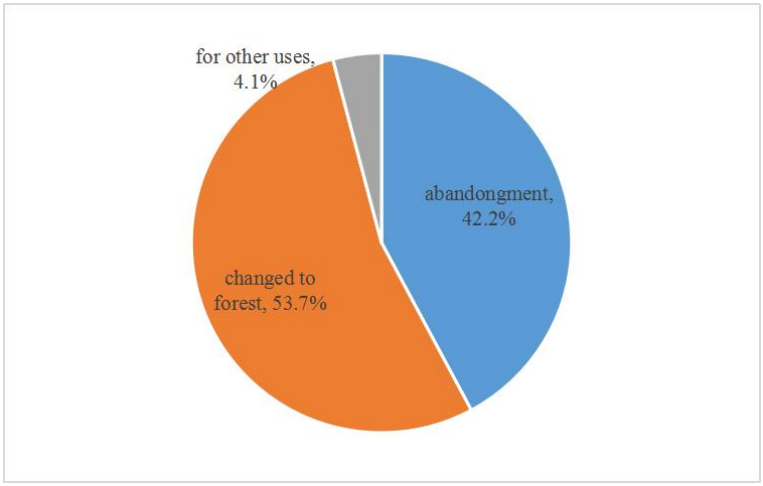


Fig. 3.1.6 Different Reasons for the Reduction in the Area of Stone Terraced Fields

The heritage site is located deep in Mount Taihang, and a key region for the promotion of farmland reforestation policies. In the past decades, afforestation has improved the local ecological environment to a certain degree, and have brought a certain amount of economic benefit. However, the rapid expansion of the forest has caused damage to the original large acreage terrace landscape. The landscape now has a higher degree of fragmentation.

On the other hand, the convertion of stone terraced fields to forests has affected the soil and water conservation capabilities of the terraces. From Fig. 3.1.7 and Fig. 3.1.8, it can be seen that as the surface area of stone terraced fields decreases, the degree of soil erosion in the heritage site increases, and the amount of soil conserved in the heritage site continues to decrease.

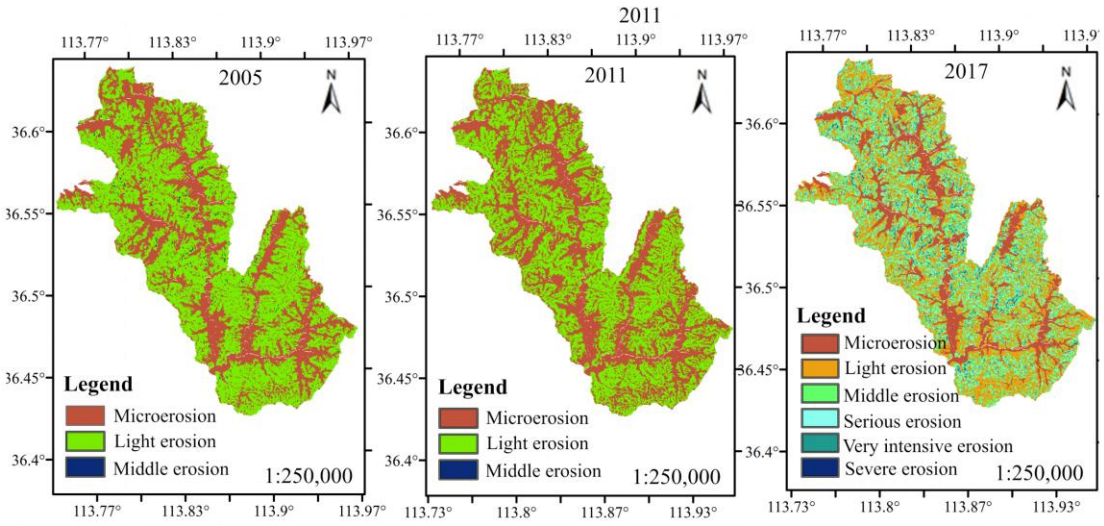


Fig. 3.1.7 Degree of Soil Erosion in the Heritage Site During Different Periods

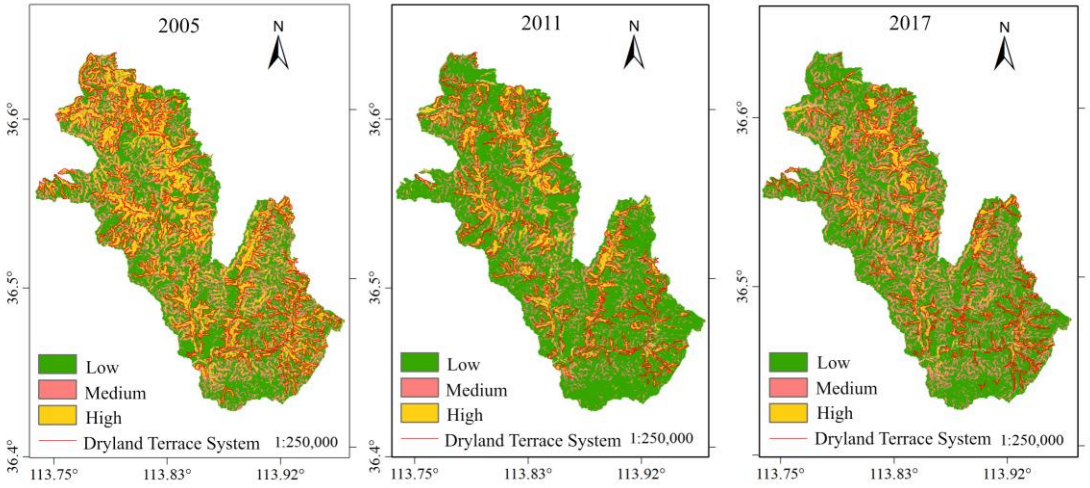


Fig 3.1.8 Different Amounts of Soil Conserved in the Heritage Site During Different Periods

These research results prompt us to take a fresh look at the planting structure adjustment policies characterized by “pooling water to plant trees”. Though such policies bring economic benefits in the short run, the damage they cause to the landscape and the water and soil conservation abilities of the stone terraced fields will

last a long time. Hence, how to manage the tension between such changes in cultivation strategy and heritage conservation is a huge challenge faced by the conservation and development of the dryland terrace system of Shexian.

(3) Improve Rural Conditions while Conserving the Heritage

The hygiene problem in rural environments is an important topic when discussing new village construction. As they are still raised in free-range conditions by each household in the heritage site, and their manure piles widely scattered (Fig. 3.1.9), making it difficult to timely clean up, the donkeys negatively impact the hygiene of the local environment. Furthermore, donkey manure will also spread into streets, alleys and public spaces as donkeys move around (Fig. 3.1.10), not only affecting the public hygiene of the heritage site, but also causing visual and olfactory discomfort to residents and visitors from outside.

Fig. 3.1.9 Donkey Manure Piled along the Road

Fig. 3.1.10 Donkey Manure Scattered on the Road

Next, as man demands better living conditions in the modern era, the original, traditional stone houses no longer satisfy the local residents' modern residential needs for running water, electricity, natural gas and internet (Fig 3.1.11). In addition, the misinterpretation of concepts such as village neatness in new village construction has also caused some ancient, unsophisticated but unique stone residences to be replaced by houses of concrete and tile. Even more egregiously, the entire buildings of some villages have been painted in various colors in the name of creating different village ambience, which has destroyed the unique traditional stone village style and features and also damaged the comprehensive conservation of the dryland terrace system.

Fig. 3.1.11 Traditional Stone Buildings

Also, the misinterpretation of the concept of entire region tourism has also affected the conservation of the traditional village style and features of the heritage site to a certain extent. In order to convert villages into scenic spots, some villages have begun to build visitors' trails, observation decks, signboards and visitor's directories, and to construct buildings that were completely inconsistent with the original style of the villages, greatly impacting the aesthetics and comprehensiveness of the traditional villages in the heritage site (Fig. 3.1.12).

Fig. 3.1.12 Village Landscapes Carved by Tourism

3.2 Proposed Actions

To deal with these threats and challenges, 34 actions have been planned, including 3 comprehensive actions, 7 ecological conservation actions, 6 cultural inheritance actions, 7 sustainable tourism development actions, 5 eco-agricultural product development actions and 6 capability building actions (Fig. 3.2.1).

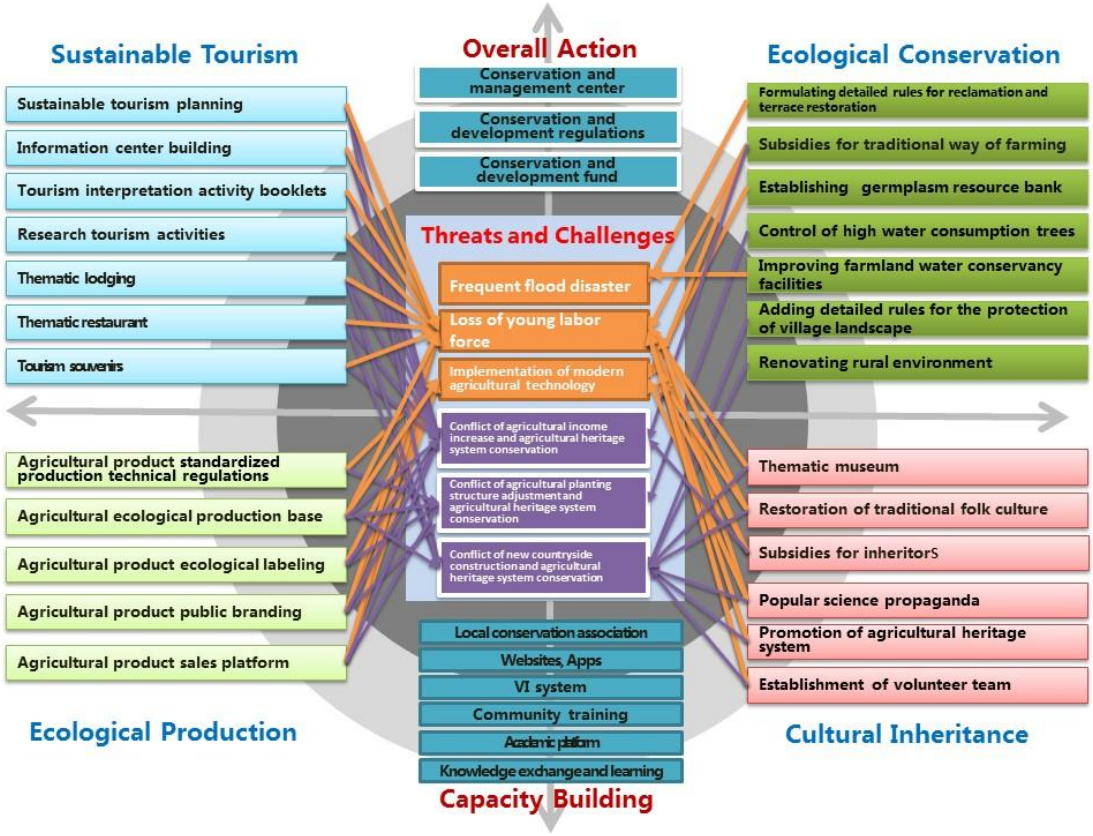


Fig.3.2.1 Actions in Response to Threats and Challenges

3.2.1 Comprehensive Actions

Action 1: Establishing a Management Center for Shexian Dryland Stone Terraced System

Description of the Action: It requires to establish an agricultural heritage management center under the Bureau of Agriculture and Rural Affairs of Shexian with dedicated personnel to be in charge of the conservation, development and capability building of Shexian Dryland Stone Terraced System.

Implementation Period: 2018 – 2020

Stakeholder Involved: Shexian Commission Office for Public Sector Reform, Bureau of Agriculture and Rural Affairs of Shexian

Action 2: Revising the Measures on the Conservation and Management of Shexian Dryland Stone Terraced System

Description of the Action: It requires to revise the original "Measures on the Conservation and Management of Shexian Dryland Stone Terraced System" to include new management details regarding the reclamation of terraces, repair of stone ridges, construction of irrigation facilities, conservation of traditional germplasm resources, subsidies for traditional farming methods, control of the style and features of villages, improvement of village environment, inheritance of traditional farming culture, production of eco-agricultural products, development of sustainable tourism, and capability building.

Implementation Period: 2018 – 2020

Stakeholder Involved: People's Government of Shexian, Bureau of Agriculture and Rural Affairs of Shexian, Bureau of Culture and Tourism of Shexian, governments of relevant towns, communities in the heritage site

Action 3: Establishing a Special Fund for the Conservation and Development of Shexian Dryland Stone Terraced System

Description of the Action: It requires to establish a fund dedicated to heritage conservation and development, which is mainly used to support the reclamation of terraces, repair of stone ridges, construction of irrigation facilities, conservation of traditional germplasm resources, subsidies for traditional farming methods, control of the style and features of villages, improvement of village environment, inheritance of traditional farming culture, production of eco-agricultural products, development of sustainable tourism, and capability building.

Implementation Period: 2018 – 2020

Stakeholder Involved: People's Government of Shexian, Bureau of Finance of Shexian

3.2.2 Actions on Ecological Conservation

Action 4: Enacting Detailed Rules for the Reclamation and Repair of the Terraces

Description of the Action: It requires to enact detailed rules for the reclamation and repair of the terraces by identifying the number, area and location of abandoned terraced plots in the heritage site and formulating reclamation and repair plans according to the conditions of different plots.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System, funds to support farmland construction, finances of relevant towns, funds of associations

Action 5: Subsidizing Traditional Farming Technologies in the Heritage Site

Description of the Action: It requires to issue detailed rules for subsidizing traditional farming technologies in the heritage site, such as continuing to raise donkeys, repairing stone ridges, and reclaiming terraces. Also, farmers who cultivate traditional varieties of such crops as millet, maize, soybeans and long beans shall be given encouragement and support in policies.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Finance of Shexian, Bureau of Agriculture and Rural Affairs of Shexian, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 6: Establishing a Seed Bank for Traditional Varieties in the Heritage Site

Description of the Action: By surveying and collecting local varieties in the heritage site, it requires to establish a germplasm resource bank focusing on crops such as millet, maize, soybeans, long beans, pumpkins, Chinese prickly ash, black jujubes and persimmons. The establishment of the germplasm resource bank shall follow

international standards used in seed banks, and fully incorporate the capabilities of the local farmers.

Implementation Period and Location: 2018 – 2020, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, governments of relevant towns, communities in the heritage site, research institutions

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 7: Controlling the Planting Area of High-Water Consumption Tree Species in the Heritage Site

Description of the Action: For the comprehensive conservation of the "forest/shrub – stone-ridge terrace – village – river/river beach" landscape of the heritage system, it requires to control the area of the terraces that are abandoned and reforested, and to plant low-water consumption tree species as far as possible when terraces are reforested. Economic tree species should not be planted over large areas just to develop the rural tourism industry.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 8: Improving the Agricultural Irrigation Facilities in the Heritage Site

Description of the Action: It requires to construct water tanks, water cellars, water pipes (to transport water from reservoirs) on the foundation of currently existing facilities near stone terraced fields and neighboring areas, thus realizing seasonal regulation of water resources. It also includes building drains and small reservoirs in the areas near the terraces to guard against droughts and floods.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, governments of relevant towns, communities in the heritage site,

Source of Funding: funds to support irrigation facility construction

Action 9: Enacting Detailed Rules for the Conservation of the Style and Features of Villages

Description of the Action: It requires to enact measures to conserve the style and features of villages in the heritage site, which satisfy the needs of the landscape conservation, by drawing red-lines, carefully building tourism facilities such as visitors' trails, observation decks, signboards and directories, large-scale visitors' centers, and avoiding extensive damage to the style and features of traditional villages.

Implementation Period and Location: 2018 – 2020, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, Bureau of Housing and Construction of Shexian, Bureau of Culture and Tourism of Shexian, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 10: Improving the Rural Environment in the Heritage Site

Description of the Action: It requires to specify fixed locations to pile donkey manure, clean donkey manure off the roads timely, reduce the environmental and visual pollution caused by donkey manure as well as the negative effects caused by the diffusion of the odor of donkey manure. It also includes timely cleaning of garbage off road surface to prevent environmental pollution caused by littering and inappropriate dumping.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, Bureau of Ecology and Environment of Shexian, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

3.2.3 Actions on Cultural Inheritance

Action 11: Establishing a Thematic Museum about Shexian Dryland Stone Terraced System

Description of the Action: It requires to establish a thematic museum about Shexian Dryland Stone Terraced System, by systematically collecting, sorting out and displaying the main elements of the heritage system (including traditional crop varieties, relevant zoological resources, relevant botanical resources, traditional knowledge and technologies, relevant folk culture, architectural culture, donkey culture, terrace landscapes, rural lifestyles, industrial development, etc.), and make it a window for people to know the heritage system.

Implementation Period and Location: 2018 – 2025, in the county town

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, Bureau of Culture and Tourism of Shexian, governments of relevant towns, communities in the heritage site

Source of Funding: finances of Shexian

Action 12: Exploring, Sorting out and Inheriting the Farming Culture, and Restoring Part of Traditional Folk Culture

Description of the Action: It requires to dig deep into the traditional culture of the heritage site (including festive customs such as temple fairs, myths and legends, food culture such as millet *menfan*, stone culture such as stone shelters), gradually restore valuable folk activities (such as *erguibandie,* boat dances, donkey dances, bamboo horse dances, carrying sedan chairs, family songs, drum bands, lion dances, harvest celebration), and organize cultural activities such as the Chinese Prickly Ash Pick-up Festival, the Persimmon Pick-up Festival and the Harvest Festival, ensuring the continuity of traditional farming culture.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Culture and Tourism of Shexian, Bureau of Agriculture and Rural Affairs of Shexian, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 13: Subsidizing Inheritors of the Traditional Farming Techniques in the Heritage Site

Description of the Action: It requires to certify the inheritors of traditional techniques such as stone ridge repair techniques, stone masonry, donkey and mule training techniques, and to subsidize the inheritors to support them in launching related cultural inheritance activities every year.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Culture and Tourism of Shexian, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 14: Compiling Science Popularization Publications to Publicize the Shexian Dryland Stone Terraced System

Description of the Action: It requires to compile popular science publications about Shexian Dryland Stone Terraced System aimed at different audiences, including children, teenagers, the general public and farmers, publicizing heritage knowledge through these publications.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, relevant enterprises , governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 15: Launching Publicity Activities on Shexian Dryland Stone Terraced System

Description of the Action: It requires to publicize the heritage system through publicity handbooks, publicity films, audio-visual materials, photography, writing contests, painting and recitation competitions, feature stories in media, etc.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Culture and Tourism of Shexian, Writers' Association of Shexian, relevant enterprises, governments of relevant towns, communities in the heritage site

Source of Funding: finances of Shexian, private investment, Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 16: Establishing a Volunteer Team for the Conservation and Inheritance of the Heritage System

Description of the Action: It requires to establish a volunteer team in the heritage site mainly comprising students and farmers to explore and sort out the ecological and cultural resources of Shexian Dryland Stone Terraced System, to design and launch research and learning activities, as well as to organize women volunteers to launch traditional food culture conservation activities.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, Women's Federation of Shexian, Education Bureau of Shexian, governments of relevant towns, communities and schools in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

3.2.4 Actions on Eco-agricultural Product Development

Action 17: Enacting/Updating Technical Standards for the Production of Eco-Agricultural Products in the Heritage Site

Description of the Action: It requires to enact/update technical standards for the production of eco-agricultural products in the heritage site, guiding the production of eco-agricultural products such as millet, maize, beans, Chinese prickly ash, black jujubes and persimmons.

Implementation Period and Location: 2018 – 2020, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 18: Establishing Demonstration Bases for the Production of Eco-Agricultural Products in the Heritage Site

Description of the Action: It requires to establish several demonstration bases for the production of eco-agricultural products such as millet, maize, Chinese prickly ash and beans in the heritage site, and to provide training for farmers and farmers' cooperatives to promote the production of eco-agricultural products in the heritage site.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, relevant enterprises, governments of relevant towns, communities in the heritage site

Source of Funding: funds to support agricultural projects

Action 19: Expanding the Certification of Eco-Agricultural Products from the Heritage Site

Description of the Action: It requires to expand the certification scale of eco-agricultural products from the heritage site, increase the quantity of certified eco-agricultural products, and expand the certified area of the production of eco-agricultural products.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, relevant enterprises, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 20: Forming a Public Brand for Agricultural Products from the Heritage Site

Description of the Action: It requires to establish a public brand for the agricultural products from the heritage site and enact measures on the use of the public brand. Agricultural products that use this public brand shall be strictly monitored and managed according to the measures.

Implementation Period and Location: 2018 – 2020, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, Bureau of Market Regulation of Shexian, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 21: Establishing Sales Networks and Platforms for Agricultural Products from the Heritage Site

Description of the Action: It requires to intensify efforts to promote and sell agricultural products from the heritage site, establish offline sales networks and online sales platforms, as well as link the online platforms with major e-commerce platforms.

Implementation Period and Location: 2018 – 2020, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, Supply and Marketing Cooperative of Shexian, relevant enterprises, governments of relevant towns, communities in the heritage site

Source of Funding: finances of Shexian, private investment

3.2.5 Actions on Sustainable Tourism Development

Action 22: Making a Plan for the Sustainable Tourism Development in the Heritage Site

Description of the Action: It requires to make a plan for the sustainable tourism development in the heritage site, clarifying principles, directions and paths of the tourism development suitable for the heritage system.

Implementation Period and Location: 2018 – 2020, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, Bureau of Culture and Tourism of Shexian, relevant research institutions, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 23: Establishing an Information Center about Shexian Dryland Stone Terraced System

Description of the Action: It requires to establish an information center about the Shexian Dryland Stone Terraced System, displaying and publicizing the features of the heritage system through multiple media.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Culture and Tourism of Shexian, Bureau of Agriculture and Rural Affairs of Shexian, governments of relevant towns, communities in the heritage site

Source of Funding: funds to support rural construction

Action 24: Compiling Tourism Interpretation Booklets for Shexian Dryland Stone Terraced System

Description of the Action: It requires to compile tourism interpretation booklets for Shexian Dryland Stone Terraced System aimed at different audiences to introduce the sustainable tourism activities.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, Bureau of Culture and Tourism of Shexian, relevant research institutions, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 25: Organizing Study Trips to Shexian Dryland Stone Terraced System

Description of the Action: It requires to organize study trips to Shexian Dryland Stone Terraced System for elementary, middle and high school students, including seminars, outdoor activities and participatory projects.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, Bureau of Culture and Tourism of Shexian, Education Bureau of Shexian, governments of relevant towns, communities in the heritage site, relevant research institutions, primary and middle schools of Shexian

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 26: Establishing Thematic Lodgings in the Heritage Site

Description of the Action: In conjunction with the visual identity (VI) system, it requires to select typical rural households to establish 1 – 3 lodgings with the agricultural heritage theme in the heritage site. The number of the thematic lodgings could be gradually increased in later phases.

Implementation Period and Location: 2018 – 2025, typical villages in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, governments of relevant towns, communities in the heritage site, relevant research institutions

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 27: Establishing Thematic Restaurants in the Heritage Site

Description of the Action: In conjunction with the visual identity (VI) system, it requires to select typical rural households to establish 1 – 3 restaurants with the agricultural heritage theme in the heritage site, and to conserve and inherit traditional food culture relying on these thematic restaurants. The number of the thematic restaurants could be gradually increased in later phases.

Implementation Period and Location: 2018 – 2025, typical villages in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, Bureau of Culture and Tourism of Shexian, governments of relevant towns, communities in the heritage site, relevant research institutions

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 28: Developing Tourist Souvenirs of Shexian Dryland Stone Terraced System

Description of the Action: It requires to develop tourist souvenirs of Shexian Dryland Stone Terraced System, and put them into the thematic restaurants and lodgings. It also requires to establish 1 – 2 souvenir shops in the heritage site and gradually increase the number of the souvenir shops in later phases.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, Bureau of Culture and Tourism of Shexian, relevant enterprises, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

3.2.6 Actions on Capacity Building

Action 29: Establishing a Community-Based Agricultural Heritage Conservation and Utilization Association

Description of the Action: It requires to build up a community-based agricultural heritage conservation and utilization association, mobilizing forces from all over society to participate in the conservation and development of the Shexian Dryland Stone Terraced System.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Civil Affairs of Shexian, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 30: Establishing Information Platforms for the Shexian Dryland Stone Terraced System

Description of the Action: It requires to design and operate several information platforms for the Shexian Dryland Stone Terraced System (including websites, apps, etc.). The website shall initially feature the characteristics of the heritage system, and in later phases increase tourist attractions and tourism guides, and promote the online sales of specialty agricultural products and creative cultural products.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, Bureau of Culture and Tourism of Shexian, relevant enterprises, relevant research institutions, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 31: Designing a Visual Identity (VI) System for the Shexian Dryland Stone Terraced System

Description of the Action: It requires to design a visual identity (VI) system for the Shexian Dryland Stone Terraced System, which can start with logos. The VI system must apply for copyright and trademarks, and the detailed regulations for its use must be formulated.

Implementation Period and Location: 2018 – 2020, in the heritage site

Stakeholder Involved: Bureau of Press and Publishing of Shexian, Bureau of Market Regulation of Shexian, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 32: Providing Skill Training for the Residents in the Heritage Site

Description of the Action: It requires to provide training for the residents in the heritage site to increase their skills in organic agricultural production, sustainable tourism development, event promotion and cultural inheritance.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, Bureau of Human Resources and Social Security of Shexian, relevant research institutions, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 33: Establishing a Research Platform for the Conservation and Utilization of the Heritage system

Description of the Action: It requires to jointly establish a research platform for the conservation and utilization of the heritage system with research institutions, promoting collaborative research between research teams from different fields, and providing intellectual support for the conservation and utilization of Shexian Dryland Stone Terraced System.

Implementation Period and Location: 2018 – 2020, in the heritage site

Stakeholder Involved: Bureau of Science and Technology of Shexian, relevant research institutions, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

Action 34: Carrying out Exchanges on the Conservation and Development of the Heritage System

Description of the Action: It requires to participate in domestic and international research conferences, working meetings and exchange activities, and regularly invite experts to guide the conservation and development of the Shexian Dryland Stone Terraced System.

Implementation Period and Location: 2018 – 2025, in the heritage site

Stakeholder Involved: Bureau of Agriculture and Rural Affairs of Shexian, relevant research institutions, governments of relevant towns, communities in the heritage site

Source of Funding: Special Fund for the Conservation and Development of the Shexian Dryland Stone Terraced System

3.3 Safeguard Measures

3.3.1 Multi-Stakeholder Participation

In order to ensure the effective implementation of the action plan, we will continuously improve and perfect the multi-stakeholder participation mechanism that supports the conservation of the Shexian Dryland Stone Terraced System (Fig. 3.3.1), allowing the forces of governments, communities, enterprises, research institutions and the media to participate in the conservation and management of the agricultural heritage.

Fig. 3.3.1 The Multi-Stakeholder Participation Mechanism

Firstly, we shall establish a management center that is responsible for the conservation, development and capacity building of the Shexian Dryland Stone Terraced System, and serves as the main government body in charge of communication and collaboration with the Ministry of Agriculture and Rural Affairs, the Department of Agriculture and Rural Affairs of Hebei Province, and other county government departments.

Secondly, we shall continue to promote the establishment of an agricultural heritage conservation and utilization association on the county level. In 2018, such a village-level association was established in Wangjinzhuang Village, which mobilized the forces of multiple stakeholders, specially the business and community sectors, to

participate in the conservation and development of the terraces. In the future, we shall further expand the scale of this association, and gradually form a core-village-based heritage conservation and utilization network as well as a rural household participation network on the county level. On the foundation of the association, we shall organize an agricultural heritage conservation and utilization volunteer team whose members are mainly drawn from the community. Such a volunteer team shall fully engage women, the elders and students in the heritage site to incorporate the conservation of agricultural heritage into the community's daily life and curricula of local schools.

Moreover, we shall gradually establish mechanisms to train and empower community participation. We shall also optimally utilize domestic and international agricultural heritage exchange and collaborative platforms, invite domestic and foreign experts to guide the conservation and utilization of the Shexian Dryland Stone Terraced System, invite domestic and foreign journalists to cover the results of the conservation and development of the heritage system, and boost the enthusiasm of the local community for the heritage conservation and their abilities.

3.3.2 Fund Leverage and Resources Mobilization

In order to ensure the smooth implementation of the action plan, we shall fully mobilize the resources of various sectors to secure ample funds (Fig. 3.3.2).

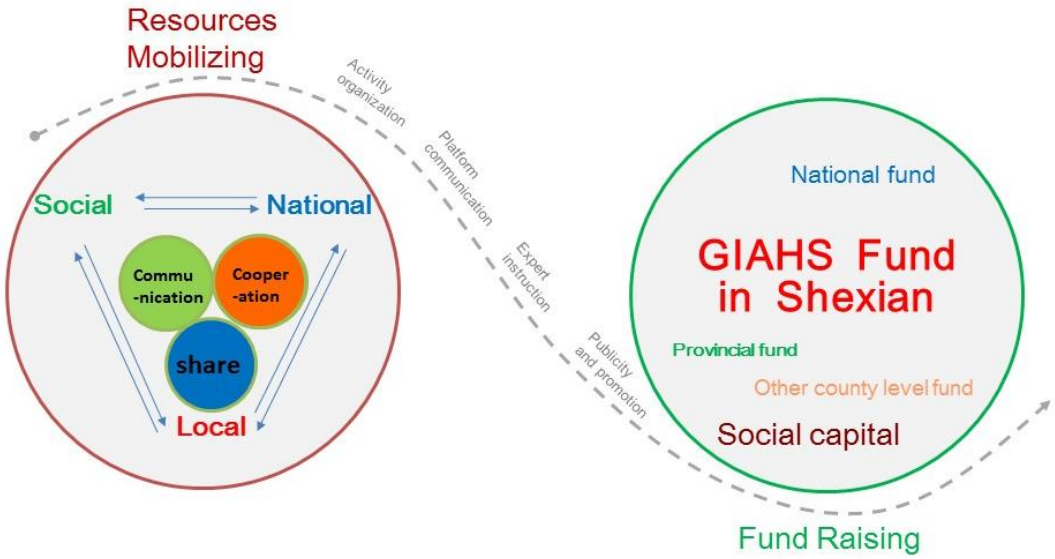


Fig. 3.3.2 The Fund Leverage and Resources Mobilization Mechanism

Firstly, a fund dedicated to agricultural heritage and conservation shall be established in the county finances to act as the main source of funding for the implementation of the action plan. The implementation of some actions shall also be funded by county finances and other construction funds according to circumstances.

Secondly, we shall also work to obtain financial support from province-level financial special projects, and national-level funds for agricultural support projects, to be used in the conservation and development of the Shexian Dryland Stone Terraced System.

Furthermore, we shall fully mobilize private investment, work to obtain financial support from the business sector and non-governmental bodies, thus complementing government conservation funds. Through working with universities, colleges and research institutions to establish collaborative research platforms, Shexian can also obtain support from research grants dedicated to the conservation and sustainable development of agricultural heritage.

3.3.3 Monitoring and Evaluation

To promote the conservation and development of the heritage system, we shall establish a monitoring system for Shexian Dryland Stone Terraced System. Under the guidance of the Ministry of Agriculture and Rural Affairs, we shall systematically monitor the functions of ecological conservation, economic development, social maintenance and cultural inheritance of the heritage system, and meticulously and continuously record how actions are implemented such as institutional construction, publicity, demonstration and promotion. Through surveys of households and sectors as well as field investigation, we shall obtain relevant statistics and survey data for annual reports and survey reports (Fig. 3.3.3), and report to the Ministry of Agriculture and Rural Affairs through the dynamic monitoring system developed by the Ministry.

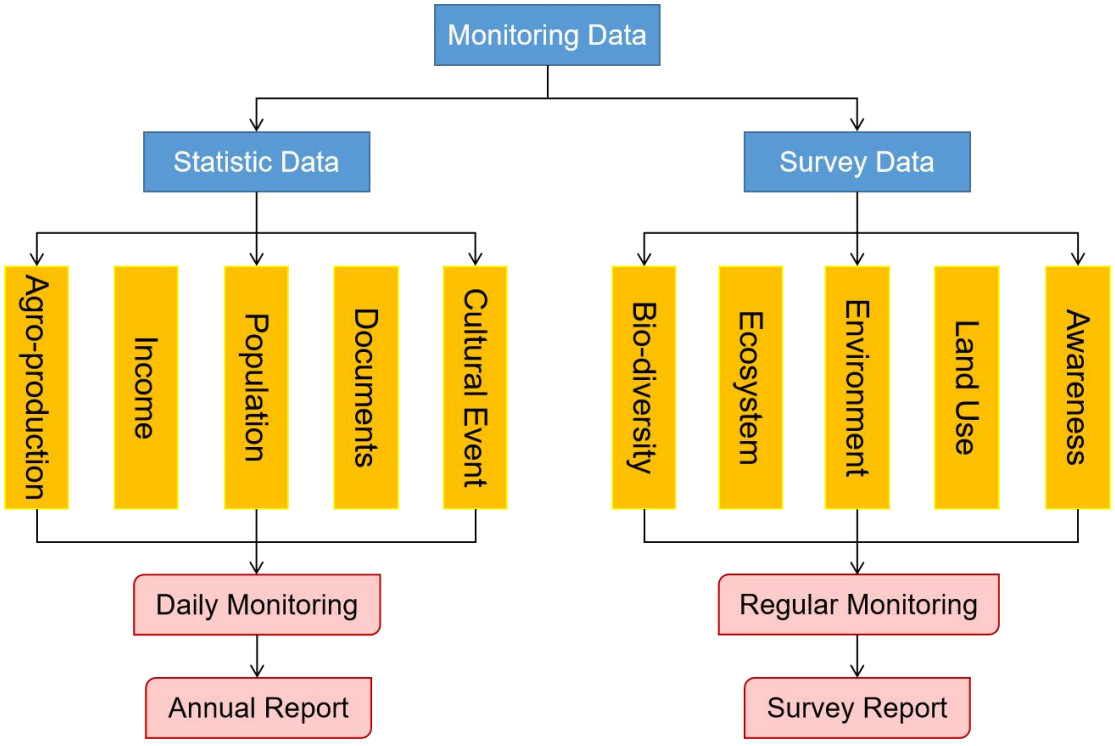


Fig. 3.3.3 The Monitoring Framework of the Heritage System

To ensure the effective implementation of the action plan, we shall also evaluate these actions. From late 2020 to early 2021, we shall evaluate the effectiveness of the implementation of the action plan from 2018 – 2020, and complete a self-evaluation report (Fig. 3.3.4). The self-evaluation report shall sum up the relevant work done in

the past three years for each action, and evaluate its effectiveness qualitatively and quantitatively. The report will summarize the experiences of some actions that were completed on or ahead of time, and analyze factors that caused some actions to fail or be delayed. Results from the report will be used to strengthen or adjust relevant actions in the next action plan phase (2021 – 2025). On the basis of these works, we shall actively cooperate with the inspection by the Ministry of Agriculture and Rural Affairs, proactively solicit opinions and proposals from the expert committee, promoting the optimal adjustment and implementation of the action plan.

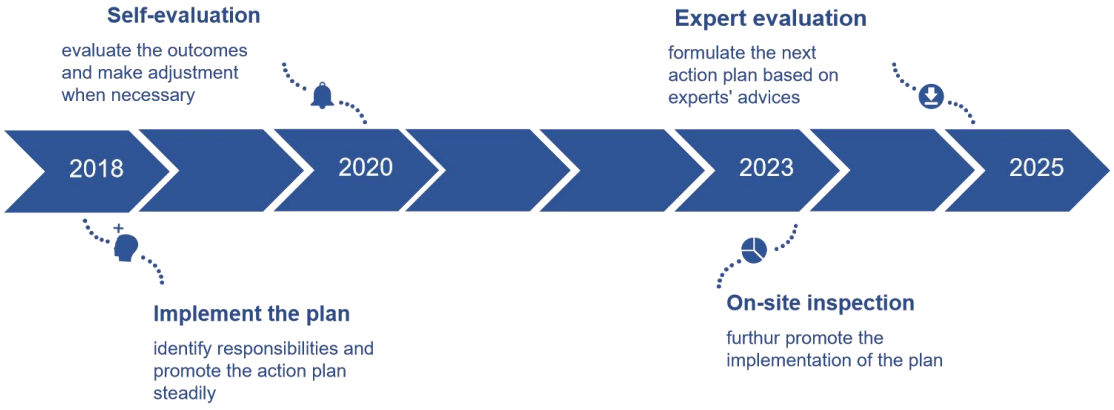


Fig. 3.3.4 The Mechanism of the Evaluation on the Effectiveness of the Action Plan

Annex

Annex 1 Main Plant Resources in Shexian

Phylum	Family	Genus	Species
BRYOPHYTA	Rebouliaceae	*Reboulia Raddi*	*Reboulia hemisphaerica*
	Conocephalaceae	*Conocephalum Weber*	*Conocephalum conicum*
	Marchantiaceae	*Marchantia*	*Polymorpha*
	Ricciaceae	*Ricciocarpus Corda*	*Ricciocarpus*
	Ditrichaceae	*Ditrichum*	*Ditrichum pallidum*
	Pottiaceae	*Gymnostomum*	*Gymnostomumcalcareum Niisef Hornsch*
		Tortula	*Tortula muralis*
		Weisiopsis	*Moss of wrinkled leaves*
	Georgiaceae	*Tetraphis*	*Moss Tetradentate*
	Bryaceae	*Bryum*	*Silver moss*
			Bryum caespiticium
	Ptychomiriaveae	*Pohlia*	*Loofah racomitrium moss*
		Mnium	*Mnium laevinerve*
		Plagiomnium	*Bryophyta acuminata*
	Hypnaceae	*Taxiphyllum*	*Taxiphyllum taxirameum*
	Funariaceae	*Funaria*	*Hygrometrica*
		Physcomitrium	*Sphaericum*
	Hedwigiaceae	*Hedwigia*	*Hedwigia ciliata*
PTERIDOPHYTA	Lycopodiaceae	*Lycopodium*	*Lycopodium clavatum*
			Cypress pine
	Selaginellaceae	*Selaginella*	*Selaginella*
			Selaginella sinensis
			Stauntoniana
			Tamayiscina
			Selaginella moellendorfii
	Equisetaceae	*Equisetum*	*Meadow pine*
			Equisctum palustre
			Equisetum pratense
			Equisetum hiemale
			Drilgrass
	Dennstaedtiaceae	*Dennstaedtia*	*Dennstaedtia wilfordii*
	Pteridaceae	*Pteridium*	*Pteridium aquilinum var. latiusculum*
		Pteris	*Pteris nervossa*
		Pteris multifida	*Pteris multifida*

	Hemionitidaceae	*Gymnnopteris*	*Ear-necked golden-haired fern*
	Sinopteridaceae	*Aleuritopteris*	*Argentea*
			Aleuritopteris kuhnii
			Shensiensis
		Onychium	*Onychium japonicum*
	Adiantaceae	*Adiantum*	*Capillus-veneris*
	Athyriaceae	*Athyrium*	*Fallaciosum*
			Pachyphlebium
			Sinense
		Cystopteris	*Fragilis*
	Aspleniaceae	*Asplenium*	*Asplenium incisum*
			Asplenium pekinense
	Onocleaceae	*Matteuccia Todaro*	*Matteucciaintermedia*
	Dryopteridaceae	*Cyrtomium*	*Cyrtomium fortunei*
		Dryopteris	*.Dryopteris laeta*
			D. crassirhizoma Nakai
		Polystichum	*Dryopteris flagellis*
			Dryopteris trinis
			Polystichum squarrosum
	Davalliaceae	*Nephrolepis*	*Tuber fern*
	Polypodiaceae	*Pyrrosia*	*Pyrrosia davidii*
			Pyrrosia lingua
			Pyrrosia petiolosa
			Pyrrosia dabidii
	Marsileaceae	*Marsilea*	*Clover fern*
GYMNOSPERMAE	Cycadaceae	*Cycas*	*Cycas revoluta*
	Ginkgoaceae Engler	*Ginkgo*	*Ginkgo biloba*
	Pinaceae	*Cedrus*	*Deodara*
		Picea	*Picea asperata*
		Pinus	*Pinus armandi*
			Lacebark pine
			Masson pine
			Tabulaeformis
			Pinus tabulaeformis var. mukdensis
	Taxodiaceae	*Metasequoia*	*Glyptostroboides*
	Cupressaceae	*Platycladus Spacs*	*Oriental arborvitae*
			Platycladus orientalis (a cultivated variety of Platycladus orientalis)
		Sabina	*Sabina chinensis*
			Sabina chinensis var. sargentii
			Juniperus chinensis

			Sabina procumbens
			Sabina davurica
		Cupressaceae	*Cupressus funebris*
		Juniperus	*Juniperus rigida*
	Ephedraceae	*Ephedra*	*Ephedra equisetina*
			Ephedra sinica Stapf
ANGIOSPERMAE	Salicaceae	*Populus*	*P. Canadensis Moench*
			P. cathayana
			Populus davidiana
			Lombardy poplar
			Populus beijingensis
			Small-leaf poplar
			P. tomentosa
		Salix	*Salix cathayana*
			Salix matsudana
			Salix matsudana f. pendlula
			Salix matsudana var. umbraculifera
			Salix matsudana f. tortuosa
			Dryland willow
			Babylonica
			S. Caprea
			S. cheilophila
			Salix chinensis
			Salix wallichiana
	Juglandaceae	*Juglans*	*J. cathayensis*
			J. mandshurica
			Juglans regia
		Pterocarya	*P. stenoptera*
	Betulaceae	*Betula L.*	*Betula chinensis*
			Betula ermanii
			B. platyphylla
		Carpinus L.	*Carpinus cordata*
			Carpinus cordata B1.var.chinensis Franch.
			Carpinus cordata B1.var.mollis
			Carpinus turczaninowii
		Corylus L.	*Filbert*
			C. mandshurica
		Ostryopsis	*Ostryopsis davidiana*
	Fagaceae	*Castanea*	*Mollissima*
		Quercus	*Oriental white oak*

			Quercus dentata.
			Quercus wutaishanica
			Quercus mongolica
			Oriental oak
			Quercus acutissima
	Ulmaceae	*Celtis L.*	*Celtis bungeana*
			C. koraiensis Nakai.
		Pteroceltis	*Pteroceltis tatarinowii*
		Ulmus	*U. macrocarpa*
			Ulmus parvifolia
			U. pumila
			Ulmus androssowii var. subhirsuta
		Zelkova Spach.	*Zelkova sinica Schneid*
	Chlorant haceae	*ChloranthusSwartz*	*Chloranthus japonicus*
		Sarcandra	*Sarcandra glabra*
	Moraceae	*Broussonetia*	*Paper mulberry*
		Cannabis	*Cannabis sativa*
		Ficus caricaL	*Ficus carica*
			F. elastica Roxb.
			Ficus microcarpa
		Humulus L.	*Humulus scandens*
		Morus L.	*Morus australis*
			M. alba
		Cudrania	*Cudrania cochinchinensis*
			Cudrania tricuspidata
	Urticaceae	*Girardinia Gaud*	*Girardinia cuspidata*
		Sceptrocnide	*Laportea macrostachya*
		Parietara	*Parietaria micrantha*
		Pilea Lindl.	*Pilea cadierei*
			Pilea pumila
		Urtica L.	*Urtica angustifolia Fisch.*
			Urtica macrorrhiza
	Santalaceae	*Thesium L.*	*Thesium chinensis*
			Thesium refractum
		Osyris	*Wight osyris root and leaf*
	Loranthaceae	*Visum*	*Mistletoe*
			Viscum diospyrosic-olum Hayata
	Aristolochiaceae	*Aristolochia L.*	*Aristolochia contorta*
			Aristolochia fruit
		Asarum L.	*Asarum multiflorum*
			Asarum cnndinaerum

			Asarum caudierum
	Polygonaceae	*Fagopyrum*	*Fagopyrum esculentum*
			F. tataricum
		Fallopia	*Polygonum ciliinerve*
		Homaloclatycladum	*Homalocladium platycladum Bailey*
		Polygonum	*Polygonum alpinum*
			Polygonum sieboldii
			Polygonum amphibium
			Polygonum bistorta
			Polygonum aviculare
			Polygonum bungeanum
			Polygonum convolvulus
			Polygonum caespitosum
			Polygonum dentate-alatum
			Polygonum divaricatum
			Polygonum lapathifolium
			Polygonum lapathifolium
			Polygonum hydropiper
			Polygonum nepalense
			Polygonum longisetum
			Polygonum longisetum
			Polygonumsibiricum
			Polygonum plebeium
			Polygonum perfoliatum
			Polygonum sagittatum
			Polygonumorientale
			Polygonum tinctoria
			Polygonum. thunbergii
			Polygonumsuffultum
		Rheum L.	*Rheum . franzenbachii*
			Rheum officinale Baill.
			Rheum palmatum
		Rumex	*Rumex acetosa*
			Rumex patientia
			Rumex crispus
			Rumex obtusifolius
			Rumex dentatus
			Rumex madaio
			Rumexamurensis
			Rumex japonicus
	Chenopodiaceae	*Beta*	*Beta vulgaris var. cicla*

			Beta vulgaris
		Spinacia	*Spinacia oleracea*
		Chenopodium	*Chenopodium acuminatum*
			Chenopodium album
			Chenopodium glausum
			Chenopodium urbicum
			Chenopodium foetidum
			Chenopodium Ambrosioides
			Chenopodium serotinum
			Chenopodium aristatum
		Corispermum	*Corispermum puberulum*
		Salsola	*Salsola collina*
			Salsola komarovii
		Kochia	*Kochia scoparia*
			Kochia scoparia
	Amaranthaceae	*Achyranthes*	*Achyranthes bidentata*
			Achyranthes aspera
		Alternanthera	*Alternanthera bettzickiana*
		Amaranthus	*Amaranthus albus*
			Amaranthus paniculatus
			Amaranthus caudatus
			Amaranthushypochondriacus
			Amaranthus lividus
			Amaranthus retroflexus
			Amaranthus roxburghianus
			Amaranthusspinosus
			Amaranthus tricolor
			Amaranthus viridis
		Celosia	*Celosia argentea*
			Celosia cristata
		Gomphrena	*Gomphrena globosa*
	Nyctaginaceae	*Bougainvillea*	*Bougainvilleaglabra*
			Bougainvillea spectabilis
		Mirabilis	*Mirabilis jalapa*
	Aizoaceae	*Mollugo*	*Mollugo stricta*
			Mollugo cerviana
	Phytolaccaceae	*Phytolacca*	*Phytolacca acinosa*
			Phytolacca americana
	Portulacaceae	*Portulaca*	*Portulaca grandiflora*
			Portulaca oleracea
			Talinum paniculatum

	Basellaceae	*Basella*	*Basella alba*
	Caryophyllaceae	*Arenaria*	*Arebarua serpyllifolia*
		Pseudostellaria Pax	*Pseudostellaria .Japonica*
		Dianthus	*Dianthus caryophyllus*
			Dianthus chinensis
			Dianthus superbus
		Malachium	*Malachium aquaticum*
		Silene	*Silene aprica Turcz.*
			Silene conoidea
			Silene firmum
			Silene gallica
			Silene tatarinowii
			Silene asclepiadea
		Stellaria	*Stellaria chinensis Regel*
			Stellaria dichotoma
			Stellaria root
			Stellaria media
			Stellaria saxatilis
			Stellaria alsine
		Vaccaria	*Accariasegetalis*
		Gypsophila	*Gypsophila acutifolia*
			Gypsophila oldhamiana
			Gypsophila paniculata
			Gypsophila pacifica
		Lychnis	*Lychnis fulgens*
	Nymphaeaceae	*Nelumbo*	*Nelumbonucifera*
		Nynphaea	*Nynphaea tetragona*
		Euryale Salisb	*Euryale ferox Salisb.*
	Ceratophyllaceae	*Ceratophyllum*	*Ceratophyllum demersum*
	Eupteleaceae	*Euptelea*	*Euptelea pleiosperma*
	Ranunculaceae	*Aconitum*	*Aconitum barbatum var. puberulum*
			Aconitum kusnezoffii reichb
		Adonis	*Szechwan adonis herb*
			AdonisamurensisRegeletRadde
			Adonis sutchuenensis
		Anemone	*Anemone tomentosa*
		Aquilegia	*Aquilegia yabeana*
			Aquilegia viridiflora
		Cimicifuga	*Cimicifuga acerina*
			Cimicifuga simplex
		Clematis	*Clematis aethusifolia*

			Clematis argentilucida
			Clematis brevicau-data
			Clematis flotida
			Clematis lasiandra
			Clematis peterae
			Clematischinensis
			Clematis heracleifolia
			Clematishexapetala
			Clematisintricate
			Clematiskirilowii
			Clematiskirilowii var. chanetii
			Clematismacropetala
			Clematis. Platysepala
		Consolida	*Consolida ajacis*
		Pulsatilla	*Pulsatilla chinensis*
		Ranunculus	*Ranunculus chinensis*
			Ranunculus japonicus
			Ranunculus sceleratus
		Batrachium	*Batrachium bungei*
		Thalictrum	*Thalictrumbaicalense*
			Thalictrum minus
			Thalictrum Petaloideum
			Thalictrum ramosum
			Thalictrum aquilegifolum
			Thalictrum acutifo-lium
			Thalictrum foetidum
			Thalictrum simplex
			Thalictrum squarro-sum Steph.ex Willd
			Thalictrum tenue
	Paeoniaceae	*Paeonia*	*Paeonia lactiflora*
			Paeonia obovata
			Paeonia suffruticosa
	Berderidaceae	*Berberis*	*Berberis thunbeygii*
			Berberis thunbeygii var. atropurpurea)
			Berberis amurensis
			Berberis poiretii
		Caulophyllum	*Caulophyllum robustum*
		Nandina	*Nandina domestica*
	Menispermaceae	*Menispermum*	*Menispermumdauricum*
		Tinospora	*Tinospora sagittata*
	Magnoliaceae	*Magnolia*	*Magnolia grandiflora*

		Michelia	*Michelia figo*
		Chisandra	*Schisandra chinensis*
	Calycanthaceae	*Chimonanthus*	*Chimonanthuspraecox*
	Papaveraceae	*Chelidonium*	*Chelidonium majus*
		Corydalis	*Corydalisbungeana*
			Corydalisedulis
			Corydingis pvirtuingly inglida
			Corydalis racemosa
		Dicentra	*Dicentra spectabilis*
		Dicranostigma	*Dicranostigma leptopodum*
		Hypecoum	*Hypecoumerectum*
		Macleaya	*Macleayacordata*
		Papaver	*Papaver rhoeae*
	Cappardaceae	*Cleome*	*Cleome gynandra*
			Cleome spinosa
	Cruciferae	*Arabis*	*Arabis pendula*
		Brassica	*Brassica oleracea .*
			Brassica oleyacea var. botrytis
			Brassica oleyacea var. italica
			Collard
			Kohlrabi
			Cabbage mustard
			Brassica napus
			Brassica napobrassica
			Brassica pekinensis
			Brassica Narinosa
			Brassica chinensis
			Brassica Parachinensis
			Brassica napiformis
			Brassica Juncea
			potherb mustard
			Brassica juncea var. megarrhiza
			Brassica campestris
			Brassica campestris Pikinensis
			Brassica rapa
		Nasturtium	*Nasturtium officinale*
		Capsella	*Capsella bursa-pastoris*
		Cardamine	*Cardamine lyrata*
			Cardamine macrophylla
		Chorispora	*Chorispora tentlla*
		Descurainia	*Descurainia Sophia*

		Dyaba	*Dyaba nemoyosa*
		Erysimum	*Erysimum bungei*
			Erysimum cheiranthoides
		Isatis	*Isatis indigotica*
		Lepidium	*Lepidium apetalum*
		Malcolmia	*Malcolmia ofricana*
		Matthiola	*Matthiola Incana*
		Orychophragmus	*Orychophragmusviolaceus*
		Raphanus	*Raphanus sativus var. longipinnatus*
			R. sativus L. var. rabiculus Pers.
		Rorippa	*Rorippa cantoniensis*
			Rorippa.globosa
			Rorippa indica
			Rorippa islandica
		Sicymbrium	*Sicymbrium heteromajjum*
			Sisymbrium luteum
		Thiaspi	*Thiaspi arvense*
	Crassulaceae	*Aeonium*	*Aeonium haworthii*
		Hylotelephium	*Hylotelephium erythrost-ictum*
		Bryophyllum	*Bryophyllum pinnatum*
		Crassula	*Crassulaperforata*
		Echevaria	*Echevaria glauca*
			Echevaria secunda
		Kalanchoe	*Kalanchoeblossefeldiana*
		Orostachys	*Orostachys fimbriatus*
		Sedum	*Sedum aizoon*
			Sedum erythrostictum
			Sedum pseudospectabile
			Sedum sarmentosum
			Sedum stellariaefolium
			Sedum tatarinowii
			Sedum kamtschaticum
			Sedum lineare
	Saxifragaceae	*Astilbe*	*Astilbe chinensis*
		Deutzia	*Deutziagrandiflora*
			Deutzia parviflora
			Deutzia scabra
		Parnassia	*Parnassia palustris*
		Penthorum	*Penthorum chinense .*
		Philadelphus	*Philadelphus Pekinensis*
			Philadelphus

			Philadelphus henryi
		Hydrangea	*Hydrangea bretschneideri*
			Hydrangea macrophylla
		Saxifraga	*Saxifraga stolonifera*
	Pittosporaceae	*Pittosporum*	*Pittosporumtobira*
	Eucommiaceae	*Eucommia*	*Eucommia ulmoides*
	Platanaceae	*Platanus*	*Platanus acerifolia*
			Platanusoccidentalis
			Platanus orientalis
	Rosaceae	*Agrimonia*	*Agrimonia pilosa*
			Agrimonia pilosa var. nepalensis
		Chaenomeles	*Chaenomeles speciosa*
		Chamaerhodos	*Chamaerhodoserecta*
		Cotoneaster	*Cotoneaster acutifolius*
			Cotoneastermultutlorus
			Cotoneasterzabelli
		Crataegus	*Crataegus cuneata*
			Crataegus pinnatifida
		Cydonia	*CydoniaOblonga*
		Duchesnea	*Duchesnea indica.*
		Exochorda	*Exochorda giyaldii*
			Exochorda racemosa
		Fragaria	*FragariaAnanassa*
			Fragariavesca
		Geum	*Geum. Aleppium*
		Malus	*Malus asiatica*
			Malus Baccata
			Malus honanensis
			Malus micromalus
			Malus Prunifolia
			Malus Pumila
			Malus spectabilis
		Potentilla	*Potentilla Anserina*
			Potentilla Centigrana
			Potentilla conferta
			Potentilla Chinensis
			Potentilla discolor
			Potentilla flagellayis.
			Potentilla Fragarioides
			Potentilla multicaulis
			Potentilla freynia-na Bornm.

			Potentilla kleinia-na Wight et Arn.
			Potentilla supina
			Potentilla tanacetifolia
		Prunus	*Prunus armeniaca*
			Prunus armeniaca
			Prunus cerasifera
			Prunus davidiana
			Prunus dictyoneura
			Prunus humilis
			Prunus mume
			Prunus persica
			Prunus . persica var. nectarina
			Prunus persica. f. conpressa
			Prunus persica. f. albo-plena
			Prunus persica. f. rubro-piena
			Prunus salicina .
			Prunus simonii
			Prunus tomentosa
			Prunus serrulata.
			Prunus Yedoensis Matsum.
		Pyracantha	*Pyracantha fortuneana*
		Pyrus	*Pyrus betulifolia*
			Pyrus bretschneideri
			Pyrus ussuriensis
		Rosa	*Rosabella*
			Rosacentifolia var. pomponia
			Rosacentifolia f. albo-muscosa
			Rosacentifolia f. muscosa
			Rosa.chinensis
			Rosachinensis var. cemperflorens
			Rosachinensis var. minima
			Rosa chinensis var. viridiflora
			Rosa. multiflora
			Rosamultiflora var. carnea
			Rosa multiflora var. cathayensis
			Rosamultiflora var. platyphylla
			Rosa odorata
			Rosa rugosa
			Rosa davurica
			Rosa xanthina
		Rubus	*Rubuscrategifolius*

			Rubus corchorifolius
			Rubus hirsutus
			Rubus mesogaeus
			Rubus parvifolius
			Rubus parvifolius var. adenochlamys
		Sanguisorba	*Sanguisorba officinalis*
			Sanguisorba officinalisvar.longifolia
		Spiraea	*Spiraea cantoniensis*
			Spiraea blumei
			Spiraea pubescens
			Spiraea trilobata
		Taihangia Yü et Li	*Taihangia rupestris Yu er li var. ciliata Yu et Li*
	Leguminosae	*Albizia*	*Albizia. julibrissin.*
			Albizia kalkora
			Albiziamacrophylla
		Amorpha	*Amorpha fruticosa*
		Amphicarpaea	*Amphicarpaea trisperma*
		Arachis	*Arachishypogaea*
		Astragalus	*Astragalus adsurgens*
			Astragalus capillipes
			Astragalus complauatus
			Astragalus dahuricus
			Astragalus melilotoides
			AstragalusmembranaceusVar.mongholicus
			Astragalus membranaceus
			Astragalus scaberrimus
		Campylotropis	*Campylotropis macrocarpa*
		Cassia	*Cassia nomame*
			Cassia tora
			Cassia obtusifolia
		Dolichos	*Dolichos lablab*
			Dolichos colichiscaypa
		Caragana	*Caragana arborescens*
			Caragana leveillei
			Caragana microphylla
			Caragana pekinensis
			Caragana rosea
			Caragana sinica
			Caragana stipiata
		Cercis	*Cercis chinensis*

		Gleditsia	*Gleditsia heterophylla*
			Gleditsia japonica
			Gleditsiasinensis
		Glycine	*Glycine max*
			Glycine soja
		Glycyrrhiza	*Glycyrrhizauralensis*
		Gueldenstaedtia	*Gueldenstaedtia multiflora*
			Gueldenstaedtiastenophylla
			Gueldenstaedtia taihangensis
		Indigofera	*Indigofera amblyantha*
			Indigofera bungeana
			Indigofera kirilowii
			Indigofera pseudotinctoria
		Kummerowia	*Kummerowia stipulacea*
			Kummerowia striata
		Lathyrus	*Lathyrus maritimus*
			Lathyrus palustris var. pilosus
		Lespedeza	*Lespedeza bicolor*
			Lespedeza caraganae
			Lespedeza davurica (Laxm.) Schindl.
			Lespedeza floribunda
			Lespedeza Formosa
			Lespedeza junceavar.sericea
			Lespedeza pilosa
			Lespedeza inschanica
			Lespedeza tomentosa
			Lespedeza .virgata
		Medicago	*Medicago falcate*
			Medicago lupulina
			Medicago sativa
		Melilotus	*Melilotusalbus*
			Melilotus dentatus
			Melilotus officinalis
			Melilotussuaveolens
		Oxytropis	*Oxytropis bicolor*
			Oxytropis caerulea
			Oxytropis hirta
			Oxytropis leptophylla
			Oxytropis ochrantha
			Oxytropis psammocharis
		Robinia	*Robinia hispida*

			Robinia psudoacacia
		Pueraria	*Pueraria lobata*
		Pisum	*Pisum sativum*
		Phaseolus	*Phaseolus angularis*
			Phaseolus coccineue
			Phaseolus lunatus
			Phaseolus lunensis
			Phaseolus minimus
			Phaseolus radiatus
			Phaseolus vulgaris
			Phaseolus vulgaris var. humilis
		Sophora	*Sophora flavescens*
			Sophora japonica
			Sophora japonica f. pendula
		Trifolium	*Trifoliumhybridum*
			Trifolium pratense
			Trifolium repens
		Vicia	*Viciaamoena*
			Vicia faba
			Vicia sativa
			Viciabungei
			Viciacracca
			Vicia gigantean
			Vicia unijuga
		Vigna	*Vigna cylinbrica*
			Vigna sinensis
		Wisteyia	*Wisteyia sinensis*
			Wisteyia villosa
	Oxalidaceae	*Oxalis*	*Oxalis cornicnlata*
			Oxalis corymbosa
	Geraniaceae	*Erodium*	*Erodium stephanianum*
		Geranium	*Geranium dahuricum*
			Geraniumsibiricum
			Geraniumwilfordii
		Pelargomium	*Pelargomium graveolens*
			Pelargomium hortorum
	Tropaeolaceae	*Tropaeolum*	*Tropaeolum majus*
	Linaceae	*Linum*	*Linum stelleroides*
			Linum usitatissimum
	Zygophyllaceae	*Tribulus*	*Tribulus terrestris*
	Simaroubaceae	*Ailanthus*	*Ailanthus altissima*

		Picrasma	*Picrasma quassioides*
	Meliaceae	*Aglaia*	*Aglaiaodorata*
		Melia	*Melia azedarach*
			Melia toosendan
		Toona	*Toona sinensis*
	Rutaceae	*Citrus*	*Citrus medica var. sarcodactylis*
		Dictamnus	*Dictamnus dasycarpns*
		Euodia	*Euodia daniellii*
			Euodia rutaecarpa
		Fortunella	*Fortunella margarita*
		Zanthoxylum	*Zanthoxylum armatum*
			Zanthoxylum schinifolium
			Zanthoxylum simulans
			Zanthoxylum bungeanum
	Polygalaceae	*Polygala*	*Polygalasibirca*
			Polygalatenuifolia
	Euphorbiaceae	*Acalypha*	*Acalypha australis*
		Breynia	*Breyniapatens*
			Breynia retusa
		Codiaeum	*Codiaeum variegatum*
		Euphorbia	*Euphorbia antiqurom*
			Euphorbia esula
			Euphorbia esula.var.cyparissoides
			Euphorbia antiquorum
			Euphorbia fischeriana
			Euphorbia hippocrepi-ca
			Euphorbia helioscopia
			Euphorbia heterophylla
			Euphorbia humifusa
			Euphorbia hylonoma
			Euphorbia indica
			Euphorbia milii
			Euphorbia pekinensis
			Euphorbia lunulata
			Euphorbia pulcherrima
			Euphorbia ebracteoiata
		Leptopus	*Leptopuschinensis*
		Ricinus	*Ricinuscommunis*
		Securinega	*SecurinegaSuffRuticosa*
		Speranskia	*Speranskia Tuberculata*
	Buxaceae	*Buxus*	*Buxusbodinieri*

			Buxusharlandii
			Buxussinica
	Anacardiaceae	*Cotinus*	*Cotinus coggygria*
			Cotinus coggyria .var.cinerea
		Rhus	*Rhus typhina*
		Pistacia	*Pistacia chinensis*
		Toxicodendron	*Toxicodendron ver nicifluua*
			Toxicodendron delavayi
			Toxicodendron succedaneum
	Celastraceae	*Celastrus*	*Celastrusorbiculatus*
		Euonymus	*Euonymus alatus*
			Euonymus chinensis
			Euonymus maackii
			Euonymus phellomana
			Euonymus japonicus
	Aceraceae	*Acer*	*Acer davidii*
			Acer ginnala
			Acer mono
			Acer negundo
			Acer palmatum
			Acer truncatum
	Tiliaceae	*Grewia*	*Grewia biloba var. parviflora*
		Tilia	*Tilia mongolica*
	Sapindaceae	*Koelreuteria*	*Koelreuteria paniculata*
		Xanthoceras	*Xanthoceras sorbifolia*
	Balsaminaceae	*Impatiens*	*Impatiens balsamina*
			Impatiens Noli-tangere
			Impatiens siculifer
			Impatiens Sultanii
	Aquifoliaceae	*Ilex*	*Ilex cornuta*
	Rhamnaceae	*Rhamnella*	*Rhamnella.franguloides*
		Rhamnus	*Rhamnusglobosa*
			Rhamnus maximovicziana
			Rhamnusparvifolia
		Sageretia	*Sageretia paucicoctata*
		Ziziphus	*Ziziphus jujuba*
			Ziziphus jujuba
	Vitaceae	*Ampelopsis*	*Ampelopsis aconitifolia*
			Ampelopsis aconitifolia
			Ampelopsisbrevipedunculata
			Ampelopsis humulifolia

			Ampelopsisaponica
		Cayratia	*Cayratia japonica*
		Corniculate cayratia root	*Cayratia cornicula-ta*
		Parthenocissus	*Parthenocissusaustro-orientalis*
			Parthenocissustricuspidata
		Vitis	*Vitis adstricta*
			Vitis amurensis
			Vitis flexuosa var. parvifolia
			Vitis piasezkii var. pagnuccii
			Vitis wilonae
			Vitis vinifera
	Malvaceae	*Abelmoschus*	*Abelmoschus manihot*
			Abelmoschus sagittif-olius
		Abutilon	*Abutilon indicum*
			Abutilon theophrasti
		Althaea	*Althaearosea*
		Gossypium	*Gossypium herbaceum*
			Gossypium hirsutum
		Hibiscus	*Hibiscus mutabilis*
			Hibiscus rosa-sinensis
			Hibiscus syriacus
			Hibiscus syriacus var. albus-plenus
			Hibiscus syriacus var. totus-albus
			Hibiscus triornum
		Malva	*Malva mohileviensis*
			Malva verticillata
			Malva neglecta
			Malva rotundifolia
			Malvasinensis
	Sterculiaceae	*Firmiana*	*Firmiana plantanifolia*
	Actinidiaceae	*Actinidia*	*Actinidia kolomikta*
			Actinidia arguta
			Actinidia chinensis
	Theaceae	*Camellia*	*Camellia japonica*
	Cuttiferae	*Hypericum*	*Hypericum perforatum*
	Tamaricaceae	*Myricaria*	*Myricariabracteata*
		Tamarix	*Tamarix chinensis*
	Violaceae	*Viola*	*Viola bariegata*
			Viola. dissecta
			Viola concordifolia
			Viola grypoceras

			Viola mandshurica
			Viola. prionantha
			Viola selkirkii
			Violavariegata
			Violaverecunda
			Violayedoensis
			Violayezoensis
	Begoniaceae	*Begonia*	*Begonia grandis*
			Begonia semperflorens
			Begonia grandis
	Cactaceae	*Astrophytum*	*Astrophytum asterias*
			Astrophytum myriostigma
		Cereus	*Cereus peruviaanus*
		Echinocactus	*Echinocactus grusonii*
		Echinopsis	*Echinopsis multiplex*
			Echinopsis tubiflora
			Echinopsis eyriesii
		Epiphyllum	*Epiphyllum oxypetalum*
		Gymnocalycium	*Gymnocalycium mihanovichii*
			Gymnocalycium pflanzii
		Hylocereus	*Hylocereus trigonus*
			Hylocereus Undatus
		Mammillaria	*Mammillaria hahniana*
			Mammillariaperbella
		Mamtllaria	*Mamtllaria boscana*
			Mamtllaria compressa
			Mamtllaria elongata
		Nopalxochia	*Nopalxochia phyllanthoides*
		Notocactus	*Notocactusscopa*
		Opumtia	*Opumtia dillenii*
			Opumtia microdasys
		Zygocactus	*Zygocactus truncates*
	Thymelaeaceae	*Diarthron*	*Diarthronlinifolium*
		Edgeworthia	*Edgeworthia chrysantha*
		Wikstroemia	*Wikstroemia chamaedaphne*
	Elacgnaceae	*Elaeagnus*	*Elaeagnus multiflora*
		Hippophac	*Hippophac rhamnoide*
	Erieaceae	*Rhododendron*	*Rhododendron micranthum*
			Rhododendron simsii
	Primulaceae	*Androsace*	*Androsace septentrionalis*
			Androsace umbellata

		Lysimachia	*Lysimachia barystachys*
			Lysimachiapentapetala
			Lysimachia clethroides
		Cyclamen	*Cyclamen persicum*
		Primula	*Primula saxatilis*
	Plumbaginaceae	*Limonium*	*Limonium bicolor*
	Apocynaceae	*Nerium*	*Neriumindicum*
		Apocynum	*Apocynum venetum*
		Trachelospermum	*Trachelospermum jasminoides.var. hetero phylum*
	Lythraceae	*Lagerstroemia*	*Lagerstroemia indica*
		Lithrum	*Lithrum salicaria*
	Punicaceae	*Punica*	*Punica granatum*
			Punica granatum var. nana
			Punica granatum var. nigra
			Punica granatum var. pleniflora
	Onagraceae	*Circaca*	*Circaca cordata*
		Epilobium	*Epilobium hirsutum*
			Epilobium .palustre
			Epilobium platystigmatosum
		Fuchsia	*Fuchsia hybrida*
		Oenothera	*Oenothera.biennis*
			Oenothera stricta
		Ludwigia	*Ludwigia prostrata*
	Alangiaceae	*Alangium*	*Alangium chinense*
	Cornaceae	*Macrocarpium*	*Cornus officinalis*
	Haloyagidaceae	*Myriophyllum*	*Myriophyllum spicatum*
			Myriophyllum verticillatum
	Araliaceae	*Acanthopanax*	*Acanthopanax senticosus*
		Hedera	*Hedera nepalensis var. sinensis*
		Schefflera	*Schefflera octophylla*
	Umbellferae	*Angelica*	*Angelica dahuraca*
			Angelica dahurica Sav.cv.hangbaizhi
		Apium	*Apium. graveolens*
		Bupieurum	*Bupieurum chinense*
			Bupieurum scorzonerifotium
			Bupieurum longiradiatum
		Carum	*Carumcarvi*
		Centella	*Centella asiatica*
		Changium	*Changium smyrnioides*
		Cicuta	*Cicuta virosa*
		Cnidium	*Cnidium monnieri*

		Coriandrum	*Coriandrumsativum*
		Daucus	*Daucus carota var. satiua*
		Ferula	*Ferula licentiana*
		Foeniculum	*Foeniculumcvulgare*
		Glehnia	*Glehnia littoralis*
		Ligusticum	*Ligusticum jenolense*
			Ligusticum sinense
			Ligusticum. tachiroei
			Ligusticum tachiroei var. filisectum
		Notopterygium	*Notopterygium incisum*
		Oenanthe	*Oenanthe decombens*
			Oenanthe javanica
		Osmorhiza	*Osmorhiza aristata*
		Peucedanum	*Peucedanum decursivum*
			Peucedanum praeruptorum
			Peucedanum terebinthaceum
		Sanicula	*Sanicula chinensis*
		Saposhnikovia	*Saposhnikoviadivaricata*
		Torilis	*Torilis japonica*
	Ebenaceae	*Diospyros*	*Diospyros kaki*
			Diospyroslotus
	Symplocaceae	*Symplocos*	*Symplocos paniculata*
	Oleaceae	*Chionanthus*	*Chionanthus retusus*
		Forsythia	*Forsythia suspense*
		Ashtree	*Fraxinus mandshurica*
		Fraxinus	*Fraxinus bungeana*
			Fraxinusrhynchophylla
		Jasminum	*Asminum floridum*
			Asminum nudiflorum
			Asminum officinale f. grandiflorum
			Asminum sambac
		Ligustrum	*Ligustrum japonicum*
			Ligustrum lucidum
			Ligustrum quihoui
		Osmanthus	*Osmanthus fragrans Lour*
		Syringa	*Syringaobiata*
			Syringapubescens
			Syringa vulgaris f.alba
			Syringa reticulata var. mandshurica
	Gentianaceae	*Gentiana*	*Gentianadahurica*
			Gentianamacrophylla

			Gentianasquarroca
		Gentianopsis	*Gentianopsis barbata*
		Swertia	*Dilute swertia*
		Nymphoides	*Nymphoides pelatata*
	Boraginaceae	*Lappula*	*Lappulamyosotis Moench*
		Bothriospermum	*Bothriospermumchinense*
			Bothriospermum tenellum
		Lithospermum	*Lithospermumarvense*
			Lithospermumerythrorhizon
		Lycopsis	*Lycopsis orientalis*
		Trigonotis	*Trigonotis peduncularis*
	VcrbEnaceae	*Caryopteris*	*Caryopteris terniflora*
			Caryopteris nepetaefolia
		Clerodendrum	*Clerodendrum bungei*
			Clerodendrumthomsonae
			Clerodendrumtrichotomum
		Verbena	*Verbena officinalis*
		Vitex	*Vitex nggundo var. heterophylla*
			Vitex trifolia var. simplicifolia Cham.
	Pedaliaceae	*Sesamum*	*Sesamum indicum*
	Gesneriaceae	*Boea*	*Boeahygrometrica*
		Corallodiscus	*Corallodiscus cordatulus*
		Sinningia	*Sinningia speciosa*
	Orobanchaceae	*Orobanche*	*Orobanche coerzulescens*
			Orobanche pycnostachya
	Asclepiadaceae	*Cynanchum*	*Cynanchum Sibiricum*
			Cynanchumchinense
			Cynanchum amplexicaule
			Cynanchumversicolor
			Cynanchum thesioides
			Cynanchumstauntonii
			Cynanchum paniculatum
			Cynanchuminamoenum
			Cynanchum cathayense
			Cynanchum bungei
			Cynanchumauriculatum
			Cynanchumatratum
			Cynanchum wilfordii
		Hoya	*Hoya carnosa*
		Meaplexis	*Meaplexis japonica*
			Meaplexis hemsleyana

		Periploca	*Periploca sepium*
		Tylophora	*Tylophora floribumda*
	Convolvulaceae	*Calonyctiou*	*Calonyctiouaculeatum*
		Calystegia	*Calystegia hederacea*
			Calystegia pellita
			Calystegia sepium
			Calystegia soldanella
		Convolvulus	*Convolvulus arvensis*
		Cuscuta	*Cuscuta chinensis*
			Cuscuta japonica
		Ipomoea	*Ipomoea Aquatica*
			Ipomoea batatas
		Merremia	*Merremia sibirica*
		Pharbitis	*Pharbitis hederacea*
			Pharbitis limbata
			Pharbitis nil
			Pharbitis purpurea
		Quamoclit	*Quamoclit pennata*
	Scrophulariaceae	*Antirrhinum*	*Antirrhinum majus*
		Linaria	*Linaria vujgaris*
		Mazus	*Mazus japonicus*
			Mazus stachydifolius
		Melanpyrun	*Melanpyrun roseum*
		Paulownia	*Paulownia catalpifolia*
			Paulownia elongata
			Paulownia tomentosa
			Paulownia tomentosa var. tsinlingensis
		Pedicularis	*Pedicularis lachnoglossa*
			Pedicularis davidii .
			Pedicularis striata
		Phtheirocpermum	*Phtheirocpermum japonicum*
		Rehmannia	*Rehmannia glutinosa*
		Scrophularia	*Scrophularia ningpoensis*
		Siphonostegia	*Siphonostegia chinensis*
		Varonica	*Varonica anagallis-aquatica*
			Varonica undullata
	Labiatae	*Ajuga*	*Ajuga ciliata*
			Ajuga nipponensis
			Ajuga lupulina
			Ajuga decumbens
		Agastache	*Agastache rugosa*

		Amethystea	*Amethystea caerulca*
		Coleus	*Coleus scutellarioides*
		Dracocephalum	*Dracocephalummoldavica*
			Dracocephalum rupestre
		Elhsoltzia	*Elhsoltzia ciliata*
			Elhsoltziadensa
			Elhsoltziastauntoni
		Lamium	*Lamium amplexicaule*
		Lagopsis	*Lagopsis supina*
		Leonurus	*Leonurus artemisia*
			Leonurs Macranthu
			Leonurus pseudomacranthus
			Leonurussibiricus
		Lycopus	*Lycopus lucidus*
			Lycopus lucidus Var. hirtus
		Mentha	*Mentha haplocalyx*
		Nepeta	*Nepeta prattii Lévl.*
			Nepeta cataria
		Microtoena	*Microtoena insuavis*
		Mosla	*Mosla chinensis*
		Ocimum	*Ocimum basilicum var. pilosum*
		Perilla	*Perilla frutescens*
			Perilla frutescensvar. acuta
			Perilla frutescensvar. crispa
		Rabdosia	*Rabdosia rubescens*
			Rabdosia serra
			Rabdosia amethystoides
			Rabdosia angustifo-lia
			Rabdosia lophanthoides
			Rabdosiajaponica.var. glaucocalyx
		Phlomis	*Phlomis umbrosa*
		Salvia	*Salvia coccinea*
			Salvia. japonica
			Salviamiltiorrhiza
			Salvia plebeia
			Salviasplendens
			Salvia chinensis
			Salvia umbratica
		Schizonepete	*Schizonepeta tenuifolia*
		Scutellaria	*Scutellariabaicalensis*
			Scutellaria discolor.

			Scutellaria indica
			Scutellaria orthocalyx
			Scutellariascordifolia
		Stachys	*Stachys baicalensis*
			Stachys chinensis
			Stachys geobombycis
			Stachys sieboldi
		Teucrium	*Eucrium viscidum*
	Bignoniaceae	*Campsis*	*Campsis grandiflora*
		Catalpa	*Catalp abungei*
			Catalp aovata
		Incarvillea	*Incarvillea sinensis*
	Solanaceae	*Capsicum*	*Capsicum annuum*
			Capsicum annuum var. cerasiforme
			Capsicum annuum var. conoides
			Capsicum annuum var. fasciculatum
			Capsicum annuum var. grossum
			Capsicum annuum var. longum
		Cestrum	*Cestrum nocturnum*
		Datura	*Datura innoxia*
			Datura stramonium
		Hyoscyamus	*Hyoscyamus niger*
		Lycium	*Lycium chinense*
		Lycopersicon	*Lycopersicon esculentum*
			Lycopersicon esculentum var cerasiforme
			Lycopersicon. esculentum var pyriforme
			Lycopersicon esculentum var validum
		Nicotiana	*Nicotiana rustica*
			Nicotiana tabacum
		Physalis	*Physalis alkekengi var. franchetii*
			Physalis angulata
			Physalis minina
		Solanum	*Solanum melongena*
			Solanum melongena. var. serpentinum
			Solanum melongena var. esculentum
			Solanum nigrum
			Solanumpseubo-capsicum
			Solanum septemlobum
			Solanum surattense
			Solanum tuberusum

			Solanumxanthocarpum
	Phrymaceae	*Phryma*	*Phryma leptostachya var. asiatica*
	Plantagianceae	*Plantago*	*Plantago asiatica*
			Plantago depressa
	Rubiaceae	*Galium*	*Galium aparine*
			Galium bungei
			Galium verum
		Gardenia	*Gardenia jasminoides*
		Leptodernis	*Leptodernis oblonga*
		Rubia	*Rubia chinensis*
			Rubia cordifolia
	Caprifoliaceae	*Abelia*	*Abelia biflora*
		Sambucus	*Sambucus williamsii*
			Sambucus chinensis
		Lonicera	*Lonicera elisae*
			Lonicera japonica
			Lonicera fragrantissima subsp. Standishii
		Viburnum	*Viburnum dilatatum*
			Viburnum hupehense
			Viburnum mongolicum
			Viburnum sopulus var. calvescens
			Viburnum schensianum
	Valerianaceae	*Patrinia*	*Patrinia diandra*
			Patriniaheterophylla
			Patrinia Villosa
			Patrinia rupestris Juss.）
			Patrinia scabiosaefolia
			Patriniascabra
		Valeriana	*Valeriana officinalis*
			Valeriana officinalis var.latifolia
		Nardostachys	*Nardostachys chinensis Batal.*
			Nardostachys jatamansi
	Dipsacaceae	*Scabiosa*	*Scabiosa tschiensis*
		Dipsacus	*Dipsacus asperoides*
			Dipsacus japonicus
	Cucurbittaceae	*Benincasa*	*Benincasa hispida*
		Bolbostemma	*Bolbostemma paniculatum*
		Citrullus	*Citrullus lanatus*
		Cucumis	*Cucumis melo*
			Cucumis melo var. conomon

			Cucumis sativus
		Cucurbita	*Cucurbita maxima*
			Cucurbita moschata
			Cucurbita moschata var. melonaeformis
			Cucurbita . moschata . var. toonas
			Cucurbita . ficifolia
			Cucurbita pepo
			Cucurbita pepo var. ovifera
			Cucurbita pepo var. akoda
		Gynostemma	*Gynostemma pentaphyllum*
		Lagenaria	*Lagenariasiceraria*
			Lagenaria siceraria var. clavata
			Lagenaria siceraria var. cougourda
			Lagenaria siceraria var. gourda
			Lagenaria siceraria var clavata
			Lagenaria siceraria var. depressa
			Lagenariasiceraria var. depressa
			Lagenaria siceraria var. microcarpa
		Luffa	*Luffa acutangula*
			Luffa cylindrica
		Momordica	*Momordica charantia*
		Sechiom	*Sechiom edule*
		Thladiantha	*Thladiantha dubia*
		Trichosanthes	*Trichosanthes anguina*
			Trichosanthes kiyilowii
	Campanulaceae	*Adenophora*	*Adenophora. divaricata*
			AdenophoraA.hunanensis
			Adinophora stricta Miq
			Adenophora polyantha
			Adenophora stenanthina
			Adenophora tetraphylla
			Adenophora trachelioides
			Adenophora gmelinii
			Adenophora wawreana
		Companumoea root	*Campanumoea jauanica*
			Campanumoea jauanica subsp japonica
		Codonopsis	*Codonopsis lanceolata*
			Codonopsis pilosula
		Platycodon	*Platycodon grandiflorus*
	Compositae	*Achillea*	*AchilleaA alpina*

			Achillea millefolium
		Anaphalis	*Anaphalis hancockii*
		Arctium	*Arctium lappa*
		Artemisia	*Artemisia annua*
			Artemisia apiacea
			Artemisia argyi
			Artemisia argyi
			Artemisia capillaries
			Artemisia eriopoda
			Artemisia gnelini
			Artemisia igniaria
			Artemisia integrifolia
			Artemisia japonica
			Artemisia lavandulaefolia
			Artemisia scoparia
			Artemisia selengennsis
			Artemisia sieversiana
			Artemisia sylvatica
			Artemisia tanacetifolia
		Aster	*Aster ageratoides*
			Aster altaicus
			Aster alpinus
			Aster senecioides
			Aster tataricus
		Atractylodes	*Atractylodes chinensis*
			Atractylodes lancea
			Atractylodes macrocephala
			Atractylodes koreana
		Bidens	*Bidens bipinnata*
			Bidens biternata
			Bidens maximowicziana
			Bidens parvifiora
			Bidens pilosa
			Bidens tripartite
		Cacalia	*Cacalia ambigua*
			Cacalia hastata
		Callistephus	*Cacalia chinensis*
		Carduu	*Carduu crispus*
		Carpesium	*Carpesium cernuum*
			Carpesium triste var. sinense diels
			Carpesium abrotanoides

		Carthamus	*Carthamus tinctorius*
		Centaurea	*Centaurea cynus*
		Cineraria	*Cineraria cruentus*
		Chrysanthemum	*Chrysanthemum moyifolium*
			Chrysanthemum coronalium
		Cirsium	*Cirsium japonicum Fisch.*
			Cirsium Segetum
			Cirsium pendulum
			Cirsium setosum
			Cirsium shansiense
		Coreopsis	*C. grandiflora*
		Cosmos	*C. bipinnatus*
			C. sulphureus
		Dahlia	*Dahlia pinnata*
		Dendranthema	*Dendranthema chanetii*
			Dendranthema grandiflorum
			Dendranthemalavandulifolium
			Dendranthema lavandulifolium var. seticuspe
			Dendranthema indicum
			Dendranthema morifolium
			Dendranthema zawadskii
		Doellingeria	*Doellingeria scaber*
		Echinops	*Echinops latifolius*
		Eclipta	*Eclipta prostrata*
			Eclipta bonarinsis
		Conyza	*Conyza canadensis*
		Eupatorium	*Eupatorium fortunei*
			Eupatorium japonicum
			Eupatorium chinense
			Eupatorium lindleyanum
		Farfugium	*Farfugium japonicum*
		Gaillardia	*Gaillardia pulchella*
		Galinsoga	*Galinsoga parviflora*
		Gnaphalium	*Gnaphalium affine*
			Gnaphalium hypoleucum
			Gnaphalium japonicum
		Helianthus	*Helianthus annuus*
			Helianthus decapetalus var. multuiflorus
			Helianthus tuberosus
		Helichrysum	*Helichrysum byacteatum*

		Hemistepta	*Hemistepta lyrata*
		Heteropappus	*Heteropappus altaicus*
			Heteropappus altaicus var. millafolius
			Heteropappus hispidus
		Inula	*Inula helenium*
			Inula britannica
			Inula japonica
		Ixeris	*Ixeris chinensis*
			Ixeris denticulata
			Ixeris sonchifolia
		Leucanthemum	*Leucanthemum vulgare*
		Ligularia	*Ligularia dintata*
			Ligularia fischeri
		Kalimeris	*Kalimeris indica*
			Kalimeris integrifolia
			Kalimeris shimadae
		Lactuca	*Lactuca indica*
			Lactuca sativa
			Lactuca.sativa var. angustana
			Lactuca sativa var. capitata
			Lactuca sativa .var. crispa
			L. sativa var. romana
		Leibnitzia	*Leibnitzia. anandria*
		Leontopodium	*Leontopodium leontopodioides*
		Myripnois	*Myripnois dioica*
		Olgaea	*Olgaea leucophylla*
		Picris	*Picris japonica*
		Prenanthes	*Prenanthes henryi*
			Prenanthes tatarinowii
		Rudbeckia	*Rudbeckia laciniata*
		Saussurea	*Saussurea amara*
			Saussurea frondosa
			Saussurea japonica
			Saussurea mongolica
			Saussurea nivea
		Scorzonera	*Scorzonera albicaulis*
			Scorzonera austrica
			Scorzonera ruprechtiana
			Scorzonera sinensis
		Senecio	*Senecio argunensis*
			Senecio scandens

			Senecio nemorensis
		Tephroseris	*Tephroseris kirilowii*
		Serratula	*Serratula centauroides*
			Serratula polycephala
		Siegesbeckia	*Siegesbeckia orientalis*
			Siegesbeckia pubescens
		Herba Siphonostegiae	*Siphonostegia chinen-sis Benth.*
		Solidago	*Solidago virgaurea var. leiocarpa*
		Sonchus	*Sonchus asper*
			Sonchus brachyotus
			Sonchus oleraceus
		Stemmacantha	*Stemmacantha uniflora*
		Syneilesis	*Syneilesis aconitifolia*
		Tagates	*Tagates erecta*
			Tagates patula
		Taraxacum	*Taraxacum mongolicum*
			Taraxacum borealisinense
		Turczaninowia	*Turczaninowia fastigiata*
		Opisthopappus Shih	*Opisthopappus longilobum Shih*
		Tussilago	*Tussilago farfara*
		Xanthium	*Xanthium sibiricum*
		Youngia	*Youngia japonica*
		Zinnia	*Zinnia elegans*
			Zinnia peruviana
	Typhaceae	*Typha*	*Typha angustata Bory et Chaub.*
			Typha. angustifolia
			Typha orientales
	Sparganiaceae	*Sparganium*	*Sparganium stoloniferum*
	Potamogetonaceae	*Potamogeton*	*Potamogeton crispus*
			Potamogeton cristatus
			Potamogeton distinctu
			Potamogeton malaianus
			Potamogeton natans
			Potamogeton perfoliatus
			Potamogeton pusillus
	Alismataceae	*Alisma*	*Alisma plantago-aquatica*
		Sagittaria	*Sagittaria trifolia*
	Hydrocharitaceae	*Hydrilla*	*Hydrilla verticillata*
	Gramineae	*Achnatherum*	*Achnatherum extermiorientalc*
			Achnatherum splendens
		Aeluropus	*Aeluropus sinensis*

		Aethfaxom	*Aethfaxom hispidus*
			Aethfaxom hispidus var. cryptatherus
		Leymus	*Leymus chinense*
		Arstida	*Arstida adscensionis*
		Avena	*Avena fatua*
		Bechmannia	*Bechmannia syzigacsne*
		Bothriochloa	*Bothriochloa ischaemum*
		Bromus	*Bromus inermis Leyss*
			Bromus japonicus
		Buchloe	*Buchloe dactyloides*
		Calamagrostis	*Calamagrostis emodensis*
		Chikusichioa	*Chikusichioa aquatica*
		Chloris	*Chloris virgata*
		Cleistogenes	*Cleistogenes caespitosa*
			Cleistogenes chinensis
			Cleistogenes hancei
			Cleistogenes polyphylla
		Coix	*Coix lacryma-jobi var.ma-yuen*
		Crypsis	*Crypsis acoleata*
		Cynodon	*Cynodon dactylon*
		Dactyloctenium	*Dactyloctenium aegyptiaacum*
		Digitaria	*Digitaria adscendens*
			Digitaria ciliaris
			Digitaria ischaemum
			Digitaria sanguinalis
			Digitaria violascens
		Echinochloa	*Echinochloa colonum*
			Echinochloa crusgalli
			Echinochloa crusgallivar. caudate
			Echinochloa crusgalli var. hispdula
			Echinochloa crusgalli var. mitis
			Echinochloa crusgalli var. submutica
			Echinochloa crusgallivar. zelayensis
		Eleusine	*Eleusine indica*
		Elymus	*Elymus dahuricus*
			Elymus sibiricus
			Elymus excelsus
		Eragrostis	*Eragrostis minor*
			Eragrostis cilianensis
			Eragrostis pilosa
			Eragrostis. autumnalis

			Eragrostis ferruginea
		Eriochloa	*Eriochloa villosa*
		Hordeum	*Hordeum vulgare*
		Imperata	*Imperata. cylindrica var. mojor*
		Leptochloa	*Leptochloa chinensis*
		Lolium	*Lolium multiflorum*
		Melica	*Melica scabrosa*
			Melica turczaninoviana
		Microstegium	*Microstegium nodosum*
		Triarrhena	*Triarrhena saccharifl orus*
		Miscanthus	*Miscanthus sinensis*
		Hemarthria	*Hemarthria altissima*
		Oplismenus	*Oplismenus undulatifolium*
		Oryza	*Oryza sativa*
			Oryza sativa var.glut-inosa
		Oryzopsis	*Oryzopsis chinensis*
		Panicum	*Panicum miliaceum*
			Panicum miliaceum var. roderole
		Pennisetum	*Pennisetum alopecuroides*
			Pennisetum centrasiaticum
			Pennisetum americarum
		Phragmites	*Phragmites australis*
		Phyllostachys	*Phyllostachys pubescens*
			Phyllostachys glauca
		Poa	*Poa annua*
			Poa pratensis
			Poa sibirica
			Poa sphondylodes
			Poa szechuensis
		Polypogon	*Polypogon fugax*
			Polypogon monspeliensis
		pleioblastus	*Pleioblastus amarus*
		Roegneria	*Roegneria ciliaris*
			Roegneria kamoji
		Setaria	*Setaria italica*
			Setaria lutescens
			Setaria viridis
			Setaria viridisVar. gigantea
			Setaria viridisvar. gigantean
			Setaria viridis var. purpurascens
		Alopecurus	*Alopecurus aequalis*

		Sinocalamus	*Sinocalamus affinis*
		Sorghum	*Sorghum bicolor*
		Spodiopogon	*Spodiopogon sibiricus*
		Stipa	*Stipa bungeana*
			Stipa baicalansis
		Themeda.	*Themeda japonica*
			themeda
		Trago	*Tragus berteronianus*
		Tripogon	*Tripogon chinensis*
		Trisetum	*Trisetum spicatum*
		Triticum	*triticum aestivum*
		Zea	*Zea mays*
	Cyperaceae	*Carex*	*Carex heterostachya*
			Carexkobomugi
			Carex leucochlora
			Carex siderosticta
			Carex subpediformis
		Cyperus	*Cyperus alternifolius*
			Compress galingale
			Cyperus difformis
			Cyperus glomeratus
			Cyperus iria.
			Cyperus michelianus
			Cyperus nipponicus
			Upright-spiked galingale
			Cyperus pilosus
			Cyperus rotundus
		Eleocharis	*Eleocharis valleculosa*
			Eleocharis yokoscensis
		Juncellus	*Juncellus serotinus*
		Kobresia	*Wormwood*
		Kyllinga	*Kyllinga brevifolia*
		Lipocarpha	*Lipocarpha chinensis*
		Scirpus	*Scirpus jumcoides*
			Scirpus pumilus
			Scirpus schansiensis
			Scirpus planiculmis
			Scirpus triangulatus
			Scripus triqueter
			Scirpus tabernaemontani
			Scirpus yagara

		Scleria	*Scleria elata*
	Palmae	*Caryota*	*Caryota ochlandra*
		Chrysalidocarpus	*Chrysalidocarpus lutescens*
		Phoenix Linn	*Phoenix hanceana*
		Rhapis	*Lady palm*
		Trachycarpus	*Hemp palm*
	Araceae	*Anthurium*	*Calamus*
		Anthurium	*Anthurium pedato-radiatum*
		Arisaema	*Arisaema amurence*
			Arisaema erubescens）
			Arisaema franchetianum
			Rhizoma arisaematis
		Caladium	*Caladium*
		Monstera	*Monstera deliciosa*
		Pinellia	*Pinellia pedatisecta*
			Pinellia ternata
		Scindapus	*Scindapus aureus*
		Typhonium	*Typhonium trifoliatum*
		Zantedeschia	*Calla lily*
	Lemnaceae	*Lemna*	*Lemna minor*
		Spirodela	*Duckweed*
	Eriocaulaceae	*Eriocaulon*	*Flos Eriocauli*
	Commelinaceae	*Commelina*	*Dayflower*
			Commelina bengalensis
		Setcreasea	*Setcreasea purpurea*
		Streptolirion	*Streptolirion*
		Tradescantia	*Tradescatia fluminensis*
			Spiderwort
		Zebrina	*Wandering jew*
	Pontederiaceae	*Monochoria*	*Monochoria korsakowii Regel et Maack*
			Pickerelweed
		Eichhornia	*Eichhornia*
	Juncaceae	*Luzula.*	*Luzula pallescens*
			Luzula oligantha
	Stemonaceae	*Stemona*	*The tuber of stemona*
	Liliaceae	*Allium*	*Allium victorialis*
			Allium victorialis var listera
			fragrant-flowered garlic
			Allium ramosum
			Allium senescens

			Allium tenuissimum
			Scallion
			Kashgar onion
			Onion
			Shallot
			Allium macrostemon
			Allium sativum
			Allium macrostemon
			Allium thunbergii
			A. tubiflorum Rendle
			Allium wallichii
		Aloe	*Aloe arborescens var. natalensis*
			Barbados aloe
			Aloe vera var. chinensis
		Anemarrhena	*Rhizoma anemarrhenae*
		Asparagus	*Radix asparagi*
			Asparagus
			Asparagus
			Asparagus fern
			Asparagus trichophyllus
		Chlorophytum	*Chlorophytum comosum*
			Chlorophytum capense var. medo-pictum
			Chlorophytum capense var. variegatum
		Tricyrtis	*Tricyrtis capense*
		Convallaria	*Convallaria majalis*
		Fritillaria	*Bulbus Fritillariae Ussuriensis*）
		Hemerocallis	*Day lily*
			Hemerocallis esculenta.）
			Hemerocallis fulva
			Hemerocallis nana
			Hemerocallis minor
			Hemerocallis citrina
		Hosta Tratt	*Jade hairpin*
		Lilum	*Lilium brownii*
			Deep red
			Lilium leichtlinii var. Maximowiczii
			Morningstar lily
		Liriope	*Liriope graminifolia*
			Liriope muscari
			Liriope spicata

		Ophiopogn	*The tuber of dwarf lilyturf*
		Genus Paris	*Paris verticillata*
		Polygonatum	*Polygonatum cirrhifolium*
			Polygonatum involucratum
			Polygonatum macropodum
			Radix polygonati officinalis
			Polygonatum
		Sansevieria trifasciata	*Sansevieria*
		Scilla	*Chinese squill*
		Smilacina	*Smilacina japonica*
		Smilax	*Smilax menispermoidea*
			Smilax scobinicaulis
			Smilax riparia
			Smilax sieboldii
			Smilax stans
		Tulipa	*Tulip*
		Veratrum senecio	*Black false hellebore.*
		Yucca schidigera	*Yucca gloriosa*
	Amaryllidaceae	*Agave*	*Century plant*
			Agave americana var.marginata-aurea
			Agave angustifolia
		Cliiva	*Kaffir lily*
		Hippeastrum	*Hippeastrum vittatum*
			Hippeastrum vittatum
		Narcissus	*Narcissus*
		Polianthes.	*Tuberose*
		Zephyranthes	*Zephyranthes candida*
			Zephyranthes grandiflora
	Dioscoreaceae	*Dioscorea*	*Dioscorea japonica*
			Dioscorea nipponic
			Dioscorea cirrhosa
			Chinese yam
	Iridaceae	*Belamcanda*	*Belamcanda chinecsis rhizoma belamcandae*
		Gladiolus	*Gladiolus*
		Iris	*Iris dichotoma*
			Chinese small iris
			Iris ruthenica var. nana
			Fleur-de-lris
			Iris tenuifolia
	Zingiberaceae	*Zingiberaceae*	*Zingiberaceae*

	Cannaceae	*Canna*	*Canna generalis*
			India shot.
	Orchidaceae	*Herminium*	*Herminium monorchis*
		Gastrodia	*Rhizoma gastrodiae*

Annex 2 Part of Animal Resources in Shexian

Family	Species
Unionidae	*Unionidae, Cristaria plicata, Hyriopsis cumingii, Polytumorous clam, Unbalanced clam*
Acipenseridae	*Acipenser schrenckii, Acipenser dabryanus, Russian sturgeon*
Cyprinidae	*Crucian carp, Mud carp, Grass Carp, Carp, Erythroculter ilishaeformis, Misgurnus anguillicaudatus, Hemiculter leucisculus, Silver carp, Triangular bream, Opsariichthys uncirostris , Parabramis pekinensis, Pseudorasbora parva, Rhodeus sinensis, Fingill, Sarcocheilichthys sinensis sinensis, Xenocypris argentea*
Limacidae	*Agriolimax agrestis, Luminous wild slugs, Limax flavus Linnaeus*
Fruticicolidae	*Bradybaena ravida）, Bradybaena similaris, Jiangxi whip snail*
Ichthyobdellidae	*Olive leech*
Salmonidae	*Oncorhynchus mykiss*
Gammaridae	*Gully shrimp*
Potamidae	*Creek Crab*
Siluridae	*Catfish, Silurus meridionalis*
Synbranchidae	*Ricefield eel*
Callichthyidae	*Tilapia mossambica*
Ophiocephalidae	*Snakehead fish*
Trionychidae	*Soft shelled turtle*
Philomycidae	*Dual-line Mucous Slug*
Anatidae	*Mandarin Duck, Duck, Mallard, Domestic geese, Tufted duck, Spotted-backed Diving Duck, tufted duck Swan goose, Bean goose, Ruddy Shelduck*
Motacillidae	*Dendronanthus indicus, Yellow wagtail, Motacilla citreola, Motacilla cinerea, Motacilla alba, Field bird, Tree lark, Water lark*
Campephagidae	*Coracina melaschistos, Pericrocotus ethologus*
Laniidae	*Lanius tigrinus, Brown Shrike, Lanius sphenocercus*
Corvidae	*Cyanopica cyana, Magpie, Bare-nosed Crow, Daw, Corvus macrorhynchos*
Muxicicapidae	*Rufous-tailed Robin, Rubythroat, Bluethroat, Orange-flanked Bush Robin, Daurian Redstart, Phoenicurus erythrogaster, White-capped Water Redstart, Blue-capped Rock-thrush, Blue-headed Rock Thrush, Whistling Thrush, Zoothera sibirica, Zoothera dauma, Larus schistisagus, Turdus obscurus, Dark-throated Thrush, Spotted thrush, Plain Laughingthrush, Paradoxornis webbianus, Bush Warbler, Bradypterus tacsanowskius, Great reed warbler, Acrocephalus, bistrigicepsAcrocephalus , agricola, Phylloscopus fuscatus, Phylloscopus schwarzi, Pallas's Leaf Warbler, Greenish warbler, Eyebrowed Thrush, Robin, Urchin, Grey-streaked Flycatcher, Asian Brown Flycatcher, Asian Paradise Flycatcher*
Picidae	*Grey-capped Pygmy Woodpecker, Big Spotted Woodpecker, Dryocopus, Black Woodpecker, Wryneck, Picus canus*
Hirundinidae	*Delichon urbica, Barn swallow, Hirundo daurica*
Strigidae	*Little Owl, Long-eared Owl, Short-eared Owl, Eagle owl, Scops owl, Cape Owl*
Cuculidae	*Cuculus canorus, Cuculus fugax, Cuculus micropterus, Cuculus poliocephalus, Cuckoo*

Paridae	*Great tits, Coal tit, Parus palustris, Willow Tit, Aegithalos caudatus*
Charadriidae	*Charadrius alexandrinus, Little Ringed Plover, Charadrius hiaticula*
Phasianidae	*Rock chicken, Quail, Chicken, Spotted-winged Quail, Ring-necked Pheasant, Columbidae, Pigeon, Columba rupestris, Streptopelia decaocto, Mountain turtledove*
Oriolidae	*Oriolus chinensis*
Upupidae	*Hoopoe*
Coraciidae	*Dollarbird*
Apodidae	*Hawk swallow, Apus pacificus*
Caprimulgidae	*Goatsucker*
Laridae	*Common Tern*
Bovidae	*Cattle, Sheep,*
Suidae	*Domestic pig, Jiangbei subspecies of wild boar*
Canidae	*North China subspecies of red fox*
Mustelidae	*North China subspecies of weasel, Northern Subspecies of Badger*
Leporidae	*Central Plains Subspecies of Rabbit, Rabbit*
Sciuridae	*Rock squirrel North China subspecies, North China subspecies of North squirrel, Northern subspecies of Dauricus dauricus, Chipmunk subspecies North China, Beijing subspecies of Cryptomeria chinensis, Flying squirrel North China subspecies, Compound-toothed squirrel*
Cricetidae	*Designated subspecies of Chinese hamster, Named subspecies of Hamster, Designated subspecies of Hamster, Named subspecies of Castanopsis farreri, Hebei subspecies of Microtus furcatus, Myospalax psilurus*
Muridae	*Apodemus agrarius Northeast subspecies, Apodemus draco, Apodemus agrarius North China subspecies, Nest Rat North China Community, Gansu subspecies of mice, Mustela sibirica manchurica, Jiangbei subspecies of social rat, Rattus norvegicus*
Atyidae	*Caridina denticulata sinensis, Lepidopteridae, Macrobrachium nipponense*
Vespidae	*Polistes chinensis, Yellow Star Horsebee, Sawfly, Japanese Bumblebee, Apis cerana, Italian bee, Apis sinensis, Xylocopa phalothorax, Black Round Bumblebee, Bumblebee*
Discoglossidae	*Bombina orientalis, Bufonidae, Bufo gargarizan gargarizan, Black-orbited toad, Bufo raddei*
Ranidae	*Pelophylax nigromaculata, Named subspecies of Rana aureus, Bullfrog, Rana chensinensis*
Microhylidae	*Kaloula borealis*
Hylidae	*Hyla arborea*
Gekkonidae	*Gekko swinhonis*
Scincidae	*Eumeces capito*
Lacertian	*Eremias argus, Eremias brenchleyi*
Colubridae	*Elaphe anomala*
Erinaceidae	*North China Subspecies of Hedgehog from Northeast China*
Soricidae	*Asian shrew subspecies of West Malaya*
Vespertilionidae	*North Subspecies of Great Brown Bat, Peking Rat-eared Bat, East Asia Wing*