Post-Print: Research on Geographical Scenario Design for China' s Ecological Civilization Construction

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Date: 2024-03-27T00:00:00+00:00

Abstract

Guided by the vision of building a Beautiful China through ecological civilization construction, this article conducts framework design for geographic scenarios, positing that geographic scenarios are a series of rational projections regarding human-environment systems, centered on geographical research elements and based on the interaction mechanisms of human-environment relationships as well as the influences of key uncertainty factors, with the aim of establishing and maintaining regional development sustainability. Geographic scenarios for ecological civilization construction require element-specific, phase-specific, and region-specific design, with one important objective being the achievement of spatial equilibrium in regional development; thus, their design represents an extension of spatial equilibrium models for regional development. The construction pathways for geographic scenarios vary across different regions, and each region will design distinct geographic scenario construction plans based on the specific characteristics of their comprehensive development status. Currently, in the benchmarking design of indicator systems for Beautiful China construction and ecological civilization construction in China, academic circles refer extensively to relevant indicator systems from the United Nations; however, comparatively speaking, the indicator systems of developed countries and regions such as the European Union and the United States offer greater reference value. Selecting appropriate benchmarking targets is of significant importance for the scientific and rational design of China' s geographic scenarios.

Full Text

Preamble

Citation Format: Zhang W Z, Yu J H. Research on geographical landscape design of ecological civilization construction in China. *Bulletin of Chinese*

Academy of Sciences, 2023, 38(12): 1977-1986, doi: 10.16418/j.issn.1000-3045.20231007001. (in Chinese)

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Abstract

This study, oriented toward the ecological civilization construction of Beautiful China, presents a framework design for geographical landscape. Geographical landscape takes geoscience research elements as its object and formulates a series of reasonable prospects for the human-land system based on the interaction mechanism of human-land relationships and the influence of important uncertain factors, with the aim of establishing and maintaining regional development sustainability. The geographical landscape of ecological civilization construction requires design by elements, stages, and regions. One of its important objectives is to achieve spatial equilibrium of regional development; therefore, its design represents an extension of the regional development spatial equilibrium model. The construction pathways of geographical landscapes differ across regions, with each region designing distinct geographical landscape construction plans according to the specific characteristics of its comprehensive development state. While current academic research on Beautiful China and ecological civilization construction in China frequently references United Nations indicator systems for benchmarking, the relevant indicator systems of developed countries and regions such as the European Union and the United States offer greater reference value. Selecting appropriate benchmarking targets is crucial for scientifically and rationally designing China' s geographical landscape.

Keywords: Beautiful China, ecological civilization construction, geographical landscape

1. Conceptual Connotation and Basic Framework

1.1 Conceptual Connotation

Geographical landscape is a concept born from national strategic demands in the process of Beautiful China ecological civilization construction. Landscape refers to an ideal scenario. Beautiful China ecological civilization construction is a grand national project encompassing all aspects of national life, corresponding to future landscapes across multiple domains, among which geographical landscape constitutes an important component. Within the context of Beautiful China ecological civilization construction, the conceptual connotation of geographical landscape is defined as: taking geoscience research elements as the target, and formulating a series of reasonable prospects regarding the human-land system according to the interaction mechanism of human-land relationships and the

influence of important uncertain factors, with the purpose of establishing and maintaining regional development sustainability.

The geographical landscape of ecological civilization construction comprises four components: the elements constituting the geographical landscape, the temporal stages for its gradual realization, the regional divisions for designing geographical landscapes according to local conditions, and the policy orientation of geographical landscape design.

1.2 Basic Framework

The overarching purpose of ecological civilization construction geographical landscape design is to guide the resolution of China' s principal social contradiction in the new era: "the contradiction between unbalanced and inadequate development and the people' s ever-growing needs for a better life." In the field of geoscience research, this is specifically manifested as: incoordination between economic and social development and the current state of resources and environment, with increasingly greater resource and environmental costs paid for development; increasingly prominent regional development imbalances, with widening gaps in economic development levels across regions; continuous emergence of problem areas such as industrial decline and urban shrinkage; and complexification of regional development contradictions brought about by rapid development. Due to the complexity and diversity of mutual influences and feedback between humans and nature in the human-land system, ecological civilization construction geographical landscape requires design by elements, stages, and regions [Figure 1: see original paper].

(1) Design by Elements. On the one hand, based on the theory of human-land relationship territorial systems, starting from natural and ecological elements such as water, land, and air, the geographical landscape framework takes attributes that significantly influence territorial function patterns and sustainable development processes—including resources, ecology, environment, and disasters—as its research foundation. On the other hand, integrating national ecological civilization construction requirements such as green development, reform of ecological environment supervision systems, and optimization of territorial spatial development patterns, the framework incorporates human elements such as economy, society, urban areas, rural areas, and population that significantly influence territorial function patterns and sustainable development processes, with comprehensive consideration of human activities and associated risks. Therefore, the element system of ecological civilization construction geographical landscape should consist of five elements: resources, ecology, environment, human activities, and disasters. Among these, resources, ecology, and environment are the primary natural elements acting on the geographical landscape; human activities are the primary humanistic elements; and disasters, including natural and human-induced disasters, are comprehensive elements of natural and human factor interactions.

(2) Design by Stages. Following the strategic deployment timeline requirements for the "Two Centenary Goals," by 2035, fundamental improvement of the ecological environment will be achieved and the goal of Beautiful China will be basically realized; by the mid-21st century, comprehensive enhancement of material, political, spiritual, social, and ecological civilization will be accomplished, with basic realization of common prosperity for all people. Simultaneously considering changes in current domestic and international development situations, the node of the first Five-Year Plan period in the new era is incorporated into the geographical landscape design stages. Therefore, the design stages for ecological civilization construction geographical landscape are 2025, 2035, and 2050.

(3) Design by Regions. In Mr. Wu Chuanjun' s explanation of the basic methods for studying human-land relationship territorial systems, classification is the primary research method, and rational organization of territorial functions in different regions constitutes an important pathway for achieving orderly regional development. In national spatial strategy, major function oriented zoning represents one of the primary tasks of ecological civilization construction and is endowed with foundational institutional status in optimizing territorial spatial development and protection patterns. Therefore, to achieve geographical landscape design from the perspective of optimizing territorial spatial development patterns and promoting ecological civilization construction, major function oriented zoning must serve as the top-level regional division rule, based on which the formation mechanisms of territorial functions, regional development differentiation laws, and orderly principles of spatial structure evolution in different regions can be analyzed. The regional division for ecological civilization construction geographical landscape design should first employ major function oriented zoning as the highest level, using optimized development zones, key development zones, and restricted development zones as top-level regional categories; secondly, it should conduct comprehensive subdivisions based on natural geographical zonality and regional characteristics of human-economic activities to design differentiated geographical landscapes.

2. Theoretical Basis for Geographical Landscape Design

Classical regional development theory posits that regional development potential energy caused by economic development gaps (represented by per capita GDP) constitutes the basic driving force for regional balanced development. Economic development gaps between regions trigger industrial transfer, population flow, etc., and these transfer and flow processes cause continuous transformation of potential energy between regions, gradually leading regional development toward equilibrium. The regional development spatial equilibrium model proposed after introducing territorial function concepts expands the scope covered by regional balanced development, arguing that regional development goals include not only economic development but also ecological and social development. Therefore, ecological civilization construction geographical landscape design is constructed following the extended approach of the regional development

spatial equilibrium model [Figure 2: see original paper].

An important purpose of ecological civilization construction geographical landscape design is to achieve spatial equilibrium of regional development. Under the orientation of ecological civilization construction, spatial equilibrium in geographical landscape design refers to: when various development state thresholds such as economic and social development and ecological environment level are within certain state intervals, the per capita value Di identifying the comprehensive development state of any region (Ri) tends to be roughly equal. Here, the comprehensive development state is comprehensively composed of development states including economic and social development category (Di1), ecological environment category (Di2), resource utilization category (Di3), and disaster risk category (Di4). In other words, a region with low economic and social development level can improve its comprehensive development level through better ecological environment state, disaster prevention and mitigation capacity, and resource guarantee and utilization levels. People living in regions with high economic and social development levels may experience lower comprehensive living standards than those in regions with relatively lower economic and social development levels due to poor ecological environment quality, low resource utilization levels, or high disaster risk.

Assuming the total populations of regions Ri and Rj are Pi and Pj respectively, the regional development spatial equilibrium model for ecological civilization construction geographical landscape is:

When Dim > L, Djm > L, Di = m = 1 Dj = m = 1 Di = Dj

Where Dim represents the m-th development state of region i, Djm represents the m-th development state of region j, and L represents the minimum threshold of development state, with n being the number of development state categories.

The necessary condition for achieving regional development spatial equilibrium in ecological civilization construction geographical landscape is that the construction capacities of geographical landscapes in all regions are comparable and development factors flow freely between regions. The regional development spatial equilibrium model can effectively explain the ultimate goal of ecological civilization construction geographical landscape design. Through the design and construction of ecological civilization construction geographical landscape, issues such as incoordination between regional economic and social development and resource-environment conditions, excessive resource-environment costs of regional development, and unbalanced regional development will be fundamentally resolved. Meanwhile, construction pathways of geographical landscapes differ across regions, with each region designing different geographical landscape construction plans according to the specific characteristics of its comprehensive development state [Figure 3: see original paper]. Regions with prominent ecological environment conditions but weaker development in other aspects must formulate geographical landscape construction plans different from those with better economic and social development but poorer resource guarantee capacity.

3. Benchmarking Analysis of Future "Landscape" Design

3.1 Overview of Future "Landscape" Designs

Ecological civilization construction geographical landscape design is closely integrated with the stages and goals of China' s socialist modernization and strong country construction, requiring geographical landscape development to match the strong country' s status of "leading comprehensive national strength and international influence" by the mid-21st century. Therefore, comparative analysis with advanced countries and regions worldwide helps avoid detours and achieve geographical landscape design goals more rapidly . In the initial stage of geographical landscape design, its core content is benchmarking of the landscape design indicator system.

The United Nations' *2030 Agenda for Sustainable Development* and its Sustainable Development Goals (SDGs) are currently the focus of academic analysis. Its 17 sustainable development goals (including 169 specific targets and 232 specific indicators) mainly involve three layers of sustainable development—social, economic, and environmental—as well as important aspects related to peace, justice, and effective institutions. Additionally, various specialized conferences and branch agencies within the United Nations have formulated corresponding sustainable development target systems in their respective responsible fields, such as the *Sendai Framework for Disaster Risk Reduction 2015-2030*, *New Urban Agenda*, *Vienna Programme of Action for Landlocked Developing Countries for the Decade 2014-2024*, and *Strategic Plan for Biodiversity*. These programmatic documents' development goals are closely integrated with the UN 2030 sustainable development goals, forming the UN' s indicator system set for sustainable development. Furthermore, the United States, the European Union, and other countries and regions, as well as leading cities, have proposed their own future development goals. To address spatial development challenges in the coming decades, the United States proposed the "America 2050" spatial strategic plan, constructing a basic framework for national spatial development. The European Commission formulated the *EU Strategic Plan 2016-2020* and is currently developing the next strategic goals for 2030. Simultaneously, building upon and developing the 2020 climate and energy policy guidelines, the European Commission also released the 2030 climate and energy strategic guidelines. The African Union launched *Agenda 2063*, aiming at a 50-year development goal to build a new Africa with regional integration, peace, and prosperity within the planning period. The ASEAN Community has also proposed a similar development vision document, *ASEAN 2025: Forging Ahead Together*, aimed at strengthening regional integration development levels. Some leading large cities have also formulated their own development goals, with these plans and documents all establishing assessment indicator systems or development targets for their regions' sustainable development.

3.2 Selection of Benchmarking Targets for China's Geographical Landscape Design

In current academic research on benchmarking indicator systems for Beautiful China and ecological civilization construction in China, there is frequent reference to relevant UN indicator systems, particularly the sustainable development goals formulated in the UN *2030 Agenda for Sustainable Development*. However, in specific indicator analysis, we find that the UN *2030 Agenda for Sustainable Development* and its SDG system, due to the need to accommodate the development levels of the vast majority of developing countries worldwide, have slightly lower standards for indicator and threshold formulation and cannot prospectively predict development trends in advanced regions. Consequently, its reference value for China' s ecological civilization construction geographical landscape design is not as great as that of relevant indicator systems from developed countries and regions such as the European Union and the United States [Figure 4: see original paper].

In comparison, corresponding development plan indicators from the European Union and the United States demonstrate stronger forward-looking characteristics and better targeting of major future development issues, making them more suitable as benchmarking targets for China' s ecological civilization construction geographical landscape design. The *EU 2030 Climate and Energy Strategic Guidelines* explicitly propose that the EU achieve zero greenhouse gas emissions by 2050, representing a leading indicator in climate change adaptation. The *EU Strategic Plan 2020* includes indicators such as "proportion of innovative talents/institutions from non-EU countries participating in EU innovation activities," "degree of regional energy price differences," and "re-employment rate after vocational training." These indicators demonstrate forward-looking perspectives in areas such as international talent introduction, inclusive innovation, regional infrastructure equalization, and re-employment training institution efficiency, offering good reference value for China' s future inclusive development and regional coordinated development .

4. Research Prospects for Geographical Landscape Design

China' s ecological civilization construction geographical landscape design is a complex, systematic research endeavor closely integrated with national strategic objectives, involving multidisciplinary and multi-domain research content. Currently in its initial stage, the research content remains to be further clarified and deepened. Building upon the perfected geographical landscape design framework, future research should focus on four key aspects.

(1) Reference for Ecological Civilization Construction Indicator Systems. The sustainable development indicator systems of the United States, the European Union, and some of their states and cities demonstrate excellent forward-looking characteristics and scientific merit, offering important reference value for Beautiful China construction. However, in terms of specific indicators

and their thresholds, China' s geographical landscape design indicator system should be primarily based on China' s national conditions, with adaptation and transformation of some imported indicators to form a geographical landscape design indicator system with Chinese characteristics.

(2) Spatial Scale of Geographical Landscape Design. Geographical landscape design takes the entire nation as its research scope, designing future landscapes according to the geographical characteristics of different regions. Therefore, it is necessary to properly handle the relationship between the whole and its parts, and to identify the appropriate spatial scale as the basic research unit that can both fully express regional geographical characteristics and prevent excessive fragmentation in overall design, thereby forming a geographical landscape design scheme with distinctive features and strong systematicity.

(3) Resident Perception in Geographical Landscape Design. Geographical landscape design is conducted within the framework of Beautiful China ecological civilization construction, which is to some extent a concept of resident perception without absolute standard definitions. Therefore, the measurement and analysis of residents' sense of gain and happiness are of important guiding significance for geographical landscape design. In geographical landscape design, it is necessary to fully analyze the characteristics and mechanisms of resident perception and incorporate resident perception decision-making into the design framework to truly achieve people-oriented design objectives.

(4) Application Interface of Design Outcomes. The judgments about future development trends in geographical landscape, including inter-regional development trends and development thresholds, can play considerable scientific supporting roles in formulating sustainable development goals and countermeasures for different regions. Therefore, geographical landscape design needs to be closely integrated with national strategic objectives and connected with national plans and policy systems such as territorial spatial planning, ecological civilization construction assessment, and regional coordinated development, to better fulfill its application value.

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Note: Figure translations are in progress. See original paper for figures.