Analysis of Urban Park Landscape Creation Strategies Based on Low-Maintenance Design Concepts

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Abstract: As an important carrier of urban ecological and humanistic environment, urban parks play a key role in the improvement of residents' quality of life and the construction of ecological civilization. The current challenges of urban development, such as environmental pollution and resource constraints, have led to the emergence of the concepts of economical gardening and low-maintenance landscaping. This study focuses on the practical path of the low-maintenance concept in the construction of urban parks and greenspaces, and systematically explores the strategy of sustainable plant landscape creation, aiming to build a new model of urban park construction with synergistic development of economic, ecological and social benefits, and to provide a reference path for the promotion of the sustainable development of urban green space.

Keywords: Low-Maintenance Design, Urban Parks, Green Spaces and Landscapes

1. Introduction

The quality of urban greening is an important foundation for improving the living environment of residents and upgrading ecological functions, and its construction effect is not only related to people's physical and mental feelings when they are relaxing in parks, but also directly affects the comprehensive ecological functions of regulating the temperature of the city, purifying the air, as well as protecting the diversity of plants and animals. In the past, common construction methods often have obvious defects: excessive pursuit of short-term landscape effects, ignoring long-term maintenance costs and ecological carrying capacity, resulting in frequent damage to facilities, excessive consumption of water and electricity resources, and difficult to maintain the landscape on a permanent basis. In terms of resource utilization, rain gardens, permeable paving and other technologies are used to realize the recycling of irrigation water. Under the premise of maintaining landscape aesthetics, this design method greatly reduces the input of manpower and material resources for daily maintenance, so that the green space system gradually forms a self-sustaining virtuous cycle, which provides a practical and feasible new idea for balancing ecological protection and operation management.

2. The Current Situation and Problems of Landscape Creation in Urban Parks and Green Spaces

2.1 The Current Situation of Landscape Creation in Urban Parks and Green Spaces

As a key component of the urban ecosystem, parks and green spaces not only provide citizens with a place for daily recreation, but also play an important role through the ecological functions of the plants themselves - the transpiration of trees helps to cool down the temperature and increase humidity, and the dense vegetation effectively adsorbs dust and absorbs noise, which are natural mechanisms that not only alleviate the urban heat island phenomenon, but also These natural mechanisms not only alleviate the urban heat island phenomenon, but also improve the local climate environment, while providing habitats for wildlife and promoting ecological balance. In terms of cultural heritage, the designers skillfully integrate historical stories and regional characteristics into the landscape design to create a public space that can show urban memory and spread ecological concepts (as shown in Figure 1), so that citizens can naturally feel the cultural inculcation in the process of recreation. The current implementation of scientific construction standards, through a reasonable mix of plant species, strengthen the daily maintenance

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management, both to enhance the ecological function of the green space and extend the service life of the landscape, so that the city in the improvement of the quality of the living environment at the same time, to achieve the organic unity of ecological protection, cultural heritage and social development, and to promote the development of urban construction in a more sustainable direction.

Figure 1. Fenghuang Mountain Music Park, Chengdu

2.2 Problems of Green Space Landscape Creation in Urban Parks

2.2.1 The current ecological landscape field has the dual dilemma of cognitive narrowing and construction alienation

One-sided ecological simplification for the greening rate indicators, giving rise to high consumption and low efficiency of the deformed model, some projects blindly transplanted foreign lawn paradigm, although the low cost of short-term greening to achieve the standard, but led to a surge in the late maintenance costs - lawn maintenance costs as high as 2-3 times of the native plant communities, and carbon sink capacity, biodiversity and other core Ecological benefits such as carbon sink capacity and biodiversity have plummeted by 80% [1]. What's more, in order to pursue visual novelty, they spend a lot of money to introduce exotic plants, and the ecological backlash triggered by them has formed a vicious circle: not only due to the lack of climate adaptation leading to a low survival rate, the rising cost of management and maintenance, but also through the mechanism of biological invasions to disrupt the balance of the local ecology, and ultimately forming a resource black hole of "construction-decay-reconstruction".

2.2.2 Contemporary landscape creation is caught in the dual dilemma of the dissolution of the spirit of place and the convergence of plant language

When the design shifts from functional supply to spiritual empowerment, the construction of place memory should be the core proposition, but in practice, it is alienated into the symbolic stacking of landscape vignettes [2]. This cognitive bias leads to plant landscape reduced to visual background plate - nationwide identical exotic tree species combination, creating a spatial aphasia of de-regionalization, such as ginkgo boulevard instead of countryside acacia forests, European flower border extrusion of native thickets, the seemingly exquisite plant configuration is actually cut off from the bloodline of the connection between the people and the land. In essence, it is a systematic misjudgment of the three-dimensional value of native plants, which are not only low-maintenance and highly adaptable ecological carriers, but also cultural gene pools that carry collective memory. When designers ignore these local genes deeply rooted in the earth, what they build is just a rootless landscape container.

2.2.3 The double paradox of declining native plant communities and the drawbacks of engineered management

In recent years, China's urban parks and green space construction has exposed the development of misunderstandings that deserve vigilance. In the context of rapid urbanization, many cities one-sided pursuit of green space coverage indicators, keen to transplant adult trees to create instant landscape, this kind of short-term greening not only leads to the degradation of the local plant community, but also make earthworms, pollinators and other soil biodiversity significantly reduced. Some of the new parks just completed the acceptance of the withered vegetation, facility damage phenomenon, exposing the "reconstruction light maintenance" management of the persistent problems - maintenance funds are stretched to the limit, the professional team is not enough, so that should continue to improve the ecological environment is reduced to "one-time project". In-depth study of these chaotic phenomena into the In-depth investigation of the causes of these phenomena, the primary problem lies in the concept of cognitive bias. Part of the decision-makers will simply equate the construction of green space to the performance of the project, in the selection of tree species prefer expensive foreign varieties, but ignored the local elm, acacia and other ecological value of suitable plants. Planning and design aspects of the same professional short board, many projects lack of site

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microclimate, underground pipelines and other basic data of the systematic research, resulting in the completion of the area of the lack of shade in the summer, the rainy season, serious waterlogging. More noteworthy is that, from the financial budgeting to the later maintenance inputs, the financial security mechanism has always existed fault, some cities even appeared to divert greening maintenance funds to subsidize other municipal projects of short-sighted behavior.

3. Landscape Design Strategies for Urban Parks and Green Spaces under Low Maintenance Concepts

The construction of urban parks, which are both an important foundation for urban ecology and a major venue for citizens' daily activities, is shifting from the past practice of large-scale demolition and construction to a new model that emphasizes sustainable management. The core of this shift is to change the previous practice of excessive artificial intervention, and instead to follow the laws of nature, through the rational use of terrain, vegetation and water interaction, to create a long-term self-sustaining green space system. The new low-maintenance design method retains the original topography and locally optimizes rainwater infiltration paths, combines native plants adapted to the local climate to build a stable community of trees, shrubs, and herbs to enhance ecological resistance, and relies on intelligent irrigation and rainwater collection technologies to achieve recycling of water resources to form a self-sufficient green space system. This holistic design not only promotes the formation of a virtuous ecological cycle chain in the green space, but also simultaneously realizes the comprehensive benefits of ecological resilience, regional cultural expression and operation and maintenance cost control: through the native plant communities to show the city's characteristics, the naturalized topography and water-saving system to enhance the ability to cope with extreme weather, and significantly reduce the manpower and material resources invested in long-term maintenance [3]. This practice model, which takes into account environmental protection, cultural heritage and economic feasibility, provides a scientific and systematic solution for the upgrading and renovation of existing urban green spaces.

3.1 Follow the Principle of Landscape Construction with Geographical Background

The long-term effects of regional climatic and geological processes have shaped differentiated topographic and geomorphic features, which form the natural substrate for landscape design. The following ecological guidelines should be followed in the construction of parks and green spaces: firstly, maximize the retention of native landscape structures through terrain-adaptive design to maintain the surface runoff system and ecological continuity [4]; secondly, implement topsoil protection strategies to preserve the soil seed bank and native microbial communities to maintain the original biodiversity components; and at the same time, set up a dynamic monitoring mechanism of the soil quality to control the fluctuation of the physicochemical properties in order to safeguard the synergistic relationship of the plant-soil-microorganisms. microbial synergistic relationship [5]. On this basis, a low-intervention construction system is constructed to limit the intensity of artificial modification to the threshold of maintaining the ecological service function of the site, so as to achieve the sustainable operation and maintenance goal through the self-organization mechanism of terrain-vegetation-hydrology.

3.2 Establishment of a Technical Framework for Systematic Construction of Landscapes

Based on the spatial analysis technology of GIS, a multi-scale linked landscape planning system is constructed. Following the principle of optimization of ecological efficiency, a balanced layout of green space is realized through the patch-corridor-substrate network model, and the carbon sink density and biodiversity index are simultaneously improved [6]. At the plant configuration level, the principles of community ecology are used to establish a native germplasm resource base, form a climate-adaptive hierarchical configuration model, and ensure the rationality of the vertical structure of the tree layer, the shrub layer and the ground cover layer. In the construction phase, a full-cycle control mechanism should be set up, and ecological engineering methods should be used to

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implement topsoil protection, microtopography reshaping and rainwater retention and infiltration system construction,as shown in Figure 2, and optimize the planting plan through dynamic monitoring of soil microbial activity[7]. Finally, a closed-loop management system of planning-design-construction is formed to ensure that the landscape system maximizes the output of ecological services within the self-sustaining threshold.

Figure 2. Schematic diagram of wavy lawn

3.3 Build a Sustainable Operation and Maintenance System for Low-Maintenance Landscapes

Under the premise of ensuring the stability of plant communities, a micro-ecological cycle with self-sustainability is formed through micro-topography optimization, native plant configuration and rainwater self-balancing system construction. During the operation and maintenance stage, dynamic monitoring of plant physiological status should be carried out, differentiated maintenance cycles should be formulated by combining seasonal characteristics, and cyclic intervention should be carried out by applying eco-engineering standards [8]. Focusing on the monitoring of tree canopy closure, shrub renewal capacity and ground cover layer natural succession trends, the establishment of a dynamic response mechanism based on ecological resilience, while guaranteeing the functional integrity of the landscape, the frequency of artificial interventions will be controlled within the ecosystem's self-repair capacity thresholds.

3.4 Creating a Cultural Genetic Intelligent Landscape Operation and Maintenance System

Urban landscape architecture needs to focus on deepening the exploration and application system of cultural values, and constructing a characteristic display platform through the revitalization of historical cultural resources and humanistic deposits. The design practice should establish regional cultural gene mapping, organically integrate intangible cultural heritage, traditional construction techniques and contemporary landscape vocabulary, and form a culturally recognizable spatial narrative structure. At the implementation level, the innovative application of local materials and crafts can be relied on to shape a landscape product system with regional recognition, thus strengthening the brand value and communication effectiveness of urban green space. For the sustainable operation of landscape results, a synergistic mechanism of “construction, management and publicity” can be constructed [9]. Firstly, establish an all-media communication matrix, use virtual reality technology to develop a cloud-based tour system, and form a three-dimensional communication network by combining offline cultural themed activities; secondly, innovate the public participation mode, cultivate the public's sense of place identity through ecological education demonstration bases, volunteer adoption system, etc.; and finally, improve the collaboration mechanism between the government and enterprises, and utilize green financial tools to stimulate the participation of the market, and at the same time, set up a smart monitoring platform. The implementation of the whole life cycle management, to ensure that the low-maintenance concept throughout the whole process of landscape maintenance [10].

3.5 Creating a Scientific Management System and Ecological Development Path

In the process of urban park landscape construction, project managers should strengthen the talent echelon construction, through multi-dimensional initiatives to enhance management effectiveness. Specifically, through a sound system, optimize the management mechanism, carry out systematic vocational training and other means, continue to enhance the professional ability and comprehensive quality of practitioners. In particular, we should focus on cultivating the gardening technology team, take skills training, on-site guidance, qualification certification and other training modes, and systematically improve the professional and technical level of greening construction personnel and project management capabilities. In the dimension of ecological construction, the principle of ecological priority should be upheld to build a

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sustainable development system. Through the scientific preparation of landscape planning programs, the implementation of ecologically sensitive area protection strategies, the implementation of resource recycling technology and other innovative means to minimize environmental disturbance. At the same time, a diversified ecological compensation system should be constructed to realize the benign interaction between ecological protection and economic development through the establishment of an ecological account system, the innovation of compensation financing channels, and the improvement of ecological value assessment mechanisms.

3.6 Establishment of a Multidimensional Co-design Mechanism

Comprehensive design work needs to take into account a number of aspects, designers and staff need to comprehensively combine low-maintenance concepts from landscape plant selection, terrain creation, landscape facility configuration, planning and design. In the selection of landscape plants, it is necessary to take into full consideration the climatic conditions and soil conditions of different regions, rationally select plant species, and scientifically match plant species. At the same time, it is necessary to select plant species adapted to local growth according to local climatic conditions and soil conditions. When choosing plants, the ornamental and ecological properties of plants should be fully considered and combined with the landscape construction of the park green space to make a landscape plant configuration table. In terms of terrain creation, according to the terrain characteristics of different regions, make full use of the advantages of terrain and geomorphology, and skillfully combine the low maintenance concept with the terrain. Under the premise of ensuring the landscape function of the park green space, minimize the transformation of the terrain and geomorphology, and maximize the benefits of the park green space landscape construction. In the configuration of landscape facilities, it is necessary to combine the landscape construction characteristics of park green space in different regions and reasonably configure park green space landscape facilities. Under the premise of meeting the requirements of the use function, the maintenance and transformation of park green space landscape facilities should be reduced as much as possible, and at the same time, comprehensive consideration should be given to factors such as the type, number and layout of plants in the park green space. In terms of landscape planning and design, planning and design should be carried out according to the characteristics and needs of park green space landscape construction in different regions. Under the premise of ensuring ecological benefits, the destruction and pollution of the urban park green space environment should be minimized, while focusing on scientific planning, rational design, careful construction and fine management.

4. Summarize

The construction of low-maintenance oriented urban parks and green spaces needs to integrate the synergistic relationship between urban development planning and ecological landscape construction. In the process of planning and implementation, a dynamic coupling mechanism should be established between the evolution of urban space and the renewal of green space system, so as to realize the goal of long-term maintenance through scientific planning and systematic design. In practice, it is necessary to combine the positioning of regional development and ecological characteristics of the substrate, use adaptive technology systems to promote landscape construction, and ensure an optimal balance between functional benefits and maintenance costs throughout the life cycle of the project.

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