International Workshop:
Non-grid solutions for the future of urban water management: The path forward

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Congressi Stefano Franscini, Meeting Platform of ETHZ
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Non-grid solutions

The conventional centralized 'big pipes in, big pipes out' approach to urban water management (UWM) relies on well-established socio-technical systems that are designed to provide safe and reliable urban water services.[1] These include hygiene (personal and public), water supply (for drinking, fire control, irrigation, and other purposes), pluvial flood control, environmental protection, and resource recovery.[2]

Leading research institutes, international organizations and national governments are increasingly questioning whether conventional UWM systems are the best solution to meet all the upcoming challenges of an increasingly urbanizing world.[2-5] Instead, they propose to complement the current dominating approach by non-grid UWM systems, i.e. more flexible, cost-effective and resource-efficient systems that show greater adaptability to fast changing boundary conditions.[6-8] Such systems provide one or several essential urban water services with a minimal amount of piped networks and feature a low degree of technical centralization. Their modular scalability may result in a similar or even better long-term resource efficiency than conventional networked systems.

To scope a path forward for alternative UWM systems, an international group of researchers and practitioners from 21 different organizations came together at the Conference Centre 'Congresso Stefano Franscini' (ETH Zurich) at Monte Verità in Switzerland in March 2018. They discussed current and future challenges related to non-grid UWM systems, identified current research gaps and outlined promising future research activities to support transition toward alternative UWM systems. Taking into full consideration the Sustainable Development Goals, these experts propose four basic principles that need to be respected when developing and implementing alternative socio-technical UWM systems and related to these, outline the next decade of non-grid UWM research.

Principles

1. **Recognize** the **diversity** of technical and social UWM systems available and the possible **variety** of decentralization degrees (centralized, semi-centralized, decentralized, hybrid) that can constitute locally appropriate UWM systems.
2. **Align technical and social components** to ensure that alternative UWM solutions result in socio-technical systems that can be adapted to changing conditions and are capable of providing essential urban water services at any time.
3. **Approach UWM systems as** part of a **whole**, i.e. of a 'system of urban infrastructures' that comprise different sectors, such as water supply, stormwater, wastewater, energy, solid waste, transport and leverage synergies between the different sectors and systems.
4. **Consider equity** within the current population and among present and future generations to safeguard access to sufficient, safe, acceptable, physically accessible and affordable urban water services.

The path forward for research

1. Toward socio-technical UWM systems

Future research must consider urban water infrastructures as socio-technical systems, forming part of an 'overall system of urban infrastructures'. More understanding and evidence is needed on interdependencies and interactions within and between the different sectors and systems and their respective components. Research needs to cross traditional disciplinary boundaries and integrate different perspectives from both science and practice. Moreover, it should explore how both technical and social components could best align, and analyze major drivers and barriers to such alignment considering different socio-economic contexts. Research needs to objectively compare different UWM systems in terms of flexibility, adaptability, resilience, cost effectiveness, resource efficiency, and analyze the potentials and limitations of alternative systems.

2. Socio-technical sector transition

Future research must recognize the temporal and spatial dimension of socio-technical transitions, where a phasing-out of an old system and a phasing in of a new system run in parallel. Research on socio-technical transitions requires collaboration of all relevant stakeholder groups, and a clear, context-specific UWM vision specifying potential end-points of the transition. Research should show alternative transition pathways and transition steps to reach the envisioned target system and identify indicators to assess progress of the transition at both technical and social level.

3. Generative learning

To mainstream non-grid UWM systems, future research must generate evidence through lighthouse projects in the Global North and Global South that apply alternative UWM systems. These shall illustrate drivers and barriers for such innovation, demonstrate the potentials and limitations of non-grid UWM systems, and thereby inform research, policy and practice. Besides lighthouse projects, future research should also leverage for pilot projects at different scales within different contexts, document the experience and share this knowledge among researchers, practitioners and other experts within and across the urban water sector to foster generative learning. Learnings from UWM systems that have adapted to changing boundary conditions within different socio-economic contexts and experiences from other sector transitions (e.g. energy transition) should be promoted.

Next steps

The workshop participants agreed that Eawag, the Swiss Federal Institute of Aquatic Science and Technology, will take the lead in:

- disseminating the main workshop results via scientific and practice-oriented publications in 2018
- establishing, in collaboration with the International Water Association (IWA), working groups on selected sub-topics (e.g. urine separation and treatment) in 2018
- organizing a second international workshop in 2021 to bridge between science and practice and discuss, among others, success and failure of different pilot projects, potentials and limitations of different alternative UWM systems

Workshop Participants

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