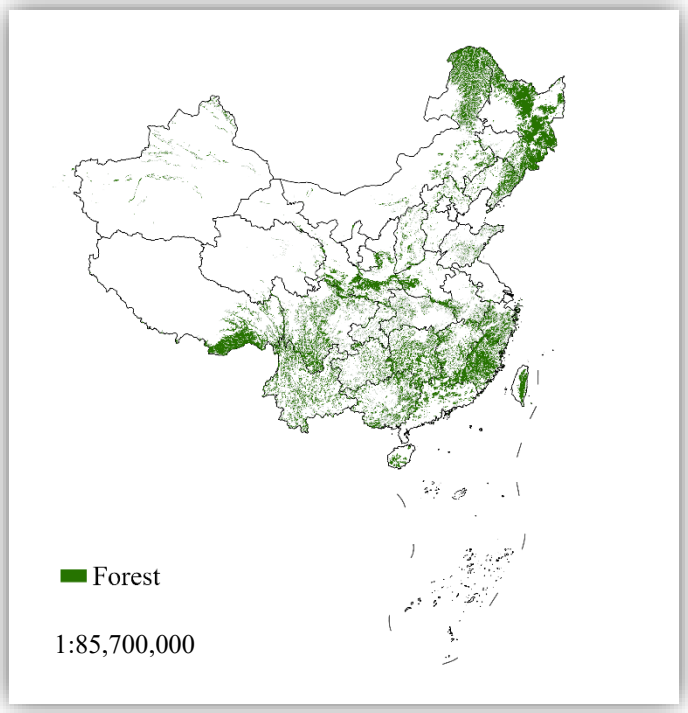
Forest Conservation in Our Country

I. Overview of Our Country's Forest Resources

As of the end of 2023, our country's forest coverage rate has exceeded 25%, with a forest stock volume surpassing 20 billion cubic meters, placing the total forest resources among the highest in the world. The area of artificial forests ranks first in the world, exceeding 85 million hectares, contributing more than 25% of the world's green growth. However, due to its large population, the per capita forest area is only one-fourth of the global average, and the per capita forest stock volume is just one-seventh of the global average. The overall resource volume remains relatively insufficient and unevenly distributed, posing significant challenges to the protection and sustainable utilisation of forest resources.

Figure 1: Distribution of Forest in Our Country



Map reference: 1. 國家生態科學資料中心. 2024. 1990-2020 年中國人工林與天然林空間分佈資料集 (Remarks: The base map is based on 自然資源部標準地圖 GS（2024）0650 號) https://www.nesdc.org.cn/sdo/detail?id=672d67777e28174998e6324a&subjectCode=673168437e28174998e6325e

2. 國家地理資訊公共服務平臺天地圖. （2024）https://cloudcenter.tianditu.gov.cn/administrativeDivision/ (Date of reference:26 March 2025)

II. Distribution and Characteristics of Our Country's Forests

1. Physical and socio-economic factors

Our country's terrain is complex and diverse, generally sloping from northwest to southeast, with multiple east-west mountain ranges (such as the Qinling Mountains and Taihang Mountains) and north-south mountain systems in the southwest (such as the Hengduan Mountains). These features significantly influence the distribution of climatic zones, thereby shaping the growth and distribution patterns of forests. The monsoon is obstructed by mountain ranges, concentrating precipitation in the southeast, while the northwest remains arid. As a result, the distribution of forests is highly uneven.

In addition, our country's unique geographical location and socio-economic conditions have resulted in a complex pattern of forest distribution. Human activities have had a profound impact on forests: in the eastern regions with rapid economic development and urbanisation, primary forests have been damaged and largely replaced by secondary forests and planted forests; whereas in the remote mountainous areas of the northeast and southwest, primary forests have been better preserved.

2. Characteristics of forest distribution

Influenced by the combined effects of physical and socio-economic factors, the distribution of forests in our country is very uneven:

- Most forests are concentrated in the southeastern regions and mountainous areas where annual precipitation exceeds 400 mm.
- Primary forests are mainly found in remote, less accessible mountainous regions such as in the northeast and southwest, while in the eastern plains and areas with active human activities, primary forests have largely been replaced by secondary forests or planted forests.

3. Distribution of the vegetation in the eastern and western regions

- **Eastern Humid Region**

  In the eastern humid region, the latitudinal zonation of forest vegetation is relatively distinct. From north to south, the distribution includes the cold-temperate coniferous forest zone dominated by larch, e.g. the larch forest in Daxing'an Mountains, the temperate mixed coniferous and deciduous broadleaf forest zone, the warm-temperate deciduous broadleaf forest zone, the transitional subtropical deciduous broadleaf forest zone with some

evergreen broadleaf trees, the subtropical evergreen broadleaf forest zone, the transitional tropical rainforest evergreen broadleaf forest zone, and the tropical monsoon rainforest and rainforest zone.

- **Western Arid Region**

  The western arid and semi-arid regions exhibit a pronounced continental climate. In the south, the uplift of the Qinghai-Tibet Plateau makes the latitudinal zonation of vegetation extremely complex. Taking the 89°E longitude as an example, from north to south, the zones include the temperate semi-desert and desert zone, the warm-temperate desert zone (Figure 2), the alpine desert zone, the alpine grassland zone, and the alpine mountain shrub-grassland zone.

Figure 2: Gobi Desert

4. Vertical zonation of vegetation in mountainous areas

a. Impact of climate on vertical zonation of vegetation

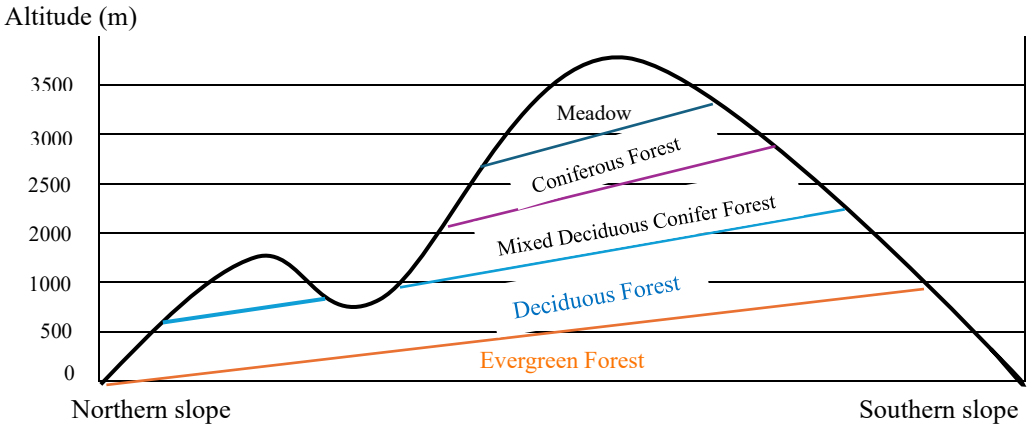
Air temperatures control the vertical zonation of vegetation. Air temperatures drop with an increase in altitude. However, trees grow only at the mean temperature above 6°C. Therefore, the altitude with temperature 6°C marks the tree line. Above the tree line, with the cold, dry and windy environment, trees are replaced by shrubs, meadow and bare rock surface. At the height with 0°C, it is the snow line where few vegetation survives.

In addition, the aspect of the slopes affects the air temperatures. Sun-facing slopes, usually the southern slopes, receive more solar radiation. Thus, the average temperature is higher and the tree line and snow line are also at higher altitude. On the other hand, the sun-shading slopes, i.e. the northern

slopes, are cooler. The tree line and snow line are at lower altitude.

Windward slopes receive more precipitation in form relief rain and fog. The climate is mild and wet. The leeward slopes are rain-shadow with extreme climate and dry condition. Thus, the tree line and snow line are higher at the windward slopes than that of the leeward slopes (Figure 3).

Figure 3: Vertical Zonation of Vegetation



b. Vertical zonation of vegetation in the Eastern and Western Regions

- **Eastern Humid Region**

  The vertical zones of vegetation are relatively simple in structure, typically consisting of broadleaf forests at the mountain base, mixed forests in the middle, and shrubs or meadows at the summit. For example, Mount Tai's vertical zonation transitions from deciduous broadleaf forests at the foothills to meadows at the peak.

- **Southwest and Qinghai-Tibet Plateau:**

  The vertical zonation is complex, ascending from mountain monsoon rainforests at the mountain base, to subtropical evergreen broadleaf forests, mixed forests, subalpine coniferous forests (such as spruce), alpine shrubs, alpine meadows, and finally the alpine snow and ice zone, fully showcasing vegetation diversity. On the mountains of the subtropical regions in the southwestern part of China, the tree line can reach 4,400m above sea level. The tree line declines 100m with every increase in 1^{o} latitude.

- **Northwest Tianshan and Altai Mountains:**
  The climate is dry and cold, resulting in simpler vertical zonation, often comprising coniferous forests at the base (such as Siberian larch) (Figure 4) and meadows (Figure 5) or snow and ice zones at the summit.

Figure 4: Alpine Coniferous at Tian Shan

Figure 5: Meadow and Bare Rock at Tian Shan

III. Multiple Functions of Forests

- Forests are often referred to as the “lungs of the Earth,” playing an irreplaceable role in maintaining ecological balance and providing ecosystem services.

- Carbon Sink Function
  Forests absorb large amounts of carbon dioxide annually and release oxygen, serving as a critical natural solution to combat climate change. By 2024, our country’s annual forest carbon sequestration will exceed 1.2 billion tons, accounting for more than 10% of the country's total carbon emissions, which

is the key to achieving the "dual carbon" goals.

- Water Conservation

  Forests regulate water cycle and enhance the rate of infiltration and groundwater reserve. The baseflow of rivers is more stable with dense forests at the catchment area. For instance, the forests in the Sanjiangyuan region nurture the headwaters of Chang Jiang, Huang He, and Lancang (Mekong) River, earning the title of “China’s Water Tower”.

- Soil Protection

  Forest root systems stabilise soil, reducing wind and water erosion and preventing land desertification (Figure 6). For example, the Three North Shelterbelt Project has reduced the area of desertification.

Figure 6: Windbreak to Reduce Wind Speed

- Biodiversity

  Forests are vital carriers of biodiversity, supporting numerous rare flora and fauna species. According to statistics, terrestrial vertebrate species in our forests account for approximately 10% of the global total, including precious species such as the giant panda, golden snub-nosed monkey, and Amur tiger. Additionally, our forests are home to abundant plant resources, with many endemic tree species (such as the dove tree and silver fir) holding significant conservation value worldwide.

IV. Challenges in Forest Conservation

Despite the abundance of our country's forest resources, numerous challenges remain in terms of protection and sustainable development:

1. Forest degradation

- In some areas, overexploitation, illegal logging, and poor management have led to the degradation of forest ecosystems and a decline in the quality of forest.
- The area of natural forests has decreased, while the proportion of planted forests has increased. However, the ecological functions of planted forests are far inferior to those of natural forests.

2. Loss of biodiversity

- Habitat fragmentation and shrinking forest areas have threatened the survival of many rare species, such as the giant panda and Amur tiger.
- The invasion of non-native species has also caused damage to local ecosystems.

3. Impact of climate change

- Extreme weather hazards (such as droughts, floods, and forest fires) are becoming more frequent, causing severe damage to forest ecosystems.
- Climate change has led to a shrinking distribution range for some vegetation species, reducing the stability of forest ecosystems.

4. Pressure from human activities

- Urbanisation, expansion of agricultural areas, and development of infrastructure have resulted in a reduction of forest area.
- Overgrazing, excessive logging, and illegal timber trade have intensified the depletion of forest resources.

5. Uneven regional distribution

- Forest resources are primarily concentrated in regions like the northeast and southwest, while areas such as the northwest and north China have low forest coverage and high ecological vulnerability.

V. Measures of forest conservation in our country

To address the challenges facing its forests, our country has implemented a series of protection and restoration measures:

1. **Natural forest protection project**

- Launched in 1998, this project aims to halt commercial logging of natural forests and restore their ecosystems.
- It covers key forest regions nationwide, particularly in the northeast and southwest.

2. **Returning farmland to forest project**

- Convert terraces and desertified farmland back to forest and restore forest vegetation.
- Since its implementation in 1999, more than 500 million mu of farmland has been afforested.

3. **Three-North Shelter Belt Project**

- The largest ecological construction project aims to prevent sandstorms and improve the ecological environment through afforestation.
- Covering the Northeast, North China and Northwest China, it is known as the "Green Great Wall".

4. **Establishing nature reserves and national parks**

- As of 2023, our country has established more than 2,700 nature reserves, covering 15% of the country's land area.
- National park system pilot projects (such as the Giant Panda National Park and the Siberian Tiger and Leopard National Park) have provided important support for the protection of biodiversity.

5. **Sustainable forest management and ecological compensation**

- Promoting sustainable forest management models and encourage community participation in forest protection.
- Implementing an ecological compensation mechanism to provide economic compensation to farmers and regions that protect forests.

6. **Afforestation and greening**

- The government coordinates urban and rural afforestation and greening, carries out large-scale national greening actions and greening of cities and towns, promotes the construction of forest cities and promotes rural revitalisation.
- Citizens are encouraged to participate in afforestation through tree planting,

forest conservation and forest management and adoption.

7. Technological support and monitoring

- Use satellite remote sensing, drones and advanced technologies to conduct real-time monitoring of forest resources.
- Conduct research on forest ecosystems to provide a scientific basis for protection and restoration.

VI. Effectiveness of forest conservation

Through years of protection actions, our country has achieved remarkable results in the management of forest resources and ecological conditions:

1. Growing forest area and coverage

- By 2023, our country's forest coverage rate exceeded 25% and the forest area reached 220 million hectares.
- The area of artificial forests ranks first in the world, accounting for more than 30% of the global artificial forest area.
- Our country has become one of the countries with the fastest growing forest resources in the world, contributing more than 25% of global green growth.

2. Recovering ecosystem functions

- The natural forest protection project and the project of returning farmland to forest have significantly improved the quality of forests and enhanced the stability of the ecosystem.
- The Three North Shelterbelt Project has effectively reduced the occurrence of sandstorms and has improved the regional ecological environment.

3. Protection of biodiversity

- The population of rare species such as giant pandas, Siberian tigers, and golden monkeys has grown steadily. By 2024, the number of wild giant pandas increases to 1,950, and the habitat recovery rate of threatened species reached 75%.
- Nature reserves and national parks provide safe habitats for endangered species.

4. Reduction of water and soil erosion

- As forest coverage in the key river basins such as Chang Jiang and Huang He

increases, soil erosion decreases. The water conservation capacity of the Three Rivers Source regions increases, and the annual water volume increases.

5. **Improvement of carbon sequestration capacity:**

- Forests absorb about 1.2 billion tons of carbon dioxide every year, making an important contribution to our country's achievement of the "dual carbon" goals (carbon peak and carbon neutrality).

6. **Significant social and economic benefits**

- Green industries such as forest tourism and forest economy are booming, providing employment opportunities and income sources for residents.
- The ecological compensation mechanism promotes the coordinated development of regional economy and ecological protection.

VII. Conclusion

Our country's forest conservation efforts have yielded remarkable results, with steady increases in forest area and ecological functions, delivering a win-win outcome for ecological protection and economic development. However, ongoing efforts are needed to mitigate challenges such as uneven distribution of forests and climate change. Insofar, our country has strengthened scientific management, has raised public awareness of environmental conservation, and work together to build a green homeland. It lays the foundation for the goal of increasing forest coverage to 26% by 2030.

References:

1. 國家林業和草原局
   http://www.forestry.gov.cn/lcgk.jhtml

2. 中國科學院地理科學與資源研究所
   http://www.igsnrr.cas.cn/cbkx/kpyd/zybk/slzy/202009/t20200910_5692955.html

3. 中華人民共和國森林法
   https://www.mee.gov.cn/ywgz/fgbz/fl/202106/t20210608_836755.shtml

4. Liu Huaxun, "The Vertical Zonation of Vegetation in China", Acta Geographica Sinica, 1981, Vol. 36, Issue 3, p.267-279
   https://www.geog.com.cn/EN/10.11821/xb198103003

5. Ming-Zhe MA, Guo-Zhen SHEN, Gao-Ming XIONG, Chang-Ming ZHAO, Wen-Ting XU, You-Bing ZHOU, Zong-Qiang XIE, "Characteristic and representativeness of the vertical vegetation zonation along the altitudinal gradient in Shennongjia Natural Heritage", Chinese Journal of Plant Ecology 植物生態學報, 2017, Vol. 41, Issue 11, p.1127-1139
   https://www.plant-ecology.com/EN/10.17521/cjpe.2017.0092