

Liveable Cities; The Art of Integrating Today What We Need Tomorrow

By **Herbert Dreiseitl**

Liveability is an ever-changing precept. It depends on people's perceptions and expectations, and is significantly different from culture to culture. As a general idea, however, liveability is understood at three levels:

- the physical level in which we can provide technical excellence
- the social level in which we can increase social knowledge, provide space for interaction as by public participation, and influence good governance
- the cultural level in which we can provide inspiration and contribute to cultural competence

The biggest challenge to liveability is the pace of urbanisation taking place in the world today. It is incredible that, within our generation, cities now host more than half of all mankind; soon it will be two-thirds. Looking at challenges of pollution, climate change, end of resources, loss of biodiversity, etc., the real battle of this planet is with human consumption and lifestyle expectations. In this context, cities are increasingly important; decisions on how we will live and survive will be taken in cities. Urbanisation has created enormous problems, but it might also be the key to solutions.

Looking to history, people gathered in villages and towns to seek protection against nature and enemies, to share and divide work and be more efficient in production and service processes, and to give solidarity and help each other—physically and mentally. Specialisation of professions, craft workshops and industrialisation were only possible because of urbanisation. The creation and development of art and culture were strongly connected to cities where people could gather to find inspiration and independence. The Italian Renaissance cities, for instance, were the epicentres of transformation, where innovators like Leonardo Da Vinci gravitated towards.

1 Tanner Springs Park in Portland, Oregon. The park is a green and blue oasis for the Pearl District neighbourhood



Herbert Dreiseitl is an urban designer, landscape architect, water artist, interdisciplinary planner, Harvard GSD Loeb fellow, and professor in praxis and visiting professor at the National University of Singapore. An expert on creating Liveable Cities, his work looks into inspiring and innovative approaches to use water to solve urban environmental challenges; connecting technology with aesthetics; and ways to encourage people to care for and develop a sense of ownership in the places they live in. He has realised groundbreaking projects in the fields of urban design, urban hydrology, water art, storm water management, planning and landscape architecture. He lectures worldwide and has authored many publications including three editions of *Recent Waterscapes*, *Planning, Building and Designing with Water*.

Dreiseitl is also founder of Atelier Dreiseitl, a globally integrated design studio with more than 35 years of history of excellence in urban design, landscape architecture and ecological waterscapes. He integrates the organisation's strategic design and planning efforts, demonstrating a portfolio of site-responsive interventions in urban planning, hydrology, and environmental engineering.

As director of Liveable Cities Lab (LCL), the new think tank at Rambøll Group International, Dreiseitl focuses on urban initiative projects, academic activities and research through worldwide collaborations with universities. He explores the potentials and conditions of liveable cities for the future in areas such as policymaking and good governance, in order to bring the best out of a society, create a culture of inspiration, and facilitate the implementation of better-integrated urban infrastructure.

In much of the world today, space in cities is scarce. With growing populations and new demands for workspace, production, mobility, and recreation, cities are fighting for shrinking land resources. The losers in this battle for urban space are foremost the soft and unspoken voices with smaller budgets: protagonists of green spaces, common ground, and the environment.

Inflexible urban structures and missing connectivities cannot cope with the dynamic forces of change, the almost unpredictable rhythms of the environment, and the socio-economic and political trends that affect society. The nature of change is itself changing¹.

What could be a model for future cities? Nature might have some of the answers. Comparing structures in the natural environment with those in urban settings, a significant difference can be seen. Nature works on principles of flexibility and resilience, a dynamic reaction and balance to any event, from a soft change to the unexpected disaster. Given the enormous impact of, say, a flood on soils, hurricanes on forests, and avalanches or volcanoes on mountains and hillsides, it is incredible how quickly ecosystems adapt to new conditions. Over time, one hardly recognises the impact of the disaster; only experts with domain knowledge can tell the difference. This flexible and dynamic response of ecosystems is unique, and some lessons can be learnt from this in the design of urban settings.

Blue-Green Infrastructure (BGI) is an approach to urban design that relies on natural elements (flora and water) deployed in strategic ways. The true function and value of BGI to a city and its inhabitants have yet to be properly understood. But it is the backbone for liveability, and a repository of resources that balances and stabilises life processes. We cannot easily measure, count and quantify the value of BGI to urban structures, not in the way that we might do for, say, hard forms of engineered infrastructure. BGI can never be a prefabricated décor that is countable, statically-determined and unchanging. Vegetation is in a permanent state of evolution, responding to daily rhythms, seasonal changes and the many stages of ageing and renewal. All phases coexist in a living system. In a natural forest, this process of renewal takes place all the time, with life and death coexisting. It is a resilient living system.

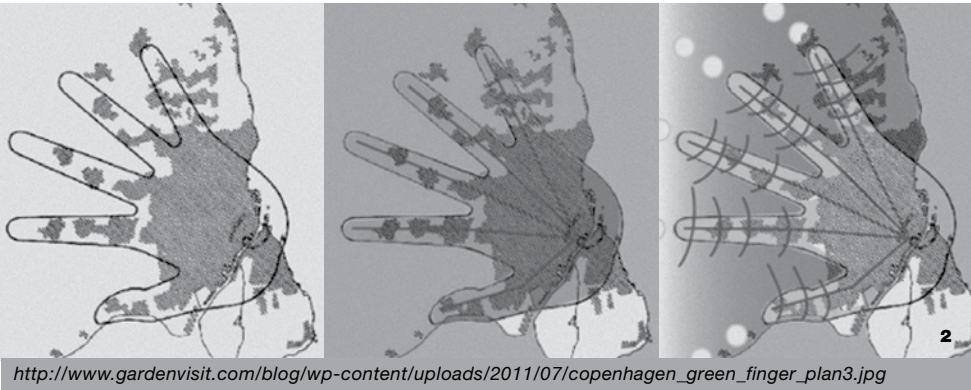
In what ways does BGI offer resilience and liveability?

UN statistics show that 60 percent of the world's cities today will face water shortages by 2025². Ironically, many cities across the globe will also experience, in parallel, the devastation of floods. Flood and drought will happen more frequently, adversely affecting food production, water security, energy, mobility, and public health. There is a trend of a “too much at one time, too little at other times”.

A fast-growing urban sprawl continues to cover the surface of the planet with asphalt and concrete. Instead of slowing down rainwater run-off, holding it back, and avoiding concentrations, this type of development results in large quantities of water collecting at the same time and place. These are conditions for urban flooding. There are other consequences to this question of water conveyance: urban streams often lack water in dry periods. As a result, temperatures rise and oxygen is low; natural habitats die; and fish and plant life suffer. BGI can mitigate these conditions, creating natural corridors that are highways for biodiversity.

BGI has a significant impact on microclimate. Without blue and green, there is no filtration of air, and no holding back of micro particles (wind-blown dispersal), resulting in higher dust concentrations which contribute to unhealthy environments. Research in the city of Hamburg showed clearly that in city centres with less green and water-bound surfaces, concentration of dust particles is significantly higher. Streets with trees have less dust than streets without trees and planted greens. According to World Health Organisation (WHO) estimates, 7.1 million people died in 2012 as a direct result of air pollution.

In most parts of the world, built urban fabric is not only growing, but it is also appropriating natural landscapes. This might not be a problem were it not for the way we design or engineer these urban settings. The fragmentation that occurs simply cuts the breath out of the living environment. The growth of a city, and its impact on the surrounding countryside are therefore important considerations.



2 Copenhagen's Green Finger Plan. Extending from the 'palm', that is, the dense urban fabric of central Copenhagen, green wedges in between the 'fingers' will provide land for agriculture and recreation
3 Aerial view of Tianjin Cultural Park in China
4 The urban pond system in Tianjin Cultural Park acts as a buffer against storms while cooling down the site and offering picturesque waterfront views for visitors



Photos courtesy of Atelier Dreiseitl



Photo courtesy of Atelier Dreiseitl

Without water systems and green structures (and their proper management), there is no foundation for long term sustainability. It is the DNA for any healthy urban development, the medicine to keep cities alive and vibrant.

It is common for cities to lose almost all their ecological structures and green corridors, including open waterways, productive landscapes and park networks. Most successful modern cities, on the other hand, manage to keep and develop their BGI. Among these cities is Copenhagen with its Green Finger Plan. Launched in 1947, it is a strategy that was easy to understand: leave corridors free from construction. Today, Copenhagen is among the greenest cities with the highest liveability and lifestyle rankings in the world (Green Capital of Europe 2014, Nr1 in Mercury Report 2014).

5 Portland's Tanner Springs Park celebrates the return of nature in this formerly industrial area

Whatever scale and dimension of the development, BGI fundamentally connects people with their environment. Without water systems and green structures (and their proper management), there is no foundation for long-term sustainability. It is the DNA for any healthy urban development, the medicine to keep cities alive and vibrant.

Lastly, the character of a place is its gestalt. It might be one of the most important factors for any human settlement, a key ingredient in liveability. Blue and green elements offer a platform for human interaction and place-making.

There are many questions to be answered about the integration of BGI into cities. What functions and qualities must these spaces fulfill today and in the future? How can we create living systems that save natural resources; filter, clean and regulate water supply; balance temperature; produce good air; and increase natural habitats? What are the basic principles, processes and methods to integrate BGI in cities of today and in the future?

Liveability is contingent on likeability, the making of stronger emotional and spiritual connections. To give hope to denser growing cities, we have to create partnerships that balance the needs of people and the environment within urban landscapes in a more respectful way.

These questions must extend to the search for strategic policymaking tools and good governance structures. Detailed knowledge about Blue-Green living systems, and materials and integrated technologies have to be developed. Experts must be called in during the early stages of the project, and more importantly, be taken seriously. Urban landscape architecture should have a higher priority in a development and not be seen as a by-product.

And since these projects affect people, there must be public engagement and society building. Liveability is contingent on likeability, the making of stronger emotional and spiritual connections. To give hope to denser growing cities, we have to create partnerships that balance the needs of people and the environment within urban landscapes in a more respectful way.

It seems we have all the technology and knowledge available today, and yet there is a lack of implementation. There is a discrepancy between what designers and engineers can create with what governments can activate in reality. We cannot afford this dilemma in the future.

The growing interest and influence of urban regions and cities are visible in the increasing number of conferences, symposiums and mayor events. At the 2014 World Mayors Forum (part of the Worlds Cities Summit in Singapore), it was clear that mayors have a much better understanding and contact with their people. More importantly, cities were no longer discussed in simple mechanistic terms, but seen as drivers of change towards greater liveability.

¹ We are confronted with different needs at different times often in the same place. City spaces in India, for instance, can change in the course of a single day; what is in the morning a market, can at noon be a food court, which later becomes a bazaar, before finally, turning into an event space for a wedding in the evening. The urban planner Rahul Mehrothra calls this phenomenon The Kinetic City.
² FAO, http://www.fao.org/nr/water/topics_scarcity.html



PORTLAND

Tanner Springs Park, a newly created park in Portland, Oregon in the US, was formerly a wetland bisected by Tanner Creek and sided by the broad Willamette River. For many decades, rail yards and industry claimed, drained and used the land. Over the past 30 years, a new neighbourhood—young, mixed, urban, and dynamic—has progressively established itself. Today, the Pearl District is home to families and businesses. But instead of covering the area with concrete and asphalt, the city of Portland engaged Atelier Dreiseitl to design a new park, not only bringing blue and green into this formerly industrial area, but also creating a space for contemplation and celebrating the return of nature.

More than 300 citizens were involved in three public events where art, imaginative brainstorming and planning workshops informed and inspired the design process. An art wall was constructed from iron rail track pieces recycled from the site where they once supported trains and industry. Time seems to have reversed, as the wall looks like the old 'urban skin' of an entire downtown block was peeled back with layers of covered natural wetlands coming to the surface. Fusing Portland glass inset with images of dragonflies, amphibians and insects reminds visitors of creatures long gone. Today, the long forgotten wetland habitat is restored to its former glory filled with plants and animals. You might even be lucky and see an osprey catching a fish. Tanner Springs Park is an energy source for people to enjoy the inherent and natural vitality of the park.

TIANJIN

Located just half an hour away from the southeast of Beijing by high-speed train, Tianjin is one of China's top five cities; not only in terms of size and population but also in terms of business investment. As a city close to the ocean with a high groundwater table, Tianjin needs to be properly managed to prevent seawater from encroaching the inland. The dry, harsh climate also does not preclude flooding.

Using the Berlin experience as a model for integrated BGI, the design of a new cultural district includes a new opera house, the existing city hall, and a

90-hectare (222-acre) urban pond system. The pond is a storm water feature, a balancing water body that can effortlessly handle a one in 10 years storm event and buffer a one in 100 downpour. To increase outdoor comfort and create dynamic, social pedestrian routes, the waterfront offers views to the opera house, museum, gallery, and library. Trees and plants shield the waterfront from cold Mongolian winds. Roadbeds purify the water, while the pond also stores water for irrigation. The urban pond has its own natural biology and reduces extreme temperatures.

SINGAPORE

Singapore has developed rapidly into a modern Asian city state with high densities. Situated near the equator with frequent tropical thunderstorms, the problem of flooding was initially solved in the tradition of old engineering with mono-functional technical solutions of concrete channels to get monsoon rain showers out to the ocean as directly and quickly as possible. Other aspects such as the integration of the channels into the urban fabric and existing parks, contact with water, enjoyment by people, and consideration and protection of local flora and fauna habitats were not prioritised.

In 2006, the Public Utilities Board and the National Water Agency of Singapore started a programme called ABC Waters—Active, Beautiful, and Clean—that aims to realise the full potential of an integrated BGI approach. By treating rainwater as a prime resource to fill up reservoirs and water bodies, the ABC Waters' programme is a strategic initiative that works with the entire urban catchment of the island. Instead of channeling rainwater away from the city, areas within the urban development are used for rainwater collection. This also helps to contribute to the country's water security. The programme was implemented with the expectation that it will take off with more projects by private developers. An estimated 150 projects are on their way to be realised in the next 20 years.

6 Today, Bishan-Ang Mo Kio Park in Singapore is a vibrant urban river with natural elements, but still very much informed and shaped by the people using it
7 The park is situated at the heart of a dense residential area in Singapore
8 Plants and bedding materials were used to stabilise the banks in the park





MAIN FEATURE



One of the pilot projects, and by far the largest, was the transformation of 3.2 kilometres of the Kallang River and 62 hectares of Bishan-Ang Mo Kio Park. This is classic BGI project with a strong social component of over 3 million visitors per year.

The design was carried out under the leadership of landscape architects in an interdisciplinary planning process, which included on-site test studies, and hydraulic modeling with flow simulations. This BGI was designed to accommodate the dynamic process of a river system, which includes fluctuating water levels and widths to make sure unexpected problems are accounted for. A special focus on security led to the creation of a special safety system in case of sudden waterleaves rise in the open river valley. Elements from the concrete canal—previously on the site—were recycled and reused as substrate in the riverbed and on a specially-formed platform for artwork.

Today, the park comprises a vibrant urban river with natural elements, although it is still very much formed and shaped by the people that use it. Better hydrological capacities, upgrading parameters of limnology, efficient erosion control and others were possible through suitable bioengineering techniques and reshaping of the river profile.

Plants and bedding materials were used to stabilise the banks to withstand the erosive energy of high flows while at the same time creating diverse stream habitats for native plants and animals. Not only is there a significant increase in biodiversity, there is also a completely new atmosphere that has resulted in connecting the people in the neighbourhood together. Socio-economic factors play into this development and at present there is a study on the effects of the BGI on real estate value and other parameters.

The Bishan-Ang Mo Kio Park has won numerous awards and is seen as a new vision for BGI which addresses the dual needs of water supply and flood management while creating spaces for people and nature in the city.

COPENHAGEN

On 2 July 2011, Copenhagen was hit by a very strong cloudburst with an intensity never measured before. Within two hours, 150 millimetres of rain transformed the city centre into a horror scene previously unknown to this region. Not only was the drainage system hopelessly overwhelmed, the sewage system was completely filled. Manholes exploded and ejected untreated sewer water that mixed in with the rainwater. The problem was made more complex by the high tide, which limited the hydrological flow of rainwater into the sea. Streets and houses were flooded, cars disappeared underwater, and the national hospital had to be evacuated. The damage to the city as a result of this two-hour event was estimated at over 1 billion euros.

But this is not a singular situation in Europe. Increasing rain intensity and reduced retention capacities of strongly regulated rivers are creating floods and

dramatic damages. The effect of increasing climate changes can be seen globally and many reports indicate we will have to expect more intense storm events and longer dry periods.

“Making the city resilient is good business,” said Ayfer Baykal, the technical mayor of Copenhagen. As a result, the city started a strategic action plan, changing regulations and creating a Cloudburst Adaptation master plan.

By analysing the hydraulic catchment areas with its lowest sites, a decentralised system of controlled flooding (maximum 10 centimetres, the so-called service level) was developed. Instead of bringing water directly underground into the pipes and canals of the drainage system, water is stored in streets and public parks whenever there are strong storm events. An existing lake cascade was optimised so that it could store a substantial amount of rain. Special boulevards and broader streets were identified as retention corridors with swales to capture the water. The elevations that were most critical were studied carefully.

Comparing the costs with a conventional drainage system, this new resilient approach, it proved to be less expensive. Public consultation and involvement with the private sector were deemed most important; special graphics and films that illustrate the needed BGI were developed.

9 Copenhagen was hit with a very strong cloudburst back in 2011 **10** Flood management in Copenhagen through BGI **11 to 13** Street in dry weather, during moderate rain, and in heavy storms. In Copenhagen's flood management master plan, special boulevards and broader streets were identified as retention corridors with swales to capture water from the rain



11



12



13

Photo and images courtesy of Atelier Dreiseitl