Integrated Water Management

Design with Water

Justin Abbott Europe Water Leader October 2020

"A common currency across the SDGs"



Economic Environmental Geopolitical Societal Technological







THE NEED TO ADDRESS WATER CHALLENGES IS GREATER THAN EVER, BUT SO IS THE OPPORTUNITY TO REDISCOVER THE POSITIVE ROLE OF WATER: ITS POTENTIAL TO SHAPE A SUCCESSFUL, RESILIENT AND SUSTAINABLE CITY.

The Living with Water Partnership

Hull City Council East Riding of Yorkshire Council Yorkshire Water Environment Agency



Design with Water; Integrated, Catchment Scale, Systems View



Design with Water; Unpacking each of the dimensions





Thoughts on some (6) key principles for Designing with Water

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Design with Water



Supports human-wellbeing and natural systems; human centred design, community engagement, co-creation







RainScape GlawLif



Looking through a health and wellbeing lens...



and







EXPLORING A HEALTH-LED APPROACH TO PLACE

ARUP

Adults.

FCand use

ands

Key asset

Generating ideas to enhance and develop health & wellbeing assets



Design with Water

Is guided by systems thinking; system led approach, systems of systems

Cities are made up of different systems and these interact with each other in a system of systems way. One of the primary systems is the water system ie the water cycle. The scale of this system is not the city boundary but rather the catchment or catchments the city may depend on for water. It is therefore fundamentally importance to understand who is responsible for each part of the water cycle.





The City Water Resilience Approach (CWRA) responds to a demand for innovative approaches and tools that help cities build water resilience at the urban scale. The CWRA was developed to help cities grow their capacity to provide high quality water resources for all residents, to protect them from water-related hazards, and to connect them through water-based transportation networks ("provide, protect, connect").

Dimensions of Resilience

- Planning and Finance
- Infrastructure and Ecosystems
- Health and Wellbeing
- Leadership and Strategy





Design with Water

Leverages digital technology; *accessible platforms, enabling asset sharing, new insights*

Shanghai water masterplan achieved savings at concept stage through the use of blue and green infrastructure (vegetation, temporary surface water storage) to reduce the scale of residual grey infrastructure (tunnels, pumps etc). This is implementing the principle of sponge cities at scale.





Our approach

Digital methodology



Earth Observation data Local environmental data Climate change projections City drainage asset and planning data Design standards

Analysis



Deep learning model to identify city land uses Assessment of the potential of nature-based solutions (NBS) to address city drainage challenges



Summary web dashboard for easy and collaborative end-user experience

Our approach

Identification of relevant typologies





Components

 1
 2
 3
 4
 5
 6

 战略原则和要素



多功能渗透性 单车道

Restore network to its original capacity

多功能渗透性 单车道

Extension to existing tunnels



优化的河网 Optimise river network



Natural flood management with machine learning

Arup, NVIDIA and DigitalGlobe explored machine learning potential to evaluate the performance of natural flood management schemes. We have successfully developed multiple deep learning based systems that provide map data on land use and object identification at a higher resolution than other datasets that are currently available.

Design with Water

Delivers holistic urban planning; design for resilience, water as a catalyst, blue green

"A new generation of infrastructure projects is necessary to achieve development goals, including water security, disaster risk reduction, poverty alleviation, and resilience to climate change.

Strategically combining green and gray infrastructure to lower costs and improve resiliency can help tackle the looming financial and environmental crisis facing global infrastructure systems."

World Bank, Integrating Green and Grey



Leeds, UK Flood Alleviation Scheme



ARUP

Case Study: New York City





Bioswales constructed from the Newtown Creek contract

²³ NYC Green Infrastructure



Green Infrastructure below the viaduct

²⁴ Under The Elevated | Sunset Park, Brooklyn

Green infrastructure... transforming waterfronts

The New York Times

A Queens Park Opens, Already a Storm Survivor



By DAVID W. DUNLAP Published: September 4, 2013

The Hunters Point South Waterfront Park in Queens opened on Aug. 28. It had already survived Hurricane Sandy. Construction of the 5.5-acre park was well along last October when the storm hit. Surging waters immersed much of the project, including the central green, a 52,200-square-foot bowl formed by a berm of natural grass wrapping around a flat playing surface of synthetic turf.

"This whole area had four feet of standing water," recalled Michael Manfredi of the architectural firm Weiss/Manfredi,





Design with Water

Works in partnership; early engagement, *delivering shared assets & optimising investment*

The transformation of a flood prevention area into an award winning, multi-use community space and wetland park was achieved through partnership working. Arup along with the Environment Agency, The Land Trust, London Development Agency, and London Borough of Barking and Dagenham reinvigorated the space to create 53 hectares of wetland park for the local community.

Partnership delivery

1. Understand the water cycle at catchment scale	-0- +
2. Align with other drivers and development needs	
3. Identify partners and understand their priorities	
4. Build a shared case for investment and action	+
5. Delivery, maintenance, evaluation, feedback	





Need to understand governance across the water cycle.

A collaborative effort between Arup and the Stockholm International Water Institute (SIWI), and funded by the Resilience Shift, the OurWater tool addresses the need for improved water governance through coordination and knowledge-sharing between actors working in the water system.



DEFINING SHARED VALUE

Shared Value is found at the nexus of business opportunities, corporate assets, and social needs.



Source: Shared Value Initiative

Design with Water

Understands the full value of water; recognition and valuation of wider benefits







CIRIA The Multiple Benefits of SuDS



Cities Alive: Rethinking green infrastructure

Cities Alive looks at how we can build nature into our urban systems at all scales through high quality landscape design, via new development or retrofitting through a green infrastructure design approach.

The publication analyses existing research and trends in landscape design, drawing out key elements which can help deal with rapidly rising urban populations, mitigate climate change and produce integrated solutions.

It shows how the creation of a linked 'city ecosystem' encompassing parks and open spaces; urban trees, streets, squares; woodland and waterways can help create healthier, safer and more prosperous cities. To realise this vision, green infrastructure has to now take a more influential role in the planning and design of cities and urban environments.





















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