



CRC for
Water Sensitive Cities

Forest Park Ecological Wetland

Location:
Kunshan,
Jiangsu, China



Case Study — Prepared by Cooperative Research
Centre for Water Sensitive Cities, September 2018



Business
Cooperative Research
Centres Programme

Insight

Urban parklands can be upgraded to be multifunctional water treatment and flood management assets

Project description

Built in 2001, the Kunshan Forest Park is a National Urban Wetland Park covering an area of 166 hectares in the northwest of Kunshan city in Jiangsu province, China. The Forest Park boasts an array of eco-tourism resources and is characterised by parklands, forests and lakes.

The ecological wetland project aims to improve the water quality of five large park lakes by transforming traditional green space into multifunctional green infrastructure which provides water treatment, water recirculation, and extra flooding storage within a versatile landscape. In addition, an ecological restoration zone is planned to protect and remediate the local aquatic and terrestrial habitat, restoring the ecological values and encouraging flora and fauna back to the area.

The drivers

Improve waterway quality for enhanced community wellbeing and environmental health

Kunshan is a polder (a piece of land in a low-lying area that has been reclaimed from a body of water by building dikes and drainage canals) city, meaning it is a low-lying area enclosed by dikes, with no connection to other groundwater sources, except through diverted rivers or engineered canals. Polder waterway quality can be poor and flooding can be an issue in some areas of the city. A strategy was developed to help address this issue by integrating constructed wetlands into precinct parklands to enhance water quality. Canal water would be recirculated through constructed wetlands for treatment, creating a series of open cells within the polder waterway network. The incorporation of these cells has also been used for greater floodwater protection by connecting them as emergency detention basins. The Forest Park Ecological Wetland has been undertaken as a trial to test this strategy.



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Vision of Forest Park,
Kunshan, China

What does this case study demonstrate?

Each case study has been selected to demonstrate specific solutions, benefits or enabling structures that support the creation of water sensitive cities. This case study focuses on:

Stormwater treatment

Water sensitive parks and open spaces

Flood resilience

Ecosystem health

The innovations

Working demonstration of innovative flood management and water treatment approach to protect a growing population and its downstream aquatic environments

- **Automatic flood relief** – The lake system is hydraulically connected to an adjacent waterway by an active gate. If the polder reaches a critical flood level, the gate opens and allows for the Forest Park Lake system to act as additional storage for flood waters.
- **Multifunctional landscapes** – Forest Park wetlands have been designed to support both water quality treatment and passive recreation within a broader parkland setting.
- **Polder water recirculation** – Polder water is recirculated through constructed wetlands for greater waterway health.



Construction and establishment of Forest Park wetlands




- **Improved ecological value of open space** – The forest plantations within Forest Park were reviewed with the objective of enhancing their ecological value. One area within the park was found to support significantly greater bird life than other areas. This was an island that received no parkland maintenance. Pathway and visitation patterns were reviewed accordingly and areas adjacent to the high ecological value island were zoned for ecological enhancement, forming a large area dedicated to habitat and biodiversity. Pathways for pedestrians were downgraded, buffer planting was established, and any parkland style maintenance ceased to reduce disturbance.
- **Fish breeding habitat creation** – The lakes in Forest Park are mostly excavated waterbodies. Consequently, there is limited natural habitat diversity. The constructed wetland component of the project was going to result in some tree removal, so an opportunity was taken to use the removed trees as large woody debris in the lakes as enhanced fish habitat. Wood debris was carefully located to improve the littoral zone of the existing habitat island and to reduce wave action on the windward edge of the island.



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Left: Areas of plantation forest where understorey and lake edge vegetation is regularly slashed. Right: Island vegetation with no maintenance and higher habitat values

The outcomes

 Cities providing ecosystem services	 Cities as water supply catchments	 Cities comprising water sensitive communities
<ul style="list-style-type: none"> • New urban wetlands – Lake-wetland system provides water cycling and purification. • Biodiversity values – Forest enables nutrient cycling, pollination and the provision of habitat. There are over 60 varieties of wild animals, including otters and zibets, and approx. 10,000 migratory birds visit the park every year. • Air purification – Park is considered a green lung for the city, because its forest coverage is as high as 95%. • Climate regulation – Lake system and forest provide evaporative cooling. • Sense of place – Precinct provides an aesthetic destination for spiritual and recreation activities. 	<ul style="list-style-type: none"> • City as a catchment – Lake system offers the opportunity for stormwater harvesting. 	<ul style="list-style-type: none"> • Education – Park offers exhibitions of aquatic plants and animals and wetland purification activities. • Knowledge – Park functions as a platform for science popularization and research.

Business case

Costs	Benefits
<ul style="list-style-type: none"> • Total investment of 250 million yuan (AUD \$52.32 million). 	<ul style="list-style-type: none"> • Enhanced eco-tourism. In 2013, Forest Park received a total of 1.8 million visitors. • New opportunities for scientific research and implementation of innovative technologies. • Greater flood resilience for the local area and confidence in new urban development. • Increased waterway health. • Cool sanctuary during heatwaves. • Preserved habitat for local flora and fauna.

The lessons

- Parklands can be designed to become multifunctional water management infrastructure, providing both filtration to improve water quality and flood water storage.
- Cleared trees can be utilised for habitat creation providing an important ecological resource while lowering disposal costs.

Transferability

The principles of this case study can be applied anywhere.

Project collaborators

- E2DesignLab
- CRC for Water Sensitive Cities
- Kunshan City Construction, Investment and Development Company (KCID)
- Suzhou Garden Design Institute

Awards

The park has received a number of honours, including National Science Popularization Base and the First Health-Themed Park in Kunshan. In 2008, the park was approved by the Ministry of Housing as a National Urban Wetland Park.



Large woody debris enhancing fish breeding habitat by damping down wave action and protecting littoral zone vegetation development

Additional information

More information about Kunshan Forest Park can be found at:

- [Kunshan Forest Park, the green lung for the city](#)
- [Kunshan's Scenic Spots](#)

