INTERNATIONAL JOURNAL OF WATER RESOURCES DEVELOPMENT, 2018
VOL. 34, NO. 2, 147–149
https://doi.org/10.1080/07900627.2018.1429905

Routledge
Taylor & Francis Group

EDITORIAL

Impacts of megatrends on the global water landscape

Megatrends can be defined as 'sequence[s] of events or observed phenomena that have some momentum in a particular direction and some level of durability' (Rohner, 2018). They are reshaping the future of the world in many known and unknown ways. In the area of water, megatrends that are driving use and management practices and processes include demographic development, economic growth, urbanization, sustainability-related issues, infrastructure, technology, commercialization, social and perceptional changes, climate variability and change, and, most importantly, water-related thinking (Biswas, Tortajada, & Rohner, 2018).

The relevance of these megatrends is dependent on the economic, social, political and environmental implications they have for the society as a whole, both currently and in the future. An important consideration is how society can be better prepared for, learn about and take advantage of the opportunities that megatrends offer. How can the water profession and policy makers build resilience sustainably over the long term and not simply react to these changes in an ad hoc manner? How can plans best be formulated so that water-related institutions are able to provide appropriate, timely and cost-effective responses?

Events are often unexpected, such as those related to climate, and thus institutions may not be prepared to formulate and execute appropriate responses. There is no doubt that countries with functioning institutions that are accountable, transparent and inclusive will be better able to overcome the challenging situations, as well as provide necessary services to their populations efficiently and effectively. Countries that are not prepared and do not have adequate institutional capacities are likely to be the most vulnerable.

Under these conditions, the questions that should be asked are whether institutions, policies, regulations, management and administrative skills, and investments are in place to deal adequately with a future that is full of uncertainties and increasing complexities. Are institutions able to function efficiently and effectively under rapidly evolving conditions? In terms of basic services such as water supply and wastewater management, how will these megatrends affect service delivery? What will be the impacts of sea-level rise on water infrastructure, hydropower and irrigation, especially with changing and uncertain precipitation patterns? How will these uncertain events affect societies in the coming years? What policies should be formulated to ensure that overall development is not hindered?

The global water landscape is changing rapidly. While historical knowledge and past experience are always useful to understand and appreciate the genesis of any problems, new lenses are necessary through which they should be viewed, analyzed and solved. Even this may not be enough. Addressing more comprehensively all future water-related problems in a coordinated manner, compared to the situations at present, will invariably require proactive and effective institutions, coordination of multidisciplinary and multisectoral skills, new and innovative approaches, and societal responses that may have been rare in the past but are appropriate for the future. In addition, and most important, currently used and widely accepted paradigms may have to be challenged; many may have to be abandoned, and more appropriate ones developed.

Decision making, management, governance and technology need to keep up with future changes not only in the water area but also in other sectors like energy, food and environment, which will affect water management and overall development. In fact, demands from these

non-water-related sectors may be more challenging to manage, since the water profession may have limited or no say or control over them.

Water management practices will increasingly have to accommodate diversified, even contradictory, demands of stakeholders based on institutional requirements but also on differing economic and political agendas, as well as demands from a sceptical media with widely varying interests. It will be essential to determine what are likely to be the new and emerging issues, along with their medium- and long-term implications. It will further be necessary to analyze who is likely to benefit from these developments and who may pay the cost. Such analyses will be needed to make appropriate decisions (Biswas & Tortajada, 2018).

The situation is likely to become more and more complex due to relentless economic competition among countries and within countries, concurrent and even conflicting demands resulting from the forces of globalization and anti-globalization, and intensifying pressures from single-cause activist non-governmental organizations. Such external pressures will make water management after 2030 an exceedingly complex task.

In the twenty-first century, it has still not been possible to provide clean water and adequate wastewater management even to the current population after nearly four decades of sustained effort. What is the best way to provide safe water and efficient sanitation and wastewater management services to the additional 2.3 billion people expected in the world in only a little over three decades? Without efficient management, as the urban population centres grow in the developing world, more water has to be imported from the hinterlands to meet their needs. The marginal costs of transferring water over increasingly longer distances are rising rapidly, as are the environmental and social costs. In addition, the populations in the hinterlands and their economic activities are likely to expand, requiring more resources, including water, but also energy and food, for which additional water will also be necessary. Populations in the hinterlands are already increasingly reluctant to export water to the cities, for in doing this they surrender some of their control over local water resources, often with no perceived compensation.

Megatrends and their impacts on the global water landscape will affect the global development landscape through a variety of pathways. International rhetoric notwithstanding, even the water-related UN Millennium Development Goals could not be achieved by 2015. Currently, at least 2.5–3 billion people do not have access to clean water, and only approximately 20% of the people in the developing world have access to proper wastewater management. Most of the UN Millennium Development Goals need water in one way or another. These are likely to present formidable challenges.

In this issue of the *International Journal of Water Resources Development*, van Soesbergen and Mulligan (2016) discuss the potential impacts of multivariate climate change on the water resources of the Santa basin in Peru; and Yang, Chan, and Scheffran (2016) present their analysis of climate change, water management and stakeholders' perceptions in the Dongjiang River basin in China. Wang et al. (2016) present a study of conventional and holistic urban stormwater management in coastal cities, including Hong Kong and Singapore.

A conceptual market framework for nitrate pollution is presented by Broadbent, Bernknopf, and Brookshire (2017), and in a more rural context, Tsinda, Abbott, Chenoweth, Pedley, and Kwizera (2017) examine the role of hybrid approaches (market and state-led) to improve sanitation in informal settlements of East African cities.

Continuing with rural settings in Africa, Méndez-Barrientos, Kemerink, Wester, and Molle (2016) discuss commercial farmers' strategies to control water resources in South Africa, and Murugani and Thamaga-Chitja (2017) discuss livelihood assets and institutions for access to markets by smallholder irrigation farmers. In India, also in a rural setting, Kumar, Reddy, Narayanamoorthy, Bassi, and James (2017) argue that rainfed areas are poorly defined and that the proposed solutions are flawed. Alsamawi, Murray, Gómez-Paredes, and Reyes (2017) analyze the virtual water content of Saudi Arabian agricultural exports. Finally, from an environmental viewpoint, Baldwin

et al. (2017) discusses ecological patterns of fish distribution based on traditional knowledge and on Western science.

At the *International Journal of Water Resources Development*, we continue to aim at advancing the progress of knowledge. Every year, our journal recognizes the most highly cited article in the previous year's Impact Factor window. This year, the award goes to "Impact of Climate Change on the Hydrological Regime of the Indus, Ganges and Brahmaputra River Basins: A Review of the Literature," by Santosh Nepal and Arun Bhakta Shrestha (2015). This award is based on citations in Web of Science in 2017 of articles published in 2015–16. This is an open access article. This is further recognition of the excellent analysis presented in the article, as well as the outstanding work of the co-authors and of ICIMOD, the International Centre for Integrated Mountain Development.

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