

Research on the Integration of Ecology and Aesthetics in Urban Park Landscape Design

Cheng Zhang

School of Art and Design, Wanjiang University of Technology, Ma'anshan 243031, Anhui, China

Keywords: Urban park; Landscape design; Ecological design; Ecological aesthetics; Landscape integration

Abstract: The harmonious unity of ecological value and aesthetic value is a problem that current landscape design needs to confront. Urban parks are not only urban ecological infrastructure but also public places where citizens can experience the beauty of nature. This paper starts from the intrinsic relationship between ecology and aesthetics, combines theories such as landscape ecology, ecological aesthetics, and sustainable landscape, and discusses specific implementation methods from aspects such as spatial arrangement, plant configuration, water system treatment, material selection, and visitors' sensory experience. The research suggests that ecology ensures the long-term stable operation of the landscape, and aesthetics enables people to perceive the ecological achievements. Design should adhere to the principle of ecological priority, use appropriate landscape organization to transform the natural laws into experiential landscape forms, so that the park not only plays an ecological regulation role but also has aesthetic feelings, and at the same time undertakes multiple functions such as ecological services and public management.

1. Introduction

With the development of urbanization, people's demands for parks go beyond simple walking and entertainment; they increasingly desire to be close to nature in the green spaces and to enjoy good aesthetic experiences. There were two types of park construction in the past. One type followed traditional garden construction methods, prioritizing aesthetics, and using symmetrical layout and hard landscaping to achieve the desired effect. Such sites looked beautiful, but it was difficult to establish a stable ecosystem, and subsequent maintenance required a lot of effort. The other type focused on ecological restoration, arranging all measures according to ecological indicators, striving to restore vegetation and animal habitats, and giving insufficient consideration to the ornamental nature of the landscape. The resulting sites lacked aesthetic conditions. Parks are open spaces in the city that are close to nature, serving both ecological functions such as retaining water and regulating climate, and aesthetic tasks such as aesthetic education and spiritual comfort. Combining the two is to break away from the either-or thinking and seek design methods that better suit people's sensory habits while respecting natural laws.

2. Analysis of the Connotations of Ecology and Aesthetics in Urban Park Landscapes

2.1 Ecological Connotation

The ecological connotation refers to the complete ecosystem structure and continuous ecological processes within the site, with the core being the respect for natural laws and maintaining the health and stability of the system. Urban parks are important ecological patches in the urban built environment, providing space for local flora and fauna to breed, migrate, and rest, helping to enhance regional biodiversity and alleviate the negative impacts of urban ecological islands. The vegetation, water bodies, and soil in the site can also jointly function to complete ecological regulation such as runoff purification, cooling and humidification, and carbon sequestration and oxygen release, reducing the pressure on urban environmental carrying capacity. Park creation from an ecological perspective should avoid forcibly altering the original base conditions of the site, respecting the original topography, hydrology, and soil characteristics, and using more native plants to construct a richly layered and structurally stable plant community.

2.2 Aesthetic Connotation

Urban park landscapes are a dynamic and immersive environmental aesthetics. The aesthetic beauty at the form level is the most intuitive part, which is also the core focus of traditional landscape studies, including composition, color, texture, rhythm, and scale order. The undulating changes at the forest edge line, the graceful forms of the water edge line, and the alternating transitions of space openness and closure are the aesthetic contents that people first perceive. The ecological artistic beauty is rooted in nature itself. The seasonal changes of plants, the flowing light and shadow of the water surface, and the dynamic scenes formed by the free activities of wild animals are different from the refined visual experience artificially created, carrying the original wild charm and constantly changing over time. The ultimate goal of landscape aesthetics is people's perception, the transparent and expansive lines of the walking paths, the gentle and soothing light and shadow atmosphere, can all soothe people's emotions and release the spiritual value of the landscape.

2.3 The Internal Unity of Ecology and Aesthetics

A healthy and stable natural ecosystem inherently possesses aesthetic qualities. Well-structured ecological communities often have harmonious order, rich layers, and continuous changing beauty. The landscape organization that conforms to aesthetic laws is also conducive to building a structurally reasonable and richly layered plant community. The two are mutually compatible at their roots^[1].

From the perspective of value goals, both point to harmonious coexistence between humans and nature. Ecological design aims to protect and restore nature, while aesthetic design aims to help people perceive and love nature. The ecosystem provides a material carrier for aesthetic expression, and aesthetic expression gives the ecological space a channel to convey value, lacking ecological support is only a false and temporary decoration, and lacking aesthetic expression will turn the ecological space into a closed and isolated area that is difficult to be accepted by the public. The essence of integration is to transform the rigorous ecological structure into a landscape form that ordinary people can appreciate, while making aesthetic design based on the constraints of ecological science.

3. The Theoretical Foundation of the Integration of Ecology and Aesthetics

3.1 Landscape Ecology Theory

Landscape ecology focuses on patches, corridors, and substrates as its basic elements, mainly studying the interrelationships between landscape structure and ecological processes. It can serve as a basis for park layout. Designers should appropriately arrange different types of habitat areas, connect scattered habitats through vegetation corridors, and ensure that the paths for animal migration are not obstructed. The landscape pattern itself also has certain artistic value. The shape and size of patches, the direction of corridors, and the connections between various regions will all affect the opening and closing of the internal space and the layers of vision.

3.2 Ecological Aesthetics Theory

Ecological aesthetics breaks away from the traditional human-centered aesthetic perspective, believing that humans and nature form an aesthetic community, and recognizing that the original state of nature itself has aesthetic value. It advocates respecting the original appearance of nature, accepting natural changes, including fallen leaves, dead trees, and seasonal withering, and does not advocate excessive interference with nature for the sake of maintaining visual cleanliness^[2]. This viewpoint has guiding significance for the integration design. Landscape aesthetics does not require maintaining a perfect picture forever, but accepts the dynamic beauty brought about by the changes of the seasons and the evolution of life, providing a basis for low-intervention and nature-closer landscape aesthetics.

3.3 Sustainable Landscape Theory

The sustainable landscape concept integrates the ideas of resource conservation, low-impact development, and long-term operation into landscape creation. It advocates minimizing resource consumption, reducing the burden of later maintenance, and controlling pollutants from entering the site. From an ecological perspective, it requires that the hydrological conditions, soil conditions, and vegetation communities of the site can maintain a relatively stable state. From an aesthetic perspective, sustainable landscape values are the long-lasting landscape appearance, not relying on continuous artificial management to maintain visual effects.

4. Design Paths for the Integration of Ecology and Aesthetics in Urban Parks

4.1 Creating Spatial Order Based on Ecological Patterns

When laying out, the base of the site should be sorted out first, determining the original terrain, water collection lines, native vegetation, and ecologically sensitive areas, which serve as the basis for spatial division. According to the concepts of landscape ecology, core conservation patches, transitional buffer patches, and recreational activity patches should be divided. The core patches aim to protect habitats, are relatively closed in space, the transitional patches play a buffering and connecting role, and the recreational patches are the main places for citizens' activities and viewing, with a higher degree of openness.

On the basis of ensuring ecological connectivity and habitat safety, the aesthetic order is shaped by the boundaries of patches and the direction of corridors. The boundaries of patches can be composed of natural curves or broken lines to create diverse forest edges and water shores, and corridors can be combined with the pedestrian tour system to create sequences of changing views.

The opening and closing of space are adjusted according to ecological zones, with the core ecological area being deep and secluded, creating a dark atmosphere, and the recreational area being open and transparent, becoming the center of vision.

4.2 Integration of Community Scientificity and Plant Landscape Aesthetics

Plants are an important part of the park ecosystem and the main form of landscape aesthetics. The key to integration is to establish a stable and visually attractive near-natural plant community. Species selection should be mainly based on native plants, which adapt to the local climate and soil, have low maintenance costs, and can provide food and habitats for local insects and birds, having higher ecological value than exotic horticultural varieties.

The establishment of the community imitates the natural vegetation structure of the region, establishing a multi-layered community model of trees, shrubs, herbs, and ground cover to enhance stability. Under the unchanged ecological foundation, aesthetic arrangements are made through colors, textures, heights, and seasonal changes, with the upper layer of trees forming the forest canopy line and the skyline, the middle layer of shrubs adding layers and forming color combinations, and the lower layer of herbs and ground cover filling the forest undergrowth, forming meadows or flower beds^[3-4]. The design should also take into account the seasonal changes of plants, actively appreciating the beauty of the changing seasons - flowers blooming in spring, shade providing in summer, fruits ripening in autumn, and branches remaining throughout winter. It should not insist on evergreen plants throughout the year.

4.3 Integration of Natural Hydrological Processes and Water Feature Aesthetics

Traditional water features often employ hard retaining walls, enclosed pools, and artificial fountains, aiming for a clean and orderly appearance. However, this approach cuts off the exchange between the water body and the soil groundwater, causing the water body to become over-nutrientized. Continuous water replacement and chemical maintenance are required. The eco-oriented water system design aims to restore the natural hydrological process, using forms such as ecological retaining walls, rain gardens, ecological ponds, and gentle slope wetlands to ensure the water body's self-purification ability, and complete the functions of rainwater collection, purification, and storage. Using flexible materials such as crushed stones, aquatic plants, wooden stakes, and block stones to create a gentle and undulating shoreline, the water edge remains naturally undulating, and the water body and vegetation mutually penetrate to form a rich waterfront interface. The water surface shape follows the natural water collection path, avoiding regular geometric pools, and relying on water depth differences to create different habitats. In shallow areas, floating and emergent plants are planted, while in deep areas, water-dwelling animals have space to rest. Dynamic water features primarily rely on natural height differences to form cascading shallow beaches, replacing energy-intensive artificial fountains, and creating sensory beauty through water sounds and light effects in a low-intervention manner, achieving the ecological functions of water body purification and rainwater regulation, and integrating the natural aesthetics of the still water shallow wetland.

4.4 Integration of Low-Carbon Ecological Materials and Landscape Texture Aesthetics

The selection of materials affects the ecological carrying capacity of the site and also determines the texture, color, and texture of the landscape. The selection of materials is mainly ecological, using the original stones, local stone materials, and logs obtained from site excavation to reduce carbon emissions from transportation. Replace impermeable hardened ground with permeable and

porous ecological paving to ensure rainwater infiltration, replenish groundwater, and alleviate flooding.

The texture, color, and texture of the material itself are an aspect of aesthetic expression. The rough texture of native stones, the warm texture of logs, and the graininess of permeable aggregates can form a simple and close-to-nature atmosphere, distinct from the artificial feel of polished stones and colored hardened pavements. The selection of materials should be moderate, controlling the types and avoiding complex decorative patterns. Relying on the natural texture of the materials to form a simple and stable visual effect, while considering safety and durability, and coordinating permeability, slip resistance, and durability in areas with a large number of people, such as walkways and activity areas.

4.5 Creation of Natural Perception and Immersive Aesthetics

High-quality park landscapes can stimulate multiple senses, such as vision, hearing, smell, and touch, guiding users to pay attention to the details within the ecosystem. Visually, create multi-level lines of sight by relying on vegetation, water bodies, and terrain, and retain transparent views towards natural patches. Additionally, retain natural sounds such as bird calls, flowing water, and the rustling of leaves in the wind. Smell-wise, create seasonal aromatic experiences with local fragrant plants. Touch-wise, retain soft ground cover under the trees and shallow water bodies that can be touched. This immersive aesthetic experience is essentially the sensory signals transmitted by the ecosystem, and the design does not need to deliberately create strong visual impacts. Instead, it creates a quiet and relaxed natural perception environment, guiding visitors to observe the details of plant growth, insect activities, and waterbird habitats, and establishing an understanding of the ecosystem in the experience, achieving the ecological educational value of the landscape.

5. Conclusion

This article focuses on the integration of urban park ecology and aesthetics as the main issue. It explores specific implementation methods from aspects such as spatial layout, plant configuration, water system treatment, material selection, and the sensory experience of visitors. Ecological conditions are the foundation for the normal operation of the landscape, while aesthetics can give the ecological space the characteristics that can be perceived by ordinary people. The convergence point of the two lies in respecting the original natural conditions of the site, allowing the aesthetic appeal of the landscape to naturally emerge from the ecological structure, rather than determining the appearance style first and then considering the ecological arrangement. With the continuous development of urban green space construction, this combination method will gradually promote the transformation of landscape creation towards a less disruptive approach, establishing urban green spaces using methods that are more in line with natural laws, providing citizens with open spaces that are beneficial to the ecological environment, conducive to relaxation, and suitable for the popularization of natural knowledge.

Acknowledgements

Anhui Provincial Department of Education 2024 Action Plan for the Training of Young and Middle aged Teachers "Domestic Visiting and Training Funding Project for Young Backbone Teachers" (JNFX2024098); Key Scientific Research Project of Anhui Provincial Department of Education in 2025 (Natural Science Category) "Research on the Promoting Effect and Impact Mechanism of Urban Green Space Exposure on Residents' Health" (Project Approval No. 2025AHGXZK31310).

References

- [1] Gobster H P, Nassauer I J, Daniel C T, et al. *The shared landscape: what does aesthetics have to do with ecology* [J]. *Landscape Ecology*, 2007, 22(7): 959-972.
- [2] Shaoying Z, Zhang S, Wu M. *Landscape construction of urban wetland park based on ecological aesthetics research* [J]. *IOP Conference Series: Earth and Environmental Science*, 2020, 510(6):062019.
- [3] Du H, Jiang H, Song X, et al. *Assessing the visual aesthetic quality of vegetation landscape in urban green space from a visitor's perspective* [J]. *Journal of Urban Planning and Development*, 2016, 142(3):04016007.
- [4] Veinberga M, Skujāne D, Rivža P. *The impact of landscape aesthetic and ecological qualities on public preference of planting types in urban green spaces* [J]. *Proceedings of the Latvia University of Agriculture: Landscape Architecture & Art*, 2019, 14(14):7.