Review on the development of Eco-garden in China

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Abstract. The current research progress of Eco-garden in China is summarized to understand the current research progress and deficiencies, so as to provide references for related theoretical and practical research. Based on the CNKI periodical library and using Excel, Citespace and other software, the literature related to ecological garden was analyzed statistically and quantitatively from 1986 to 2018. The results show that the concept of Eco-garden is not unified; the scientific theoretical system is not formed; the research coverage is limited; the research methods are mostly qualitative and the quantitative research methods are few. Finally, this paper puts forward suggestions on the research results: constructing a complete and mature Eco-garden theory system; expanding the research content of ecological garden; deepening the research level of Eco-garden; paying attention to the evaluation of Eco-garden; and combining qualitative and quantitative analysis methods.

1. Introduction

The Eco-garden originated in the West, and its purpose is to protect the natural landscape. The concept of Chinese ecological gardens was only put forward at the meeting of Chinese landscape architecture society held in Wenzhou in 1986. Then the country began to pay attention to the research on ecological gardens. In 2016, seven cities including Xuzhou, Suzhou, Kunshan, Shouguang, Zhuhai, Nanning and Baoji were listed as ecological garden cities. After decades of development, domestic scholars have made great progress in the research on ecological gardens, covering a wide range of areas, but there are still some deficiencies. This paper analyzes the relevant research literature on ecological gardens from 1986 to 2018, summarizes the current situation of the research in China, reveals the deficiencies in the research process, and forecasts the development trend and direction of the research on ecological gardens.

2. Quantitative analysis of Eco-garden

2.1. Statistical analysis of Eco-garden literature

Based on the CNKI retrieval platform, the periodical literature database in China's CNKI database is selected. Since domestic "Eco-garden" was first proposed in 1986, the starting time of literature retrieval is January 1, 1986, and the end date is August 1, 2018. With "Eco-garden" as the retrieval subject word, it carries out repeated high-level searches and obtains 5084 documents. In addition, based on the CNKI search platform, the paper limits the Chinese core journals, CSSCI, SCI literature...
database to carry out repeated high-level searches, and obtains 362 core articles. According to the retrieval results in figure 1, it can be seen from figure 1 that the research results of ecological gardens have presented a gradually increasing trend since 1986, but from 1986 to 2000, the fluctuation increased and the increase rate is small, and the number of related literature is small. However, after entering the 21st century, the growth rate is large, and the research field of Eco-garden is more active, which indicates that scholars in the research of landscape architecture pay more and more attention to its ecology, which will promote the sustainable development of landscape architecture.

Figure 1. Annual publication trend.

2.2. Visual Analysis of Hot spots
The paper uses citeSpace-2018 5.2 to visualize the keyword information of domestic Eco-garden to understand more clearly and intuitively the distribution of domestic Eco-garden hot spots. Thresholds is 2, and the font and node size is adjusted. Eco-garden is theme word, so it is removed. According to the statistical results, the key words close to the node area are "landscape architecture", "ecological garden city", "landscaping", "garden plants", "biodiversity", "garden city" and so on. There are few connections between nodes in the visualization map, indicating that the research areas in these research topic categories are few or not deep enough, and further mining and discussion can be considered.

3. Research progress

3.1. Research contents
The concept of ecological garden cannot be fully elaborated from the two words ecology and garden. The term "Eco-garden" is first put forward in 1986 [1], and its concept is soon supported by all walks of life [2]. At present, the concept of ecological garden has not been unified.

Since Li Jiale put forward the relationship between ecological gardening and landscape ecology in 1993, the research content of Eco-garden has been enriched continuously [3], but the focus is mostly different, mainly including the following aspects: the construction of Eco-garden, urban Eco-garden, Eco-garden city, the benefits of Eco-garden. Urban Eco-garden and Eco-garden city are also about the construction of Eco-garden, so the research content can be summarized as two aspects: Eco-garden construction, Eco-garden benefit.
3.1.1. Eco-garden construction

The main contents of Eco-garden construction are urban Eco-garden and Eco-garden cities [1-15], and the key points include the belief, principle, construction method and plant configuration, plant landscaping, biodiversity and so on. (1) The belief of Eco-garden construction generally includes the belief of overall coordinated development, the belief of overall planning of comprehensive factors, the belief of limited objectives, the belief of urban open space control, the belief of scientific index system. (2) The principle of ecological garden construction mainly includes the principle of adapting measures to local conditions, the principle of sustainable development, the principle of ecological balance, the principle of local characteristics, the principle of biodiversity protection. (3) The main methods of construction are: highlighting its natural attributes by modern expressions rooted in local areas; embodying "compatibility" in the conflict between local and foreign cultures; theoretical methods of landscape ecology and ecology; establishing evaluation models for planning and construction; and digital construction methods. (4) The main content of plant allocation is the application of allocation principles, artistic techniques, key points and related theories in plant allocation. (5) The emphasis of plant landscaping lies in the principles, methods, principles, classification and problems that should be paid attention to in plant landscaping. (6) Biodiversity generally includes the ways and methods of organic combination of ecological garden construction and plant diversity, the methods of biodiversity conservation, and the application of biodiversity principles in ecological garden construction.

3.1.2. Benefits of Eco-garden

Economic benefit, social benefit, ecological benefit and landscape benefit are the main research directions of ecological garden benefit, but the research results are few and the research content is relatively single [14-23]. (1) The landscape benefits of Eco-garden emphasize the importance of respecting the natural habits of plants, following the natural law, keeping the local unique characteristics, achieving aesthetic and ornamental value. (2) The matching and complexity and stability of plant scattering can play an important role in environmental protection, such as wind and sand fixation, air purification, soil and water conservation, earthquake prevention and fire prevention, and produce ecological benefits. (3) The social benefits mainly reflect the roles of beautifying the city, providing a good place for leisure and entertainment, stimulating people to protect the environment and live in harmony with nature awareness. In addition, the social benefits provide a place for cultural publicity and popular science education. (4) The economic benefits of ecological garden are not only the direct benefit of sightseeing, but also the indirect benefit of landscape greening.

3.2. Research method

After decades of development, the research scope of ecological gardens in China has been continuously expanded. However, the research methods are still dominated by qualitative analysis, supplemented by mathematical statistics. After the concept of Eco-garden was put forward, almost all of its research methods are qualitative descriptions. In the next 30 years, the research methods of Eco-garden are still based on qualitative analysis, but the related scholars start to pay more attention to the application of quantitative analysis in Eco-garden.

4. Conclusion and prospect

4.1. Conclusion

Through the summary of the literature, we can see that the current domestic research on Eco-garden is in a rapid development stage, mainly focused on the construction of Eco-garden and the evaluation and accounting of their later benefits. However, there is no scientific research system and a mature theoretical system. The analysis perspective has certain limitations, and the research is still insufficient.

In terms of research contents, firstly, domestic scholars have not reached an agreement on the concept and connotation of ecological gardens. The fuzzification of the concept of Eco-garden makes
the government, enterprises and related stakeholders act independently in the process of Eco-garden construction, which is not conducive to its planning and design. In addition, in the research process, which will mislead the ecological landscape research. Secondly, through literature review and summary, it is found that most of the research focuses on the principles, concepts and plant community construction of ecological gardens. Research on policies, regulations and standards is lacking. Thirdly, most scholars choose one aspect to analyze and summarize the research on the benefits of ecological gardens. There are few achievements in the holistic analysis of the four benefits, and there is a lack of systematic evaluation methods and index system.

In terms of research methods, domestic scholars adopt the qualitative analysis method, supplemented by mathematical statistics, with less quantitative research. On the whole, the research lacks systematic, scientific and normative research methods.

4.2. Conclusion

(1) Constructing a complete and mature theoretical system of Eco-garden. Theory is the forerunner of practice. The practice of Eco-garden depends on its complete and abundant scientific theory system. However, at present, there is no consensus on the concept, and objective principles of Eco-garden, which is not conducive to the construction of scientific theory system. In the future research, it is necessary to define the concept of Eco-garden, strengthen the research on the theoretical breadth and depth, and form a complete theoretical system of Eco-garden.

(2) Expanding the research content of Eco-garden. Eco-garden is a complex ecological system in which living things and environment live in harmony. However, in terms of biological research, most scholars focus on the study of plant and non-human animal diversity and how plants should be configured in the construction of ecological gardens, while ignoring the role of human beings in the construction of ecological gardens. Different lifestyles such as human needs and behaviors will also affect ecological gardens. At the same time, how the non-organic environment such as water quality, soil and air interact with the Eco-garden should also be studied. In addition, the research of policies and related standards and norms about Eco-garden should also be strengthened.

(3) Strengthening attention to the benefit evaluation of Eco-garden. After decades of development of Eco-garden there are still few achievements in the evaluation of Eco-garden benefits compared with the research achievements in the construction of Eco-garden. In addition, the changes of Eco-garden in time and space are rare, and should be studied from multiple perspectives and levels. Due to the strong intersecting nature of the Eco-garden discipline, involving many fields and methods and theories, the research can learn from the theories and research methods of other disciplines or fields, summarize the scientific theories and methods for the evaluation of Eco-garden benefits.

(4) Combination of qualitative and quantitative analysis methods. At present, the multidisciplinary development is a trend. In the research process, the scientific and mature methods from other disciplines can be introduced into the research of ecological gardens to make the research methods and technical means of ecological gardens more scientific and reasonable.

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