

Research on municipal landscape design under the concept of sustainable development

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Abstract. The municipal landscapes is one of the most important manifestations of the city's cultural connotation and plays an important role in the process of urban development. In recent years, with the continuous construction and development of cities, pollution and other problems brought about by industrialization have become increasingly serious, and people's concern for the environmental problems of their living places has gradually increased. With the growing awareness of health and environmental protection, the level of greenery is gradually becoming one of the criteria for residents to choose their living environment. In view of the current problems in municipal landscape design, this paper applies the concept of green sustainable development to achieve a balance between natural ecology, ornamental aesthetics, energy conservation and environmental protection as well as economic benefits in urban landscaping, so as to offer some references for manual intervention to build green cities and green space functions and for the future.

Keywords: sustainable development, municipal landscape, landscape design.

1. Introduction

Municipal gardening, is the city on the basis of traditional gardening, combined with the development of modern gardening and urban development situation, under the leadership of the government to the entire city precinct as a carrier, in order to adapt to the needs of contemporary people to survive and live and achieve a new type of gardening of the entire urban area large area gardening. Municipal landscape gardening is the artistic image of landscape gardening shaped by the use of engineering technology in municipal engineering (the part of gardening engineering in municipal engineering). The urban municipal landscape design under the concept of sustainable development is to use the self-regulation and repair ability of the ecosystem, follow the objective laws of nature, use engineering measures and biological technology and other methods to build the landscape while minimizing the damage to the regeneration capacity of the natural environment [1], and to achieve sustainable use of urban landscape in both the natural environment and cultural environment to achieve sustainable development and maximum social benefits. The use of engineering measures and biotechnologies to construct landscapes while minimizing damage to the regenerative capacity of both the natural and cultural environment. This paper looks at the parts of current municipal garden design that are not adapted to the development of durability, analyses and summarizes the existing problems, and discusses the best maintenance solutions for manual intervention to build green cities and green space functions and for the future.

2. The important value of sustainable municipal landscaping

Municipal landscape engineering is one of the basic projects of the city, is the most intuitive embodiment of the image of a city [2], to ensure the sustainable development and smooth operation of the city plays a key role, is to improve the urban ecological environment and create an important initiative of the green city.

2.1. Contributes to the enhancement of the city's appearance and overall coherence

Ecological problems are currently the most serious crisis facing human society, especially in today's cities where it is most prominent. Increasingly serious environmental pollution problems such as haze and acid rain have emerged [3] as a result of the massive emissions of harmful gases such as industrial waste. These problems have become one of the serious obstacles to sustainable urban development. In municipal gardening projects, the number of green plants and their planting area are increased through rational planning and planting of garden trees, and the characteristics of green plants are used to absorb toxic gases and waste gases in the air. Plants can also absorb carbon dioxide and release oxygen through photosynthesis, increasing the oxygen content required for human respiration. The increase in negative oxygen ions in the air will give people a sense of freshness and thus achieve the purpose of purifying the air and improving the urban environment, showing a green and natural urban outlook. The types of garden plants can also be diversified, with a sense of art and order in the landscape through group planting or specific pruning.

2.2. Promoting the organic integration of cultural landscapes

Garden plants have a wealth of application possibilities and can be organically combined with both human landscapes such as buildings, pavilions and scenic walls and natural landscapes such as natural mountains and water. Modern gardens have a subtle influence on social development in all aspects of politics, culture and the environment, and municipal gardens play a key role in enriching the spiritual life of residents. The organic integration of cultural landscapes is reflected on the one hand on formal level and on the other hand on the spiritual level. The formation of the original landscape in the city is the cohesion of local culture and local characteristics, if the culture of an urban area is to be better inherited, it needs to take the road of sustainable development, i.e. not only can it not be conservative nor blindly push the new. The city's original landscape resources need to be transformed and utilized in a selective and selective manner, with the maximum retention of old trees, ancient corridors and other iconic garden features, and the retention of native tree species with good growth potential as far as possible. If non-native plants need to be introduced, they need to be carefully examined and introduced on a large scale only after a full understanding of their growth habits and successful trial planting to prevent species invasion or failure to survive due to unsuitable soil. In addition, the transformation of the landscape needs to be new, combining the original cultural image [4] with flexible design in terms of arrangement, shape, orientation design and other expressions to create new urban symbols. The new urban landscape is an inheritance and development based on the original landscape, and if its sustainable development can be actively promoted, then it is bound to beautify the city, increase the happiness of the residents and enhance the soft power of culture.

2.3. Increase the science and systematization of design

In municipal landscape design work, design workers need to refer to the content of ecological disciplines and research related to the concept of sustainable development, so that the design is carried out under the guidance of scientific concepts [3]. And the configuration of green plants needs to be designed from the practical point of view, in the pre-planning of the site's land conditions, technical indicators, construction period and other systematic investigation and research before the next step of planning and design. At the same time, designers should also have a holistic view, pay attention to the integrity and consistency of the landscape configuration, to avoid incongruity or deviation from the theme, and minimize the possibility of failing to achieve the expected benefits and landscape effects.

3. The main problems of the current municipal landscape design

The systematization of municipal gardens in China started late, and the municipal landscapes that already exist in many cities are not yet able to meet the requirements of urban construction. In many places, there are still various problems with the construction of municipal gardening projects, which require continuous improvement.

3.1. Unreasonable planting combinations

Most of urban green spaces today are filled with lawns to fill large areas of open space, especially in the northern parts of China, with monochromatic ground covers such as rye grass and early grass. Due to partial deviations in the selection of tree species at the design and construction stages, a large number of species that bring economic benefits are continuously selected, resulting in a relatively homogenous planting of trees, with a wide variety of colors and levels not being reflected, often ending up with a single lawn and street trees or a landscape of lawns and trees planted alone, making the landscape imagery too monotonous and ornamental.

3.2. Lack of ecological interactivity

Municipal landscapes need to meet the ornamental and partly interactive nature at the beginning of their design. At present most municipal landscape still focus on a single urban greening, to increase the green coverage for the purpose of creating landscape, there is a formality, template and other problems, can not make people the viewing subject really in it, the lack of people and scenery of effective interaction, did not consider the human space.

3.3. Lack of innovation

Innovation is the soul of national progress, but today many designers lack originality in the planning and design stage, and the actual projects on the ground are largely similar, failing to incorporate local characteristics and cultural history, resulting in a uniform and under-utilized landscape, making it difficult to promote social development.

3.4. Shallow cultural connotation

Landscape is a carrier of regional culture, and the construction of urban landscape culture should be focused on. Modern urban landscapes often make a big deal out of form while ignoring people's deep-seated spiritual pursuits, which is not conducive to cultural inheritance and the sustainable development of local or even national cultures.

3.5. Lack of post-care management

With the development of technology, the construction and maintenance periods of landscape projects require the use of a large number of machines and expertise, especially with the introduction of automated equipment that requires specialized technical staff to operate. The technicians currently engaged in frontline garden work are generally familiar with the use of old machines but lack the corresponding new skills to really apply advanced machines in practice. The overall quality and competence of the construction staff is low and the lack of appropriate management personnel makes it difficult to put in place the maintenance and management at a later stage to maintain the best possible landscape image.

4. Principles of sustainable municipal landscaping

4.1. The principle of territoriality, with a focus on cultural continuity

Municipal garden design should first of all respect regional culture. In the southern and northern regions of China there are two distinct forms of municipal gardening, subtropical and temperate, due to different climates, and in the western and eastern regions there are also desertification and humid landscapes. Location as a constraint, in the design of the initial, garden design staff must first

understand the local cultural characteristics, and in the design process to take full account of the basic factors and special factors, including geography and climate, hydrology, soil, rivers and other natural factors, as well as ethnic communities, economic and cultural and other human factors [5], in order to facilitate the preservation and continuation of the excellent regional culture. At the same time, it should also be adapted to local conditions, giving preference to local native seedlings and materials to facilitate adaptation to the environment and subsequent maintenance and management. Municipal gardens are an important means of sustainable cultural development, and landscaping is a means of artistic expression that directly presents the distinctive local culture.

4.2. Principles of rational use of natural resources

The concept of sustainable development promotes respect for nature, its protection and the harmonious development of economic, social and environmental protection. Natural resources need to be exploited and used in a controlled manner. One of the fundamental tasks of urban regeneration in many regions is to return the city to its natural ecology and create an ecological garden city. The use of established technologies to transform the city in situ, including the more popular ecological restoration of mines and wetlands, allows development and conservation to take place at the same time and is more conducive to the long-term development of the city.

4.3. Principle of overall coherence

The wide range of greenery in municipal gardens means that the effect of the landscape in different areas should be coherent [6], reflecting a variety of changes in a consistent manner. The tone of the landscape should be macro-controlled with the city as the smallest unit as a whole, with reasonable arrangements in terms of colour configuration, type configuration, height configuration and other aspects of planting and mutual integration with the surrounding environment, in line with the development trajectory of the city, further promoting the city's economic and cultural balance and synergistic development.

5. Construction application measures for sustainable municipal landscaping design

5.1. Optimizing planting patterns

With a rich variety of plant species and varied shapes, the rational allocation of plants is an important ecological initiative in the construction of sustainable landscapes. Native tree species [1] should be used as far as possible to maintain the ecological stability and economic benefits of the area. Attention should also be paid to the growth of different trees as a basis for a reasonable division of the configuration levels to increase the ornamental nature and continuity of the landscape. In addition, creating a sustainable landscape also requires optimizing the plant space to ensure ecological balance between species and relatively independent growth of individuals, so as to build a healthy and harmonious ecological environment. In order to have a complete spatial grasp of the whole at the early stage of design, BIM technology can also be used to build a BIM 3D model [7] to optimize the matching of spatial landscape factors.

5.2. People-centred, humanistic focus

The direct service object of the municipal landscape is the people living in the city, so the five senses of people should be fully mobilized, so that the landscape is actively close to people, increasing the residents' daily experience and thus enhancing their sense of well-being. Designers should fully consider the role of people in urban development and the needs of residents to improve the utilization rate. The new landscape should be ornamental as well as functional, creating ecological corridors, tree pools and benches and other interactive landscape features [8].

5.3. *Using new sustainable technologies*

Designers also need to enhance the regenerative use of resources in the landscape. In recent years, as natural resources have become increasingly scarce, more attention has been paid to the sustainable use of existing resources. New ideas should be fully integrated into the construction of municipal gardens, using new technologies and materials. Clean resources such as solar and wind energy can be used instead of traditional non-renewable resources [9] to promote the improvement of the urban ecological environment. Rain gardens and depressions can also be built according to the actual situation, bringing together surface water through the terrain, then purifying the rainwater through a mixture of plant self-purification and sand and soil sedimentation, eventually collecting and reusing the rainwater or gradually infiltrating it into the soil and nourishing groundwater. Garden designers should focus on learning and applying the “sponge city” application techniques [7] in practice, using ecologically sustainable rainwater control and rainwater utilization facilities to solve the dual problems of plant growth and rainwater storage.

6. Conclusion

Municipal landscape construction is an important initiative to showcase the image of a city, and promoting sustainable development of gardens can facilitate the coordination of resources, environment and economic development in future cities [10]. Most of China's cities are currently deficient in both natural and human aspects, including unreasonable selection and matching of plants, a lack of innovative interaction, the absence of a scientific and systematic system, and insufficient reflection of regional culture. This paper identifies the importance of respecting the natural ecology and the principles of design and management in terms of culture and nature by analyzing the current problems from the perspective of sustainable development, improvement measures are proposed in the areas of pre-project preparation, mid-term design and construction and post-project maintenance and management, including but not limited to the allocation of necessary resources through human intervention, the rationalization of green space use and the enhancement of ornamental and usage rates through the shaping of diverse landscapes, which are conducive to the better adaptation of municipal landscapes to the future development of society.

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