

Strategic Issues on Eco-Civilization Construction

The Comprehensive Research Group for *Research on Strategic Issues on Eco-Civilization Construction*

Abstract: This paper comprehensively studies the status of eco-civilization construction in China and, simultaneously, attempts to meet the new party and state requirements for eco-civilization construction from the perspective of green environment, green production, green living, and green governance. The paper evaluates the eco-civilization status of 337 cities at the prefecture level and above. The results show that the overall level of eco-civilization development in China is disheartening. Three research areas are addressed, including the carrying capacity of resources and environment and the layout of economic and social development, the classification and utilization of solid waste, and the transformation of agricultural development modes and beautification of countryside. This research performs a thorough analysis and presents corresponding strategies and tasks to further enhance China's eco-civilization status, as well as provides countermeasures and strategic suggestions for macro decision-making in eco-civilization construction at the national level.

Keywords: ecological civilization; development status evaluation; resources and environmental carrying capacity; resource utilization; agricultural development mode; strategy

1 Introduction

While China has made great advancements in economic and social development, resource and environmental issues have begun to emerge [1]. Consequently, the party and state have strategically decided to promote the construction of an ecological civilization in a creative manner, incorporating the ecological civilization into the “five-in-one” strategy. The construction of an ecological civilization has become a guideline for the whole party, and significant progress has been made across the country [2,3]; this is highly regarded and widely encouraged by the international community. At present, China is focusing on attaining the first centenary goal and, subsequently, moving towards the second goal. Committed to green development, coordinated growth of ecological resources and assets, and boosting economic development, the new era of socialist ecological civilization is the only way to achieve the centenary goals of our country [4,5]. The Chinese Academy of Engineering launched a consultation project on the “Several Strategic Issues on Eco-Civilization Construction (Phase II)” in 2015. This program presents relevant policy suggestions on the environmental bearing capacity of our country, as well as economic and social development strategies,

the classification of solid waste utilization, changes in agricultural development mode, and beautification of rural areas, all of which are based on the evaluation of the development level of China's ecological civilization (CECL).

2 Evaluation of ecological civilization level

To comprehensively and objectively discuss the CECL, we evaluate the achievements of China's ecological civilization construction in contrast with the overall goals and present an index system that includes four areas: green environment, green production, green living, and green governance [6,7]. The current CECL evaluation considers 337 cities as evaluation objects (excluding Hong Kong, Macao, Taiwan, and Sansha City) with 2014 as the assessment year. It uses double-baseline objective approximations [8], with data collected from the *China Statistical Yearbook on Environment 2015* and the *Statistical Bulletin of National Economic and Social Development 2015* [9,10]. According to the function orientation, the evaluation was performed on three levels: country, province, and city. The results were divided into four grades (A, B, C, D, and E) based on the obtained scores.

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China's overall CECL score was 59.73, which is classified as D-grade. Out of the 31 provinces, none of the provincial-level regions achieved A-grade (provinces, municipalities, and autonomous regions). Only two areas (Zhejiang and Guangdong) achieved B-grade; 14 provinces obtained C-grade; 14 provinces obtained D-grade; and 1 province obtained E-grade (Table 1). In total, 70% of China's surface area failed this evaluation (achieving D- or E-grade), which indicates that the overall CECL was markedly lower than the national target and international level.

The CECL in the southeast is superior to that of the northwest; the southeast has an obvious advantage of economic efficiency and green governance, while the northwest shows a pattern of economic weakness. Additionally, the optimized-development zones show a higher level of ecological civilization development, whereas the agricultural production areas show a low level of ecological civilization development. When comparing the index layers, the urban habitat index, environmental quality index, and pollution control index show higher scores, while pollution emission index, construction performance index, and resource efficiency index show lower scores. In summary, economic and social achievements are significant in China in terms of economic life, as some first-tier cities are comparable to high income countries. However, it is imperative to strengthen the areas of ecological and environmental protection, control of pollution, optimization of production, and resource efficiency.

3 The strategic task of ecological construction

3.1 Resource environment carrying capacity and economic and social development strategy

3.1.1 Industrial and energy structure layout

The high consumption of resources with low industrial benefits should be controlled at first, and outdated materials such as steel, cement, and flat glass should be rejected. Industrial pollution emissions should be managed, along with the promotion of industry progress with green technology and greening emission standards. The water resource and water efficiency capacities should be taken into consideration when determining agricultural layout; such water resources and water systems must be strengthened to match the development of western China. Moreover, green coal mining techniques, especially in western China, should be developed, and strict water strategies should be incorporated into industrial development. Lastly, regional coal

production should be reduced by encouraging the development and use of alternative energy, and the emission standards of coal utilization should be strictly controlled.

3.1.2 Industrial structure layout of key areas

The industrial structure of the Beijing-Tianjin-Hebei region should take the atmospheric environmental capacity constraints into account. Moreover, efforts should be made toward improving energy consumption, reducing surface water utilization and air and water pollution, and renewing the layout of scientific research and development in Beijing, advanced manufacturing in Tianjin, and material equipment and transportation in Hebei. Based on the capacity constraint of the atmospheric environment, "reduction and control" measures for steel, cement, glass, and non-metal industrial materials must be adopted to improve the process technology and reduce the production capacity as soon as possible. Furthermore, the policies of the textile, leather, and papermaking industries should be adjusted based on the capacity constraints of the surface water environment. In order to achieve sustainable development, the constraints of the water resource bearing capacity should be taken into consideration.

In the five provinces of northwest China and the Inner Mongolia autonomous region, the rational distribution and orderly development of industrial structure should receive more attention with respect to the capacity of water resources [11]. It is imperative to make full use of the local natural gas resources to improve the energy structure, and advance the processing of the coal chemical industry with strict control of production. Due to environmental capacity overload, the chemical, food, and paper industries should be closed or transferred; furthermore, the metal smelting and petrochemical industries must adopt measures of professional, clean production and improve the sewage treatment process. We will accelerate the development and transformation of traditional industries to achieve faster economic development without destroying the ecological environment. Moreover, we will strengthen agricultural water-saving, develop the technology for agricultural facilities and water-saving irrigation, and promote the construction of demonstration zones for efficient and water-saving modes of agricultural and animal husbandry. All of the strategies mentioned above should be supported by the construction of basic infrastructure for the agriculture and animal husbandry service system, the development of deep processing, as well as the construction of platforms for information services, scientific and technological support, and processing and sales.

Table 1. CECL in provincial-level regions and grade distribution (2014).

Grade	A-grade	B-grade	C-grade	D-grade	E-grade	Total
Number of provincial-level regions	—	2	14	14	1	31
Proportion of area (%)	—	2.97	23.45	69.08	4.50	100
Average score	—	71.93	63.90	54.58	49.07	59.73

3.2 Resource utilization strategy of solid waste classification

3.2.1 Strategic guidelines for the utilization of solid waste resources

A comprehensive management system must be established based on the total lifecycle management of production. To coordinate resource allocation, guidance from the market and the government are important, along with a benefit-sharing mechanism. Priority should be given to source reduction and fine classification of solid waste.

To achieve source reduction of solid waste, several measures must be taken. First, gradually reduce and restrict the mining intensity of metal mineral and non-metal resources. Additionally, reduce the amount of solid waste and increase the amount of resources available. Furthermore, we must promote ecological design, green supply chain construction, and the green transformation of traditional industrial production. We must also improve resource utilization and limit solid waste deposits into landfills, incineration, and other methods of final disposal.

Fine classification is beneficial to ensure full recycling, and should be accomplished according to resource endowment. For economic development, we should ensure the preferential extraction of iron, ten nonferrous metals, and other resources that strategically support this goal. Furthermore, we must gradually improve the replacement ratio of solid waste to non-metallic mineral resources and energy, and participate in the international circulation of resources to make full use of international high quality mineral resources and renewable resources.

3.2.2 Strategic deployment for the utilization of solid waste resources

The institutional system and market mechanism should be optimized by promoting the closed-loop circulation of resources. We should improve and integrate the legal system of solid waste resources, forming an external policy environment conducive for the development of resource-oriented industries. Toxic and hazardous substances should be controlled throughout their whole life cycle, whereas solid waste pollution control and resource utilization should be assessed before production.

The use of fiscal incentives and taxation should also be optimized to foster an endogenous driving force for the development of resource-based products. This could be achieved by strengthening the internal binding force of resource taxes, implementing environmental taxes on solid waste reduction, as well as increasing the number of available solid waste incineration and landfill disposal sites, promoting fine classification, and resource utilization. Tax incentives should be expanded for the comprehensive utilization of solid waste products, green procurement, product restriction elimination, and government subsidies. Furthermore, we should establish a flexible adjustment mechanism for resource utilization and harmless disposal prices, improve the disposal cost of available waste, and establish a market envi-

ronment of “benefits for those who make use of it” and “benefits for those who recycle it.”

The system of technical standards must be improved to promote the healthy development of resource-oriented industries. We should establish a standard system for the control of resource utilization and the quality control of products, and promote the comprehensive utilization of products to enter the consumer market. Additionally, identification standards and a quality standard system for industrial byproducts should be established; this could promote ecological design standards in key industries and green supply chain construction. We should also develop manufacturing technical specifications for key industrial equipment, as well as a standard system for remanufacturing products.

3.3 Transformation of agricultural development and construction strategy for beautiful countryside

3.3.1 Strategic tasks for beautiful countryside construction

These guidelines aim to change agricultural development in accordance with the development philosophy of “innovation, coordination, green, openness, and sharing” by developing new and fine agriculture with high standards, deep fusion, long industrial chains, and high quality products. We should focus on resource-conserving and environment-friendly agricultural development, then comprehensively improve the rural environment. In order to address environmental pollution in rural areas, we should promote rural waste reduction, sewage treatment, and soil restoration. Farmers should be guided toward developing a healthy, low-carbon, environmentally friendly, and modern production lifestyle to create a livable country with blue skies, green mountains, and clean rivers. Moreover, we should focus on the formation of beautiful countryside that establishes an equal exchange mechanism between urban and rural factories. With a distinct industry and effective use of resources, rural infrastructure construction and rural landscape upgrading would be promoted. Also, we should optimize agricultural development through sustainable and diverse improvements, as well as through the protection and inheritance of agricultural civilization. Lastly, the construction of beautiful countryside should be an important carrier for the improvement of agricultural production, narrowing the gap and promoting urban and rural integration by forming an “endogenous” development path.

3.3.2 Transformation of planting industry

We aim to modify the development of the planting industry through five development concepts: innovation, coordination, green development, opening up, and sharing. In order to improve the comprehensive production capacity of agriculture, the quality and safety of agricultural products should be improved first. With resource conservation and environmental friendliness as basic requirements, we should then focus on agricultural efficiency and improving farmers’ income. This could be achieved

by targeting international markets, relying on scientific and technological progress and mechanism innovation, and implementing the strategy of “hides food from the ground and technology” ensure grain is basically self-sufficient and food is absolutely safe, as well as by promoting a supply-side structural reform of the planting industry and developing regionalized layouts and specialized production. Furthermore, by promoting the coordination of grain and feed, the combination of agriculture, husbandry, and fishery, and the combination of planting and breeding, we could deeply integrate and develop the agricultural industry. We should strengthen the protection and management of the ecological environment by promoting clean planting, green planting, cycle planting, and adjusted planting systems. Consequently, planting efficiency, quality of agricultural products, and market competitiveness would be improved, while a sustainable and stable development of the planting industry would be simultaneously promoted.

3.3.3 Transformation of animal husbandry

According to the requirements of high yield, high quality, high efficiency, ecology, and safety, we insist on transforming the development of animal husbandry. We should focus on the three major tasks of ensuring supply, safety, and ecology by promoting the standardization of husbandry, cycle development of planting, and breeding combination. To this end, we propose a pilot project of “food and feed reform,” which promotes the coordinated development of ecological protection and income increase; this will strengthen the quality of feed and livestock products by enhancing the capacity of comprehensive and sustainable development for husbandry, resulting in a modern development of animal husbandry. Consequently, this could increase the farmers’ income and lead to the development of husbandry and beautiful countryside construction.

3.3.4 Rural land planning for the construction of beautiful countryside

We should aim to build a new pattern for the construction of villages and towns, and create a new spatial pattern for “city, village, agriculture, and ecology” four-in-one measures. This could be achieved by establishing a protection mechanism system of quality and quantity for arable land, which would ensure a steady improvement in arable land production. Furthermore, it is of significant importance to improve the balance system of cultivated land and build a long-term mechanism for arable land increase, arable land quality improvement, and arable land production capacity. Additionally, the land transfer security system should be improved, and the land transfer mode should be innovated. We must insist on the principle of “abiding by the law, being voluntary, and getting paid in land roaming” to ensure a reasonable allocation of farmland resources. Moreover, developing a rural green infrastructure cycle network and ecological construction system is necessary. Overall, new plans should be

made for infrastructure development by improving the mechanism, which will ensure long-term investment.

4 Conclusions

The development of an ecological civilization is of great theoretical and practical significance. It not only determines the goal and the banner of the primary stage of socialism in China, but also provides green development solutions for two thirds of the world’s countries. The program, “Several Strategic Issues on Eco-Civilization Construction (phase II),” explores the latest advancements in the construction of national ecological civilization, focusing on the problem of resources and environment protection during construction. In this article, we have evaluated the development of CECL and have analyzed the causes of the imbalance in development. Furthermore, with the capacity of resources and the ecological environment as the bottom line, we have presented green development paths and strategic tasks for the development of various industries and a circular economy, as well as some policy suggestions to support green development and the construction of beautiful countryside.

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