



Resilient and climate-proof cities

Improving the resilience

Cities face major challenges, including rapid growth and urban compaction, changing land use, and human intervention in the water system. Climate change is adding to the pressures. In order to cope with such challenges, cities need to be made more resilient. Comprehensive planning is essential, as are solutions designed to accommodate continuous change.



What's the issue?

By 2050, 70 per cent of the world's population is expected to live in cities. Urbanisation provides social, cultural and economic development opportunities, but also creates challenges to people's quality of life. Those challenges stem from factors such as rapid urban expansion and urban compaction, changing land use, and human intervention in the water system. While excess water is often a threat, it is also necessary to protect against water shortages and water pollution. Coastal and delta cities face particular difficulties. Challenges that would be considerable under any circumstances are amplified by climate change. Especially, where water is concerned. Precipitation is becoming more extreme, groundwater levels and river flows are changing, and sea levels are rising. In short, our cities are threatened by water from all sides.

Cities consequently need to be made more resilient. Comprehensive spatial planning is essential. We need robust systems, based on designs that provide for water, and multi functional solutions that add value to the city by combining traditional engineering with ecological solutions. It is such versatility that underpins the concept of the climate-proof city.

Cities make the difference

Cities are increasingly important in the context of how we address and anticipate climate change. Many initiatives and innovations are developed in cities. And cities play a defining role in spatial planning, nowadays frequently on the basis of dialogue with residents. Networks such as C40, the Rockefeller Foundation's 100 Resilient Cities Campaign, and Connecting Delta Cities – an initiative by the city of Rotterdam – are created to focus global attention on the challenges we face, and to share knowledge and experience.

Rotterdam: a delta city in transition

For the last fifteen years, Rotterdam has been looking for new ways to manage water. In the past, security has been sought by fighting against the water. The modern philosophy, however, is to embrace water and solutions are designed to accommodate continuous environmental change. Intelligent design combines additional water storage capacity with improved, attractive outdoor spaces. This helps to make a city safer and more agreeable to the people who live there and the enterprises located there. Rotterdam has adopted a neighbourhood-based approach, in which local people are involved in the development and implementation of solutions. In recent years, the city has demonstrated what is required for such an approach, and, especially, what can be achieved. A few examples of small adaptations that contribute to the resilience of the city are presented below.

Large-scale installation of "green roofs"

A roof covered with grasses, moss or sedum has many advantages. "Green roofs" retain rainwater, relieving the pressure on the urban drainage system during heavy rainfall. They also help to reduce energy use inside the building, because a vegetation-covered roof has an insulating effect, translating into lower heating and cooling costs. Moreover, green roofs radiate less heat than black roofs, and therefore help to mitigate urban heat.

Water squares

Bentham Square in Rotterdam is the site of a special water collection facility. During periods of heavy rain, water from its surroundings collects in the facility, easing the load on the city's sewer system. As well as being functional, the square also serves as public space – the lowered areas designed to retain water can be repurposed for sports and recreational use during dry weather. It has three basins: two shallow basins that receive rainwater from the immediate surroundings, and one deeper basin into which water flows only during prolonged wet periods.

Rain tiles

Without much open ground to absorb water, streets are prone to flooding when there are downpours. One solution is the Rain(a)Way tile: a paving tile that features an absorbent base with raised cement strips. When the tiles are laid, the cement strips of adjoining tiles meet, creating a swirling pattern of enclosed spaces. During heavy rain, the water collects in the spaces and then drains into the soil below. As a result, the rain doesn't flow into the city's sewer system, easing the pressure on the system. Naturally, rain tiles can't resolve urban flooding problems on their own, but they do serve as an example of how intelligent design can help a city to cope with heavy precipitation.



Partnership provides international assistance

Direct contact with local people, enterprises and knowledge centres is very important to the process, in Rotterdam just as elsewhere. We are happy to share and deploy our experiences regarding multi-functional solutions and water-based design for urban areas worldwide. A number of partners have now linked up to form the Rotterdam Centre for Resilient Delta Cities. The Centre is a vehicle through which the consultancies, design agencies and universities that have gained experience climate-proofing Rotterdam can deliver assistance to other cities outside of the Netherlands. This has already been beneficial for Ho Chi Minh City, New Orleans, New York, Jakarta, and Mexico City, for example. In 2015 alone, Rotterdam and its partners received more than eighty international delegations.

The broader picture

A city needs more than protection against water. The complexity of the urban ecosystem and its physical infrastructure, the needs of local people as well as governance challenges necessitate comprehensive planning with a focus on chains and flexibility. The city as a whole needs to increase its ability to cope with climate change, economic development, evolving social relationships, and other issues (including digitalisation). Membership of the Rockefeller Foundation's 100 Resilient Cities Campaign can facilitate the formulation of appropriate coping strategies.

Coverphoto:
Henk Ovink (Special Envoy for
International Water Affairs) and
Wim Kuijken (Dutch Delta
Commissioner) lay innovative rain
tiles in Rotterdam. The tiles help rain
water to drain into the soil below.



More information and contact

Rotterdam Climate Initiative
www.rotterdamclimateinitiative.nl

Rotterdam Centre for Resilient Delta Cities
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Connecting Delta Cities – A C40 Cities network
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