CRC for
Water Sensitive Cities

Kunshan Ring Road

Location:
Kunshan,
Jiangsu Province,
China

Case Study — Prepared by Cooperative Research Centre for Water Sensitive Cities, August 2019

Australian Government
Department of Industry, Innovation and Science
Business Cooperative Research Centres Programme

Insight

Creation of multifunctional green corridors through integrated design of land beneath and adjacent to major elevated roads

Project description

The Kunshan Ring Road project was completed in 2017. The Ring Road is a major asset enabling the growth and development of Kunshan. It is approximately 44 km long, crossing many canals within Kunshan.

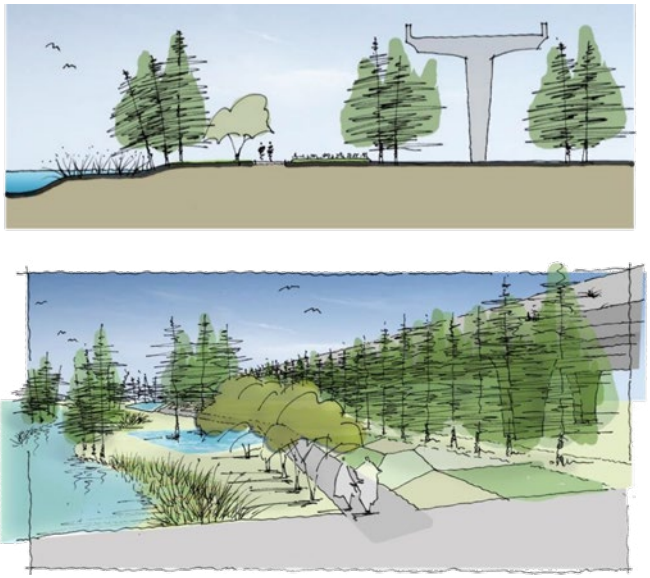
The CRC for Water Sensitive Cities worked with the local government in Kunshan to explore possibilities for the land beneath the Ring Road. A concept was developed to create a 'Ring Road in a forest corridor', where the land corridor beneath the road was utilised as a multifunctional parkland. Multiple functions of the green corridor include: recreation, urban cooling, air quality mitigation, ecological corridors connecting city parklands and vegetation remnants, and the treatment of road stormwater runoff and canal waters. The Ring Road interchanges were designed as nodal parklands where they function as important ecological diversity reserves for flora and fauna, recreational spaces for local communities, as well as ecological treatment to stagnant canals for improved water quality.

The drivers

Kunshan has been designated by the Chinese government as a 'sponge city', where opportunities for water sensitive solutions are being explored

The construction of an elevated Ring Road was a major opportunity for a multidimensional and multifunctional green corridor

- Kunshan is a polder city (a piece of land in a low-lying area that has been reclaimed from a body of water by building dikes and drainage canals) with many canals and waterways which can have poor water quality in some areas.



Kunshan Ring Road was conceptualised as a road in a multifunctional forest corridor

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:

Water sensitive streets and carparks

Water sensitive parks and open spaces

Ecosystem health

- An overarching ecosystems services framework was developed which aims to embed water, forest, food and culture into a mosaic of open spaces across the city. An inner ring ecological corridor was proposed to restore existing waterways while an outer ring ecological corridor was proposed to be created along the Ring Road corridor. These two corridors will link open spaces and provide city-wide connectivity.

- As a designated 'sponge city', Kunshan is a hub for technologies and techniques that promote infiltration, greening and integrated water management. This designation gives focus to opportunities in the city and has been supported by the input from various researchers including the CRC for Water Sensitive Cities.

- The Ring Road (elevated road bridge) was proposed to support the urban growth in Kunshan. As the road would have a major influence on the urban design of the city, local authorities wanted to explore opportunities to enhance amenity and ecological functionality.

- The Ring Road crosses many canals, so there were opportunities to construct wetlands at various locations along the road land to treat canal water and contribute to the overall water quality management strategy for the city.

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Construction and establishment of Kunshan Ring Road Project

The innovations

Integrated design of a city-wide parkland corridor

- **Multifunctional landscapes** — This project has been designed to support both water quality treatment and enhance amenity within an urban setting by designing a road corridor that is multidimensional and multifunctional.

- **Road stormwater treatment** — Utilising water sensitive urban design techniques, such as raingardens and constructed wetlands for water treatments, the Ring Road project provides immediate treatment to stormwater runoff from bridge surfaces, improving water health of receiving water bodies.

- **Polder water treatment** — Polder water is recirculated through constructed wetlands for greater waterway health.

- **Ecological system of nodes and links** — Parklands are designed and constructed at specific spots along the Ring Road, creating urban green spaces for local communities.

- **Use of shade tolerant plants in bioretention systems** — Shade tolerant plants are selected for the bioretention systems under the Ring Road bridge.

The outcomes

Cities providing ecosystem services	Cities as water supply catchments	Cities comprising water sensitive communities
• **Ecological network** — The Ring Road crosses many canals. With many nodal parklands along the Ring Road, it creates an integrated ecosystem resilient to climate change. • **Species enrichment** — Emergent plants and swamp forests which are less commonly seen in an urban environment are introduced to enhance landscape along the Ring Road. • **Self-maintenance** — Once reaching system balance, the ecological system can achieve self-maintenance with minimal maintenance costs.	• **Improved water resources** — Raingardens and constructed wetlands are used to provide immediate stormwater treatment, improving the health of receiving water bodies and canals.	• **Sense of place** — Nodal parks provide aesthetic destinations for spiritual and recreation activities for local communities. • **Community interaction with WSC** — Nodal parks are popular with the local community, providing opportunities for them to interact with water sensitive cities design.

Business case

Costs	Benefits
• Total investment of 800 million yuan (AUD $167.4 million)	• New opportunities for scientific research and implementation of innovative technologies • Improved waterway health • Multifunctional parklands under the elevated road bridge • Blue-green infrastructures create sponge Kunshan city • Provide examples to growth city to incorporate green infrastructures into urban planning

The lessons

- Road-side landscapes and spaces under fly-overs provide great potential to be converted to blue-green corridors, which are important connections for a city and regional scale ecological system.
- Parklands can be designed to become multifunctional water management infrastructure, providing filtration to improve water quality.

Transferability

The principles and concepts can be transferred and applied elsewhere with elevated road structures.

Project collaborators

- E2DesignLab
- CRC for Water Sensitive Cities
- Kunshan Government
- Kunshan City Construction, Investment and Development Company (KCID)
- Kunshan Transportation Development Holding Group Company

Additional information

More information on the Kunshan Ring Road can be found at:

- Visit Kunshan "Ecological New Green Corridor" – Site Record of Central Green Landscape Ecological Restoration Project
- Kunshan Zhonghuan Road elevated ecological restoration system
- Kunshan Sponge City Special Plan was selected as "National Model"
- Kunshan built 13 sponge city projects, making the city more "breathing"