

Study on Campus Landscape Micro-Renewal Design under Sustainable Design Theory: The Hainan University Youth Memory Square Renovation Project

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Abstract: With the rise of global sustainable development, sustainable design theory is increasingly applied to landscape design. Campus landscape micro-renewal is closely tied to sustainable design. As important places for teachers and students to work and study, campuses require thoughtful landscape micro-renewal design based on sustainable design theory. This paper uses sustainable design theory to study campus landscape micro-renewal design, focusing on three main aspects: First, it analyzes the policy and industry background of sustainable design theory to clarify the needs for campus landscape renewal. Second, it examines the connotation of sustainable design theory and micro-renewal design theory, elucidating their application methods and strategies in campus landscape micro-renewal. Third, it discusses the practical application of sustainable design theory in campus landscape micro-renewal, proposing design strategies based on specific project conditions. The case study of the Youth Memory Square at Hainan University aims to further promote sustainable campus development and provide design ideas for future campus landscape micro-renewal projects.

Keywords: Sustainable Design; Campus Landscape; Micro-renewal.

1. Background and Significance of the Study

1.1. Policy Background

As globalization deepens, countries face interconnected challenges like climate change, resource scarcity, and environmental pollution. The Brundtland Report, issued by the United Nations in 1987, urged nations to adopt sustainable development, defining it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." In 2015, the United Nations adopted the 2030 Agenda for Sustainable Development, establishing 17 global goals to promote economic prosperity, social well-being, and environmental protection.

China is an active participant in the sustainable development agenda. President Xi Jinping endorsed the 2030 Agenda at the United Nations Development Summit in 2015 and released China's Country Programme for Implementing the 2030 Agenda for Sustainable Development in 2016. The sustainable development strategy is a fundamental national policy of China. Therefore, in campus landscape design, designers should adhere to sustainable development principles, renewing and transforming campus spaces and landscapes to meet current needs and drive further campus micro-renewal through environmental design.

1.2. Industry Background

Campus environments currently face multiple issues: long-term human interference and inadequate management have led to ecological degradation, including vegetation destruction, soil quality loss, and biodiversity reduction. Many campuses lack adequate rainwater collection and treatment systems, resulting in water waste and pollution. Additionally, some campus facilities are outdated, poorly maintained, and lack humane design to meet the needs of modern students. Initial planning often did not fully consider

students' needs, leading to irrational spatial layouts and unclear functional zoning, which negatively impact students' lives and learning. Landscape renewal of university campuses is crucial to addressing these problems and improving campus quality. Through measures such as ecological restoration, air quality improvement, facility renewal, cultural heritage preservation, and efficient water resource use, a more ecological, green, livable, and learnable modern campus can be created, promoting sustainable campus development. Therefore, university campus landscape renewal is urgent and important.

1.3. Significance of the Study

By summarizing campus landscape micro-renewal design methods under sustainable design theory, this research enriches the sustainable design theory and provides ideas for future campus landscape micro-renewal projects.

Theoretical Significance: The thesis analyzes sustainable design and micro-renewal design theories, promoting public awareness of these concepts and their integration in campus landscapes.

Practical Significance: By applying sustainable design principles in the renovation of Hainan University's Youth Memory Square, the study demonstrates how rational planning and design can enhance campus environments, improve resource utilization, and promote continuous optimization. This creates a better and more pleasant learning and living environment for teachers and students, fostering a sense of belonging and identity through a unique campus landscape.

2. Definition and Analysis of Relevant Concepts

2.1. Introduction to Sustainable Design Theory

Sustainable design theory has evolved in response to global sustainability concerns. It is a strategic design activity that develops solutions considering economic, environmental,

ethical, and social issues in a balanced way, aiming to meet consumer needs while maintaining sustainable satisfaction of those needs. Sustainable design not only focuses on environmental and resource sustainability but also emphasizes social and cultural sustainability.

British architect and urban planner Ian McHarg's theories have significantly influenced sustainable urban design. In his book *Design with Nature* (1969), he emphasized integrating urban design with the natural environment, considering the interaction between ecosystems and human life in urban planning.

Sustainable design considers various aspects to achieve human society's sustainable development. Adopting sustainable design methods and strategies can reduce environmental damage, improve resource utilization, and meet human needs.

2.2. Micro-Renewal Design Theory

Micro-renewal design theory advocates a small-scale and progressive approach to renewing and transforming local urban areas to optimize space, improve city quality, and meet residents' needs. It emphasizes bottom-up participation, focusing on improving design schemes through residents' feedback to achieve sustainable urban space development.

In campus landscape design, micro-renewal maintains the continuity and wholeness of the campus landscape, preserving its historical characteristics while gradually enhancing quality. Because micro-renewal projects are small and quick, they yield fast results, allowing teachers and students to enjoy an improved outdoor environment sooner. Therefore, micro-renewal intervention offers great potential for campus landscape design.

2.3. Focused Analysis of Campus Micro-Regeneration Design Driven by Sustainable Design

Campus micro-renewal design driven by sustainable design should focus on ecological restoration, green design, energy efficiency, humane design, functional improvement, and historical preservation. Key areas include:

Vegetation Renewal: Introduce plants adapted to local conditions to enhance ecological value and aesthetics.

Ecological Landscape: Create ecological ponds and rain gardens to promote rainwater infiltration and purification, improving water resource efficiency and providing eco-education spaces.

Green Infrastructure: Implement green roofs and vertical greening to increase green areas, reduce energy consumption, and mitigate the urban heat island effect.

Energy Efficiency: Use renewable energy sources like solar and wind, optimizing campus energy systems.

Sustainable Materials: Use environmentally friendly, renewable materials in campus landscapes to promote resource recycling.

Functional Spaces: Modify campus spaces to meet the needs of teachers and students, adding study areas, leisure seating, and sports facilities.

Cultural Elements: Incorporate campus cultural elements into the design, showcasing history and culture through various forms.

3. Design Case Studies

3.1. Design Background and Positioning

The author conducted field visits and data collection at Hainan University's Haidian Campus, recording plant configurations, infrastructure conditions, ecological environment, and user experiences. First-hand information was collected through photos, data measurements, and interviews. Many plants were found to have poor growth conditions due to soil and water issues or poor management, affecting campus aesthetics and ecological function.

Ecological facilities on campus were found to be lacking, with insufficient ecological education facilities like ponds and rain gardens. The campus also lacked cultural landscapes representing Hainan's local characteristics and the school's history. Comparing other universities' ecological facilities further identified pain points in environmental design.

3.2. Design Strategies



Figure 1. Design effect diagram

Ecological Optimization and Resource Utilization:
Creating Rain Gardens in Sunken Plazas

Plan internal green space in Youth Memory Square, creating a rain garden in the sunken plaza. Introduce native plants to utilize natural filtering, improving the microclimate and providing eco-education and recreational space.

Integration of Regional Culture: Showcasing Hainan's Tropical Landscapes

Incorporate Hainan's regional cultural elements into the design, enhancing the campus's cultural atmosphere and visual appeal through tropical plantings and cultural features.

Multi-Functional Space Design: Meeting Diverse Needs

Design multiple landscape nodes and multifunctional spaces for socializing, resting, reading, and other activities. This enhances the plaza's use efficiency, flexibility, and functionality, making it a popular activity spot.

4. Conclusion

In the context of global sustainable development, campus landscape micro-renewal design is crucial for enhancing campus environment quality and promoting sustainability.

This paper proposes design methods and strategies through in-depth research on sustainable design theory and campus landscape micro-renewal, combined with a practical case study of Hainan University's Youth Memory Square renovation.

Looking ahead, with the deepening and popularization of sustainable development concepts, campus landscape micro-renewal design will face more opportunities and challenges. Designers should actively respond to the call for sustainable development, continuously exploring and innovating design methods and techniques to promote the sustainable development of campus landscapes.

References

- [1] Xue Shengjian, Xue Shenghui. "Research on the Construction of Aesthetics under the Concept of Sustainable Design." *Design*, 2018, (15): 84-86.
- [2] Zhang Yanyan. "Research on Micro-Renewal Design Strategy for Urban Old Communities." *Design*, 2023, 8(3): 1366-1371.
- [3] Zhang Ziyu. "Landscape Design Methods and Research on University Campus." Chang'an University, 2019.