



# 长沙中航城国际社区山水间公园 HILLSIDE ECO-PARK OF ZHONGHANG CATICITY COMMUNITY IN CHANGSHA

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1. 转动抽水器戏水的孩子们 (抽水器左边转盘为凹透镜, 右边转盘为凸透镜)。

1. Children playing with the water in-take device — there is a concave turntable on the left and a convex one on the right.

## 1 项目背景

在城镇化快速发展的当下, 高密度集约化的土地开发模式已成为城市发展的重要特征。因应这一现状, 我国正积极开展“海绵城市”建设, 以试图平衡土地开发、休闲游憩与雨洪管理之间的关系。

在过去, 当许多理念、概念作为“舶来品”引入国内时, 人们通常仅关注其外化的形式, 而易于忽视其内在的逻辑关系。海绵城市作为一种管理场地水文的开发模式, 其往往涉及到诸多非工程方面的影响因素。设计师应避免让公众将海绵城市简单理解为解决场地径流的工程方法, 而需运用恰当的设计方法, 在环境体验、教育、认知(参与性)等多个方面实现公众引导。

高密度住宅社区是我国集约型土地开发的重要实践场地。作为住宅社区重要的开放空间, 社区公园是海绵城市建设的理想场所。山水间社区公园地处长沙市雨花区, 是

湖南长沙中航城国际社区的重要公共绿地。全园绿地面积1.4hm<sup>2</sup>, 在全区开发用地总面积中所占比例较低(7.2%)。社区公园一大难点在于如何在满足社区住户日常生活使用的同时, 在有限的开放空间中运用“参与性”设计最大程度地激发公众活力。同时, 场地位于整个社区的低势区域, 其中原有大量林地和池塘, 生态基础良好, 具备进行生态复育和雨洪管理的条件。设计团队借此契机, 力图从参与性与生态性两方面切入, 将环境体验和教育与人们的日常活动相融合, 创建一种“参与性生态”的新型高密度社区公园。

## 2 设计策略

### 2.1 参与性设计

该项目力图在保留自然环境的基础上最大化整合人们的日常活动需求。其中, “参与性”设计通过对全园景观的构建, 将参与

### 摘要

高密度居住社区是我国人居环境的重要组成部分, 作为其重要开放空间的社区公园也与居民日常生活息息相关。本文系统阐述了张唐景观在长沙中航城国际社区山水间公园设计中探索“参与性”及“生态性”的逻辑策略及技术手段, 反映了景观设计师当下对于高密度社区公园建设的新思路。

### 关键词

社区公园; 参与性; 雨洪管理; 生态设计

### ABSTRACT

High-density residential communities are a critical part of the Chinese living environment. Equally important are neighborhood parks which play an integral role in residents' daily lives. This article examines the strategies and techniques of the Hillside Eco-Park in Zhonghang Caticity Community, Changsha designed by Z+T Studio, for its participatory and ecological characteristics as a reflection of contemporary landscape design ideas.

### KEY WORDS

Community Park; Participatory; Stormwater Management; Ecological Design

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**项目地址:**  
湖南省长沙市雨花区

**项目面积:**  
1.4hm<sup>2</sup>

**项目委托:**  
长沙中航里城有限公司

**景观设计:**  
张唐景观设计事务所

**首席设计师:**  
张东、唐子颖

**项目团队:**  
张亚男、赵梓、周啸、蔡孙喜、刘昕、姜雪婷、王晨、王墨、姚瑜、林佩勤、郑佳林、刘洪超

**设计时间:**  
2014年8 - 12月

**施工时间:**  
2014年12月 - 2015年5月

**LOCATION:**  
Yuhua District, Changsha, Hunan Province

**AREA (SIZE):**  
1.4 hm<sup>2</sup>

**CLIENT:**  
Changsha Aviation City Co., Ltd.

**LANDSCAPE ARCHITECTURE:**  
Z+T STUDIO Landscape Architecture

**CHIEF DESIGNERS:**  
Dong Zhang, Ziying Tang

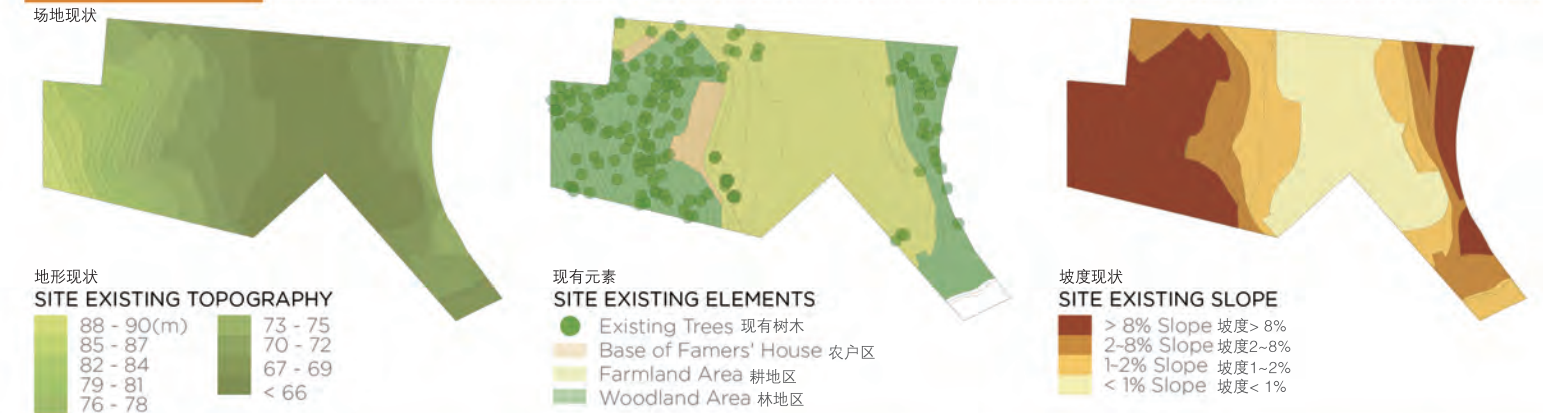
**PROJECT TEAM:**  
Yanan Zhang, Hua Zhao, Xiao Zhou, Sunxi Cai, Xin Liu, Xueting Jiang, Chen Wang, Mo Wang, Yu Yao, Peixun Lin, Jialin Zheng, Hongchao Liu

**DESIGN PERIOD:**  
August 2014 - December 2014

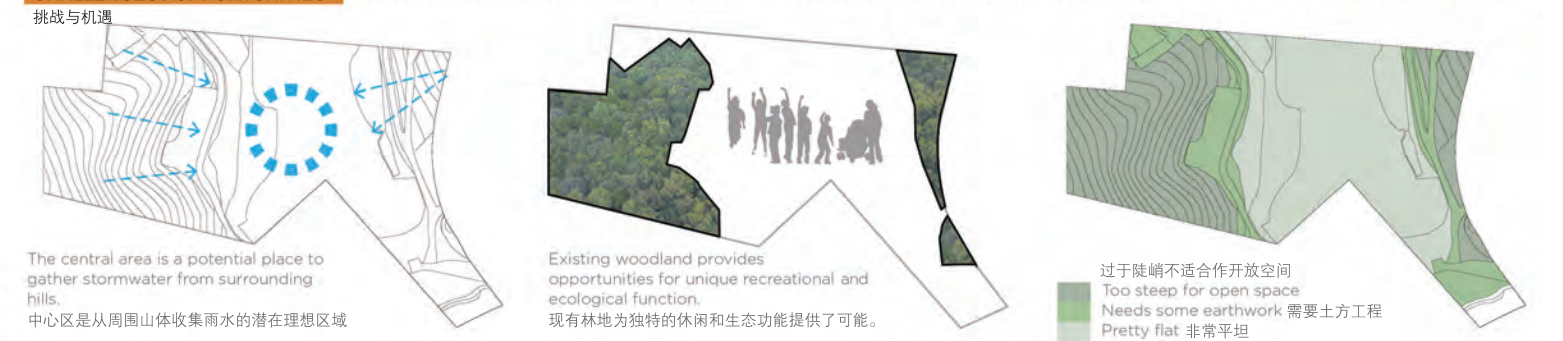
**CONSTRUCTION PERIOD:**  
December 2014 - May 2015



**EXISTING CONDITIONS**



**CHALLENGES / OPPORTUNITIES**



**DESIGN GOALS**



2. 总平面图
3. 场地分析图
2. Site plan
3. Site analyses

人群与景观元素的互动关系视为“活力”要素，并进行着重体现。

**2.1.1 入口水景**  
入口广场水景由考顿钢板LOGO水景墙及下方的镜面水池两部分组成。其中镜面水池被设计为一处薄水面（最深处仅6cm），可供儿童下水玩耍。

**2.1.2 阿基米德花园**  
阿基米德花园由阿基米德螺旋式抽水

器、观察水渠及雨水花园三部分构成。游人转动抽水器将湖水抽至观察水渠，而后流进雨水花园进行水质净化，最后再次汇入湖中。整个设计通过人力取水这一趣味方式，有助于人们参与并了解雨水净化过程。其中旋转转盘还被设计为凹面镜与凸面镜两种形式，为整个景观增添了美感和趣味性。

**2.1.3 山林乐园**  
在公园靠近保留山体一侧的山林乐园中，设计师们设置了一组以“栖息在山林中



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的大昆虫”为主题的大型互动雕塑群。其设计灵感来源于《格列佛游记》中的“巨人国”，这些昆虫雕塑（包括“大蚂蚁”、“大瓢虫”、“青虫说”以及“大蚯蚓”等）体量被夸大，从而营造出一种“巨虫国”的梦幻气氛。

“大蚂蚁”雕塑是以蚂蚁为原形，用直径8mm的钢条编织而成，后喷涂白色氟碳漆。这组雕塑共有三只蚂蚁，最大的蚂蚁在其尾部开洞，可供儿童钻入其中，体验变成“蚂蚁宝宝”的奇妙感受。

“大瓢虫”雕塑将瓢虫的形态抽象为半球形，表面采用镜面不锈钢加彩色喷漆处理，在满足孩子攀爬、滑梯等需求的同时，还在内部设置了一个八音盒，它的控制拨片与瓢虫眼睛相连，当人们转动“大瓢虫”的眼睛时，八音盒即可播放相应曲目。

“青虫说”雕塑将青虫的形态与传声装置结合。两端喇叭状的设计可有效加强声音的传播效果，使得孩童在娱乐的同时了解声音传输的知识。此外，该雕塑接近地面的部

分还兼备座椅的功能。

“大蚯蚓”滑梯由不锈钢滑道以及连接滑道的弧形塑胶地垫构成。整个作品形态模拟了蚯蚓的体节，并且依山就势设计了4组不同坡度的滑梯，以满足儿童的各种挑战需求。

山林乐园的互动设施还包括“木剧场”、“木桩森林”和“攀爬墙”。“木剧场”是一大片铺设在原有山体上、呈波浪状的不规则木平台，其变化的坡度和高差可供游人进行躺、坐、靠等多种休憩。“木桩森林”是由一组高达3m的木桩构成的互动装置，木桩之间可设置秋千或爬网，亦可作为攀爬木剧场时的扶手。“攀爬墙”是一处可以为儿童提供有氧运动的体育设施。通过越秀木爬墙、沙坑以及小黑板的空间组合设计，为儿童提供了更适宜交流的体验空间。

#### 2.1.4 环境教育标识牌

该项目设置了系列标识牌，使游人可以在环境体验中学习相关知识。例如，在入口

4. 入口广场考顿钢板水景墙和镜面水池
5. 雨水花园整石水坝
6. 滞留池（生态湖）和水生植物

4. The corten steel water wall and the interactive shallow pool at the entry plaza.
5. The rain garden dam made of a whole stone
6. The retention basin and aquatic plants



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区的亲水平台上，设计师们结合安全围栏设计了一款长约10m的标识牌，讲解内容涵盖了公园设计的主要原理和相关内容；在阿基米德花园、雨水花园和山林乐园中散置了一些小型标识牌，向游人说明与雨洪管理、植物以及昆虫相关的知识。

#### 2.1.5 社区活动中心及社区菜园

该项目所在场地目前为中航城国际社区的展示区，将在2018年全面改造为社区活动中心，为周边居民提供餐饮、健身、阅读等促进邻里交流的空间。阿基米德花园北侧设置了一处社区菜园，附近居民可以在此体验种植蔬果的乐趣，菜园的浇灌用水由院内收集的雨水提供，实现了自给自足的自然循环。

### 2.2 生态性设计

该项目因应活力与环境有机融合的理念，创新采用了雨洪管理与景观参与相结合的综合设计策略，设立滞留池和雨水花园等基础设施。项目场地年降水量1 450mm，蒸发量1 100mm，可利用雨水量4 984m<sup>3</sup>。经计算设计的两个总容积260m<sup>3</sup>的蓄水池可以满足三个月无明显降水的景观用水量需求。通过运用雨洪管理措施，力图使全园水文达到永续平衡，在管控特大暴雨雨量的同时，利用收集到的雨水资源维持全园景观用水需求，并改善其水质状况。为了实现以上目标，该项目采用了雨水循环系统、雨水利用系统以及水环境稳定系统三方策略。

#### 2.2.1 雨水循环系统

循环水系的构建是维系水环境稳定性的重要条件，故该项目首先构建了适用于全园的雨水循环系统，使得雨水径流得到循环利用。山水间社区公园雨水循环系统包括被动式和主动式两类。其中被动式循环系统通过地下蓄水设施收集来自集水范围内的地表径流，而后这些雨水将依次流入雨水花园和滞留池，最终通过循环设施循环流动。同时，设计团队创造性地运用了激活“参与性”的主动式循环系统，通过参与者手动使用阿基



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米德取水器来实现滞留池和雨水花园之间的水量输送。

### 2.2.2 雨水利用系统

该项目基于场地景观水文的实际状况及所面临的问题和挑战，透过滞留、入渗、过滤和净化4种主要的结构性措施，综合配置了诸如滞留池、雨水花园等设施，使得雨水资源能够基本满足全园景观用水的需求，并在水量和水质两方面对全园的雨水径流进行管理。

在雨水收集利用方面，通过将滞留池的滞留空间与地下蓄水池相结合，在降低成本造价的同时也增强了环境体验。该项目所蓄积的雨水径流除了可维持场地长达三个月无雨量补给情况下的景观用水需求外，还可以100%滞留10年一遇降雨延时24小时的特大暴雨径流量，缓解市政排水压力。

### 2.3 水环境稳定系统

该项目中水环境稳定系统主要针对滞留池的水质改善，包括4个步骤，依次为基底改良、可见度提升、水生植物群落构建和水生动物群落构建。通过构建水环境稳定系统改善径流的整体水质状况，使其达到国家地表水III类标准。

### 3 结语

社区公园承载着人们的日常生活，如何在社区公园建设上达到参与性和生态性的平衡是该类设计的关键性议题。张唐景观在“参与性生态”方面的不断尝试，旨在探索拉近人与自然距离的途径，力求在场地设计中达到“人性”的生态和“生态”的人性。LAF



7. 三只白色“大蚂蚁”被放置在活动草坪的最高点。
8. 正在用“青虫说”雕塑对话的母子。
9. 在“大蚯蚓”滑梯玩耍的孩子们。
7. The three "giant ants" on the top of the activity lawn.
8. A mother and her son talking through the "talking caterpillar."
9. Children playing on the "giant earthworm" slide.

10. “木剧场”提供了多种休憩的可能性。
11. “木桩森林”和“木剧场”
12. 木质“攀爬墙”与小黑板

10. The wood carpet provides various ways for relax.
11. The forest stakes and the wood carpet
12. The wooden climbing wall and the small blackboard

## 1 Background

High-density land development has been an important feature in China's current urbanization. In response to the rapid speed of development, China is actively engaged in building Sponge Cities (or Low Impact Developments) that act to better balance relationships between land development, recreation, and stormwater management.

In the past, when design concepts were imported to China, too much attention was given to organizing external features rather than internal logic. For example, the "Sponge City" model is one example of hydrological site management, and its factor often involves a complex set of design principles incorporating non-engineering elements. Designers should try to keep the public from misinterpreting Sponge City as a simple engineering solution to site runoff. A better model would be to show the public how Sponge Cities incorporate environmental experience, education, and design awareness or participation.

High-density residential communities are a critical element of China's development. This type of development requires intensive use of land, meaning that open space considerations are a crucial practical consideration. As such, neighborhood parks have become ideal sites for Sponge Cities. One example is the Hillside Eco-Park, the major public green

space of Changsha Zhonghang Caticity Community located in Yuhua District, Changsha, Hunan Province. Covering an area of 1.4 hectares, the park accounts for a very small total area of the community (7.2%). Despite this, the park is designed to meet the daily use of residents. Fulfilling such a range of needs in a limited open space meant that the park faced participatory design difficulties. However, the site also enjoyed the ecological advantage of being positioned within low topography, allowing for ecological restoration and stormwater management within the original woodlands and ponds. The designers combined participation and ecological features to incorporate environmental experience and education, creating a new "participatory ecology" within a high-density neighborhood park.

## 2 Design Strategies

### 2.1 Participatory Design

The designers sought to meet the residents' daily needs while maintaining the site's existing features. In this context, participation means highlighting dynamic interactions between people and landscape through the overall landscape design.

#### 2.1.1 Entrance Waterscape

The waterscape at the entry plaza is made of two parts. The first is a corten steel



water wall and the other is an interactive shallow pool where children can play benefiting from the shallow depth (6 cm at the deepest).

### 2.1.2 Archimedes Garden

The Archimedes garden consists of three parts: the Archimedes water in-take devices, an observation runnel, and rain gardens. A functional pump allows visitors to transfer water from the lake to the observation runnel. The water then moves into the rain gardens, where it is purified before returning to the lake. Allowing visitors to participate in the process is not only for fun, but also shows visitors how the landscape design is ecologically productive. Additionally, the interesting design of concave and convex turntables adds to the overall aesthetic quality of the space.

### 2.1.3 Mountain-Forest Paradise

In the remaining hillside, the designers installed large-scale "insects in a habitat" themed interactive sculptures in the "mountain-forest paradise." Inspired by "A

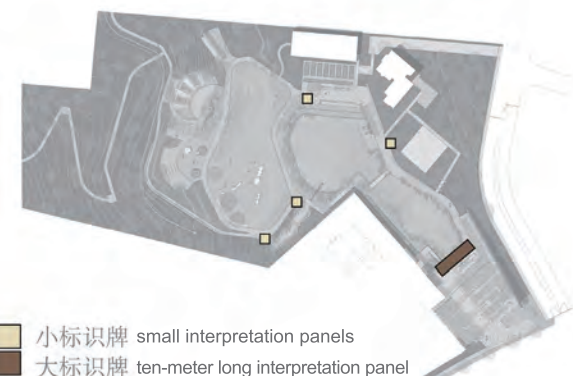
Voyage to Brobdingnag" in *Gulliver's Travels*, the insect sculptures are exaggerated in size, creating "a dream country of giant insects," which included the "giant ants," "giant ladybug," "talking caterpillar," and "giant earthworm."

Real ants are the prototype of the giant ant sculptures. As the steel bars which diameter eight millimeters weaved together, and coated with white fluorocarbon afterwards, three giant ants take shape. There is an open hole at the tail of the largest ant that allows children to go inside and enjoy the wonderful experience of being "baby ants."

The hemispherical shaped ladybug sculpture is an abstraction of real ladybugs, and made of color-painted and mirror stainless steel at the surface. The sculpture is an interactive play structure, meeting the children's need of climbing and sliding. A music box with control paddles connected to the ladybug's eyes plays music when its eyes are rotated.

The "talking caterpillar" is also an acoustic learning device. Sound travels

- 13. 环境教育标识牌
- 14. 雨洪管理数据分析图
- 13. The educational interpretation panels
- 14. Data analyses of stormwater management

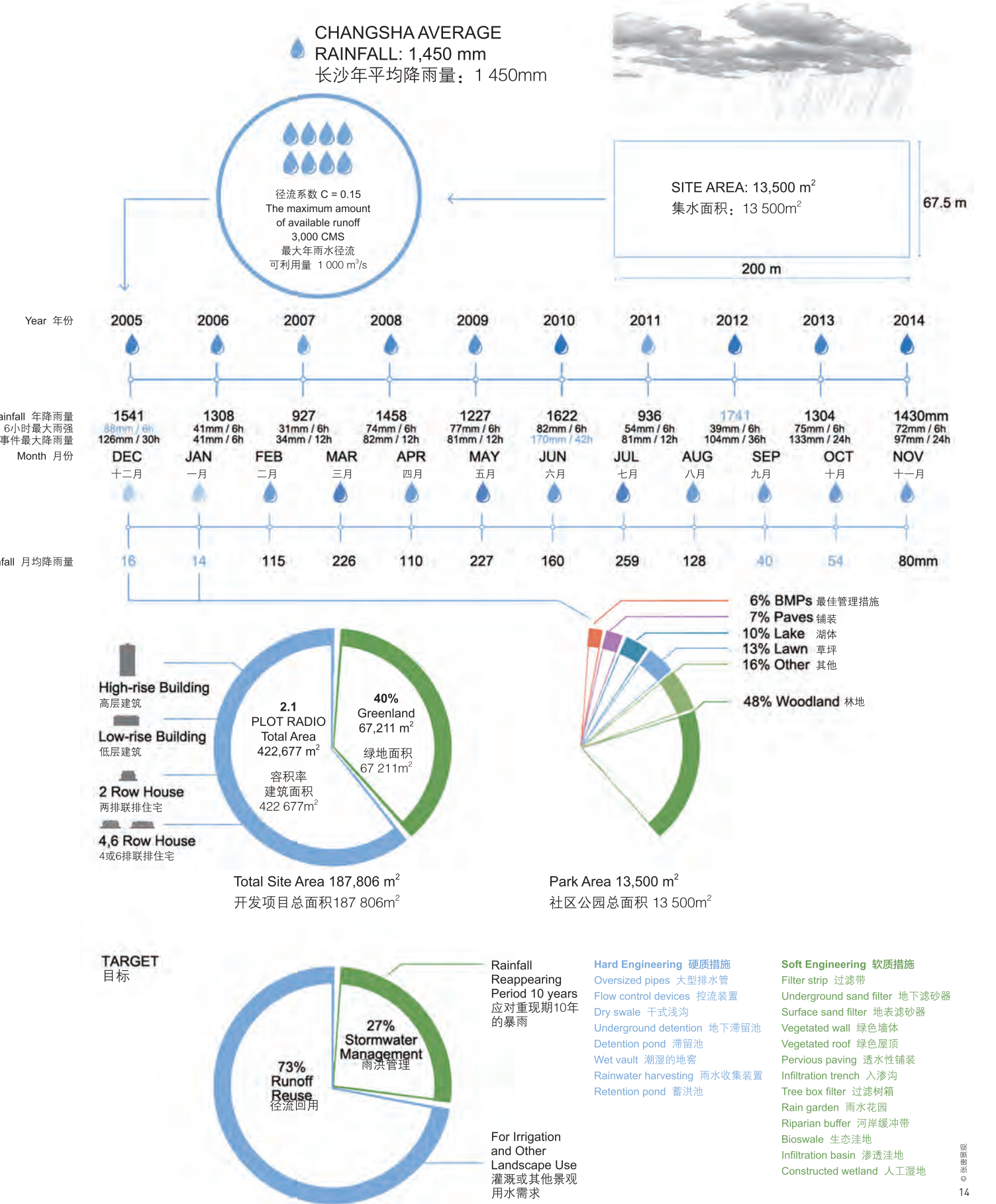


小标识牌 small interpretation panels  
大标识牌 ten-meter long interpretation panel

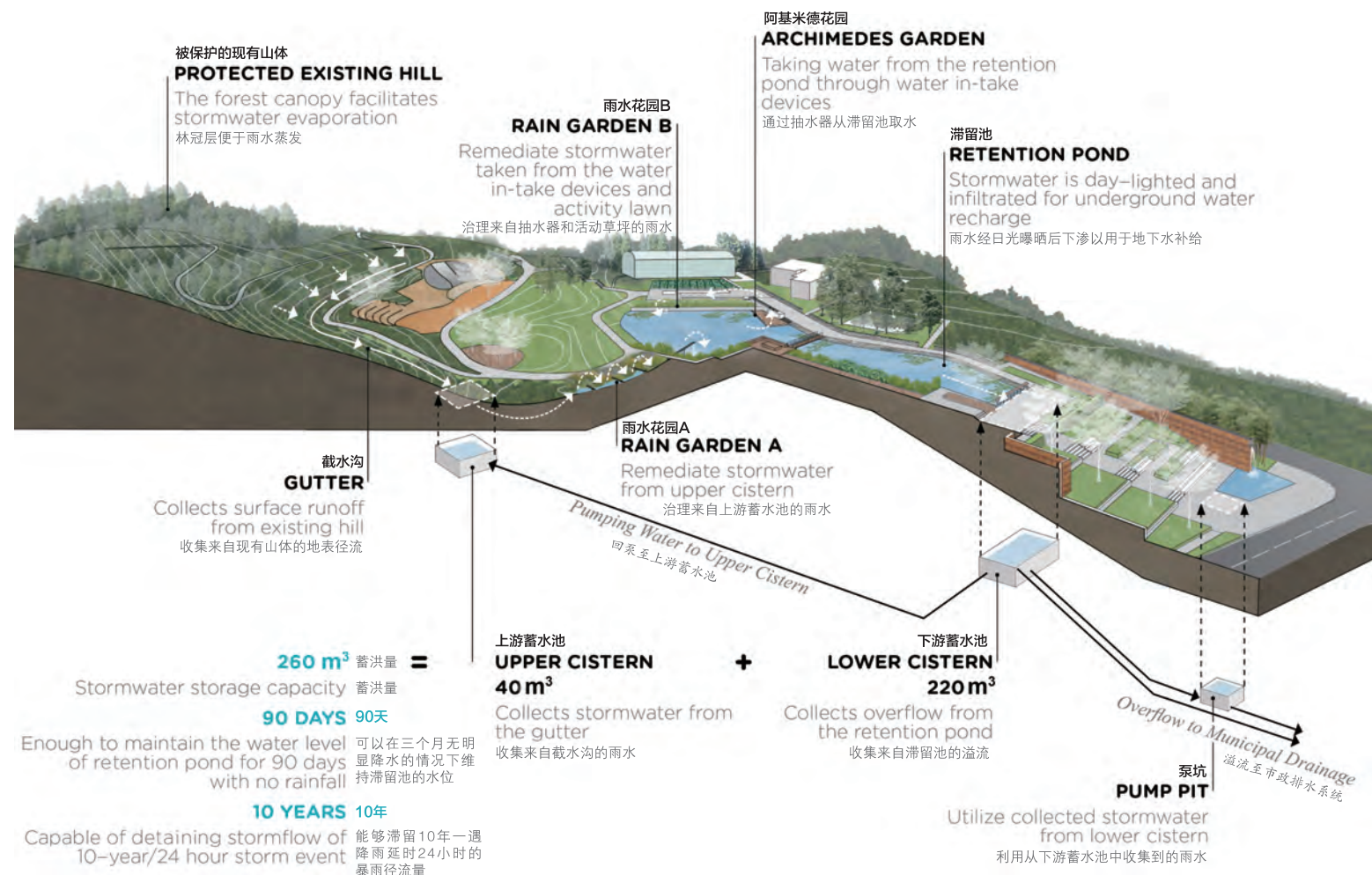


公园简介 Introduction  
总平面图 Site plan  
功能分区 Zoning  
生态系统解释 Ecosystem  
儿童活动区设施说明 Facilities in the children playground  
雨水花园说明 Rain garden  
阿基米德花园说明 Archimedes garden

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better through the horned shape, allowing children to better learn how sound is carried through the air. What is more, the sculpture close to ground also has a seated function.

The "giant earthworm" is a slide made of stainless steel chutes and curved plastic mats. It mimics the somites of earthworms through four sets of differently slopes slides that follow the natural shape of the mountain to meet the different needs of children.

Other interactive design of mountain-forest paradise includes a wood carpet, forest stakes, and a climbing wall. The wood carpet is a wavy wooden platform laid on the original mountain, with slope and elevation variations for lying, sitting or leaning against. The forest stakes are

an interactive installation of three-meter high stakes, among which swings or crawls can be placed as wished. The stakes also serve as handrails for the wood carpet, and the climbing wall provides aerobic sports facilities for children. The combining design of KOSHIWOODS climbing walls, bunkers and small blackboard serves as more appropriate exchange space for children.

#### 2.1.4 Educational Interpretive Signage Panels

A series of educational signage panels inform visitors of relevant information during their visit and contribute to the environmental learning. The water platform at the entrance includes a ten-meter long

15. 全园雨洪处理方案
16. 入口广场雨洪管理系统示意图
15. Stormwater management of the whole park
16. Stormwater management system of the entry plaza

signage panel along the security fence that explains relevant information of the park. Additional educational small signage panels with information on storm-water management, plants, and animals are found in the Archimedes garden, rain gardens, and the mountain-forest paradise.

#### 2.1.5 The Community Center and Kitchen Garden

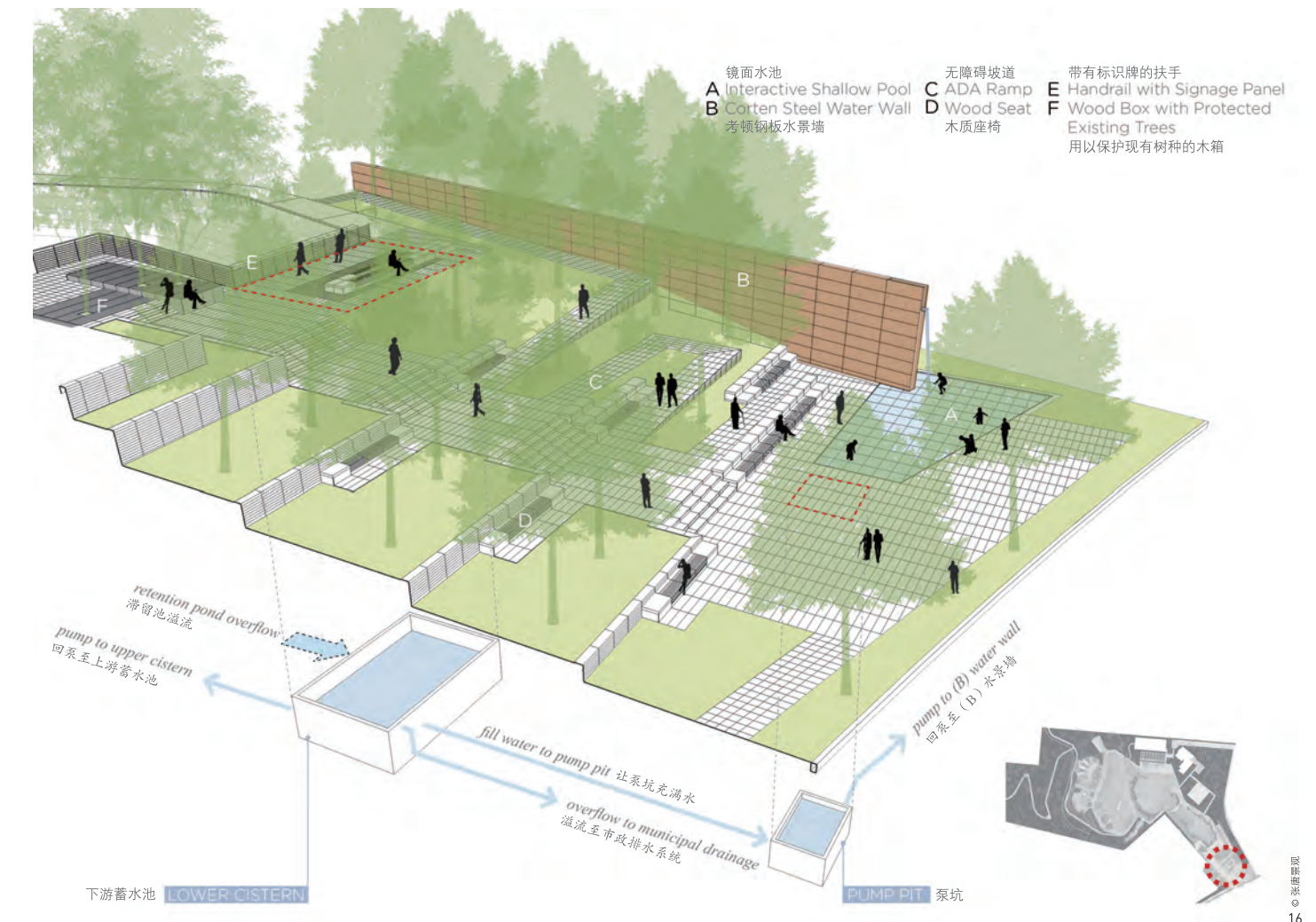
The project now serves as a showcase of Zhonghang Caticity Community. It will be fully transformed into a community center with dining, fitness, and library facilities in 2018.

A kitchen garden on the north side of the Archimedes garden allows residents to

participate in planting fruits and vegetables, and a stormwater system provides irrigation for the garden fulfilling self-sufficiency in natural circulation.

#### 2.2 Ecological Design

The project integrates vitality and environment by employing an innovative strategy of combined stormwater management and landscape design within systemic facilities that include retention ponds and rain gardens. The average annual precipitation is 1,450 mm and nearly 1,100 mm is lost to evaporation in Changsha. Based on the rainfall events, there is 4,984 cube meters of runoff for



recharging by estimation. The total volume of the two cisterns is 260 cubic meters that is large enough to store a three-month water supply without significant rainfalls. The stormwater management system is designed to maintain a sustainable hydrological balance, control floods, collect rainwater for landscape uses as well as improve the water quality through the structural practices. The three parts — rainwater recycling system, rainwater utilization system, and water stabilization system are used to achieve above objectives.

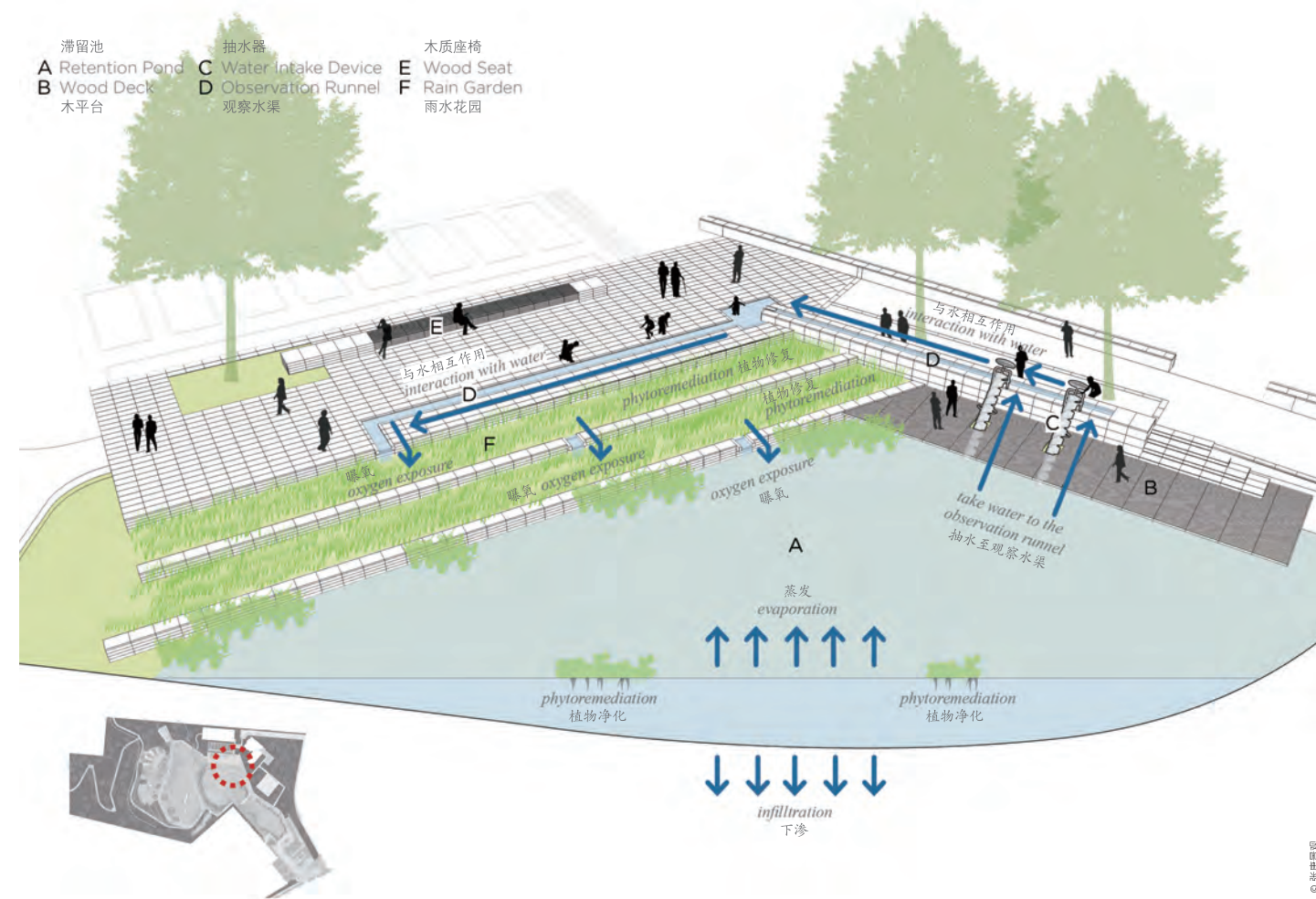
### 2.2.1 Rainwater Recycling System

Continuously circulating water is very important for maintaining the stability of the hydrological environment. The project

incorporates a rainwater recycling system which allows for runoff to be reused through passive and active circulatory systems. The passive system collects surface runoff through underground cisterns, which will flow into the rain gardens and retention basins in turn before finally being recycled within the circulation facilities. Additionally, manual use of the Archimedes water intake devices makes water delivery possible between the retention basins and rain gardens which acts as an active way.

### 2.2.2 Rainwater Utilization System

To solve the problems and challenges of site hydrology, the design measures the retention basins and rain gardens within four main systems of retention, infiltration,



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- 17. 阿基米德花园雨洪管理系统示意图
- 18. 雨水花园雨洪管理系统示意图
- 17. Stormwater management system of the Archimedes garden
- 18. Stormwater management system of the rain garden

filtration, and purification. Rainwater meets the needs of overall landscape at most times and helps control the quantity and quality of the runoff throughout the park.

The combination of retention basin and underground water tank leads to a low-cost rainwater system with enhanced environmental experience that can store enough water to meet the park's needs for up to three months. Additionally, it relieves municipal drainage by detenting the runoff in the 10-year / 24 hours stormwater event.

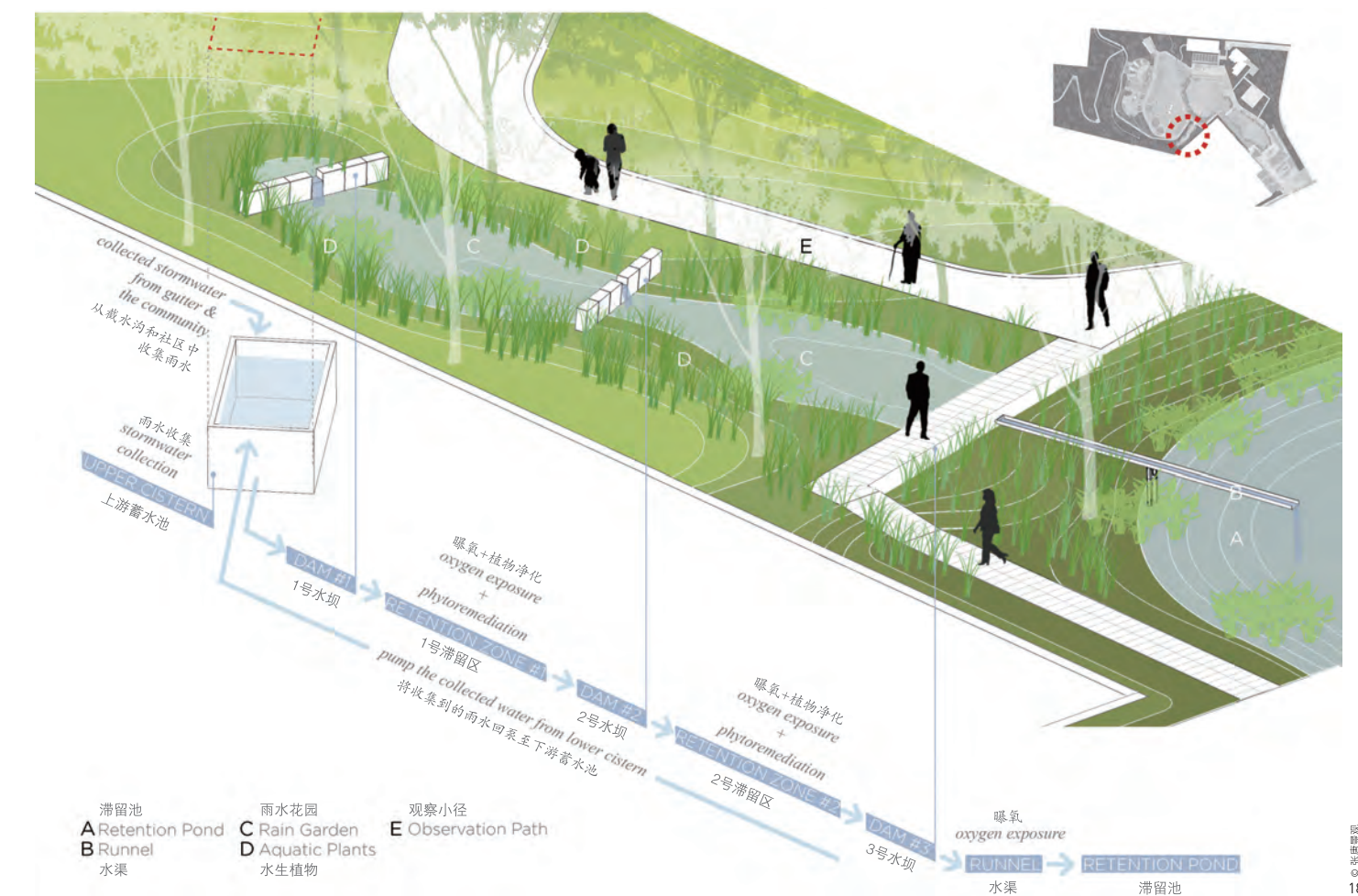
### 2.3 Water Stabilization System

The water stabilization system focuses on improving water quality in the retention basins through base improvements, transparency upgrades, aquatic flora

community builds, and aquatic animal community builds. The project aims to improve the runoff water quality by building a water stabilization system that meets the national surface water standard criterion III.

### 3 Conclusion

Neighborhood parks are closely linked to people's daily life. How their design meets participatory and ecological balances is a key design issue. Z + T Studio explores "participatory ecology" design practices in an effort to narrow the distance between man and nature, and bring "human ecology" and "ecological humanity" together through built design. **LAF**



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