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PRACTICES

Pipe Dreams: Cities Get Creative With Water

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ABSTRACT
A photo and sound essay to demonstrate creative ways in which cities are using water to increase resilience, and bring comfort and stability to the lives of residents.

KEYWORDS
Water; Resilience; Urban Planning; Porto; Rochdale; Lille; Wroclaw; Copenhagen.

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"Water is the bloodstream of the biosphere and the determinant of our future,"[1] says Johan Rockström from the Stockholm Resilience Centre. When it comes to cities, water has long been the wellspring of their development, remains today a strategic asset. Considering the yearly recurrence of extreme weather events, increasing in the face of climate change, most cities have come to realise the urgency of improving their urban resilience.[2] And as many resilience specialists have pointed out, urban resilience cannot be achieved and sustained without urban water resilience.

A water resilient city should be well prepared to overcome the challenges associated with both too little and too much water. Cities and residents understand their vulnerability in the face of unpredictable weather. Extreme rainfall, floods generating sewer overflow, draughts and scarcity and rising sea level, are new daily realities for many environment departments in cities.

It is, however, the dose that makes the poison. Water is also a tremendous asset, too long under-utilised by urban planners. In a creative upsurge, cities are bringing long buried water back to the surface for great environmental, cultural and creative ends. New rivers, pools, ponds, lakes and fountains, and their green banks, are reducing the effect of urban heat islands, becoming community gathering spots, and improving local health and wellbeing.

Cities need to think of water as an opportunity and as a resource for economic development while also meeting the critical needs of their residents and the environment[3]. A blue revolution is underway in cities, and this photo and sound essay demonstrates some of the creative ways cities are using water to increase resilience, and bring comfort and stability to the lives of residents.

Daylighting

The second biggest city in Portugal, **Porto**, is suffering from extreme weather events as a result of climate change. To promote resilience, the city is linking blue and green infrastructures, creating natural spaces that improve water quality and function as permeable and shaded areas, engaging people with water.

Porto is bringing a hammer to the concrete, opening the soil and streams beneath. 'Daylighting' cracks open the pipes that have hidden rivers for decades and lets them flourish once again, reconnecting people with the water. **[Fig. 1]**

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1. https://www.thesourcemagazine.org/understanding-resilience-key-water-management/, accessed 9 January 2019.

2. Arcadis Sustainable Cities Water Index, 2016

3. Arcadis Sustainable Cities Water Index, 2016

FIG. 1 Dewatering of the Granja stream / source: Águas do Porto (Porto Water Company)

FIG. 2 Granja stream before and after / source: Águas do Porto (Porto Water Company)

The new green spaces absorb excess rainwater to prevent flooding during rainy seasons. The new blue spaces reduce ambient temperature during hot periods and mitigate the 'urban heat island' effect. [Fig. 2]

Unleashing the water creates a chain reaction. First comes the water, then the greenery, then the people. Porto puts water at the heart of the city's biophysical, economic, and social wellbeing. Water resources of the cities are for its citizens and public participation is a key factor. Water for the people, by the people. [Fig. 3]

Trouble over bridged water

FIG. 3 Águas do Porto (Porto Water Company)
Contact Rita Cunha, Manager, Storm Water, Streams and Beaches Department (rita.cunha@aguasdoporto.pt) for more information.

Rochdale, in **Greater Manchester**, opened up a 500 meter section of its river Roch which had been buried for a century. When it was discovered that a medieval bridge lay under the concrete cover, there was a movement among civil society to bring the bridge back to the city. This was initially quashed, but just over a decade later the decision was made to go ahead with the plan. [Fig. 4]

By reducing the height of the bank and building a drop-in centre where people could learn about the river and its history, Rochdale fully exploited the natural and historical richness of the site. Increased footfall in the area brought economic benefits to local businesses.

FIG. 4 Roch river daylighting timelapse https://youtu.be/x2AQkEG3O8Y

FIG. 5 The brief uncovering of the Rochdale Bridge, 1996. Source: Copyright Dr Neil Clifton and licensed for reuse under CC BY-SA 2.0 via geography.org.uk.

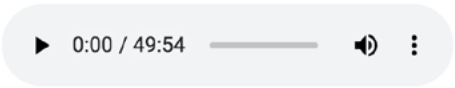
The deculverting of the Roch was also an opportunity to remove debris that built up below the concrete cover, mitigating the risk of future floods. [Fig. 5]

An interesting dilemma arose when it was pointed out that parts of the concrete covering of the river were also of heritage significance. Dating from 1904, these sections were one of the earliest applications of the Hennebique reinforced concrete system.

It is important to remember that heritage involves recent as well as distant history, concrete as well as stone. However, the outcome of the dilemma in this case may be summarised by the image below:

Consciousness of stream

FIG. 6 Rochdale Bridge following restoration, 2017. Source: Copyright David Dixon and licensed for reuse under CC BY-SA 2.0 via geography.org.uk.



BOX 1 Yellow Stream. Discover the ingenious use of pee in China's Forbidden City, and more smart city toilet tricks. Link to site: https://monocle.com/radio/shows/the-urbanist/130/.

In **Lille**, France, Leblan Lafont, an old cotton and linen factory, is today headquarters of the 'site of excellence' dedicated to new technology. The canal crossing this district was relegated to its industrial role, invisible to the surrounding neighbourhoods. The land surrounding the city is flood-prone due to topography and the presence of groundwater close to the surface. Surface water spread 'eutrophication' to water courses, that is green slime from nutrient-rich stagnant pools. [Fig. 7]

Lille decided to redirect the water to the people! New water basins and watersheds that regulate discharge into the canal were integrated into public spaces, to roadside streams and water gardens. In the slow, deep canals, larger impurities sink away from the water, and in the water gardens smaller matter is absorbed by tree roots, natural and inexpensive ways to improve water quality. The new plants, waterways and open green spaces reduce flooding by absorbing and redirecting excess water. [Fig. 8]

Lille's new policy against 'soil-sealing', that is, covering ground with impermeable materials like concrete, mandates that at least 20% of land must be able to absorb rainwater. The location of new buildings is also now

FIG. 7 Lille, Leblan Lafont, cotton and linen factory, © Yves Bercez

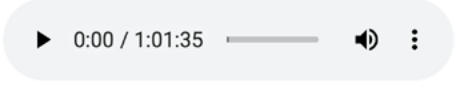
FIG. 8 Lille, roadside stream © Yves Bercez

decided based on soil composition, so that the balance of groundwaters is respected.

The new mix of land and water is teamed up with fluid social diversity. There is a balance between properties for sale and for rent at market prices, affordable housing, and social housing. [Fig. 9]

Sink or swim

FIG. 9 Lille, water park © Yves Bercez



BOX 2 Saying water. Water can be a catalyst for local imagination. "Saying water" is artist Roni Horn's tribute London's River Thames. Link to site: http://www.ubu.com/sound/horn.html.

FIG. 10 Riverboat, copyright Municipality of Wroclaw

1997 was the year that **Wroclaw's** river leapt up and swept across the city. The flood cost around €3 billion, claimed 54 lives and ravaged 40% of Wroclaw's surface. Rebuilding the city's flood protection was not just a matter of repair, or improvement, but of rebirth. The new floodway system developed of river embankments, boulevards, and flood plains. **[Fig. 10]**

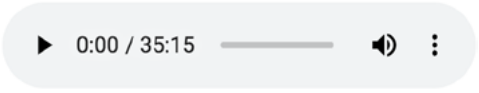
With the flood having destroyed enormous amounts of agricultural land, urban farming is now springing up, with more than 1,000 farms in the city. As well as improving food security, stimulating the local economy, and

FIG. 11 Grassy bank, copyright Municipality of Wroclaw

FIG. 12 Tamka Island, copyright Municipality of Wroclaw

preserving agricultural traditions, this farmland keeps improves the city's water retention capacity, strengthening it against future floods. [Fig. 11]

You can bring the people to water, but you can't make them drink. Wroclaw has sought to make the waterway a democratic issue through stakeholder engagement, public consultation and debate. The city is using a multilateral governance model that brings it together with state institutions, as wells as collaborating with entrepreneurs, to develop its 'riverside identity'. [Fig. 12]



BOX 3 Ready to fire for water. In the USA, some citizens have found a novel way of protecting water: Guns. Link to site: https://www.citymetric.com/skylines/podcast-not-drop-drink-1846.

Fit to burst

In **Copenhagen** the cloudburst system means that the shape of the city and its amenities are subtly adjusted to prepare for floods. When the clouds 'burst' a road serves as a viaduct to siphon water out of the way while skateparks and football fields become temporary reservoirs. [Fig. 13]

FIG. 13 Copenhagen, retention road, illustration from "Cloudburst typologies" developed by HOFOR, EnviDan and Urbanisten for the city of Copenhagen (2014)

A cloudburst road is a road which in normal weather functions as a road in the city and when torrential downpours and large volumes of water occur transport the water to places from which they can either be collected or discharged (typically to the harbour or similar receiving body). The central avenue is brought to a level lower than the pavement and inclined downwards towards the water's intended destination. This can be combined with a retention road. The retention road, pictured above, is convex with porous or green spaces on one or more flank, and stripes

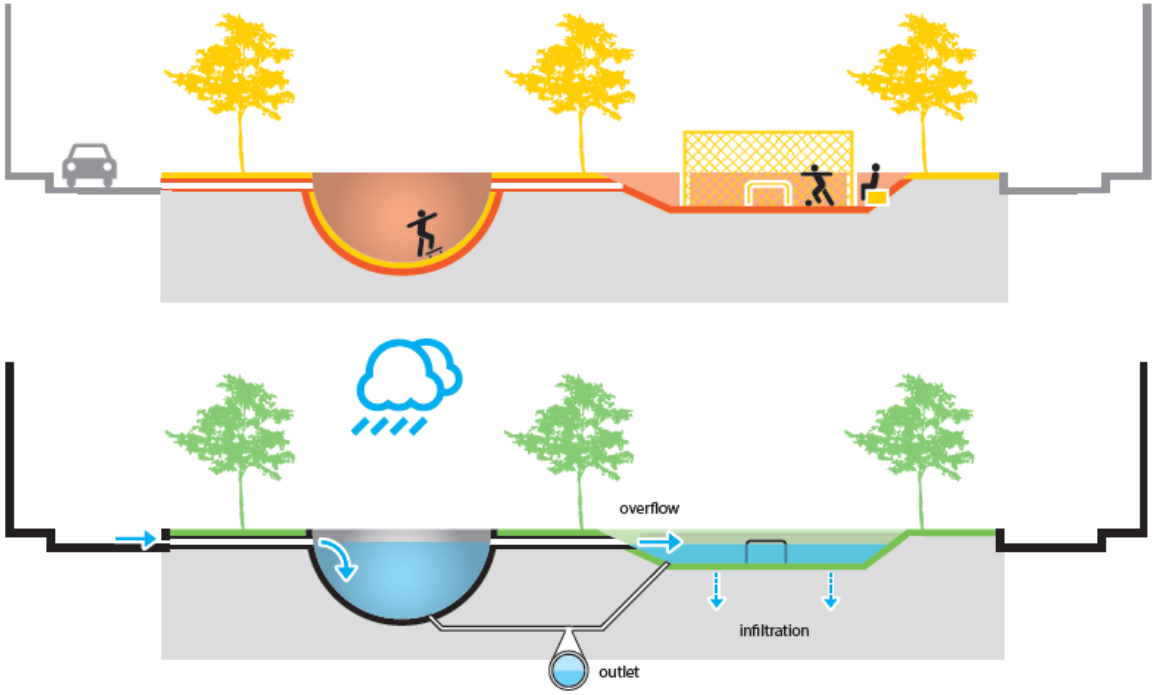


FIG. 14 Copenhagen, retention space, illustration from "Cloudburst typologies" developed by HOFOR, EnviDan and Urbanisten for the city of Copenhagen (2014)

FIG. 15 Copenhagen, retention space in Sankt Annae Plads (photo credit: Søren Svendsen)

of porous stones running across it. The green areas allow excess water to be stored below the street and improve the safety and ambience of the walkways. [Fig. 14]

A retention space is a square or a park arranged to store stormwater. When the downpour is over, the facility is drained either to the sewers or to the cloudburst management system. An example of such a space is Tåsinge Plads. You wouldn't have much fun rollerblading in this weather anyway! [Fig. 15]

Matthew Bach joined ICLEI Europe as an experienced knowledge broker in 2017. He has been working on a broad range of topics from nature-based solutions to cultural heritage, and is currently the scientific coordinator for UrbanA, Urban arenas for sustainable and just cities, a new Horizon2020 project. Prior to ICLEI, Matthew worked globally in academia, the energy sector and international organizations. He holds degrees from Freiburg and Cambridge universities.

Anthony Colclough holds an MA in creative writing from Sarah Lawrence College (NY) which he has been putting to good use unlocking the stories that lie beneath innovative policy and practice for the last 10 years.
He works at EUROCITES on projects in the fields of mobility, smart cities, culture, environment and social affairs. This cross-cutting role allows him to create the hooks and see the links that open cities' stories to the world.

Cristina Garzillo employed with ICLEI since 2005. Having almost 20 years of experience working in and for local governments, Cristina is recognised for her work as expert in local sustainability processes, integrated management and governance as well as author of numerous publications in the field of local sustainability, cultural heritage and knowledge brokerage.
Cristina is an external evaluator for the URBACT III programme and an expert for the European Commission and the Committee of the Regions. She can also draw on a wealth of academic experience gained from previous
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Cécile Houpert After a Master degree in European affairs and international relations, Cécile joined EUROCITIES in 2015 as part of the culture team where she works as project officer for culture and cultural heritage. She was involved in the management of the Culture for Cities and Regions initiative, a three-year peer-learning programme for European cities and regions financed by the European Commission. She now coordinates EUROCITIES' activities as part of the H2020 project ROCK, monitoring implementation in the 10 ROCK cities and organising peer-learning and capacity-building activities with partners. She is also involved in EUROCITIES' culture forum and working groups related activities.