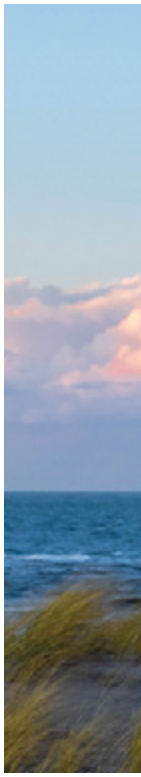
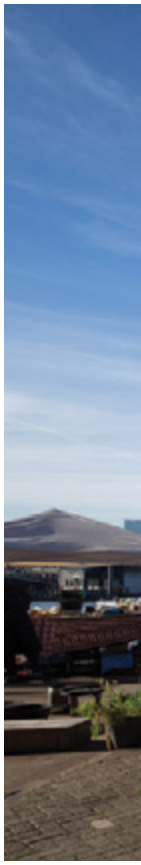
CITY FOCUS

Rotterdam

In Harmony with Nature

It has become second nature for Rotterdam's urban planners and architects to build and adapt to the environment, due to its geographical challenges. CLC adjunct editor **Arthur Sim** elaborates, with insights from Ahmed Aboutaleb, Mayor of Rotterdam, and Dr Ronald Waterman, CLC's Visiting Fellow in February 2015.





Rotterdam in the Netherlands is home to one of the busiest ports in the world, but its strategic location within the Rhine-Meuse-Scheldt river delta in the North Sea also makes it one of the most vulnerable to flooding.

Measures to tackle flooding have been in place since the 13th century, with the construction of the first dam across the Rotte river, and then the building of dykes. In the mid-19th century, an ambitious plan to manage water levels with canals was initiated. However, severe flooding in 1953, caused by a combination of a high spring tide and a severe European windstorm over the North Sea, resulted in over 1,800 fatalities and damage to close to 50,000 buildings in the Netherlands. It was clear that a different approach to dealing with the effects of nature had to be adopted.

Ahmed Aboutaleb, mayor of Rotterdam, notes that while dykes and pumps previously offered protection against flooding, climate change has exacerbated the extremes in weather conditions, with heavy rainfall now also a concern.

"We are a very low-lying city and water comes from four different sides: the sea, local rivers, the sky and the ground," he says. Recognising that nature changes when climate changes, he adds: "If you are going to adapt, you will have to adapt to nature."

Building with Nature

Adapting to nature has been the main thrust of the city's urban planning strategy since the 1980s. Then, hydraulic engineer Ronald Waterman mooted a plan to reclaim the original coastline through an "integrated coastal policy" that supported economic development and incorporated natural processes.

Called the Waterman Plan, it reduced emphasis on inflexible, concrete structures like dams and dykes, and promulgated flexible structures that co-exist in harmony with the sea, like sandy dunes and beaches, that permits colonisation of marine species.

Arthur Sim is a freelance writer and journalist with 15 years of experience in the fields of real estate, design and architecture. Trained as an architect, he also has a special interest in urban planning and social economics.

Sandy beaches help to preserve Rotterdam's coastline in a more natural way than concrete structures.

Rotterdam is determined to ensure that the city remains vibrant, despite unpredictable weather conditions.

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The expansion of the Port of Rotterdam, called Maasvlakte 2, has been the most ambitious phase of the Waterman Plan. Officially opened in 2015, it spans 2,000 hectares, half of which is commercial space for environmentally sustainable businesses.

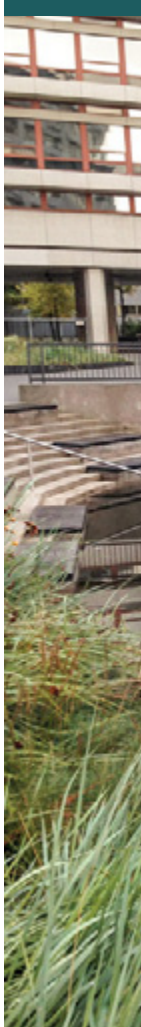
Dr Waterman says that his trademarked method of "Building with Nature" is relatively inexpensive, even after accounting for maintenance. "The most time-consuming factor is the decision-making process to convince [all stakeholders]. Also, [ensuring that] required licences fit within the framework of the various laws and regulations," he adds.

With Maasvlakte 2, Dr Waterman introduced a demarcation between port and port-related activities on the northern side, and a nature reserve area on the southern side. "With a new terrestrial nature reserve, a seascape as a breeding and mating ground for marine organisms and an existing terrestrial natural reserve… it is possible to develop plans that strengthen the economy and improve the environment," he asserts.

Flexible Measures that Adapt to Nature

On a more modest scale, though no less innovative, Rotterdam has embarked on a range of "no-regret measures"—initiatives that remain effective even when conditions change—that adapt to nature while reducing floods and sewerage overflows in the city. "We very consciously decided to implement various solutions with different positive side-effects," Mayor Aboutaleb says. These include building water squares, underground water reservoirs, and green roofs.

Of these, water squares, like the one in Benthemsquare, have become very popular. Dirk van Peijpe, director of the urban design firm De Urbanisten that designed the water square, says the challenge was to integrate the management of rainwater with a public space "in a visible and tangible way."



01 Maasvlakte 2 is segregated into port and port-related activities on the northern side, and a reserve on the southern side.

02 Benthemsquare serves as a popular public space, during days of good weather.

03 The Benthemsquare becomes a water catchment area, even during episodes of cloudburst (extremely short but heavy periods of rainfall).

“Rotterdam has embarked on a range of ‘no-regret measures’—initiatives that remain effective even when conditions change...”

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During dry seasons, the water square is a recreational space. When rain occurs, the three-level sunken water square collects storm water and channels it via large stainless steel gutters (that double as skateboard ramps) into basins for treatment. The stormwater does not flow into the mixed sewage system—preventing overflow into the open water system and improving the quality of open water in the city.

As a part of the design process, De Urbanisten conducted workshops with the local community, who requested that water be a visible part of their lives. Apart from incorporating waterfalls (that act as rainfall gauges) and public water fountains, an open-air baptistery with a fountain was also sited next to the church in Benthemsquare. "It's crucial to involve local stakeholders in the process of design. They are the users and have to have ownership of the public space.

We are building with nature and for people," adds Mr van Peijpe.

There are also plans to transform Rotterdam's water edge into tidal parks. The concept has already been tested on the island of Brienenoord by incorporating sloping, soft riverbanks, a new foot and cycle bridge, and improved walking paths. Earlier in 2015, rubble was also deposited into the Meuse river as the base.

Another measure is the green roof. Rotterdam boasts one of the world's largest roof parks that serves as a dyke against flooding. Built over a shopping centre, the park is 800 metres long, 80 metres wide and rises nine metres. Built on former railroad yards, the roof park uses new technologies in roof greening such as lightweight soil, water-buffering and underground horizontal water drainage.

01 Tidal parks will bring nature closer to the people of Rotterdam.

02 Roof parks like the Four Harbour Roof Park inject even more greenery into Rotterdam.

03 Inspired by the Benthemsquare, Rotterdam citizens in the Zomerhofkwartier district gathered to build raingardens.

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> **we are… turning this into a movement that should go through our city, like a 'green wave'.**

Getting Citizens Involved

While many of Rotterdam's projects are large-scale, Mayor Aboutaleb notes that "[m]any small measures can include residents' involvement."

For example, residents participate in Rotterdam's programme of replacing traditional pavements with more permeable or natural options, so that water infiltrates into the soil easily, and increases the city's absorption capacity. Mayor Aboutaleb adds: "The implementation of small measures started about two years ago, and we are … turning this into a movement that should go through our city, like a 'green wave', if you will."