



Hydro Politics

Newsletter

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Nature-Based Solutions for Water

NBS use or mimic natural processes to enhance water availability (e.g., soil moisture retention, groundwater recharge), improve water quality (e.g., natural and constructed wetlands, riparian buffer strips), and reduce risks associated with water-related disasters and climate change (e.g., floodplain restoration, green roofs).

Nature-based solutions(NBS) offers a vital means of moving beyond business-as-usual to address many of the world's water challenges while simultaneously delivering additional benefits vital to all aspects of sustainable development.

Currently, water management remains heavily dominated by traditional, human-built (i.e. 'grey') infrastructure and the enormous potential for NBS remains under-utilized. NBS include green infrastructure that can substitute, augment or work in parallel with grey infrastructure in a cost-effective manner. The goal is to find the most appropriate blend of green and grey investments to maximize benefits and system efficiency while minimizing costs and trade-offs.

NBS for water are central to achieving the 2030 Agenda for Sustainable Development because they also generate social,



economic and environmental co-benefits, including human health and livelihoods, food and energy security, sustainable economic growth, decent jobs, ecosystem rehabilitation and maintenance, and biodiversity. Although NBS are not a panacea, they will play an essential role towards the circular economy and in building a more equitable future for all.

Working with nature improves the management of water resources, helps achieve water security for all, and supports the core aspects of sustainable development.

Best wishes

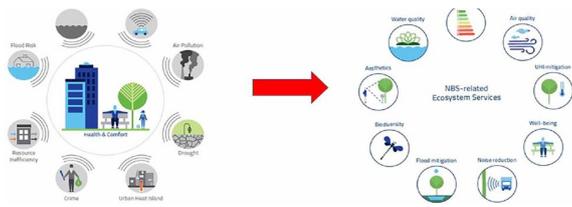
Dursun Yıldız

Director

Hydropolitics Academy



EXISTING URBAN WATER MANAGEMENT



Despite the risks that water can pose in urban spaces, it is an integral part of the city and a vital resource for the residents. From the human health perspective, it is necessary to integrate water in the urban layout. Therefore, a modern approach to the urban planning of the so-called WSUD assumes the use of the most natural technological solutions, the so-called eco-engineering. We count green roofs, bioretention systems, 'rainforests' and hydrophyte systems that combine the function of purification and retention and provide many ecosystem services (ES), including biodiversity and returning rainwater to the local water cycle by evapotranspiration. The natural



ground cover would only have 10% runoff with 40% via evapotranspiration and 50% through infiltration while the impervious cover would have 55% runoff with 30% evapotranspiration and 15% infiltration (US EPA 2003).

As presented above, existing water management systems are not sufficient in many cases, and the need to solve the problem of quantity and quality of water exists in order to implement the concept of an urban circular economy. The synergy of constantly growing urban areas with impervious surfaces and pollution associated with human activities, and climate change with an increasing number of meteorological extremes, requires a new approach for cities to become more resilient to socioenvironmental pressures.

Therefore, based on the identified challenges, there is an urgent need to support the

implementation of NBS in cities in order to contribute to climate change adaptation by reducing their vulnerability to environmental threats. NBS allow mimicking pre-development hydrologic regime and detaining runoff close to its source following the principle of low-impact development and use plants to later return the water to the local water cycle through evapotranspiration, thus supporting the plants in dry periods. Therefore, NBS become an essential feature of urban resilience managing stormwater, contributing to urban cooling through evapotranspiration and alleviating urban heat island effects while supporting urban green with local water resources.

Flood protection and risk management

Ecosystems, depending on their management, can either contribute to the problem or provide effective NBS for flood risk reduction or climate change mitigation and adaptation. At the same time, the implementation of NBS depends on the state and capacity of ecosystems to provide particular regulating services (flood, erosion, climate). Their spatial dimensions provide a basis for land use management and urban planning decisions in accordance with an ecosystem-based approach for flood risk management and other aspects of urban environmental management (Szopińska et al. 2019). On the other hand, there are other, potentially very cost-effective ways of achieving flood protection by tapping into nature's own capacity to absorb excess waters. Consequently, NBS implementation aims at preventing natural disasters to make urban areas safe and resilient, which can be achieved in combination with technological and engineering solutions if necessary.

Planning infrastructures to manage flood risk is related to connectivity, circularity and finding a balance between natural and urban elements (Gaines 2016). Moreover, in a fast developing city, the loss of circularity is often associated with the altered hydrological cycle, implying that water is not a natural, valuable resource, but rather a threat to the

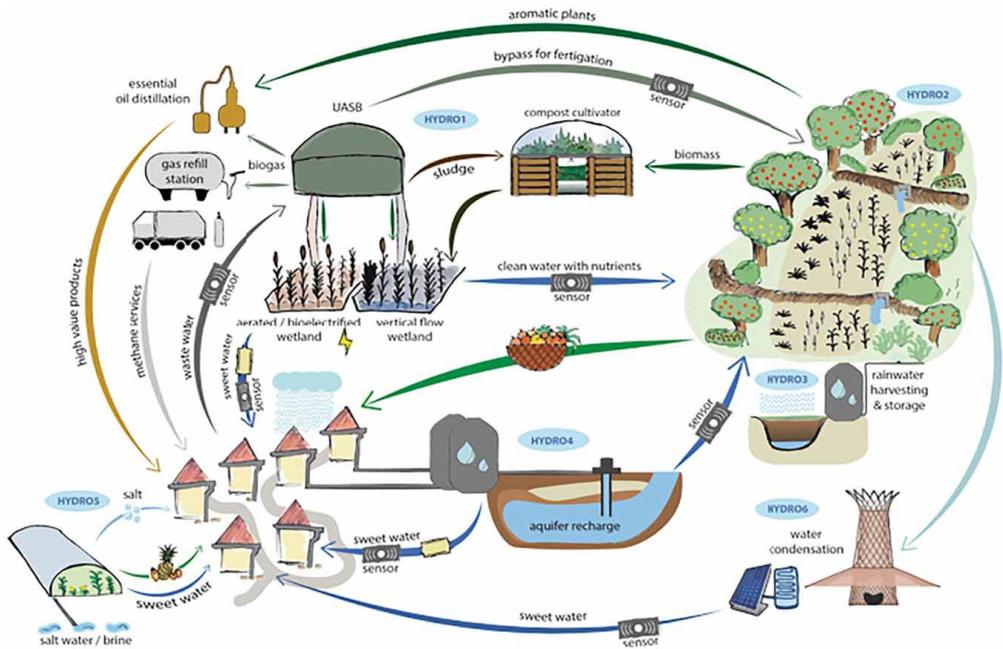
urban environment, when it flows at rates different from those of natural paths, from/toward locations that are functional to the development of human activity rather than to the environmental dynamics, through managed (often fast) connections, with quality standards far from those provided by natural water bodies (EPA 2005).

Consequently, the loss of circularity in the altered natural water cycle is derived from the reduction of soil infiltration capacity and resulting in fast surface runoff. The fact that the natural water cycle is replaced by the urban water cycle threatens soil, channelised urban drainage systems, receiving water bodies and downstream cities. Furthermore, the wash-off of pollutants from anthropogenic catchments poses a threat to the receiving water bodies and their biomes. The loss of infiltration and uncontrolled leakage from sewage threaten groundwater and connected surface water bodies. Subsequently, the resources, politics and awareness affect the socio-environmental dynamics and determine whether the socio-hydrological system will undergo irreversible decline or be self-sustainable.

Source :Hasan Volkan Oral et al. 2020 A review of nature-based solutions for urban water management in European circular cities: a critical assessment based on case studies and literature Blue-Green Systems Vol 2 No 1



PROJECTS/CASE STUDIES APPROACH

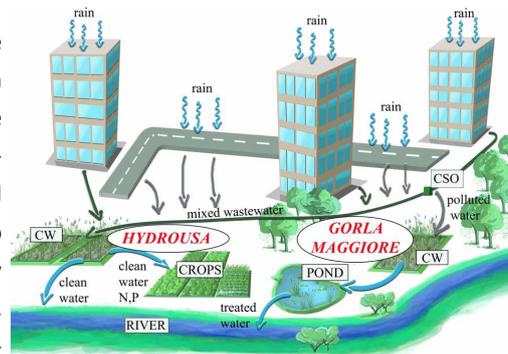


KURAS PROJECT

The aim of this project is to give the answer to the question 'How can the future wastewater discharge, water quality, urban climate and quality of life in the city be improved through intelligently coupled storm water and waste water management?'

HYDROUSA PROJECT

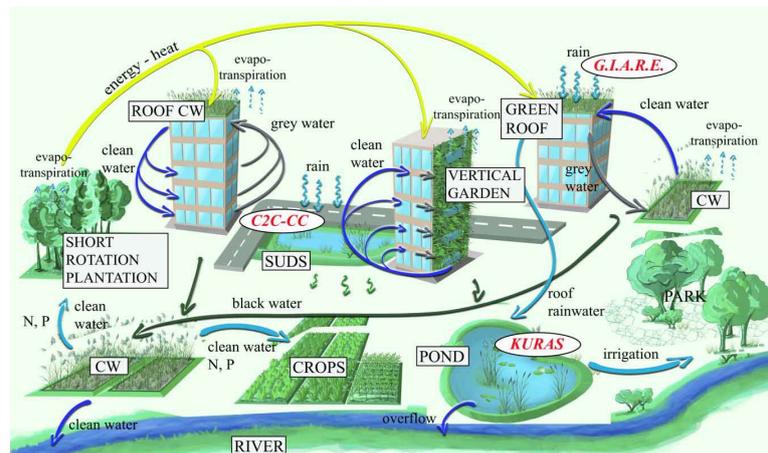
HYDROUSA aims to revolutionise the water supply chain in Mediterranean regions by demonstrating innovative solutions for water/wastewater treatment and management, which will close the water loops and will also boost their agricultural and energy profile. Relevant to NBS applications, HYDROUSA demonstrates that circular NBS technologies work for wastewater treatment and nutrient recovery, while creating further environmental and societal benefits. The project offers a solution for the problem of rare water reserves in Mediterranean regions in the summer during the high tourism season. The project will not only develop and demonstrate innovative water services, but will also revolutionise the water value chains in Mediterranean areas from water abstraction and use up to sewage treatment and reuse (www.hydrusa.org, 2019). There are five water categories in the HYDROUSA project: rainwater, groundwater, wastewater, water vapour and sea water and the systems defined between these categories are harvesting, recharge and restore, wetlands, vapour condensation and



tropical greenhouse. Moreover, bi-mimicry design concepts and fertigation are being applied to increase the efficiency of the selected NBS. Some of the recovered products of these systems are water for domestic use, irrigation water, biogas, drinking water and salt.

The project consists of a network of partners from research and industry as well as the city of Berlin decision-makers. KURAS is the elaboration and exemplary demonstration of integrated concepts for a sustainable handling of wastewater and rainwater for urban locations.

As mentioned in the Introduction section, NBS aim to protect, sustainably manage and restore natural or modified ecosystems. The KURAS project aims to decrease water consumption after heavy rainfall in the city and enables the sustainable management. Some of the following sub-goals, which are defined, to reach this achievement can be available from (www.watershare.eu, 2019):



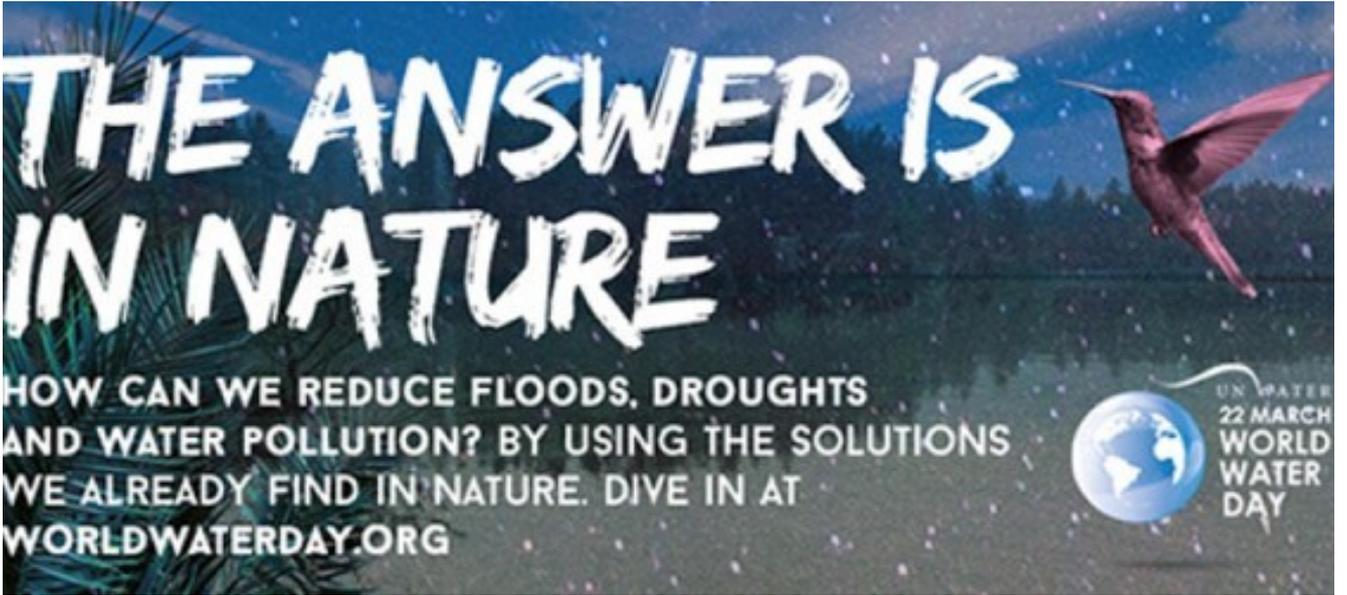
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Protecting water sources

Natural ecosystems (forests, grasslands, crops, vegetated areas, etc.) provide important regulatory functions that protect or enhance water quality, while bringing additional economic and socio-environmental benefits.

Working with nature to improve the management of water resources, achieve water security for all, and contribute to core aspects of sustainable development



We need to built a future,
Where people live in harmony with nature

HPA

Think Forward . Lead Forward

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News Coordinator: Assoc Prof. Dr. Nuran YILDIZ
Assoc. Prof.Dr. Doğan YILDIZ
Content : HPA Technical Unit – www.hidropolitikakademi.org
Editor: Dursun Yıldız
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