



Project name:**2022 冬奥会及冬残奥会延庆赛区生态修复及景观设计**

**Ecological restoration and landscape design of the Yanqing  
competition area for the 2022 Winter Olympics and Paralympics**

## Basic Project Information

**Location:** Yanqing, Beijing, China

**Area:** 2040000 m<sup>2</sup>

**Design and construction year:** 2016-2022

**Climate:** Continental monsoon climate

**City feature:** Yanqing District is located in the Jundu Mountains of the Yanshan Mountains. It is located in Haituofeng, Yanqing District, with an altitude of 2190 meters and a vertical altitude of 1100 meters.

## Design Background

The Yanqing competition area is located about 30 kilometers northwest of the central city of Yanqing District, Beijing. It is the link area for the Winter Olympics and plays a central role in connecting the three major competition areas of the Winter Olympics, driving the coordinated development of Beijing, Tianjin and Hebei, and promoting the overall planning of urban and rural areas.

**At the national level:** The Beijing Winter Olympics is a major landmark event at an important historical node in the country. It is an important opportunity to show the country's image, promote national development, and invigorate the national spirit. It has a strong driving effect on the coordinated development of Beijing, Tianjin and Hebei.

**Regional level:** Adhering to "hosting the Olympics in a green, shared, open, and clean manner", the Winter Olympics is an important measure to implement the Beijing-Tianjin-Hebei coordinated development strategy.

**Event level:** The vision is to make the 2022 Winter Olympics a wonderful, extraordinary and outstanding Olympic event. Further stimulate the public's enthusiasm for the Olympic movement, and drive more people to care about, love and participate in ice and snow sports.



## Design Concept

### Mountain and Forest Venues, Ecological Winter Olympic Park

In the planning and design of the core area of the Yanqing competition area, "Hosting the green, shared, open, and clean manner Olympics" is implemented. Protect the ecological environment and cultural relics, embody Chinese elements and local characteristics, inherit and develop the traditional Chinese concept of humanistic landscape, plan modern buildings to complement natural landscape, history and culture, and present a modern mountain and forest complex with Chinese characteristics that can face the world, Ecological Winter Olympics Park.

Continuing and maintaining Yanqing's unique ecological environment resources and historical humanities, not only creating a new milestone in the history of Winter Olympic venues, ensuring the requirements of exciting Olympic events, but also minimizing disturbance to the mountain and forest environment, and integrating architecture, landscape and nature, China Combining landscape culture and Winter Olympics culture, a Winter Olympics competition area hidden in natural mountains and forests will be built.

## Planning Strategy

Prioritizing the protection of ecological resources is the foundation of "Green Olympic Games", in accordance with the concept of "close to nature, coincident borrowing" of "priority of protection, simultaneous restoration, and restoration of vitality".

Through the three strategies of "drawing the ecological red line, repairing the ecological corridor, and maintaining the security pattern", we will ensure the maintenance of biodiversity, ecological habitats, and the overall protection of the ecological system during and after the game.

## Implementation path

- **Coordinated design and implementation of the whole process of ecological protection and restoration**

**The first part**, ecological collaboration, completed the collaborative work with ecological consultants and ecological experts from 2017 to 2019, and completed eight ecological reports as the implementation basis for ecological protection and restoration.

**The second part** is scientific planning. From 2018 to 2019, the matrix of environmental protection measures for the overall planning environmental impact assessment will be completed to guide the implementation goals, and the implementation plan of the six ecological restoration sections will be completed to guide the implementation process.

**The third part**, on-site design, combined with the site conditions of the implementation site, designed and implemented while practicing, broke through the stripping and utilization of topsoil, the guidance plan for the preservation and transplantation of large trees, the construction guidance plan for the test section of the wall slope, and the disasters and disasters on the slope of the project. Numerous practical achievements have been made, such as seminars on the restoration of bare areas, planting experiments on slopes in high mountainous areas, and research on bare land restoration of vegetation fiber blankets on snow tracks in high mountainous areas.

- **The venues in the competition area that are close to nature, cleverly borrowed from ecological scenery and humanities**

The excavation of natural scenery and the protection of cultural relics help to reflect the Chinese landscape and humanistic characteristics of the Winter Olympics. Use the functional roads in the competition area to connect the sleigh and snowmobile venue experience, the Xiaozhuangke Site Protection Area of the Winter Olympic Village in the competition area, and the natural scenery along the mountain trail adventure, and you will have a panoramic view of the beauty of the integration of nature and humanities.



# Overall ecological restoration and landscape construction in the competition area

## Ecological Restoration Strategy of National Alpine Ski Center:

- Based on the principle of ecological restoration, vegetation restoration and slope protection restoration are the main ones.
- Restoration content: Alpine ski trails, technical ski trails, surrounding sports venues

## 国家高山滑雪中心 National Alpine Ski Centre

## Ecological Restoration Strategy of Winter Olympic Village:

- Satisfy basic functions and integrate ecological and humanistic strategies
  - Preserve native trees to the greatest extent, and the mountain settlements shaded by mountains and forests
  - Create the artistic conception of Chinese mountain gardens
- Restoration content: Olympic Village, security check square

## 国家雪车雪橇中心 National Sliding Centre

## National Snowmobile and Sled Center Ecological Restoration Strategy:

- Satisfy the game time function
  - Landscape ecological restoration
- Restoration content: Disaster treatment around the venue, the slope of the site, and the slope under No. 3 Road

## 延庆冬奥村 Olympic Village

## 市政公共区

## Ecological Restoration Strategy of Municipal Public Areas:

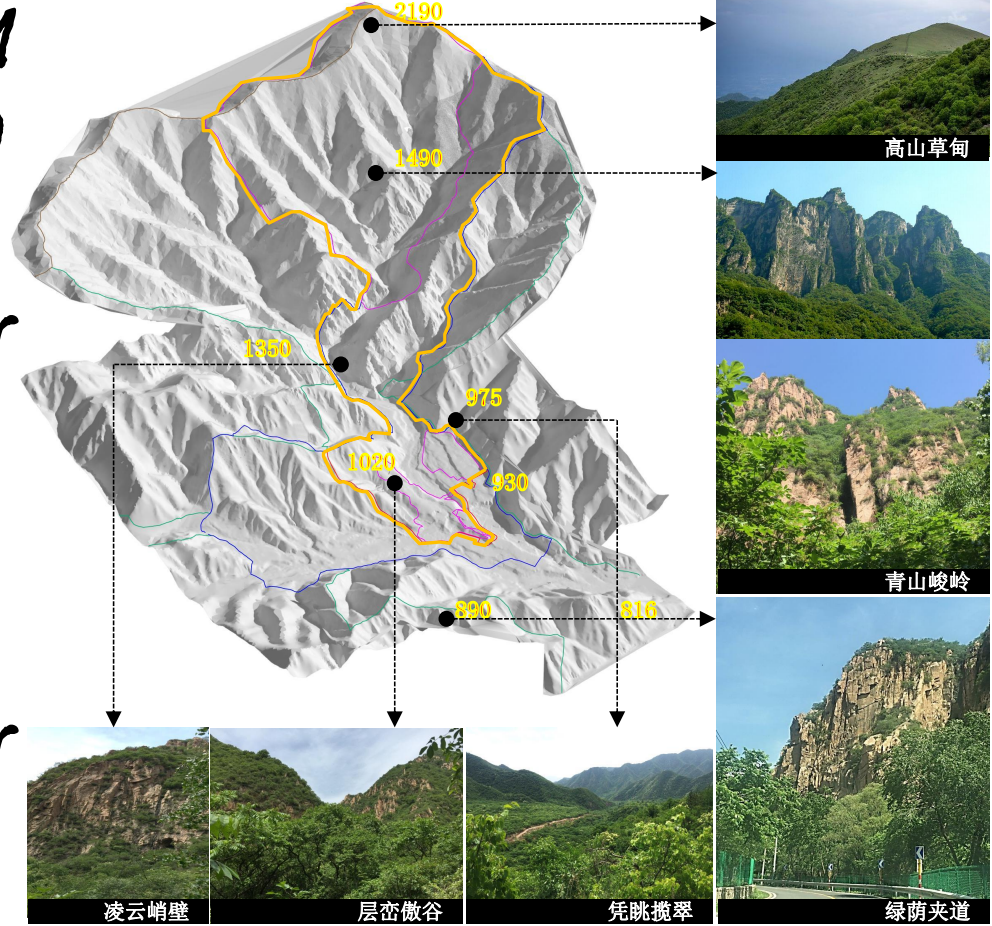
- Service game time function
  - Comprehensive Ecological Restoration
  - Various functional venues are connected in series to improve the environment
  - Leave blank and add green, reserve conditions for post-match
- Restoration content: No. 1, 2, 3, 4 roads, connecting roads, etc.



The natural background of the overall ecological restoration of the competition area

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At the southern foot of Haituo Mountain, the vertical height difference is relatively large, and the construction is distributed with mountains and valleys. The current mountain is between 800 and 2190 meters above sea level, with a large drop and rich expressions. It has the artistic conception of Chinese mountains and rivers.

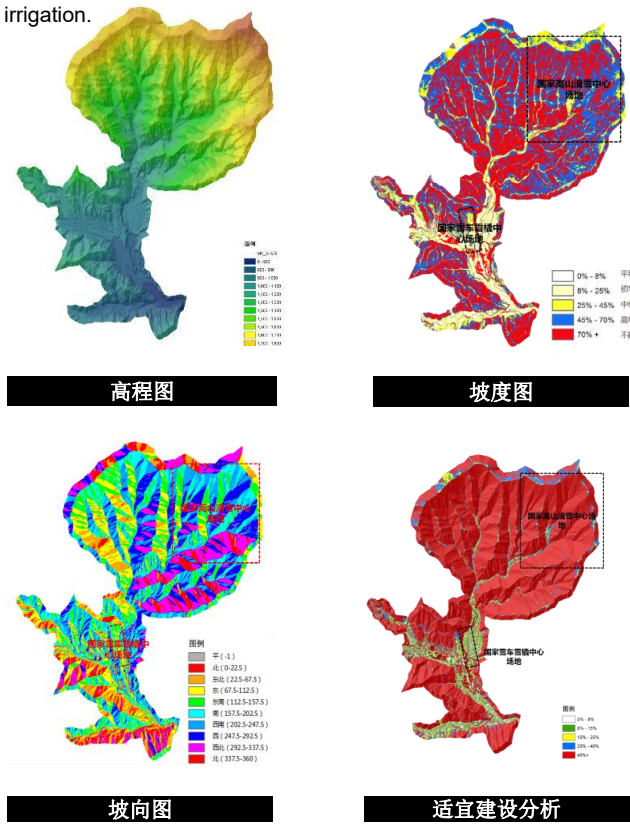


土

The soil texture is mostly cinnamon soil, lack of organic matter, and the distribution is diverse.

Part of the thin soil (<25cm), steep slope site conditions, mainly to retain the original vegetation, not suitable for arbor afforestation. The soil thickness is medium soil (25cm~50cm) and thick soil (≥50cm), the slope is flat, gentle, or steep, and the slope is mainly shady. Proper afforestation is carried out, and partial site preparation is selected for irrigation.

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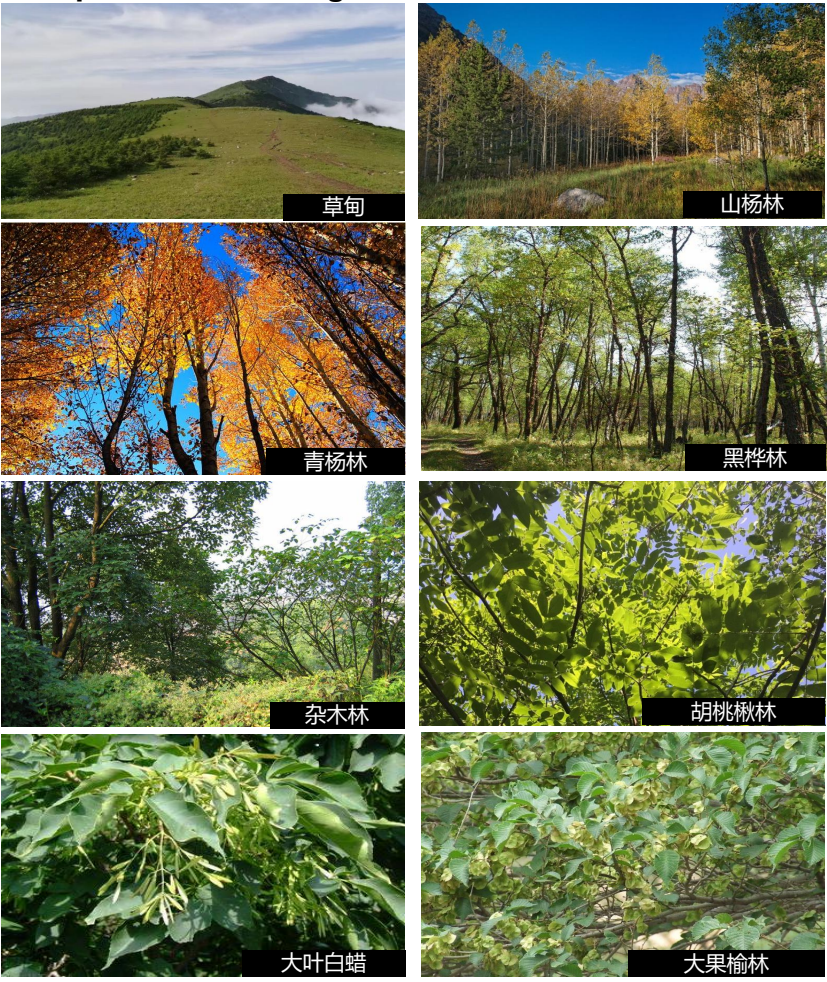
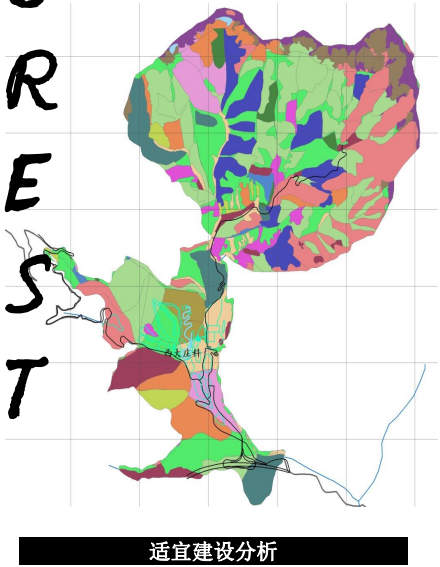


林

The current plant resources are rich, the plant types are diverse, rare plant communities, and evergreen plants are lacking.

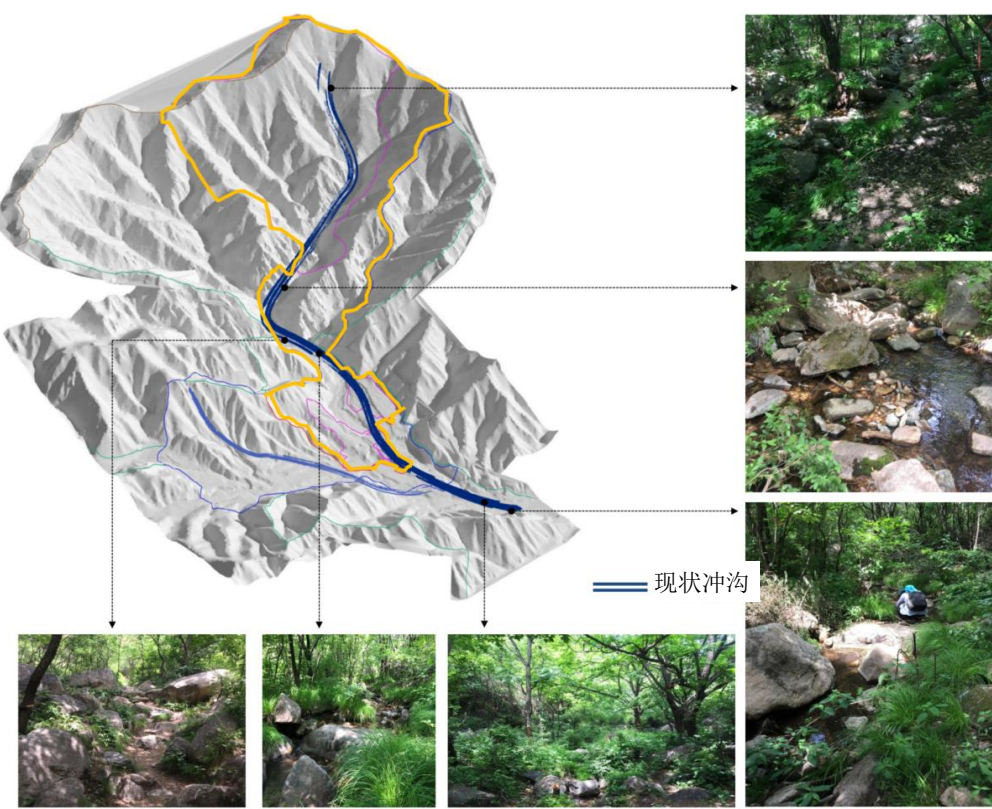
The flora is mainly composed of plants of the North China flora, which belongs to the Pan-Arctic flora, the China-Japan forest flora subregion, and the North China Plain mountainous subregion. Plants are dominated by temperate distribution, and typical temperate species include Rosaceae, Poaceae, Compositae, Liliaceae, and Brassicaceae.

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水

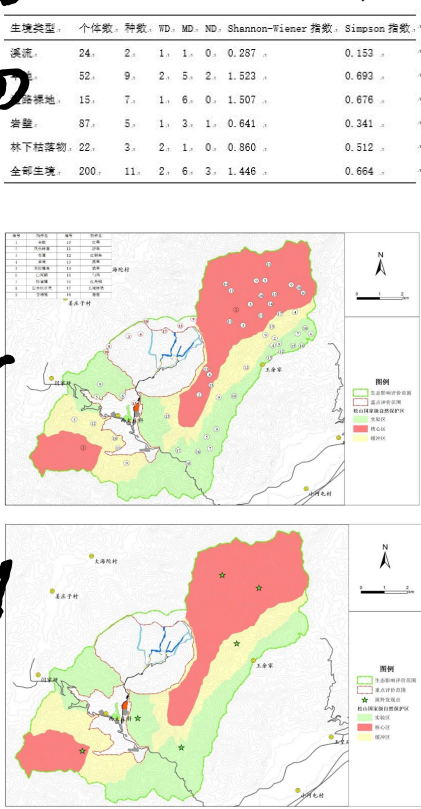
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动物

Rich animal resources, diverse habitats, rare animal populations

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Current cultural resources include: Foyukou Reservoir, West Dazhuangke Village, Xiaozhuangke Village Site, and Haituo Campground.

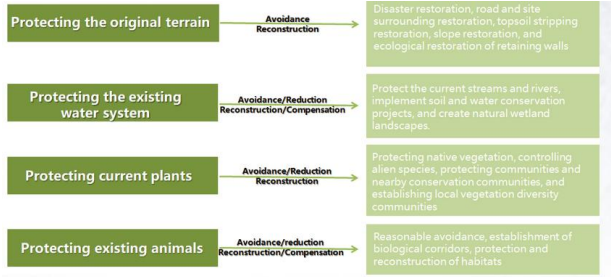




# Six major sectors of overall ecological restoration in the competition area

## Unified planning Dynamic repair

Close to the core area of the competition area, the "Master Plan Environmental Impact Assessment and Environmental Protection Measures Matrix" takes ecological sustainability as the starting point, and follows the whole process and implements them one by one



## Matrix of Environmental Protection Measures for Overall Planning Environmental Impact Assessment

序号	措施	类型	实施阶段	设计阶段保护措施	实施阶段	实施效果
1.1	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线
1.2	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线
1.3	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线
1.4	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线
1.5	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线
1.6	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线
1.7	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线
1.8	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线
1.9	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线
1.10	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线	生态保护红线

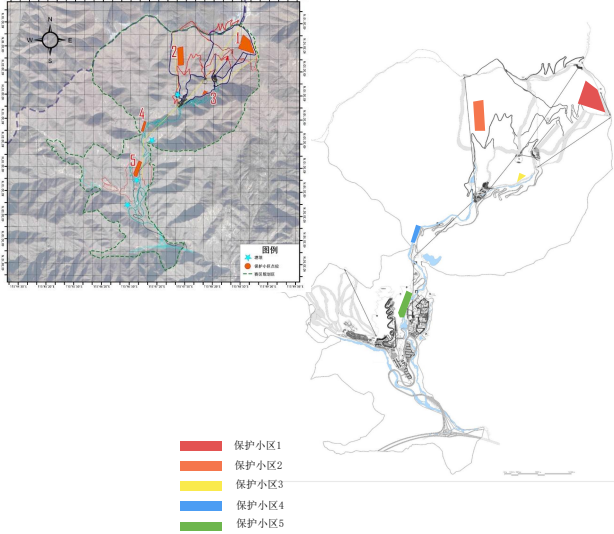
## "Based on eight major ecological reports"

- 《北京冬奥会延庆赛区生态本底调查》
- 《北京2022冬奥会及冬残奥会延庆赛区裸露边坡生态修复技术方案》
- 《北京2022冬奥会及冬残奥会延庆赛区亚高山草甸保护与恢复技术方案》
- 《北京2022冬奥会及冬残奥会延庆赛区森林生态系统经营技术方案》
- 《北京2022冬奥会及冬残奥会延庆赛区动植物资源保护技术方案》
- 《北京2022冬奥会及冬残奥会延庆赛区植物保护小区及近地保护小区方案》
- 《绿色建筑方案策划书》
- 《北京2022冬奥会及冬残奥会延庆赛区高山滑雪中心、雪车雪橇中心、配套基础设施、冬奥村及媒体中心生态环境修复规划》

## "Six Ecological Restoration Plates"

- Topsoil Stripping and Utilization
- Subalpine Meadow Protection and Restoration
- Ecological Restoration of Bare Slopes
- Forest Ecosystem Management
- Construction of plant protection communities and near-ground conservation communities
- Protection of animal and plant resources

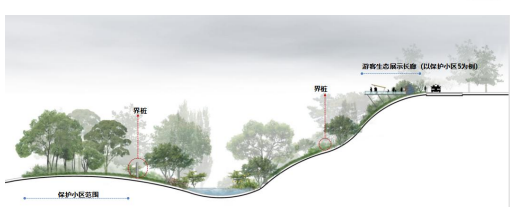
## 5. Construction of plant protection communities



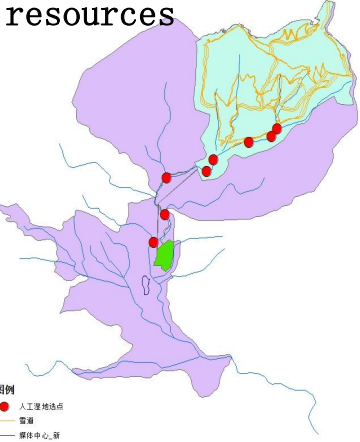
### 近地保护小区



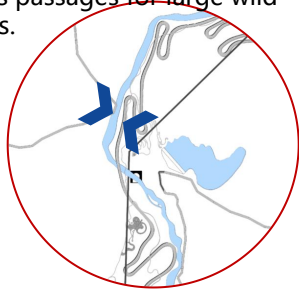
### 保护小区



## 6. Protection of animal and plant resources

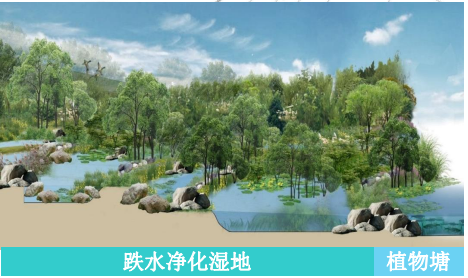
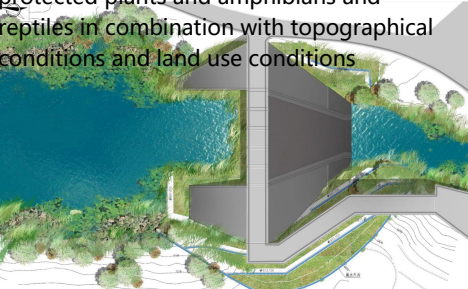


The narrow waist in the middle of the south and north competition areas is planned, and the valleys along the gentle hills and ridges are used as passages for large wild animals.

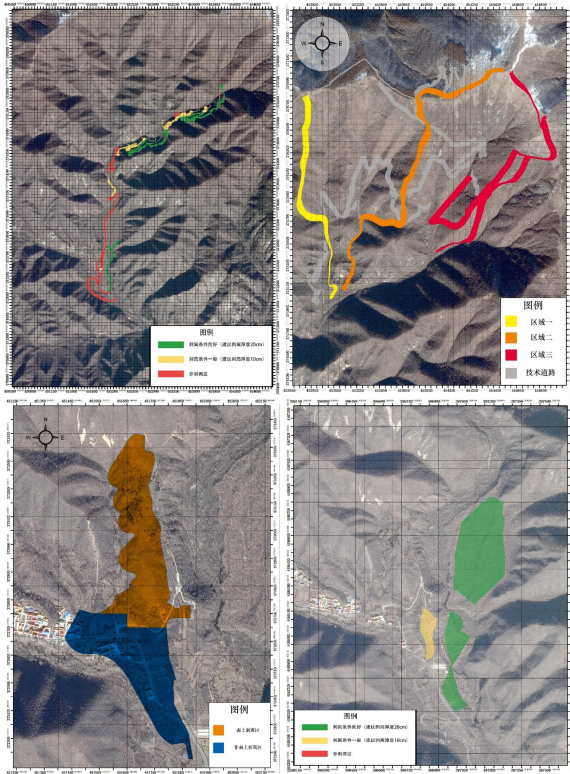


## Aquatic protected plants and amphibians and reptiles protected animal habitats

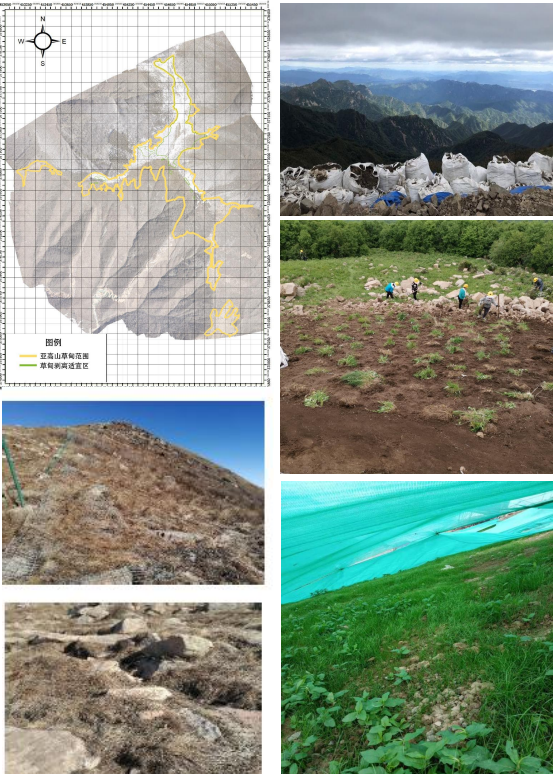
Make full use of existing river water bodies and pools, and take into consideration the construction of habitats for aquatic protected plants and amphibians and reptiles in combination with topographical conditions and land use conditions



## 1. Topsoil stripping



## 2. Subalpine meadow protection and restoration



## 3. Ecological restoration of exposed slopes

Divide according to altitude: below 800, 800-1200, 1200-1799, 1800-2000, and above 2000, analyze the site conditions of shady and sunny slopes, give priority to local vegetation, take into account the market price of seedlings to determine varieties; take into account the feasibility of maintenance conditions and choose trees, shrubs and grasses.



## 4. Forest ecosystem management

"Near-Natural" Restoration Principles  
Ecosystem restoration and optimization should follow the principle of "native forest cultivation" and retain the original tree species as much as possible. According to the rules of the original ecosystem, native tree species should be used, and artificial traces should be minimized to make it adapt to the surrounding natural landscape.

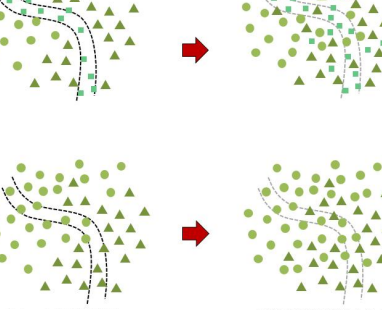
"natural succession" restoration principle

Recently: Arbors reach 20%-35% coverage, shrubs and grasses cover 100%, primary shrubs and arbors and grasses are fully covered; broad-leaved evergreen mixed forest is about 1100 trees/ha.

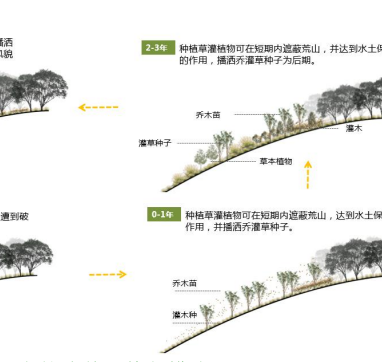
Mid-term (3 years): Higher than 20-35% coverage of trees and grasses and full coverage of shrubs.

Long term (10 years): The recovery effect of more than 50% of the arbor coverage provides time and space for the long-term self-repair of vegetation. The broad-leaved evergreen mixed forest is 750~900 plants/ha.

## "Near-Natural" Restoration Principles



## "自然演替" 修复模式





# The application effect of the overall ecological restoration technology in the competition area



At high, medium and low altitudes, focus on the ecological restoration technology for slopes with different steepness, water conservation, and site suitability.



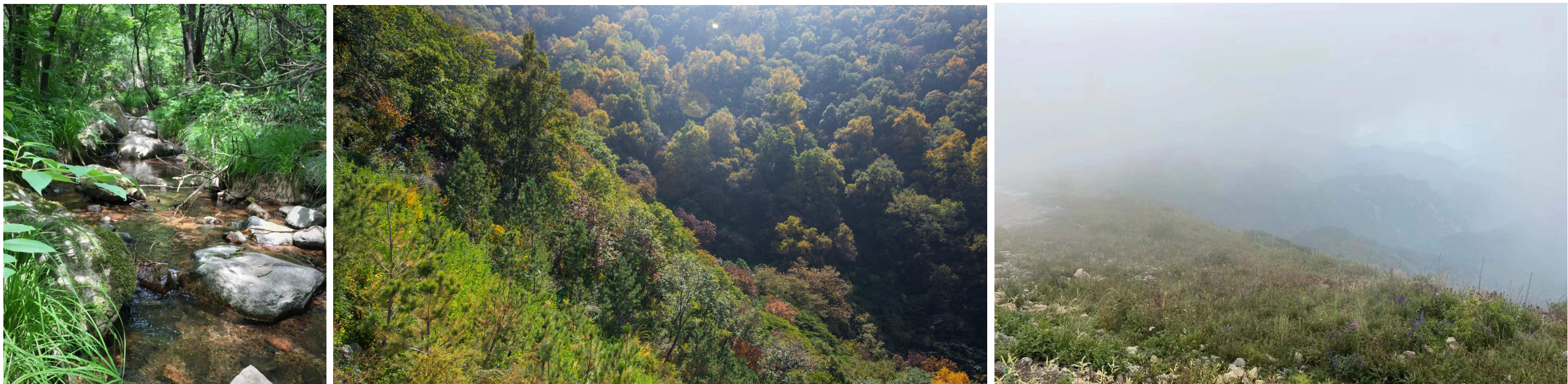
Apply stripped topsoil to the original soil seed bank to repair the exposed slopes and mountains.



# The application effect of the overall ecological restoration technology in the competition area



Cultivate off-site, replant on-site, and plant water elm, linden, elm, schisandra, and peeling elm.

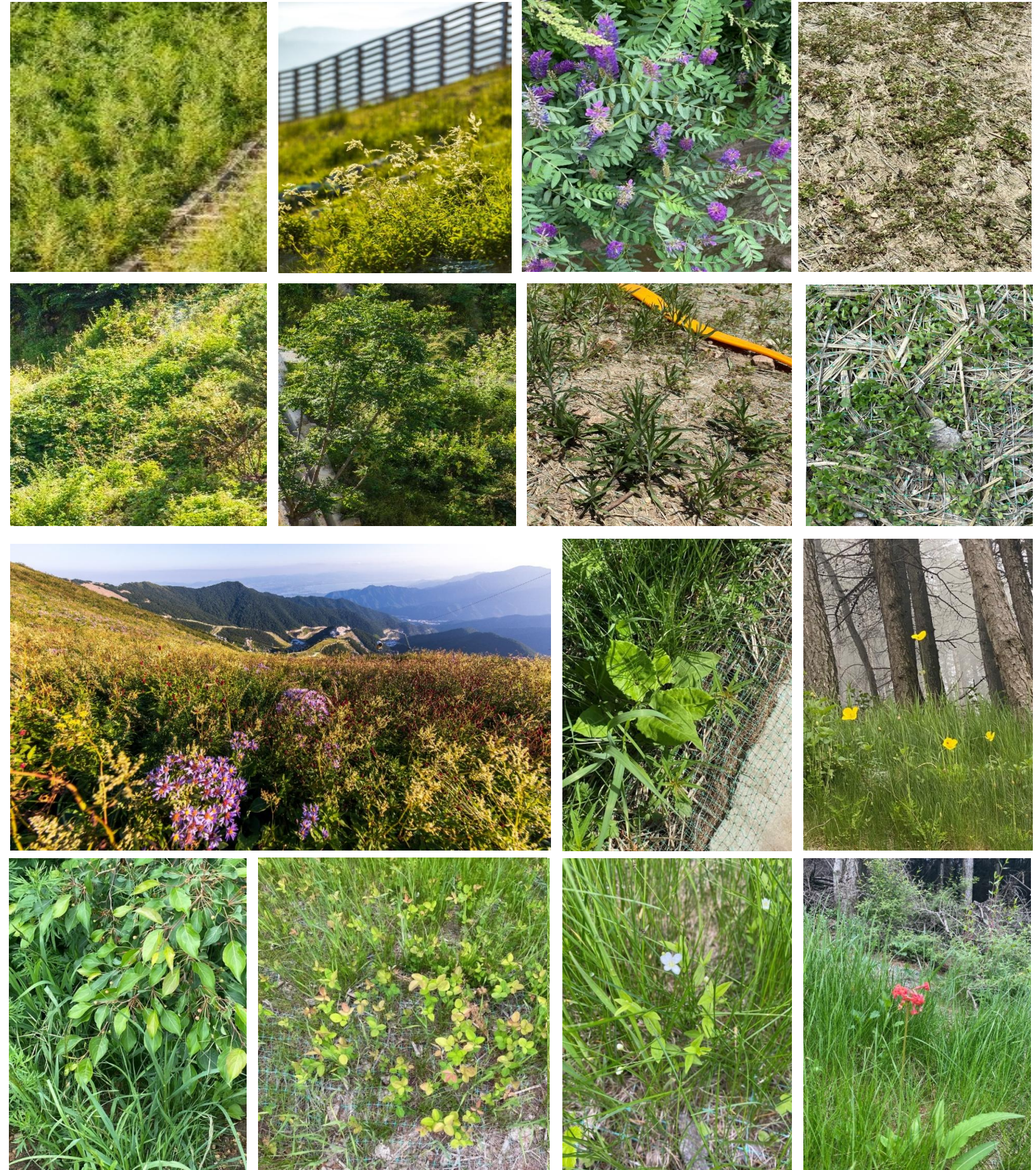


The integrated application of vegetation protection and forest seedlings restores three typical habitats, the habitats of rocky beaches and creeks under forests, forest habitats, and subalpine meadow habitats.



# The application effect of the overall ecological restoration technology in the competition area

- **1. Jianping species:** It grows vigorously within one year of planting, and it is suitable for one or two-year-old grass vegetation, low maintenance and high density. Divided into high, medium and low altitude, grass seed sowing accounts for 70%-75%.
- **2. Successive species:** grow within one year of planting, vigorously in two years, plant leguminous vegetation first, choose shrubs with well-developed root systems, low-maintenance and tolerant to barren vegetation. It is divided into shrubs and grasses suitable for high, middle and low altitudes, and the proportion of shrub sowing is 25%-30%.
- **3. Cutting shrubs:** The species are close to the natural principle, and the methods include cutting, pressing, and on-demand, and the density is 4-8 plants/m<sup>2</sup>.



Grass-shrub combination sowing or cutting, the time is divided into the establishment period and the succession period, which are recommended according to the middle and low altitudes and high altitudes.



# The application effect of the overall ecological restoration technology in the competition area



**Altitude 860m**



**Altitude 1650m**



**Altitude 1050m**



**Altitude 1400m**



**Altitude 1950m**

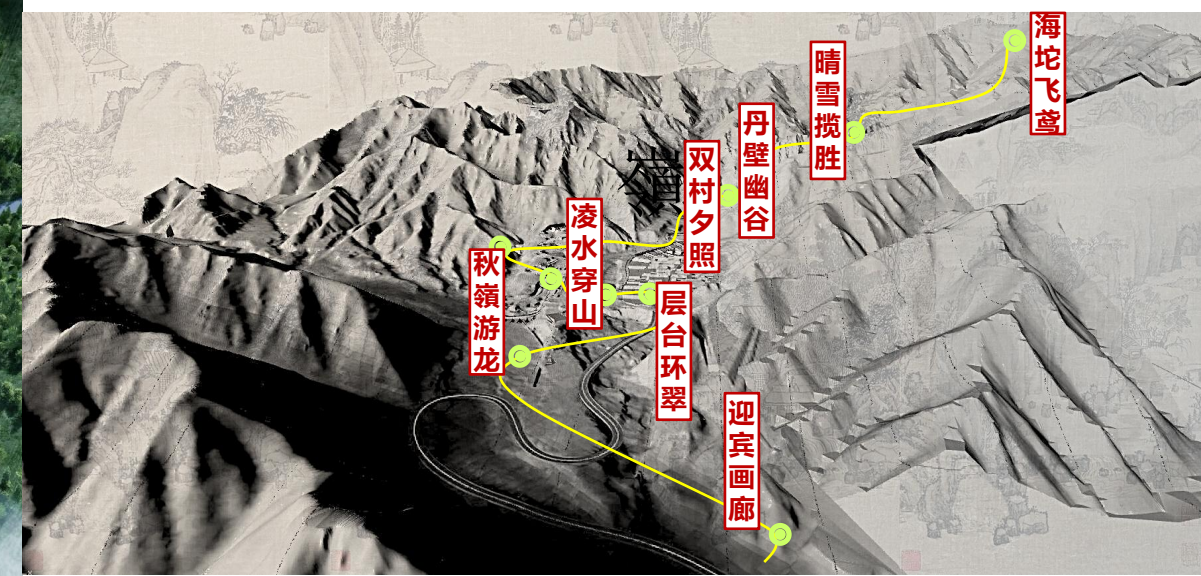
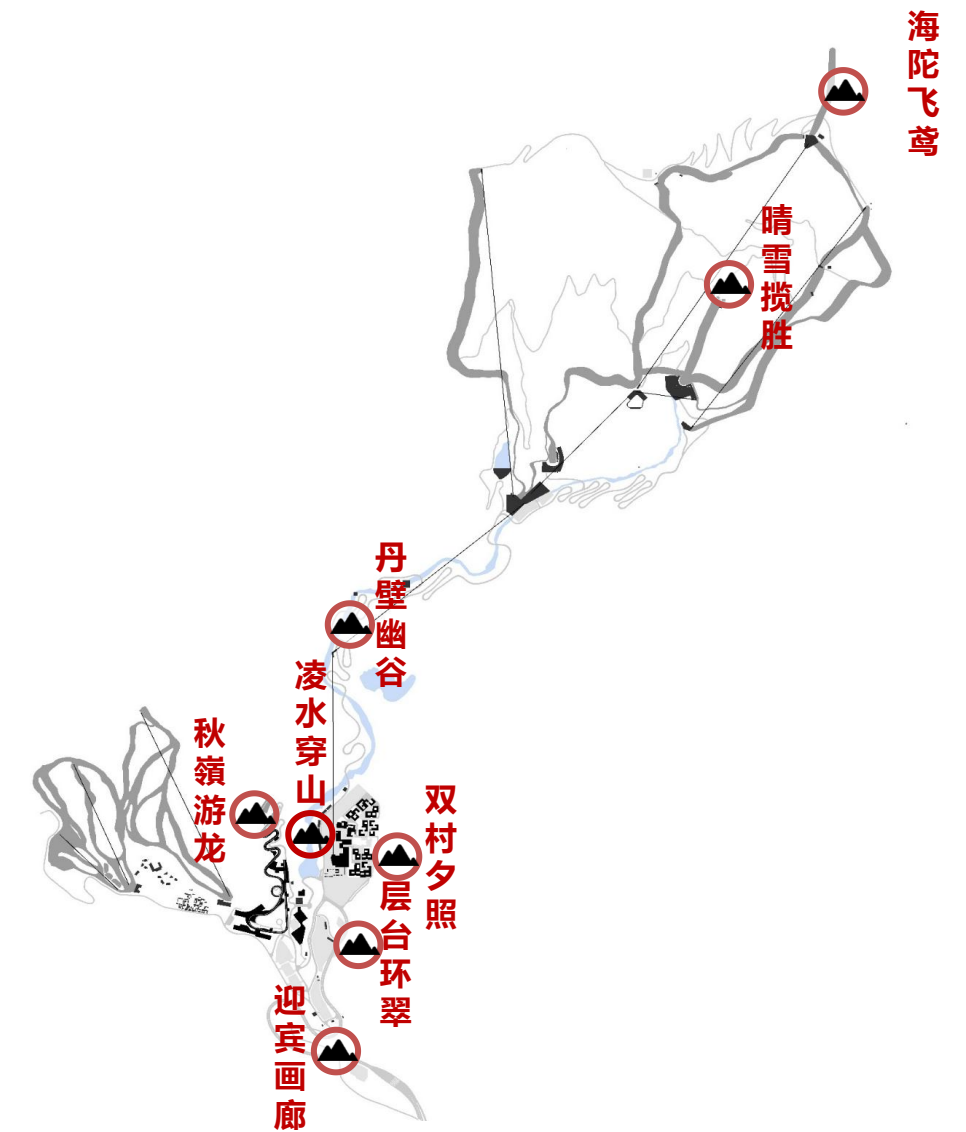
Near-natural restoration, application effect of native arbor vegetation at middle and low altitudes and high altitudes.





## Ecology is the priority Utilize the scenery to interests

On the premise of satisfying the functions of ecological protection, ecological restoration and competition time, sort out and connect functional venues, superimpose "cultural meaning" to highlight the environmental quality, and combine the current landscape resources to form the "Eight Scenic Spots of Winter Olympics".







Ecological restoration and landscape design in the southern part of the Yanqing competition area, the bobsled area and the Winter Olympic Village area to make up for the damage caused by the construction.





The integration of the cultural landscape of the Winter Olympics, the ruins of the Winter Olympics Village and Xiaozhuangke Village present a combination of vigor and simplicity and the beauty of humanistic gardening.

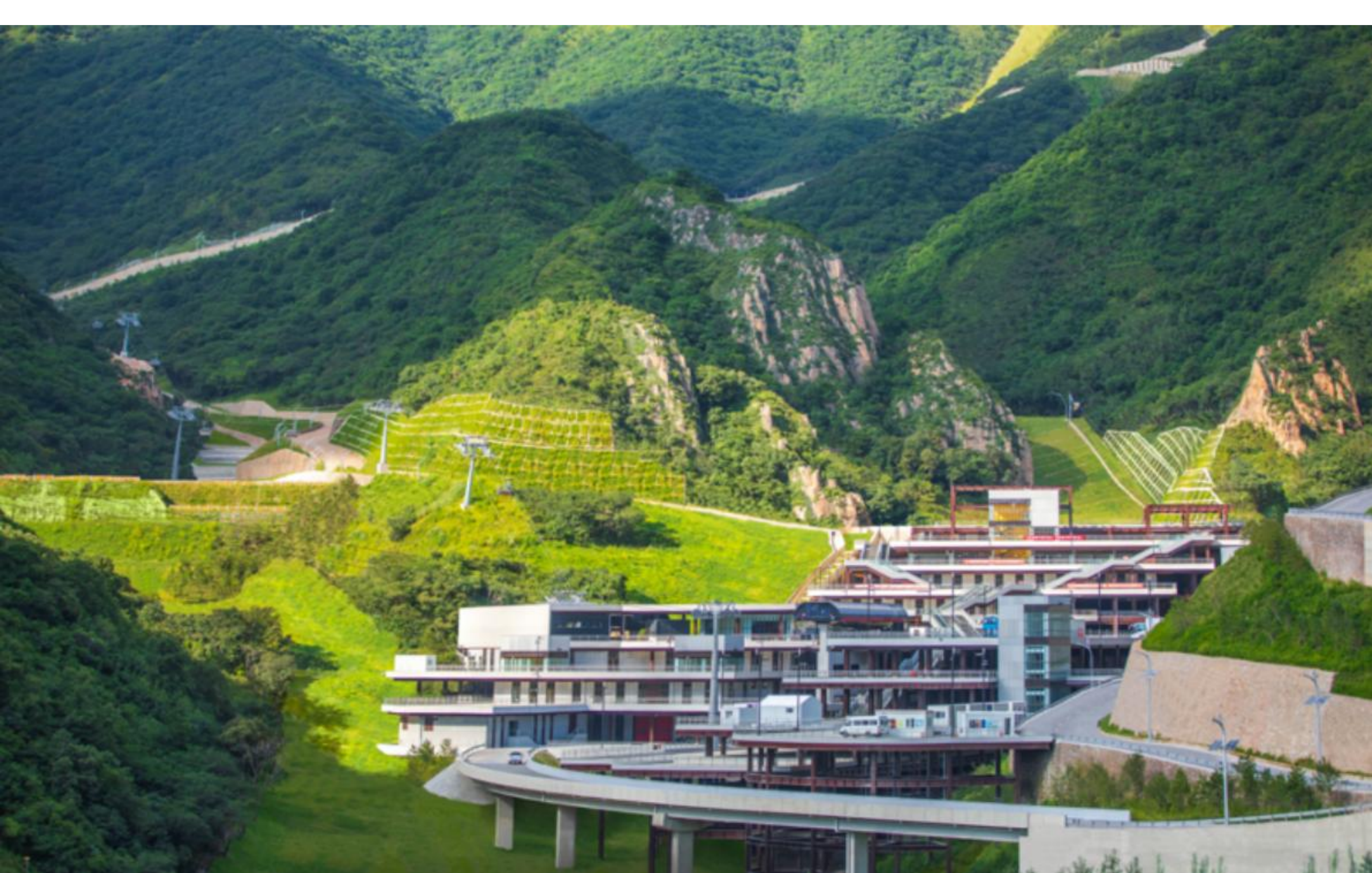


A model of Olympic humanities, the Winter Olympic Village and the Olympic Security Square have the effect of forest protection and utilization.



The slope area of the snowmobile sled area and the slope protection and aquatic habitat restoration around the pond and dam.





National Alpine Ski Center - The area around the construction of the Alpine District Distribution Plaza, the natural growth effect of the ecological restoration of the exposed slope in the next year.





The natural growth effect of the ecological restoration of municipal road slopes in the next year.





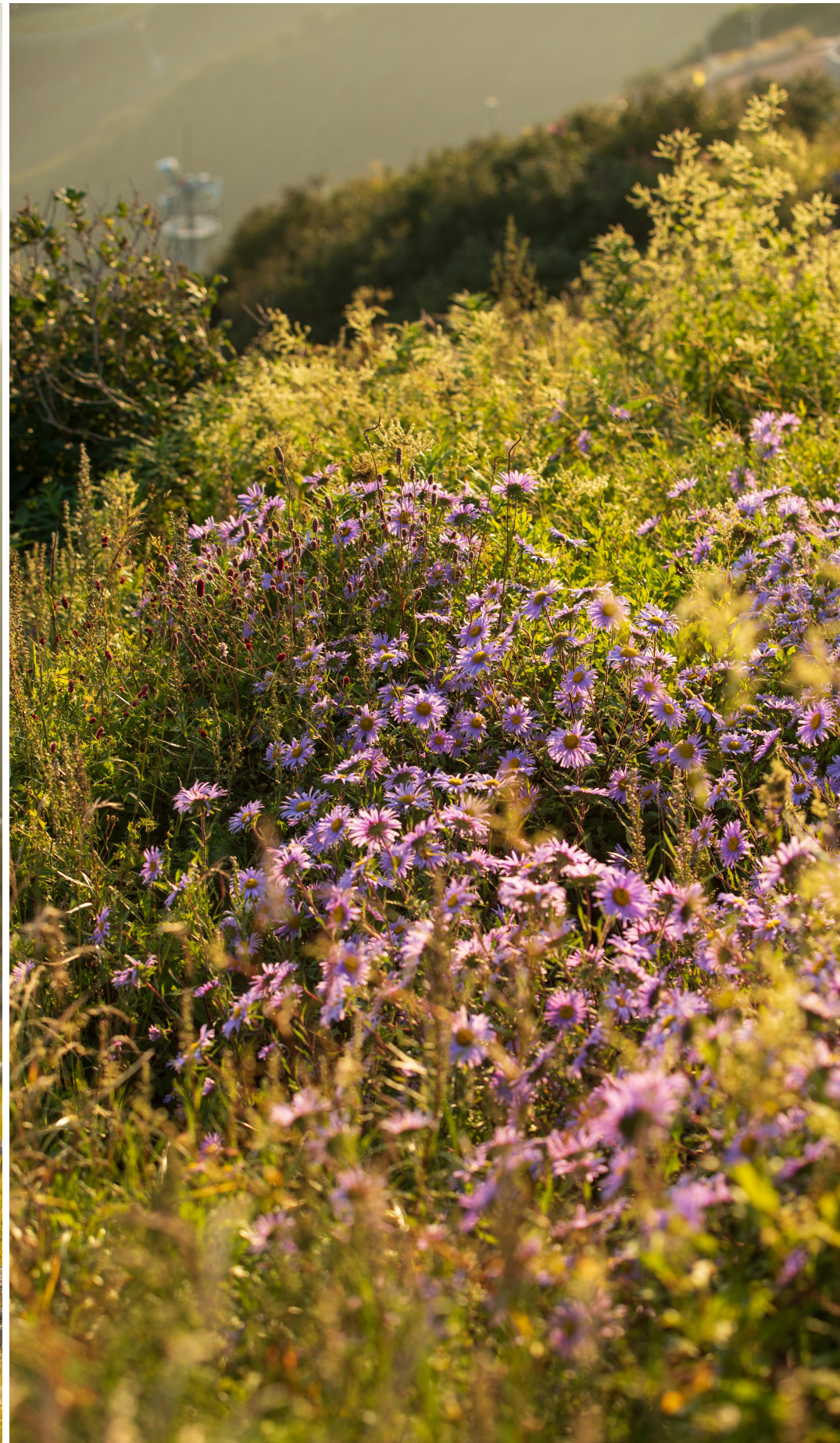
In the National Alpine Ski Center, the ecological restoration of the snow track vegetation has bridged the damage caused by the construction of the site.





The National Alpine Ski Center is rated as "the most beautiful ski run in the world" by the International Ski Federation.





National Alpine Skiing Center - High altitude 1700-2000m vertical altitude area, using the restoration effect of native vegetation.





National Alpine Ski Center-subalpine meadow, meadow suitability topsoil stripping area technical plan for the restoration of meadow habitats above 2,000 meters above sea level, and the natural recovery effect in the next year.



## Persistent



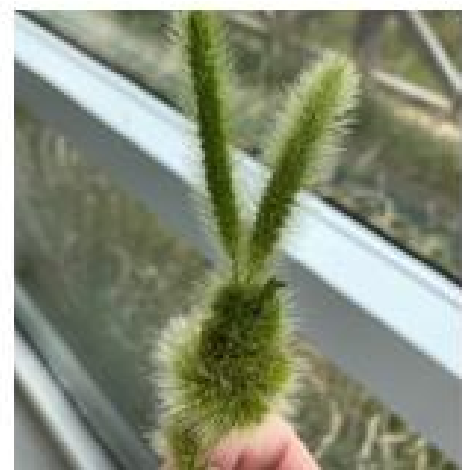
## Concentrate



## Unite



## Reconciliation



Teamwork in the Winter Olympics: Designers, constructors, and builders work together