

GestPatPluvO : gestion patrimoniale durable des solutions fondées sur la nature dédiées aux eaux pluviales urbaines

Nature-based stormwater solutions asset management



The last decades have seen an impressive evolution in the way stormwater is managed: Nature-Based Solutions (NBS) are becoming as important as drainage pipes. The design of Nature-based stormwater management solutions seems well established when considering water quantity (and quality). More work is however needed to consider economic, environmental, societal aspects and adaptations to climate change related to the city and its inhabitants. Very few are also known regarding the required management for their long-term performance. **The GestPatPluvO project is focusing on NBS implemented at the scale of the parcel and the district. It aims to propose a multi-criteria decision aid method to assess the performance of NBS and the (positive and negative) impacts of management strategies for the utility manager, the city, and its inhabitants.** The work will build on existing scientific and operational literature and will also encompass methods developed for other infrastructures such as roads, green areas, dams, and dikes, as these assets share services functions with NBS dedicated to stormwater management. The developments will also rely on knowledge held by managers and local authorities. **The method and tool will be applied on real case-studies to verify the feasibility and interest of the project.**

NEW CHALLENGES FOR ASSET MANAGEMENT

Categories	Criteria	Scientific knowledge	Techniques and technologies	Non-technical solutions	Knowledge transfer – training of practitioners
Technical objects	Performance	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5
	Assets deterioration	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5
	Digital water solution	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5
Processes, impacts, risks	Urban flooding	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5
	Runoff pollution	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5
Urban services, urban planning	Waterwise Cities	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5
Water cycle	Water resources	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5
	Adaptation to climate change	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5

'Traditional' water infrastructures

Continuous system: the network is composed of pipes linked together
Single purpose: pipes are designed to convey water from one point to another
Assets are 'grey' (man-made) and depend on the civil engineering field
Immediate effect of rehabilitation: the asset is back to normal functioning after the construction works
All assets are very similar and are often considered homogeneous groups (cohorts)
Assets are hidden underground: they are not visible but can be distinguished from other urban elements
Assets are managed by one department which can be the water department or sanitation department

BGI

Discontinuous system: BGIs are often spread individually on the territory aiming to manage stormwater 'at source'
Multi-functionality: in addition to runoff management, BGIs can improve biodiversity and provide social benefits, etc.
Assets are 'grey' and 'green' (nature-based) and depend on the civil engineering and the ecosystem fields
Nature time-scale dependent: any rehabilitation involving a nature-based component can need time to fulfil completely its function
Each asset is unique in terms of size, form, and constitution and service delivered, and thus requires a unique model
Assets are integrated within an urban environment, and it can be a road, a playground, a sports field, a park, etc.
Assets require collaborative management between, for example, water department, street cleaning department, and green space service

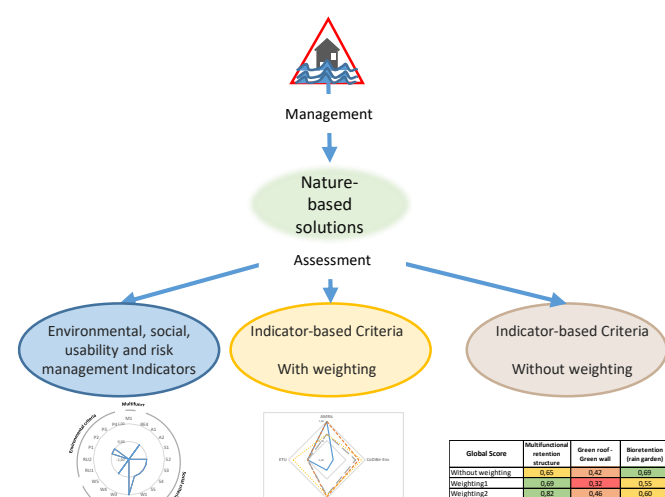
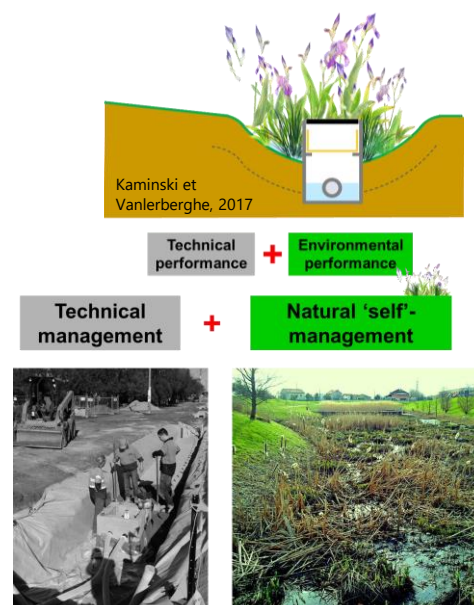
Comparison between 'traditional' water infrastructure and Blue Green Infrastructure (BGI) or Nature-Based Solutions (Langeveld *et al.*, 2022)

Needs expressed in the legislation and policy documents of Denmark, France, Germany, Spain, Switzerland, the Netherlands and the United Kingdom, quantitative overview – Co-UDlabs project (Tondera *et al.*, 2023)

TOWARD A MULTICRITERIA DECISION TOOL



Generic representation of Sustainable Urban Water Management System functions (Belmeziti *et al.*, 2015)



Procedure to assess the co-benefits/disbenefits of risk management measures such as Nature-based solutions (Curt *et al.*, 2022)

References

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Curt C., Di Maiolo P., Schleyer-Lindenmann A., Tricot A., Arnaud A., Curt T., Parès N., Taillandier F. (2022) Assessing the environmental and social co-benefits and disbenefits of natural risk management measures. *Heliyon*, Dec 19;8(12):e12465. <https://doi.org/10.1016/j.heliyon.2022.e12465>

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