

Landscape Planning and Design of Children's Parks from a Child-friendly Space Perspective: A Case Study of Guanshanhu Children's Park in Guiyang City

Rui Gong^{1*}

¹ School of Karst Science, Guizhou Normal University, Guiyang, China

Email Address

825442005@qq.com (Rui Gong)

*Correspondence: 825442005@qq.com

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Abstract:

Amidst rapid urban development, children's play spaces have significantly diminished, with urban areas largely dominated by office buildings, commercial streets, and residential complexes. The scarcity of dedicated activity areas, combined with academic pressures and children's psychological needs, has limited their access to engaging, participatory, and friendly urban environments. To better support the holistic physical and mental development of children, this study takes Guanshanhu Children's Park as a case study. Guided by the "Dual-Friendly" framework—prioritizing both child-friendly and environment-friendly principles—this research integrates children's psychological and behavioral patterns into the design of outdoor spaces. By adapting landscape planning to the existing site conditions, the project aims to create dynamic activity zones that encourage children to interact with nature. Through this approach, the design seeks to foster environmental awareness, safety consciousness, and a sense of companionship, ultimately establishing an inclusive and supportive open space for children.

Keywords:

Friendly Space, Children's Park, Planning and Design, Safety and Health

1. Introduction

With the acceleration of urbanization and the transformation of the social economic structure, dual-career families have become a common phenomenon. Due to work-related stress, parents have significantly reduced the time for parent-child interaction, and the responsibility for child care and emotional support has gradually shifted to grandparents or school teachers [1]. This change in the care model has potential negative impacts on children's psychological security, potentially leading to social withdrawal, reduced communication willingness, and other mental health problems. Over time, children's dependence on public spaces during their growth has increased,

while existing urban public spaces often lack systematic design tailored to children's behavioral characteristics and psychological needs [2].

In this context, the fair rights and healthy growth environment enjoyed by children in urban living spaces have increasingly become the focus of social attention. Building a child-friendly society has become an urgent public issue to be advanced [3]. Therefore, in response to the challenges in children's growth environment during the urbanization process, by exploring child-friendly space planning strategies and institutional support paths, we aim to promote the all-round development of children in physical, cognitive, emotional, and social aspects [4]. Child-friendly space environments, such as safe outdoor activity areas and interactive landscape facilities, can effectively enhance children's psychological security and promote the development of their social willingness and communication skills. Moreover, integrating the systematic construction of a child rights protection system is a key prerequisite for achieving their comprehensive and balanced development, laying an important foundation for their future active integration into society and assuming the responsibilities of the times.

2. Theoretical Background

2.1. The Concept of Child-Friendly Environments

"The Concept of Child-Friendly Environments" represents a continuously evolving core principle, centered on the respect and fulfillment of children's fundamental rights, as well as the systematic optimization of their growth environments and conditions. This concept traces its origins to the 1989 United Nations Convention on the Rights of the Child, which established four fundamental rights for children—the right to life, survival, development, and participation—and emphasized society's responsibility to respect and ensure the realization of these rights [5].

Building upon this foundation, "child-friendly" is defined as an environmental, policy, or operational orientation aimed at protecting and promoting children's rights, well-being, and holistic development. In practical terms, the child-friendly approach permeates multiple domains, including education, health, social welfare, recreation, culture, and legal systems. Its fundamental objective is to provide appropriate conditions for children's growth through institutional and resource support, enabling the full development of their potential.

The construction of child-friendly environments and policies is embodied in a set of interconnected core principles. The cornerstone of this framework is the principle of rights protection, which emphasizes the establishment of a comprehensive legal system to safeguard children from abuse, exploitation, violence, and discrimination. Another critical focus is the principle of environmental safety, aimed at creating clean and secure learning and development spaces for children. Furthermore, the long-term orientation of this concept lies in implementing the principle of equal opportunity, ensuring that every child can realize their unique potential and achieve comprehensive and healthy development through supportive policies.

2.2. Research Significance

Children's activities primarily take place in indoor and outdoor settings, with well-designed outdoor environments playing a crucial role in fostering a positive atmosphere for engagement. Such environments actively contribute to children's

growth, development, and overall physical and psychological well-being. The design of children's parks should emphasize innovation and interactivity, incorporating diverse elements and facilities to stimulate children's interest and creativity. For instance, the introduction of challenging play equipment such as slides and trampolines not only promotes physical fitness and vitality but also encourages teamwork and strategic thinking.

Furthermore, simulated settings like miniature farms or urban street scenes can be integrated into park designs, allowing children to engage in role-playing activities that enhance their understanding of different social roles and environments. A child-centered approach should guide the planning of these spaces, addressing both behavioral and psychological needs while offering a variety of recreational and interactive experiences. By combining play with education and social practice, children's parks can serve as venues for learning, growth, and communication, enabling children to enjoy a safe, healthy, and joyful childhood. Through collaborative efforts across various sectors, we are confident that children's parks will continue to improve, making an increasingly meaningful contribution to the development and well-being of future generations.

3. Characteristics of Child Development

Children aged 0-3 rely on physical sensory experiences to explore the external world and require consistent adult companionship and supervision. Play facilities combining water and sand are particularly suitable for this developmental stage, as they provide rich sensory stimulation and ample exploratory opportunities. Such activities not only support the development of motor skills and coordination but also facilitate the formation of positive parent-child relationships. Therefore, interactive engagement with water and sand represents a highly beneficial approach to promoting holistic development and enhancing cognitive abilities in early childhood.

Children aged 3-6 have fully mastered independent walking and, through kindergarten experiences, begin to develop early social behaviors, though their psychological states remain notably unstable. Characterized by intense curiosity and rich imagination, they exhibit a strong preference for role-playing games. Therefore, play equipment such as slides and themed cartoon facilities serve as optimal choices for this developmental stage.

Children aged 6-12 experience progressive cognitive development, demonstrating enhanced logical reasoning capabilities and increased physical activity intensity. This age group exhibits growing self-regulation and begins to consciously engage in structured group activities and sports. With the continued strengthening of learning capacity and systematic thinking, climbing-based recreational facilities effectively meet the developmental needs of these children [6].

Adolescents aged 12-18 undergo a critical transitional phase from childhood to maturity, marked by the development of abstract logical thinking alongside concrete-imaginal cognition. During this period of physical and psychological transformation, they form distinct competitive awareness and engage in more intensive physical activities, demonstrating a need for structured competitive sports such as basketball and soccer. Concurrently, participation in cultural and artistic activities is essential to foster intellectual growth and promote holistic development—integrating moral, intellectual, physical, aesthetic, and social dimensions [7].

4. Children's Park Planning Strategies

4.1. Research Subject

Guanshanhu Park is situated on both the northern and southern sides of the Guanshan Bridge in the Guanshanhu District of Guiyang City, Guizhou Province. As a central open-space park in the district, it is located approximately 12 km from downtown Guiyang and covers a total area of about 366 hectares, of which approximately 277 hectares are forested. The park features a diverse range of tree species and high vegetation coverage, making it an ideal site for public recreation and leisure. The park is accessible through a total of eight main and secondary entrances located on its eastern, southern, western, and northern sides [8].

The park exemplifies the typical karst landforms of Guizhou, where mountain runoff converges to form the lake, integrating natural elements such as water bodies, woodlands, hills, farmland, and lakes into a landscape of significant aesthetic value. The site designated for the Children's Park is bordered to the north by cultural facilities including a museum and a library, while its western, eastern, and southern edges are adjacent to residential buildings, schools, and a convention center. The project site, located in the northern part of the park, features a distinctive topography. Within the defined project boundary, the planning focuses on developing child-friendly outdoor activity spaces in the children's park (Figure 1).



Figure 1. Current Site Conditions of the Children's Park.

4.2. Existing Problems

4.2.1. Interaction in Friendly Spaces

Addressing the need for direct interaction among children is of paramount importance. To create an environment conducive to their growth and development, it is essential to consider their social interactive needs and provide corresponding opportunities and resources. This involves incorporating dedicated social spaces—such as playgrounds and resting areas—into the design, which should be capable of accommodating multiple children for play and interaction. In child-friendly spaces, opportunities and settings that promote socialization should be prioritized. For instance, multi-user play equipment can be introduced in activity zones to encourage cooperation and interaction among children. Similarly, resting areas can be furnished with comfortable seating and tables to facilitate communication and social engagement. To further enhance direct interaction, structured activities and group games can be organized. These may include team competitions, role-playing, and intellectual games, through which children can learn to cooperate, share, and communicate with their peers. Such activities not only strengthen social bonds but also help cultivate a sense of collectivity and team spirit.

Through these integrated measures, a positive, engaging, and interactive environment can be established, providing children with favorable conditions for holistic growth and development.

4.2.2. Play-Centric Perspective

It is crucial to consider the play perspective of children, as their activities of play and exploration within a space significantly impact their cognitive, emotional, and social development. First, children's height and body size must be taken into account. Since children are shorter and smaller than adults, their perception of space differs considerably [9]. Designers should determine spatial dimensions and proportions based on children's eye level and physical stature. Moreover, to ensure that various elements are accessible to children, designers may incorporate adjustable-height features, such as tables and seating. Given that children often exhibit strong curiosity and a desire for exploration during play, appropriate measures must be implemented to ensure their safety. Finally, designers should also account for children's range of movement within the space, ensuring that they can move freely without encountering physical obstacles.

Through rational planning and thoughtful design, a healthy, safe, and stimulating environment can be created for children, thereby promoting their holistic development.

4.2.3. Transportation Accessibility

The issue of children's accessibility involves how children travel to and from such spaces, as well as how easily they can utilize the facilities and resources within them. During the design process, careful consideration must be given to how children reach these spaces, ensuring convenient access via public transport, walking, or cycling. Safety and traffic should be close to the comfortable natural environment of children, and within a walking tour distance range [10]. Furthermore, the safety and completeness of infrastructure such as footpaths, bicycle lanes, and sidewalks are essential to enable children to reach their destinations safely. Within child-friendly spaces, it is important to provide amenities and equipment tailored to children's age groups and developmental levels. These may include playgrounds, outdoor sports facilities, libraries, schools, and childcare centers. Such amenities should be distributed as evenly as possible to ensure broader and more equitable access for

children. Safety in child-friendly spaces is of utmost importance. Throughout the design and planning process, the safety needs of children must be thoroughly addressed [11].

4.3. Planting Design Principles and Configuration

4.3.1. Design Principles

For children, the seasonal transformations of plants serve as the most vivid primer on the cycle of life—from the fragrant blossoms of spring and the shaded canopies of summer, to the crimson foliage of autumn and the quiet dormancy of winter. Children, driven by innate curiosity, often interact more directly with plants than adults do. Therefore, plant selection within the planning area must prioritize safety. Trees suitable for providing shade should be selected as the primary planting type, while all toxic species—including those with harmful flowers, leaves, or fruits, such as oleander—must be excluded [12]. Similarly, plants with thorns, such as Chinese holly, black locust, and rose species, should be avoided to prevent skin injuries or damage to clothing. Species that may cause irritation or emit strong odors, like the lacquer tree, are also unsuitable due to the risk of triggering allergic reactions. Additionally, plants prone to pests and diseases, or those bearing messy berries—such as persimmon and mulberry—should not be used. To establish a safe botanical environment for children in the park (Figure 2), turfgrass varieties with high trampling tolerance should be selected for lawn areas.

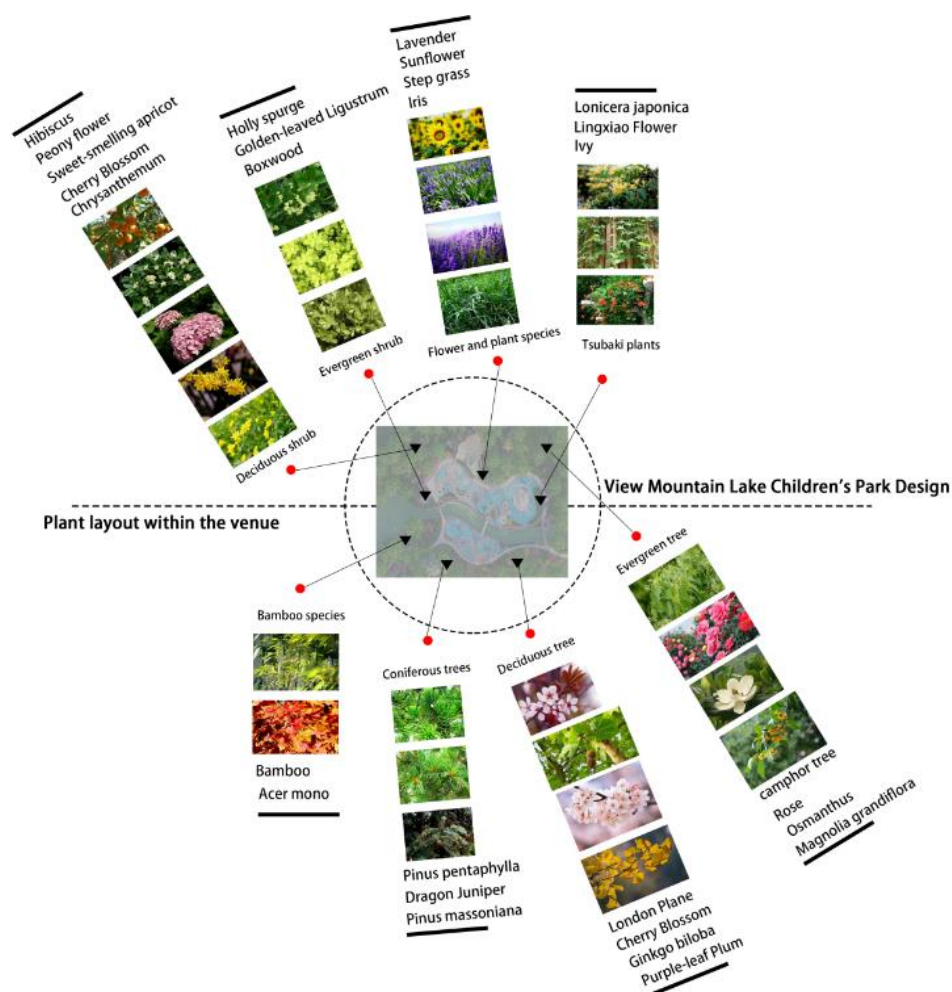


Figure 2. Selection of Child-Safe Plants.

4.3.2. Planting Design for Mountainous Terrain

In the design of rockeries within the children's park, plant species characterized by low height, slow growth, short internodes, small leaves, abundant flowering, and vibrant coloration have been selected. Species such as *Lonicera japonica* (Japanese Honeysuckle), *Lonicera sempervirens* (Coral Honeysuckle), and *Hedera helix* (English Ivy) are employed for this purpose. Along the earthen slopes surrounding the park area, flowering trees of consistent thematic species are planted as backdrop vegetation. Selected species include *Bougainvillea glabra* (Paperflower), *Prunus persica* (Peach), *Prunus serrulata* (Japanese Cherry), and *Osmanthus fragrans* (Sweet Osmanthus). This planting strategy aims to create a harmonious botanical composition that ensures "scenic beauty throughout all four seasons, with each season presenting a distinct landscape."

4.3.3. Turfgrass Planting Design

all arboreal species such as *Cinnamomum camphora* (Camphor Tree), *Pinus massoniana* (Masson Pine), and *Ginkgo biloba* (Ginkgo) have been selected as backdrop trees within the lawn areas. These species serve to functionally zone the space, create relatively tranquil environments, and contribute beneficially to the microecology. In terms of seasonal coloration, *Acer palmatum* (Japanese Maple), *Acer palmatum* 'Dissectum' (Featherleaf Japanese Maple), and other species from the *Aceraceae* family have been incorporated. These provide red tones in spring, green in summer, and transition to red again in autumn, offering dynamic seasonal variation. Year-round color is ensured through the inclusion of *Ligustrum × vicaryi* (Golden Privet) and *Loropetalum chinense* var. *rubrum* (Chinese Fringe Flower). The lawn planting follows a structured hierarchy of trees, shrubs, and herbaceous species. A multi-layered composition is achieved by planting *Acer palmatum* and *Prunus cerasifera* (Purple-leaf Plum) at 3-meter intervals, complemented by *Cupressus funebris* (Chinese Weeping Cypress) and *Liquidambar formosana* (Formosan Sweetgum) spaced at 5-meter intervals. This arrangement creates a textured grove displaying green, red, purple, and yellow hues, which not only enhances the sense of tranquility but also helps mitigate noise transmission from the children's park to adjacent residential areas.

4.3.4. Planting Design for Pathways

The planting design along the pathways in the children's park adopts a multi-layered approach, combining trees, shrubs, flowering shrubs, and groundcover plants to create engaging and dynamic path landscapes. At the entrance sections of the paths, bamboo groves are strategically placed, while further sections feature extensive plantings of *Acer palmatum* (Japanese Maple), *Acer palmatum* 'Atropurpureum' (Red Japanese Maple), *Rhododendron simsii* (Azalea), along with other mid- and lower-layer colorful foliage trees, flowering shrubs, and herbaceous groundcovers. This planting strategy creates a landscape that blends natural woodland charm with intentionally curated color composition, forming a visually rich backbone for the scenic areas within the park. The circuitous layout of the pathways, with each bend revealing new vistas, allows children to experience ever-changing scenery during play. This design not only enhances their interaction with nature but also facilitates botanical learning through exposure to diverse and visually appealing plant species.

4.3.5. Plant Application in Built Structures

The strategic arrangement of plants can significantly enhance children's appreciation of the park environment. By utilizing diverse plant materials and applying site-specific, seasonal, and scene-oriented artistic configurations—such as borrowed views, framed scenes, and opposing vistas—the design provides children with varied visual experiences and perspectives. Around children's play facilities, low-growing flowering shrubs and groundcover plants—such as daisies, azaleas, and tulips—should be planted to ensure both safety and accessibility during play. Near fixtures such as lamps, benches, paving areas, and trash receptacles, groundcover plants and flowering species like irises, primroses, salvia, carnations, and *Exacum affine* can be incorporated. These plantings not only facilitate the use of the facilities but also enrich the color palette of the park. To maintain dynamic seasonal variation, annual plants should be prioritized wherever possible, ensuring continuous visual interest and botanical diversity throughout the year across the planned landscape.

4.4. Design Strategies

4.4.1. Ecological Friendly Design

In the planning and design of children-friendly natural spaces, various natural factors need to be comprehensively considered to create a safe and reliable environment, with the foundation of ensuring the physical and mental safety of children. By integrating natural elements such as water bodies, sand, and climbing structures into the game and entertainment facilities, the interactivity and experience of the space can be enhanced. The plant configuration is divided according to functions into areas for relaxation and shade, viewing activities, plant education, and special display, and the diversity of the environmental site is utilized to promote children's physical development, cognitive improvement, emotional cultivation, and social skills development.

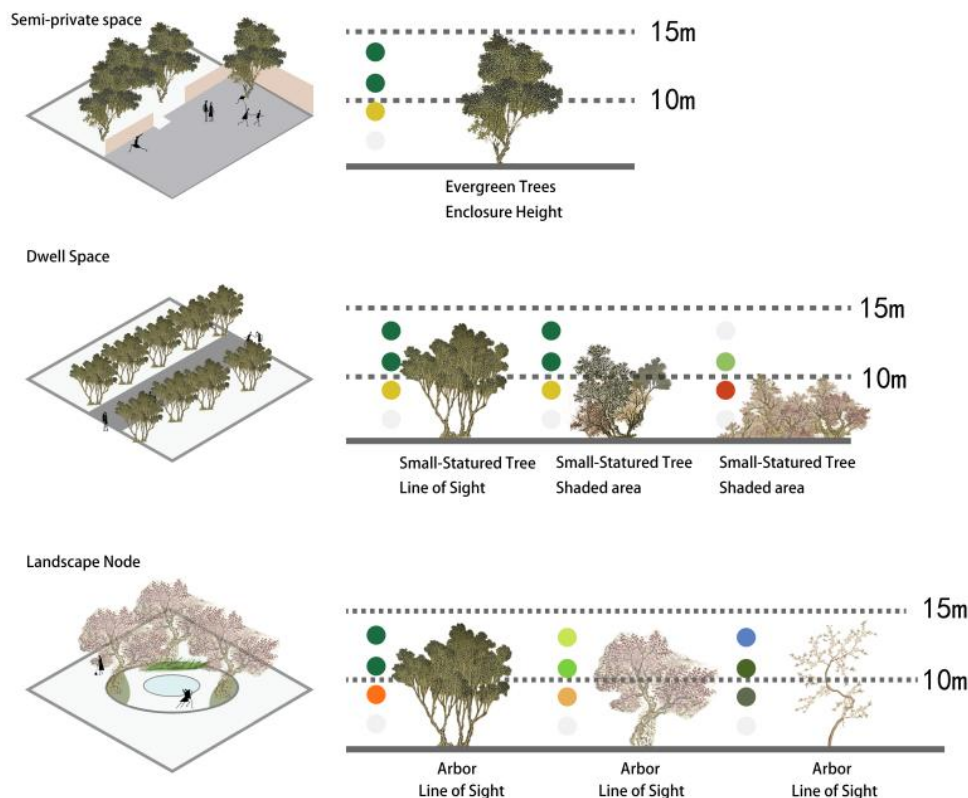


Figure 3. Analysis of Botanical Recreation Areas.

In the vegetation planning of the children's park, the principles of sustainability and ecological protection should be fully implemented. Eco-friendly materials and resources should be given priority to minimize the disturbance to the natural environment. At the same time, through behavioral guidance and educational demonstrations, children's awareness of conserving resources, reducing waste, and protecting biodiversity should be cultivated, enabling them to understand the value of nature through hands-on experiences. Integrating the natural system into the children's activity space and properly utilizing the spatial dimensions can help create an ideal growth environment that supports their all-round development (Figure 3).

4.4.2. Adaptive Functional Zoning

Well-planned circulation routes are essential in child-friendly spatial design, ensuring optimal experiences and developmental opportunities for children (Figure 4).



Figure 4. Play Route Planning.

The following functional zones can enhance both recreational and educational value:

(1) Creative Activity Zone

This area features dedicated spaces for artistic expression, including painting walls and clay modeling stations, to stimulate children's imagination. Art-inspired installations can be incorporated to encourage creative replication and innovative craft-making.

(2) Active Play Zone

Designed with age-specific considerations, this zone includes developmental play equipment such as slides, climbing mounds, swings, and trampolines. These facilities not only engage children's interests but also improve physical coordination and motor skills[13].

(3) Knowledge Exploration Zone

Educational elements are integrated through botanical labels detailing growth characteristics and ecological habits, complemented by interactive walls illustrating health and safety knowledge. This allows children to acquire practical knowledge through play, combining enjoyment with learning.

(4) Scenic Interaction Zone

Themed viewing platforms accessible via child-friendly climbing routes encourage physical engagement and reward persistence. Reaching elevated viewpoints fosters a sense of accomplishment and expands perceptual awareness.

(5) Interactive Exhibition Zone

A dynamic display area for children's artistic and scientific creations stimulates peer interest and promotes participatory learning through example.

In summary, a comprehensively programmed child-friendly space should incorporate diverse functional areas to address varied needs and interests. Such environments provide safe, engaging, and educational settings that actively contribute to children's holistic development (Figure 5).

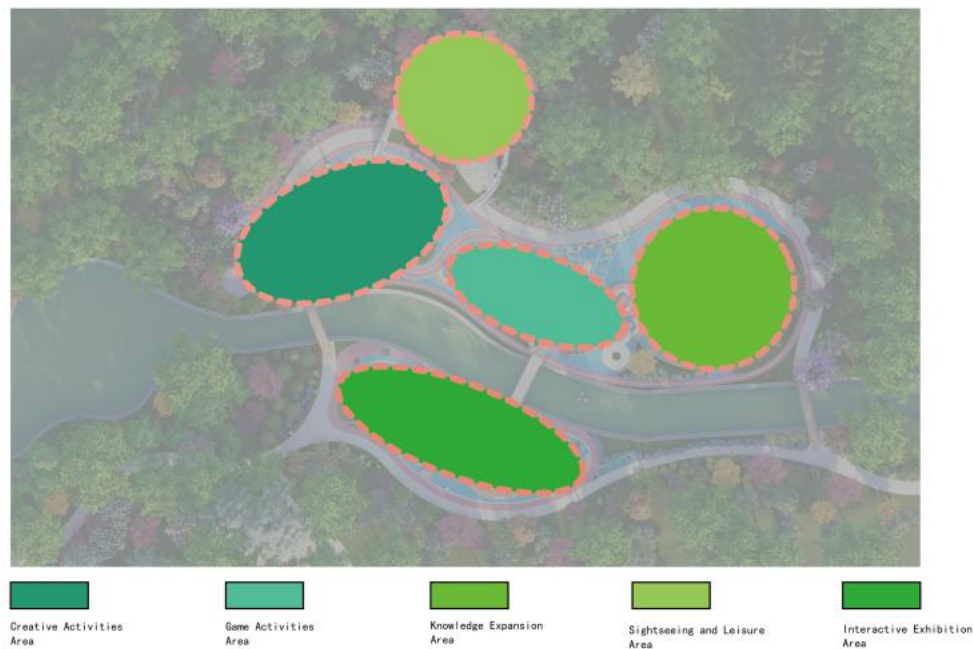


Figure 5. Functional Zoning.

4.4.3. Developmental Education Principles

In spatial planning and design, children's education constitutes a critical dimension. It extends beyond mere reading or knowledge acquisition to provide opportunities for holistic development. Child-friendly spaces create relaxed and comfortable learning environments that encourage children to explore, learn, and discover. Such environments typically incorporate vibrantly colored and playful site installations and decorations, along with educational resources and materials tailored to different age groups. These settings enhance children's ability to concentrate and engage in learning activities, thereby stimulating learning interest across various developmental stages. Child-friendly spaces generally offer diverse educational programs to meet children's varied needs and interests (Figure 6). Through these multifaceted educational offerings, child-friendly spaces promote comprehensive development while cultivating creativity, imagination, and problem-solving skills.



Figure 6. Comprehensive Functional Space Display.

5. Conclusions

Case-based design analysis in regional landscape planning enables more effective application of child-friendly spatial concepts in practice. Through the design of child-oriented service facilities, thoughtfully curated plant configurations, and carefully considered spatial perspectives, we can create engaging environments that genuinely serve children's needs. Establishing child-friendly activity spaces in urban areas, along with promoting exemplary practices, will encourage more landscape planners to substantively incorporate children's multifaceted requirements into the design process, thereby laying a solid foundation for social development.

Guided by the “Dual-Friendly” concept (child-friendly and environment-friendly), continued emphasis on children's safety and health will drive the innovation of further strategic research.

The design of child-friendly spaces is not a one-time task but rather a process of continuous improvement and evaluation. Subsequent efforts should include systematic collection of feedback from children and parents, regular assessment of spatial usage patterns and safety performance, and timely adjustment and optimization of design solutions. Through ongoing learning and innovation, we can ensure that child-friendly spaces consistently meet children's evolving developmental needs and effectively promote their holistic growth.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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