# Ecological Civilization Construction in Ecologically Fragile Poverty-Stricken Areas in Western China

### Li Zehong<sup>1,2</sup>, Bai Yongqing<sup>1,2</sup>, Sun Jiulin<sup>1,2</sup>, Dong Suocheng<sup>1,2</sup>, Li Jingnan<sup>1,2</sup>

1. Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, 100101, China 2. University of Chinese Academy of Sciences, Beijing, 100049, China

**Abstract:** Ecological civilization construction is an inevitable course for the sustainable development of ecologically fragile poverty-stricken areas where the ecological environment is seriously damaged and poverty is concentrated. In this paper, the future ecological civilization construction in Western China is studied; the development path for simultaneous growth of ecological assets and per capita net income of farmers and herdsmen is demonstrated; and a corresponding strategic road map for the ecological civilization construction is proposed. Holding the two baselines of development and ecology, promoting the harmonious coexistence of mankind and nature, and achieving green modernization in an all-round way are proposed as the overall strategic goals for the ecological civilization construction in the ecologically fragile poverty-stricken areas in Western China. Meanwhile, the phased tasks for ecological civilization construction in the middle and long term (from now to 2050) are described. It is predicated that by 2020, relative poverty in Western China will be basically eliminated and the ecological asserts will show a restorative growth; by 2035, relative poverty in Western China will be eradicated, the damaged natural ecological environment will be completely restored, and an overall ecological recovery will be achieved; and by 2050, green modernization featuring resource conservation, environmental friendliness, and comprehensive socio-economic development will be achieved in Western China.

**Keywords:** ecologically fragile poverty-stricken areas; Western China; ecological civilization; green modernization

#### **1** Introduction

Most regions in Western China face issues related to ecological fragility and poverty, and scientific development has become an important issue in ecologically fragile and poverty-stricken areas. In order to achieve the harmonious development of humans and nature in these areas of Western China, it is necessary to research the construction of an ecological civilization. Since the 1950s, scholars have been exploring the relationship between the natural environment and impoverished populations, and studying the concept of ecologically fragile and poverty-stricken areas and the developmental model used in the construction of ecological civilization.

#### 1.1 Theoretical research on the vicious circle of ecological fragility and poverty

In the middle of the 20th century, British economist Ragnar Nurkse put forth a systematic theory of the vicious

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Corresponding author: Li Zehong, Associate Professor from the Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences. Major research field is regional ecological economy. E-mail: lizehong@igsnrt.ac.cn

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circle of poverty, explaining why underdeveloped countries have not developed as quickly as other countries [1]. Subsequently, a series of theories were presented about eradicating poverty and promoting economic development [2–7]. Since the 1990s, the concept of global sustainable development has been widely recognized, and the relationship between the environment and poverty has become a prominent research topic. Motoyama and Hansen studied the vicious circular relationship between poverty and environmental damage in developing countries [8,9]. Insufficient investment, low technological development, and rapid population growth led to increased consumption of resources. The inability to compensate for such consumption and control population growth led to a poverty crisis.

Among the 592 national poverty-stricken counties specified by the *Seven-Year Program for Lifting 80 Million People out of Poverty* in 1994, 425 were distributed within an ecologically fragile zone. Ninety-five percent of people living in absolute poverty reside in extremely vulnerable ecological environments. The major issues facing concentrated and contiguous areas covering more than 70% of the national poverty-stricken people are ecologically fragile environments and deterioration of living conditions [10,11]. Zhang studied the dialectical relationship between ecological fragility and poverty in the Loess Plateau, demonstrating the causal relationship between soil erosion and economic underdevelopment, which directly leads to the deterioration of ecological and economic functions [12]. Many studies on the distribution of ecological environment and its correlation with poverty in China show that in the western regions of China—such as the provinces of Guizhou, Gansu, Shaanxi, and the Xinjiang Uygur Autonomous Region—ecologically vulnerable areas commonly overlap with economically depressed areas. This shows that poverty and ecological fragility are mutually causal and form a vicious cycle [13–17]. The key to solving problems related to ecological fragility and economic poverty is to break the vicious cycle of "fragility—poverty" and strike a balance between environmental protection and sustainable economic development. This way, we can protect our clean water and green forests while realizing economic growth [18].

#### 1.2 Research on the development and practice of ecologically fragile and poverty-stricken areas

In 2003, Dong et al. put forth the concept of ecologically fragile and poverty-stricken areas. They studied the relationship between ecological fragility and poverty in Dingxi, Gansu Province, which belongs to the hilly and gullied area of the Loess Plateau. The researchers found that the vicious cycle of "fragility–poverty" in this area is the result of the long-term effects of natural and human factors, with human factors acting as the predominant force for decades [19]. According to Huang et al. [20], ecologically fragile and poverty-stricken areas are not only the most typical and intense areas of environmental damage but also struggle with the problem of poverty. Social and economic development in these regions faces deterrents such as poverty and environment deterioration.

At present, research on the development of ecologically fragile and poverty-stricken areas covers topics such as land use change, ecological environment effects, ecological reconstruction, and industrial development [21-24]. Li et al. put forward strategies and countermeasures for achieving the sustainable development of agriculture and rural areas based on a comprehensive analysis of the interaction between agricultural development and fragile environments in ecologically fragile and poverty-stricken areas [25]. Zhang introduced the example of development in the Guizhou Karst mountain area, which combined grass planting and livestock raising, poverty alleviation and development, and rocky desertification control. This example constitutes the organic combination of ecological restoration, poverty alleviation, development, and increasing the income of farmers [26]. Dong et al. summarized the problems accompanying the ecological economy in the western region based on the ecological and economic division of Western China and studied the developmental mode of unconventional ecological economies and circular economies, construction mode of ecological cities, and developmental mode of ecological tourism in the western region [27,28]. Yao et al. studied successful examples of the coordinated development of governmental ecological compensation policies, clean production by enterprises, and public clean energy consumption, all which conform to the requirements of reduction, coordination, and effectiveness necessary for the construction of ecological civilization in poverty-stricken areas inhabited by ethnic minorities [29]. Overall, the construction of an ecological civilization in the ecologically fragile and poverty-stricken areas of Western China remains a fiercely debated research topic.

Owing to the goal of "promoting the construction of ecological civilization" established by the 18th National Congress of the Communist Party of China, the construction of an ecological civilization has emerged as a national priority and has been incorporated into the national development plan, which guides sustainable development in China. While considering the severe state of ecosystem degradation, environmental pollution, resource constraints, and lagging economic development in the ecologically fragile and poverty-stricken areas of Western China, this

paper analyzes key obstacles to the construction of an ecological civilization. This study also puts forth innovative suggestions for the economic development of ecologically fragile and poverty-stricken areas in Western China. Our suggested road map for the construction of an ecological civilization places equal emphasis on natural protection and economic development and is expected to inform future research in this area.

#### 2 Problems faced by ecologically fragile and poverty-stricken areas

Research on the construction of an ecological civilization in ecologically fragile and poverty-stricken areas in the western regions must include the following basic input indicators:

(1) The distribution of the 592 national poverty-stricken counties determined by the Seven-Year Program for Lifting 80 Million People out of Poverty issued by the State Council in 1994

(2) The scope of China's ecologically fragile areas above the medium level and the strategic pattern of ecological security with "two screens and three belts" as the core of the plan determined by the *Plan for National Main Functional Areas* issued by the State Council in 2011

(3) The distribution of 14 concentrated and contiguous poverty-stricken areas as indicated by the *Outline of China's Rural Poverty Alleviation and Development (2011–2020)* issued by the State Council in 2001

(4) The distribution of 676 counties and urban areas, which are the national key ecological functional areas proposed in *Reply to the Approval of Adding Some Counties (Cities, Districts and Banners) into the National Key Ecological Functional Areas* issued by the State Council in 2016

(5) The distribution of eight ecologically vulnerable areas defined in the *National Plan for the Protection of Ecologically Vulnerable Areas* issued by the Ministry of Environmental Protection in 2008

(6) The natural geographical characteristics of the western region

(7) Certain socio-economic indicators such as the per capita GDP data of prefecture-level administrative regions in 2017 and the per capita net income of farmers and herdsmen

The western region contains the highest concentration of ecologically fragile and poverty-stricken areas in China. The Qinghai Tibet Plateau, Loess Plateau, Qilian mountain area, and Southwest Karst mountain area are not only ecologically fragile but also poor. They are also important support areas for China's "two screens and three belts" ecological security strategy, which constitutes the majority of the ecologically fragile and poverty-stricken areas in Western China. These areas face common problems such as difficulty in protecting ecological security barriers, poverty alleviation, insufficient infrastructure and public service facilities, as well as relative lack of economic development.

#### 2.1 Difficulties in coordination

As important ecological barrier areas, ecologically fragile and poverty-stricken areas in Western China fulfill significant ecological functions such as water conservation, wind erosion prevention, and biodiversity protection. However, these areas face the problem of merging ecological protection with economic development. According to the plan, the main national functional areas should be protected. However, these areas are also impoverished and inhabited by ethnic minorities, with some situated on the borders. To eradicate poverty as soon as possible, regional economic development must be accelerated to maintain national unity and stabilize border areas. Therefore, converting clean water and green forests into invaluable assets is a fundamental task to be completed in western regions. A national ecological compensation system for ecological barrier areas has still not been established nor implemented. In this context, coordinating national ecological barrier protection and regional economic and social development as well as realizing a harmonious coexistence of the economy and ecology has emerged as the central task for constructing an ecological civilization in the ecologically fragile and poverty-stricken areas of Western China.

#### 2.2 Fragile ecology

The living conditions in the ecologically fragile and poverty-stricken areas of Western China have been relatively poor for a long time. According to the different topographical characteristics of the roots, the ecologically vulnerable areas in Western China can be divided into three categories: arid and desertified areas in the northwest; mountainous, rocky, and desertified areas in the southwest; and alpine composite eroded areas in the Qinghai-Tibet Plateau. In particular, the Loess Plateau is dry and lacks water while also suffering from serious soil erosion in hilly and gullied areas. The Qinghai-Tibet Plateau is cold and anoxic. The terrain of the Yunnan-Guizhou Plateau fluctuates greatly with severe long-term rocky desertification. These regions have

frequent geological disasters, extreme living conditions, and a highly fragile ecological environment that is difficult to restore once damaged. The Qinghai-Tibet Plateau, Loess Plateau, and Southwest Karst Mountains have been evaluated as areas unsuitable for human habitation by United Nations agencies. In order to prevent further disruptions to these ecosystems due to large-scale development, the scale of development has been limited in these areas, which places serious constraints on local economic and social development.

#### 2.3 Poor economy

Ecologically fragile and poverty-stricken areas in Western China face the arduous task of poverty alleviation. The western region has a large number of poor people and severe levels of poverty, which presents a considerable obstacle for poverty alleviation in China. As of February 2018, 435 of the 585 poverty-stricken counties in China were located in the western region. Some areas have been closed for a long time due to historical and other reasons, resulting in the inability to lift themselves out of poverty. The largest obstacle standing in the way of building a prosperous and thriving society by 2020 in the poverty-stricken areas of Western China is breaking the vicious cycle of poverty and ecological fragility.

#### 2.4 Weak foundation

The construction of infrastructure in the ecologically fragile and poverty-stricken areas of Western China is critically inadequate and lags behind the urban eastern regions in terms of transportation, cultural, education, and health. This is due to the influence of history, geographical location, ecological environment, and level of economic development. In 2017, the highway density was 0.27km/km<sup>2</sup> in Western China and 1.18 km/km<sup>2</sup> in Eastern China. The poor state of infrastructure and public service facilities in Western China has restricted the development of local economies and has resulted in a vicious circle. A large number of studies show that the southwest region lacks soil, northwest region lacks water, and the Qinghai-Tibet Plateau suffers from deficient accumulated temperature. Construction in these places is challenging and expensive, making it difficult to achieve the main indicators of infrastructure and basic public services approximating the national average level. These problems must be overcome in order to achieve the construction of ecological civilization in the ecologically fragile and poverty-stricken areas of Western China.

#### 2.5 Factor shortage

The investment of capital, technology, talent, and other factors in western regions is highly unbalanced because it is located far away from the economic center in China. Owing to the overwhelming attraction of coastal areas, the phenomenon of "Peacock Flying Southeast" prevails in the western region, where young, highly qualified, and competitive scientists and engineers often move to the southeastern coastal areas. This brain drain has led to the loss of technology and capital, thus hindering the sustainable development of ecologically fragile areas in Western China.

## **3** Strategic roadmap of construction of ecological civilization in ecologically fragile and poverty-stricken areas in Western China

Considering the dire reality of ecosystem degradation, environmental pollution, resource constraints, and economic underdevelopment in the ecologically fragile and poverty-stricken areas of Western China, we must develop the concept of an ecological civilization that respects, complies with, and protects nature. The construction of ecological civilization must be prioritized and integrated into all aspects of economic, political, cultural, and social construction in the western region. We should adhere to the two baselines of development and ecology in order to achieve harmonious coexistence between mankind and nature.

#### 3.1 Strategic objectives

The overall goal is to keep the baselines of development and ecology, promote the harmonious coexistence of man and nature, and achieve comprehensive green modernization. This will ensure complete and balanced economic and social development. At present, the main task is to eradicate poverty and build a prosperous and thriving society. In the medium term, it is necessary to establish a solid foundation to achieve modernization. In the long run, it is necessary to realize comprehensive modernization. Keeping the baseline of ecology allows for positive growth in ecological assets. At present, the main task is to curb all forms of environmental deterioration

and restore all ecological assets. In the near future, the goal is to completely repair the damage dealt to natural ecological environments and achieve the restorative growth of ecological assets. In the long run, it is necessary to promote the virtuous cycle of the ecological environment, realize the growth of ecological assets, and promote the harmonious coexistence of man and nature.

#### 3.2 Strategic principles

**Principle of guaranteed development.** Guaranteed development requires maintaining the bottom line of development, correcting shortcomings and breaking the development bottleneck, taking advantage of development potential, and solving the problems of insufficient and unbalanced development in the western region. Efforts to tackle poverty alleviation need to be intensified to narrow the development gap between the western regions and central and eastern regions.

**Principle of green development.** A long-term plan for sustainable development and a green low-carbon recycling industry system to maximize resource conservation for western regions must be established.

**Principle of ecological protection.** The strategy of the main functional areas should be strictly implemented to purposefully protect national ecological security barriers. Additionally, the relationship between development and ecological environment protection must be coordinated according to an ecological red line and ecological bottom line in order to comprehensively solve the problems of poverty and ecology. This way, we can protect our clean waters and green forests as invaluable assets.

Principle of adapting measures to local conditions. Differential development strategies should be adopted for areas in the western region because of the vast territory. For national ecological security barriers—such as the Three-Rivers Headwaters Region, the Qinghai-Tibet Plateau, the Qilian Mountains, other western national ecological security barrier areas, as well as ecologically fragile areas of the Loess Plateau—priority should be given to ecological protection. For the key development and resource-rich areas, initiatives such as green development, cyclic development, and low-carbon development should be emphasized.

**Principle of regional coordination.** Preferential fiscal and taxation policies should be implemented in the western region when increasing national financial transfer payments and exploring inter-regional ecological compensation policies. The counterpart support work from the central and eastern provinces and cities to the west should be promoted continuously to realize comprehensive connections between industry, science and technology, education, medical treatment, and culture. Such interconnections can promote regional coordination in Western China.

**Principle of stable ethnic harmony in the border areas.** Generous poverty alleviation efforts should be intensified in areas inhabited by ethnic minorities and border areas in the western region to speed up economic development. Furthermore, terrorism, separatism, and religious extremism should be suppressed to guarantee border security and protect the normal development of productive capacities and human life in the western region.

#### 3.3 Strategic roadmap

By placing the net income per capita of farmers and herdsmen and the time series on the horizontal axis and the ecological assets on the vertical axis, we propose a strategic roadmap for the development of ecological civilization in ecologically fragile and poverty-stricken areas of the western region. This roadmap aims to realize the growth of the ecological assets and net income per capita of farmers and herdsmen in the process of modernization construction in the future. The strategic roadmap is shown in Fig. 1.

At present, absolute poverty in the western region must be completely eradicated. Moreover, we must reverse the ecological deterioration of national ecological security barriers and strictly control the decline speed of ecological assets.

By 2020, relative poverty will be nearly eradicated and the western regions will become prosperous and equal to the rest of the country, laying the foundation for successfully achieving modernization. Ecological deterioration in all forms will be completely curbed, and ecological assets will spur restorative growth.

By 2035, relative poverty will be completely eradicated and the western regions will achieve economic modernization equal to that of the central and eastern regions of China. The damaged natural ecological environment will be completely repaired, and ecological assets will enter a stage of overall positive growth after more than 10 years of ecological restoration.

From 2035 to 2050, Western China will become a resource-saving and environment-friendly society featuring comprehensive socioeconomic development and harmonious coexistence of man and nature.



Per capita net income of farmers and herdsmen

Fig.1. Strategic roadmap of ecological civilization construction in ecologically fragile and poverty-stricken areas of Western China.

# 4 Strategic countermeasures and suggestions for construction of ecological civilization in ecologically fragile and poverty-stricken areas in Western China

To promote the construction of an ecological civilization in ecologically fragile and poverty-stricken areas in Western China, we must achieve the following: (1) coordinating regional development to speed up the formation of the protection system of green ecological barriers; (2) strengthening ecological restoration and promoting the positive growth of ecological assets, to establish a green, low-carbon cycle industrial system and foster driving forces for sustainable development; (3) actively exploring a system for ecological poverty alleviation, and promoting the construction of infrastructure and public service facilities with new urbanization; (4) making up for the shortcomings of elements by revitalizing ecological assets and increasing external support.

Therefore, in the immediate and near future, it is necessary to increase policy support for ecologically fragile and poverty-stricken areas in Western China.

### 4.1 Perfecting the national mechanism for ecological barrier protection and ecological compensation to realize positive growth of ecological assets

The western ecological barrier areas function to safeguard national ecological security. It is necessary to further improve ecological compensation mechanisms to protect national ecological barriers, ensure that the basic public service capacities of ecological barrier areas are not lower than the national average level, and ensure that such areas are no longer harmed by destructive development and construction. First, we should build a national compensation system for ecological barrier protection; promote the establishment of a horizontal ecological compensation system for river basins; and implement an ecological compensation system for the eastern, central, and western regions of China. Second, we should strengthen the top-level design of ecological compensation systems from single-factor compensation and classified compensation to comprehensive compensation. Third, transfer payment compensation in poverty-stricken areas of the western ecological barrier should be changed from blood-transfusion-type compensation to hematopoietic-type compensation, which should be further combined with local economic transformation, enhancement of development capacity, and poverty alleviation.

The construction of national parks is one important method to protect ecological barriers in western regions. We suggest that western national parks be constructed in key ecological barrier areas such as the Qinghai-Tibet Plateau and the Three-Rivers Headwaters Region, and a new type of natural protection system be constructed. In addition, public participation and cooperation management mechanisms must be improved to attract public participation in the protection of national parks. In addition, development models for changing clean water and green forests into invaluable assets must be actively explored to optimize the economic benefit distribution of national parks and achieve the sustainable growth of ecological assets.

### 4.2 Supporting the industrial development of ecologically fragile and poverty-stricken areas in the western region to realize poverty alleviation

Ecological construction can alleviate the dual pressures of economic development and environment protection. We suggest advancing the concept of clean water and green forests as invaluable assets to promote the industrialization process of ecological construction and protection. The development of western regions should take ecological protection projects and comprehensive ecological management as an opportunity to explore the developmental mode of ecological construction and protection that is responsive to local conditions. We suggest fully exploiting local ecological value and vigorously strengthening the industrial development of ecological agriculture, cultural tourism, bio-industry, and new energy. We must strengthen tax reduction and fee reduction to stimulate the technological innovation of western enterprises. We must also develop financial and taxation policies for industrial restructuring in ecologically fragile and poverty-stricken areas of Western China as well as implement special preferential fiscal and taxation policies for industries such as ecological agriculture, animal husbandry, food processing, biopharmaceuticals, and new energy development in Western China.

We recommend that ecological poverty alleviation be combined with key ecological projects such as returning farmland to forests, returning grazing to grassland, providing compensation for public welfare forests, protecting natural forest resources, and constructing the Three-North Shelter Forest System to realize green development and protect employment. Such measures will guide farmers and herdsmen to become ecological workers and provide more employment opportunities in ecological protection areas. We must promote the integration of rural living environments with the natural environment, encourage multi-party integration of resources, present a unified plan, centralize investment, promote the construction of key infrastructure and social development projects, and implement population relocation and poverty alleviation in different places. We must also relocate populations living in ecologically fragile areas with poor natural conditions that lack basic living necessities and suffer frequent geological disasters. They must be moved to areas with resources and an environment with a strong carrying capacity. We must strengthen vocational skills training, encourage the transfer of the labor force from poor areas to eastern coastal areas, and fundamentally alleviate the pressure on local population and environmental resources.

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