

# Analysis of the Current Status and Development Strategies for Ecological Corridor Construction in Henan Province

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**Abstract:** This paper deeply analyzes the significant progress made in ecological corridor construction in Henan Province, a populous and agriculturally rich region of China, and proposes corresponding countermeasures to address existing issues. Through planning guidance and Superior support Henan Province has successfully promoted the rapid development of ecological corridors, effectively protected biodiversity, and fostered the growth of green industries. However, issues such as unreasonable planning and design, insufficient funding, and weak enforcement of laws and regulations still constrain the quality and effectiveness of ecological corridor construction. To this end, the report suggests strengthening top-level design and planning, increasing financial investment and superior support, optimizing land use structure, enhancing scientific research and technical support, and promoting public participation and social supervision among other multidimensional measures to achieve sustainable development of ecological corridor construction in Henan Province.

**Keywords:** Henan Province; Ecological Corridors; Biodiversity; Green Development; Countermeasure Suggestions

## 1. Introduction

Henan Province, as a populous and agricultural province in China, has achieved significant results in promoting ecological civilization construction in recent years. The ecological corridor, as a green channel connecting natural reserves, parks, wetlands and other ecological spaces, is of great significance for maintaining biodiversity, improving the ecological environment, and promoting regional sustainable development.

Henan Province is located in central China, with a superior geographical location, and is the intersection of the three major water systems of the Yellow River, Huai River, and Yangtze River. The province has abundant natural resources and biodiversity, making it a habitat for various rare and endangered species [1]. In recent years, the Henan Provincial Government has attached great importance to the construction of ecological corridors, making it an important component of ecological civilization construction. Through various measures such as planning guidance, Superior support, and financial investment, the rapid development of ecological corridors has been promoted.

## 2. The Current Situation of Ecological Corridor Construction in Henan Province

### 2.1 Gradual Improvement of Planning and Layout

Henan Province has formulated a series of planning documents for the construction of ecological corridors in accordance with the needs of ecological environment protection, clarifying the construction goals, layout principles, and key tasks of ecological corridors. Through scientific planning, an ecological corridor network with a focus on the Yellow River and Huai River basins has been formed [2]. As of the end of 2023, Henan Province has built 10 provincial-level ecological corridors with a total length of about 12000 kilometers, covering 18 cities (districts) in the province. Among them, there are 5 key ecological corridors, including the Funiu Mountain Tongbai Mountain Ecological Corridor, which connects the two important mountain ranges of Funiu Mountain and Tongbai Mountain, protecting biodiversity and water conservation functions. Taihang Mountain Wangwu Mountain Ecological

Corridor: connecting the two major mountain ranges of Taihang Mountain and Wangwu Mountain, protecting forest ecosystems and soil erosion. Yuxi Mountain Funiu Mountain Ecological Corridor: connecting the Yuxi Mountain and Funiu Mountain, protecting biodiversity and water conservation functions. The Ecological Corridor between the East Henan Plain and the West Henan Mountains: connecting the East Henan Plain and the West Henan Mountains, protecting biodiversity and soil erosion. Yunan Mountain Tongbai Mountain Ecological Corridor: connecting the Yunan Mountain and Tongbai Mountain, protecting biodiversity and water conservation functions<sup>[1]</sup>.

## 2.2 Significant Ecological Restoration Results

Henan Province attaches great importance to ecological restoration and environmental governance and adopts the following measures for construction: land acquisition and transfer: land within the scope of ecological corridors is expropriated or transferred for ecological restoration measures such as afforestation and wetland restoration. Tree planting and afforestation: Planting local tree species within the ecological corridor range, restoring forest vegetation, and improving biodiversity. Wetland restoration: restoring wetlands within the ecological corridor, purifying water quality, and providing habitats for wildlife. Ecological restoration: implementing ecological restoration measures such as soil erosion control and returning farmland to forests to improve the ecological environment<sup>[3]</sup>. The construction of ecological corridors in Henan Province has achieved significant results, effectively protecting biodiversity, water conservation, and soil erosion, making important contributions to the construction of ecological civilization in the province. Especially in the Yellow River Basin, the service function of the river ecosystem has been improved through the implementation of comprehensive basin management and ecological restoration projects<sup>[4]</sup>.

## 2.3 Effective Protection of Biodiversity

Ecological corridors are land or water areas that connect different habitats or protected areas, allowing wild animals to move and migrate between these areas. Search for food,

water, spouse, and shelter. This is particularly important for species that migrate seasonally; Ecological corridors promote gene exchange between different populations, thereby maintaining genetic diversity<sup>[5]</sup>. This is crucial for the long-term survival and adaptation of species to constantly changing environments; Ecological corridors themselves can provide habitats for various species, including plants, insects, birds, and mammals. They can support the food chain and food web and provide shelter and breeding grounds for wildlife; Ecological corridors can buffer habitats from the impact of human activities, reduce habitat fragmentation, and provide safe pathways for wildlife; Ecological corridors can promote ecosystem services, and they can also help regulate climate and mitigate natural disasters. The dependence of biodiversity on ecological corridors. Biodiversity is the key to the effective functioning of ecological corridors<sup>[6]</sup>. Multiple ecological corridors in Henan Province have become important protected areas for rare and endangered species.

## 2.4 Rapid Development of Green Industries

Ecological corridors can connect different nature reserves and scenic spots, forming ecotourism routes. Tourists can enjoy wildlife and experience natural scenery in the ecological corridor, promoting local economic development; Ecological corridors can provide ecological services for agriculture, such as water conservation, soil conservation, and pollination<sup>[7]</sup>. Farmers can develop green agriculture near ecological corridors, produce organic agricultural products, and increase the added value of agricultural products; The construction and maintenance of ecological corridors require various materials and equipment, which drives the development of related industries such as architecture, landscaping, and environmental protection. Meanwhile, ecological corridors can also attract investment and promote local economic transformation; The construction and management of ecological corridors require a large amount of human resources, creating employment opportunities. Local residents can increase their income by participating in ecological corridor construction, tour guides, and ecological product processing; Ecological corridors can improve the urban environment and enhance the city's image. The ecological

corridor shaded by green trees not only beautifies the urban landscape, but also purifies the air and water quality, improving the quality of life for residents. The Funiu Mountain Ecological Corridor in Henan Province connects the Funiu Mountain National Nature Reserve and the Laojieling National Nature Reserve, forming a approximately 100 kilometer long ecotourism route. Along the route, there are observation platforms, boardwalks, and tourist centers, attracting a large number of tourists to come for sightseeing<sup>[1]</sup>.

### **3. Problems in the Construction of Ecological Corridors in Henan Province**

In recent years, with the rapid development of the economy and the acceleration of urbanization, Henan Province is facing dual pressures of ecological environment protection and economic development. The construction of ecological corridors, as an important ecological civilization construction project, aims to restore and protect the ecosystem, improve the quality of the ecological environment, and promote regional sustainable development<sup>[8]</sup>. However, there are also some problems and challenges in the construction process of ecological corridors in Henan Province.

#### **3.1 Unreasonable Planning and Design**

The planning and design of ecological corridors are the foundation of their construction. In some areas of Henan Province, the planning and design of ecological corridors lack scientific and rational considerations, failing to fully consider the local natural conditions, ecological environment characteristics, and socio-economic development needs<sup>[9]</sup>. Some ecological corridor plans are too broad and lack specific implementation plans; Some overlook the multifunctionality of ecological corridors, only considering their role in beautifying the environment, and neglecting their importance in biodiversity conservation, soil and water conservation, climate regulation, and other aspects.

#### **3.2 Insufficient Capital Investment**

The construction of ecological corridors requires a large amount of financial support, including land acquisition, vegetation

restoration, water quality improvement, infrastructure construction, and other aspects. However, due to limited fiscal budgets and the long-term and indirect nature of ecological benefits, the construction of ecological corridors often lacks sufficient financial support. The shortage of funds not only affects the construction quality of ecological corridors, but also limits their scale and functionality.

#### **3.3 Inadequate Enforcement of Laws and Regulations**

Although China has established a relatively complete legal and regulatory system for ecological environment protection<sup>[10]</sup>, there are still some problems in the specific implementation process. In the construction of ecological corridors in Henan Province, due to lax supervision and insufficient law enforcement, some illegal activities are difficult to effectively stop.

#### **3.4 Low Public Participation**

The construction and management of ecological corridors require extensive social participation. However, currently in Henan Province, the public's awareness of ecological corridors is not high, and their participation awareness and ability are limited. The lack of effective public participation mechanisms has led to insufficient attention and support from all sectors of society for the construction of ecological corridors, which has affected the social effectiveness and sustainability of ecological corridor construction<sup>[11]</sup>.

#### **3.5 Difficulty in Ecosystem Restoration**

Some areas in Henan Province have poor ecological environment foundation and severe ecosystem degradation, which poses great challenges to the restoration and construction of ecological corridors. How to effectively restore ecosystem functions and improve biodiversity within limited time and space is a major challenge faced by ecological corridor construction<sup>[12]</sup>.

#### **3.6 Incomplete Collaborative Management Mechanism**

The construction of ecological corridors involves multiple departments and regions, requiring coordination and cooperation from all parties. At present, Henan Province has not yet formed an effective collaborative

management mechanism in the construction of ecological corridors. The division of responsibilities between different departments is unclear, and information sharing, and resource integration are insufficient, which affects the overall efficiency and effectiveness of ecological corridor construction.

### **3.7 Insufficient Technological Support**

The construction of ecological corridors is a systematic project that requires planning, construction, and management based on advanced scientific and technological advancements. However, the current technological support in the construction of ecological corridors in Henan Province is not sufficient, and there is a lack of systematic scientific research and technical guidance, resulting in insufficient scientific and effective construction of ecological corridors.

## **4. Countermeasures and Suggestions for the Construction of Ecological Corridors in Henan Province**

### **4.1 Strengthen Top-level Design and Planning**

A plan for the construction of ecological corridors throughout the province should be formulated, with clear goals, tasks, and measures to ensure the systematic and continuous construction of ecological corridors. Firstly, in the initial stage of ecological corridor construction, comprehensive planning and design principles should be formulated to clarify the project's goals, scope, functions, and positioning. This helps to ensure the smooth implementation and sustainable development of the project. Secondly, it is necessary to strengthen cross departmental collaboration. The construction of ecological corridors involves multiple departments, such as urban planning, transportation, water conservancy, environmental protection, etc. Strengthening top-level design requires collaboration among departments to ensure that the interests of all parties are fully balanced and coordinated. Thirdly, scientific evaluation and prediction should be carried out. In the process of ecological corridor construction, the ecological environment, socio-economic, and transportation conditions of the project area should be scientifically evaluated and predicted, providing a scientific

basis for the implementation of the project. Finally, we need to strengthen ecological protection, restoration, and optimize spatial layout. The construction of ecological corridors should focus on ecological protection and restoration and pay attention to the integrity and stability of the ecosystem. In the design process, factors such as ecologically sensitive areas and important ecological functional areas should be fully considered to ensure that the ecological functions of the ecological corridor are effectively utilized. In the construction of ecological corridors, spatial layout should be optimized, and the position, width, and form of ecological corridors should be reasonably arranged to improve their ecological and socio-economic benefits.

### **4.2 Increase Capital Investment and Superior Support**

The government should increase investment in the construction of ecological corridors and introduce relevant policies to encourage social capital to participate in the construction and operation of ecological corridors. The government can establish special funds for the construction and management of ecological corridors. This includes improving the transfer payment policy for national key ecological functional areas, including the construction of ecological corridors in the scope of transfer payments, and ensuring a stable source of funding; By providing financial subsidies, encourage and attract more enterprises, social organizations, and individuals to invest in the construction of ecological corridors. At the same time, tax incentives and other policies can be implemented to reduce the costs of investors and improve their return on investment; Encourage and guide social capital to participate in the construction of ecological corridors, attract social capital to invest in ecological construction through public-private partnership (PPP) models, franchise rights, and other means, and jointly share the economic and environmental benefits brought by ecological corridors; Utilize financial instruments such as green bonds and green funds to provide financing support for the construction of ecological corridors. These financial products can combine environmental protection with investment returns, attracting more investors to pay attention to and support ecological projects; Seeking technical support

and financial assistance from international organizations and foreign governments, especially in international environmental projects such as the Global Environment Facility (GEF), to seek more opportunities for international cooperation; Raise public awareness of environmental protection through publicity and education, and encourage the public to participate in the construction of ecological corridors through donations, volunteer services, and other forms. At the same time, an ecological corridor construction public welfare fund can be established to accept donations from all sectors of society; Establish an ecological corridor construction investment and financing mechanism guided by government investment, with social capital as the main body, financial institutions as the support, and market-oriented operation; Provide long-term incentives and guarantees for all parties involved in ecological corridor construction through legislation or formulation of relevant policies, ensuring the sustainable development of the project.

#### **4.3 Optimizing Land Use Structure**

Reasonably adjust the land use structure, prioritize the protection of ecological corridor construction land, and reduce conflicts with urban construction and agricultural production. Firstly, it is necessary to identify key ecological elements such as ecological source areas, ecological corridors, strategic points, and overall networks, and to identify their spatial location and scope. This helps to determine the key areas and directions for the construction of ecological corridors. Secondly, it is necessary to plan the ecological spatial structure reasonably and based on the natural geographical characteristics of the region and the current land use status, adopt the "corridor cluster networking" model to optimize the layout of the ecological spatial structure of urban agglomerations. This method helps to build a more stable and efficient ecosystem. The third is to implement spatial control strategies, which allocate resources, economy, ecology and other elements in a reasonable spatial layout to achieve optimization and improvement of ecosystem services. This includes adhering to the coordinated development of production space, living space, and ecological space, and building a new pattern of land space development and

protection. The fourth consideration is the width of the ecological corridor. In ecological planning, design, and construction, the spatial layout and width of the ecological corridor should be taken into account, as the width has a significant impact on the ecological function of the corridor. The migration activities of different species have different requirements for corridor width, so it is necessary to determine the appropriate width of the corridor based on the needs of the target species. Scientific methods such as MCR (Minimum Cumulative Resistance) and gravity models can be used to identify and extract potential ecological corridors, which can help determine the optimal path and location of ecological corridors. At the same time, the construction of ecological corridors involves multiple departments, such as urban planning, transportation, water conservancy, environmental protection, etc. It requires collaborative cooperation among various departments to ensure that the optimization of land use structure meets the requirements of the overall ecological security pattern.

#### **4.4 Strengthening Scientific Research and Technological Support**

Strengthen scientific research on ecological corridor construction, promote the application of advanced ecological restoration technologies and materials, and improve the quality and efficiency of ecological corridor construction.

#### **4.5 Promote Public Participation and Social Supervision**

encourage public participation in the planning, construction, and management of ecological corridors, establish and improve social supervision mechanisms, and improve the transparency and public satisfaction of ecological corridor construction.

#### **5. Conclusion**

The construction of ecological corridors in Henan Province is a systematic project that requires the joint efforts of the government, enterprises, and the public. By strengthening planning, increasing investment, optimizing land use, strengthening scientific research support, and promoting public participation, this goal can be achieved.

### 5.1 Project Layer Design

The government should formulate scientific and reasonable planning schemes, clarify the construction goals and directions of ecological corridors. This includes determining the location, scale, and function of the ecological corridor, as well as coordinating its development with the surrounding areas. The government should also increase investment in the construction of ecological corridors, provide necessary financial and Superior support.

### 5.2 Corporate Participation

As an important force in economic development, enterprises should also actively participate in the construction of ecological corridors. Enterprises can reduce negative impacts on the environment through technological innovation and transformation and upgrading, while actively participating in the construction and operation of ecological corridors. Enterprises can also promote the sustainable development of ecological corridors by investing in green industries and projects.

### 5.3 Public Awareness

The public should enhance environmental awareness and actively participate in the protection and management of ecological corridors. The government can carry out promotional and educational activities to enhance public awareness and understanding of ecological corridors. At the same time, the government should also encourage public participation in the supervision and evaluation of ecological corridors, forming a good situation of social governance.

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