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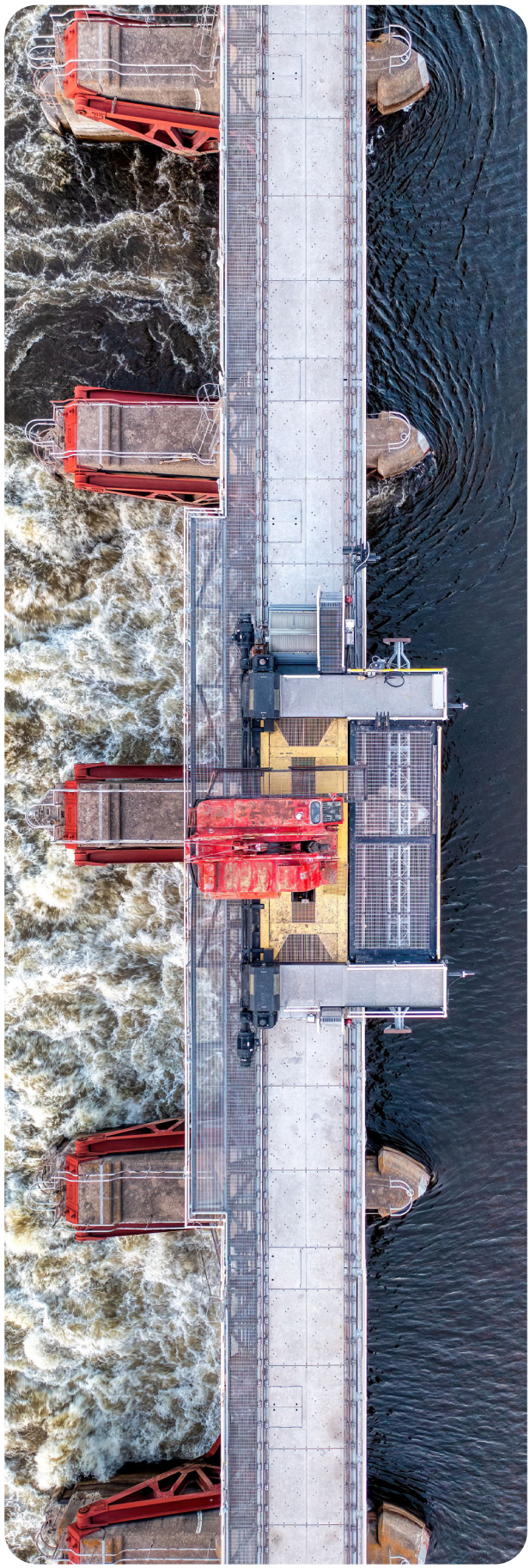
BLUE SERIES POLICY BRIEF

Smart Water Management: Can it Engineer Sustainability?

KEY POLICY MESSAGES

- Smart Water Management can improve water management through efficient metering, digital feedback, and real-time analysis
- Smart Water Management policy challenges include threats to privacy, problem-solution mismatch, resistance to uptake, technical obsolescence, and high expense
- Smart Water Management technologies should be accompanied by effective institutions to enable public engagement, particularly in disadvantaged communities
- Smart Water Management technologies developed for the Global North will often need adaptation for the Global South



Smart Water Management (SWM), broadly defined as the application of Information and Communications Technology to water management, lies at the confluence of technological advancement and looming challenges in water governance. Examples are real-time water quality monitoring, metering that provides users with data about their water consumption, and integrated management of water, sewage, and flood events. Governments often see SWM as a pathway to improve water quality, reliability, and sustainability, but they should also be mindful of broader impacts and sustainability determinants.

MAKING SMART WATER MANAGEMENT SMART

Given increasing water stress and political mandates to support environmental sustainability, SWM is an appealing policy tool and holds opportunities for progress on humanitarian and developmental policy goals (including Sustainable Development Goal #6: Clean Water and Sanitation). Applied tactically, it can expand fair and equal access to clean water, improve operational efficiencies that have fiscal benefits, generate more intricate data for water management, and better connect water solutions to situational and local contexts.

SWM has been applied for a variety of purposes, from urban systems for water distribution and flood mitigation to rural and agricultural systems for irrigation, runoff, and catchment management. Examples are:

- Real-time monitoring of water quality and quantity at the National Autonomous University of Mexico
- Integrated water management to minimise flood damage and ensure water supply continuity during South Korea's dry season
- Integrated governance of institutionally fragmented sanitation systems in Greater Paris
- Soil moisture and nutrient monitoring tools to improve irrigation decision making and reduce water use in Southern Africa
- Improvement in availability and quality of water data in the Canary Islands

At the same time, decisions to invest in SWM should be made judiciously and with realistic expectations about its capabilities, as substantial investment is often needed for enabling technologies. **While SWM harbours the promise of technology-driven environmental sustainability,** complementary institutional and regulatory capacities should be strengthened to safeguard privacy, enable uptake, and facilitate public participation in decision making.

THE RIPPLE EFFECTS OF SWM

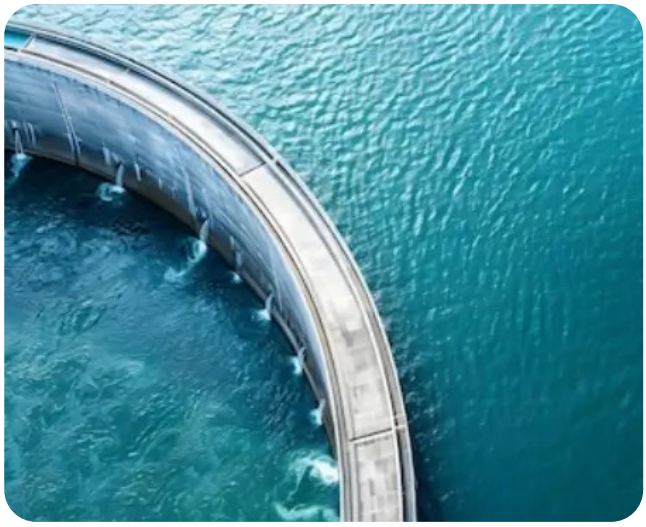
SWM uses 'smart' not only as a technological trait but also as a way of thinking about water management that accounts for risks, contingencies, and connections with other policy domains. This poses some challenges for policymakers.

> ***Technology should not be used to double down on outdated thinking about water management.***

First, new technology grafted onto faulty or outdated technology can be technically and fiscally wasteful. SWM can be used counterproductively to postpone necessary but difficult and costly upgrades that have long-term benefits, while offering short-term gains in efficiency that are politically expedient but cannot be sustained. Furthermore, technologies are often overlaid onto systems where deeper faults require non-technical solutions.

Second, off-the-shelf technologies promoted by developers and vendors as universal solutions can be inappropriate for certain contexts. A tension exists between water needs based on local experience and solutions based on the apparent efficiency of standardisation. SWM systems have typically been developed through cross-sector efforts in Global North contexts, with the burden of contextual adaptation falling to Global South governments that often have less leverage and resourcing. This disadvantage risks perpetuating global inequalities and gaps in water management efficiencies.

In an era when technology firms seek more influence over 'smart' narratives and policy agendas, policymakers should recognise the need for in-house government capacity to understand which emerging technologies meaningfully address local needs. This requires governments to take a broader view of the concept of 'smart' – not as a purely technical undertaking but as an integrated and socio-politically embedded one.



Relatedly, three questions should be asked when considering whether to adopt SWM:

- What non-technical alternatives exist to solve a water management problem and how can they complement hard technologies?
- How can SWM be adopted in a way that avoids making water management a purely technical or technocratic exercise, and how are all parties, including those without scientific training, included in decision making?
- How can SWM technologies fit into and support broader policy goals concerning sustainability, socio-economic equality, democratisation, and fiscal feasibility?

SWM IN THE 21ST CENTURY: SINK OR SWIM?

It is important to consider what SWM can and cannot accomplish. New water technologies are often more immediately alluring than conventional engineering approaches like retention, purification, reclamation, storage, and delivery. They can also give the impression of a qualitative change in approach rather than 'the same but faster and cheaper.'

However, the broader governance setting must be recognised for encompassing non-technical factors, including resource constraints and uncertainties related to climate change

and systemic crises. Political considerations arise as well. For example, some technologies (e.g., remotely monitored smart meters) may lower operating costs by eliminating the need for human workers, but lost employment opportunities engender social and economic policy challenges.

While SWM offers some operational advantages, better technologies do not excuse society from deeper critical reflection about unsustainable behaviours and values. For example, policymakers must consider how new technology implicitly encourages wasteful consumption – not only in wealthy countries but also in the Global South, where increased wealth is rapidly altering lifestyle choices.

In this way, over-reliance on SWM leads to a 'moral hazard' in which society feels comfortable continuing to act unsustainably while assuming that gains in technology will reliably forestall inevitable or unforeseen consequences. The perpetuation of a 'bailout' mindset incorrectly suggests that deeper behavioural or structural problems always have a technological solution.

SWM can complement existing water management systems but must be viewed as only one among many complementary solutions. Together with broader efforts to ensure environmental awareness and participatory policymaking, SWM can help foster a new generation of water management that is sustainable and 'smart' in all senses of the word.

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Smart Water Management: Truly intelligent or just another pretty name?

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