



GOVERNANCE FOR A WATER SENSITIVE TRANSITION IN BOGOR RAYA, INDONESIA



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This report aims to provide broad recommendations for water related governance and policy reform and interventions, based on focus group discussions and interviews with individuals, agencies and organisations related to the water system in Greater Bogor. The intended audience for this report encompasses government agencies involved in water policy, regulation, management and planning, academics in law and public management researching water governance and management in Indonesia, and, to a lesser extent, the broader Indonesian communities faced with water, urban and environmental challenges. It is expected that the recommendations of this report will help inform future public sector programs in developing new models of water governance and water policy, to ensure sustainable water futures for Greater Bogor.

URBAN WATER CLUSTER PUBLICATIONS:

The key findings from this research collaboration have been published in a summary report titled “Leapfrogging Towards a Water Sensitive City: Exploring Pathways for Bogor” along with eight more detailed reports covering all deliverables. The full list of reports, including this one, is as follows:

“Leapfrogging Pathways for a Water Sensitive Bogor”.

B Rogers, D Ramirez-Lovering, DR Marthanty, HS Arifin, M Farrelly, H Fowdar, A Gunn, J Holden, R L Kaswanto, R Marino, D McCarthy, W Novalia, E Payne, R Suwarso, Y Syaikat, C Urich, A Wright, D Yuliantoro.

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“Governance for a Water Sensitive Transition in Greater Bogor”

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“Review of the application of green infrastructure for water management in Bogor”

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“Guidance on developing infrastructure adaptation scenarios for Bogor’s water sensitive transition”

A Wright, C Urich, DR Marthanty, F Zulkarnain, Y Purwanto, N Mulyana Arifjaya

“Pulo Geulis Revitalisation 2045: Urban Design and Implementation Roadmap”

D Ramirez-Lovering, R Marino Zamudio, HS Arifin, RL Kaswanto, HA Simarmata, D R Marthanty, C Brodnik, M Farrelly, H Fowler, A Gunn, J Holden, L Maryonoputri, N Panjaitan, E Payne, B Rogers, Y Syaikat, Y Suharnoto, R Suwarso, I Sondang, C Urich, A Wright, , D Yuliantoro

“Griya Katulampa: Lessons Learned Case Study Report”

D Ramirez-Lovering, R Marino Zamudio, HS Arifin, RL Kaswanto, HA Simarmata, DR Marthanty, C Brodnik, M Farrelly, H Fowler, A Gunn, J Holden, L Maryonoputri, N Panjaitan, E Payne, B Rogers, Y Syaikat, Y Suharnoto, R Suwarso, I Sondang, C Urich, A Wright, D Yuliantoro,

“Situ Front City: Transition Strategy to WSC”

D Ramirez-Lovering, R Marino Zamudio, HS Arifin, RL Kaswanto, HA Simarmata, DR Marthanty, C Brodnik, M Farrelly, H Fowler, A Gunn, J Holden, L Maryonoputri, N Panjaitan, E Payne, B Rogers, Y Syaikat, Y Suharnoto, R Suwarso, I Sondang, C Urich, A Wright, D Yuliantoro

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GLOSSARY

AKKOPSI	<i>Asosiasi Kabupaten Kota Peduli Sanitasi</i> , Association of Cities and Regencies Concerned about Sanitation
APBD	<i>Anggaran Pendapatan Belanja Daerah</i> , Local government budget
Bappeda	<i>Badan Perencanaan Pembangunan Daerah</i> , Regional Development Planning Board
Bappenas	<i>Badan Perencanaan Pembangunan Nasional</i> , National Development Planning Agency
BPDAS	<i>Balai Pengelolaan Daerah Aliran Sungai</i> , Watershed Management Center
BPSDAWS	<i>Balai Pengelola Sumber Daya Air Wilayah Sungai</i> , River Basin Management Office for Water Resources
DLH	<i>Dinas Lingkungan Hidup</i> , Environmental Office
ESDM	<i>Energi & Sumber Daya Mineral</i> , Department of Energy & Mineral Resources
FGD	Focus group discussion
IPB	<i>Institut Pertanian Bogor</i> , Bogor Agricultural University
IPAL	<i>Instalasi Pengolahan Air Limbah</i> , Wastewater Treatment Plant
IWM	Integrated water management
KSM	<i>Kelompok Swadaya Masyarakat</i> , User-manager groups
MU	Monash University
Musrenbang	<i>Musyawarah Perencanaan Pembangunan</i> , Development Planning Consultation
PAL	<i>Pengelolaan Air Limbah</i> , Wastewater Utility
Pokja	<i>Kelompok Kerja</i> , Working Group
PDAM	<i>Perusahaan Daerah Air Minum</i> , Drinking Water Supply Company
PSDA	<i>Dinas Pengelolaan Sumber Daya Air</i> , Department of Water Resources Management
PUPR	<i>Dinas Pekerjaan Umum dan Penataan Ruang</i> , Department of Public Works and Spatial Planning
RPJMD	<i>Rencana Pembangunan Jangka Menengah Daerah</i> , Medium term local government strategy
SANIMAS	<i>Sanitasi Oleh Masyarakat</i> , Sanitation by Communities
SPAL	<i>Saluran Penyaluran Air Limbah</i> , Wastewater Network
UI	<i>Universitas Indonesia</i> , University of Indonesia
UPTD	<i>Unit Pelaksana Teknis Daerah</i> , Regional Technical Implementation Unit
UWC	Urban Water Cluster
WSC	Water Sensitive City

EXECUTIVE SUMMARY

Transforming urban water practices to more sustainable systems is widely regarded as a water governance challenge, which involves working within and across the different levels and layers of social, political and economic frameworks where urban water management takes place. Achieving a water sensitive city requires rethinking the way urban water governance is conceived of and delivered – moving beyond traditional single-service delivery models, to incorporate more flexible, integrated and complex institutional designs to respond to and accommodate multi-functional and adaptive infrastructures.

As a result, broad urban water governance transitions involve conceptualising change as a coordinated, multi-staged set of processes. To work towards a common vision, in this case a water sensitive Bogor in 2045, those processes must involve engaging:

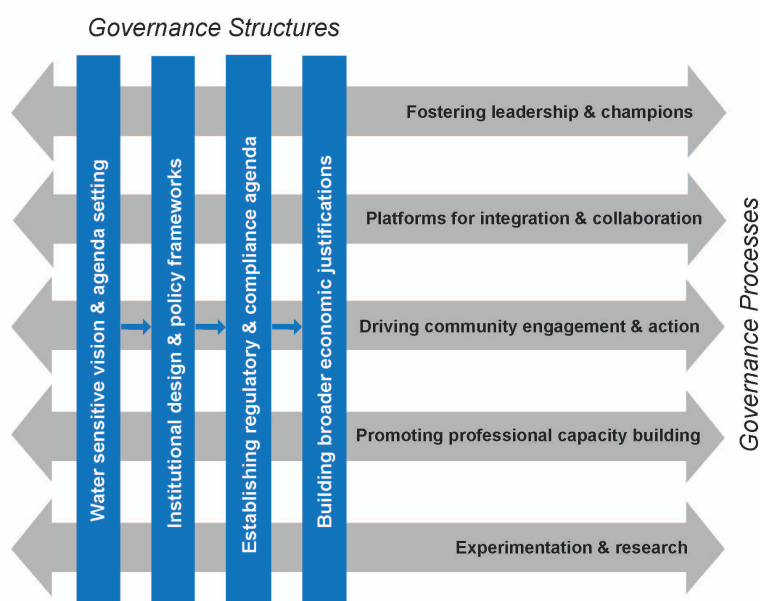
- with multiple actors
- across multiple spatial scales (e.g. local and catchment) and multiple levels of decision-making, and
- across multiple sectors (e.g. planning, environment, health, agricultural, urban design, among others).

Our Governance Research

To generate guidance for future water governance reforms the Urban Water Cluster's (UWC's) governance research team examined the historical and contemporary governance structures and processes of urban water systems in Greater Bogor, a region including Bogor City and Bogor Regency. This involved a series of focus group discussions and research interviews with key urban decision-makers and community leaders to gain insight into the current water system structure and into how the system works, to identify opportunities to improve current interventions.

The Transition Dynamics Framework (Brown et al. 2013; Brown et al. 2016, Brown et al. 2017) was used to guide group discussions and interviews to unpack the key structures and processes at play. This is a useful approach when examining contemporary practices while also identifying structural, agency and learning opportunities for future governance interventions.

Urban water governance in Indonesia is complex and traditionally fragmented on a number of levels: bureaucratically, socially, politically and spatially. Combined, this poses significant challenges to key institutional structures and dynamics that involve planning, protecting and developing the water system across various spatial scales and decision-making levels. Furthermore, it is important to recognise that there is no one-size-fits-all approach to governance or institutional design, rather these need to relate to the relevant social, environmental and development contexts.



Attributes of governance for change (adapted from Farrelly et al (2012) see section 5)

The recommendations outlined here are based on reflections from numerous detailed discussions with urban water practitioners in Bogor. The recommendations are delineated as ‘governance structures’ that may be relatively stable over longer timeframes, *but* remain subject to ongoing ‘governance processes’ that can adapt more readily to changing circumstances. It should be noted that the recommendations of our governance research are designed to be interrelated and not necessarily stand-alone.

RECOMMENDATIONS FOR WATER SENSITIVE GOVERNANCE

Water Sensitive Vision & Agenda Setting

A significant first step in achieving water sensitive governance involves generating a collective vision across all actors and multiple scales, regarding what is possible and desired across Greater Bogor and in Bogor Regency and Bogor City individually. This effort is underway but needs alignment.

The process of creating the vision is, in itself, an important intervention in bringing a broad range of actors together to build a common understanding of what is desired and what is possible within a water sensitive scenario. A major component of establishing this vision would be to align core political, organisational and community agendas, and to inform an agreed-upon trans-disciplinary, co-designed research agenda to guide future developments. Generating ‘water sensitive insights’ like this would involve experts in law, policy, geography, sociology, community development, engineering, economics, urban design and other fields.

Institutional Design & Policy Frameworks

While conventional command-and-control approaches will continue to suit certain situations (e.g. regulating groundwater extraction or controlling effluent discharge into waterways), looking ahead to

water sensitive governance requires a more cooperative and coordinated approach to institutional design. The contemporary water governance system is relatively decentralised and has multiple centres of decision making. While this approach is supported, it is recommended that the roles and responsibilities amongst the multitude of organisations (including the provincial government) which play a part in the functioning of Greater Bogor's urban water systems be further clarified. For example, the provincial government could engage in discussions with city and regency governments prior to key decision-making (e.g. issuing permits).

The complexity within urban water governance in Indonesia is high, which poses significant challenges related to key institutional dynamics and in operationalising on-ground actions. It is recommended that:

- » The formal and informal organisational routines, practices and assumptions used to shape current and emerging water initiatives be further studied to identify possible future interventions and redesigns.
- » Actors promote engagement and cooperation (formal and informal) within geographic areas of mutual interest across relevant organisations (e.g. through MoUs or project partnership agreements). Here it is wise to utilise and adapt (where necessary) existing arrangements. Progress in this space is occurring, in part facilitated by this project (e.g. Greater Bogor Urban Water Learning Alliance).

Establishing Regulatory & Compliance Agendas

At present, the national water legislation does not provide a contemporary framework for guiding decision-making authorities towards delivering more water sensitive systems. National leadership for advancing more sustainable urban water servicing is an important element in generating more formalised authority for decentralised decision-makers, freeing them to act to create change. Aspirational targets are useful for illustrating what water sensitive initiatives can deliver, but to be effective in driving on-ground action, the targets should be locally-relevant, realistic, clear, measurable and scientifically-derived. Targets should also be guided and monitored by dedicated, trained staff.

Compliance was regarded by most stakeholders as a key issue. Nevertheless, this domain is constrained for various reasons including, among others, inappropriate rules, cultural implications, knowledge deficits and resourcing limitations. Further attention is required to ensure a robust framework for compliance enforcement is established.

Building Broader Economic Justifications

Diverse and integrated urban water systems can deliver multiple benefits to communities and their environments. However, our research found there is limited awareness and appreciation of the many social and environmental functions and services provided by multifunctional green infrastructure (such as rainwater tanks, raingardens etc.). Awareness of and the financial value of these outcomes needs to be embedded across the multiple layers of decision-making, for example, in national and regional strategic priorities, planning requirements and within the various budget allocations.

Fostering Leadership And 'Water Champions'

Over the course of the research, water leaders were located across multiple levels of decision-making, hierarchies, from community leaders through to city, regency, provincial and national governments. Fostering distributed leadership, i.e. shared, collective and extended leadership practice, is important for building capacity for change and needs to be reinforcing and aligned towards a common agenda. Within and across organisations, executive level support is key to distributing decision-making authority for 'advancing water sensitive practices'. There are also key roles for 'water champions' within various organisations. If supported appropriately (i.e. through dedicated programs to foster emergence and development), these champions could drive internal organisational change and foster inter-organisational relationships and on-ground delivery of alternative systems.

Platforms For Administrative Integration And Collaboration

The research workshops themselves were a useful platform for bringing together multiple actors involved in urban water decision-making in a structured but open discussion regarding current and future water practices. Looking ahead, similar coordinated, facilitated, formal and informal processes are required, whereby actors from different organisations can come together to shape innovative and alternative water practices. Here decision-makers from planning, urban development and water resources, among others, should be involved in tailored and facilitated discussions to share data, build trust and ultimately build (and improve) decision-making capacities. When designed well, this can generate networks capable of promoting a cohesive plan for change within future urban developments.

Many excellent platforms already exist, but may require a reconfiguration around roles, responsibilities and working towards a common catchment-wide agenda. For example, the recent establishment of an 'integrated water forum' will be instrumental in beginning the conversation to develop an alternative water narrative and vision. In addition, identifying and designing demonstrations can be opportunities to work collaboratively to a common end-point and can bring multiple actors together to share experience and insights.

Promoting Professional Capacity Building

Having multiple actors (individuals and organisations) involved in delivering a water sensitive vision for Greater Bogor will require a dedicated and tailored capacity building program. This will require building on existing opportunities and developing new knowledge-sharing programs (e.g. learning alliances, study tours, seminars and workshops). These should be made for different scales and actors, and be aimed at shaping their professional knowledge in relation to delivering water sensitive technologies and practices. Such efforts would bring together the work of practitioners already working on the ground with similar technologies/practices and researchers who are advancing our knowledge in these areas.


Driving Community Engagement & Action

The research identified many excellent initiatives already underway across the diverse local community structures within Greater Bogor that could be leveraged and expanded (e.g. environmentally-friendly communities, eco-villages, and or river clean-up groups). There were examples of self-organising community initiatives aimed at fostering local knowledge around improvements to waterway health. Creating an environment which can support and nurture the development of local water sensitive city champions, particularly among women, would work to further underpin the growing efforts in transforming to more water sensitive practices. Further study is warranted to understand how best to continue raising community awareness and gaining individual and community commitments to cleaner, healthier environs (by maintaining drainage channels and septic tanks, paying for piped drinking water, reducing rubbish output, etc.) which are key components of driving water sensitive change. Careful attention is required to ensure there is broad community participation, not just community elites. Indeed, the Pulo Geulis community visioning and urban co-design process developed by UWC researchers is a key example of fostering and building local community capacity while influencing future local design outcomes.

In addition, there is great scope for key decision-makers to be engaging with and promoting the growing work of existing water-based social entrepreneurs through co-designing future projects and programs aimed at improving community equity within water servicing.

Experimentation & Research

Co-designing a joint industry, community and academic research agenda that is policy relevant would assist with developing and testing new innovative, place-based approaches and technologies. Demonstration projects would create a platform for showcasing not only new technologies, but also emerging governance processes and mechanisms needed to facilitate stakeholder integration and collaboration. When designing experiments, it is important to embed a dedicated learning agenda that



looks at how to manage delivery and maintenance of the experiment (particularly if new interventions are trialled), alongside technical feasibility and confidence building. Additionally, research-designed evaluations of contemporary water-related innovations are required to develop sound, empirical insights regarding their efficacy.



Chapter 1

Introduction

1. INTRODUCTION

Transforming urban water practices to more sustainable systems is widely regarded as a water governance challenge, which involves working within and across the different social, political and economic frameworks where urban water management takes place. Achieving a water sensitive city requires rethinking the way urban water governance is conceived of and delivered – moving beyond traditional single service delivery models, to incorporate more flexible, integrated and complex institutional designs to respond to and accommodate multi-functional and adaptive infrastructures.

This report sets out the collated research insights regarding the contemporary urban water governance system of Greater Bogor, Indonesia, with the aim of examining the governance and policy strengths, weaknesses and opportunities for expediting a transition of Greater Bogor to a ‘water sensitive city’¹.

Greater Bogor is located in Indonesia’s most populous province, West Java, which has a total population of 43 million people (BPS Statistics Indonesia 2018) on an area of approximately 35,000km². Greater Bogor encompasses the municipalities of Kota Bogor (Bogor City) and Kabupaten Bogor (Bogor Regency). The former includes the historic centre of the city, which includes one of the President’s residential palaces, and the latter accommodates more recent suburban sprawl around Kota Bogor. Greater Bogor is located approximately 60 km south of Jakarta and is home to over 3 million people, with over 1.1 million in Bogor City. Proximity to Jakarta means many residents within Greater Bogor commute to work in Jakarta, while many individuals who have a primary residence in Jakarta often have a second, or “holiday home”, in Greater Bogor. The region, like many others, is experiencing rapid population growth (largely associated with rural-urban migration patterns) and associated urban development pressures, with ongoing land conversion through deforestation and drainage of wetlands for urban expansion and agricultural development (ADB, 2016). These circumstances in turn generate pressure on existing, and create demand for new, urban water services, and with a reduction of natural buffering capacities within the river catchments associated with land conversion, there are increased risks of floods and droughts (ADB, 2016). It is therefore timely to consider the way in which water governance functions and to identify mechanisms and interventions that underpin a transition to more alternative urban water infrastructure, services and management.

This report complements a larger, interdisciplinary research project undertaken as part of the Australia-Indonesia Centre’s Urban Water Cluster (UWC). Framed through the broader “sustainability transitions” thinking (e.g. Lorbach 2010), this report unpacks the formal and informal structures, processes and actors that influence and shape urban water governance, reviews key steps already taken by relevant actors and proposes future processes to inform a ‘water sensitive’ transition within Greater Bogor.

1.1 Towards improved urban water governance

Urban environments are complex. Their challenges are considered ‘wicked’ and multifaceted in nature and among them water and water-related services have been identified as critical, especially in the case of emerging Asian economies (OECD, 2015, Angel and Rock, 2009, Pahl-Wostl et al. 2010). Urban water scholars broadly accept the need to embed sustainability,

¹ The terminology ‘water sensitive city’ emerged from Australia as a way of capturing water infrastructure, services and management that are fundamentally different to conventional practices. During the course of the research, it became apparent that this language did not resonate within Indonesia and as such, the terminology ‘Water Friendly’ emerged following discussions with urban water practitioners. For consistency, we adopt the language of water sensitive practices, but in translating this report, encourage the use of ‘water friendly’.

resilience and ecological principles within infrastructure development. Yet achieving a wholesale shift in infrastructure delivery and servicing has proven challenging. This inertia is labelled 'technological path dependency', whereby systems are regarded as being "locked-in" to a pre-defined, narrow technological trajectory (Milly et al., 2008; Bai et al. 2010). While technology and infrastructure innovations remain important for improving availability, access and quality, the challenge with transforming urban water systems to more sustainable systems are widely recognised as a **water governance challenge** (OECD, 2016), whereby conventional institutional settings coupled with inadequate resources dovetail to create barriers to advancing sustainable urban water management (Pahl-Wostl, 2009; Biswas and Tortjada, 2010).

Water governance is an inherently multi-scalar and multi-actor suite of assemblages and interactions among nested structures and processes. This report frames water governance as the intersection of action (e.g. related to policies, management, institutions and decision-making) within formal and informal structures, across multiple layers, actors and sectors (Stoker, 1998, Hooges and Marks, 2003; Stephenson, 2013). We approach this research recognising that the watershed within which urban water governance is situated is important, but highlight that to gain a deep understanding of contemporary urban water governance initiatives, and the agency of particular actors, we need to focus on the legal and regulatory boundaries within which key actors operate (see e.g. Ozerol et al., 2018). As a result, we focus on the governance aspects of transformation, involving the formal and informal engagement and cooperation of government **and** non-state actors, including, among others, private sector entities, community groups, universities, and transnational non-government organisations (e.g. aid organisations). The relevance of these actors may derive from their involvement in technological innovation or research collaborations at different scales, or implementation of service delivery partnerships.

Despite broad recognition of the need for transformation of conventional water governance practices, there remain significant challenges associated with overcoming traditionally siloed approaches to natural resource governance. This calls for a new balance between state, market and society, where formal and informal networks, interventions, and processes seek to co-generate innovative ideas leading to new policies and programs that address new problem definitions, ambitions, solutions and agendas (Loorbach, 2010). Sustainability transition scholars argue that robust, long-term policies that are detached from the influences of political agendas and help steer transitions toward more sustainable practices and socio-technical regime configurations are required (Smith et al., 2005; Elzen and Wieczorek, 2005). This requires conceptualising broader governance transitions as a multi-step process, whereby we experiment with alternative practices/processes, and once policy and planning change occurs, the next steps involve translating this into sustained implementation action (Meijerink and Huitema, 2010).

To examine the complexity inherent within the practice of urban water management, this study has drawn upon the sustainability transitions scholarship, wherein the multi-level perspective presents an overarching architecture to understand how complex processes of change take place inside socio-technical systems, as well as the dynamics of the systems themselves (Boyd & Juhola 2015). This framing recognises that urban water transitions, for example, do not simply involve the integration of new technologies or practices into society, but rather the embedding of new technologies or practices invokes changes to markets, policies, legislation and regulations, cultural meanings, and user practices, among other factors (Geels, 2010). The multi-level perspective regards three interactive levels of practice and influence:

1. the niche level whereby innovations and local practices manifest;
2. the regime level is a representation of the dominant, and often very deeply embedded and stabilised, norms, routines and formal practices; and

- the landscape layer represents the broader global societal and political movements that influence changes in practice (e.g. environmentalism, climate change or the global financial crisis).

The boundaries between these layers are sometimes blurred, but for this study, assists with moving in and out of understanding contemporary practices, critical influences and opportunities for future change.

Complementing this multi-level framing, we also draw on the urban water management framework heuristic proposed by Brown et al. (2009) which outlines the broad socio-political drivers and structural responses towards delivering 'water sensitive cities' (see Figure 1). A water sensitive city is considered an aspirational 'city state' that regards urban water systems as being adaptive and resilient. This framework posits that urban water systems, largely in developed country contexts, have historically focused upon addressing critical socio-political drivers of water supply security, public health protection and urban drainage for protection against flooding, and in more recent times, attempted to embrace more sustainable, resilient approaches to resource constraints and environmental protection (Figure 1). This heuristic hypothesises that technological responses would shift from the dominant large-scale, centralised infrastructures, to a mix of hybridised and decentralised approaches to urban water systems. Which in turn increases the complexity inherent within governance and policy structures and processes.

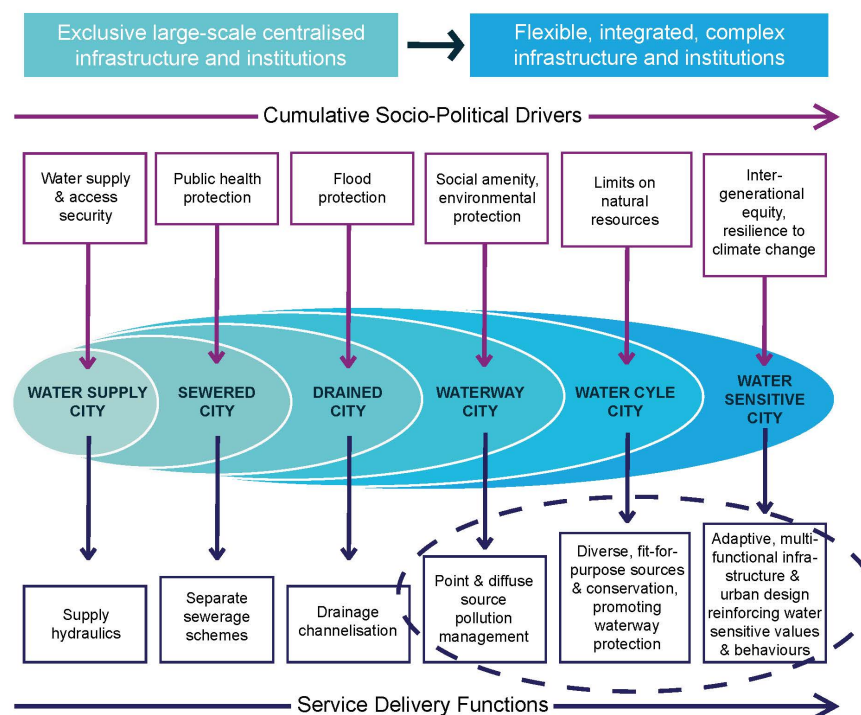


Figure 1: Water system continuum (adapted from Brown et al 2009).

Within the context of low-to-middle income countries, this framework presents an opportunity to reflect on contemporary socio-political drivers and responses, and frame future interventions around the principles of a 'water sensitive city'. These principles are:

- Cities as water supply catchments – whereby water is sourced from a diversity of sources and scales;
- Cities providing ecosystems services – whereby the built environment is designed to support and supplement natural environmental functions; and

- Cities comprising water sensitive communities – whereby citizens are engaged in decision-making, and socio-political actors champion and practice sustainable behaviours (Wong and Brown, 2009).

Collectively, these principles support adaptive and flexible urban infrastructure systems through smart design and implementation to deliver on and reinforce water sensitive values. Recognising there are myriad social, cultural, institutional and political contexts, the heuristic provides an overarching guide towards aspirational goals that can be tailored to specific contexts. To better understand how Greater Bogor may transform their urban water governance systems, we turn to contemporary sustainability transitions scholarship which has begun to identify core transition dynamics and attributes to assist in guiding future pathways of change.

1.1.1 Transition Dynamics Framework

What then, are the ingredients for effectively steering a transition towards more sustainable urban water governance? Previous studies have identified key features relevant to promoting change including: the steady adaptation of existing institutional frameworks; systematic experimentation to shape or make innovations; the involvement of diverse actors and knowledge; and, opportunities for collaboration and social learning (see e.g. Loorbach, 2010; Brown, Farrelly & Loorbach, 2013). This mirrors the theories associated with policy-making that regard these processes as incremental, messy and ill-structured, rather than a rational, ‘top-down’ process (Meadowcroft, 2009). Thus a key emphasis of this work suggests that to drive processes for change and ultimately implementation of alternative approaches and processes, engagement with diverse actor-networks across public and private sectors, and across multiple scales is critical (Loorbach, 2010). Therefore, we draw on existing empirical insights that outline the ingredients for steering sustainable change derived from examining the urban water transition contexts within Melbourne, Australia. The transitions dynamics framework (TDF) illuminates a series of key enabling conditions that underpin a city-scale transition towards more water sensitive practices (Brown et al., 2013; Brown et al., 2016, Brown et al. 2017). The TDF, outlined below in Table 1, sets out an approach to unpacking contemporary features of broader water governance practices, and assists with framing future initiatives through five domains of change: (i) actors and champions; (ii) platforms and bridges for connecting; (iii) science and knowledge-building; (iv) projects and applications; and, (v) practical and administrative tools.

Table 1: Transition Dynamics Framework: domains of change (modified from Brown et al., 2013; Brown et al., 2016, Brown et al. 2017)

DOMAIN OF CHANGE	ACTORS	BRIDGES	KNOWLEDGE	PROJECTS	TOOLS
	Key networks of individuals (vertically and horizontally) Engage both leaders and practice champions Support multiple networks including technical, policy and multi-agency networks	(semi) formalized organizations, structures and processes for coordination and alignment Aim to bring science, industry, policy and capacity building efforts together. Foster social capital	Conduct research into the physical and social sciences to generate localized, contextualized knowledge to inform decision-making. Translate to capacity building efforts	Generate multiple experiments (at varying scales) to build technical feasibility and confidence. Frame experiments as dedicated learning opportunities Generate profile and connect to science	Generate, disseminate and train practitioners on best-practice guidelines (e.g. engaging with community; co-design; flood modelling etc.) Create legislative amendments, appropriate regulatory modes

A first key step is recognising **who** is critical for involvement in the transition. This does not just relate to positional power dynamics (i.e. those stakeholders that hold legal responsibility for key levers in the system), but also actors who have the potential to direct and influence change from inside or outside the system (e.g. operational staff, community leaders, consultants, among others). Not only is stakeholder mapping an important (and ongoing) task, but also assists in revealing key champions within the system, particularly those who are strategic and creative in the manner they work. For example, individuals who are skilled in recognising appropriate contexts for transition and the best levers for guiding change in a desirable direction are regarded as change agents or champions of change (Smith et al., 2005). This also aligns with the important role of leadership. While government and executive leadership remains crucial to success, leadership often goes beyond one individual or a singular mandate, to involve a group of actors within or across more than one organisation working towards a common vision (Loorbach and Rotmans, 2010).

To support change agents and facilitate broader actor-networks, the creation of key bridging organisations (also referred to as intermediaries, see Kivimaa, 2014) are critical (Bos et al., 2015). These formal or informal (e.g. shadow networks) spaces provide opportunities for participating individuals/organisations to collaborate without significant conflict, each making their own contribution to the transition goals while also attaining their individual goals. Building effective bridges (or platforms for engagement) requires effort towards building **trust** among network members. This contributes towards **accumulating social capital** - reinforcing relationships and interdependence between network participants (embeddedness). This relates to principles of good governance, whereby perceptions of fairness and transparency are important. Thus, bridging organisations need to be mindful of not creating resistance to change from individuals or stakeholders outside the network, for this can lead to technological or practice-based 'lock-ins', or missed opportunities for identifying change and innovation. Avoiding this path requires looking externally to the broader policy landscape and maintaining strategic foresight. This often means the development of new (temporary) organisations are required to monitor and revise goals and interventions in order to guide and promote successful transitions (see Bos et al. 2015).

Governance for transitions also recognises that fostering **learning** among participants is key. This is not just to help find technical solutions to complex problems, but also related to **how** a transitions process is contextualised and policy problems are defined (van de Kerkhof and Wieczorek 2005). Depending on the nature of the transition, basic scientific evidence to understand and frame the scale of the problem may be required, and in response, new practices and or technologies are generated to suit contextual conditions.

A **portfolio of options** needs to be developed and maintained to avoid lock-in to solutions that may, in the long-term, prove not to generate anticipated outcomes (Kemp et al., 2007). However, there is a tension between the need to 'fix' a plan to take immediate steps towards sustainability and the need to retain flexibility because of uncertainty about which plan would be most effective (Rip, 2006). Nevertheless, it is important to consider social drivers: demand-side issues and the use of societal (as opposed to purely technical) transitions can easily be overlooked by transitions management stakeholders (Kemp et al., 2007). Thus a variety of projects and experiments are important for generating knowledge building opportunities and creating redundancy and resilience (Farrelly and Brown, 2011).

Overall, transitioning Greater Bogor to sustainable water sensitive practices will require unified direction and integration of government policy and practices, broad engagement with actors beyond government (including academia and consultants), market forces, and bottom-up

initiatives from NGOs and communities (e.g. social entrepreneurs). The purpose of this report is to explore the steps required for multi-actor and multi-level networks within Greater Bogor to embed governance for a water sensitive transition.

1.2 Method

Unpacking urban water governance requires a multi-layered research design and engagement with a broad range of actors to identify the core structures and processes that inform governance. Taking a multi-level governance and multi-perspective framing, the research is designed to illuminate the current complexity of the urban water sector, to profile the existing actors, structures, policies and activities, and then explore how these align with the previously identified transition dynamics (see section 1.2.1). This research has empirically explored a broad set of socio-political actors and their associated formal (rules, legislation, policies etc.) and informal (e.g. professional networks, community roles) decision-making environments across Greater Bogor. The overall research design draws on multiple data sources to examine existing urban water governance and identify opportunities for moving forward.

The research project involved primary and secondary data collection over a 10-month period (November 2017-August 2018) and required direct engagement with a broad range of individuals involved in various decision-making environments that influence urban water management in Greater Bogor (outlined below).

1.2.1 Administrative and geographic case context

Indonesia's climate brings high annual rainfall, with monsoonal rains between October and April that often result in alluvial or pluvial flooding. Bogor has year-round warm temperatures and average annual rainfall of 4100 - 4400 mm. As it is located higher in its catchment, Bogor is less vulnerable to significant flooding. However, as several rivers traverse Bogor on their path to the Bay of Jakarta, it has the potential to influence flood volumes within Jakarta. Despite high annual rainfall across Java, the island's high population, low surface storage volumes and seasonal variation can result in periods of water supply shortages in urban environments.

Greater Bogor (see Figure 3) incorporates two municipalities within the province of West Java. It comprises the whole of the municipality of Kota Bogor (Bogor City), which has an area of 118.5 km² and population of 1,016,687 (2016). The surrounding municipality of Bogor Regency includes satellite suburbs of Bogor such as Cibinong, Ciomas and Sentul City, but also a large area of rural land with no urban connection to Bogor metropolitan area. It is difficult to draw an accurate population assessment for the Greater Bogor metropolitan area because most economic and social data is published at the scale of municipalities. While there is no official delineation of Greater Bogor for statistical purposes,

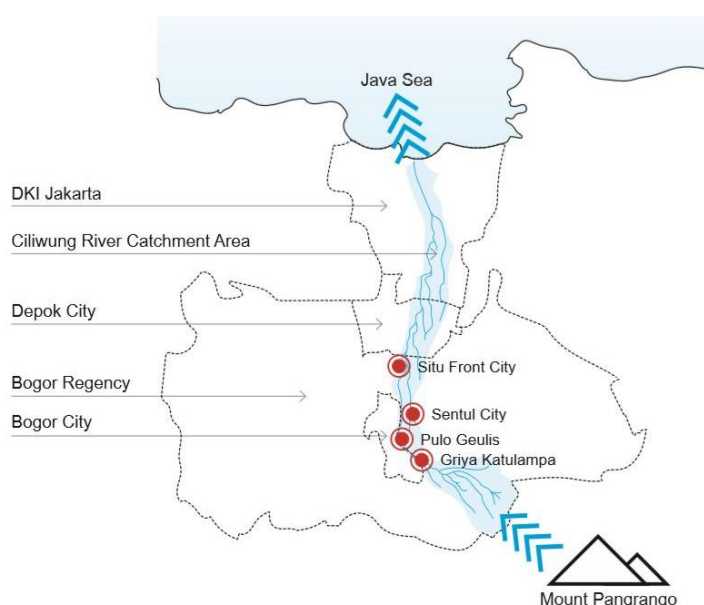


Figure 2: Map showing Greater Bogor (Bogor City and Bogor Regency) and location of UWC case study sites

by summing the populations of the Bogor Regency districts (Kecamatan) near the boundary of Bogor City, an upper bound of the region's population may be determined. This indicates that the population of Greater Bogor may be greater than 3.3 million people. This area does include some exurban communities, yet they are likely still within the influence of Bogor.

1.2.2 Research Interviews and Stakeholder Engagement

Between November 2017 and August 2018, a series of stakeholder engagement activities were undertaken. Two key approaches were utilised: (i) facilitated focus group discussions (FGDs) with relevant government and non-government actors working within (a) Bogor City and (b) Bogor Regency, and (ii) semi-structured interviews with key urban water decision-makers across a range of hierarchies, divisions and domains in Greater Bogor. The aim of hosting a variety of direct engagement opportunities was to build a solid foundational understanding regarding how the actors who work/engage within this space perceive the contemporary urban water system, and to provide an opportunity to bring together key decision-makers to openly discuss key issues, to share insights and understanding.

The first FGD was held in November 2017 over five days. This involved Indonesian and Australian research collaborators and students identifying and assessing evidence for benchmarking the performance of Greater Bogor's water system using the Water Sensitive Cities Index (WSC Index), developed by the Cooperative Research Centre for Water Sensitive Cities. This benchmarking exercise involved a structured process in which key actors (including government officials and Indonesian researchers) were engaged in a series of deep discussions related to the different elements of the WSC Index, and rated the current performance of Greater Bogor according to different indicators for each water sensitive city goal. Of note, the descriptions for a number of the indicators were adapted to more adequately reflect a developing country context, as the WSC Index was originally derived within the Australian context (Chesterfield et al. 2016). This benchmarking exercise included an assessment of the goal of "good governance" and its associated seven indicators (see Table 2). The full results of the Benchmarking study are reported in an accompanying UWC report².

Table 2: Features of 'Good Governance' as identified in the Water Sensitive City Index (Chesterfield et al. 2016).

WSC Index Goal	Indicators
Ensure Good Governance	1.1 Knowledge, skills and organisational capacity
	1.2 Water is key element in city planning and design
	1.3 Cross-sector institutional arrangements and processes
	1.4 Public engagement, participation and transparency
	1.5 Leadership, long-term vision and commitment
	1.6 Water resourcing and funding to deliver broad societal value
	1.7 Equitable representation of perspectives

The second and third series of FGDs were held in April and July 2018 respectively, again involving representatives from government and non-government stakeholders across the two areas (a = Bogor City and b = Bogor Regency) and ran for approximately 3 hours each. FGD2a and b (April) discussions were structured around the Transition Dynamics Framework (TDF, see

² UWC Report 2: "Benchmarking Bogor's Water Sensitive performance"

section 1.2.1). Following an explanation of the FGD's purpose and the theory underlying the TDF, questions posed to the participants explored the five enabling factor types for the relevant local government area. Discussion questions were asked by both Indonesian and Australian members of the research team. When required, questions and answers were translated by a member of the research team *in situ* from English to Indonesian and vice versa.

FGD3a and b (July) were designed to test the research in development with as many of the original participants from FGD2 as possible. In contrast to FGD2, FGD3 was conducted nearly entirely in Indonesian, facilitated by a fluent member of the Indonesian research team. First, the FGD involved validating a preliminary results table outlining the various organisational responsibilities for different dimensions of urban water, while the second half involved a facilitated, open discussion regarding the validity and utility of preliminary strategic insights and policy-based recommendations.

In addition to the FGDs, semi-structured interviews were conducted during the data collection window (May 2018). This involved face-to-face interviews, facilitated through an interpreter, about perceptions regarding opportunities and challenges with advancing water sensitive concepts. During a number of key interviews with senior officials (e.g. City of Bogor and Bogor Regency), several individuals from the same agency or closely aligned agencies were also present. The interviews were broad-ranging in their line of questioning in comparison to the FGDs. Interview questions explored the agencies' approach to long-term water planning, role in policy coordination, practices promoting participatory planning, examples of inter-department collaboration and significant water planning challenges. All FGDs and semi-structured interviews were audio-recorded, with permission, and professionally transcribed and translated (in English) to facilitate joint analysis between Indonesian and English-speaking researchers.



Figure 3: Photo of April FGD2b at Bappeda Kota Bogor office.

1.2.3 Secondary data collection

Secondary data source material included government websites, planning and policy documents, statistical reports, and legislation and regulations. Many of documents were made available with official English translations, and others were analysed by Indonesian collaborators. In particular, the historical and contemporary water legislation and regulations were compiled and reviewed by Indonesian researchers. Where important primary documents were not available with official translations, excerpts of the Indonesian text were machine-translated by common Web services to allow joint analysis.

In addition, Australian researchers, guided by our Indonesian collaborators, participated in multiple tours of the case study villages, meeting informally with local leaders and witnessing first-hand the challenges associated with water and sanitation servicing. Notes (and photos) taken during these visits were also incorporated into the overall dataset for analysis.

1.2.4 Exploring strategic governance actions for change

In addition, and in direct support of this research project, postgraduate students (Masters and PhDs) from Indonesia and Australia were involved in unpacking different levels of strategic governance action for change in relation to urban water (see Table 3). These involved examining a range of complex topics at a variety of different scales.

At the community-scale, contemporary knowledge of urban water systems and willingness to pay for improved services was explored in two different local socio-economic contexts (e.g. Pulo Geulis and Griya Katulampa). Other studies explored (i) the role and influence of local community social entrepreneurs operating within water resources management across West and East Java, and (ii) the strategic policy action and interventions associated with major water projects in Jakarta and Surabaya.

Although many of these projects looked beyond Greater Bogor, they were funded by the broader program of research and were explicitly engaged in ongoing discussions regarding research insights throughout this project, with the aim of deriving insights from their work to complement the recommendations associated with the primary research activities.

Table 3: Secondary research activities informing this study.

STUDENT	University	Degree	Research Topic & Approach	Level of engagement	Research Location
Asih Maryani	Institut Pertanian Bogor (IPB)	Masters	- Community knowledge of urban water servicing and supplies & willingness-to-pay - Quantitative surveys and semi-structured interviews	Local , Village	Griya Katulampa
Arum Anggraini	Institut Pertanian Bogor (IPB)	Masters	- Community knowledge of urban water servicing and supplies & willingness-to-pay - Quantitative surveys and semi-structured interviews	Local , Village	Pulo Geulis
Wikke Novalia	Monash University	PhD	- Agent-based mechanisms influencing and steering urban infrastructure initiatives in Indonesian Cities. - Semi-structured interviews and case studies	National, Strategy & Policy	Jakarta and Surabaya
Erika Duncn-Horner	Monash University	PhD	- Role and agency of social entrepreneurs in shaping sustainable urban water practices in Indonesia. - Distended case studies and semi-structured interviews.	Local, Entrepreneur	East and West Java Provinces



Chapter 2

Historical & Political Influences in Indonesian Water Governance

2. HISTORICAL & POLITICAL INFLUENCES IN INDONESIAN WATER GOVERNANCE

During the colonial era, the use of groundwater and piping technologies was associated with European populations, and the use of surface water was largely exclusive to the non-European residents (Kooy and Bakker 2008). In the Greater Bogor region, the history of government drinking water services began in 1918 when the Dutch colonial government built a water supply company, named *Gemeente Waterleiding Buitenzorg*, using spring water sourced from the settlement of Batu, 7 km from the centre of Bogor (now located in Bogor Regency) (Regional Regulation of Bogor City 16/2011, Number 1 Series D). This emerged at a time when the colonial government in Jakarta was transitioning from treated artesian water to pumped and piped mountain spring water (Kooy and Bakker 2008).

Following independence in 1945, the Indonesian constitution (Article 33 Paragraph 3) stated *Earth and water and all natural resources contained in their bodies are managed under the authority of the State and utilised in the interests of the welfare of the nation*. Thus, the land, water and natural riches contained therein are considered the responsibility/control of the State and used for the prosperity of the Indonesian people. As a result, and for most of the time since independence, water supply has been carried out by state-owned enterprises.

From the mid-1960s onwards, there were about 7,000 customers of the water supply company for Bogor City (many of which were government offices or industry), but up to 50% of the water supplied was lost. In the late 1960s efforts to improve and increase supply capacity began by utilising the Cipaku Reservoir. Kooy and Bakker (2008) characterise this period as the commodification of water, with a renewed emphasis on economic growth and profitability. Within this context there was some decentralisation of operations, though central government retained a significant role in financing and oversight of water management development and operations. During this period, the Indonesian government also drew on trans-national knowledge and financing through, for example, grants delivered through the Colombo Plan Project, in which the Australian Government played a key role. This strategic relationship-building activity was designed to generate opportunities for knowledge transfer through higher education opportunities, Australian consultants working in-country, and construction of new supply and distribution infrastructure.

During the 1970s and '80s formal government water authorities were beginning to form. Greater Bogor witnessed the establishment of PDAM Tirta Pakuan (Bogor City) and PDAM Tirta Kahuripan (Bogor Regency) following regulation enacted in 1977 and 1981 respectively. In the early 1990s, water production capacity was increased for Bogor City, with new water treatment plants located in Cipaku and Dekeng, and the exploitation of 'raw' water from the Cisadane River (Nugroho 2009). For example, PDAM Tirta Kahuripan established its water supply from the Ciburial spring (Figure 4), which also serves the cities of Depok and Jakarta. Spring water is where a groundwater aquifer has surface access.

Democratization in Indonesia has been ongoing since 1998, when the New Order Authoritarian Government collapsed, and the reform process began, popularly referred to as *reformasi* 1998. During the period of democratic reform, and following

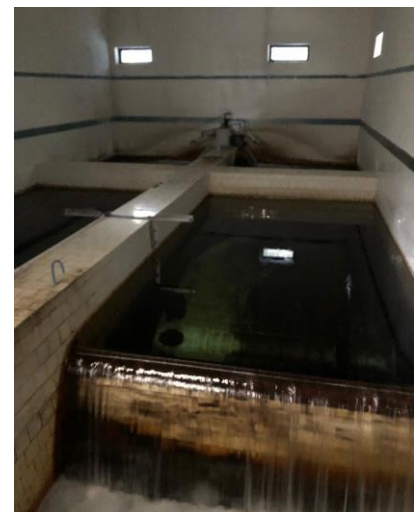


Figure 4: Photo of Ciburial Spring Installation Plant (courtesy of Jane Holden 2018)

the publication of the Dublin Principles³, responsibility for water supply was allocated to local governments. This major decentralisation of decision-making and implementation authority resulted in local governments having responsibility for water supply, sanitation and drainage. This meant the central government no longer directed local governments as it had during the authoritarian era. The roles became distributed such that the central and provincial governments were to largely focus on making policies and programs, organisational coordination and monitoring efforts, while local governments have implementation authority.

2.1 Political context of water governance in Indonesia

The *reformasi* period was framed with high expectations of promoting people's political freedom and opportunities to participate in the political process, largely channelled through decentralising decision-making powers. This process was endorsed to enable Indonesia to move "...from less accountable to more accountable government, from less competitive to freer and fairer competitive elections, and from weak autonomous associations in civil society to more autonomous and more numerous associations" (Potter et al., 1997, p.6). The reform process started by revising three important political structures: political parties, general elections, and the composition of Parliament.⁴

A consequence of the political reforms, there has been a significant increase in the number of political parties able to contest and win elections. Indeed, the numbers increased drastically from three political parties between 1977 and 1997, to 48 political parties in the 1999 Election. However, the numbers continue to fluctuate with 24 parties contesting in 2004, 38 in 2009 and only 12 national parties in 2014. Analysis of the winning votes reveals that over the years there has been no single party achieving a majority of seats (50%+) since 1998. Indeed, even in the 2014 election there was no single party that achieved over 20% of the vote, with 10 separate parties winning seats in Parliament.

This has created a challenging operational environment that constrains the organisational capacity of parties to translate their aspirations into programs and policies. Similarly, the weakening of the organisational capacity of political parties' policy-making has, in turn, reduced their influence on their elected members. Consequently, campaigning has tended to focus on short-term populist issues rather than substantive long-term policy issues, and government experience has had diminished appeal at the ballot box.

The pronounced shift towards decentralisation has opened up political engagement opportunities at different scales. Since 2005, Indonesia has held *Pilkada*⁵ at provincial and regency/city levels of administration simultaneously and continuously. In general, *Pilkada* have made local governance and local politics more vibrant, responsive and participatory. However, similar to national levels, the elected Head of Local Government often comes from a political party that is different from the party dominating the seats in DPRD. There can also be party-political differences between the national and lower levels of government. This adds complexity

³ The Dublin Principles on Water and the Environment emerged following the 1992 International Conference on Water and the Environment. The four principles **No. 1:** Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment. **No. 2:** Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels. **No. 3:** Women play a central part in the provision, management and safeguarding of water. **No. 4:** Water has an economic value in all its competing uses and should be recognised as an economic good.

⁴ Indonesian parliament consisted of: *Majelis Permusyawaratan Rakyat* (the People's Consultative Assembly; hereinafter referred to as MPR), *Dewan Perwakilan Rakyat* (the National House of Representatives; hereinafter referred to as DPR), *Dewan Perwakilan Rakyat Daerah* (the Local House of Representatives; hereinafter referred to as DPRD), and *Dewan Perwakilan Daerah* (Regional Representative Assembly; hereinafter referred to as DPD).

⁵ *Pilkada* translates to "election"



Chapter 3

Water Governance Structures in Indonesia

3. WATER GOVERNANCE STRUCTURES IN INDONESIA

This section reports on the broad stakeholder mapping and analysis in relation to how contemporary formal institutional structures, key organisations and non-state actors are participating in and shaping water management services and infrastructure in Indonesia and Greater Bogor. From the challenges of political and legal reforms to policy capacities, this section provides a framing for understanding some of the broader structural and operational challenges influencing water management of Greater Bogor today.

3.1 Contemporary Legal Setting

The constitution of the Republic of Indonesia (*Undang-Undang Dasar 1945*) Article 33 states, *Earth and water and all natural resources contained in their bodies are managed under the authority of the State and utilised in the interests of the welfare of the nation*. This constitutional principle has been re-iterated throughout various amendments and changes over time (e.g. Law number 11 of 1974 and Law number 7 of 2004⁶) (Yusman, 2000). In 2015, the Constitutional Court for Water Resources Law revoked the Water Law (UU) 7/2004 on the grounds it contradicted the constitution (see Constitutional Court Decision No.058-059-060-063 / PUU-II / 2004 and Number 008 / PUU-III / 2005). This decision confirms that there must be a guarantee that the State will retain its authority over water so that the Water Resources Law is constitutional.⁷ Nastiti et al. (2017) reported that the Court found the 2004 act had: allowed privatisation of water resources that reduced the state's ability to support human rights; fundamentally reformed water ownership; and, undermined the socioeconomic, cultural, and religious values of water (Constitutional Court, 2013). In this context, Water Resources Law is regarded as being constitutional when:⁸

- 1) the use of water for basic drinking water needs to be a Government and agricultural program and not burdened by management fees;
- 2) the concept of rights must be in line with the concept of *res commune* and not become an object of price economically;
- 3) the concept of rights must be interpreted as a derivative of the right to life in accordance with Article 28 H paragraph 1 of the 1945 Constitution;
- 4) supervision and control by the state on water is absolute;
- 5) priority of water business is with BUMN / BUMD state-owned enterprises/local government owned enterprises; and,
- 6) granting permission to the private sector for business is carried out with strict requirements.

However, in the absence of contemporary Water Law, the system has reverted back to Water Law UU 11/1974 while new laws are developed. The principles upon which Water Law UU 11/1974 is based are captured as follows (ADB, 2016 p59):

- 1) water and its sources, including natural resources contained in it, are the gift of God Almighty, which has versatile benefits fulfilling human needs of all times, both in the economic, social and cultural aspects;
- 2) earth, water, and natural resources contained in it are controlled by the state and are used for the greatest prosperity of the people in a fair and equitable way; and

⁶ Law Number 7 of 2004 was rescinded in 2013 following a constitutional challenge.

⁷ MK Decree Number 85/PUU-XI/2013, p. 141

⁸ MK Decree Number 85/PUU-XI/2013, p 141-142

- 3) commercial operation of water resources should be devoted to the interests and welfare of the people while creating growth, social justice, and the ability to be autonomous in a just and prosperous society based on Pancasila.


It is widely recognised that the 1974 Irrigation Act is entirely inappropriate to be adopted as a legal umbrella for all water resources management activities. Despite the reversion to the 1974 act, central government maintains a number of ministries and agencies, which are responsible for overseeing water management (see below and also Table 4). In addition, although central government has not yet finalised a new legislative act, they have issued a series of Government Regulations: No. 121 of 2015 and No.122 of 2015 related to utilization of drinking water and drink water supply systems respectively. Through other regulatory domains, water resources management is being influenced, for example: environmental law; spatial planning law and sectoral laws such as Forestry and the Oil and Gas law. It should be noted, however, that despite the Water Law No.7/2004 being formally revoked, many private businesses established during this period remain operational, including bottled water businesses and land developers, who typically own land parcels and associated spring water. It was suggested that the failure to replace the water legislation with more contemporary interpretations is associated with a reluctance of big business, via its influence on national parliament, to give support to any new proposed water law.

3.2 National Government Responsibilities for Water

The current Working Cabinet (Kabinet Kerja) for the President of the Republic of Indonesia, Joko Widodo, consists of 30 ministers, 4 coordinating ministers and 8 ministerial level officials. Key water-related Ministries include: Ministry of Public Works & Public Housing; Ministry of Environment & Forestry; Ministry of Health; Ministry of Mining; Ministry of Home Affairs; and, Ministry of Planning & Development (Bappenas) (see also Table 4). The Ministry of Public Works & Public Housing holds the greatest responsibility for water-related issues, as they are responsible for spatial planning and the development of infrastructure and public facilities (e.g. roads, irrigation, water treatment, wastewater treatment). Within the Ministry there is a Directorate General of Water Resources, who deals specifically with water and has the authority to formulate and implement policies in the field of conservation and utilization of water resources, controlling the destructive power of water in surface water sources and utilizing groundwater.

Additionally, the Directorate General of Natural Resources is assisted by the Directorate of Natural Resources Management, Directorate of Natural Resources Network Development, River and Coast Directorate, Directorate of Irrigation and Swamp, and Directorate of Operations and Maintenance. With the authority and organizational structure that is specifically for dealing with natural resources, the role of the Ministry is very important for it regulates not only 2% of surface water (e.g. river water, lakes and reservoirs), but also 98% of groundwater resources, up to a depth of 100m from the surface. Beyond that, the Ministry for Mining has responsibility for groundwater resources. Groundwater licencing occurs at the Provincial level, but Ministerial Regulation stipulates that licencing must be obtained for groundwater extraction if you are a commercial entity (e.g. drinking water supplier or land developer, or irrigation). Households, however, are exempt from requiring a licence permit when using a human-powered well or by using piped systems with a diameter of 2 inches or less and without being connected to a centralised distribution system.

While the primary role of central government relates to funding and providing strategic guidance for municipal operation, a notable exception is the central authority for river management which oversees approvals for capital works such as dredging of lakes. An example of an agencies “guidance role” in central government is Badan Peningkatan Penyelenggaraan Sistem



Penyediaan Air Minum (BPPSDAM), which reports to Kementerian Pekerjaan Umum dan Perumahan Rakyat (Ministry of Public Works and Settlements). The aim of BPPSDAM is to improve the implementation of drinking water supply systems operated by state and regionally-owned enterprises (i.e. PDAMs) through performance assessment in the context of meeting quality, quantity and continuity standards and by making recommendations to central and regional governments.

Table 4: Agency functions relevant to water in the Bogor region at different levels of government^a.

LEVEL	AGENCY	SERVICE				FUNCTION (roles & responsibilities)
		Supply	Sanitation	Drainage	Environment	
National	BAPPENAS	•	•			National development planning; coordinates development, utilization and conservation of natural resources
	Ministry of Public Works and Settlements (PUPR)	•		•		Spatial planning and the development of infrastructure and public facilities (e.g. irrigation, water and wastewater treatment, roads), the management of water resources and water quality, and administration of surface water coordination policy; includes BBWS, BPPSPAM.
	BBWS	•		•		Management of river basins classed as Category A; approves permits for river water extraction and works on rivers (e.g. dredging)
	BPPSPAM	•				Recently established to help governments improve organization of their drinking water supply systems
	Ministry of Home Affairs				•	Supports local government (LG) environmental management planning;
	Ministry of Environment & Forestry				•	Conservation standards, EIA regulation, monitoring water pollution and quality control (surface waters)
	Ministry of Health	•				Regulation of drinking water standards & monitoring of drinking water quality provided by water supply agencies.
Provincial	Regional Development Planning Board (Bappeda)	•		•	•	Creating consistent regional development planning. An internal 'Physical Division' supports implementation of physical development planning of regional essential services (including water), housing and settlement, spatial planning and the environment.
	Department of Settlement and Housing	•	•	•		Planning and coordination of development and formal authority over water supply and wastewater treatment systems that cover multiple local government jurisdictions; coordination of drainage through settlement infrastructure
	Water Resources Agency (DPSDA)	•		•	•	Water resources management (control and evaluation) for irrigation; plans and manages development & use of rivers, lakes and dams; SDA permits
	Watershed Management Agency (BPDAS) Citarum-Ciliwung		•			Flood management – planning, institutional development, evaluation of watershed management – focused around rehabilitation and conservation of forest resources.

SERVICE		FUNCTION (roles & responsibilities)				
LEVEL	AGENCY					Supply
	Department of Energy & Mineral Resources (ESDM)	•				Groundwater licensing (100 m below ground level and deeper)
	PTTGR	•				Raw water supply company
City / Regency ⁹	BAPPEDA	•		•		Development planning and coordination
	Department of Public Works and Administration (PUPR) -Bogor City	•	•	•	•	Formulation of policy for potable water supply, domestic sewerage regulation and infrastructure construction and operation; flood planning; through River and Channel Management branch, maintains and cleans water channels
	Department of Highways and Water Resources - Bogor Regency	•	•	•	•	Formulation of policy for potable water supply, domestic sewerage regulation and infrastructure construction and operation; flood planning; through River and Channel Management branch, maintains and cleans water channels
	PDAM Tirta Pakuan – Bogor City	•				Raw water treatment and supply to residential and business customers
	PDAM Tirta Kahuripan – Bogor Regency	•				Raw water treatment and supply to residential and business customers
	UPTD-PAL		•			Division of PUPR responsible for wastewater treatment plant operation
	Department of Health		•			Supports user-managed communal wastewater treatment systems (SANIMAS)
	Environment Department (DLH - Bogor City / LHK -Bogor Regency)		•		•	Management of non-domestic wastewater; conservation and rehabilitation of natural resources; quality monitoring and pollution control (i.e. environmental regulations)

⁹ Separate agencies exist in both Bogor City and Bogor Regency unless specified.

SERVICE						FUNCTION (roles & responsibilities)
LEVEL	AGENCY	Supply	Sanitation	Drainage	Environment	
	ESDM (Regency)	•				Processes intergovernmental sale of raw water
	KSM / Kelompok Pengelola dan Pengguna	•				User management organization for water supply (e.g. from springs and wells) and sanitation facilities (e.g. septic tanks and SANIMAS) outside PDAM service areas
a = More detailed information regarding these Agencies is provided in Appendix A						

3.3 Regional Governance

Regional governance comprises provincial governments and, in a third tier, urban or rural municipal governments. According to the Ministry of Home Affairs, regional government in Indonesia consists of 34 provinces or regions with special status, 98 cities or urban local authorities, and 416 regencies or rural local authorities (MoHA, 2018). Presidential Decree No. 114 of 1999 concerning spatial planning of Bogor-Puncak-Ciawangur Region. While the central government provides a core coordinative function across diverse portfolios, the responsibility and authority for establishing water policy lies with the provincial governments. Whereas the district and city governments have implementation authority, in terms of carrying works programs.

3.3.1 Provincial Government

West Java Province cover an area of 35,000km² with a total population of 43 million situated across 18 regencies, nine cities, 626 districts and 5962 administrative villages or sub-districts (BPS West Java, 2017). The early period of democratic reform allocated a relatively minor role to provincial governments¹⁰. Until recently, provincial governments were responsible for coordinating across district/municipal governments to implement environmental policies, monitor compliance and impose administrative sanctions on industries and enterprises within their jurisdiction. In practice though, provinces only performed this role if invited by either central government or local authorities. Provinces were also financially constrained due to the central government's preference to fund local government authorities rather than provinces (Leitmann et al. 2009).

Provinces have maintained responsibility for large scale water resources management and bulk water supply, while the responsibility for operating urban drinking water supply systems and sanitation falls to municipal governments. Table 4 outlines the key agencies and their major functions with respect to managing water systems across the multiple tiers of government.

More recently, however, there was a significant change in the distribution of authority with the enactment of Local Government Law No.23/2014. Although reinforcing the principle of autonomy with respect to local government – the right of local government to self-manage and self-organise the government affairs and interests of its community – this law witnessed a reduction in authority for district and city governments over a range of functions that have cross-boundary impacts (e.g. water resource management). This resulted in the authority of central government and particularly the provinces being increased. Provinces gained the ability to create cross-boundary policy over local governments and oversee work programs that covered the territory of multiple city or regency governments. The implications for the water sector are that only the waterways entirely within the boundaries of one city or regency government may be managed by that government, only the water supply systems servicing residents of one municipal government may be managed by that government, and the same for sewerage networks. As a result, there is a milieu of organisations involved in water management across provincial, regency and city levels, which creates challenges (and opportunities) for strategic coordination when looking to create a more holistic, integrated systems-based approach to water management.

¹⁰ Local Government Law No. 22/1999 and Regional Autonomy Law No.32/2004

3.3.2 Regency & City Municipalities

The difference between a regency and a city lies in geography, demography, size and economy. Towns and large urban areas are considered cities (*kota*) and are headed by a *Walikota* (Mayor). Regencies (*kabupaten*) are combined territories that encompass rural areas and smaller towns. Regencies are headed by the *Bupati* (Head of Regency). Regencies tend to deal more with irrigation policy and forestry issues while cities tend to be more concerned with urban water problems and sanitation. Bogor Regency has 40 districts, and Bogor City has 6 districts (BPS West Java in 2017). These *Kecamatan* (or district) are led by a 'district head', who is a civil servant, responsible to the regent (in a regency) or to the mayor (in a city). Below the district level, administration is further subdivided into *kelurahan* (generally applied to urban areas) or *desa* (for rural areas). This administrative layer is commonly referred to as comprising villages. Other additional administrative layers controlled by municipal governments (i.e., RW and RT) are not formally recognised by the central government administrative systems (Minister of Home Affairs Regulation No. 5 of 2007). Overall, the decentralisation efforts have strengthened the administrative power of local governments when working with central government. This has in-turn empowered district and city government levels to become key implementation authorities in relation to on-ground works programs. Nevertheless, our FGD data reveals the bargaining power of local governments remains weak for they are heavily dependent on revenue transfers from central government, with many participants expressing passive deference to central government decision-making.

In addition to having responsibility for implementing environmental policies and monitoring compliance within their territories, district and municipal governments have additional power to issue certain permits/licenses as well as impose administrative sanctions for license requirement violations. Hence, districts and municipalities may also create different environmental offices, depending on their local needs. These agencies generally develop technical policies that cover conservation and rehabilitation of natural resources. Since heads of provinces and districts/municipalities are elected directly and are accountable to their electorates, such local environmental agencies/offices have become directly responsible to their respective governors' and/or district heads'/mayors' regulations. This means, as a consequence, these offices may not report directly or be accountable to any of the central government ministries (Government Regulation No. 17 of 2018 regarding district).

Municipal governments own water supply companies known as PDAM. In addition to having responsibility for operating drinking water supply systems, the city and regency governments also implement environmental policies and monitoring compliance within their territories, issue certain permits/licenses for urban development and water use, as well as impose administrative sanctions for license requirement violations.

PDAM (Water Utilities)

The first water utilities in Indonesia were set up during the colonial period at the beginning of the 20th century. In the Bogor region, colonial government-built source Water Company named: *Gementee Waterleideng Buitenzorg* in 1918. Since then the influence of different government levels (central versus local) has changed considerably. For example, right after Indonesia's independence in 1945 they became part of local government, yet in the 1970s the central government became more involved in their financing and management. In 1987 a government act nominally handed water supply back to local governments, but in reality, central government remains very involved. As a result the management of PDAMs is quite

complex, as many government institutions are responsible for their operation (Hakim, 2000). For example, the Department of Public Works is responsible for the technical matters of infrastructure and raw water management, managerial aspects are the responsibility of the Department of Home Affairs, whilst financial matters are under the jurisdiction of the Department of Finance. The Department of Health is responsible for setting the requirements for drinking water quality, whilst the ownership of PDAMs lies with city or regency.

Up to 2011, the service coverage of PDAM (Bogor Regency) remained very low, where approximately only 8% of total population had access to clean water¹¹, leaving many residents relying on well and river water to meet daily needs. The rapidly growing Bogor Regency population (5.132 million people as of 2014) has meant the PDAM (and many others) struggles to meet the requirements set out in the original millennium development goals, let alone the more recent sustainable development goals. However, despite these challenges, the recent performance assessment of PDAMs across Indonesia, revealed both Kota Bogor and Kabupaten Bogor PDAMs were among the top 5% performing agencies. The number of customers of PDAM Tirta Pakuan has grown to about 147,000 in 2016 – 95% of which were households (BPS Kota Bogor 2017).

Sanitation management, on the other hand, has largely been overlooked; Indonesia has one of the world's lowest urban coverages of conventional sewerage systems (<2%) and 30% of the population lack basic sanitation infrastructure (World Bank, 2013). Systems that are in place are typically highly decentralised, with a reliance on septic tank systems managed by either individual landholders or local communities (only few piped sewerage networks exist). While there have been numerous pilots related to decentralised wastewater treatment systems and various policies and programs developed to address the gap in sanitary services (Roma and Jeffery 2010), these initiatives have not yet been replicated or scaled sufficiently to tackle the scale of the problem (Hutton and Chase, 2016).

The urban drainage network is largely a legacy of rural irrigation channel networks. Drainage is, by and large, a local government concern, unless major works are been required – such as dam construction and raising riverbanks – whereupon central or provincial government intervene.

3.4 Land Development Planning Processes

At each government level the respective development and planning agencies formulate three development plans: long-term (20+ years), medium-term (5-10 years) and annual. Development policies at higher levels influence and guide lower level development policies. To supplement the development policies, state departments and agencies need to formulate their sectoral *Renstra* (Strategic Plans), which outlines strategies and work plans for a five-year period and are used as a basis for performance auditing.

Indonesia's current National Medium-Term Development Plan 2015-2019 (RPJMN 2015-2019) is the third phase in the implementation of the 2005-2025 National Long-Term Development Plan (RPJPN). It constitutes the basis for all ministries and government agencies for formulating their respective RENSTRA. Local governments must take this plan into account when formulating their regional development policies.

Each city and regency is required to prepare a medium term regional development plan (*Rencana Pembangunan Jangka Menengah Daerah*, RPJMD). A new RPJMD is prepared

¹¹ 8% of 4.3 million people; Pikiran Rakyat, 2 Maret, 2011

when a head of local government is elected (or re-elected) and is much informed by their vision and election platform. It should refer to the long-term national development objectives and be submitted for deliberation to the local parliament. BAPPEDA is the lead agency in preparing RPJMD. RPJMD and RENSTRA are intended to be created via a participatory process (Sutmuller and Setiono 2011). For example, the final draft of the RPJMD (and annual plans) are required to be presented and discussed at the annual regional development deliberations, *Musrenbang*. Yet, a survey conducted in 2011 revealed that external consultants (including universities) continue to have a strong influence over the preparation and delivery of the RPJMD and RENSTRA. Whilst external influence is important for bringing in new ideas and opportunities, it can often be at the expense of developing internal expertise and capacity for future strategy development, and has the potential to reduce the value of the strategies for addressing local problems.

To implement the RPJMD and RENSTRA, annual workplans must be submitted to the budgeting committees. It was reported during interviews that works or policy programs are rarely allocated funding beyond this annual planning cycle, and this required a resubmission of spending proposals annually. This creates a challenging implementation environment, whereby this process can take up to six months to finalise, thus leading to erratic and uncertain program implementation which constrains the ability to apply integrated and systematic work programs.

3.5 Non-State Actors Involved in Shaping Water Governance

Governance denotes going ‘beyond government’, in recognition that government organisations and institutional structures alone will not deliver the scale of what is required to effect change. Therefore, engagement with a variety of actors beyond the state is required.

3.5.1 Role of community

Below the city/regency government offices are the *Kecamatan* (or district), which is led by a ‘district head’, who is a civil servant, responsible to the regent (in a regency) or to the mayor (in a city). There are six *Kecamatan* in Bogor City which are further divided into administration units referred to as *Kelurahan* (urban communities). These urban communities are led by a *Lurah* (sub-district head), while in Bogor Regency the sub-district layer is referred to as villages, which are led by a village head – both of whom are directly elected by their community. There are 434 villages/urban communities in Bogor Regency (Bogor Regency in Numbers 2017); and there are 68 villages/urban communities in Bogor City (Bogor City in Numbers 2017). The work of Village and Urban Community is assisted by Community Unit (RW) and Neighbourhood Unit (RT). A Community Unit is an institution established through the deliberation of the RT board and determined by the Village Head or *Lurah*. The Neighbourhood Unit is an Institution that is formed through local community deliberations in the framework of government and community services and is determined by the head of the Village or *Lurah*. It should be noted that both the community unit and neighbourhood units are not included in formal government administrative systems (Minister of Home Affairs Regulation No. 5 of 2007). However, they play a strong role in influencing on-ground actions. In Bogor Regency there are 3937 RTs, while in the city of Bogor there are 3479 RTs (Bogor Regency in Numbers & Bogor City in Numbers, 2017).

Municipal governments can delegate some functions to *kecamatan* and *kelurahan*. Indeed, some water sector activities are operated at the *kecamatan* or *kelurahan* level. For example, *Kelompok Swadaya Masyarakat* (KSM) manage water supply from springs, wells, or other sources in areas **not** covered by the PDAM drinking water network. In Bogor City, KSM have

20 facilities, which are all funded by the City budget (APBD). KSM or *Kelompok Pengelola dan Pengguna* also manage local wastewater treatment systems: septic tanks and SANIMAS¹². In the last 10 years, there have been about 105 SANIMAS installations in Bogor City alone (pers. comm., 2018). However, while these systems continue to be installed, there is currently no formal regulations at national or local levels governing septic tank sludge management or disposal (ADB, 2016). Hence, sewage is rarely treated (less than 5%) with the majority discharged untreated into surface and groundwater systems (ADB, 2016).

As a result of insufficient water servicing arrangements to broad sections of the community, often households and communities seek water supplies elsewhere. As Table 5 reveals, PDAM treated drinking tap-water supplies has decreased and communities have sought a diversity of water supplies including a large shift towards bottled water (*air minum dalam kemasan* or AMDK), particularly in West Java, where in 2016 it was more than 30% of the total drinking water consumption. The shift towards bottled water has secondary implications associated with solid waste, whereby much of the gross pollutants entering waterways is plastic bottles. In addition, due to gaps in the licensing regime and weak monitoring practices associated with groundwater access, significant over extraction of groundwater in many areas of Greater Bogor has occurred. Whilst over extraction is yet to have the far-reaching consequences that have been experienced in the Jakarta area (i.e. severe subsidence and saltwater intrusion), there are parts of Bogor where an affordable and exploitable groundwater resource is no longer available. More information is available in the accompanying report, “Benchmarking Bogor’s Water Sensitive Performance”.

The breakdown of water source is largely dependent on local resources and access which can be highly variable. For example, Village Katulampa has access to water from diverse sources of varying quality, including: ground water (wells and pumps), rivers, springs, seepage water, and PDAM’s piped water. In particular, the Griya Katulampa Housing¹³ (GKH) within the Village is well located near seepage water of good quality and quantity. However, the seepage water in GKH is not fully utilized (although it is free), because the community regards the piped PDAM-supplied water to be of higher quality, despite the costs associated (Syaukat & Maryani, 2019). In contrast, much of the community outside GKH has not been able to consume piped PDAM-supplied water to meet their daily needs due to no piped network systems, so they rely well-water (groundwater) and even river water to meet their daily needs (Syaukat & Maryani, 2019). Despite the variability of supply and quality associated with PDAM water, 50% of respondents (n=21) were unwilling to pay more for improved quality and services (Syaukat & Maryani, 2019). A similar study was undertaken in Pulo Guelis which revealed more limited sources of water, a greater utilization of PDAM water, bottled and refill water, but more individuals were willing to pay for improved PDAM services (see Syaukat & Anggani, 2019).

¹² Sanimas systems are = decentralised communal sewage septic tanks aimed to maintain public and environmental health.

¹³ Griya Katulampa Housing was incorporated as a case study site for the broader Urban Water Cluster, see report, “Griya Katulampa: Lessons Learned Case Study Report”

Table 5: Percentage of Drinking Water Consumption of the Households in Indonesia and West Java, 2000 and 2016 (in percent)

Water Sources	Indonesia			West Java		
	2000	2016	Change	2000	2016	Change
Tap water	19.08	10.66	-8.42	12.38	7.04	-5.34
Pumped water	13.82	15.42	1.60	27.28	18.74	-8.54
Bottled water	0.86	31.3	30.44	0.79	36.60	35.81
Protected well water	33.38	21	-12.38	31.45	21.31	-10.14
Unprotected well water	14.12	6.04	-8.08	13.41	4.68	-8.73
Protected spring water	7.50	8.48	0.98	7.52	7.43	-0.09
Unprotected spring water	4.61	3.1	-1.51	5.47	3.77	-1.70
Surface water	3.35	1.53	-1.82	0.96	0.27	-0.69
Rain water	2.70	2.4	-0.30	0.22	0.11	-0.11
Others	0.57	0.06	-0.51	0.52	0.06	-0.46
Total	100.00	100.00		100.00	100.00	

Source: BPS (2018): <https://www.bps.go.id/statictable/2014/09/10/1361/persentase-rumah-tangga-menurut-provinsi-dan-sumber-air-minum-2000-2016.html>

Engaging the public via encouraging oral or written suggestions to law-makers (Article 96 Legislation Making Act) is commonly facilitated via public forums such as general hearings, kunjungan kerja, socialization, seminars, workshops, and/or structured discussions. However, in practice public engagement is often not implemented as it should be. Inevitably, the substance of the regulation being developed is often shaped by the intensity and lobbying of external actors.¹⁴ Nevertheless, it is the public's right to participate and if not undertaken appropriately, may be used as an excuse to conduct a formal test in Constitutional Court (MK).¹⁵

3.5.2 Role of private sector

Major water services, with the exception of domestic wastewater, have generally been provided by the public sector. However, in the early 2000s, the central government introduced a water resources management regime (via several presidential decrees and laws, chief of which was Law No. 7/2004) that aimed to increase the role of the private sector in water supply. These reforms served to advance World Bank principles that emerged in the 1990s (e.g. the Dublin Principles – which clearly state that water has economic value so that it must be treated as an economic good) and led to subsidiaries of English and French companies participating in Jakarta's piped drinking water supply market as partners of PDAM Jaya (Hadipuro 2010). However, in 2015, the Constitutional Court of Indonesia annulled Law No. 7/2004 on the basis that the Constitution created water use rights that takes precedence over the economic value of water and supervision and control by the state on water is absolute, among other reasons (see section 3.2). Despite these changes, the private sector continues to play a significant role in drinking water supply through bottled water sales, refilling and

¹⁴ Joko Riskiyono, "Partisipasi Masyarakat dalam Pembentukan Perundang-Undangan untuk Mewujudkan Kesejahteraan", *Aspirasi* Vol. 6 No. 2 (December 2015), p. 159-160.

¹⁵ Joko Riskiyono, "Partisipasi Masyarakat dalam Pembentukan Perundang-Undangan untuk Mewujudkan Kesejahteraan", p. 162

delivery. Though licensed from state or regional government agencies, many households and businesses also manage their own supply via springs or wells.

With regard to sanitation services, there is a small, but growing number of small private operators who are engaged in sanitation service delivery, through pumping septic tanks and carting the waste to disposal sites, however, this remains largely unregulated.

3.5.2 Role of civil society organisations

Civil society organisations (CSOs) are self-organised and engaged in a variety of water-related activities, including, for example, organising small-scale river clean-ups and the socialisation of good domestic waste disposal practices for environmental health and flood management purposes. An estimate presented by a FGD participant suggests: *[w]e have many players. In Bogor, there could be 100-200 community groups, players [and] actors. All of them talk about the environment. All of them talk about programs* [Indonesian Red Cross Bogor District]. Additionally, there are examples of formalised and informal community initiatives, such as the BUMDES, which are Village-Owned Companies with responsibility for managing water supply provisions and are mostly located in rural areas.

Similar to recommendations from the ADB (2016) to improve commitments to finance and deliver improved sanitation services and foster community empowerment around sanitation issues, this research revealed an often overlooked level of action in the vertical water governance hierarchy – the local social entrepreneur. Duncan-Horner's (2018) research revealed how local social entrepreneurs were addressing critical structural governance deficits by recognising opportunity and acting on this for the betterment of their local community. There appears to be an excellent opportunity to leverage and upscale the various initiatives being trialled by SE by working closely with central and local government actors in establishing formal institutional arrangements for the management of sanitation facilities.

3.5.3 Role of transnational actors

Transnational linkages – represented by individual actors, aid organisations and financial institutions for example – represent a significant source of innovation and capability formation for developing countries and can contribute to alternative (i.e. more sustainable) development pathways (Berkhout et al., 2010). By establishing transnational linkages, government actors become embedded in globally distributed innovation systems which may lead to opportunities for developing countries to leapfrog over 'dirty phases of industrialisation' and develop in more 'environmentally pollution-efficient' ways (see e.g. Busch et al., 2005; Wolf, 2004; Binz et al., 2012; Busch et al., 2005; Goldemberg, 1998).

Within Indonesia's water sector, transnational actors are an important source of finance for infrastructure (e.g. World Bank and the Asian Development Bank) and translating knowledge, policy and management ideas, and critical capacity building. For example, in 1998 the World Bank proposed a water resources sector restructuring program known as the Water Resources Sector Adjustment Loan (WATSAL) worth US\$300m (Hirsch et al., nd). In more recent times, and following the Indonesian Government's commitment to achieving universal water supply and sanitation access by 2019, the World Bank has committed to providing US\$100 million for the 'National Urban Water Supply Project' which aims to connect significantly more households to piped drinking water supplies (World Bank, 2018). The project will allow central government to invest in local governments and their water supply enterprises to improve their capacity and performance. Whilst the target is ambitious, this program highlights the opportunity for transformation within the Indonesian water sector. To

succeed, however, requires smart decision-making regarding appropriate water sources (e.g. how much should be groundwater) and the quality of water sources (e.g. pollution, contamination, sanitation challenges) to ensure that access is clean and affordable.

Through the International Finance Corporation, the World Bank has also provided loans for a range of infrastructure projects and several governance projects in Indonesia (i.e. the Jakarta provincial government's green-buildings code to help reduce energy consumption) (IFC 2018). International finance organisations may partner with national development assistance agencies in driving smaller-scale projects. Often international foreign aid agencies, such as AusAID (Australia) and USAID (United States of America), for example, will work only with Indonesian partners. In the sanitation and water sector, AusAid provided AU\$120 million for water and sanitation projects in 2009-17 (referred to as Hibah), with up to 160 cities and regencies targeted for funded projects during the life of the program (DFAT, 2015). The Australia Indonesia Infrastructure Grants for Municipal Sanitation program (DFAT 2015) not only funded new sanitation connections, but sought implementation of agreed governance improvements. In the past, Greater Bogor has received funding for service expansion and governance improvements through USAID IUWASH (USAID 2011). These programs use an output-based approach in which payment of the grant follows verified operation for at least three months. Although appreciated by donor agencies as a means to minimise corruption (Mumssen and Kenny 2007) and relatively well-received by recipient governments, a criticism levelled at this funding process highlights operation of the facilities is frequently under-resourced and services in terms of customer reach and social and environmental performance are low, due to a lack of focus on behavioural change interventions (Tremolet et al. 2010, Averill et al. 2011). However, despite the potential for leveraging transnational actors' investment and experimentation, there remain significant challenges with respect to replication and up-scaling to challenge conventional water systems approach (Bai et al. 2010).

Other transnational actors include large, international businesses who continue to play a clear role in advocating for the privatisation of the water sector throughout Indonesia. These are largely international companies associated with branded bottled water business, including countries such as France, Sweden, United Kingdom and the United States of America. The bottled water market is utilised heavily by a large cross section of the community, but this disproportionately impacts the poor and marginalised, who typically live on less than US\$2 a day.



Chapter 4

Assessment of Transition Conditions in Greater Bogor

4. ASSESSMENT OF TRANSITION CONDITIONS IN GREATER BOGOR

Throughout the water resources management discourse, there has long been calls for integrated catchment- or river basin-wide coordination and management of key actors, developments and activities, acknowledging that administrative boundaries rarely reflect the ecological and geo-physical context within which decisions are made (see e.g. Biswas, 2008). This is challenging, for catchments are typically fragmented across a number of different domains:

- Administratively - whereby individual organisations manage different aspects of the catchment (water, forestry, planning, urban development etc.) and when the upper, middle and lower sections of a catchment or river basin are managed differently.
- Socially - regarding who and how actors engage in decision-making (e.g. elites, community, government actors etc.); and,
- Scales of interventions and policy programs - whereby local initiatives are undertaken without reference to or considering the cumulative impact to the broader catchment.

Indeed, reflecting on the previous chapter, we can see that water has been managed centrally, administratively, in a fragmented, technocratic and reactive manner, rather than embracing holistic, equitable, integrative, anticipatory and participatory approaches required to achieve more sustainable urban water governance. Our case study research identified that community actors are aware of the local water challenges and motivated to undertake action, but remain constrained by the existing institutional structures. Yet, similar to recent findings by Rahayu et al. (2019), the study also revealed how key urban water decision-makers are mobilising to create action towards change through advancing greater cooperation and collaboration.

The following presents the challenges and opportunities uncovered during the research that align with our analysis attributes of the transition dynamic framework (see section 1.2.1) and builds on the various actors roles in the preceding section.

4.1 Strategic Leadership for Sustainable Water Management

Management of urban water services has largely been decentralised to either the provincial or local level and in practice much of the operation of the system is performed by local government. In theory, therefore, particular regions have the potential to undertake reforms that position the region for a water sensitive transition. However, this requires overcoming a pervading culture and practice in local government that looks to central and provincial governments for policy leadership (Sutmuller and Setiono 2011), and which reflects the combined result of resource constraints and regulatory overlap. The examples of local government-led policy in the *Reformasi* period suggest that it is critical for local elected officials and public authorities to prioritise sustainable water management and translate a vision into real policy.

Previous analysis of local governments in Indonesia suggests that local policy innovation requires correspondingly 'brave' leadership yet risk aversion predominates (Sutmuller and Setiono 2011). The data derived through interviews and FGDs indicated that the practice of innovation is not incentivised, which constrains the emergence of project-scale or middle-management champions. Indeed, across the agencies involved in the data collection, there

were very few initiatives specifically designed to support champions across the various levels of government agencies.

Contemporary planning processes and the long- and mid-term strategic plans are guided by sustainable development and good governance principles. Indeed, principles compatible with a water sensitive city, particularly around improving levels of essential services and urban liveability, are evident in these plans. However, water has not been a high priority for the community, as evidenced by discussion at the annual *Musrenbang* deliberative meeting, compared to other infrastructure needs such as alleviating road congestion [Bappeda, Bogor City, FGD#2]. Similarly, other urban water cluster research (Cobián Álvarez and Resosudarmo, 2019) demonstrated that while there is some level of adaptation underway to flood events, overall the community did not prioritise activity within this space.

Government planning documents, reinforced by discussions with Indonesian academics, suggests that traditional delivery of essential water related services dominates funding decisions. A change in this outlook, however, was regarded to be more likely as a result of raising awareness and attention on water sensitive city approaches through this research project. Such insights would need to be introduced into medium-term strategies and decrees and regulations by heads of government, otherwise long-term change will not be possible. The current vision for Bogor is expressed in its mid-term strategic plan (2015 – 2019): "Comfortable Bogor City, faithful and transparent" (Bogor City, 2011). While there is broad in-principle support and agreement from organisational and public leaders regarding promoting water sensitive outcomes, this support is not yet formally embedded in policy, thus rendering the topic vulnerable to leadership and short term political changes.

The preceding chapters reveal the complex milieu of hierarchical, organisational and political actors, rules and policies associated with urban water management and beyond. The highly fragmented nature of the legal and operational environment make it difficult to locate sources of authority (see e.g. Table 5, in particular water supply) (see e.g. Abers and Keck, 2013). The government agencies have long operated within a culture of hierarchical autonomy and have long been considered risk averse. The obfuscation of authority and the organisational cultures can hinder the identification and/or operation of internal champions for change at project or middle-management levels. Indeed, there are very few initiatives to identify, support or foster the development of champions at different organisational levels.

Bappeda representatives in particular, recognised the need for aligning the various agendas of different actors throughout the vertical layers of decision-making, to support coordinated action moving forward. For example, FGD participants from Bappeda spoke about the need to generate alignment and create a collective vision:

The issues were not defined, and the agendas or commitments were in many ways confusing. At the local level, the contest was led by assorted specific issues related to local needs. In one region, for example, the priority issue was unemployment problems; in another region, community health problems or infrastructure facilities, such as building a community centre and paving roads, were prioritised.

So, its like this, because we don't have a vision, no – a different vision ... we first harmonised out perceptions because if they are not the same surely this raises questions...

Generating a core, common vision for advancing water practices can be challenging. Dedicated attention is required here towards highlighting the important role of high-quality water, sanitation and drainage servicing for human health impacts, flood mitigation and

healthy local environments and its broader role in disaster risk reduction and climate change adaptation. This requires leadership and a reinforced message from core agencies when working with the already engaged local communities (see section #####). By fostering local 'water sensitive champions' within communities, there is the potential for generating the necessary socio-political capital for promoting and acting on change.

4.2 Opportunities for integration and collaboration

As outlined previously, the Indonesian decentralisation agenda has led to the establishment of multiple agencies and organisations in urban water management across multiple layers of hierarchy and operation. Indeed, the provinces, municipalities and districts are regarded as autonomous regions (e.g. Rahayu et al. 2018). While such diversity and polycentrism (multiple nodes of decision-making) is encouraged within governance studies, to be effective, high levels of integration and collaboration are required, which often result in high-transaction costs (e.g. human, financial and resources). At present, organisational responsibilities are fragmented and coordination and cooperation between agencies is regarded as important, but remains limited and/or is typically informal and through personal relationships. In addition, hierarchy still plays an important role in the cooperation between government authorities and in shaping relations between government and the public.

At the national scale, Government Regulation No. 122/2015 endorses the development of a coherent water policy framework to operate across the different levels of government. Mulyana & Suganda (2017) report that water policies and master plans for the water sector (e.g. RISPAM) are to be generated at national, provincial and city/district level, and that these documents are to be a key coordination tool to deliver on relevant sustainable development goals (Mulyana & Suganda, 2017).

4.2.1 Cross-sector integration

Following the constitutional court's decision to invalidate Law No. 7/2004, the main legal basis for integrated catchment management was removed (Fulazzaky 2014). Currently, cross-sector integration is considered the responsibility of the planning and development agencies *Bappenas* (in central government) and *Bappeda* (local government). Interviewees highlighted, however, that while it was widely understood that integration was important, there remains minimal coordination, "there hasn't been any significant integration across agencies" (PUPR Kota Bogor representative, FGD3), and that when it does happen, it is typically project-by-project, or when specific organisational leaders spearhead collaborative efforts, with much reliance on good will. Success in this space relies on sporadic, informal and ad-hoc knowledge and information exchange among lead actors within water management. Additionally, unclear and overlapping responsibilities in development planning between national and local government levels has led to weak or absent enforcement of planning regulations and implementation.

4.2.2 Cross-boundary collaboration

Before Bogor City was carved out of Bogor Regency, there was a single local government for Greater Bogor. Strong links remain between the two local government areas from an administrative and geo-spatial perspective. Indeed, there is no natural physical boundary amidst the urban sprawl and there are a number of infrastructure co-dependencies. For example, Bogor City's water is sourced from and treated in facilities located in Bogor Regency. Hence, the relationship between governments is generally close given this shared origin and proximity. Nevertheless, while generally positive about the relationship between

the two governments, separate discussions with staff from the two governments suggest there is considerable scope for improved collaboration.

There is evidence of past formal collaborations between agencies of the different governments. For example, there was a Memorandum of Understanding for intergovernmental cooperation in drinking water provision. Though this partnership was permitted to lapse in 2017, participants at the 3rd FGD revealed strong interest, at least within Bogor City, to revive this formal collaborative relationship.

In addition to horizontal collaboration, interviewees also highlighted the need for greater vertical collaboration with greater data and knowledge sharing required. As outlined in the following quote by a *Bappeda* Bogor City representative:

the challenge for us is that the one who really understands and knows exactly the condition is in the city/regency; yet, the permit and regulations are issued under the provincial government. There should be consultation with the city or regency government prior to determining the outcome of the permit application, and also notification of permits issued by the provincial government. (Bappeda Bogor City, FGD3)

Potentially working against increased collaboration is the impact of Local Government Law No.23/2014. This law effectively reallocates responsibilities upwards when certain conditions of cross-boundary operations are met. This has implications for Greater Bogor's drinking water supply and sewerage management. When fully enforced, this could dis-incentivise local government cooperation out of fear that local control may be handed to the provincial authorities.

4.2.3. Vertical organisational coordination

The highly fragmented and decentralised approach to water management demands not only strong horizontal coordination and collaboration, but also vertical coordination among the many key decision-making authorities and resultant policies and programs. One challenge often repeated during our interviews and FGDs was the example of *situ* management and protection, outlined below.

...while located within our jurisdiction, we have limited ability to protect and manage them to our benefit. For example, *situs* are often subject to shallowing (i.e. increased sedimentation) and require dredging to ensure they maintain their ecological function, but also provide natural flood mitigation – however, in order to undertake active management requires altering the central government to the issues and request they undertake some action, but this often never occurs... (Bappeda Representative, FGD2)

Local governments have been empowered with implementation authority, yet many of the on-ground works required still need higher level approvals and resourcing. Indeed, the challenge of limited financial autonomy to undertake key on-ground activities that are responsive to the local context is a key concern – at present, if action was to be undertaken without prior consent/approval, this would create a political and reputational risk issue.

As outlined in Table 5, there are a large number of organisations/agencies that have authority over water management – either formally or informally. With regard to waterway health, respondents highlighted that while there are key agencies there is often limited capacity to engage due to a very narrow remit. Considering Greater Bogor's location in the middle reaches of the Ciliwung, in order to have a significant impact on waterway health, there is a need for greater integration and coordination beyond Greater Bogor, to incorporate the

organisations involved in (or influence) the management of upper and lower reaches of the Ciliwung river basin.

4.2.3 Promoting social capital and community inclusion in water planning and management

The extensive sub-district governance structure of villages and ‘urban communities’, which have community-elected leaders, play a critical part in influencing (i) local awareness of environmental and water-related issues, and (ii) on-ground implementation activities. Formal processes exist to encourage transparency and ensure the community have a voice in developing strategy and policy documents. For example, opportunities for public engagement and participation exist at the lowest administrative level in form of community working committees (CWCs) and through the annual *Musrenbang* process. However, despite these initiatives, water management decisions are not very transparent. Water decision-making remains top-down and the ability to influence system decisions is weak. Previous studies regarding the influence of *Musrenbang* on policy formulation has been found to be minimal (Sutmuller and Setiono 2011). Too often consultation occurs when decisions have already been made; indeed, one government FGD participant stated

...third, we need to be definite about what our programs are, so we're clear when "selling" them to the community, it's easy (FGD2 participant).

Although often ad hoc and not well monitored, public engagement typically operates on a project-by-project basis, facilitated through community non-government organisations and local community leaders. At present, there are limited attempts to broaden participation, for example by recruiting new volunteers or community champions, for there is a reliance on existing formal or informal hierarchies. For example, “If the government runs a particular program, they inform the key leaders and figures who will get the community on board” (FGD3 participant). This shift in responsibility makes it difficult to manage accountability for program implementation and hinders effective evaluation. Nevertheless, FGD participants did acknowledge there is extensive community self-organisation, as evidenced through different community initiatives and forums such the Ciliwung Care forum and the Tree Planting Care forum (FGD2 participant). Beyond this, civil society is very active in the water sector framed through programs related to *River Clean Ups* and *Biopore programs*, among others. Beyond this, many CSOs (e.g. Red Cross) are involved in raising community awareness and building capacities – framed largely through disaster risk reduction and climate change adaptation than water management, but they are implicitly connected.

Leveraging a bottom-up approach to influencing and informing decision-making has been largely overlooked, despite widespread decentralisation and attention to increase participation in water management decision-making. Yet Duncan-Horner et al. (2019) revealed opportunities for leveraging the efforts employed by local social entrepreneurs whose focus on creating innovations in water management, is driven by empathy and social value creation, for more widespread positive outcomes.

4.2.4 Incorporating pro-poor decision-making

There are policies that support marginalized segments of society (e.g. slum dwellers or illiterate people) at the different levels of government. Within water management, the notable outcomes of these policies are differential tariffs and the general preservation of groundwater access rights. For example, PDAM Tirta Pakuan provides increasing block tariffs to Pulo Geulis village households (Syakaut and Anggraini, 2019). Nevertheless, there are gaps in

delivering on these high-level commitments, for example, future extensions of the drinking water network are planned on a cost recovery basis which shapes (constrains) where the infrastructure is developed (see e.g. Hadipuro, 2010). Thus, areas with a high proportion of low-income households where PDAMs are only able to charge discounted tariffs are less favoured for network extension as a result (Averill et al. 2011).

In Jakarta, low income households may be more dependent on groundwater systems, and where groundwater volumes or quality is poor, are typically required to pay more for alternatives than higher-income households who also have access to piped water (Kooy et al. 2018). While there has not been an equivalent analysis for Bogor, it is reasonable to assume the finding for Jakarta holds true for Bogor. According to Brinkerhoff and Wetterberg (2013), Indonesia has seen the emergence of a citizen-centric budget analysis movement that aims to assess the pro-poor orientation of regional government budgets, coupled with collation of data on indicators of participation, gender equality and transparency. This research did not show whether this movement has impacted Bogor's governance, but would be pertinent for future research to establish how this was influencing urban water decision-making in the greater area.

4.3 Knowledge and Capacity Building

“After prioritizing infrastructure development in the first phase of administration, President Joko Widodo’s agenda will now focus heavily on developing skills of young people”¹⁶

Currently, only a quarter of the people who would be required for adequate water service provision are employed in the sector (BAPPEDA, 2017a). While the numbers of administrative staff are generally high, urban water and city development agencies lack staff with skillsets required to fulfil organisational functions and responsibilities (Wieriks, 2011). Analysing the interviews and FGD data revealed that many research participants have a high level of knowledge related to many aspects of the water system, particularly in relation to areas that they are closely involved in, that are closely monitored, and publicly disclosed (e.g. the financial performance of PDAMs). However, interviews and FGD discussions revealed data deficits persist in numerous areas including, among others, limited baseline scientific and technical data and technical implementation and operation. Of note, however, this gap in knowledge was not routinely regarded as a core limitation to making progress in relation to advancing water servicing, management and governance. Nevertheless, the absence of full, appropriate and accessible data can impede decision-making or lead to unforeseen consequences following action (e.g. poor siting of a constructed wetland may lead to increased risk of flooding). The paragraphs below capture some of the core knowledge deficits revealed throughout this urban water governance study.

The broader Urban Water Cluster research revealed urban water management system-related data is currently very limited or fragmented across different agencies, especially where it is required to underpin land-use planning and policies associated with flood management¹⁷, groundwater conservation and water distribution maintenance and efficiency. However, while generating scientific data is critical, how this data is understood and utilised by decision-

¹⁶ <https://setkab.go.id/perlu-58-juta-tenaga-terampil-presiden-jokowi-ingin-perguruan-tinggi-luar-negeri-bisa-buka-di-indonesia/>

¹⁷ Bogor City have undertaken several drainage studies in the last year, but have yet to compile results and their suitability for flood investigation is uncertain.

makers is also important. Thus, ensuring suitable data generation and effective knowledge translation requires early engagement with key decision-makers to increase the utility and likely adoption of research insights.

By way of example, strategic planning departments (BAPPEDA) identified a suite of data constraints including population statistics as outlined in the quotes below,

...sometimes the data provided to us and the data in a particular place is different. The population according to Statistics Indonesia is different to the Directorate-General of Population and Civil Registration, which is different to the subdistricts. Now, there needs to be cooperation. So, we should collect that data together. [Kabupaten, FGD2]

... I want the data on the number of absorption wells in Bogor City. The data will be different to ours. It will be quite different to that of the sub-districts. It depends on when it was collected. ... perhaps [it was collected] last year, 2017. Now, if we collect the data together, for example, data on the number of biopores built in each neighbourhood association (RT) and citizens association (RW), we can do that. But we need to provide guidance on **how to collect data, how to input data**.

[BAPPENAS, FGD2, authors' emphasis]

Indeed, the knowledge capacity gaps of planners, limited data-sharing and insufficient monitoring and evaluation stifle the alignment of these principles with planning practices. Additionally, there is little direct coordination between urban and water service planning actors, and only happens on a project-by-project basis. Strategic coordination and integration is limited to a focus on essential service provision. As a result, planning for population growth and housing is rarely linked to more sustainable or integrated forms of urban water management. Overcoming these knowledge deficits is further challenged by the pace and demands of private urban developments, which often prioritise economic growth over environmental and social sustainability.

The data collated reveals that mono-disciplinary expertise dominates the organisations responsible for water and city development services in Bogor City and Bogor Regency. Interviewees suggested that knowledge gaps within Greater Bogor may reflect this narrow range of expertise within water-related organisations, which typically have a strong orientation towards engineering. Similar issues have been identified at the central government level, whereby policy-making capacity has been found to be lacking, resulting in technical or engineering projects being favoured over other interventions (Kerk et al. 2013). FGD2 participants spoke extensively of the need for 'new' knowledge in relation to changing climate patterns – particularly rainfall data.

Further challenging these knowledge and capacity deficits is the influence of the staff rotation policy. While adopted to counter corruption, this approach can potentially disrupt capacity-building, building organisational memory, program delivery within agencies¹⁸, and is vulnerable to political influence. Dedicated knowledge management processes to assist knowledge transfer during staff rotations are not currently in place, as outlined in this quote:

What we need is to transfer the work skills and knowledge. Sometimes people that already had good work in one position are not able to share their knowledge and

¹⁸ Staff rotations usually occur within one government organisation; there is very little exchange of personnel between different agencies. It should also be noted that there is insufficient data supporting job rotation as an anti-corruption measure (see e.g. Borges et al. (2017)).

accomplishments easily. It should be like a transfer knowledge along with the rotation, but it doesn't happen here.

Staff rotations usually only happen between departments within one government organisation and because they are a requirement, may hinder the development of field-specific in-depth knowledge and the discontinuation of particular projects. There does not appear to be an effective knowledge management processes to assist knowledge transfer during staff rotations.

Although the competence of staff in Bogor is considered high – performance of Bogor's PDAMs is rated among the best in the country – there is ambition to address the skills gaps. There is focus on improving the competence and professionalism of staff in water management by the central government (BPPSPAM, 2018) and by Bogor City, particularly as it relates to planning (http://bappeda.kotabogor.go.id/frontend/menu/visi_misi). However, it remains unclear what steps are proposed to realise these ambitions.

Concern was also raised regarding gaps in knowledge associated with water-user preferences. For many domestic consumers, PDAM's piped water product is easily and readily substituted with groundwater, at a lower cost for the consumer. Given the objective (across Indonesia) to grow the PDAM customer base, there appears to be lack of data to inform marketing, such as perceptions of water quality and associated health benefits. Consequently, two IPB Masters students – as part of the Urban Water Cluster research team – undertook quantitative surveys to examine local community perceptions regarding water quality and servicing and tested their willingness-to-pay for improved PDAM services. These studies reveal a distinction between the two cases, but that overall, PDAM water quality was perceived to be 'good enough'; but that in one location 50% of households were unwilling to pay for improved services (Syakaut & Maryani, 2019), while in the other location, 61% of respondents were willing to pay more for improved quality and servicing by the PDAM (Syakaut & Anggraini, 2019). While this goes a small way to revealing how community perceive existing water services, larger studies with a wider sample base, across more villages of Bogor (and beyond) are necessary to adequately determine future servicing and development opportunities for PDAMs.

Finally, interview data revealed project and program evaluation (and associated monitoring) is an area in critical need of capacity-building development. The pressures of development and on-ground action often lead to project-to-project management, often without assessing the efficiency of conventional or innovative practices (see e.g. Farrelly and Brown, 2011). This was highlighted in relation to rainwater absorption wells, whereby the uptake of these systems is growing rapidly, but the performance of these systems has not been systematically evaluated – as one interviewee stated “[a]nd biopores can't be monitored. No one monitors them. Because it's voluntarily, so nobody can monitor this program. So, we don't know this is will sustainable or not, because nobody is monitoring this” (DLH Bogor Regency, FGD2). Without data to support the effectiveness of biopores as an approach, there are risks these systems are being sited incorrectly, may fail, or lead to unforeseen consequences.

4.2 Governance for Water Project Initiation and Deployment

Within Indonesia, sanitation services have long been considered a responsibility of the individual or household, leading to: high rates of open defecation, less than 2% of households connected to a centralised sewerage network, and up to 90% of urban wastewater being inadequately treated prior to disposal (World Bank, 2013). This situation poses significant risks

to human and environmental health, and over the last 20 years, there has been a significant increase in government attention towards addressing insufficient sanitation services. As a result, numerous international organisations are engaged in trialling various decentralised wastewater treatment system solutions (e.g. Boyd et al., 2009; Bright-Davies et al., 2015; Fladerer, 2010; Kurniaidie, 2001, 2011). More ‘conventional’ centralised city-scale sewerage is currently undergoing environmental impact assessment, but funding has not yet been finalised. It should be noted that many sites in Greater Bogor would be overlooked in any roll-out of city-scale sewerage, particularly informal settlements like Pulo Geulis, discussion of which is covered in a companion case study¹⁹ report as part of this research.

Water supply has also been decentralised, but to a lesser degree. Beyond the PDAM water supply infrastructure, there are 50 sites of non-PDAM, user-managed water supplies, each covering approximately 30-50 houses in Bogor City. In addition, households often exploit localised spring water or confined aquifer groundwater sources (see e.g. Syakaut & Maryani 2019, and Table 5). The growing unregulated drawdown of spring and groundwater recharge, and in particular deep aquifers that take far longer to replenish, are creating concerns around land subsidence and localised sinkholes. There is little oversight regarding permit allocation and extraction volumes which is compounding this situation.

A large number of small packaged wastewater treatment plants (“IPAL”) – up to 120 by the end of 2018, have been placed “all over 6 districts”. Each is connected to about 500 houses. There are also several pilot drainage projects underway:

We have pilot project so that there will be no puddle in the street by creating what we call as Environment-Based Street. So along the way we make water shelter. The idea is coming from infiltration well, beneath the road construction, so we make tankers that can accommodate up to 2 m³ water, and we don’t cement the bottom of the tank, so it will directly seep into the ground. (FGD2 participant)

FGD Participants and interviewees revealed a widespread perception that innovation in the water sector is largely constrained by inadequate regulation – and that with a stronger legal framework, innovation would be less dependent on the individual. As a Bappeda representative suggested:

if we want it to be implemented in all villages, districts, sub-districts in a legal and binding approach, then it should be set forth on the Laws.... an innovation depends on the person, if it has strong basis in accordance to the laws, then maybe the impact will be more significant (FGD2 participant).

Direct foreign investment is a significant factor in project initiation. The scale of investment encourages small-scale decentralised projects. Due to the design of this funding (see Section 3.6), foreign assistance funded projects, particularly in the sanitation sector, often omit consideration of required changes in behaviour. Indonesian Red Cross Bogor District, however, have taken a more bottom-up and long-term change approach to managing drainage with their program, ‘Disaster Risk Mitigation and Adaptation to Climate Change’. This has involved constructing approximately 5000 biopores or drainage wells. One of their program indicators is to increase community knowledge of, attitudes to and skills in environmental management.

¹⁹ Pulo Geulis Revitalisation 2045: Urban Design and Implementation Roadmap.”

4.4 Tools and Instruments for Sustainable Water Practices

The above information has revealed a context where responsibilities for urban water systems are divided between central, provincial and local governments, making regulatory coherence and integration a significant challenge. Central government sets standards and recently strengthened expected wastewater treatment standards (No. P.68/MenLH/Setjen/Kum.1/8/2016). Central government also regulates works on major waterways, including the two rivers that flow through Bogor. Research participants revealed that the need to secure central government approval created tensions and frustrations, for there are often long delays in decision-making approvals. Frustrations were also shared regarding the lack of appropriate, tailored and necessary regulatory control over key land development issues associated with natural waterways, whereby an FGD participant highlighted *[w]e don't even have policy related to water river bank development and limitations*.

Targets and strategic commitments to advancing local water management exist, for example the Department of Settlement and Housing (*Dinas Perumahan dan Permukiman*) is targeting 90% coverage for sanitation services by 2019, which mirrors the national-level priorities tied to meeting the sustainable development goals. However, it remains unclear what policies and programs are in place to achieve these targets. Indeed, interviews with transnational NGOs operating in this space highlighted that the difficulty with such ambitious goals is *'implementation at all costs'* [NGO representative] becomes the mantra, which ultimately overlooks the resources (i.e. time, human and financial) required for building community knowledge and capacity associated with adopting sustainable decentralised sanitation systems.

Local Governments do retain important functions related to regulating urban water systems including urban development planning, drinking water and sanitation planning and environmental regulation. For example, within the water domain there are water supply tariffs, and regulations for domestic sewerage, whereas in the domain of environmental matters, there are regulations around waste discharge to waterways by industry, domestic littering, and some waterway and drainage channel maintenance. This decentralised authority has, to some extent, created management challenges. For example, often an agency is responsible for both establishing regulations and providing the service functions, which can constrain monitoring and compliance efforts.

Indeed, enforcement remains a systemic issue across all levels of government (Hadipuro 2010, van de Kerk et al., 2013). Interviewees highlighted that within the environment domain, enforcement capabilities are impacted by capacity shortages; this ranges from local issues related to enforcement all the way to the training of judges regarding relevant environmental laws. For example, during the FGDs participants repeatedly raised concerns related to understaffing and difficulties in meeting requirements for qualified staff, particularly in planning and environmental enforcement. For example: *"we don't have enough staff to monitor and enforce pollution rules for the catchment area"* (Bogor Regency Representative, FGD2). Even when monitoring is noted as critical by central government, there remain localised challenges, as one respondent noted *"[c]entral government has mandated that monitoring division staff should be certified and yet the availability of the qualified human resource is still limited, especially in Bogor City"* (Bogor City representative, FGD2).

Incentives for regulatory enforcement remain weak. Our data revealed there are deeply embedded social and political barriers to enforcement. For example, although an attempt to

constrain development and occupation of riparian land within the 200m buffer zone has been put forward, there remain political bottlenecks, as one respondent highlighted “*the policy making process takes time. DLH [Department of Environment] usually need years to make any regulation/policy.*” Respondents attributed these delays to poor engagement with stakeholders during the formulation **and** implementation phases - commonly referred to as a lack of “socialisation”.

In response to this situation, there has been a reliance on community action, which is regarded as more flexible and dynamic given the institutional barriers to practice change. As one respondent described,

“our solution is to involve the community to try to maintain water bodies, because we can’t do anything to it- that is already regulation. We cannot make any changes. ... The most effective way [to clear water channels] is to have socialization for the people, telling them not to dump their waste, garbage to the river and water channels” [PUPR respondent].

Yet, without adequate resourcing and capacity-building, this approach also raises questions regarding effectiveness. This situation suggests there is a need to translate a ‘systems view’ of the problem into feasible, practical interventions, where, for example, the levers of behavioural change beyond regulation need to be more thoroughly explored. Fostering social norms around the importance of (and access to) public bins and frequency of waste collection needs to be increased, to provide households with an acceptable alternative to littering.

Weak enforcement capacity is further compounded by unclear and overlapping responsibilities between national and local government levels. Planning and building permits are issued by local authorities, and groundwater extraction permits are issued by the Province. This is further complicated by the fact that water extraction (‘SIPA’ permit) might be issued by BBWS Ciliwung Cisadane, but the institution collecting fees for water extraction can be the local authority (i.e. ESDM Regency). In addition, groundwater resource information is often most accurate at the local government level. This obstacle is common throughout Indonesia where the authority over natural water resources and bulk water supply resided with the national and provincial governments respectively, but municipalities are responsible for urban water supply (Mulyana and Suganda 2017).

Alternative water infrastructure/technology is often constrained by land availability. Land acquisition processes in Bogor are expensive and prone to conflict. This reflects a number of challenges including, for example, a complicated land tenure system and urban planning regulations. The specific mechanisms to make land available to the authorities could involve land acquisition programs, offsets or public private partnerships depending on the project and the local circumstances. Importantly, policy consistency is needed across local government boundaries.



Chapter 5

Directions for Enabling Water Sensitive Water Governance

5. DIRECTIONS FOR ENABLING WATER SENSITIVE GOVERNANCE

Reflecting on the transitions dynamics framework and the insights generated from primary and secondary data analysis, this chapter outlines key governance strategies for fostering a pathway for change. Reflecting on both formal and (where possibly the) informal structures and processes, this section outlines a series of governance-related recommendations to transform Greater Bogor into a water sensitive region. We have utilised the governance structures and processes diagram, see Figure 5: Attributes of governance for change (adapted from Farrelly et al 2012), as a way of framing the high levels of interconnection between these different approaches. This recognises that when introducing new modes of governance, there is a need for a clear, long term direction that supports coordinated action among existing and emerging actor-networks which share, learn and trial new approaches (technological and process-oriented) in support of a transition.

This report outlines a series of strategies, but note that while they can be tackled on their own, their success lies in ensuring there is coordinated activity underway in the other suggested areas.

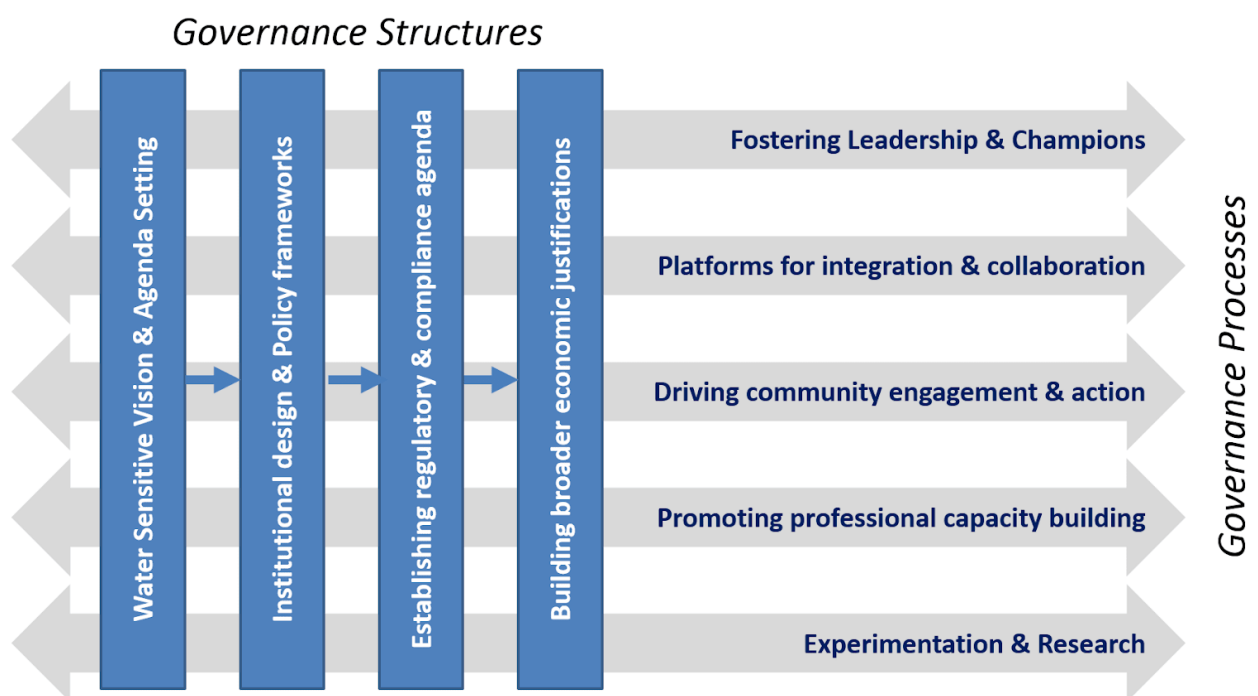


Figure 5: Attributes of governance for change (adapted from Farrelly et al 2012)

5.1 Water Sensitive Vision & Agenda Setting

A significant first step in achieving water sensitive governance involves generating a collective vision across all actors and multiple scales, regarding what is possible/desired for Greater Bogor and also in Bogor Regency and Bogor City individually. Efforts in this space are underway but require alignment.

The process of creating the vision is, in itself, an important intervention in bringing a broad range of actors together to build a common understanding of what is desired and what is possible within a water sensitive scenario. A major component of establishing this vision would be to align core political, organisational and community agendas, and to inform an agreed-

upon trans-disciplinary, co-designed research agenda to guide future developments. Generating 'water sensitive insights' like this would involve experts in law, policy, geography, sociology, community development, engineering, economics, urban design and other fields.

To legitimise the vision, consideration will need to be given to important process questions such as by whom the vision needs to be prepared and endorsed. The current approach to water planning is generally top-down and decision-making to support social equity is limited. For the envisioning process, there are several models of community and representative decision-making to draw from such as an advisory committee to executive or legislative branch of government, participatory budgeting, watershed management, or a citizens' jury (see also Ferguson et al. 2013). A Greater Bogor's water sensitive vision can be a useful tool for raising community awareness of a range of connected concepts, such as residents' role in the urban water cycle, flood mitigation and emergency planning, and responsibility for safe grey water and black water disposal. Given the scale of the change required, a national campaign is likely needed, but Greater Bogor should consider the opportunity to lead by developing experiments and pilots in community engagement for sustainable water.

5.2 Institutional Design & Policy Frameworks

While conventional command-and-control approaches will continue to suit certain scenarios (e.g. regulating groundwater extraction or controlling effluent discharge into waterways, and land development in sensitive areas), looking ahead to water sensitive governance requires a more cooperative and coordinated approach to institutional design. The complex and traditionally fragmented urban water governance poses significant challenges to key institutional structures and dynamics. While the contemporary polycentric water governance system is relatively decentralised and has multiple centres of decision-making, it is further recommended that the roles and responsibilities amongst the multitude of organisations (including the provincial government) which play a part in the functioning of Greater Bogor's urban water systems be further clarified and streamlined. For example, having the provincial government engage in discussions with city and regency governments prior to making key decisions (e.g. issuing groundwater permits).

Recognising that there is no one-size-fits-all approach to governance or institutional design, it is further recommended that:

- » the formal and informal organisational routines, practices and assumptions used to shape current and emerging water initiatives be studied to identify possible future interventions and redesigns. We suggest engaging with politicians, policymakers, practitioners, development agencies, private sectors, civic actors, and other key non-state actors, to unpack the mix of hierarchical and network-based interaction patterns in urban development sector that produce diverse formal & informal regulatory frameworks, organisational routines, and normative framings utilised to initiate, shape and implement current and future urban initiatives.
- » actors promote engagement and cooperation (formal and informal) within geographic areas of mutual interest across relevant organisations (e.g. through MoUs or project partnership agreements) – here it is wise to utilise and adapt (where necessary) existing arrangements.

Some of the barriers to institutional change arise from constraints set by the formal roles allocated to agencies involved in the water sector. For example, PDAM has never had authority to promote efficient water use. Promoting efficient water use is common for water utilities in Australia where it has been found that the cost of service augmentation to meet higher water demand significantly outweighs the cost of demand management, including revenues foregone. While the markets are not equivalent due to geographical and social

differences, there is a case for permitting more dynamic system management in Greater Bogor.

Other changes can be led by the local governments themselves. Such as: developing new *Tupoksi* for cross-agency project collaboration and consultation in decision-making. This should not just be for the lead planning agencies, but other agencies involved in settlement planning and development.

5.3 Establishing Regulatory & Compliance Agendas

At present, the national water legislation does not provide a contemporary framework for guiding decision-making authorities towards delivering more water sensitive systems. National leadership for advancing more sustainable urban water servicing is an important element in generating more formalised authority for decentralised decision-makers, freeing them to act to create change. Aspirational targets are useful for illustrating what water sensitive initiatives can deliver, but to be effective in driving on-ground action, the targets should be locally-relevant (appropriate), realistic, clear, measurable and scientifically-derived. Targets should also be guided and monitored by dedicated, trained staff. For example, having regulated objectives for developers to meet regarding runoff quality could help to enforce the use of treatment technologies (similar to the 'Clause 56' embedded within the planning regulations of Victoria). Many jurisdictions around the world regulate runoff quality and volume reduction from new developments. However, it is also important to determine the appropriate objectives so that system performance can be monitored.

An independent environmental regulatory authority, distinct from other government agencies and reporting directly to a relevant Minister for Environment has been an approach undertaken in many countries. Separating the regulatory functions of compliance and enforcement from service delivery allows for independent assessments and a greater strategic oversight of site-specific and cumulative impacts associated with delivering strong environmental and public health outcomes.

This research revealed many key actors are calling greater support and resources to deliver effective enforcement and compliance activities. We recommend

- » in the short-term, lead decision-makers come together to collectively identify practical challenges to on-ground compliance enforcement and to seek joint strategies for addressing these. This would include the relevant community Lurahs and District Heads to foster understanding and gain community support for these activities.

- » in the long-term, it would be desirable to divest some responsibilities from government agencies to create more independent oversight of water service operations. A clear outcome-focused regulatory environment needs separation from service delivery functions. This requires direction from central government, but reform is more likely if regional government is supportive.

5.4 Building Broader Economic Justifications

Diverse and integrated urban water systems can deliver multiple benefits to communities and their environments. However, our research found there is limited awareness and appreciation of the diverse social and environmental functions and services provided by multifunctional green infrastructure. There is a growing body of knowledge devoted to identifying the benefits associated with incorporating green infrastructure (e.g. rainwater tanks, raingardens,

biofiltration systems, constructed wetlands etc.) into urban environments. Such benefits include, among others: reducing stormwater discharge, lowering urban waterway pollution loads, mitigating peak flood levels, improving local aesthetics and providing micro-climate improvements (e.g. air quality and localised cooling), public health benefits associated with greater mental and physical health outcomes (see e.g. Hansen and Pauliet, 2014). There is also a growing body of scholarship exploring the potential of green infrastructure to assist with providing local food security (see e.g. Kay et al. 2018)

Indonesia has committed to delivering on the United Nation's 17 Sustainable Development Goals. Goal 6 in particular seeks to ensure equitable access and availability of clean and safe water supplies and sanitation services for all. In delivering these and other water-related services, it is pertinent to recognise the multiple benefits associated with sustainable urban water management. We recommend:

- » Fostering and promoting awareness of the multiple benefits that can be derived from green infrastructure and sustainable urban water systems thinking. This should be promoted and discussed across multiple decision-making portfolios including planning, land development, environmental regulation, licencing and permits, among many others.
- » Determining the financial value of the identified multiple benefits in an effort to further embedded this within ad across the multiple layers of decision-making, for example, in national and regional strategic priorities, planning requirements and within the various budget allocations.

5.5 Fostering Leadership And 'Water Champions'

Over the course of the research, water leaders were located in all decision-making hierarchies, from community leaders through to city, regency, provincial and national governments. Fostering distributed leadership, i.e. shared, collective and extended leadership practice, is important for building capacity for change and needs to be reinforcing and aligned towards a common agenda. Within and across organisations, executive level support is key to distributing decision-making authority for 'advancing water sensitive practices'. There are also key roles for 'water champions' within various organisations. If supported appropriately, these champions could drive internal organisational change and foster inter- organisational relationships and on-ground delivery of alternative systems.

Leaders and champions play an important role in 'socialising' the concept of water sensitive practices within and across the myriad organisations involved in water management. They can also contribute to development and promote a long-term vision of Greater Bogor as a water sensitive city. Following the Declaration of the Water Sensitive City made by Greater Bogor leaders in November 2017, there is a solid foundation of leaders who can continue to promote this transition. We recommend actively constructing programs that can grow the number of 'water champions' across the multiple levels and spatial scales required for the successful delivery of water sensitive cities. This might involve:

- » Leveraging the extensive non-government organisation networks to seed programs of change within communities. This would involve targeting specific groups, such as improving the access to and role of women in localised water infrastructure decision-making (e.g. siting communal sanitation systems, siting appropriate green infrastructure systems).
- » Building support structures to nurture and encourage the emergence and activities of local social entrepreneurs who innovate within the water domain. Locally developed innovations come with the advantage of local wisdom and local legitimacy, which can be very effective in promoting bottom-up changes in practices.

- » Working with international governments (e.g. Government of Victoria, in particular international Liveability Victoria) to access knowledge and training opportunities to continue professional development and fostering 'water champions' who can incorporate alternative practices and thinking into their day-to-day work operations. This would extend the opportunities afforded by this research project whereby we have had key delegations of lead decision-makers come to Melbourne to hear from leading water practitioner and tour key urban water development sites (e.g. Fishermans Bend Urban Renewal Development).
- » Fostering internal organisational structures to support 'water sensitive champions' in their promotion of interrelated activities of planning, community development, urban design and water infrastructure development (see also section 5.6 below).

5.6 Platforms for Administrative Integration and Collaboration

The 'connective capacity' of water resonates through multiple decision-making domains. This has led to an increase in the number of organisations and interests in water management; however, too often the diverse actor-network talks across each other, and not directly with each other. In recognition of the deep scholarly understanding that the effectiveness of multi-actor arrangements requires senior and powerful decision-makers buy-in, alongside access to relevant resources for action and the extent to which sanctions can be applied in circumstances of non-compliance (e.g. see Newell et al. 2012), the research design aimed to embed forums that facilitated senior decision-makers with discussing current and future water practices. Additionally, the Cluster also established a formal Urban Water Cluster Learning Alliance (launched in Bogor, 30th November 2017) aimed at fostering water champions, supporting research data collection, testing early data insights and participating in masterclass training programs.

- » Looking ahead, similar coordinated, facilitated, formal and informal processes are required, whereby actors from different organisations can come together to shape innovative and alternative water practices. Here decision-makers from planning, urban development and water resources, among others, should be involved in tailored and facilitated discussions to share data, build trust and ultimately build (and improve) decision-making capacities. Well-designed, facilitated and coordinated forums can generate actor-networks capable of promoting a cohesive plan for change within future urban developments.
- » Many excellent platforms already exist, but may require a reconfiguration around roles, responsibilities and working towards a common catchment-wide agenda. For example, initiating an 'integrated water forum' could be instrumental in beginning the conversation to develop an alternative water narrative and vision. In addition, identifying and designing demonstrations can be opportunities to work collaboratively to a common end-point and can bring multiple actors together to share experience and insights.

The transformation towards more collaborative practices within and across key authorities/agencies, will require effort to engage with external organisations. Coordination or integration does not need to involve transferring accountabilities, rather collaboration should be embedded at the strategic and operational levels of relevant organisations. Local governments are best-placed to achieve this, given relatively small workforces, shared workplaces and some overlapping tasks. Multi-agency working groups should guide sectoral planning and there should be more extensive use of formal participatory policy-making processes to facilitate open and transparent input from civil society organisations and the private sector. Transitioning to a water sensitive city model will also underpin the delivery of many SDGs in an impactful and significant way.

In general, it is important to develop forums and networks in which people from a range of backgrounds linked by an interest in WSC can come together to support each other and exchange ideas. These networks (or platforms) shouldn't be exclusive to a particular organisation, because the transition pathway necessarily requires the input of different knowledge and perspective. There are several examples of public service "innovation networks" around the world. Several governments in Australia have developed platforms to enable public servants to access policy development stories from colleagues, toolkits that have proven successful, and learnings from projects. Though sometimes only open to staff of the host government, they are useful in connecting a community of practice who can assist each other in creating, applying and sharing ideas. This in turn helps overcome organisational boundaries and create opportunities for demonstrating new practices. They frequently use social media to share information, events and activities that may be useful for network members. Indeed, sharing resources such as information, data and co-funding small projects will be critical in fostering trust among key actors and assist with building political coalitions for promoting government cooperation and action.

5.7 Knowledge & Capacity Building

The WSC transition will take place in a complex and adaptive social-ecological system. The system has diverse actors operating in an environment with changing resource constraints and involves dynamic feedback effects that impact individual behaviour. An effective transition requires better models, policies and tools to understand complexity. Narrow domains of knowledge and expertise are present in Bogor, but are not sufficient in themselves to steer a water sensitive transition. Given the importance role of cross-sectoral, multidisciplinary and systems approaches and the multiple actors (individuals and organisations) involved in delivering a water sensitive vision for Greater Bogor, a dedicated and tailored capacity building program at the individual, organisational, inter-organisational and societal level will be required. This will require building on existing opportunities and developing new knowledge-sharing programs (e.g. learning alliances, study tours, seminars and workshops). These should be made for different scales and actors, and be aimed at shaping their professional knowledge in relation to delivering water sensitive technologies and practices.

» There are opportunities to extend and scale the informal program of capacity building and knowledge-sharing undertaken throughout this research project. For example, there are opportunities to replicate and extend the initiative whereby we have drawn on Melbourne practitioners to engage with lead decision-makers within government agencies and water authorities involved in integrated water management. Here we aimed to establish network connections, foster skills and knowledge, and opportunity for practitioners and decision makers at an international level to cooperate and collaborate.

There are clear knowledge deficits within Bogor that are hindering effective policy-making. Thoroughly understanding the barriers to sustainable urban water transition will support future governance and policy designs to support transformation. Evidence-based decision-making is an important approach to fostering concrete and actionable policies. Ongoing application and reflection on the application of the Water Sensitive Cities Index (see Chesterfield et al., 2016) will be useful for structuring existing evidence to inform policy priorities and identifying sources of uncertainty and opportunities for improvement. Periodic assessment is critical for accumulating system information and tracking progress towards Greater Bogor's goals.

This research revealed critical weaknesses in baseline technical information resources that if corrected can improve decision-making. This includes accurate flood levels, building

footprints, groundwater resources and well locations, end-use water quality, and sanitation performance. There are also gaps in the socio-economic realm that are also seen in countries with more developed water systems, including the social benefits of low impact development and consumer preferences for green space or pollution reduction; these knowledge deficits contribute towards a risk-averse policy culture. Some of this data exists, but it is not being channelled into policy formulation. Thus, better tools and knowledge sharing are needed to enable wider access to this data and to make better connections between different expert communities. To support this, partnerships between academia, industry and government need to be strengthened. Where data has not yet been collected, data collation priorities need to be addressed in organisational budgeting.

While there are standards informing regulation and practice, there remain few best management practice guidelines for industry or local government related to the implementation of 'water sensitive' practices. There is a significant body of existing knowledge captured primarily in academic reports or held by specific consultants. Efforts should be directed towards advancing technical (e.g. green infrastructure) and social (e.g. behaviour change program) guidelines for local government organisations and to develop industry and private sector support for innovation and best management practices. The Green Infrastructure guidelines developed within the Urban Water Cluster research program are a solid example of this (see Payne et al. 2018).

The community is also an important element in navigating system complexity, both as stakeholders in change processes requiring traditional approaches to consultation, and as a source of change through reframing policy debates and mobilising community and household resources to drive transition. In either case, the public sector's overall capacity to engage and mobilise the community needs to be enhanced. This would benefit from better connections between government levels and agencies (especially with the agencies currently undertaking much of the socialisation with government). It may be necessary, however, to foster this expertise through selective workplace training and capacity-building. In addition to this, learnings from projects that incorporated some form of participation or collaboration should be collected and disseminated to Bogor's public sector through bulletins or a new data portal / website. Innovative efforts in this field should be recognised with internal awards or as a feature of performance evaluations.

5.8 Driving Community Engagement & Action

The research identified many excellent initiatives already underway across the diverse local community structures within Greater Bogor that could be leveraged and expanded (e.g. environmentally-friendly communities and eco-villages). There were examples of self-organising community initiatives aimed at fostering local knowledge around improvements to waterway health. Creating an environment which can support and nurture the development of local 'water sensitive city' champions, particularly among women, would work to further underpin the growing efforts in transforming to more 'water sensitive' practices.

Further study is warranted to understand how best to continue raising community awareness and gaining individual and community commitments to 'cleaner, healthier environs' (by maintaining drainage channels and septic tanks, paying for piped drinking water, reducing rubbish output, etc.) which are key components of driving water sensitive change. Careful attention is required to ensure there is broad community participation, not just community elites. Indeed, the Pulo Geulis community co-design process developed by UWC researchers is a key example of fostering and building local community capacity while influencing future local design outcomes. Our research has also revealed there is great scope for key decision-

making actors to engage with and promote the growing work of existing water-based social entrepreneurs through co-designing future projects and programs aimed at improving community equity within water servicing.

The community as consumers can be a significant driver of change in services. In Indonesia, community groups have an additional role in providing direct action either in managing service functions themselves (i.e. in the absence of formal water services, achieving the service outcome informally) or through advocacy to one or more levels of government to pressure public action, even if it is in isolated or ad hoc cases. Engaging with the community may be best achieved by targeting specific community or religious leaders, who often wield significant influence at the local level. There is evidence suggesting there are effective structures in local government for implementing social programs through influencing or upskilling community champions. Initiatives to recognise local achievements (e.g. awards) and competition among local administrative areas for prizes are popular means for achieving social or environmental outcomes.


However, without a deeper transformation of the community's understanding of the connection between water sensitive practices and long-term personal, public and environmental health, change is likely to be short-lived. To sustain long-term change, it is suggested that bottom-up learning and practice change be developed through local demonstrations of water sensitive practices, linking these practices with health outcomes. This may require a substantial change in the way on-ground projects are designed and implemented. Community participation in solution design when informed by clear and understandable social, environmental and economic objectives is critical. For example, there are excellent, innovative youth-centred initiatives, led by Eco Fun Indonesia in collaboration with secondary schools and non-government organisations (e.g. Red Cross) which utilise game-based theory and approaches to foster greater knowledge about environmental issues such as waste management, flood protection and the role and importance of water champions.

5.9 Experimentation & Research

Co-designing a joint industry, community and academic research agenda that is policy relevant is a key step to developing and testing new innovative, place-based approaches and technologies. Water sensitive demonstration projects would create a platform for showcasing not only new technologies, but also governance processes and mechanisms needed to facilitate stakeholder integration and collaboration. When designing experiments, it is important to embed a dedicated learning agenda that looks at how to manage delivery and maintenance of the experiment (particularly if new interventions are trialled), alongside technical feasibility and confidence building.

Additionally, research-designed evaluations of contemporary water-related practices and innovations are required to develop sound, empirical insights regarding their efficacy. Such evidence can be used to inform future policy and on-ground programs of work. Programs of evaluation may include:

- » local and regional scale evaluations of bio-pore adoption, raingardens and raintanks (and other water-related interventions). Here evaluating the technical efficacy, alongside the socio/cultural understanding (e.g. historical and contemporary roles of biopores) would assist with generating the evidence base to inform appropriate siting, policy, regulation, management and protection mechanisms of such approaches.
- » river-basin scale evaluations of direct and indirect intervention programs are required to understand what is working and opportunities for improvements. For example, the ambitious



program of work being undertaken by the Citarum River Taskforce would provide a solid insight into how the different programs of works are coordinated and work to mutually deliver improvements in waterway function and health.



Chapter 6

Conclusion

6. CONCLUSION

Water governance remains a multifaceted and evolving challenge. There are growing demands on conventional, linear urban water management systems to accommodate flexible, integrated and multi-functional infrastructures (e.g. disaster risk reduction, water supply, ecological health etc.) and alternative service delivery models.

This report set out to detail the contemporary urban water management systems of Kota Bogor and Kabupaten Bogor, and to identify appropriate governance mechanisms and interventions that would support a sectoral transformation. Using the transitions dynamics framework as a diagnostic tool, the research has identified core governance structures and processes that require attention to assist with delivering improved urban water management services and infrastructure. Key opportunities include establishing a co-generated 'water sensitive vision', generating and funding opportunities for (technical and governance) experimentation and related research activities, fostering greater sectoral professional capacity, and establishing platforms for broader knowledge sharing through facilitated formal (and informal) professional networks, among others.

Overall, the insights derived from this research contribute towards a larger, interdisciplinary research project undertaken as part of the Australia-Indonesia Centre's Urban Water Cluster (UWC) and the core insights derived from this body of work and others, have informed the recommendations framed within the *Leapfrogging Pathways for a Water Sensitive Bogor* (Rogers et al. 2019).

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