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FEATURES

Mountain Trail; Outdoor Hiking; Handmade Trail; Nature Education; Low Disturbance; Low Cost

PRACTICE REFLECTIONS

- The project employs nature-inspired design, low-impact construction, and the “Triple-Zero Principles” to balance trail functionality with the natural environment
- The initiative prioritizes the authentic aesthetic value of natural elements, seeking to reawaken public appreciation of nature’s inherent beauty
- The integration of landscape design, nature education, and volunteer participation establishes an innovative paradigm for showcasing site-specific ecological characters

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Fig. 1 A trail returning to nature.

Ecological Trails for Urban–Wilderness Integration: Practice and Reflections on the Hiking and Nature Education Trails in Donghu Park, Shenzhen, China

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1 Project Background

With the deepening of urbanization and the improvement of living standards, public attention has increasingly focused on physical health and mental well-being. This shift has catalyzed the rise of eco-conscious lifestyles as a prevailing social trend. In parallel, outdoor recreational activities such as hiking and mountaineering have surged in popularity, offering the public



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opportunities to reconnect with nature and relieve stress, thereby becoming a popular leisure choice among contemporary urban residents.

Mountain trails are vital ecological spaces for nature immersion, serving as essential infrastructure to meet the public demand for outdoor recreation. However, the prevailing reliance on overly artificial and hardened construction approaches in conventional trail design has led to multiple critical issues, including biodiversity

degradation, compromised landscape coherence, and weakened human–nature interaction. In the context of advancing ecological civilization in the new era, there is an urgent need to establish innovative design frameworks that reconcile human needs with ecological principles, thereby ensuring the sustainability of ecological landscapes.

Shenzhen, as a pilot demonstration city of ecological civilization, pursues high-quality sustainable development through

the “Mountain–Sea Vistas.” This initiative constructs a “Three Trails & Three Loops” long-distance hiking system, integrating the city’s representative bays, mountains, rivers, and regional green spaces into a cohesive ecological network. Leveraging its abundant mountain and water resources as well as its proximity to Hong Kong, China, Luohu District has emerged as a frontier in advancing regional ecological integration. Against the backdrop of deepening Shenzhen–Hong Kong exchanges, it has led the exploration of innovative design and construction paradigms for cross-boundary ecological synergy.

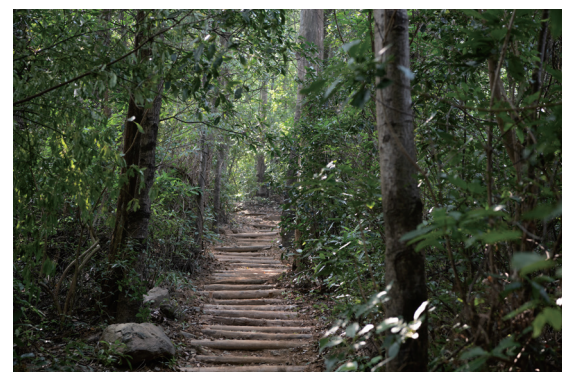
2 Design and Construction Process

2.1 Seamless Transition From Urban to Wilderness

In the route planning, the Hiking and Nature Education Trails in Donghu Park (Liantang Port Line) follow the principle of universal accessibility. Strategically connecting urban communities with long-distance hiking corridors, it provides an accessible pathway for citizens to experience mountain forest ecosystems. This approximately 2-kilometer trail represents one of the most convenient trails between Shenzhen and Hong Kong. Its southern entrance lies just 150 m from Liantang Port Metro Station, enabling a seamless transition from metropolitan



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Fig. 2 Field surveys to understand site features and natural resources.

Fig. 3 Fallen trees enriching the trail experience.

Fig. 4 *In-situ* stones forming natural landscapes.

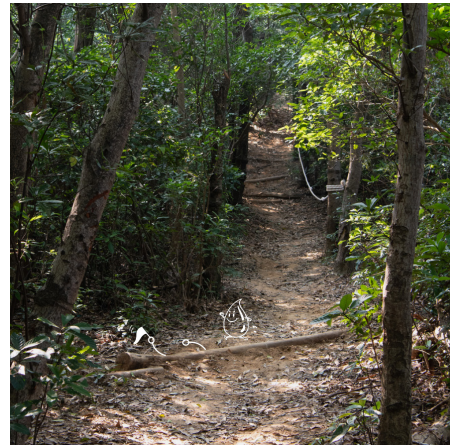
Fig. 5 Manual construction minimizing the disturbance to the environment and historic setting.

Fig. 6 A tranquil trail from metropolitan bustle.



Fig. 7 Trail-edge logs blending with exposed roots.

Fig. 8 Water-diversion logs guiding mountainous runoff.



bustle to tranquil wilderness. At its northern terminus, Mingcui Pavilion on the Wutong Greenway connects with Section 10 of the Kungpeng Trail—recognized by the China Mountaineering Association as one of China’s “Top Ten National Mountaineering & Outdoor Destinations of 2024”—offering direct access to advanced wilderness exploration.

2.2 Returning to the Aesthetics of Nature

The design celebrates the original landscape features of the trail, delving into its unique ecological character to preserve traces of natural succession and cultivate

site-specific aesthetic experiences. Native stones uncovered along the mountain path were retained in their undisturbed positions, forming intrinsic scenic elements that embody the wilderness authenticity. Fallen trees—iconic symbols of regional identity—were either adaptively repurposed or preserved *in situ*, enriching spatial narratives and enhancing sensory engagement with nature. Naturally formed tree arches were transformed into “challenge modules,” inviting physical interactions to foster deeper human–nature emotional bonds.

2.3 Low-Impact Construction Under “Triple-Zero Principles”

The mountain trail construction adopted a low-impact strategy by systematically integrating existing natural paths to minimize disturbance to vegetation and topsoil, while also reducing construction costs. Following the “Triple-Zero Principles”—zero expansion of cement paving, zero loss of ecological resources, and zero impact on natural environments—the project excluded the use of cement and other hardening materials. Instead of heavy machinery, manual trail-building techniques relying on hand tools were employed, significantly reducing ecological disturbance.

2.4 Eco-Engineering Techniques Integrated With Nature

The project combined natural materials (timber, stones, etc.) and simple yet robust eco-engineering techniques to seamlessly blend the trail into its environment. Trail-edge logs define pathway boundaries while merging with exposed tree roots to create cohesive natural structures. Water-diversion logs can effectively direct runoff, preventing puddling and maintaining the



Fig. 9 Interpretive panels for science education.

Fig. 10 Public participation in trail construction and maintenance, reflecting shared commitment to the site.



healthy rhythm of natural water flow. Fallen branches and decaying wood were arranged into energy-dissipating barriers along slopes, simultaneously providing microhabitats for diverse organisms.

2.5 A Trail for Tailor-Made Nature Education

The mountain trail also serves as a living classroom for wildlife observation, where the development of specialized interpretive systems helps realize their full ecological education potential. By integrating distinctive flora and fauna resources and culturally significant stories into visually engaging interpretive panels, the project transforms the ecological history of the site into compelling narratives. This approach allows visitors to acquire environmental knowledge and biodiversity insights while hiking, thereby stimulating ecological curiosity

and fostering emotional connection with nature.

2.6 Co-Creation and Collective Stewardship for Public Awareness

Through diversified volunteer programs, the project promotes broad public participation in trail construction and maintenance, fostering awareness of human impacts on nature and cultivating a mindset aligned with ecological civilization. During the construction phase, more than 60 volunteer groups contributed to building earthen steps and installing trail-edge logs. After completion, ongoing clean-up initiatives were organized to reinforce the environmental stewardship consciousness among the public.

3 Project Review

Since their opening, the Hiking and

Nature Education Trails in Donghu Park (Liantang Port Line) have rapidly become a premier outdoor recreational destination for Shenzhen and Hong Kong, infusing green vitality into urban development and establishing a new paradigm for cross-border leisure within the Guangdong–Hong Kong–Macao Greater Bay Area. By amplifying the trail’s natural attributes anchored in ecology and enriched by culture, it integrates urban landscapes and cultural resources into the regional ecological network, showcasing a model of sustainable symbiosis between urban and wilderness spaces.

Competing interests | The authors declare that they have no competing interests.

Project Name: Hiking and Nature Education Trails in Donghu Park (Liantang Port Line)
Location: Luohu District, Shenzhen City, China
Size (area): 2 km (length)
Client: Urban Management and Comprehensive Law Enforcement Bureau of Luohu District, Shenzhen City
Landscape Architecture: Shenzhen Weiming Design Consulting Co., Ltd. (WMLA)
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Supporting Institution: Peking University Shenzhen Institute
Design Time: September ~ November 2024
Completion Time: December 2024



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Fig. 11 Wooden hammocks offering comfort and relaxation.

Fig. 12 Well-placed resting spots along the trail.

Fig. 13 Clear signage guiding the way.

Fig. 14 Check-in point with representative plants in Shenzhen and Hong Kong.