ULI CASE STUDIES

Urban Land Institute

Dasha River Ecological Corridor

July 2023

QUICK FACTS

LOCATION
Nanshan District, Shenzhen, China

PROJECT TYPE
Ecological restoration

SITE SIZE
93.3 hectares

SITE LENGTH
13.7 kilometres

DEVELOPER
China Resources Land

MASTERPLANNER
AECOM

LANDSCAPE DESIGN
AECOM

ENVIRONMENTAL PLANNER
AECOM

ARCHITECTURE
AECOM

Dasha River Ecological Corridor

Project Summary

The Dasha River runs through the Nanshan district of Shenzhen, a city in southern China adjoining Hong Kong. The river extends in a southwest direction for 18.8 kilometres, running from Yangtai mountain in Shenzhen's northern hills and reaching the sea in Shenzhen Bay. Although short, the watercourse represents an important green axis connecting the increasingly affluent Nanshan district on the coast to the more mountainous area that defines the northern part of the city.

Historically, the river had served as a link connecting local fishing and farming communities. However, its condition deteriorated rapidly once Shenzhen began to industrialise in the early 1990s. Contamination from large amounts of sewage and other pollutants was compounded by construction of two upstream dams, leading to reduced water flow, while misguided flood control measures saw authorities harden and straighten its once meandering banks. As a result, the formerly lively waterway quickly became disconnected from the local community.

At the same time, however, the area's rapid urbanisation had brought an influx of new residents, transforming Nanshan from an agrarian community into a densely populated neighbourhood currently numbering some 1.4 million people. For a now densely populated community, the polluted waterway was both an eyesore and a missed opportunity. Authorities therefore launched a major rejuvenation programme.

The resulting urban park, stretching 13.7 kilometres from the sea to the river's upper reaches, has proved a success on a number of levels. Involving a relatively modest investment, it has:

- Restored the river basin's original ecological function by linking pre-existing patches of natural green space to form an unbroken linear park from the sea upstream.
- Provided a substantial social benefit by boosting the mental wellbeing of local residents and reconnecting the community to green and blue open space
- Generated significant tax revenues for the district government by raising local land values and bringing an influx of new businesses and residents to adjoining neighbourhoods.

Dasha River orientation

Water Resources Management

Planning for the regeneration of the Dasha River began as early as 2006 and commenced in earnest in 2013, with a preliminary goal of addressing the river's degraded water quality following years of use as an outlet for sewage and stormwater discharge. At that time, water in mid- and downstream parts of the river, as measured by China's 5-tiered water-quality classification system, was assessed at lower than Grade 5 (ie, the lowest quality), making it "essentially useless" for any purpose, including agricultural. Although upstream the situation was better, levels of dissolved oxygen were inadequate to sustain healthy animal or plant life.

Initial work to improve water quality involved construction of water treatment and drainage infrastructure. Concrete conduits were placed under riverbanks to intercept sewage and floodwater discharges. These were then linked to two wastewater treatment facilities, the Nanshan plant and the Xili plant.

Effluent overflows into the Dasha River

At a relatively modest 100,000 cubic metres per day, combined treatment capacity of these plants is too small to deal with runoff from the local catchment during heavy rain. However, the Dasha River has a number of unusual qualities that helped ensure the project's success. The short distance from source to sea, the relatively small volume of water carried by the river, and the fact that the entire watercourse runs through a single administrative area (thereby reducing bureaucratic hurdles) meant that a cleanup could be effective in practice and also affordable economically.

As a result of the hydrological work, water quality improved to Grade 4 or better (with further improvements anticipated), at which levels ecological remediation became possible.

The park draws 40,000 visitors daily

Multidisciplinary Approach

With the engineering and infrastructure components complete, attention turned to other aspects of the project, in particular reinstatement of the river ecology and also the creation of a valuable recreational amenity for the benefit of surrounding communities.

Beginning in 2017, designers first moved to link pre-existing islands of green space scattered along the river, forming a linear ecological corridor spanning almost its full length. This involved a multi-layered design featuring a mix of pathways, native vegetation, themed destinations, modern landscaping, and public recreational facilities. By integrating these spaces into a single corridor, the amount of green land along the Dasha River increased from 80 hectares to 93.3 hectares along a 13.7 kilometre corridor stretching from the sea to the upper reaches of the river.

One of the challenges in completing the project was that the recent engineering work undertaken to address pollution and flooding issues had stripped the river of its winding shoreline. The straight and narrow concrete edges created as a by-product of the sub-riverbank culverts may be efficient in terms of carrying water to the ocean, but they also made reinstatement of the river's natural ecosystem more difficult. Although they can be concealed to some extent by applying a variety of landscaping elements, they also restricted planners' options in developing the overall site.

Still, despite integration problems, the subsequent landscaping and ecological remediation work is notable for its multidisciplinary approach that achieves a fine balance in reinstating indigenous plant

Numerous pedestrian pathways are placed in riverside areas.

A rowing club on the downstream river.

The Dasha River traverses numerous communities and landscapes

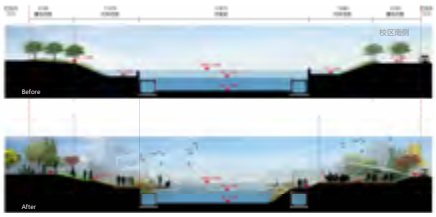
Social Impact

Apart from reducing pollution and restoring the environment, river rejuvenation also plays an important social role. China's increasingly high-density urban environments mean that its living spaces continue to shrink, so the creation of a major city-centre amenity of this kind at a cost-effective price creates significant value in terms of its positive psychological impact on the community.

Pedestrian and bicycle paths play obvious roles, while the re-wilding of the river (see below), including installation of a variety of habitats in upstream and downstream areas, has established it as a natural oasis amidst the intensity of the surrounding city. Its success is underlined by the fact that the park currently attracts some 40,000 visitors per day.

A number of permanent facilities have been built in different parts of the park, ranging from a visitor service centre near the sea outlet (in Dasha He Park), to a nature classroom further upstream at Jiuxiangling Wetland Park. Eleven different toilet/shower blocks, spaced every 500-800 metres along the river, allow users to shower after exercising on the way to work, five new bridges (with more to come) allow pedestrians to move easily from one riverbank to another, and an assortment of tree houses, book bars, tearooms,

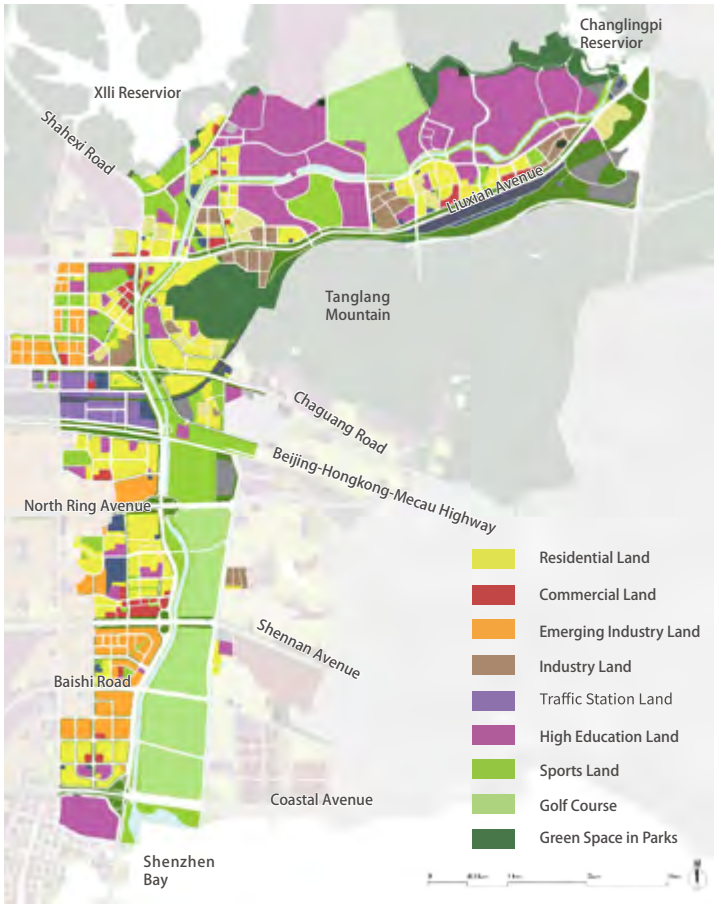
and wildlife while also serving the needs of the neighbouring urban environment.



Drainage culverts have left hard river edges.

The resultant rivercourse park now links the bay ecosystem in the south to the forest areas in the north. Illegal buildings and bridges have been removed, idle land repurposed, and pedestrian and bicycle paths set out along the length of each riverbank. In the process, the former islands of green space have been transformed into a continuous chain of ecosystems comprising ecological zones, recreational parks, residential neighbourhoods, a nature reserve, and (in its lower reaches) landscaped riverside areas running alongside a series of golf courses. The entire length of this corridor is planted with a mixture of lawns, flood-tolerant grasses, and wetland areas both large and small.

A book cafe and other recreational facilities are placed strategically along the riverfront.



Land use along the Dasha River

playgrounds, lookouts, pavilions, watchtowers, and a covered skybridge all add to the recreational possibilities. Finally, a rowing club situated on the far downstream section of the waterway provides more formal sporting options.

Nor are recreational facilities yet complete. In particular, the Dasha River forms part of the Shenzhen government's plan to complete some 600 kilometres of ecological pathways traversing the estuaries of local rivers in and around the city (in particular via the Shenzhen Bay outlet) by the end of 2022. Beyond that, the river's pedestrian walkways will also connect to the Guangdong Provincial Greenway System via links that are currently being built from the Changlinpi and Xili Reservoirs and the Yangtai Mountain Forest Park.

River Continuum

Another noteworthy aspect of the social value created by the sheer length of the ecological corridor is how it connects neighbourhoods along different parts of the river, giving them easy access to other areas with quite different characteristics and facilities.

This is important not simply for practical reasons, but also because linking previously isolated northern parts of Nanshan to more urbanised areas in the south – by bicycle, upstream sections are now only 20 minutes from the sea – has changed the district's character and scale. For one, it provides easy access for residents of crowded downstream neighbourhoods to the more remote and unspoiled upstream context (and vice versa). In addition, it generates new potential for residential development in formerly unfashionable neighbourhoods – in particular, the mid-stream Xili area, also slated as host to a planned high-speed rail hub, has become a more desirable residential destination.

This idea is also reflected in the decision by planners to implement a "river continuum". Because the river's natural context and adjacent land use vary quite dramatically along its length, designers activated different parts of it by populating them with habitats and design features suited both to their different characters and to the needs of adjoining communities, allowing specific social requirements to be addressed by specific types of facilities:

- In the east/west-flowing upriver section, where the University District hosts a number of higher-education institutes, the landscape has been adapted to an educational context, sporting a campus-like feel that acts as an extension of the pre-existing campus environment. Specific features include a reading garden, spaces for socialising, and five cross-river bridges. Future plans include construction of an outdoor theatre.
- Further downstream, the river turns south and runs through a mountainous, forested area that includes the entrance to a country park (ie, the Tanglang Mountain Park). This section has been themed to focus on natural features, re-wilding of ecosystems, and removal of invasive plants.
- Along the final few kilometres leading to the ocean outlet, riverbanks in the vibrant waterfront area near the Technology Innovation Centre cater to a more urbanised context. In contrast to the focus on footpaths in upstream green spaces, the landscaping here adopts a more modern hardscaped approach that serves the needs of larger numbers of people looking to socialise and exercise. This area saw the most extensive construction work, given the greater numbers of residents living nearby.

Riverbank areas function as a sponge to absorb rainwater runoff.

The City as a Sponge

Aside from the issue of water quality, another problem for the Dasha River catchment – in common with river catchments throughout Shenzhen – has been that the area's former agricultural land has been mostly paved over. With the ground now unable to absorb rainwater efficiently, the high-intensity rainstorms common to the area are causing an increase in floodwater – together with associated contaminants – washing into the watercourse. These pollutants include high levels of nutrients that are in turn contributing to the formation of toxic algae blooms in Shenzhen Bay and the Pearl River Delta.

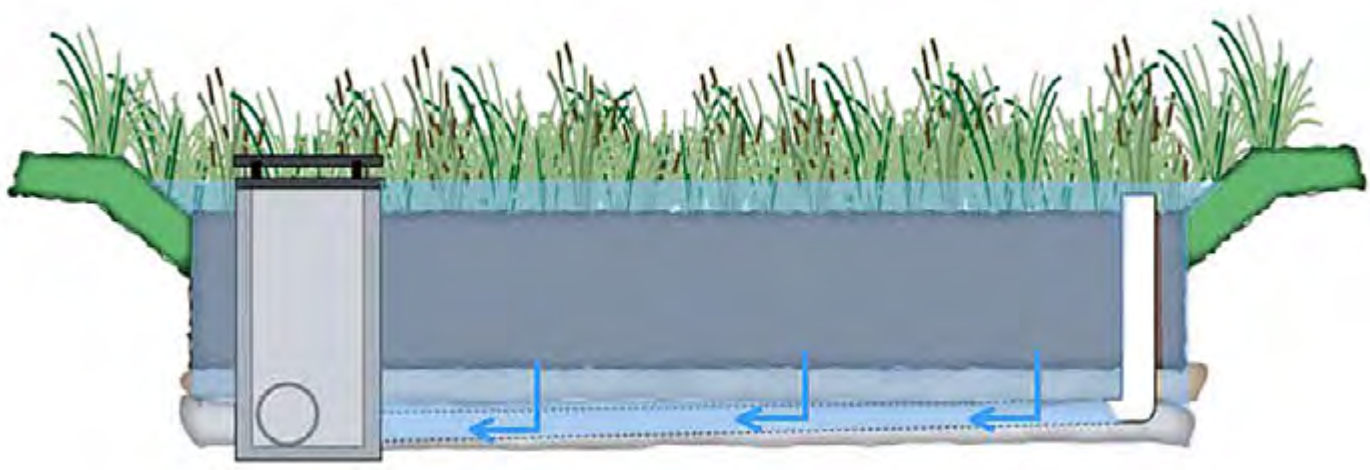
To address this, local authorities have begun installing features that can temporarily retain floodwater until precipitation subsides, thereby reducing the stress on local drainage and water treatment systems. The concept is known globally by various names, including Water Sensitive Urban Design, Sustainable Urban Drainage Systems, Low Impact Development, and (in China) Sponge City Development. .

Although the sponge city concept was not adopted in China until relatively recently, uptake has been rapid, at least partly due to growing awareness of the risks of unrestrained development, including a number of incidents where urban flash-floods have caused extensive damage and death.

Shenzhen was nominated as a pilot Sponge City in 2016, and has since constructed numerous water-retaining facilities, including pocket parks, green rooftops, permeable pavements, and neighbourhood rain gardens to help manage surface water discharges. Today, the city is arguably the most advanced in China in this area, with sponge features covering 24 percent of the city's total surface area in 2020, according to government figures. An ambitious 80 percent target has been mandated for 2030.

The sponge city concept has also been applied to the Dasha River Ecological Corridor in terms of its construction materials (eg, permeable paving), selection of plants, and landscaping design. In addition, along the mid-river, artificial habitat islands have been built. These feature reinforced concrete bases to absorb the impact of floodwaters as well as providing a habitat for aquatic plants and water birds. Designers have also planted the length of the river with species that offer similar qualities (including wetland plants such as windmill grass, reeds, and goldenseal), in addition to constructing a number of rainwater gardens and slopes that allow sheet flow of stormwater as part of the landscaping and park facilities.

The upper reaches of the Dasha River



Vegetation in constructed wetlands are designed to soak up floodwaters.

Two "constructed wetlands" developed upstream also feature significant expanses of vegetation. These could in principle be used to soak up floodwater, but given the limited amount of available land, they have been designed in this case to function only as a filter for polluted sediments and chemicals.

Water shortages

A further issue faced by planners is that water-supply problems along the Dasha River are a double-edged sword – in addition to flooding, therefore, the river is also subject to water shortages. There are a number of reasons for this. First, the area has significant seasonal rainfall variations. Second, the construction of two upriver dams in the 1990s created "upstream abstraction" that has caused the width of the watercourse to shrink by half to just 15 metres, while also reducing channel depth to make it unnavigable for boats. Another side effect of reduced flows from upstream is that pollutants contained in rainwater runoff in the lower reaches now become more concentrated.

Finally, and in common with other urban waterways across China, prioritisation of flood prevention has led local authorities to straighten and harden riverbanks to facilitate water flows to the ocean. According to one source interviewed for this study: "The system works from an engineering standpoint, but when you're talking about landscape for the purposes of ecology its dreadful because you have a straight, concrete-lined, engineered channel containing a dribble of polluted water except for a few days a year when it fills up."

To deal with this issue:

- A new wastewater treatment plant (ie, the Xili Water Purification plant) built next to the Dasha River has been designed to boost water supply by discharging its output directly into it. While not perfectly clean, treated water improves the visual appearance of the river and is good enough for various uses, including ecological regeneration, as noted above. The same approach has also been used to increase water supply in other water-stressed rivers throughout the Shenzhen area.
- Constructed wetland areas (also described above) are designed not only to prevent flooding by soaking up stormwater, but also to help alleviate water shortages as they gradually release retained water back into the watercourse. The 8.8 hectares of constructed wetland created to date along the river are able to add as much as 30,000-45,000 cubic metres of supplemental water per day to the river flow. In addition, the two upstream dams are also able to release water on demand, assuming adequate reservoir levels.
- Natural runoff from the adjacent Tanglang Mountain Park has been directed into the Dasha River to replenish supply in mid- and downstream sections.

A biologist studies the river ecosystem.

Shallow sections of the river have been built to create hunting platforms for wading birds.

Re-wilding

Another important design philosophy embraced by project planners was a commitment to "re-wilding" – in other words, to restore, as far as possible, the river's original plant and wildlife ecosystems. This approach was based on a desire not only to re-establish the river's original ecology, but also to create an holistic context better suited to promoting social wellbeing than could be achieved in a conventionally-landscaped park.

As a result, the corridor has been populated with an array of different indigenous plant species rather than the more regimented displays of plants found in most parks in China. Until recently, re-wilding was an unusual strategy in China, and its success in the Dasha River system has led to its adoption in other open space projects around Shenzhen.

Implementation, however, was challenging. Severe time constraints were one problem. Beyond that, the narrowness of most of the river channel, the marginal water quality and volume, and the density of nearby human communities all acted as a deterrent to the types of wildlife designers wanted to attract. They therefore had to balance the need to create a public amenity with the need also to accommodate a baseline wildlife population able to tolerate close proximity to large numbers of humans.

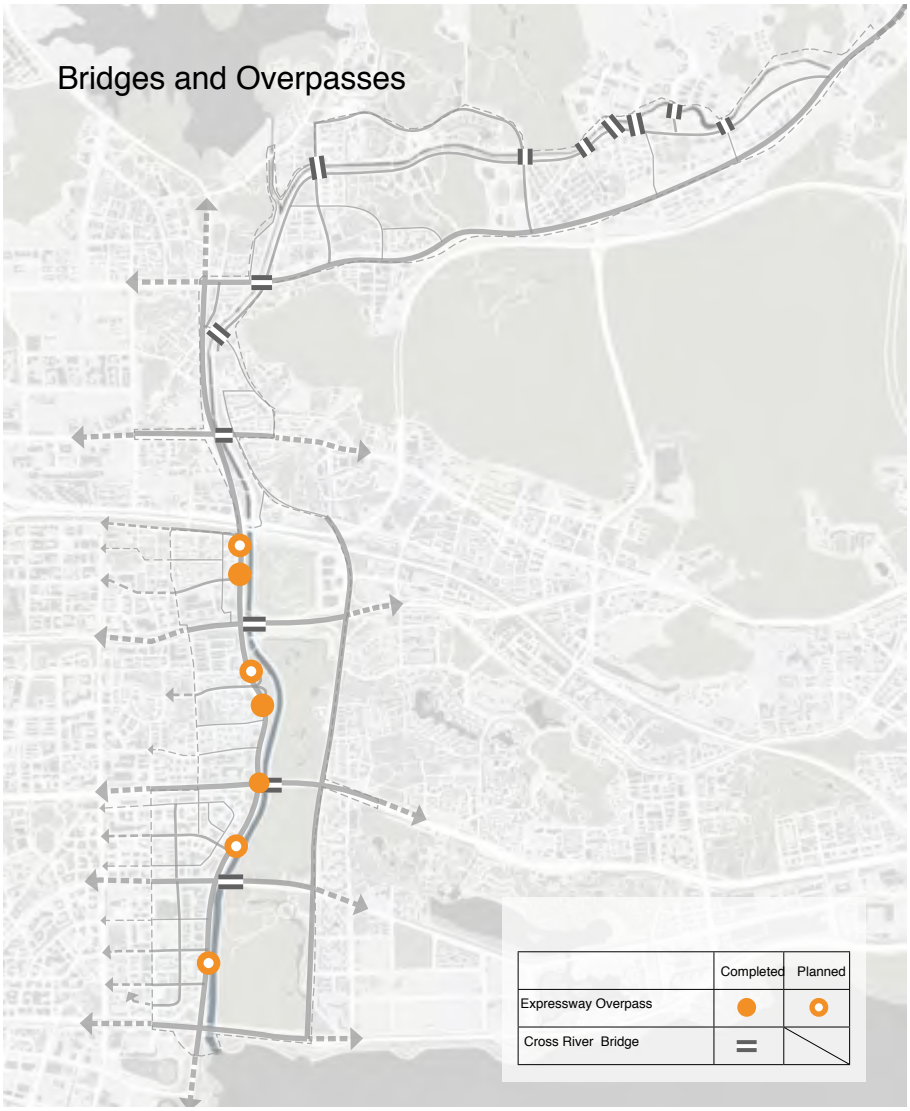
A final noteworthy element of the design is that, wherever possible, the restorative measures taken are both low tech and low impact – underlining the fact that a comprehensive plan approached in a multidisciplinary way is not only more effective, but can also be both cheap and replicable.

Particular aspects of the ecological and landscaping work include:

Wild grasses on riverbanks absorb runoff.

- Removal of non-native plant species, preventing them outcompeting the native vegetation. In addition, a commitment was made to retain mature trees and other established plant life. Pathways were therefore laid out so they navigated around surviving patches of original vegetation, and a skywalk feature providing access to the canopy was installed on the same basis. In both cases, the fundamental premise was to regenerate the site with a view to respecting already-existing habitats. Although there are associated maintenance costs in ensuring non-native species do not return, this light-touch approach to remediation has also proved cost effective.
- Retaining the original sandbar base formed by long-term siltation in the upper section of the river where the gradient changes. This sand trap reduces sedimentation downstream, and with annual cleaning it can continue to improve water quality and maintain ecological habitats. Notwithstanding this feature, however, sedimentation in the river continues to be a problem.
- Implementing site-specific alterations to mid- and upstream surface-water areas to attract wildlife. Pools of slower, deeper, water were created to help aquatic animals avoid predators. Wooden poles were planted in some slower-moving sections, providing hunting perches for Kingfishers. Faster-moving stretches were also formed through strategic placement of stones that created riffle-sections in the river. This helped aerate the water and also provided hunting platforms for wading birds.
- Enhancing eco-corridors to encourage wildlife to relocate to the river basin. Fortunately, several large areas of natural green space – including Tanglang Mountain Park, and the Xili and Changlingpi Reservoirs – already adjoin the river. By upgrading connectivity to these areas, the river has benefited from an increase in incoming animals.
- Incorporation of flood-resistant features, including constructed wetlands and smaller equivalent spaces, as already described. These were implemented not only in terms of plant choices but also in the landscaping layout, which has been conceived to retain and filter runoff. Riverbanks, for example, slope gradually towards the water and are planted with wild grasses (including pennisetum) and other flood tolerant species that will intercept and absorb runoff – another simple but effective design approach.
- Installation of small-scale features such as nest boxes and insect hotels that help sustain native animal and insect species common to this type of urbanised area.
- Activating grey space under bridges, including by placement of bat houses and swift nest boxes under the eaves and on the sides.

A bat house



New bridges have been built strategically to allow easy access.

Accessibility and Connectivity

The creation of an uninterrupted passage from the sea to the river's upstream reaches was one of the primary design goals. This proved problematic, however, because the north/south course of the river basin conflicts with the east/west axis on which the city and its main transport infrastructure are built. The river was cut, therefore, by legal and illegal bridges in multiple places, disrupting easy passage along its banks. Problems were compounded by numerous other obstructions – such as illegal buildings and markets – that had sprung up over the years. Physically constructing continuous pedestrian and bicycle paths along each bank was therefore one of the project's biggest challenges.

That said, significant amounts of pre-existing green open space on both riverbanks helped expedite the process. Designers could tap elements of several urban parks, two upstream reservoirs, a university district, and a country park to integrate or catalyse development of the river corridor. Downstream, several adjoining golf courses along the east bank offering significant river frontage were also pressed into service. With long-term plans calling for these underutilised sites to be reclaimed by the city, proposals have also been drawn up to assimilate parts of them into the ecological corridor whenever the authorities choose to redevelop.

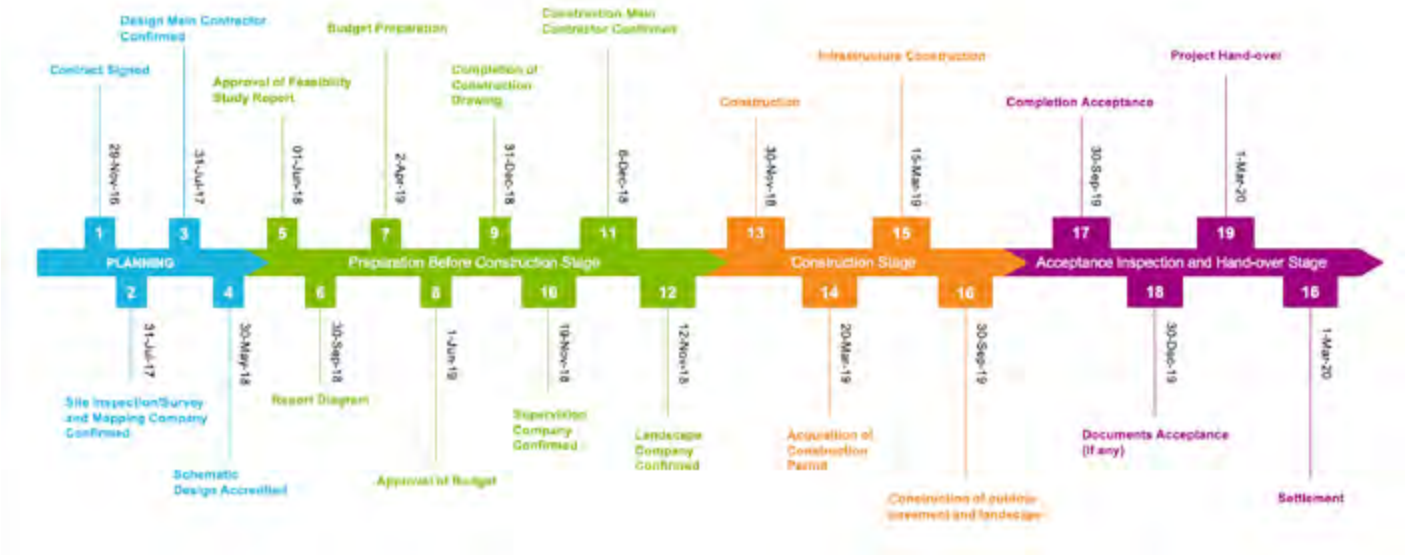
Another significant accessibility issue arises from the fact that years of river pollution and neglect had created a disconnect between the community and the waterway. While the corridor is served by some 31 entrances, therefore, access to them from the surrounding neighbourhood is not ideal because, until recently, there had been little incentive to prioritise physical connectivity from surrounding neighbourhoods, with authorities instead concentrating on pedestrian access to subway and bus stations. One particular problem is that direct pedestrian access to the river from adjacent commercial and residential areas is hampered by a multi-lane expressway that runs parallel to the river's west bank.

The river regeneration programme has resulted in increased focus on solving these connectivity issues, and has also acted as a catalyst for local authorities to find solutions for other pre-existing neighbourhood circulation and connectivity issues.

Still, while pedestrian linkages to the river have now been improved, recreating historical levels of connectivity is no small task. Local authorities are planning further improvements to the pedestrian system on the west side of the river by, for example, eliminating ground-level crossings and replacing them with new footbridges (especially over the expressway) connecting to the park.

Longstanding problems with road traffic circulation in the area are also being addressed. Over the long-term, the local government has expressed interest in moving the expressway underground and converting the above-ground space into a pedestrian-friendly, slow-moving system. Within the park, meanwhile, more bridges are also needed – although the corridor currently has 25 cross-river connections, all but 6 are found in upstream sections.

Construction Timeline



Construction Timeline

Although most of the river's engineering and infrastructure components were completed before landscaping and remediation work began, construction of the ecological corridor took place in a remarkably compressed timeframe, with work completed within around three years from design stage in 2017 to project launch.

Attention was initially focused on the 2-kilometer stretch at the bottom of the river. Once the design package for this section was complete and construction began, work on the remainder of the roughly 12-kilometer upstream section commenced. Five different construction teams were appointed by CRL to execute the plan, with all teams working simultaneously. Given the need to revise plans on the fly due to inaccurate initial survey data, the pressure on design and construction teams was intense. However, the majority of construction work was ultimately completed by May 2020.

There are various reasons why the project could be finished on such an accelerated timeline. First, the pace of construction is generally faster in China than it is elsewhere, partly because corporate culture demands it, and partly because the regulatory framework for river restoration projects tends to be less intricate in China than in the West, where extensive bureaucratic and community consultative processes have become the norm.

Beyond that, the particular circumstances of the Dasha River project were also a factor. First, local authorities had set tight deadlines because they wanted work completed in time for the celebrations of the 40th anniversary of the creation of the Shenzhen Special Economic Zone. Second, the land needed to complete a continuous park along each riverbank was both already owned by the government and free of permanent occupants, thereby obviating the need for potentially lengthy proceedings to obtain vacant possession. In addition, the fact that most of the hydraulic engineering work had been completed before work on the Ecological Corridor began also helped accelerate the construction process.

Finally, and perhaps most importantly, an expedited pace was possible because a locally-based developer (state-owned China Resources Land (CRL)) was appointed to act as both project manager and as main coordinator to deal with municipal government departments. Not only was CRL able to deploy more resources in terms of manpower than the local government (thereby expediting both design and construction-related tasks), but its familiarity with official processes and its connections within the bureaucracy allowed it to navigate challenges more efficiently than any operator from the private sector.

The appointment of state-owned entities to act as project managers and as go-betweens for local governments is today increasingly seen as an effective method of approaching large-scale public/private environmental regeneration projects in China.

Dasha River approaching Shenzhen Bay

Finance

The creation of the Dasha River Ecological Corridor was funded by the Nanshan District government at a cost of some Rmb1.5 billion (ie, about US$235 million). This compares to the Rmb 4.6 billion

cost of constructing the initial sewage infrastructure. While this is a significant investment, it is not that large in terms of the cost of other major infrastructure projects in large Chinese cities.

This is especially so if project costs are seen in terms of value enhancement for the entire area. From a social perspective, the value may be hard to quantify (although it is still very real). But even when seen in a narrow financial context, the amount invested is often able to deliver significant returns.

In this case, the Nanshan government had calculated that remediation work could be directly monetised because it would draw in new tech-based businesses to the Dasha River Innovation Corridor – a national-level innovation base located in the neighbourhood. In the process, it would boost land values, business activity, and associated taxes. Although official statistics are lacking, the payback has by now probably more than paid for the underlying investment. Beyond that, the city benefits in intangible ways because of its burnished reputation and public image.

Another way that river regeneration projects in China can be financed is for often short-staffed local governments to work in partnership with a local state-owned enterprise. In this case, the participation of China Resource Land (CRL) as a go-between with private contractors smoothed bureaucratic and administrative processes with the local government and facilitated design and development work. The highly compressed timeline required in this case, with multiple contractors working simultaneously on different parts of the project, would probably have been impossible had CRL not acted as intermediary and facilitator.

This model therefore provides greater operational efficiency. A variation of this approach is now also increasingly common, whereby qualified state-owned developers are appointed to carry out all the work themselves, receiving in-kind payment in the form of a land grant, either on the same land parcel or elsewhere.

Either way, such arrangements tend to lead to a better outcome than if the project is wholly state-led. As one of the Dasha River project team interviewed for this study observed: "Sometimes the problem in China is that, no matter how good your design is, the construction quality is not always there, so the end result doesn't always meet expectations. But one reason why the Dasha River turned out to be such a good project is because of the quality control – China Resource Land has done a lot of high-end development in China, so they applied similar standards to this project."

Meanwhile, the cost for local governments is likely to be relatively affordable because urban regeneration usually takes place in areas where at least some of the land is underutilised and of lower value. Authorities can therefore pay in the form of an asset that is undervalued and would otherwise remain so, while also accruing higher revenues once a run-down area is regenerated. This model has recently become increasingly popular for local governments undertaking urban renewal projects in other parts of China.

Lessons learned

- A multidisciplinary approach is key. Remediation work is conducted more efficiently if different aspects are completed as part of a single overarching plan, rather than (as is the norm) for high-priority engineering work to be commissioned at the outset, with ecological aspects bolted on as an afterthought.
- The social value of this type of inner-city regeneration is hard to quantify but remains very real. Moreover, it is likely to become increasingly important as a means of boosting social wellbeing, increasing social community connections, and providing citizen spaces as inner cities continue to densify.
- Although remediation work can be expensive, costs of a well-planned, low-impact, approach need not be prohibitive.
- Higher land values and the influx of new and more affluent residents and businesses into regenerated areas will lead to additional tax revenues that help local governments pay for some (or potentially all) the required work. Upfront costs are therefore only a downpayment on future value created by the regeneration work.
- An efficient strategy will often be for local governments to appoint an experienced, probably state-owned, local developer to act as intermediary, oversee administrative processes, and hire contractors. For example, when different universities located along upstream sections of the river were reluctant to open their waterfronts to the public, CRL was able to negotiate effectively with them and local authorities to find a mutually acceptable compromise. An alternate version (and one that has seen increasing traction elsewhere in China) is to hire the developer to do all the work, receiving payment-in-kind in the form of a nearby land parcel for development.
- The project would probably have not been possible for a river carrying significantly greater volumes of water. Given the Dasha River's relatively limited water flow, however, a regeneration strategy that:
  - directed treated sewage and flood water back into the river, together with
  - a commitment to natural (or 'sponge city') processes that retain and filter storm runoff,

  has functioned to alleviate both drought and flood conditions in the watercourse while also helping maintain a baseline standard of water quality.

Project Information

Project commencement
— July 2017

Project completion
— May 2020

Site size
— 93.3 hectares

Ecological park length
— 13.7 kilometres

Constructed wetland
— 8.8 hectares

Constructed wetland water supplement
— 30,000-45,000 m3 per day

Maximum treated wastewater discharge —
100,000 m3 per day

Daily traffic —
40,000 people per day

Park corridor entrances — 31

Cross-river bridges — 25

Toilet/shower blocks — 11

River width — 15-85 metres

Riparian corridor width
— 70-200 metres

Cost of pre-existing sewage infrastructure —
approx Rmb 4.6bn

Cost of landscaping/remediation work —
approx Rmb 1.5bn

Urban Land Institute

About ULI

The Urban Land Institute is a global, member-driven organisation comprising more than 45,000 real estate and urban development professionals dedicated to advancing the Institute's mission of shaping the future of the built environment for transformative impact in communities worldwide.

ULI's interdisciplinary membership represents all aspects of the industry, including developers, property owners, investors, architects, urban planners, public officials, real estate brokers, appraisers, attorneys, engineers, financiers, and academics. Established in 1936, the Institute has a presence in the Americas, Europe, and Asia Pacific regions, with members in 80 countries.

The extraordinary impact that ULI makes on land use decision making is based on its members sharing expertise on a variety of factors affecting the built environment, including urbanization, demographic and population changes, new economic drivers, technology advancements, and environmental concerns.

Peer-to-peer learning is achieved through the knowledge shared by members at thousands of convenings each year that reinforce ULI's position as a global authority on land use and real estate. In 2020 alone, more than 2,600 events were held in about 330 cities around the world.

Drawing on the work of its members, the Institute recognizes and shares best practices in urban design and development for the benefit of communities around the globe.

More information is available at asia.uli.org.
Follow ULI on Twitter, Facebook, LinkedIn, and Instagram.

KNOWLEDGE FINDER

Project Staff

May Chow
Senior Vice President,
ULI Asia Pacific

Colin Galloway
Principal Author,
ULI Consultant

James A. Mulligan
Senior Editor, ULI

Laura Glassman
Manuscript Editor,
Publications Professionals LLC

Diwa Law
Senior Associate
ULI Asia Pacific

Olivia Luo
Associate
ULI China Mainland

Urban Land Institute Asia Pacific

3418 Jardine House
1 Connaught Place
Central, Hong Kong

Tel: +852 2886 1620
Email: asiapacific@uli.org

asia.uli.org