

## Concept, Assessment and Method of Landscape Characteristics under the Perspective of Regional Geography

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**Keywords:** Regional geography, cultural landscape, landscape Characteristics

**Abstract:** Along with regional consubstantiality trend and local characteristics' disappearing, protection and management on traditional landscape is imminent. As an essential perspective and means to study the relationship between human beings and land in regional geography, landscape characteristics assessment attaches importance to identification, assessment and formation mechanism of heterogeneity. In this paper, the author starts from the view of regional geography, to sort out relevant landscape connotation and development, giving popular research views of regional landscape. After analyzing the interaction between regional geography and landscape characteristics, both frontier methods and shortcomings of assessment are also given.

### 1. Introduction

Since the industrial revolution, the commercialization of life and nature has further disintegrated the impact of global capital on local culture and identity. Regional consubstantiality is constantly replicated and expanded[1]. In the first half of the 19th century, regional geography was born, which experienced the impact of the revolution of geometrics and the Renaissance of modern new regional geography[2]. Research focus falls on characteristics, causes and driving forces of regional landscape differentiation[3]. Achievements of relevant study leave a profound impact on human land relationship cognition[4-5], regional development policy[6-7], land planning and sustainable management[8-9].

The landscape characteristics assessment was initially released by the Countryside Agency, UK and Scottish Natural Heritage.[10] In 2000, the signing of the European Landscape Convention played as the tool of official document for the European continent[11]. Then, the United States, Canada, Japan, South Korea, China and other countries explored the concept, method and framework of landscape characteristics assessment from different perspectives[13]. The research includes three types: macro, meso and micro. Natural landscape characteristics[14], historical and cultural landscape characteristics[15] and ecosystem services are involved, supporting decision-making basis and policy of local landscape planning and protection[16].

At present, researches on landscape characteristics assessment in the global scope mainly focuses on landscape planning[17-18], management[19-20], assessment method innovation[15,17,21] and other fields. Domestic researches from different angles are given to explore the landscape characteristics assessment theory[22-23], characteristics of scenic spots and field case studies[24], such as urban, rural, green land, waterscape[25-28], etc. Among them, domestic scholars named Bao Ziting, Zhou Jianyun[29-30], Chen Yingjin, Yang Rui[31] and Lin Yinan[22] summarize research status of landscape characteristics assessment from multiple dimensions. However, observations of overall development picture about landscape characteristics standing on regional geography has not been involved. Therefore, this paper studies the connotation and development of landscape from the perspective of regional geography. Main research dimensions of regional landscape also help to summarize the frontier methods of landscape characteristics assessment.

## **2. The connotation and development of landscape in the context of regional geography**

### **2.1. Origin of the concept of landscape in the context of geography**

The term landscape was first used to mean the landscape or scenery of a place, and in the early 19th century, landscape was introduced as a central issue in geography by Alexander von Humboldt, a pioneer of modern geographic science, who considered landscape as "the general character of a geographical area" and explored the process of transforming a primitive natural landscape into a cultural landscape [31]. The process of transforming a primitive natural landscape into a cultural one [32]. It can be seen that landscape includes both natural and cultural landscapes. Based on this concept, between 1799 and 1804, Humboldt studied a specific region as the object of research, and synthesized the regional characteristics of local natural and human landscapes [33]. The founder of modern regional geography, German geographer Alfred Hettner, also studied that "the combination of natural and human landscapes is the region" [34].

Regional geography emphasizes how human capabilities and roles and social structures influence the formation of local identity, and also explores the relationship between the external environment and local forces on the formation of society [35]. Both landscape and regional geography characterize specific spatial locations, exploring the influence of environmental and human interrelationships on the drivers of identity, and are characterized by location-specific regions rather than universal concepts. It is because regional geography follows that nothing can occur spatially apart from space-time, and thus local landscapes are complex, diverse, and interconnected. When exploring the human-landscape relationship from a regional geography perspective, the landscape is considered dynamic and the changing patterns of dynamic features of regional landscapes are locational characteristics of regional geography.

### **2.2. The birth of landscape science under the influence of regional geography**

Early geographic research involved both cultural and natural sciences, inspiring the idea of integrating natural ecology and historical and cultural research in landscape science [36]. Geographical science takes space as the research object, and its disciplinary development has gone through a long period of dichotomy until the development of modern geography in the first half of the 19th century, when the study of regional differentiation emerged. The field believes that regions are a combination of natural and human landscapes, and that research should comprehensively examine the natural and human factors of geographic space. For example, Humboldt, a representative scholar of modern geography research, took Latin America fieldwork as an example and explored the characteristics of regional natural and human landscapes comprehensively, and his research ideas were widely disseminated and became the founder of the discipline of regional geography. The concept of landscape was proposed under the opportunity of the "duality" of regional geography and geography integration. According to German Schlüter, "landscape is an integrated external unit of a region, a unique combination of natural and human phenomena [37]. Because of the research paradigm that the concept of landscape theory takes into account both nature and culture, it has been widely concerned by regional geography, and its concept, connotation and research methods have been widely adopted, and "landscape science" was formally formed in the late 19th and early 20th century [38]. Regional geography attaches importance to the mutual differences among regions in space due to their different elements, and landscape science inherited the viewpoint of regional geography in the development process of highlighting local characteristics, rather than the evaluation of the merits of characteristics.

### **2.3. Diversified development of landscape connotation**

Landscape ecology, formed by the intersection of landscape science and ecology, has greatly expanded the connotation of landscape research, and its research paradigm focuses on natural science, and is concerned with the interaction and mutual coordination of human activities and landscape. The Soviet landscape scientist Berg (L.S., 1876-1950) defined landscape on the basis of natural environment, and considered landscape as a unity composed of a set of environmental elements (local weather, topography, soil, plants and animals) occupying a certain territory and

interconnected with each other. German botanist and landscape scientist C. Troll proposed "landscape ecology" in 1938, emphasizing the comprehensive analysis of the interrelationship between the inorganic world and organic organisms within the landscape, and by the 1980s, landscape ecology was rapidly developing worldwide.

The scope of the concept of landscape under the postmodernist discourse has shown multiple characteristics. The German S. Passager included cities in the landscape system, and his book "Landscape Comparative Science" considered landscape as the smallest ground unit of landscape elements in the regional hierarchy [39], and the American Carl Suhr proposed that landscape is equivalent to the concept of region, and is the general term of a certain regional complex [40]. The diversity of landscape connotation helps to cognize the human living environment at different levels and scales, but the overly diverse conceptual exploration is always detrimental to the advancement of scientific research. 2000 European Landscape Convention, 2010 Global Landscape Convention define the commonly used concept of landscape, pointing out that landscape is the assembly of land, water system, marine area, and its appearance is the result of natural and cultural factors unilaterally or interactively. Regardless of the dimensions of landscape exploration, the consensus feature of landscape perception is the perceptible surface complex and the value of natural and cultural landscape interactions should be explored in depth.

### **3. Research dimension of regional landscape**

#### **3.1. Cultural landscape dimensions**

Regional geography retains the qualities of classical geographic research, which provides an interpretive research paradigm for landscape by studying the whole surface of the earth through comparing different units with the region as the core. Especially in the dimension of cultural landscape research, it needs to be rooted in a specific region to explore the uniqueness of the research object and reveal its formation mechanism, rather than explaining the general laws of universal cultural phenomena. The original paradigm of cultural landscapes draws on the classical research norms of regional geography, such as Hettner's "Scheme of Chorology," which is characterized by a "topographical" synthesis of research. The Chinese scholar, Zhang Qiyun, has described the European and American studies as the most important. Domestic scholar Zhang Qiyun introduced the modern regional geography research methods from Europe and America into China, localized its main methods and contents, and proposed "Fangzhiology" to describe, classify, and identify geographical phenomena in the region, and then analyze and summarize their interrelationships and laws of occurrence. This traditional way of cognition of regional geography and culture provided inspiration for the cognition of landscape resources, environmental attributes and regional characteristics in China at that time.

In the context of urbanization, regional geographic features converged and even standardized regional landscapes, traditional regional research values shifted to the integration of nature and culture, and the scope of cultural landscape expanded accordingly, breaking the sense of separation between human and nature. It has been noted that cultural landscapes are "various forms of human activities attached to natural landscapes" and that the preservation of human heritage and ancient architecture is as important as the preservation of valuable human life scenes. The first international legal instrument to emphasize the "cultural-natural interaction" of cultural landscapes was the Convention Concerning the Protection of the World Cultural and Natural Heritage in 1992, followed by the IUCN's new Protected Area Management Typology Guidelines, which significantly revised the "Protected Landscapes" entry. The IUCN's new Protected Area Management Typology Guidelines have significantly modified the entry for "Protected Landscapes" to focus on the protection of valuable humanized and managed landscapes, including unique natural and cultural landscapes, and working landscapes.

#### **3.2. Natural landscape dimension**

Landscape is understood as a new sense of regional physical geography view, the general

physical geography complex is divided by top-down approach, while landscape is divided into regional units by bottom-up research method to obtain the natural landscape complex, there are various directions in the conceptual understanding of landscape in regional geography research, such as understanding landscape as the basic unit of zoning equivalent to physical geographic area, or understanding landscape as a type of cave with the concept of "species" in biology. The concept of "species" in biology is similar to the concept of "cave". In 1936, German geographer C. Troll proposed landscape ecology, and then the theoretical research was divided into two theoretical schools, the American system school and the European applied school, the system school focused on landscape heterogeneity, connectivity, landscape structure and landscape spatial pattern, and the applied school focused on land use evaluation, landscape structure and landscape spatial pattern. The applied school focuses on land use evaluation, landscape planning and management. Landscape ecology in planning applications combines practical problems to expand the theoretical basis, based on ecology, geography, environmental science, ecological economics, human geography and other integrated disciplinary theories, to coordinate the internal structure and ecological processes of all elements of the landscape in the process of land use and allocation of territorial spatial resources, and thus achieve sustainable development of man and nature, culture and social economy.

### **3.3. Regional landscape character assessment**

Regional landscape is dynamic and changing, and landscape character assessment is used to identify, protect and enhance landscape features, so that the landscape of a certain place can be transformed in an orderly manner, and thus protect and pass on the regional landscape culture. Landscape character assessment is defined as "a process that includes a characterization phase of identifying, mapping, classifying and describing landscape features and a phase of making judgments and decisions based on landscape features" [49], and has become an appropriate method for rating landscapes. The rationale of landscape character assessment is based on the study of regional geographic differentiation, where landscape features are all valuable and character assessment emphasizes the qualities that distinguish one landscape from another. Landscape character assessment is considered to be the basis for preserving the territorial identity of a landscape, and the research objectives of regional geography also include an in-depth understanding of the landscape character of each territory, the process of its generation, and its value to humans .

The methodological origins of the study of regional landscape character described above can be traced back to the Manchester landscape appraisal in 1970, whose research objective was to objectively quantify landscape elements and evaluate which elements within a given territory have better landscape value than others. Subsequently, the English Countryside Commission document proposed a landscape assessment tool based on this quantitative approach to analyze and describe landscape features. 1993 landscape character assessment replaced landscape appraisal, emphasizing the identification of landscape features rather than values that distinguish a territory from others, not only describing objective landscape features, but also incorporating regional history and culture, visual aesthetic perceptions, etc. [31]. after 2000 in continental Europe with a formal document tools were promoted [22], and related research and practical applications have emerged in the United States, Canada, Japan, Korea, China, and other countries.

## **4. Landscape Characteristics assessment method**

### **4.1. Scale of landscape feature assessment**

Scale studies the spatial and temporal dimensions of an object or process, being described by resolution and scope. It marks the level of understanding about details of research object [32]. Landscape characteristics assessment can be divided into three scales, including a wide range of national and regional landscape features, local scale of landscape subtle changes and a smaller range of sites. The European LCA system sets three scales as follows: national and regional scale 1:250000; local scale 1:50000 or 1:25000; site scale 1:00000 or less. Globally, land cover is the principle of regional and national scale, while soil and vegetation are the basis of large-scale

landscape feature unit division. The medium scale landscape characteristics can be divided into three units: landscape type combination, landscape type and landscape. Small scale sites may be regarded as a complete landscape type. The research covers the change process of small-scale landscape characteristics, landscape elements, as well as constraints and degree with other elements.

#### **4.2. Assessment of natural landscape characteristics dominated by landscape ecology**

Different methods can be used to describe and recognize natural landscape characteristics according to various scales. The natural landscape characteristics of national regional scale are mainly described by remote sensing satellite images, land cover and other natural geographic data, including climate, topography, geology, etc. LANMAP limited to geophysics lacks consistency in data on European cultural and historical factors. Recognition of natural landscape characteristics in local scales needs to be divided more carefully. The regional scale landscape characteristics type map makes a deeper investigation on the studied places. Common methods have been used for reference to the study of landscape ecology. The basic data of terrain fluctuation, slope, slope direction and vegetation type are applied based on ArcGIS platform. Map algebra, neighborhood analysis, overlay analysis, reclassification, surface analysis and visibility tool set are selected for space technology analysis.

#### **4.3. Cultural landscape-led assessment of historic landscape features**

Cultural landscapes are living or working landscapes where people or people and nature work together, and cultural landscapes at the national and regional scales can be analyzed in terms of anthropogenic land cover types. Regional and site-scale cultural landscapes can be based on the HLC system, which began in 1991 as a framework for the management and future development of historic landscape conservation in the United Kingdom. Data from the sites are collected through field surveys, examined, and summarized graphic information is used to refine the division of landscape features in the temporal dimension, and each feature type and element is described in the classification description to identify key elements of regional features. The elements of human characteristics of cultural landscape can be explored in terms of land use, settlement layout morphology, building plan morphology, building façade morphology, building structure, farmland morphology, transportation, facilities, etc.

#### **4.4. Integrated Natural and Cultural Features Assessment**

Landscape character assessment integrating nature and culture is a hot research topic for scholars at home and abroad, and the methods that can be referred to include matrix analysis, public participation methods, landscape quality objective methods, sensitivity analysis framework and other assessment methods . Landscape sensitivity can quantify the rate of change in the landscape after being disturbed by the outside world, for example, if the ecological and cultural sensitivity components of any landscape feature unit in Cyprus are high, the overall landscape feature sensitivity is considered extremely high. Public participation can reduce the neglected landscape features and form a common local landscape quality objective (LQO) for landscape management and implementation. For example, in Denmark, the assessment process is divided into three stages to establish a "win-win-win" landscape character assessment result by organizing multi-stakeholders to jointly plan the landscape character management objectives.

### **5. Research Prospect**

The landscape characteristics under backed up by regional geography emphasize regional differentiation. Taking the physical geographical space as the carrier, evolving process of landscape characteristics is inseparable from common influence of nature and culture. The value of different landscape characteristics should be treated equally. In general, the technical methods of natural and cultural landscape research can complement and promote the evaluation of landscape characteristics. Learning lessons from disadvantages of British LCA system and American LAF system, it is still difficult to unify the grading standards and scale grades of different regional

landscapes. The system of natural and cultural integration is still in the initial stage. The assessment of historical landscape features, ecological geographical unit assessment and environmental health diagnosis still need to be further explored.

The concept definition in domestic landscape professional standards still serves the landscape with good visual experience, aesthetics and recreation. Based on the perspective of land space, how to deal with the new situation of resource management reform needs sustainable planning, protection and management of the overall and local landscape. According to the land space of different scales, appropriate research methods are adopted to promote integration of regional nature and humanity. In addition, big data, artificial intelligence and other technology frontiers should be applied to establish an integrated landscape resources geographic information database and national unified digital map data pool for spatial management.

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