

CONFERENCE REPORT

'Impacts of droughts and floods in cities: policies and governance', World Water Week, Stockholm, 31 August 2016

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We want to discuss how cities prepare, cope, manage, and recover from such extreme events. This includes preparedness, policy responses from both formal and informal institutions, governance perspectives, infrastructure development, investments, and technologies. —Dr Cecilia Tortajada

To contribute to the discussion and the academic literature on effective urban policy and governance responses to extreme events, in particular floods and droughts, the Institute of Water Policy at the Lee Kuan Yew School of Public Policy, National University of Singapore, organized a workshop at the World Water Week in Stockholm on 31 August 2016. The two sessions of the workshop were moderated by Dr Cecilia Tortajada, senior research fellow at the institute, and Dr Aziza Akmouch, head of the Water Governance Initiative of the Organisation for Economic Co-operation and Development (OECD).

Panel participants offered their views on the following issues:

- (1) Prof. Olli Varis, head of Water Resources Group, Aalto University, Finland: Vulnerability and Resilience of Cities to Floods and Droughts: A Global Perspective.
- (2) Dr Kimio Takeya, Japan International Cooperation Agency: JICA's Experiences and Lessons Learnt on Impacts in Asia and the Sendai Framework on Disaster Risk Reduction.
- (3) Dr Nuanchan Singkran, Mahidol University, Thailand: Flood Overview and Flood Risk Management for the Chao Phraya River Basin, Thailand.
- (4) Dr Scott Moore, Water Global Practice, World Bank Group: Breaking Down Siloes in a Centralized System: The Political Economy of Integrated Urban Flood Management in China.
- (5) Dr Liping Dai, Utrecht Centre for Water, Oceans and Sustainability Law, Utrecht University School of Law, Netherlands: Singing in the Rain: A Governance Analysis of Rain-Proofing Dutch Cities.
- (6) Dr D. Parthasarathy, IIT Bombay, India: Climate Change, Uncertainty and Flooding: Politics and Perspectives in Mumbai.
- (7) Dr Ka Leung Lam, University of Queensland, Brisbane, Australia: Adapting the Urban Water Systems in Three Australian Regions to Droughts.
- (8) Dr James Horne, Australian National University: Concluding Thoughts.

'Better safe than sorry': floods, institutional preparedness and disaster risk reduction

Prof. Olli Varis provided an international perspective on cities' vulnerability and resilience to floods and droughts. The challenges are especially acute in Asia, which experiences a large share of the globe's extreme events, and where rapid urbanization is increasing vulnerabilities. The effects of natural disasters vary based on location: serious floods have stronger impacts on urban areas, while the effects of droughts are felt predominantly in rural regions.

Varis outlined a three-pronged approach to address natural disaster risks. The first element is human resources, including enhanced capacity building, governance, and economic and financial resources. Related to this is the adequate allocation of resources internally; 'averages can only say so much', and existing inequalities within societies need to be taken into account and addressed accordingly. The second element is technology and infrastructure, for example taking advantage of technological leapfrogging in reusing natural resources, and utilizing environmental infrastructure such as wastewater treatment and industrial waste management. In addition, a circular economy approach – with water reuse facilitated by technological advances – will lead to less wasteful resource cycles and a cleaner environment, which carries less risks (and costs) for humans when disaster strikes. The last component essential for addressing natural disaster risks is the environment and its eco-services. Illuminating examples include China's so-called sponge cities, where groundwater is replenished by rainfall, and Singapore's closed water loop system (Liu, 2016; Lafforgue & Lenouvel, 2015; Tortajada, Joshi, & Biswas, 2013).

Dr Kimio Takeya offered lessons learnt in Asia on responses to floods, from the 1994 Yokohama Strategy for Natural Disaster Prevention, Preparedness and Mitigation (United Nations Office for Disaster Risk Reduction [UNISDR], 1994) to the Hyogo Framework for Action 2005–2015 (UNISDR, 2005) and, most recently, the new Sendai framework 2015–2030 (UNISDR, 2015). In the past, many people believed that early-warning systems are the main way to reduce risk. While these systems can save human lives, however, they cannot prevent or mitigate economic losses and related human suffering. It is thus necessary to go beyond protecting human life by integrating disaster risk reduction into urban and landscape development and river flows. These measures also need to be linked to the Sustainable Development Goals. A paradigm shift is needed to prioritize *pre*-disaster investments, not *post*-disaster measures; unfortunately, 75% of current donor contributions still fall into the latter category. Reform of financing priorities will require both new laws and adequate budgetary systems to ensure disaster-resilient public and private investments, in particular for critical facilities, disaster risk transfer and insurance, risk sharing, and financial protection at the local level.

Dr Nuanchan Singkran explained the shift of perspective on flood risk management in Thailand, based on experiences during the 2011 flooding of the Chao Phraya River basin, home to about 20 million people (30% of Thailand's population) and encompassing its capital, Bangkok. This was Thailand's worst flood in more than half a century; almost the entire basin flooded, affecting 14 million people and killing more than 800. Real GDP growth fell 1.1%, manufacturing exports declined for the following two years, and the tourism sector was negatively affected. The National Disaster Prevention and Mitigation Plan 2000–2014 as well as the Bangkok Metropolitan Administration Disaster Prevention and Mitigation Plan 2010–2014 – although equipped, staffed and supported by various agencies – were largely

ineffective in mitigating the flood's impacts. Next to an ineffective communication and coordination strategy, one of the main reasons for authorities' unsuccessful response to the crisis was that both plans focused primarily on emergency responses – including evacuation of flood victims and provision of basic services like food, medicine and shelter – followed by recovery and reconstruction efforts, while proactive disaster preparedness measures such as floodplain management, evacuation and land-use planning, warning systems, and community education and participation measures were not addressed. In response, Dr Singkran proposed an improved system of flood risk management that incorporates: (a) a floodplain management entity that brings together all relevant public agencies (at different levels), local communities and civil society organizations; (b) increased data-collection efforts, including biophysical and socio-economic data related to floods and flood impacts; (c) studies of flood and floodplain management, including well-defined problem, hazard and risk identification; (d) floodplain management plans, including a revision of current measures, integration of existing emergency management responses with flood-sensitive land-use planning, and better community consultation; and (e) increased stakeholder and community engagement and communication during implementation to improve results and decrease flood-related social conflicts.

Dr Scott Moore presented an encouraging example of a system of integrated flood risk management in Jiangxi, China (World Bank, 2013). There are a number of 'political economy' challenges in flood policy and governance in China, including competition between sub-national agencies for centrally provided flood-related funding; a tendency for poorer and more vulnerable populations to be excluded from decision-making processes unless deliberately involved through participatory engagement; and coordination problems between administrative units for flood management and between community stakeholders affected by flooding. Nonetheless, the Jiangxi project shows that an integrated approach can work in a developing-country context, in particular for two reasons: China's high institutional capacity (many local officials possess technical backgrounds) and a large reservoir of political will, given that the state's role in flood control has traditionally been important to political leaders. Applying the integrated flood risk management approach requires moving beyond engineering infrastructure and integrating 'soft' instruments such as zoning. This includes urban land-use planning for water and non-water purposes; managing risk more transparently; and involving under-represented stakeholders in the decision-making process to increase legitimacy and allocate flood infrastructure and financing more inclusively. The World Bank project was successful by focusing largely on institutional and participatory issues, attempting to break down institutional siloes in a highly centralized system by creating platforms such as working groups and committees where officials from different agencies can coordinate with each other and with other stakeholders. In addition, the bank's financing role ensured that institutional cooperation and (previously under-represented) stakeholder decisions made an impact in allocating flood-control infrastructure.

Interim discussion: from traditional disaster relief to integrated urban planning approaches

One of the main problems of flood risk management lies in institutions tasked to respond to the challenge. 'Silo thinking', long-established vertical structures of administrative power, and a lack of horizontal collaboration between different agencies impede effective reaction

and prevention measures. Traditional policy responses to disasters in both developed and developing countries usually consist of creating a new institution or bureaucracy rather than connecting existing agencies and actors. Institutional ‘learning’ also occurs as developing countries copy traditional technocratic institutions from developed countries. A more effective approach to urban water issues can be found in the urban planning profession, which addresses the relationships between people who live in different parts of the city and the interconnections between neighbouring areas with different land uses.

Traditionally, most policy responses to natural disasters have been passive-reactive, focusing primarily on disaster relief (providing food, medication and shelter), followed by reconstruction of infrastructure and public utilities. A more proactive approach would include comprehensive data collection for risk assessments; mitigation measures that include land-use planning, flood control and resettlement strategies; and non-structural measures such as community education and consultation. This is especially important since future disaster risks are not fixed or predetermined; they change according to future urban development, since different kinds of land-use measures affect the likelihood of flooding in various ways (Falkenmark, Jägerskog, & Schneider, 2014). All agencies and stakeholders involved in urban development must integrate future risk assessments into their planning process. China’s integrated flood risk management system offers an encouraging example in this regard.

‘Singing in the rain’: building resilience by reducing institutional fragmentation and enhancing stakeholder involvement

Dr Liping Dai illustrated the Netherlands’ advances in urban flood protection in Amsterdam, Rotterdam and Utrecht, which have increased the cities’ resilience and furthered their objective to become rain- and ultimately climate-proof. Since 2000, the so-called Three-Step Plan, which focuses on delaying, storing and draining water and functions similarly to a sponge, has been included in water management policies in the Netherlands and beyond. Amsterdam, Rotterdam and Utrecht share certain characteristics in their governance approach: solidarity, i.e. cooperation and sharing of best practices instead of shifting problems ‘downstream’ to other municipalities; a long-term approach to urban planning; integrated water resources management; and close stakeholder involvement. The largely decentralized system provides municipalities a large degree of autonomy, while a variety of financing mechanisms are available, including municipal-level taxes and fees for infrastructure investments for public services; European Union funds; and international cooperation partnerships such as 100 Resilient Cities (Rotterdam) and Climate-KIC (Utrecht) (Rockefeller Foundation, n.d.; EIT, n.d.). One key element of the rain-proofing strategy in all three cities is public engagement. Although the Netherlands is constantly threatened – two-thirds of the country’s landmass lies below sea level – surprisingly, there seems to be a ‘threat awareness gap’ among citizens (Terpstra & Gutterling, 2008). This lack of awareness might stem from the not-invented-here principle: if citizens do not feel that flood-protection infrastructure is part of their local identity, they will be less knowledgeable about it and will not feel responsible for its upkeep. People’s willingness to accept, use and maintain such infrastructure can be enhanced by giving them an active role in its planning and implementation process. Consequently, all three cities involved the public in their respective infrastructure projects from an early stage. Amsterdam undertook a networking, communication and mainstreaming campaign for Amsterdam Rainproof; Rotterdam

engaged stakeholders for its Benthemplein water plaza; and Utrecht set up working groups with local residents to develop strategies to deal with heavy rainfall.

Dr D. Parthasarathy provided a political perspective from Mumbai on the inter-relation of uncertainty, flooding and urban transformation, with a sharper focus on the socio-economic consequences of natural disasters. The calamitous Mithi River flood in Mumbai in 2005, which caused major economic disruptions and claimed more than 500 lives, showed that although flood prevention and mitigation strategies have proven quite successful in protecting urban commercial areas, central business districts and key infrastructure, the urban poor often bear the brunt of such flooding events, and do not enjoy the same level of protection as other socio-economic groups. Current urban policy discourse too often does not reflect these imbalances. A better understanding of these dynamics is provided by examining the 'above', 'middle' and 'below' views in society. From 'above', experts, modellers, planners and natural scientists linked to powerful agencies and stakeholders provide official, scientific advice and accredited expertise, while from 'below', lay people and the urban poor typically learn about the issues through their own lived experience as victims of flooding events. In the 'middle' are mediators and facilitators who communicate information and 'translate' scientific and experiential knowledge, often through civil society organizations, non-governmental organizations and/or ward-level municipal officials. These groups' diverging experiences and views on the effects of flooding on their own lives are mirrored in their respective adaptation and coping strategies: these are differentiated (based on different experiences and understanding) and fractured (designed to address short-term benefits for one particular group only), and thus sub-optimal in achieving an effective flood mitigation regime. A group's capacity for resilience is clearly influenced by issues of livelihood, the existing political economy and the resulting inequalities, but this problem is not usually addressed by municipal authorities or disaster response agencies. On the contrary, the responses often create further imbalances: for example, protective anti-flooding walls or pumps move floodwater to neighbouring areas, protecting certain districts while flooding informal settlements whose residents do not enjoy opportunities for resettlement. For a majority of the population in Mumbai and in developing countries more generally, the term 'uncertainty' constitutes a complex political matrix of livelihood, political economy and inequality. Any transformational strategies must therefore go beyond ecological resilience and take into account socio-economic differences in equality and political power.

Dr Ka Leung Lam shed light on how three urban regions in Australia have adapted their respective urban water systems to droughts. Sydney, Melbourne and South East Queensland all implemented new strategies to tackle prolonged periods of drought, which the country faced between 2001 and 2009. The three cities' strategies were quite similar. In the early phases of the drought, they focused on demand-side measures, i.e. water restrictions, rebates on water-efficient devices, and conservation campaigns, leading to significant water savings. As the drought worsened, however, the cities bolstered supply-side interventions, i.e. commissioning new water infrastructure such as reverse osmosis seawater desalination plants and potable water recycling systems, and created new supply sources through inter-basin water transfer and by increasing the capacity of existing dams. As a result of these measures, the resilience to drought increased in all three cities, with improved capacities in water infrastructure and water agencies, and lower end-user demand. The costs of achieving these capacities lie mainly in higher water prices (which doubled within a decade in Melbourne and South East Queensland) and higher energy intensity for water supply (2–4 times as high

during a drought as compared to pre-drought levels). Three key lessons can be drawn. First, disaster risk management must shift from crisis-driven decision making in emergency situations to more cost-effective 'no-regret' solutions, since infrastructure projects take a long time to implement and should be relevant to a variety of different future circumstances. Second, the socio-economic effects – for example, a doubling of water bills – need to be taken into account and addressed by policy makers. Lastly, municipal governments need to build up institutional capacity to respond earlier and more quickly to drought situations, to avoid institutional fragmentation and enable effective local solutions.

Interim discussion: 'disaster-led change' towards urban transformation and collaborative decision making

Droughts, just like other disasters, can lead to positive transformation; for example, regional water panels in Australia now have long-term strategies in place for droughts, including how to project demand and how to balance demand and supply in long-term planning; manageable growth in system operations; and the use of water-efficient technology. While very little documentation or planning for water shortages existed beforehand, Australian cities and regions have taken the so-called Millennium Drought as an opportunity to reform institutional structures, policies and end-users' behaviour. When considering how urban policy and transformation can address disasters such as flooding (especially in a developing-country context like India), any zoning or resettlement approaches must take into account how disasters often disproportionately affect the most marginalized parts of society. For example, temporary migrants often have no choice but to live in precarious, flood-prone areas, and it can be quite difficult to incorporate them into flood-preparedness measures. And while many different institutions and agencies are involved in managing and preparing for disaster risks, often they do not share the same ideas, they employ different methodologies and/or procedures, and they might be unwilling or unable to share resources. However, the case studies demonstrate that policy making can be strengthened, and lead to more sustainable results, if public participation is increased and local communities are provided a strong voice in their municipality. This is particularly important since the effects of floods and droughts cannot be confined within geographical boundaries: an OECD (2014) study on a (hypothetical) flood of the Seine River in Paris shows that the vast negative externalities of such an event would extend far beyond the municipal-administrative borders of the city.

Conclusion: policies to increase cities' resilience

What we've seen over recent years is much talk about integrating a broad range of stakeholders into the policy-making process, but all the papers and discussions bore out the same: it's much more scattered about how this is translated into action. —Dr James Horne

In the concluding session, Dr James Horne summarized that climate change itself is not the problem. The challenge, rather, is one of governance: how administrations at all levels (supra-national, national, regional and municipal) manage and respond to natural crises exacerbated by urban growth. From the start, the question of improved resilience must always include the critical qualifier, *for whom?* In urban environments in many developing countries, women are the most affected by disasters and their aftermath, and are the ones responsible for securing scarce water supplies in cases of droughts and managing the health

and education consequences of floods (among many other things). Resilience also needs to cover all levels of society and reflect the context-specific situation and needs of each city and region. However, too often, basic principles of good governance are not systematically applied, resulting in a lack of information and a lack of transparency in decision making. The key question is how to strengthen the uptake of resilience-enhancing urban policies (Gopalakrishnan, 2013). It is critical to engage stakeholders, but stakeholders must also be integrated into cross-sectoral teams developing context-relevant solutions. ‘Expert siloes’ play an important role in exploring the depth of some of the new challenges, but need to eventually reconnect with the practitioners and policy makers to implement better-informed strategies. Another prerequisite for developing the policies needed to increase urban resilience is a strong understanding of the risks and new circumstances related to climate change. In the end, to achieve more effective disaster risk responses in a riskier world, governments at all levels must work together with affected communities and stakeholders on the ground, and be informed by researchers and experts sharing their case studies and lessons learnt.

The case studies discussed in the workshop will be published as a special issue of the *International Journal of Water Resources Development*.

Disclosure statement

No potential conflict of interest was reported by the author.

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