

Design of Children-Friendly Sports Park in Daxi North, Ninghai City, Zhejiang Province

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Abstract. Due to urbanization, the space available for children's activities in cities is shrinking, as urban environments are becoming more high density. An increasing number of parents and educators have noticed the importance of outdoor play in children's physical and mental development in recent years, as well as the importance of contact with the natural environment in developing children's environmental awareness. Thus, it has become a natural requirement of social development to design park environments that meet children's play and learning needs and support their multisensory development. This project is based on the functional concept of landscape, culture, and sports, in which children are the primary users of the space, while the shared use by parents, caregivers, and other citizens is also taken into consideration, in order to meet the growing demand for cultural and sports activities. The main objective of this design is to explore and apply a design solution that meets the needs of children's natural education activities through the integration of the concept of natural education into the design of a child friendly park. The aim is to create a multi functional park that integrates nature, culture, and sports, while providing children with a safe, interesting, and educational environment for growth.

Keywords: Child-Friendly, Sports Parks, Natural Landscapes, Park Landscaping

1. Introduction

As urbanization evolves and the demand for urban space grows, parks become an important element to enhance the quality of life of residents and contribute to the image of the city. The development of child-friendly areas and cities has been encouraged in recent years by the China National Program for Child Development (2021-2030). Nevertheless, in large cities, the lack of space for children's activities is still a persistent problem.

Due to the implementation of the concept of modern urban civilization and an emphasis on children's rights, the introduction of child-friendly parks targeted at children is becoming a significant aspect of urban development [1]. The design of child-friendly parks in the international context aims to integrate natural surroundings and sustainable development, with a focus on child-led exploration; domestic child-friendly parks are more concerned with safety, education, and cultural heritage.

Cases such as Shenzhen Pingshan Children's Park have shown that the model integrating natural education and culture can effectively meet the needs of children's growth.

As the most direct spatial venue for children to connect with nature, outdoor activity spaces for children provide more opportunities for them to engage with nature [2]. Based on the concept of "landscape + culture and sports" and combined with the design practice of North Daxi Children's Park in Ninghai, this paper proposes a planning strategy for multi-functional child-friendly parks, providing a reference for the innovation of urban public spaces.

2. Project overview and design concept

As shown in Fig. 1, North Daxi Children's Park in Ninghai is located in the core urban area of Ninghai County, Ningbo, Zhejiang Province. It is an urban open space that integrates natural landscapes and humanistic resources. The site is adjacent to Yuelong Mountain in the east and Daxi River in the south, with a flat terrain, abundant ecological resources, and convenient transportation. It is within a short distance from urban transportation hubs and major residential communities, making it capable of serving a wide range of people.

The surrounding communities have a dense population, while public green space resources are relatively scarce; thus, the construction of this park will become an important measure to supplement public services. In addition, Ninghai has a profound historical and cultural heritage—folk cultures such as traditional dragon dances, lantern dances, and local operas provide distinct regional characteristics for the park's design, making it not only a space for children's activities but also an important carrier for the display of urban culture.

The site enjoys superior natural conditions, belonging to a subtropical monsoon humid climate with distinct four seasons and abundant rainfall, as well as rich vegetation resources. The interior of the site has a broad field of vision; the water system in the south provides conditions for water-friendly experiences, and the mountain in the east forms a landscape background and a natural barrier.

The topography that is characterized by mountains and water gives the planning a multi-dimensional scope in design. The natural and cultural benefits of the project allow the design both to fulfill the needs of children's activities and to serve as a place for ecological education and cultural heritage.

The concept of building child-friendly cities is a new approach and undertaking in the high-quality development stage in China, and the construction of child-friendly urban parks is a spatial medium to promote the welfare of children. As the vision, the design concept provides a forest at the doorstep and a classroom outside the campus, with the focus on the comprehensive immersion of natural education, cultural heritage, and community sharing.

The project will create a safe, engaging, and exploratory growth space for both children and their families, and it will develop environmental awareness through multi-sensory experiences and interaction with nature. As it currently stands, the spaces that allow children to have activities in urban parks are too standardized, and their child-friendliness should be enhanced [4]. Hence, the design follows the principle of being child-centered, considers the psychological and physical developmental requirements of children of various ages, and offers spaces that allow interaction between parents and children, adventure experiences, and community interaction, while avoiding standardized functional organization of space.

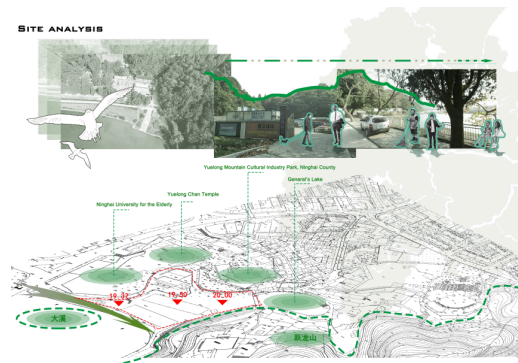


Figure 1. Site analysis

3. Overall layout

Fig. 2 indicates that the park follows a one axis, two rings, and four nodes spatial structure. It integrates the differences in the elevation of the site and the natural features to shape a landscape pattern with rich layers, and scientific planning results in creating a child-friendly park landscape with rich layers and smooth circulation. The design focuses on the rationality of functional zoning and the interest of the visit, which develops a safe, learning, and interactive environment, in which children grow and develop together with their respective families.



Figure 2. Master plan of North Daxi child-friendly sports park in Ninghai

3.1. Vertical design

The general landscape of the location is mild, with mountains nearby on the west, and the Daxi River on the south. The design makes use of the existing elevation differences to establish climbing frames, viewing platforms, and aerial walkways to create a vertical variation of 4.9 meters in the structure, which adds fun to exploration and layering of landscapes. The connection system between platforms and greening measures are embraced around buildings to achieve a natural process of transition between functional spaces. The general site layout is built on the terrain of the site, which implies safety and difficulty.

3.2. Landscape structure

The park planning is in the form of the one axis, two rings, and four nodes, as illustrated in Fig. 2: the main axis will penetrate through the central zone of the park; the two ring trails will join the different functional zones; and the four nodes will perform the functions of entrance reception, water

entertainment, sporting challenges, and rest and viewing (Fig. 2). This design also considers the landscape ecologically and in terms of efficiency in use, which gives a continuous visiting experience to children.

3.3. Functional zoning

As illustrated in Fig. 3, the functional areas are distributed sequentially in the form of the entrance area, water play area, sports area, and themed amusement area, which follow the east and west directions respectively. Greenery and fountains are introduced in the entrance area, around the play area, to create a pleasant ambience; the play area has water play facilities that offer water friendly activities which are safe for children; the sports area has sports equipment that fits the age requirements of children; the themed amusement area has facilities like climbing walls, sand pits, and slides which meet the needs of children. The landscape language and trails connect the functional areas, having independent but integrated spaces, which results in a profound visiting experience.

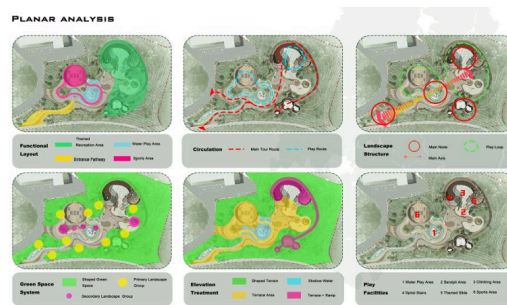


Figure 3. Functional zoning and landscape structure plan of the park

3.4. Visiting routes

The visiting paths follow the narrative plot of a fish leaping to become a dragon as the narrative central path, linking various functional nodes from the initial node of the stream start to a platform at the summit of the dragon. The walkways and viewing levels ensure that people get a multi-view experience, and the Returning to Serenity like Clouds resting area at the end gives visitors an opportunity to stay in a quiet place. The design of the traffic organization is very straightforward and free flowing, fulfilling functional purposes as well as adding cultural appeal. The general scheme blends cultural stories, ecological ideas, and the psychological needs of children, which are clearly reflected in the overall scheme. It forms a child-friendly park with safe, interesting, and educational features through vertical variations, functional combinations, and landscape routes, offering a new public service model for urban community spaces.

4. Landscape creation

4.1. Main structures

The key structures are based on the traditional folk culture of Ninghai, using the folk tradition called the Dragon Dance as their design inspiration, combining traditional cultural symbolism with contemporary entertainment facilities. The core area contains the main game device, the so-called Dragon Head, which represents power and intelligence and attracts children to play; the Dragon

Pearl area offers facilities such as slides, climbing walls, ladders, and sandpits to meet the requirements of children of different ages. The design focuses on the development of sports skills and cultural education: children can enjoy the beauty of traditional culture during play, developing cultural confidence and values. In order to increase interaction and cooperation, the structures are equipped with team game areas, where children learn to cooperate and share during play. Seating and pavilions are also provided to meet the resting needs of parents and children, further enhancing the overall experience.

4.2. Plant configuration

The concepts pattern design is also designed based on the local ecology, through using the new design concept of natural perception, cognitive participation, and systematic learning [2], and based on the principle of right tree in the right place that produces the landscape appearance of flowers in three seasons and scenery in all four seasons [6]. Arbors that are native like *Cinnamomum camphora* (camphor trees) and *Ficus microcarpa* (banyan trees) are used to form a green structure; the shrub layer is added with flowering shrubs like *Camellia japonica*, *Rhododendron simsii*, and *Osmanthus fragrans* to add more color and texture to the area; and groundcover planting is used, which consists of herbaceous plants and wildflowers with high adaptability, to construct a natural and low-maintenance ecological environment. The general scheme is aimed at the wholeness of ecological processes and landscape impacts as well, that provides a safe, comfortable, and diverse environment within which children can exercise.

The landscape design, as shown in Fig. 4, also incorporates cultural narrative with ecological design to give children the spatial experience that incorporates interests and education. The park design is not only effective in meeting play and leisure requirements, but also targets cultural heritage and environmental preservation, yielding long-term social and environmental sustainability for the park.



Figure 4. Rendering

5. Case comparison and insights

In this paper, good examples of children's parks based on natural education are given both at the local and global scale. Shenzhen Pingshan Children's Park is one of them. It focuses on the balance between play and ecology by maintaining the natural terrain and realising multi-functional zoning according to original mountain and ecological resources. On the other hand, the site area of North Daxi Children's Park in Ninghai is smaller and is enclosed by mature communities and rich cultural resources; hence, the project is more concerned with function integration and cultural expression in a small space to provide children with an efficient and multidimensional activity space.

The design insights to be synthesized based on the case comparison are as follows:

Respect nature and the ecological environment: Incorporate existing water bodies, vegetation, and terrain features, minimise human intervention, and attain ecological sustainability;

Promote cultural features: Regional cultural symbols should be emphasized to enhance the park in terms of recognition and cultural significance;

Pay attention to child development and interaction with communities: The design should respond to the physical and psychological needs of children of different ages and provide shared spaces where parents and community members can interact.

These experiences can be used as direct references in the design of the Ninghai project, enabling it to balance functional, cultural, and ecological values.

6. Conclusion

The design of North Daxi Children's Park in Ninghai takes "landscape + culture and sports" as its core concept, integrates natural education, cultural inheritance, and community sharing, and explores an innovative model of child-friendly urban parks. The project makes full use of the site's mountain and water resources as well as cultural heritage, constructs a spatial logic by combining narrative elements such as "Fish Leaping to Become a Dragon", and meets the needs of children and their families through the "one axis, two rings, and four nodes" layout and diversified functional areas.

This study shows that the design of child-friendly parks is not only an important means to improve community public spaces but also an effective way to promote ecological protection and cultural inheritance. This case provides referable strategies and methods for the planning and construction of similar urban parks in the future and has promotional value.

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