

## Discussion on the Teaching Reform of Landscape Ecology Course in Local Colleges and Universities

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### Abstract

Landscape ecology is an important basic theory of ecological environment research and management practice. In the training of undergraduate students in local universities in China, landscape ecology has gradually received attention, and has become the core course of ecology, agronomy, forestry, landscape architecture and other majors. Aiming at the teaching problems of landscape ecology in ecological majors, this paper analyzes the basic characteristics and problems of landscape ecology curriculum, and puts forward the idea of the teaching reform of landscape ecology curriculum in local colleges. The analysis shows that the current of landscape ecology teaching in local colleges and universities is faced with difficulties such as rapid updating of curriculum knowledge system, abstract theoretical methods, weak practical courses and weak advanced course system, which limits its development as a basic applied course. In order to improve the teaching of landscape ecology courses in local colleges and universities, we should focus on reasonably setting the proportion of theoretical curriculum and experimental courses, optimizing the teaching plan, improving the experimental curriculum system, and strengthening the practical guidance of the application of landscape ecology. The resulting practical teaching system is helpful to improve the accumulation of theoretical knowledge and students' ability to apply landscape ecology theory.

### Keywords

Landscape ecology; Local colleges; Undergraduate teaching; Practical teaching.

### 1. Introduction

Landscape ecology (landscape ecology) is a new interdisciplinary discipline that has developed rapidly in the late 1970s, focusing on the spatial variation of ecological pattern and process at different scales. Landscape ecology links ecological theoretical knowledge with social factors to solve the problem of sustainable development [1]. It originates from the cross development of ecology and geography, combining the spatial relationship of geographical spatial interaction with the longitudinal relationship of species and energy flow in the ecosystem [2], and develops rapidly in the application practices of solving land use planning, natural resource management and coping with environmental changes. At present, landscape ecology has become an effective way to connect nature and society and solve the major environmental and resource problems in the sustainable development of human beings [3-4], and has received attention in the maintenance of ecological security, biodiversity protection, land planning and management, climate change and other fields.

The research and teaching of Landscape ecology in China began [5] in the late 1990s, which was introduced by landscape ecology researchers such as Xiao Ding and Fu Bojie into China, and was first carried out in forestry, ecological geography and other related majors. At present, the teaching of landscape ecology has become the backbone course of the sustainable development of resources and environment in China, and it is offered in many universities. Some scholars to

explore, He Dongjin [6] introduces the ideas of landscape ecology course construction, YouWeiBin [7] and Guo Erhui [8] explore the specific ideas of the landscape ecology course reform, Zheng Jingming [9] think should be in landscape ecology teaching should introduce intuitive teaching materials, improve students to course participation, strengthen the related course contact, assessment way diversification of teaching methods. However, due to the close connection between landscape ecology theory and practice, the rapid development of relevant knowledge system, the rapid update of technical methods, and the wide application of theory, the teaching of landscape ecology still faces a series of difficulties, and how to effectively improve the teaching effect of landscape ecology courses in local universities is still facing important challenges. On the basis of summarizing and analyzing the development of landscape ecology and curriculum characteristics, this paper discusses the ideas and methods of the teaching reform of landscape ecology in local colleges, in order to provide scientific basis for the teaching reform of landscape ecology in local colleges.

## 2. Basic Characteristics of The Landscape Ecology Course

### 2.1. Development and research content of landscape ecology

Landscape ecology originated from land management in the 1940s, and under the need to reveal biological and abiotic relationships in heterogeneous space, and the ecological consequences, landscape ecology has developed rapidly since the 1980s [10]. With the rapid development of landscape ecology in the past 30 years and widely used, the related theory method constantly improve and expand, the theoretical method of landscape ecology has been widely used in the branches of ecology, greatly improved the human with spatial heterogeneity and scale variability and its ecological consequences, and affect the management of natural and human dominant landscape.

Landscape ecology in China started slightly later than that in North America and Europe, but it developed rapidly. In 1989, the first academic seminar on landscape ecology was held. In 1992, the Landscape Ecology Professional Committee of the China Ecological Society was established, and in 1996, the China Branch of the International Landscape Ecology Society was established. Zhao Wenwu and Wang Yaping [11] believe that the development of landscape ecology in China can be divided into the stage of introduction and absorption (1981~1987), the stage of development and growth (1990~2006), and the stage of development and innovation (after 2007). At present, the research of landscape ecology in China has covered forestry, ecology, agriculture, resources and environment, geographic surveying and mapping and other professional fields [5].

Landscape ecology has inherited the important research methods in ecology and geography, and formed an independent theoretical method system, which has greatly promoted the development of many fields of ecology and geography, and provided an effective way to solve many problems in the sustainable development of human beings and ecological environment. Therefore, landscape ecology is widely studied, which is expounded by different scholars. Forman[1] Put forward some basic principles and main research questions in landscape ecology. Wu & Hobbs [12] summarizes 10 priority scientific issues, including ecological flow in mosaic landscape, causes, process and consequences of land use cover change, and nonlinear dynamics of landscape complexity. Turner[13] attributes the core research factors of landscape ecology to landscape heterogeneity and the ecosystem process in the heterogeneous landscape. And the international landscape ecology society (IALE) that the core concepts and theories related to human science, mainly covers from the natural area to the urban landscape spatial pattern and process, human landscape pattern, the relationship between pattern and process, human activities, process and landscape pattern, scale effect and landscape interference, such as four main aspects.

## 2.2. Features of the landscape ecology course

(1) Landscape ecology has developed rapidly. The origin of landscape ecology and the 1940s, but it has developed rapidly after the 1980s. Since the early 1980s, the relevant theoretical methods of landscape ecology have been constantly improved and enriched, and now it has entered the stage of frontier theoretical exploration.

(2) Landscape ecology involves multiple disciplines. The theoretical sources of landscape ecology are mainly ecology and geography. In terms of basic theory, landscape ecology inherits some basic methods and theories of ecology, such as holism and systems theory, island biogeography theory, biodiversity theory, etc. Meanwhile, some geographical methods also become important components of landscape ecology, such as spatial pattern, spatial process and spatial planning. The development of landscape ecology is also interintegrated with conservation biology, urban ecology, sociology, spatial information science and other disciplines, forming an in-depth integration of discipline support in different fields, which makes landscape ecology continue to develop to sustainable science.

(3) Landscape ecology is closely related to modern information technology. Landscape ecology focuses on the spatial heterogeneity at different scales, especially the causes, changes, and influences of the spatial heterogeneity at the macro-scale. Thus, landscape ecology is a clear and spatially related discipline. Since the emergence and development of landscape ecology, it is very close to the development of spatial information technology and computer technology. With remote sensing, geographic information system, positioning and navigation system as the core of the rapid development of modern information technology to promote people can from the perspective of more system, quickly understand the macro regional characteristics, which greatly promoted the landscape ecology from early focus on land planning problem expand rapidly, become the spatial heterogeneity and its influence, solve the problem of sustainable development of human discipline. Remote sensing technology plays an important role in the identification and distribution of landscape elements, remote sensing evaluation of landscape function, landscape dynamic change, scale effect, landscape evaluation and planning [14]. In particular, temporal remote sensing data with different resolutions provides important data support for understanding ecological processes and their changes at a regional or larger scale [15]. The development of geographic information system provides an important analysis and decision-making tool for the research and application of landscape ecology, to realize the quantitative analysis and prediction of spatial process, spatial heterogeneity and spatial change. Therefore, modern information technology has become an important basis for the research and application of landscape ecology, and has become a related course of landscape ecology.

(4) Landscape ecology is a course that closely links the ecological environment with the social and economic development. Landscape ecology is a scientific [16] with applied research as the starting point and foothold, so it has inherent practicality. The current landscape ecology theory inherited the basic ideas of ecology and geography, and the ecological environment management and social and economic development coordination integration [17], surrounding forests, wetland, Marine, animals and plants, human ecosystem problems facing the key sustainable development of research and practice, and the knowledge in the field of landscape ecology theory system, greatly promote the landscape ecology to solve practical environmental problems and sustainable development of the emperor.

(5) Landscape ecology is widely used. Landscape ecology originated from the land use of planning research, but with the rapid development of landscape ecology theory and method, its application scope expanding rapidly, the theory of landscape ecology has been widely used and different disciplines, become the original research methods, such as the forest ecosystem management, climate change, biodiversity conservation, wetland protection and restoration,

Marine landscape management, recreation planning management, urban planning, and many other fields.

### **3. Teaching Status and Problems of Landscape Ecology Courses in Local Universities**

#### **3.1. The Knowledge system is updated rapidly**

Landscape ecology is a rapidly developing subject, and the related theories have been greatly enriched and expanded in the past 30 years. With the continuous enrichment and improvement of the knowledge system, the related theories and paradigms are increasing rapidly. Although the rapid expansion of knowledge system and application practice contribute to the rapid update of students' knowledge system, it also increases the difficulty of theoretical teaching, and the timely updating of teaching materials has become an important issue in the teaching process. Although many teaching reforms are aware of the existence of this problem in the reform, but the current basic problem has not been paid full attention to and reflected in the teaching system reform.

#### **3.2. Theoretical method abstraction**

Landscape ecology mostly involves macroscale theories and methods, and the relevant theoretical knowledge span is large [8]. Landscape process, for example, includes both the global scale of environmental change, including the micro level of landscape genetics, and many involves the landscape pattern and landscape process, landscape pattern and ecosystem service theory may need long-term data and experimental validation, undoubtedly increase the students for theoretical knowledge understanding difficulties.

#### **3.3. Weak practical courses**

Although landscape ecology is a subject derived from practice to practice, it involves a wide range of subjects and is difficult to arrange practical courses. Therefore, in the current teaching process, it is difficult for most schools to effectively arrange practical courses, and the application of landscape ecology still stays at the theoretical level, lack of effective measures to implement.

### **4. Thoughts on the Teaching Reform of Landscape Ecology Courses in Local Colleges and Universities**

In view of the above problems in the landscape ecology teaching, the author thinks that the local university ecology professional landscape ecology course teaching should pay attention to: reasonably set the proportion of theory course and experiment course, optimize the course teaching case, enhance the level of undergraduate course basic knowledge accumulation and exploration, improve the experimental course system, strengthen the landscape ecology application practice guide systematic reform and innovation, and in the institute of pu ecology professional undergraduate teaching practice and exploration.

#### **4.1. Set up the proportion of theoretical courses and experimental courses reasonably**

In terms of teaching content, because landscape ecology involves many rich contents from theory, method to application, it is limited in the actual teaching process, so its content must be selected. Combined with the professional background of the university and the development planning of Pu'er City, the content of landscape ecology is more oriented to biodiversity conservation.

In terms of teaching methods, in the course of teaching of landscape ecology in our school, the total class time is basically theoretical, without the support of practical courses. The basic theoretical courses are mostly based on relevant textbooks. These contents are highly theoretical, and it is difficult for students to understand the course knowledge. It is suggested that on the premise of reasonable optimization of the syllabus, the theoretical content teaching in classroom teaching should be put on the Internet for online teaching. The case teaching content should be added in class, and the proportion of practical courses should be increased, and the classroom theory teaching should be changed into classroom guided teaching and self-study theory after class for classroom practice verification.

#### 4.2. Optimize the course teaching plan

According to the current development trend of landscape ecology research and application, the curriculum syllabus is adjusted and optimized in time, adapt to the classroom guided teaching and after-class self-study transformation, and increase the attention to the content of practical learning.

### 5. Conclusion

Landscape ecology is an important fundamental theory in ecological environment research and management practice. In the undergraduate education of local universities in China, landscape ecology has gradually received attention, and has become an important core course of ecology, agronomy, forestry, landscape architecture and other majors. In view of the problems existing in landscape ecology teaching of ecology major, this paper analyzes the basic characteristics and existing problems of landscape ecology curriculum, and puts forward the teaching reform ideas of landscape ecology curriculum in local universities. The analysis shows that the teaching of landscape ecology in local universities is facing problems such as rapid updating of curriculum knowledge system, abstract theoretical method, weak practical curriculum and insufficient advanced curriculum, which restrict its development as a basic applied curriculum. In order to improve the teaching effect of landscape ecology courses in local colleges and universities, we should set the proportion of theoretical courses and experimental courses, optimize the teaching plan, improve the experimental curriculum system, and strengthen the guidance of the application practice of landscape ecology. The resulting practical teaching system is helpful to improve students' theoretical knowledge accumulation and their ability to apply landscape ecology theory.

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