

# Study on the Influence of Urban Micro-parks on Community Social Ecosystem Services

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**Abstract:** With the rapid development of urbanization, the contradiction between the shortage of urban land resources and residents' demand for high-quality community environment is prominent, and urban micro-parks have become the key to optimizing urban space and improving residents' quality of life. This paper focuses on the theoretical research on the impact of urban micro-parks on community social ecosystem services, analyzes the relationship between them, explores the impact path, and analyzes the factors that restrict the park's role. Through ecological adjustment, cultural services and support services, urban micro-parks have many influences on community social ecosystem services, and the park's own scale, layout, facilities, community residents' participation, culture, external policies, funds and other factors will all influence its role. Based on this, this paper puts forward promotion strategies from three aspects: planning and design, operation management and community participation, aiming at strengthening the contribution of urban micro-parks to community social ecosystem services.

## 1. Introduction

With the rapid progress of global urbanization, urban land resources are facing unprecedented tension. On the one hand, the expansion of the city is eroding the scarce natural space; On the other hand, with the continuous growth of urban population, residents' pursuit of quality of life is increasing, and the demand for community ecological environment and social interaction space is becoming stronger <sup>[1-2]</sup>. As a new form of urban green space, urban micro-park is gradually becoming the focus of urban planning and construction.

With its small and flexible spatial form, urban micro-parks are cleverly embedded in urban communities <sup>[3]</sup>. Compared with traditional large parks, they are closer to residents' daily life and can provide residents with more convenient leisure and social places <sup>[4]</sup>. At the same time, community social ecosystem service, as an important indicator to measure community ecology and social well-being, covers many aspects from ecological adjustment to cultural inheritance to supporting community sustainable development <sup>[5]</sup>. Understanding the relationship between urban micro-parks and community social ecosystem services is of far-reaching significance for improving the quality of life of urban residents and promoting the sustainable development of communities.

Urban micro-parks and community social ecosystem services belong to two important fields: urban ecology and community development. At present, although there have been many studies on the ecological and social benefits of urban parks at the macro level, the theoretical system focusing on this specific type of urban micro-parks and deeply discussing its impact on community social ecosystem services still needs to be improved <sup>[6]</sup>. In-depth study of the internal relationship between them is expected to fill the gaps in related theories and inject new vitality into the theory of urban ecology and community development. Urban planners and builders are actively exploring how to use the limited urban space more effectively to meet the diverse needs of residents <sup>[7]</sup>. As an effective means to optimize the utilization of urban space, the construction and development of urban micro-parks need scientific theoretical guidance to ensure that they can contribute to the service of community social ecosystem to the greatest extent <sup>[8]</sup>. An in-depth understanding of the impact of urban micro-parks on community social ecosystem services can provide a key basis for urban planning, landscape design and community management, thus improving the planning and

management level of urban space. On the whole, the research on the impact of urban micro-parks on community social ecosystem services will help deepen the understanding of the internal relationship between urban ecology and community development, improve the relevant theoretical system, and provide practical guidance for urban construction and management practice.

## 2. Analysis of the relationship between urban micro-parks and community social ecosystem services

Urban micro-parks have unique attributes. They are small in size, but widely distributed in urban communities. They are green spaces within reach of residents. These parks exist in flexible and diverse forms and are closely integrated into residents' lives. Community social ecosystem service is a key factor to ensure the sustainable development of the community and the quality of life of residents, covering ecological adjustment, cultural supply and support.

Urban micro-parks and community social ecosystem services interact with each other. The former relies on vegetation, landscape and facilities to provide services for the latter, such as regulating microclimate, promoting cultural exchanges and protecting biodiversity, and improving the ecological and human environment of the community<sup>[9]</sup>. However, the demand for community social ecosystem services has a negative effect on urban micro-parks, guiding their planning, design and functional layout, so that the parks can better meet the needs of community ecology and residents' lives, and the two promote each other and jointly promote the sustainable development of the communities.

## 3. The impact path of urban micro-parks on community social ecosystem services

Urban micro-parks have an impact on community social ecosystem services through various paths. Vegetation and water bodies in urban micro-parks are the key factors affecting ecological adjustment services. Vegetation absorbs carbon dioxide and releases oxygen through photosynthesis, which effectively improves community air quality<sup>[10]</sup>. A small urban park green space can absorb a certain amount of carbon dioxide every day. See Table 1 for specific data. Vegetation and soil can also intercept and penetrate rainwater, reduce surface runoff, regulate rainwater and reduce the risk of urban waterlogging.

Table 1 Comparison of Carbon Dioxide Absorption by Vegetation in Mini Parks in Cities of Different Sizes

| Park Size (square meters) | Average Daily Carbon Dioxide Absorption (kilograms) |
|---------------------------|-----------------------------------------------------|
| 500 - 1000                | 10 - 20                                             |
| 1001 - 2000               | 21 - 35                                             |
| 2001 - 3000               | 36 - 50                                             |

The landscape and activity space of urban miniature parks are the core of cultural service influence. Unique landscape design, such as characteristic sculpture and theme garden, has become the carrier of community culture and promoted cultural inheritance and dissemination. The park also provides residents with rich space for leisure and entertainment activities, and promotes neighborhood communication. The cultural festival held in the mini park on weekends can attract many residents to participate, enhance community cohesion and enrich residents' spiritual and cultural life. Urban micro-parks provide habitats for living things, affect community biodiversity, and then play a role in supporting services. Trees and grass in the park provide habitats and breeding places for birds and insects, and maintain ecological balance. The specific plant communities in the park attract many kinds of bees, promote the pollination of surrounding plants, ensure the normal growth and reproduction of plants, and play a positive role in supporting services such as soil formation and nutrient cycle.

#### 4. Factors affecting the role of urban micro-parks

Urban micro-parks have an important impact on community social ecosystem services, but their full play is restricted by many factors, which can be attributed to the park itself, the community and the external environment. First of all, the park itself plays a key role. The scale is directly related to the function and service capacity of the micro-park. Smaller parks may be limited in ecological regulation, and it is difficult to accommodate large areas of vegetation to effectively improve air quality or regulate rainwater. Reasonable layout is also very important. If the entrance and exit of the park are inconvenient or the internal road planning is chaotic, the accessibility and use experience of residents will be reduced. The completeness of facilities also affects its function. The lack of basic service facilities such as seats and trash cans, or functional facilities such as fitness equipment and children's play facilities will weaken the attraction and service ability of the park to residents. See Table 2 for the differences in the facilities of mini-parks of different scales:

Table 2 Facility Provision in Mini Parks in Cities of Different Sizes

| Park Size<br>(square<br>meters) | Basic Service Facility Provision                                   | Functional Facility Provision                                                          |
|---------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 500 - 1000                      | Basic seats and trash bins are provided, but in limited quantities | 1 - 2 sets of simple fitness equipment; no children's play facilities                  |
| 1001 - 2000                     | Sufficient seats and trash bins; pavilions for rest available      | 3 - 5 sets of fitness equipment; small children's play area                            |
| 2001 - 3000                     | Well-equipped basic service facilities, including public restrooms | Multi-functional fitness area, large children's play area, and cultural activity space |

Secondly, community factors can not be ignored. Residents' participation has a significant impact on the role of micro-parks. If residents' participation in park construction, management and activity organization is low, it is difficult for the park to meet the actual needs of residents and to give full play to cultural services and social interaction functions. Community culture also plays an important role, and different community cultural atmosphere will lead to different demands for park functions. For example, a community with profound cultural heritage may expect the park to carry the function of cultural inheritance. If the park planning does not consider this demand, its role will be difficult to play effectively. Finally, external environmental factors also restrict the role of micro-parks. Policy support is very important, and the government's policies in land planning, capital investment, and the formulation of construction standards directly affect the construction and development of micro-parks. The degree of capital guarantee is also critical, and sufficient funds can ensure the smooth construction, maintenance and operation of the park. If there is a shortage of funds, the park may have problems such as aging facilities and dilapidated landscape, which will reduce its ecological and service functions.

#### 5. Strategies to enhance the contribution of urban micro-parks to community social ecosystem services

In order to give full play to the positive role of urban micro-parks in community social ecosystem services, strategies can be formulated from three aspects: planning and design, operation management and community participation. In the planning and design process, multiple factors need to be considered comprehensively. First of all, we should accurately locate the functions of the park. According to the composition and needs of residents in surrounding communities, such as communities with a large number of elderly residents, we can focus on building micro parks with leisure and recreation as the main functions. It is also very important to plan the spatial layout reasonably, and scientifically set up different functional areas to ensure smooth connection between them. Cities should pay attention to ecological design, increase native plant species, build multi-level vegetation communities, and enhance ecological adjustment capabilities. Examples of plant configuration in mini parks with different functions are shown in Table 3:

Table 3 Plant Arrangement in Mini Parks in Cities with Different Functional Orientations

| Functional Orientation | Main Plant Species                                       | Plant Arrangement Characteristics                                                                                                         |
|------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Leisure and Wellness   | Ginkgo, Osmanthus fragrans, Ophiopogon japonicus         | Tall trees provide shade, aromatic plants soothe the mind and body, and ground cover plants add layers to the greenery                    |
| Children's Play        | Prunus serrulata, Lagerstroemia indica, Trifolium repens | Colorful, non-toxic, and harmless plants are selected to create a lively atmosphere, and ground cover plants ensure safety                |
| Cultural Heritage      | Pinus, Bamboo, Acorus calamus                            | Plants with cultural connotations are chosen, combined with traditional garden landscaping techniques to reflect cultural characteristics |

In terms of operation management, it is essential to establish a long-term maintenance mechanism. Managers need to check and maintain the park facilities regularly to ensure their safety and functionality; Strengthen the management of environmental sanitation in parks and maintain a clean and beautiful environment. At the same time, enrich activity planning, organize various cultural and sports activities according to different seasons and festivals, and attract residents to participate. For example, a flower viewing festival is held in spring, and parent-child ice and snow activities are held in winter. Encouraging community participation is equally significant. Through publicity and education, we can enhance residents' awareness of the value of miniature parks and enhance their awareness of protection. Build a platform for community participation, such as setting up a volunteer team for park management, so that residents can participate in the daily management and supervision of parks. Residents' opinions and suggestions on park construction and activities can also be collected, so that the park can better meet the needs of the community.

Through the coordinated implementation of the above-mentioned planning and design, operation management and community participation strategies, the contribution of urban micro-parks to community social ecosystem services can be effectively enhanced, and a more high-quality, harmonious and sustainable community environment can be created.

## 6. Conclusions

This study focuses on the impact of urban micro-parks on community social ecosystem services, revealing the complex and close relationship between them. Although the urban micro-parks are small in scale, with their unique ecological and social attributes, they have a significant impact on multiple dimensions of community social ecosystem services.

On the path of influence, urban micro-parks can effectively regulate the community climate, purify the air and regulate the rain by means of ecological elements such as vegetation and water bodies, and contribute to the ecological regulation service. Relying on characteristic landscape and activity space, urban micro-parks carry and spread community culture, promote residents' leisure and entertainment, exchange and interaction, and realize cultural service functions. By providing biological habitat, maintaining biodiversity, supporting soil formation and nutrient circulation, urban micro-parks ensure the normal operation of support services. However, the full play of the role of parks is restricted by many factors. The scale, layout and facilities of the park itself, the degree of participation and cultural atmosphere of community residents, and the level of external policy support and financial guarantee all affect the realization of its functions to varying degrees. Too small scale, unreasonable layout or imperfect facilities will limit the service capacity of the park. The low participation of residents does not match the cultural needs, which will weaken the influence of parks on communities. Lack of policies and funds may lead to difficulties in park construction and operation.

In order to enhance the contribution of urban micro-parks to community social ecosystem services, we should make concerted efforts from three aspects: planning and design, operation management and community participation. Scientific planning of functional orientation, rational layout of space and attention to ecological design, establishment of long-term maintenance

mechanism and rich activity planning, strengthening publicity and education, and building a participation platform can fully tap the park's potential and make it better serve the community ecology and social development. With the continuous evolution of urban development and residents' needs, the role and function of urban micro-parks in the community social ecosystem still need further in-depth study to continuously optimize the utilization of urban space and improve the quality of life of residents.

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