The illusion of solution?
The politics of Jakarta's quest to achieve water security

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Abstract

The increasing number of large water infrastructures built or planned worldwide denotes the (re)turn to a hydraulic mission in water management. Infrastructures are pursued mainly for water supply augmentation and flood control, that is, delivering water security for the people especially in packed urban areas. Jakarta, the capital city of Indonesia, has pressing water issue as the city is experiencing land subsidence. Combined with sea level rise and perennial flooding problem, the city's risk of sinking is extremely high. Following a major flood in 2013, the Government of Indonesia launched the NCICD (National Capital Integrated Coastal Development) plan to close Jakarta Bay with a 32-km length offshore sea wall for flood control defence. The plan also includes 5,100 hectares of land reclamation (located between the coastal line and the seawall), which was said, to fund the seawall construction. Such a megaproject whose total costs is estimated at USD 40 billion will significantly alter the biophysical as well as the social landscape of Jakarta. This thesis investigates the socio-political dynamics behind this megastructure from historical institutionalism and political ecology lenses, in which both anchored on power relations. Framing the overall discussion using 'water security' approach, it asks: *How do relations of power drive large infrastructure investments in Jakarta, and how does this contribute and respond to the problem of water security?*

Data collection primarily included 48 key informant interviews, around 400 newspaper articles and secondary data (archives and policy documents). In order to analyse these diverse data sources, I employed three types of data analyses accordingly: historical analysis for historical data, thematic analysis for interviews and policy documents, and discourse analysis for newspaper articles. This research reveals that NCICD has advanced the infrastructural pathway in Jakarta's flood policy which has been established since the colonial times. NCICD as a contemporary project is, thus, a product of the past. Furthermore, rather than dealing with complex institutional challenges associated with multiple water sectors, the government instead focuses on the seawall, which only deals with the flooding issue as a symptom of sinking, rendering the highly political issue apolitical. Reflecting on the power asymmetries manifested in NCICD and situating them on broader literature on water security, I conclude that the politics of water security, in the context of water hazards, is the politics of fear and in consequently meeting demand for security through the prescription of infrastructure. Fear is built from memories of past floods and ultimately from the construction of future uncertainties, where our knowledge is limited.

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Bismillahirahmanirrahim (In the name of Allah, the Most Gracious, the Most Merciful)

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Chapter 1. Introduction

[D]isaster lays bare the real political relations in a state.

-Olson (2000, p.265)

1.1 Rationale: The politics of water security

Both natural and man-induced disasters are political phenomena partly because they work as efficient policy windows (Boin et al., 2005). They are neither driven by politics, nor are they immune from it (Cohen and Werker, 2008). Therefore, it is not an exaggeration if Olson argues that real political relations emerge in respond to a disaster. Focusing on the pressing land subsidence issue in Jakarta, Indonesia, this thesis investigates the socio-political dynamics arising from a policy to pursue large-scale infrastructure to deal with subsidence. The thesis is framed using 'water security' as an overarching topic[1]. UN Water (2013) defines water security as 'the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability'. However, its definitions among scholars have not yet converged; it is still a 'battle of ideas' (Zeitoun et al., 2013). This variety is attributable to one's 'institutional agendas, objectives, disciplinary approaches, theoretical leanings, political preferences, views of justice and equity and geographic settings' (Gerlak et al., 2018, p.86). This dissonance in water security concept has generated a rich body of literature. The research has covered a

[1] While I use the term 'water security' as the thesis' overall framing, the discussion in each substantial chapter focuses on the flooding issue. Resilience to water-related disaster is only one dimension of water security. Other dimensions include human wellbeing, environmental needs and economy productivity (ADB, 2013; Jepson, 2014; Sadoff et al., 2015). The focus on flooding was sought to produce a sharp analysis of the role of NCICD in urban water sectors but attempts have been made throughout the thesis to address the interdependency of each dimension.

variety of scales, from household to city to region, and a range of sectors, e.g. water supply and agriculture. Researchers have also looked at the interplay of various drivers, e.g. climate change and population growths, and advocated several key responses, e.g. supply augmentation and water policy reforms (Jepson et al., 2017).

Within this diverse water security study, Zeitoun et al. (2016) note two dominant research strands, which they term as reductionists and integrative approaches. The first approach explores water security by investigating the likelihood and consequences of harm, thus enabling the trade-offs and outcomes of different decisions (Hall and Borgomeo, 2013). The acceptability and tolerability judgement process enable policymakers to prioritise risk management decisions (OECD, 2013). It evaluates the impact of policy intervention on water risks, weighs comparative importance and analyses the possibility of overall risk reduction (Graham and Wiener, 1995). This economic risk-based approach is criticised as being reductionist as it seeks to represent uncertainties through calculable risk, and therefore overlooks diversity and politics in society. The integrative approach, as Zeitoun et al. (2016) argue, addresses a range of uncertainties and recognises the plurality in the society and the environment. This results in policy recommendations that are inclusive and more likely to reach the disadvantaged groups in the society, though they often experience policy-uptake difficulties.

In this light, I recognise both the urgency to interpret water security problems in practical policy actions and the importance of appreciating diversity in the society. Therefore, I extend the definition of water security promoted by the risk scholars by adding a social dimension to it, from ‘a tolerable level of water-related risk to society’ (Grey et al., 2013, p.2), to a tolerable *and equitable* level of water-related risk to society.

One way of achieving water security is by pursuing large infrastructure, particularly in the context of a mega city. Scholars (e.g. Crow-Miller et al., 2017) argue that the (re)turn of large infrastructure to water management started to occur in the last decade. In the 1990s, water management practices seemed to turn toward 'softer' approaches, shifting away from supply-side approaches to demand management by increasing water efficiency (Postel and Richter, 2003; Brooks et al., 2009). Restraining consumption was conducted with the hope of reserving more water for environmental purposes. More recently, however, a resurgence of large-scale water infrastructure projects is seen worldwide. The projects include, among others, south-to-north water transfer in China, São Francisco inter-basin water transfer in Brazil and trans-Andean tunnel in Peru and sea walls in Jakarta, Indonesia and Bangladesh. Most of these megaprojects were justified to enhance water security in urban areas, which are packed with people and assets, by delivering more water and increasing protection from environmental hazards. Crow-Miller et al. (2017) suggest this trend of massive concrete structure is 'a turn back to the high-modernist (and earlier) reliance on big infrastructure' (p. 196). The 'hydraulic mission' is now promoted as a solution to guarantee water security in times against climate vagaries.

This thesis seeks to explore in depth the role of politics underlying this large infrastructure policy. By politics, I refer to activities used to improve one's status or increase one's power within an institution (Leftwich, 2004). Warner (2008) argues for the need to look at large infrastructure within their socio-political context as political actors can effectively play the 'politics of unease' to forge a consensus from policy circles and from the public. Focusing on flood protection schemes, he observes that 'the way floods are managed and politicised are a reflection of how society is organised' (Warner, 2008, p.311). Moreover, Bakker (2012, p.618) notes that water is 'inherently

political, not only because it is an object of conventional politics, but also because of its material imbrication in the socio-technical formations through which political processes unfold'. Despite the need to explore the politics of water security, there are insufficient studies in the field addressing its socio-political aspect (McEvoy, 2014). However, there have been growing efforts (e.g. REACH, 2018) to promote justice and equity in water security research, which may not instantly change the prevailing security logic (Varady et al., 2016) but can pave the way forward.

The proliferation of large infrastructure plans aiming to solve complex water challenges through simple technical and economic fixes can hide the underlying politics in the debate. Analyses of water security that are too fixated on physical scarcity tend to neglect its root causes that have been associated with socio-political domination (Zeitoun, 2011). Ideally, the socio-political dimensions are investigated in the same depth as the technical aspects (Budds, 2009), but in practice the discourse of water security tend to be apolitical. Questioning the politics with which science emerges as the dominant provider of justification is deemed to be necessary (Forsyth, 2003). This is mainly because neglecting politics may result in the unequal distribution of risks and benefits among the people, in which the poor usually bear the consequences (Jepson, 2014). This thesis is an attempt to contribute to filling this gap by incorporating socio-political relations of large infrastructure into water security debate.

Furthermore, despite the growing water security literature in the past two decades, relatively few scholars and practitioners have engaged with urban water security (Romero-lankao and Gnatz, 2016). The dominant themes of water security vary between places, but water quantity, particularly its relations to scarcity, remains a highly researched topic in the academic literature (Gerlak et al., 2018). Urban areas are increasingly struggling to achieve water security as they are facing myriad water

problems, including the lack of 24/7 access to water, poor water quality, lack of sanitation services, social inequity in water service, and severe water pollution. The context of deltaic megacities (population over 10 million) is of interest here.

Delta cities are facing unprecedented water challenges due to natural and socioeconomic drivers; without mitigation, these factors compromise their economic growth. Deltas have characteristically large populations, such as the Yangtze River Delta (Huang et al., 2009) that is inhabited by approximately 80 million people. Today, 18 out of 23 megacities are located in deltas and are susceptible to environmental hazards. Over the past 20 years, many delta economies have undergone a significant transformation from agriculture to industry and export trade (Seto, 2011). Their accessibility in maritime trade helps their economies outperform those of inland areas (Sachs et al., 2001). However, delta cities are subject to environmental disasters, such as sea level rise, floods, coastal erosion, and storm surges. In Bangladesh, for example, the 2007 cyclone Sidr killed 3,500 people, displaced two million people, and caused USD 4.4 billion worth of damages (Trust, 2008). Anthropogenic factors, such as demographic pressures and unregulated urban development, exacerbate this vulnerability. For instance, land subsidence at a rate of 30 mm/year from excessive deep well pumping in Bangkok increases the city's risk of sinking (Phien-wej et al., 2006). If governments do not make serious attempts to strengthen cities' resilience to these water-related disasters, delta cities will likely experience a decline in their economies. This has been evident in many cities, such as Jakarta (Bappenas, 2007) and Bangkok (Aon Benfield, 2012), when these cities were 'paralysed' during major flood events resulting in massive financial losses.

Despite many pressures, delta cities continue to grow rapidly because of their economic significance. Consequently, financial capital is continuously invested in these flood-prone zones. To protect the people and assets from environmental disasters, local governments have started to formulate water plans, for example, by creating seawalls to prevent seawater from flooding coastal areas, such as the 33-km Saemangeum seawall in South Korea (KRCC, n.d.). Paradoxically, water plans that initially aimed to provide a particular level of protection have exacerbated other water problems, such as by imposing high environmental costs. For instance, severe pollution occurred at Lake Shihwa on the west coast of South Korea due to the closed environment caused by the creation of a seawall (Choi et al., 2011). Biodiversity loss is also associated with such construction, as happened in the Great Bay Estuary, USA (Bozek and Burdick, 2005) and West Bengal Bay, India (Chakraborty, 2010).

These environmental and population pressures are even more challenging in developing countries than in the developed ones because developing countries are more likely to have unfavourable geographic locations and insufficient infrastructure and institutional platforms. Most developing countries are located in harsh hydroclimatic areas, such as arid environments in Africa and tropical monsoon zones in South Asia, compared with the relatively temperate climates of most developed countries, such as in Europe (Sachs et al., 2001; Grey and Sadoff, 2007). Many developing countries do not have adequate water infrastructure and institutional capability to deal with water problems (Grey and Sadoff, 2007), for example inadequate municipal water supply and lack of legal frameworks and enforcement capacity. This situation is even more critical when considering that nearly 90% of the world's urban population will eventually reside in these countries (United Nations, 2018). The combination of nature-driven and socioeconomic problems results in their high vulnerability to water-related risks.

Therefore, urban areas grapple with navigating the barriers and options involved in protecting people, assets and ecosystems against water-borne stresses, and one of the options is by pursuing large-scale infrastructure.

In order to analyse the hydro-politics involved in a water security policy, this study looks at a mega flood protection scheme in Jakarta, Indonesia as a case study. This case study approach (Yin, 2014) allows a more holistic analysis and provides more realistic responses to the water security issue.

1.2 Case study: Jakarta's sinking crisis and a seawall solution

Jakarta, the capital city of Indonesia, is home to 10 million people in its 700 km^2 area. But the population residing in its metropolitan areas (beyond the political boundaries) is three times this number. It is predicted that by 2030 the population in this area will reach 35.6 million, an increase of 4.1 million from 2017 to 2030 (World Bank, 2018). This trend is in contrast to that of Tokyo, whose population will shrink by about 2 million, to 35.3 million because of aging. As a result, Jakarta will defeat Tokyo as the most populous urban agglomeration in the world (Abraham, 2018).

This population growth interacts with the already deteriorated urban environment. Water supply in Jakarta is managed through the Public-Private Partnership (PPP) scheme and piped water services connect to 60% of the population (PAM Jaya, 2018). However, the majority of them use groundwater as their main water supply due to the inconsistent quantity and quality of the piped water services. According to Kooy et al. (2016), 60% of the 'improved access' was to groundwater sources, despite their quality. Commercial and industrial users are accused of excessively using deep groundwater which leads to land subsidence problem (Hasyim, 2018). Although regulation to control groundwater use has been established, its implementation is still poor. It is estimated that more than 100 million m^3 of

groundwater, which is 13 times greater than the official figures, is extracted for non-domestic purposes annually (Kompas, 2016). This links to the allegation of corruption caused by illegal groundwater use.

The wastewater service is much worse. Operated by the local government, the wastewater service covers 7% of the population (PAL Jaya, 2018), which is among the lowest coverage rate in urban areas in Asia (World Bank Group, 2017). The rest uses septic tank that potentially pollutes the groundwater, even 0.5% the people (around 50,000) still do open defecation (Tinju Tinja, 2018). This poor wastewater treatment combined with untreated discharge of industrial wastewater result in poor quality of water bodies.

To complicate the matter, the city also needs to cope with 'flood-related compound disaster' (Padawangi and Douglass, 2015, p. 519), including sea level rise, unusual weather events, tidal floods and ultimately land subsidence. Subsidence is occurring in parts of northern Jakarta at an average rate of 15 cm per year (Abidin et al., 2011), which is the fastest in the world. Combined with the sea level rise at a rate of 3 mm per year (PU, 2011), Jakarta's risk of sinking is extremely high and there would be a need to relocate 4.5 million people and lose USD 103 billion of developed land in the city (NCICD, 2013).

To deal with these complex water challenges, the Government of Indonesia launched a flood mitigation project called National Capital Integrated Coastal Development (NCICD) in 2013. Designed by a consortium of Dutch consultants, NCICD consists of the construction of a 32-km offshore seawall and a 7,500-ha coastal lake along with 1,250 ha reclaimed land (Figure 1.1). The seawall is expected to reduce the enhancement of tidal flood, which is aggravated by the backwater phenomena caused by subsidence, by creating a large lake that can buffer river outflows (NCICD,

2013). The massive costs of this USD 40 billion project (valuation in 2014) will be borne largely by the sale of reclaimed land. After a corruption scandal of a different yet related reclamation project in Jakarta Bay (17-islands), the total reclamation land becomes 5,100 ha as the 17-islands project became integrated with the NCICD plan (Sawarendro, 2015).

Unconvinced by this seawall plan to solve the city's sinking problem that is linked with groundwater extraction, I seek to investigate the underlying causes of water insecurity and the unequal power relations among stakeholders. The use of science in creating a fear of sinking has backed up the seawall solution since its inception. It would be naive to assume that large narration and politics do not play a role in driving the decision-making process of this mega project. This thesis on political analysis of water security can inform both the public of its unseen power relations and policymakers to reflect on their decisions by paying greater attention to the project's potential externalities, which so far has been undermined in the public discourse. Moreover, this study is timely because the feasibility studies of NCICD are still being reviewed by related government agencies. There is potential for this thesis to be considered by policymakers through a variety of canals, such as by disseminating the findings in national/local media and collaborating with NGOs.

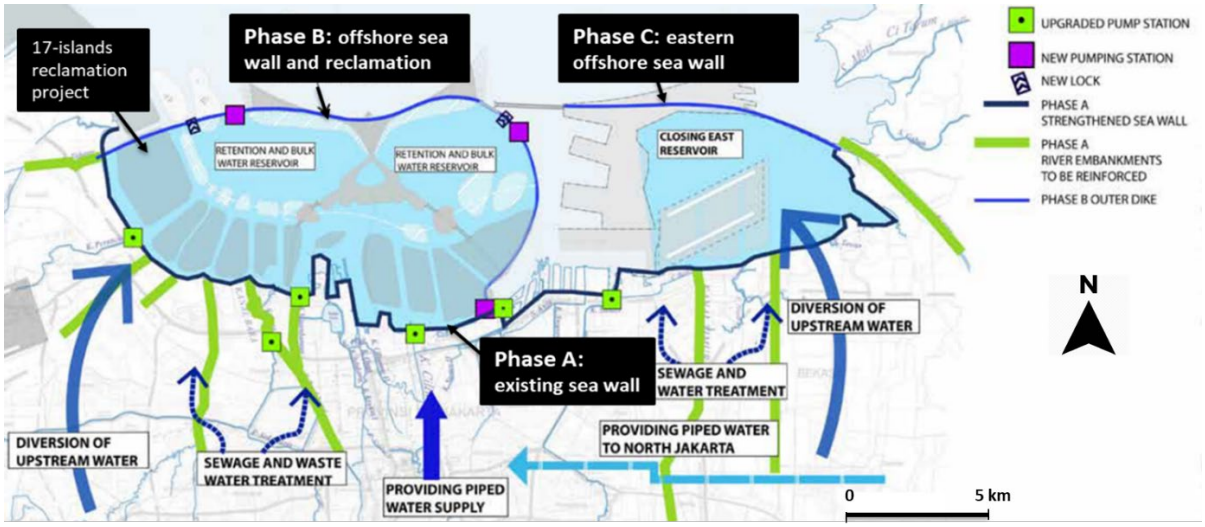


Figure 1.1 A map showing the four components of development in the NCICD plan in Jakarta Bay.

Note for Figure 1.1.: (i) 17 islands; (ii) Phase A (strengthening existing dikes); (iii) Phase B (construction of main offshore sea wall, retention lake and bird-shaped reclamation land); and Phase C (similar to Phase B but for the eastern part of Jakarta Bay). Following a corruption scandal in March 2016, the 17-islands plan has been subsumed with the NCICD plan (Source: The Coordinating Ministry of Economic Affairs, 2014).

1.3 Theoretical and empirical gaps

This thesis seeks to address the research gap explained above, on the lack of studies examining the socio-political dimensions of water security policies. This topic is important as most policies to improve water security have been translated into the need to have climate-proofing infrastructures such as dams for water supply, tunnels for water transfer and dikes for flood mitigation. Without careful assessment, these policies can limit pathways to achieving collective water security, and hide the complexity of risk and wealth distribution.

I employ historical institutionalism and political ecology as theoretical frameworks, both of which share focus upon historical processes and technology in examining power relationships in environmental policy. Insights from science and technology studies (STS) will also inform my analysis although it will not be used as an explicit frame in the empirical chapters.

Historical institutionalism focuses on the endogenous dynamics of institutions and roles of agencies in establishing as well as sustaining power structures despite changes in political regimes and growing environmental challenges. The theory will help untangle the historical processes of flood mitigation projects from Jakarta's early days in the 17th century to the present time, the extent to which contemporary seawall decision can be attributed to past decisions. Historical institutionalism serves as the theoretical framework for the first and second paper, as we shall discuss below, and discussion is centred on power that operates at the bureaucratic level.

Political ecology, on the other hand, emphasises the interaction of actors, human and non-human, and their environment; this interaction is grounded on the biophysical process and relates to social inequalities as the impacts of environmental change. In the environmental management literature, large infrastructure is known to have an apolitical character that can create externalities for society, especially for marginalised groups. As a framework in the third paper, political ecology helps interpret the securitisation theory used to untangle water security conception. The cross-fertilisation of both theories helps untangle the messy power structure constituting water security as they illuminate different aspects of its politics.

This power relationship will be explored through the sinking case of Jakarta, Indonesia. The megacity offers an opportunity to add to our understanding of the politics of water security through examining of how biophysical changes that are exacerbated by anthropogenic factors interact with politics operating at a bureaucratic level, with the involvement of both state and non-state actors. While focusing on flood as the water security issue, this study will also look at the interrelationship of flooding and other sectors of urban water.

For scholars working in cognate areas, Jakarta is a typical delta city experiencing compounding water hazards, particularly land subsidence, among emerging economies. Thus, it can represent similar growing cities in Southeast Asia, such as Bangkok and Ho Chi Minh City, as well as in mega-delta contexts, such as Shanghai and Dhaka. As a post-colonial city, Jakarta serves as an interesting case study to understand how institutional consequences of past decisions (including those from the colonial era) influence contemporary water policy. Institutional inertia, locked-in to patterns of city development, and reliance on foreign expertise and capital are amongst issues relevant to many postcolonial cities, such as Pakistan (Mustafa, 2001). While Jakarta has been known in international literature as an example of an environmentally and socially vulnerable city, this paper will generate first-hand evidence of the politics of blaming and framing used in the securitisation process. This evidence is useful for further examination in a similar context and comparison in global case studies.

1.4 Aim and research questions

This thesis seeks to better navigate the socio-political dimensions of water security by offering an explanation for the dynamics of politics that are driven by both institutional factors and the stakeholders involved, as well as by environmental factors that are beyond human control but are represented and manipulated to fit and serve certain interests. To achieve this aim, it asks: *How do relations of power drive large infrastructure investments in Jakarta, and how does this contribute and respond to the problem of water security?* This research question is elaborated into three subsidiary questions below (summarised in Table 1.1).

To understand Jakarta's current preference for large infrastructure and to avoid a 'snapshot' analysis (Pierson, 2000), it is important to understand the 'historical momentum' (Strang, 2014) shaping this policy, particularly considering the legacy of

Dutch colonialism in Jakarta. A focus on flood policy has been chosen not only because the historical reviews of other water aspects have been addressed by other scholars – drinking water by Kooy and Bakker (2008) and sanitation by Putri (2014)– but also because flood policy ultimately links to the seawall plan as a flood mitigation measure. Through the examination of Jakarta's historical pathways, the first sub-research question is: *How does Jakarta's flood policy evolution characterise its current policy decision?* Historical institutionalism is used as the theoretical framework to analyse the evolution in each political regime from the past 400 years. I mainly used secondary data complemented with key-informant interviews to answer this first question.

The next sub-question emphasises the connection between the seawall solution and the land subsidence problem. Critics charged that the seawall solution does not contain a plan to solve the subsidence that is purported to be caused by groundwater extraction, therefore the sub-question posed is: *How has the exploitation of the fear of sinking facilitated the promotion of the NCICD policy?* As established in policy literature, certain moments, such as political events and natural disasters, are important in bringing opportunities to promote a policy change that would otherwise not be politically feasible. This research question is asked in relation to the evaluation period of NCICD in 2016, which was a decisive moment for the project, yet it was not able to cancel the project despite existing support. Using key informant interviews and newspaper articles, I examined the notion of 'disaster capitalism' (the use of fear to introduce a capitalist project) to explain this near-miss 'critical juncture' (a change that is plausible and possible but fails to materialise).

The last sub-question addresses a more conceptual issue underlying enquiries in the first two questions by theorising the position of flooding in the water security conception. I unpack the concept using the securitisation theory from International

Relations that is interpreted through the political ecology lens. Securitisation is a process of perceiving an issue as a threat to enable the pursuit of extraordinary measures outside normal politics. I specifically ask: *(i) how is flooding conceptualised and understood in water security? (ii) in what ways does securitisation theory further the water security concept? and (iii) what are the roles and implications of large infrastructure in the securitisation effort?* Key informant interviews and policy documents are main data sources to answer these questions and insights from them are used to formulate a conceptual tool to assess how and why a threat is likely to undergo a securitisation move.

Table 1.1. A summary of research questions

Overarching research question: How do relations of power drive large infrastructure investments in Jakarta, and how does this contribute and respond to the problem of water security?	
Sub-question 1:	How does Jakarta's flood policy evolution characterise its current policy decision?
Sub-question 2:	How has the exploitation of the fear of sinking facilitated the promotion of the NCICD policy?
Sub-question 3:	How is flooding conceptualised and understood in water security? In what ways does securitisation theory further the water security concept? And, what are the roles and implications of large infrastructure in the securitisation effort?

Figure 1.2 presents a conceptual model for this thesis, threading theories and methods to illuminate the complexity of the politics of water security. Power is sourced from institutions and actors, both state and non-state, and their interplay can affect the environment, where water security is hinged. Understood as the function of time, this constellation can shift and reorient when non-state actors promote innovation which will also create externalities to the environment. It is worth noting that the better innovation fits into institutional agenda and culture, the more likely it will secure facilitation from the state. Historical institutionalism focuses on institution and temporal dimensions of these interaction, while political ecology underscores the role of actors,

with an explicit focus on the impact of biophysical environment. Science and Technology Studies (STS). while is not used as an explicit framework in any empirical chapters. provides insights on innovation and its politics.

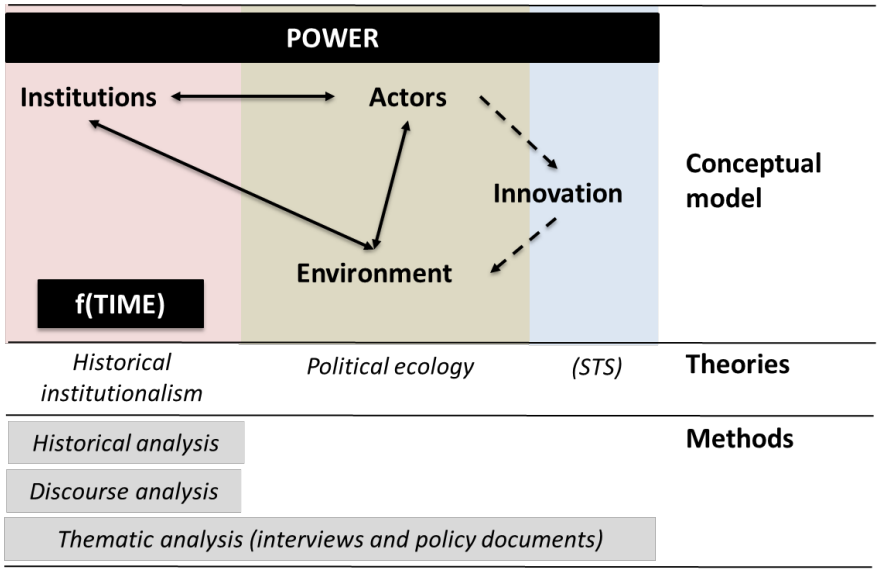


Figure 1.2 A conceptual model of the thesis

1.5 Main contribution to the literature

This thesis contributes mainly to further the concept of water security by examining its politics through the cross-fertilisation of historical institutionalism and political ecology. As discussed earlier, historical institutionalism brings critical insights to investigate the internal dynamics within institutions managing flood risks in Jakarta; while political ecology highlights the need to look at political power relations (beyond institutional power) that is rooted within biophysical change. This thesis will also unpack the water security conception to theorise the position of flooding within the concept, which is dominated by the topic of water supply. This contribution to water security scholarship is best seen in the last empirical chapter (Chapter 6), which also incorporate insights from the first two empirical chapters (Chapter 4 and 5).

It also contributes to the emerging and growing body of critical geographic scholarship on water infrastructure (e.g. Swyngedouw, 2015; Bichsel, 2016; Loftus and

March, 2016; Obertreis et al., 2016; Strang, 2016). Furthermore, the seawall analysis adds an understanding to the current large infrastructure literature that mostly focuses on dams (e.g. McCully, 1996; Lebel et al., 2005; Bijker, 2007).

By analysing a 'live' decision making process, this research contributes to historical analysis that limits their study only on past (completed) events (Mahoney and Rueschemeyer, 2003). Historical studies traditionally only address the initial shaping of technology and therefore provide little insight into contemporary urban infrastructure (Monstadt, 2009). The ongoing policy context of course poses certain challenges for this research, such as the need to shift research focus as the policy process of NCICD unfolded, but it also offers an interesting analytical value for this study. Moreover, the research outcomes are of policy relevance as they can be fed back to the policy-making process.

Lastly, and empirically, this thesis contributes to answer whether Jakarta needs a USD 40 billion seawall (and reclamation) in the first place, as well as to understand why this project has been prioritised over mundane strategies of decentralised small-scale, on-shore seawall in subsided areas, or even dealing with groundwater extraction as the main culprit of the subsidence. It is not a secret how policymakers prefer a noticeable structure to leave an infrastructural legacy. This thesis contributes to unravel the power relations constituting the seawall and its implications in achieving water security in the city. This seemingly local contribution can also be regarded as my contribution to the broader geography discipline. Largely emerged from critiques of policy (see Peet and Watts, 1996), the discipline is still criticised by its weak public engagement and inward-looking approach (Murphy et al., 2005). This thesis, while contributing to scholarly debates within the academy, also fulfils the obligation to be useful for the ongoing policy-making process.

1.6 Introduction to the four empirical chapters

After highlighting this thesis' contribution, I now introduce the three empirical chapters, which serve to answer the three subsidiary research questions mentioned above, as well as highlight the contribution of the analysis to the respective theoretical frameworks used in each chapter. The first two papers were co-authored between my supervisor, Dr. Katrina Charles, and myself (see appendix for the statement of contribution), whilst the last paper is authored by myself.

1.6.1 Paper 1, The evolution of Jakarta's flood policy over the past 400 years: The lock-in of infrastructural solutions (see Chapter 4)

Published in Environment and Planning C: Politics and Space 37(6): 1102-1125, in 2018.

Some findings from this paper have been presented at the Southeast Asian Studies Symposium 2016 in Oxford on 14-16 April 2016 and the International Young Water Professionals Conference in Cape town on 11-14 December 2018.

This paper presents an analysis of the evolution of flood-related investments in Jakarta in the past 400 years by drawing data from historical sources and interviews of key informants. I analyse the evolution in five political regimes (the walled town Batavia, the colonial era, early independence, New order regime and contemporary era). In each regime, I discuss the political rule, flooding condition and investment (if any), as well as broader water conditions. These insights are then used to discern patterns of investment and to further illuminate the general flood policy trend over the four centuries. I observe that infrastructural approach has continuously been pursued (in terms of both ideas and construction) in Jakarta. Some major flood events, while instigated new flood research, were not able to introduce institutional change. In this paper, I argue how policymakers' partiality to infrastructure increases the future

preference for this policy, also known as the 'positive feedback loop', as well as identify three mechanisms sustaining this loop.

This paper adds understanding to the current scholarship of flood management and planning by examining how the contemporary flood control approach in a postcolonial city has been locked-in to previous infrastructural measures despite growing challenges, such as population growth and climate change. Furthermore, it contributes to the historical institutionalism literature by tracing major events and associated investments in three areas (infrastructure, institutions and information) to understand path-dependency.

1.6.2 Paper 2, Disaster capitalism? Examining the politicisation of land subsidence crisis in pushing Jakarta's Seawall Megaproject (see Chapter 5)

Published in Water Alternatives 11(2): 394-420, in 2018.

Some findings from this paper have been presented at the PhD Masterclass (part of the 9th EuroSEAS Conference) in Oxford on 15 August 2017 and at the RGS-IBG Annual International Conference 2017 in London on 30 August - 1 September 2017.

The second paper examines the problematisation of land subsidence by combining the concept of critical juncture (an analytical approach focusing on a short period of time in which actors' decisions have a higher probability of affecting a particular outcome) with Klein's (2007) notion of 'disaster capitalism' (the use of fear of disaster to legitimise a capitalist project). The idea for the paper was conceived because the evaluation period of NCICD, following a corruption scandal of the 17 islands reclamation project, was not able to cancel the project, despite the many criticisms it received during the evaluation period. This outcome, where change was possible and plausible but failed to materialise, is called as a 'near-miss critical juncture' (Capoccia, 2016). Drawing data from newspaper discourse, interviews, and

policy documents, I analyse how land subsidence was problematised as a sinking crisis and how political actors interacted pre-, during and post- critical juncture.

This paper contributes to the crises-induced policy change literature by combining the critical juncture and disaster capitalism concepts. The focus on land subsidence also enriches the discussion in this field by its unnoticeable nature that does not create an urgency for actions, unlike flooding. In addition to my experimentation in employing the critical juncture concept for a contemporary event, this paper also contributes to the examination of the near-miss outcome, which is not much discussed in the historical institutionalism field.

1.6.3 Paper 3, Re-thinking water security: How does flooding fit into the concept? (see Chapter 6)

Submitted to Environmental Science and Policy journal

This last paper aims to theoretically situate flooding in the concept of water security by unpacking the concept using the securitisation theory. I use political ecology to interpret the securitisation theory that had been developed in many research trajectories. Critically reviewing literature on water security and security studies, I conclude that flooding has the same theoretical foundation to that of water supply, which dominates the water security field; they are both sourced from fear, of surplus of water and shortage of water, respectively. I also propose a conceptual tool, what I term as, 'determinants of securitisation' to analyse the likelihood of a threat to be securitised. The tool is then deployed in Jakarta's case followed by a closer examination of the seawall to assess its 'security-ness'.

In addition to proposing a conceptual tool, this paper contributes to furthering the concept of water security by theorising the position of flooding in the research field and to the security studies by investigating the social dimensions of security issues beyond

the usual military and technocracy approaches. Securitisation lens here proves to be useful, shedding a light on the 'securitised approach' in water security that has been mostly viewed negatively.

1.7 Organisation of the thesis

This chapter (Introduction) has presented the rationale behind investigating the politics of water security in the context of mega delta city and introduces Jakarta's NCICD as a case study. It also introduced the research questions and outlines main theoretical contribution of the thesis. This was followed by the introduction of the thesis' four empirical chapters.

The next chapter analyses historical institutionalism and political ecology as the main theoretical frameworks used in this thesis. Literature review on the science and technology studies (STS) is also presented as it shapes arguments in the last paper and informs my overall analysis in the thesis. After discussing the central notions of each theory, I examine their theoretical intersection and highlight potential synergies of combining the theories.

After outlining my theoretical stances, Chapter 3 presents an in-depth discussion of my methodological approach. After introducing my epistemological departure point, I describe the data collection and data analysis procedures. Three main data sources, (key informant interviews, newspaper articles and policy documents), were analysed using three analytical techniques (historical analysis for historical sources, thematic analysis for interviews and policy documents, and discourse analysis for discourse data). The chapter finishes with a discussion on research ethics and my reflexive assessment on how my identity as a researcher may affect the interpretation of the data.

The next three chapters (Chapter 4, 5 and 6) are the main analytical parts in this thesis, in which each serve to answer the three subsidiary research questions. The

chapters were written in a journal-paper format, but they have been converted to match this thesis writing format with a merged reference and appendix. The paper-route has made the repetition of the content, especially on the introduction of NCICD, unavoidable in each chapter.

Empirical findings from all substantive chapters were pulled together and discussed in Chapter 7. I first revisit the research questions and summarise how each chapter's exploration of Jakarta's case provides the answer for subsidiary research questions and ultimately for the overarching question. This is followed by my reflection on the application of social theories in this thesis, policy recommendations and suggestions for future research agenda.

Chapter 2. Theoretical frameworks

> *If our moral and political language for evaluating technology includes only categories having to do with tools and uses, if it does not include attention to the meaning of the designs and arrangements of our artefacts, then we will be blinded to much that is intellectually and practically crucial.*
>
> -Winner (1980, p. 125)

Winner's argument on the importance of recognising the meaning behind, not only the use of, technology is of major consideration in selecting theoretical frameworks. Historical institutionalism and political ecology were selected to inform the analyses in this thesis with influence form science and technology studies (STS) given my focus on infrastructure. The first half of this chapter (2.1 – 2.3) reviews the current landscape of the theories, from key notions or concepts to their engagement in water literature, as well as explains briefly their application to this research; whereas the remainder of the chapter examines their theoretical synergies.

2.1 Historical Institutionalism

Historical institutionalism is a research tradition in political science recognising that social processes must be understood as a historical phenomenon (Thelen and Steinmo, 1992; Ikeberry, 1994). Early works in historical institutionalism addressed 'big questions' (Pierson and Skocpol, 2002, 696), such as the origin of a state, the emergence of capitalism, the development of democracy or regime transformation (Polanyi, 1944; Gerschenkron, 1962; Moore, 1966). Historical institutionalists, however, have increasingly extended their scope of research as they study virtually all types of institutions, big and small, at any level (Thelen and Conran, 2016).

Two concepts that have been extensively developed and deployed in historical institutionalism are critical juncture and path-dependent trajectories. They are related but analytically distinct concepts. Collier and Collier (1991) define critical juncture 'as a period of significant change, which typically occurs in distinct ways in different

countries (or in other units of analysis) and which is hypothesized to produce distinct legacies' (p. 29). One of the central features of critical junctures is the duration, as 'the longer the juncture, the higher the probability that political decisions will be constrained by a re-emerging structural constraint' (Capoccia, 2016, p. 91).

On the other hand, path dependence suggests that institutions continue to evolve in response to changing environmental conditions but are constrained by past trajectories (Ikeberry, 1994). When a path dependent process is at work, early developments become deeply embedded in the institution, modifying its structures and hence actors, and consequently influencing unfolding events or processes occurring later in the sequence (Pierson, 2000). Therefore, a crucial feature of path dependency is the relative 'openness' of early stages in a sequence compared with the relatively more 'coercive' nature of the later stage (Mahoney, 2000). However, it is not to suggest that path dependency 'freezes' extant institutional arrangements in place. Change does occur but it is bounded until something is able to erode the reproduction of institutional continuity (North, 1990).

There has been a fascinating discussion surrounding the scale of critical junctures. The debate around this issue is partly due to the unclear qualification of what sort of change is considered sufficient to say that there has been a deviation from the existing path (Peters et al., 2005). Analysts often invoke critical juncture as large-scale, dramatic events. However, those qualities are 'neither necessary nor sufficient to generate path dependence dynamics' (Pierson, 2000, p. 75). We cannot simply assume that large effects are due to large causes for this non-linear mechanism (Abbott, 1990). Some authors (e.g. Thelen and Conran, 2016) examine the role of slow processes of gradual changes rather than rapid, major changes in affecting stable orders. They consider how everyday politics, such as small amendments, shape the structure over

time and further suggest that major events may best be understood as the cumulative result of gradual changes over a long period of time. In this perspective, incremental changes happening over a long period of time may be more consequential than a singular breakpoint to reorient the path (Pierson, 2003).

The historical institutionalism approach has been employed rather moderately in water literature. The approach is mostly used to understand how historical and institutional factors affect progress in the present era, such as in Phom Penh's sanitation system (Meacham, 2009), for reform on agriculture water governance in Kyrgyzstan and Tajikistan (Sehring, 2009), in Dutch flood policy (van Buuren et al., 2016), and for environment water recovery regulation in Australia's Murray Darling Basin (Marshall and Alexandra, 2016). Taking insights from these studies, I use the approach to understand to what extent the contemporary NCICD policy has been shaped by past decisions in Jakarta's flood policy (Chapter 4). I focus on the employment of critical juncture in Chapter 5 by exploring its negative case that took place during the project's evaluation period, which demonstrates that a dramatic event (a corruption scandal) does not always successfully create a policy change (the cancellation of the NCICD plan).

2.2 Political ecology

As the confluence of cultural ecology (Steward, 1955), political ecology has become a firmly established field in geography. By emphasising political struggles and inequities emerging from environmental transformations, political ecology advocates more attention to political influences on the hybridity of human-environment interactions.

The approach was developed through many different influences and adopts several varying guises in the contemporary movement. Here, I focus on two (related) areas of development, namely urban political ecology and political ecology of water.

Recognising urban as a process of socioecological change, urban political ecology (Heynen et al., 2006) more specifically engages with the production of nature, including water, through processes of urbanisation, with a focus on forms contestation and unequal distribution across scales. Capitalism is prominent here; this strand of research recognises 'the multiple socioecological processes of domination/subordination and exploitation/repression that feed the capitalist urbanisation process and turn the city into a kaleidoscopic, metabolic socioenvironmental process' (Swyngedouw and Heynen, 2003, p.900). Analysts are encouraged to identify strategies through which a more inclusive and equitable mode of urban nature production can be achieved.

The second strand, the political ecology of water, 'seeks to politicise understandings of the distribution of water' to illuminate 'the operation of power in the contemporary world' (Loftus, 2009, p.953). This strand was motivated mainly by the injustice in accessing water worldwide and soon expanded to other crucial water issues, notably water privatisation (Loftus and McDonald, 2001; Bakker, 2003; Budds and McGranahan, 2003). As many water politics scholars have argued (Gandy, 2004; Kaika, 2005; Bakker, 2012), water is central to the production of power in many different scales. By politicising water issues, the political ecology of water has redefined the contours of water resources research (Swyngedouw, 2009). This field has been at the forefront of advancing new approaches in human-environment relations, such as the hydrosocial relations (e.g. Motte, 2013; Boelens et al., 2016).

In this thesis, I use political ecology as a lens to interpret securitisation theory to unpack the conception of water security (Chapter 6) that has been dominated by water scarcity topic. The analysis centres on theorising the position of flooding in the concept of water security and reflects on the use of large scale infrastructure as a result securitisation.

2.3 Science and Technology Studies (STS)

The final theory I use to inform my thinking and analysis in this thesis is Science and Technology Studies (STS), although it is not explicitly used as a framework in any empirical chapters.

The understanding of the relationship between technology[2] and society as the basis of STS scholarship has been evolving over time. In the wake of STS in the 1970s, there was no more provocative an idea than the notion that technical things have political qualities (Winner, 1980). But today, technology, by this I also mean science[3], has gained special attention from social scientists (Bowden, 1995). This can be seen by how populated the STS scholarships is by a number of theories examining the relationship between technology and society, such as social determinism of technology, theory of technological politics, technological determinism and social shaping of technology (Harbers, 2005).

STS authors had viewed infrastructures as something invisible to everyone, everywhere (Winner, 1980). As one turns on the tap for water, a vast infrastructure of plumbing, water treatment plants, even regulations –if one flexibly interprets infrastructure as many things and beings (see Meehan, 2014)– is used without putting much thoughts into it (Star, 1999). However, there are some cases where infrastructure becomes visible, and vividly so. The normally invisible quality of working infrastructure becomes visible upon breakdown either incrementally, e.g. when a computer server is down, or completely, e.g. collapsed dikes. Another example is when investigating large-scale infrastructure in the making. Larkin (2013) argues that

[2] Technology is a broad concept; it is more than a physical structure or 'artefact' –as commonly denoted in STS literatures– but it can also mean a way of doing things, a social-technical system and an interrelated group of people and devices that work together as a whole to meet a need (Sismondo, 2007).
[3] Some scholars (Kuhn, 1962; Clark, 1987) differentiate the analysis of science and technology in how they affect social life. Science is considered as pure science, while technology is the application of science. I refer to technology and science as a unity constituting infrastructures.

infrastructures often inhabit a whole spectrum of visibilities, from opacity to spectacle. They are deliberately designed to elicit awe and admiration, making them difficult to go unnoticed.

STS scholars have increasingly engaged with water governance by exploring how the modernisation of water management has brought about new forms of water governance (Morita, 2017). In STS, water has been treated as more than an exclusively empirical issue. An increasing number of scholars have become aware of the multiple roles of water and thus the wide-ranging impacts of water governance. Examining the social dimensions of particular water technologies, some STS scholars offered heuristics for new conceptualisations of water in STS literature (Krause and Strang, 2016). Bijker et al. (2012), for example, propose 'water culture' as an extension of Bijker's earlier notion of 'technological culture' (Bijker, 2007). Inspired by long and interwoven history of water infrastructures and their evolution, he suggests that water cultures would heuristically draw attention to the mutual constitution of society and water.

2.4 Theoretical synergies

Hitherto, I have analysed separately the landscape of scholarship in each school (summarised in Table 2.1) and in this section I discuss the theoretical synergies gained from the combination of those schools in analysing the politics of water security. It is important to note that the theories are not mutually exclusive, instead they are mutually constitutive. For example, Kuhn (1962), the key literature influencing both historical institutionalism and STS fields, considers that the path dependence notion was derived from the study of technological persistence in economic literature. Kuhn (1962) demonstrates the difficulty of replacing scientific paradigms that have been well

institutionalised in society as people become reliant on a particular technology. This then locks consumers (states or any users) into a specific technological trajectory.

However, while informing each other, the theories are built through very specific scientific paradigms. It is not desirable to simply integrate or amalgamate them towards a metatheory, or 'to transcend the scope of disciplinary frameworks through a comprehensive and overarching synthesis' (Monstadt, 2009, p.1937). By appreciating each intellectual tradition, I combine the most valuable and relevant insights from each body of literature to help develop the understanding needed to analyse the politics of water security.

Table 2.1 A summary of how each theory conceptualises time, power and infrastructure (elaborated from Bichsel (2016)).

Approach	Historical processes as …	Infrastructure as …	Power as…	Key concepts
Historical institutionalism (Paper 1 and 2/ Chapter 4 and 5)	Change in institutional power	--	Institutions (including elites and political agencies)	Path-dependency, critical juncture, positive feedback
Political ecology (Paper 3/ Chapter 6)	Environmental/ biophysical change manifested over time affecting power relations among stakeholders	Mediator between water and politics	Relations between stakeholders, driven by and affects the socio-ecological system	Inequity, justice, scale, governance, subjectivity
Science and technology studies (STS)	--	Technology and artefacts	Politics of knowledge generation (e.g. the role of experts)	Design, regime, builders, agency

Historical institutionalism and political ecology put different emphases on power relationships, with the former focusing on institutions and the latter on human and non-human actors and giving special attention on societies. Historical institutionalists are interested in examining the role of political agencies in the institutional formation and continuation processes. Even with limited focus, it is not an easy task to fully understand the source of agency and linking outcomes with actors

(Peters et al., 2005). As a result, analysts tend to generate causal explanation through a 'black box' as they are unable to disentangle the interaction between agencies (Hedstrom and Swedborg, 1998). This discussion links to Pierson's (2016) notion on 'hidden' dimensions of power. In the past decade, some scholars (e.g. Newman, 2016; Thelen and Conran, 2016) have carefully examined the political interaction of elites to better articulate the sources and forces of agencies during a critical juncture, and in maintaining self-perpetuating cycles in one path. Drawing an analogy from pluralism that 'power is like an iceberg, with most of the mass lying below the waterline', Pierson (2016) argues that historical institutionalists know best where to look to understand the mechanism of hidden power. This is due to the tradition's structural and historical approach to detect the fundamental distribution of power in modern societies.

On the other hand, political ecologists place greater emphasis on the impact of environmental changes and its (de)politicisation on the disadvantaged groups in the society. Political ecologists perceive urban environment as inherently social and material (Swyngedouw, 1999; Castree, 2002), infused with political power and cultural meaning (Haraway, 1991). They have traditionally regarded large-scale infrastructure projects as disruptive as these projects involve relocating local people (Clochester, 1993; Heming et al., 2001). Their insights are valuable in illuminating the existence of power relations between the state who promote an infrastructure and different groups in society benefitting from it as well as those who bear the consequences. Historical institutionalists have rarely discussed this group as their focus was on the macro-scale and elite interaction.

Another important power relationship is performed by experts and knowledgeable people in promoting particular scientific paradigms and technology; insights from STS is very useful in unravelling the role of experts in this contestation.

Over time, technology increased in complexity; the technical dimensions of infrastructure, in turn, become impenetrable to most people, grasped only by swarms of experts (Bowden, 1995). Experts can, therefore, to a certain extent hold a central control acting at the top of a rigid social hierarchy (Winner, 1980) and that makes the role of experts a political one. In order to either sustain or change policies on science and technology, policymakers are required to interact with other political institutions including experts 'to produce, implement, evaluate and revise public policy' (Schlager and Blomquist, 1996, p. 653).

In conclusion, theoretical insights brought from each school create a robust and coherent foundation to help me analyse the political aspect of large infrastructure. Historical institutionalism offers path-dependence and critical juncture concepts to unravel power embedded in Jakarta's flood-related institutions over time. Political ecology provides a lens to look at the socio-political tensions that emerged from environmental issues, creating uneven distributional impacts to diverse groups in the society. The STS offers extensive knowledge on infrastructure informing my overall analysis. Such a combination has great potential to improve the examination of deeply rooted and highly consequential structures of power that is manifested in infrastructure.

Chapter 3. Methodology

The trick is to be honest about what happened in your research and to explain it to your readers as clearly as you can.

-Silverman (2013, p.351)

In this chapter, I will describe and contextualise the research process with sufficient descriptive detail so the readers can have a meaningful grasp of what the research experience was like. This chapter consists of four main parts: my philosophical underpinning of the research, data collection methods, data analysis procedures and research ethics and limitations.

3.1 Research design

3.1.1 Epistemology

My epistemological departure point is that politics permeate and affect our lives in many ways. Politics at the policymaking level affects the mundane politics of everyday life (Magstadt, 2016), for example social exclusion to access water services. It has significant implications for whose voices are heard, which concerns are valued, and which are disparaged or even criminalised. Often such implications are accepted as something organic, while in my view they are politically constructed (see Sultana, 2016).

Through policy, politics determines and regulates everything. In this case, politics affect the conceptualisation of water security as it is interpreted by high-level actors, translated into policy briefs and operationalised in a series of strategies, prioritising particular uses and users. Considering politics as the exercise of powers (Kidd et al., 2010), large infrastructure consolidates and reinforces power of existing political elites. Infrastructure is built on the logic that variability is the only source of uncertainty (Palmer, 2010) and thus policy precludes alternative methods of dealing

with the variability (Lankford, 2013a). Because of politics, messy realities of water insecurity owing to unequal power relations among stakeholders do not receive adequate treatment.

Another important epistemological position is the use of science in supporting the hard structure measures. It is important to scrutinise the politics with which science is produced and used (Forsyth, 2003). Building on the long-standing criticisms of positivist ideas about the nature of truth and knowledge (Agnew, 2007), I consider science as inherently politicised rather than purely technical and neutral assessments of environmental processes. Scientific evidence is shaped to a certain degree by scientists' research cultures and interests (Demeritt, 2001). Such factors influence generations of knowledge through, among others, assumptions made, variables included, and level of risks tolerated.

3.1.2 Research design and process

The nature of a qualitative research is iterative as it involves a systematic, repetitive and recursive process (Patton, 2002). I constantly revisited my research problem and design as they were informed by literature, unfolding research experience, emerging data and findings.

My interest in this water topic was initiated by my previous research experience in Jakarta where I assisted in fieldwork about social consequences of flooding back in 2012. During the fieldwork, I engaged with people living in the city's riverbank, or many termed as 'squatters' (van Voorst, 2016). They were exposed to frequent floods during rainy seasons and became used to it as a result. While flood control measures have been prioritised in exclusive areas of Jakarta, the poor living in riverbanks continue to be the scapegoat for the flooding problem. That experience has cultivated my research interest in Jakarta's water management.

Once the general topic has been identified, I conducted an extensive literature review around water management and Jakarta's water topics and narrowed down my research interest to looking at the city's flood risk management issue within the context of water security. The seawall plan was launched by the Government of Indonesia following a major flood in 2013. As a megaproject, there were many controversies associated with this initiative. The primary research question, *How do relations of power drive large infrastructure investments in Jakarta, and how does this contribute and respond to the problem of water security?* was refined during the course of the research process. Four subsidiary research questions were formulated in sequence. The first two took shape early in the research, whilst the last one was influenced by emerging themes from data analysis and clearer understanding of the research topics.

3.2 Data collection

I conducted two main phases of fieldwork for data collection. The first and main fieldwork was conducted from May to September 2016 to collect data on key informant interviews and policy documents. The second fieldwork was in July 2017 in which I conducted more key-informant interviews. Recognising the need to procure more information for my last paper (Chapter 6), I conducted three interviews via phone in February 2018.

While the concept 'fieldwork' can be simply understood as the process of observing and collecting data about people and environments, it is beyond that as it also works the other way around. During fieldwork, the researcher represents an entity, reflects on a phenomenon and responds to, often unexpected, events. Therefore, in collecting data during fieldwork, the researcher can never be excluded from the field as s/he translates and interprets the data (Whatmore, 2003).

During the first interview phase (in 2016), I witnessed the 'institutional fluidity' moment of the 17-island reclamation project and NCICD plan when the President of Indonesia took a major decision to suspend the ongoing reclamation project and evaluate its significance. This decision also impacted the status of NCICD that was dormant, at least in public discourse, after its launch in 2013. NCICD was evaluated for six months (April – November 2016) and because of that many discussion forums were held during this period. This crucial timing enabled me to experience and gain fruitful insights of the political dynamics which formed the basis of discussion in my second paper (Chapter 5).

Three main data sources were drawn to generate findings in this thesis; they are key informant interviews, newspaper articles and policy documents. Other data sources, namely life history interviews and focus group discussions have informed this research but have not been explicitly referred to in the paper. The combination of the data used and their corresponding data analysis to answer particular subsidiary research questions are presented in Table 3.1.

3.2.1 Key informant interviews

Key informant interviews are the primary data collection method for the second and third paper, but their insights were also used in the first paper and the thesis as a whole. Key informant here refers to individuals who have particular knowledge and experience on the issues being investigated (Fetterman, 2008). I conducted a total of 48 key-informant interviews with government officials (central government = 8; local government = 8), NGOs activists (n = 10); academics (n = 12) and other experts (n = 10) during fieldwork. However, as journal submission of each paper occurred at different stages of data collection, the total number of interviews analysed in each paper vary (with the least of 38 interviews in Chapter 4 and the most of 48 interviews in

Chapter 7). A breakdown showing each informant's affiliation and position is presented in the appendix of this thesis (Appendix 2). Considering that water issues are interrelated, the selection of interviewees was not limited to those with flood-related expertise but also includes experts of other relevant water and environmental issues. With regards to the NCICD controversies, views from a wide range of institutions were sought to ensure my research covered a broad spectrum of perspectives. For example, most government officials support the project while many NGOs activists are against it. Given that dichotomy, the interviews revealed startling discoveries, such as an insight from a government official whose personal view was completely different to his 'institutional view'.

Table 3.1. A summary of research questions and their associated theoretical frameworks and methods

Research questions	**Theoretical framework**	**Data collection** (ordered based on the importance)	**Main analytical techniques**	**Evidence generated**
How does Jakarta's flood policy evolution characterise its current policy decision?	Historical institutionalism	Archives/secondary data; key informant interviews	Historical analysis	Mapping of Jakarta's flood - related investments over the past 400 years
How has the exploitation of the fear of sinking facilitated the promotion of the NCICD policy?	Historical institutionalism (with a focus on critical juncture concept)	Key informant interviews and newspaper articles	Thematic analysis	Mechanisms in which NCICD was promoted as the only solution (the combination of interaction between political agencies and the politicisation of fear)
How is flooding conceptualised and understood in water security? In what ways does securitisation theory further the water security concept? And, what are the roles and implications of large infrastructure in the securitisation effort?	Securitisation theory (interpreted through the political ecology lens)	Key informant interviews and policy documents	Thematic analysis	A framework to analyse the securitisation process of water-related threats and critical reflection on securitisation approach in water security

My entry to Jakarta's water network was facilitated by my pre-existing contacts I acquired from my previous research experience in my local university and professional work in an Indonesian ministry. An initial list of key informants was identified from literature and policy documents review. I employed snowball sampling to gain further access to informants. My strategy was to approach the high-level-position informant first. I then acquired recommendations to interview some of the key actors in Jakarta's water-related network. While this snowballing technique is practical, it may put pressure on the recommended colleagues to participate in the research. This concern is addressed in research ethics in section 3.4. The number of informants interviewed was based on saturation point, in which further investigation can stop as no new insights are being discovered (Hammond and Wellington, 2013).

Most of the interviews were conducted face-to-face either in Bahasa Indonesia or English. Interviews were electronically recorded unless participants object. In the latter case, interviews were written in a field notebook. After the interview, field notes were typed in order for all the data to be stored digitally. The interviews lasted from 30 minutes to 2.5 hours and were mostly conducted in informant's offices for their convenience. I opted for the semi-structured format of interview to allow me to explore particular themes or responses in depth while still having pre-determined questions to prompt discussion (Dunn, 2010) (see interview guide in Appendix 3).

In the beginning of my fieldwork, the interview questions covered a broad range of water issues (water supply, sanitation, flood, land subsidence) so that I could gain a 'helicopter view' of water governance in Jakarta. I simultaneously conducted data analysis while doing data collection (Denzin, 2014) and was able to narrow down the interview questions to the most significant themes: flood, land subsidence and the seawall plan. The questions included the informants' views on land subsidence in

conjunction with other water problems, opinion on the NCICD project and opinion on alternatives to NCICD if any. The goal of the interviews is to capture unifying themes and nuances of the NCICD plan from diverse perspectives.

3.2.2 Discourses (newspaper articles)

The overarching aim of this thesis is to understand the relationship of political powers in shaping water policies and one of the ways power manifests is through discourse. Discourse, both is shaped by social practices and shapes social practices (Schatzki, 1996). This two-way relationship makes the examination of discourse essential in understanding power play. I am particularly interested in public discourse, in which spoken and written communication occurs in the public realm.

A database was created to analyse themes associated with land subsidence and to understand the problematisation of land subsidence in the sinking crisis (Chapter 5). I used the keywords 'land subsidence' and '*penurunan muka tanah'* to search for articles in Google News (405 articles, from 1 January 2007 to 23 July 2017). Before deciding to use Google News, I explored other databases, such as Lexis Nexis and several Indonesian news agencies' websites. Those sites did not provide news databases as comprehensive as what Google News offers.

3.2.3 Secondary data (archives and policy documents)

Secondary data is the most important data source for the historical paper (Chapter 4). Its long timeline (400 years) makes the information collected from interviews only relevant for the more contemporary eras. Historical sources, in the order of importance, included books, scientific journals and archives. I expected to procure plenty of information from archive analysis (Burton, 2005). I visited the National Archives of Indonesia in Jakarta in May 2016 and did a two-week search on its archives on water and life in Jakarta. The resources I found enhanced my understanding of how

central the role of water is for livelihood and trade in the city during colonial times. However, there were no significant findings to be included in the research as most of the insights were already covered by books and published papers.

Policy documents were also used as secondary data to support the analysis of NCICD's policymaking process. One of the informants who coordinated the NCICD project at the national level allowed me to access the detailed consultant reports on the project. The reports are not confidential, but they are not publicly available. Unfortunately, I did not have access to documents concerning policy recommendation on the 17-island reclamation project and on NCICD that were created following their evaluation in 2016. The documents are crucial because they contain policy recommendations by the relevant ministries for the President. The information I acquired was only from news articles regarding their main policy recommendations with no detailed explanation.

3.2.4 Life history interviews

During the first fieldwork in 2016, I conducted life history interviews (Cole and Knowles, 2001) with 17 senior citizens to examine their changing relationship with water in Jakarta. The purpose of this data collection was to reconstruct 'participatory' pathways in the post-colonial era. The participant selection criteria were senior citizens born before 1950 with extensive experience living in Jakarta (see Appendix 2 for the list of interviewees). To understand how important water is to their life, general questions about the quality of life were asked at the beginning of the interview instead of asking directly about water issues. The participants were evenly distributed all over Jakarta –not concentrated in particular districts– and from a diverse socio-economic background.

After analysing the data, I decided not to incorporate them into the main historical analysis from secondary sources. There were several key messages that can be drawn from their stories, such as massive development in early independence and how flooding has become worse or better in certain parts of the city depending on the development and flood control intervention. These insights were informative, but I do not think they add to the analysis to reconstruct a past pathway. Although not included formally, insights from senior citizens have enriched my perspective in understanding the city's water problem. For example, in-migration plays a role in changing the way the community acts towards their environment, particularly rivers, and proximity to the workplace is the main reason that many squatters have been living in flood-prone areas for decades.

3.2.5 Focus group discussions

Another source of data that enriched my perspective but not explicitly referred to in the text were the two focus group discussions (FGD) that I attended. The first FGD was on the dispute of the 17-island reclamation project held by the Ministry of the Environment in May 2016. It was attended by around 30 people from different ministries and external experts to discuss the significance of having reclamation in Jakarta Bay and its potential socio-environmental problems, especially for the fishing communities. Following a corruption scandal a month earlier, the President of Indonesia created a committee called 'Komite Bersama' consisting of five ministers, including the Ministry of the Environment and other governmental agencies to recommend a policy direction for the reclamation. The second FGD was organised by the Ministry of Planning in September 2016 and focused on creating a policy recommendation for NCICD. The discussion was attended by 15 professors and four consultants.

The topics of the two FGDs were different, but they were related because the 17-island reclamation project has now been integrated with NCICD. The FGDs were very insightful to clarify the NCICD project from diverse perspectives and alternatives solutions. However fruitful the discussion was, I cannot explicitly refer to them in my research. This is because I did not seek consent from the organiser and participants to include their information in my research. The opportunities presented themselves rather last minute, therefore paperwork to seek participants' consent could not be prepared on time.

3.3 Data analysis

The term 'analysis' has long been disputed among social scientists (see Miles and Huberman, 1994; Wolcott, 2009). I use the term analysis in a broad sense as a cyclical process and a reflexive activity to systematically transform and interpret qualitative data in a rigorous and scholarly way. There is permission to experiment and play with analysis (Coffey and Atkinson, 1996) to generate what Geertz (1973) termed as the 'thick description' of data.

In order to analyse the diverse data sources in this research, I employed three types of data analyses accordingly: (i) historical analysis for historical data, (ii) thematic analysis for interviews and policy documents and (iii) discourse analysis for newspaper articles and videos. In addition to explore the multiple facets of my data, these different analytic strategies are also used to construct different versions of the social world (Wolcott, 2009). However, the wide range of choices does not imply that one can aggregate data from different sources in the same way in order to create a single edifice (Fielding and Fielding, 1986), or what Coffey and Atkinson (1996) call as 'vulgar triangulation' (p.14).

I followed deductive analysis principle at the beginning of data analysis to examine whether the data are consistent with the theories. I also adopted inductive analysis in using detailed readings of raw data to derive concepts or themes.

3.3.1 Historical analysis

The purpose of doing a historical analysis in this research is to discern patterns of water-related investments made over the past 400 years in Jakarta to understand how past decisions contribute to limiting present opportunities. In so doing, I adopted the analytical approaches from both historical institutionalism tradition (e.g. Mahoney 2001; Pierson 1996) and water literature (e.g. Kooy and Bakker 2008; Sadoff et al. 2015). This analytical process is summarised in Figure 3.1.

One of the challenges in doing a historical analysis is establishing a causal relationship. I explored many factors, such as political condition, and how they may contribute to the making of a particular decision (whether or not the decision was pursued as a response to particular water-related events). Furthermore, historical data from various sources were not easily converged. For example, different sources cite different years for the same events. This creates difficulty in understanding the sequence of policy response.

Although this analysis was mostly driven by historical institutionalism tradition, I also drew insights from the new institutionalism theory postulated by Scott (1995). I traced flood-related investments by analysing them against three criteria: cognitive, normative and regulative aspects. This approach enabled me to analyse the novelty of a policy response –on whether the investment carried new ideas or not.

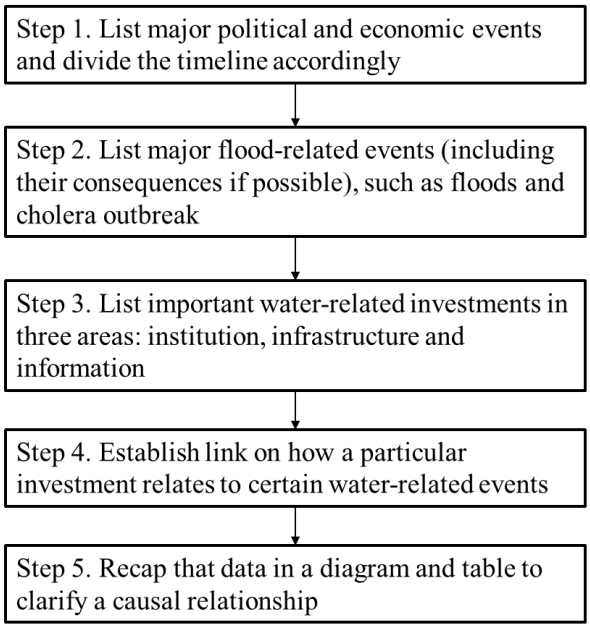


Figure 3.1. Procedures taken to conduct the historical analysis

3.3.2 Thematic analysis

Thematic analysis was used to analyse both interviews and policy documents in this research. This approach allows in-depth and broader understanding of the data and is applicable to be used with any theory. It goes beyond simply counting phrases or words in a text to identify implicit and explicit ideas within the data through coding (Braun and Clarke, 2006). By coding, a researcher can quickly collect together all the coded text, examine the core themes of a code and understand how an idea changes or is affected by other factors. However, Coffey and Atkinson (1996) warn the potential pitfall of using coding is that it may import the researcher's own motives, values and preoccupations into the codes and analytic scheme. Consequently, the analysis may more closely reflect the researcher's own preconceptions and prejudices than the views of informants. Figure 3.2 shows steps I took to do the thematic analysis.

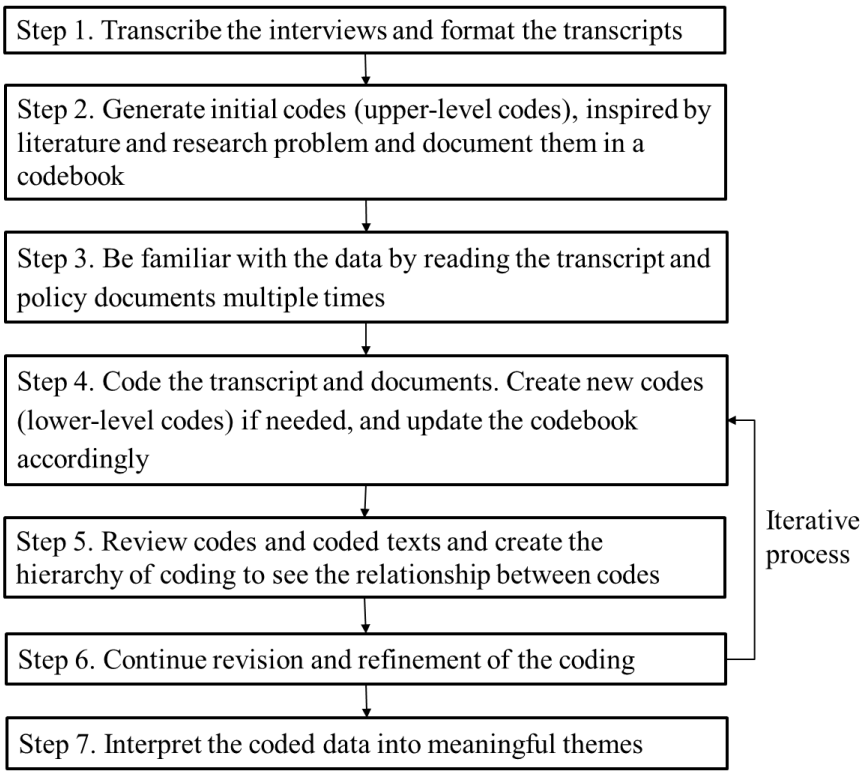


Figure 3.2. Procedures of thematic analysis employed in this research

Due to the amount of data handled, I used NVivo software to help me organise the coding process. The coding process, particularly step 4, 5 and 6, was iterative. I moved beyond coding to generate themes once theoretical saturation has been reached, in which further coding and enrichment of categories no longer provide or promise new knowledge or contradictory points of view. In this final step, I looked for both semantic (explicit) and latent (underlying) themes by paying attention to patterns, irregularities, contrasts and paradoxes (Gibbs, 2012a). A researcher's judgment is the most important determinant to assess which themes are more crucial. A theme is the outcome of coding but not the coded text.

Throughout the process, I recorded the progress of my thinking and constantly refined my research questions and hence, collected more data as required to make connections with emerging themes. Themes interpreted from coding and the relevant research paper addressing each theme is summarised in Table 3.2.

Table 3.2. List of themes and sub-themes addressed in each paper

	Themes	Sub-themes	Paper 1: Jakarta's flood policy evolution	Paper 2: Critical juncture analysis	Paper 3: Situating flooding in water security
Broad water and institutional context	Interrelated water problems: water supply, sanitation and flooding	- Lack of piped water access - Over-exploited groundwater - Lack of raw water (poor water quality) - Poor sanitation services - Land subsidence lead to sinking	✓	✓	✓
	Other institutional challenges	- Lack of law enforcement - Corruption - Lack of integration (regional and within Jakarta)	✓		
NCICD	Interaction of each element of NCICD (coastal reservoir, reclamation, seawall) and their significance to other water security's dimensions	- Environment - Economy - Human basic needs - Environmental hazards and climate change			✓
	Dynamics of policymaking process	- Relation to the 17-island policy and the corruption - Dutch involvement - Private sector involvement		✓	
	Social justice issue	- Eviction - Fishers' welfare - Exclusive development			
	Alternatives	- Decentralised dike reinforcement - Prioritising to stop land subsidence first		✓	✓

To illustrate my analytical process, responses to my question 'What is your view on NCICD?' were varied and can be further classified into several categories, such as environmental and economic concerns. Interviewees put different weight on each element of NCICD with poor water quality from the coastal reservoir as most interviewees' ultimate concern. The issue of social justice emerged as a distinct topic that has been related to wider development policy in Jakarta.

3.3.3 Discourse analysis

For the newspaper database, I conducted both thematic and content analysis. I was interested in knowing how many articles discussing particular topics, e.g. reclamation, land subsidence, flooding, social justice, were published after a particular event, be it political, economic or water-related events. This analysis enabled me to understand how discourse has developed over time and what events are likely to trigger particular attention. Figure 3.3 shows the general procedures I developed for discourse analysis inspired by previous works (Sutherland, 2005; Walton and Boon, 2014). In compiling the newspaper articles, I found it practical to put them in chronological order as there may be similar news published by different news agencies in one day.

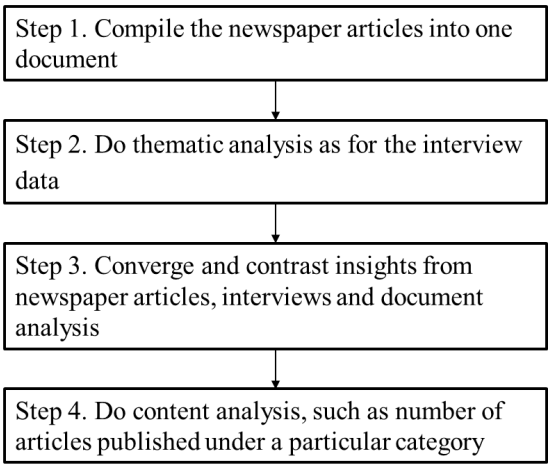


Figure 3.3. Procedures of discourse analysis employed in this research

3.4 Research ethics

This research has been approved by the Central University Research Ethics Committee (CUREC) of Oxford University in April 2016. I believe that the conduct of my research is ethical not only in the sense that relevant procedures have been undertaken following the university's guide of ethics, but also in spirit, in the respect shown to others, such as no 'judging' response given by the researcher during the interview. In this section, I address some ethical concerns involved in the interviews and describe briefly issues raised when interviewing senior citizens.

There are several ethical concerns in carrying out this research: obtaining informants' consent, using snowball sampling method and protecting informants' identity (Gibbs, 2012b). At the beginning of my interview, I started by giving a participant information sheet to the informants consisting of brief information about the research and talked them through the sheet. When possible, I also sent the sheet via email several days prior to the interview. Informants often asked for the list of interview questions in advance to prepare for the interview. Once they understood the context of the interview, I asked whether they were happy to give written consent or if they would be more comfortable to give verbal consent. Most of them gave me verbal consent to do the interview. The practice of seeking written consent is common in the western society and widely recognised amongst Indonesian academics; however, it is not widely implemented in Indonesia. According to my previous research experience in Jakarta, written consent may put pressure on the informant to give the 'correct' answers to the interviewer's questions.

Another ethical issue is raised from using the snowball sampling technique to gain access to informants (Noy, 2008). This approach may give pressure for informants to participate in this study as they were recommended by their colleagues or boss.

Therefore, I informed the participants that their involvement in this study was voluntary and they could withdraw themselves and their data from the study without penalty at any time and without giving any reason.

The last general ethical concern is the protection of interviewees' identity (Stuart and Barnes, 2005). Their identities were masked in the research outcomes. They were allowed to choose the level of anonymity that they desire. Should I need to use quotation and identify a source, additional verbal and/or written permission were sought. Insights from interviewees were referred to by particular code (e.g. LG8 means local government official number 8, see Appendix 2). Files containing interview transcripts and the informants' identity are saved in a password protected file to ensure the security and safety of the data.

Special attention was given to the interviews with senior citizens to understand their changing relationship with Jakarta's waters. Although data from these interviews were not explicitly referred to in the research, there are some issues worth mentioning. As the interviews with senior citizens involved questions that ask the participants to recall their memories, there was the possibility that sad or upsetting memories may be recalled or talked about. I reminded participants that they do not need to talk about any topic that made them uncomfortable. While I maintained the appropriate level of politeness with all informants, I paid particular attention when interviewing the elderly in terms of the level of formality of language used.

3.5 Reflexivity: Positionality and limitation

The role of the researcher in generating and interpreting qualitative data is crucial. Values of the researcher affect his or her judgement of the data. This 'recognition that the product of research inevitably reflects some of the background, milieu and predictions of the researcher' is known as reflexivity (Gibbs 2012, p.91).

Reflexivity of research suggests that no researcher can guarantee objectivity and claim to be an authoritative, politically neutral observer standing outside their reports (Merriam, 2009). Therefore, it is of major importance to constantly document close reflections of potential findings and implications during the research process.

Because the identity of the researcher matters, I was mindful of the decisions I made during the research process and the risk of bias involved in data interpretation. Here, I reflect my identity in assessing how it influences my worldview towards this research topic. To minimise personal bias, I employed triangulation methods[4] so that the conclusion is drawn from multiple and diverse sources of information.

I lived in a neighbourhood built on a dried swamp in Depok (a satellite city of Jakarta). As a result, this area was frequently flooded during rainy season. I grew up with a belief that the panacea to flooding is by building a channel or lining rivers with concrete –anything involving hard structures aimed at carrying flood water as fast as possible to the sea. However, during the research process, I constantly strived to criticise this pre-existing belief to look the flooding problem in a new light.

Moreover, my engineering background carries some influence with regards to making sense of the data. On one hand, it benefited me by allowing my understanding of the technical terms of policy documents and the language and level of uncertainty that an experimental model uses. This technical understanding has been simplified in public discourse turning NCICD into a 'black box' that is not transparently understandable. On the other hand, this engineering knowledge has embedded a thinking that science and engineering exist genuinely to help solve human problems. However, after deep engagement with literature and interviews, I started to see that this

[4] According to Denzin (1989), there are four types of triangulation: (i) data triangulation, (ii) investigator triangulation, (iii) theory triangulation, and (iv) methodological triangulation. This thesis applies all types of triangulation, except the investigator triangulation. I used different data sources, multiple theoretical perspectives and various methods to make informed decisions and draw conclusions.

genuine intention is not always, or perhaps will never be, the case. There are leitmotifs behind an infrastructural project.

Issues on ethnicity and religious views surfaced in the reclamation debates. Jakarta's former governor, Basuki Tjahja Purnama (known as Ahok) who is of Chinese descent was accused by several groups to favour Chinese developers by giving only them permission to do land reclamation. I do not think that my Malay ethnicity and religious belief affect my position as a researcher in this context. I was fully aware of that issue and took precautions to minimise bias by searching for different data to triangulate my findings on this sensitive topic.

Reflecting on my methodological choice, I was aware that my inability to gain access to interview the private actors involved in the reclamation project may cause an incomplete understanding of this megaproject. It was very difficult to reach them during the upheaval following a burst of corruption scandal between a city councillor and a developer company (Artharini, 2016). Given this difficult situation, I hope that their representation through opinions of other actors, both in favour of or against their involvement in the project, would be able to clarify their role.

During data analysis, I had to constantly decide which themes should be pursued further, and which should be dropped. Because the data was interpreted solely by me, I was aware that this data reduction activity was a subjective process. However, some precautions were taken to limit subjectivity, such as multiple reading of the text and thorough coding process until saturation point was reached. Regarding data reduction and limited access to particular information, I am cognisant that not every single hint of NCICD politics emerged from interviews could be further investigated or clarified. For example, an informant was suspicious that fund campaign for presidential election in 2014 came from the contribution of land developers in Jakarta Bay. I was not able to

follow-up this suspicion as the resources it takes to carry out such investigation are beyond the scope of this research.

This reflexive account of my identity, preconceptions and the course of the research process enabled me to identify the limitation of this research. My attempt to minimise bias by triangulating findings using different sources of data and methods ought to provide a reasonable argument to the discussion and debate in advancing the concept of water security.

Chapter 4. The evolution of Jakarta's flood policy over the past 400 years: The lock-in of infrastructural solutions

Abstract

This paper presents an analysis of the evolution of flood policy in a city in the developing world. Jakarta was selected in order to analyse the role of colonialisation on water policy. Drawing data from historical sources and interviews of key informants, we mapped the history of flood-related investments made in the city for the past 400 years. Using analysis informed by historical institutionalism, we argue that Jakarta's flood management institutions have been locked-in to infrastructural measures. Some major flood events were able to create critical junctures, resulting in the implementation of old policies and the instigation of flood research. However, they were not able to introduce institutional changes. The persistence of engineering driven solutions to cope with flooding can be explained by the positive feedback mechanisms taking place after major floods. Infrastructure, albeit expensive, provides a fast relief to flooding, which is ideal to short political cycles. Scientific knowledge introduced by the colonial government plays an important role in sustaining this persistence. The current massive seawall proposal to alleviate increasing flood risks due to land subsidence and sea level rise exacerbate the path-dependency of infrastructural measures.

Keywords

Flood policy; postcolonial city; Jakarta; historical institutionalism; positive feedback

4.1 Introduction

Many cities in the world are struggling with a myriad of urban problems (UN Habitat, 2016). In the case of Jakarta, it also has to deal with the fact that it is sinking fast to the ground. Parts of North Jakarta is subsiding at an average rate of 15 cm per

year (Abidin et al., 2011) making it among the fastest sinking city in the world (Sherwell, 2016). Lying on a delta, Jakarta is naturally vulnerable to flooding (Valkenburg, 1936; Dudal, 2005). In 2007, a major flood inundated more than 60% of Jakarta's area; it resulted in 79 deaths, 500,000 people evacuated, and almost USD 680 million in losses (Bappenas, 2007). The flood[5] was caused by a combination of high rainfall intensity within the city, runoff water from upland areas, and high tides (Brinkman and Hartman, 2009). The government is now taking action to mitigate the impacts of land subsidence and sea level rise. Following a major flood in 2013, the Government of Indonesia launched an ambitious 32-km offshore seawall project to close Jakarta Bay and reduce sea level in the artificial coastal lagoon within the wall (NCICD, 2013). The NCICD plan has unsurprisingly sparked debates since its launch, particularly in social and environmental aspects (Octavianti and Charles, under review/Chapter 6).

This seawall plan complements a recent canalisation[6] project in a 19-km stretch of Ciliwung River, the city's largest river. This project is also controversial, not only because 70,000 of the river bank settlers were forcibly evicted (Van Voorst 2016), but also because the expensive project was perceived by some local experts (Monalisa, 2015) to be an unsustainable solution for the flooding problems. Both the seawall and canalisation projects represent infrastructural solutions to control water. While it was once common practice internationally, ecological approaches are gaining favour, such as the 'Room for the River' in the Netherlands (Rijke et al., 2012) and the incorporation

[5] Almost every rainy season, Jakarta is flooded. A terminology of *banjir lima tahunan* (five-year cycle flood) was popular to refer to major floods that happened in a five-year cycle, starting in 1996, 2002, 2007 and 2013.

[6] Canalisation is an engineering practice to line natural river with artificial materials, especially concrete, to secure a defined dimension to carry flood water. There is an ambiguity between the terms 'canalisation' and 'normalisation'. Normalisation, we reckon, is a practice to normalise (to return to a normal situation) river banks, that does not necessarily include the practice of canalisation. The term normalisation is commonly used in Jakarta for the canalisation practice. However, in this paper, we use the term canalisation consistently to refer to the river lining efforts.

of ecology to flood management in Hungary (Werners et al., 2010). Although some places are still using (e.g. Osti, 2017), or are now returning to (e.g. Warner et al., 2017), infrastructural solutions to deal with frequent flooding.

Previous studies have looked at the effect of colonialism in shaping the present water infrastructures in postcolonial countries. Colonial governments have used science to secure colonial rule and justify their domination in their colonies (Adas, 1989), for instance in India and Egypt (Buckley, 1893). A variety of waterworks (dams, canals, and sluices) to control the flow of water was claimed as more rational and efficient than indigenous approaches (Murphy, 2009), although the outcomes were mixed (Beinart and Hughes, 2007). This 'imperial science' (Gilmartin, 1994) has played a significant role in how postcolonial governments govern their country. For example, Mustafa (2013) argues that policymakers' attempt to tame urban floods in Islamabad, Pakistan by stressing engineering solutions is partly a result of the colonial history of the country.

Jakarta is no exception; the city has been shaped physically by two grand floodways: the West and East Flood Canals with 14.5 km and 23.6 km respectively (Gunawan, 2010). Both canals were planned during the Dutch occupation, although the East Flood Canal was only constructed in 2003, when funding became available. This paper traces Jakarta's flood history and its policy evolution over the past 400 years to investigate how flood policy has evolved in response to major floods, and what pattern can be discerned to further understand the impacts of past decisions in contemporary measures.

Jakarta was occupied by the Dutch for more than three centuries.[7] This long colonial history has embedded certain characteristics and affected how postcolonial governments behave and set rules. Other scholars have conducted historical analyses of water policies in Jakarta, such as Argo (1999) and Kooy and Bakker (2008) in the drinking water sector, Putri (2014) in the sanitation sector and Gunawan (2010) in flood policy. They found that some characteristics, such as inequality, persist today in water policy. With regards to the current study, Gunawan (2010), who described historic flood events and some flood plans in great details, provides a good starting point for further analysis in the flood policy evolution.

Looking specifically at the NCICD plan, it is worth noting that the Government of the Netherlands plays a significant role in promoting NCICD through a consortium of Dutch engineering consultants and a grant for conducting a feasibility study (Tyas, 2016). Jakarta has a long history of occupation by the Dutch and thus they governed, or more precisely created, the city's early water management. We are, therefore, interested in exploring whether, and how, this colonial legacy has either enabled or puts constraints on the present flood policies.

To understand how past decisions influence contemporary water policies, we employ historical institutionalism (HI) approach as the analytical framework in this paper. Institutional analysis is used because institutions manifest the structures and mechanisms of a social order, a reflection of how actors behave and function according to a set of rules (Thelen, 1999). It enables us to explain the variation in policy outcomes in different regimes by explaining the ways in which national and local political

[7] Jakarta was the centre of trading during VOC time, and had been constantly under the governance of the Dutch and its allies. However, the exact total of colonialisation time in Indonesia as a whole is still a controversy. Many Indonesians believe the Dutch domination over Indonesia archipelago was around 350 years in total (or specifically 323 years from 1619 to 1942). But Resink (1968) argued that this is not the case as there was a variegated pattern of Indonesian states maintaining themselves even until the 20th century with the overt or passive occurrence of Dutch colonial authority.

institutions are structured and how institutional reforms in the past were constrained by the established arrangements at a given time (North, 1990; Marshall and Alexandra, 2016). Diagnosing mechanisms that sustain particular institutional patterns can inform policy entrepreneurs on how to advocate radical policy changes (Thelen, 1999). The HI approach has been used to analyse reforms in water policy, for instance in the irrigation sector (Libecap, 2010), flood management (van Buuren et al., 2016), sanitation infrastructure (Meacham, 2009) and broader water governance issues (Sehring, 2009; Blanchet, 2015).

Along with rational choice institutionalism and sociological institutionalism, HI is a prominent approach in institutional literature (Fioretos et al., 2016). The emphasis of HI is on 'how institutions emerge from and are embedded in concrete temporal processes' (Thelen, 1999: 371). Besides its historical orientation, HI differs from other social science approaches in its attention to real-world empirical questions and to the ways institutions structure and shape political behaviour and outcomes (Steinmo, 2008). Although HI has historically emphasised institutional stability or path-dependency (Peters et al., 2005), analysing institutional changes is also an important element of HI (Thelen, 1999). Feedback mechanism developed under the HI corridor (Pierson, 2000) provides an analytical framework for analysing institutional reproduction or stability, while critical juncture works as a powerful tool to analyse institutional changes (Capoccia, 2016). During critical junctures, certain conditions disrupt the particular mechanisms sustaining a path's stability (Capoccia and Kelemen, 2007). As a result, the likelihood of policy change is higher than usual. We shall use both HI's elements in investigating the evolution of Jakarta's flood policy.

This study builds on current understanding of the intersection of two fields: the politics of flood management and planning. These politics have been examined in

multiple forms of analysis, using case studies worldwide. Amongst the frequent topics are the contention to build on a flood zone (e.g. Krause, 2012; Porter and Demeritt, 2012) and the scalar politics raised between the local and central governments regarding the responsibility and authority to act on a flood event (e.g. Penning-Rowsell and Johnson, 2015; Moore, 2017). Our paper contributes to this discourse by bringing a postcolonial context and analysing to what extent the present flood policy is locked in to previous measures, despite increasing flood risks from global climate change, land subsidence and massive land transformations. In Jakarta, spatial planning has become an increasingly political process since the implementation of a decentralisation policy in 2001 (Silver, 2014). The connection between flood management and planning in the city can be seen ultimately in the eviction of 'illegal' kampungs (urban villages) in the name of flood mitigation (Leitner and Sheppard, 2017). Some evictions, however, were conducted to make space for commercial real estate projects to modernise the city and cleanse them from visible poverty (Leitner et al., 2017).

In this paper, we argue that Jakarta's flood policy discourse over the past 400 years has always been dominated by infrastructural solutions, the implementation of which are concentrated in the contemporary era. Some critical junctures, mostly those triggered by flood crises, were evident, but they were unable to bring radical changes, resulting in path-dependency of flood management institutions. We present a novel historical analysis of key flood management policies of each political regime along with its socio-economic and political condition in Section 4.3. Section 4.4 discusses the historical analysis against the HI framework, and section 4.5 concludes the argument presented in this paper.

4.2 Methodology

The data used in this paper comes from two main sources: secondary sources and key-informant interviews. Fieldwork was conducted in Jakarta from May to September 2016. Archival research was undertaken in ANRI (*Arsip Nasional Republik Indonesia* or The National Archives of the Republic of Indonesia) in Jakarta to find policy documents related to flood management in the colonial era and the early years of independence. Further historical analysis employs resources from credible secondary sources which includes books, academic journals and policy documents.

The historical and contemporary analyses include interviews of 38 key informants, which consists of policymakers, academics, NGO practitioners and individual experts. Interviews are referred to by their code; CG: central government officials (6), LG: local government officials (8); AC: academics (10), NG: NGO activists (7) and KI: individual experts (7). To avoid bias, we aim for an objective understanding of Jakarta's flood policy evolution by considering views from outside of the government (academics, NGO activists and individual experts) as well as inside (national and local government officials). The interviews were conducted face-to-face in a semi-structured format. The questions in the interview were regarding the informants' views on flood control measures by the current government and, if relevant to their expertise, by that of preceding governments. We particularly used the interviews to understand the development of flood policy in the more recent period (post-1945) and to help us identify secondary sources. Given the long period (400 years) under consideration in this research, our primary data collection was of secondary sources that we triangulated with the data collected from the interviews.

To trace the evolution of flood policy, we employ an approach developed by Sadoff et al. (2015), who divided water-related investments into three groups (3Ins):

infrastructure, institution, and information (Table 4.1). They also noted other events, such as crisis and political events, that may affect the policy-making process. In Jakarta, we observe that major flood events affecting the city's economy and the changing of political leaders are the most influential factors in triggering policy responses. We follow North's (1990) definition of institution as 'the rules of the game in a society, or more formally, are the humanly devised constraints that shape human interaction' (p.3). This broad definition allows us to include formal laws, policies, organisations (Streeck and Thelen, 2005), as well as informal network and coalitions (Marcussen, 2000) under the term institution. Sadoff et al. (2015) also adopted North's (1990) definition of institution as the rules of the game. The separation of investments into three groups (3Ins) does not necessarily mean that they are mutually exclusive. A decision to build infrastructure, for example, is the result of human interaction in formal or informal contexts and reflects how certain values in an institution develop. This infrastructure would later be an indication of how an institution was previously governed.

The approach that we undertake in this paper has been developed to ensure the data analysis is systematic. Historical institutionalists believe that 'history is not a chain of independent events [and, therefore, are interested in] … these interactive effects on the interdependence of multiple causal variables' (Steinmo, 2008, p.166). To understand the pattern of a policy over a long period of time, investigation of causal structures of the social or political world requires the analysis to be done systematically (see Collier, 2011). By systematic analysis, we mean that the pieces of information collected from various sources are carefully triangulated and linked to explain the causal mechanism of an event; the cause and effects associated with a flood event. Due to space constraints, however, we do not explore an in-depth counterfactual analysis to answer: what would happen if actors chose a different path? (Peters et al., 2005). The

lack of a counterfactual analysis may lead to a seemingly descriptive one, but we hope our systematic event-based analysis will be able to meet our goal of understanding why a certain choice was made and why a certain outcome occurred.

This paper adopts a chronological review (Section 4.3) in line with the historical institutionalism framework to unfold the evolution of Jakarta's flood management institutions (and investments). This chronological order enables us to trace flood policy in the context of Jakarta's changing political and socio-economic conditions in each political regime. The timeline is divided based on radical political change, signified by new leadership and ideologies. These events were also reviewed through the lens of the new institutionalism theory postulated by Scott (1995). Here we systematically traced flood-related investments by analysing them against three criteria: cognitive, normative and regulative aspects. This approach enabled us to analyse the novelty of a policy response. The analysis was undertaken as part of a broader analysis of water policy evolution in Jakarta, that includes drinking water and sanitation policies.

Table 4.1 Framework for water policy evolution adopted from Sadoff et al. (2015)

Infrastructure	Institutions	Information
Construction, irrigation infrastructure, reservoir/dam/ hydropower, sewage/ sanitation infrastructure, environmental	Allocation, cooperation/new organisation, environmental, irrigation/ agriculture, policy, permit, plan	Monitoring/measuring, hydro-meteorological, modelling, study/report

4.3 The evolution of flood management institutions: The narrative

This section discusses the evolution of flood policies in Jakarta chronologically and, where possible, their connection to other water sectors as the city grows since colonial era in the 1600s up to the present time. Table 4.2 summarises key flood investments in each political regime. The first two regimes (colonial era) were dominated by investments in infrastructure and information (research on flood mitigation). Following the difficult times in the early independence period (1940s-

1966), some key investments were made in the New Order era (1966-1998), such as small water retention basins within the city and canalisation projects following two major floods in 1976 and 1979. As the floods were getting worse, notably due to land subsidence, the government focused on infrastructure measures in the contemporary era by implementing old policies (e.g. the East Flood Canal), undertaking canalisation and, most importantly, launching an unprecedented scale of an offshore seawall to prevent the city from sinking further.

4.3.1 Early occupation: A walled town of Batavia (1619-1810)

Canals were the main feature to combat floods in Batavia (Jakarta's former name). Canal digging has been documented as early as the 5th century in *Prasasti Tugu* inscription (Heuken, 1983). This may have been the city's first attempt to cope with flood problems. The earliest recorded major flood happened in 1621 (Gunawan, 2010), three years after VOC (*Vereenigde Oost-Indische Compagnie* or Dutch East India Company) conquered Batavia. The company soon built canals inside Batavia's inner walled town, raising ground levels with the excavated dirt. These canals served as the only means of transportation and drew Europeans to live along them (Abeyasekere, 1989). Within 30 years of occupation, more than five canals were built in 1.3 km^2 Batavia's area (Abeyasekere, 1989; Putri and Rahmanti, 2010).

Table 4.2 A summary of key flood control investments in each political regime

Political regimes	Major floods	Key flood control investments		
		Infrastructure	Institution	Information
Early occupation (1619-1810s)	1621, 1714, 1733 (malaria incident)	1620s-1650s: A system of canals within Batavia town 1718: Manual dredging (maintenance) 1725: Westward canals		
Moving to *Weltevreden* (1810s-1940s)	1854, 1878, 1918	1878: Upstream canal 1918: *Bandjirkanaal* (West Flood Canal) 1928: KIP		1911: Research by *De Commissie voor den Waterafvoer de Watervoorziening van Batavia* 1917: Research by H.V. Breen 1940s: Research by W. J. van Blommestein
Early independence (1940s-1966)	1942, 1965		1965: *Kopro Banjir*	
The New Order era (1966-1998)	1976 (26,000 evacuees), 1979 (20 people killed; 700,000 evacuees), 1996 (20 people killed; 2,640 evacuees; 745 houses affected)	1960s: Water retentions construction 1968: KIP 1978-1983: Canals and pumping station construction (Cengkareng and Cakung drains; Siantar pumping station); dredging (maintenance)	1972: PBJR 1973: *Jabotabek* concept	1972: Research by NEDECO
Contemporary Jakarta (1998-2016)	2002 (25% area inundated; 30 people killed; 380,000 evacuees), 2007 (60% area inundated; 79 people killed; 500,000 evacuees), 2013 (14% area inundated; 20 people killed; 50,000 evacuees)	2003: East Flood Canal 2009: World Bank's dredging projects (maintenance) 2013: Normalisation of some dams 2013: Canalisation of Ciliwung River	2008: Regulation on regional planning 2013: NCDID plan	2007: Research in collaboration with the government of Netherlands (JCDS study)

Note for Table 4.2: The severity of flood depicted by areas inundated and/or total number of people affected is also presented, where data available. KIP - Kampung Improvement Programme; PBJR – *Proyek Pengendalian Banjir Jakarta*; NEDECO – Netherlands Development Company; NCICD – National Capital Integrated Coastal Development; JCDS – Jakarta Coastal Defence Strategy

The canal system slowly caused the river to lose its current and, consequently, deposit copious amounts of sediment (de Haan, 1935). The eruption of Mount Salak in 1654 brought silt in high quantities, worsening the state of the river (Kanumoyoso, 2011). After a violent earthquake in 1699, the Ciliwung River changed its course and brought down high quantities of earth, choking the canals (Heuken, 1983). This was exacerbated by intensive land clearing for farming in the uplands and sand brought in by high tides, closing the mouth of the river (Kanumoyoso, 2011). As the population grew, these canals were quickly clogged due to rubbish and sewage being deposited into the river (Abeyasekere, 1989), including pressed sugarcane from sugar plantation in the upstream areas. This waste ended up in the canals in front of the Batavians' houses and the running streams became a nuisance. No one paid attention to this poor stream condition (Jayapal, 1993) until in 1718 when VOC employed one hundred slaves to remove the mud from the canals (Vlekke, 1943). However, task was halted when it was seen to be endless (Blussé, 1986). Despite the clogging canals and their consequences, the canal approach was still viewed as the ultimate solution for flooding (Gunawan, 2010). In 1725, a series of flood canals were constructed westward of the town (Abeyasekere, 1989).

The poor living environment in the walled town caused the deterioration in health conditions by the late 17th century. By that time, 4,000 slaves had to be imported to replace those who had died (Heuken, 1983). Their deaths were mainly caused by waterborne diseases, such as dysentery, cholera and typhoid (Abeyasekere, 1989) as Batavians took their drinking and bathing water from the same canal they threw their waste into. In 1732, a long canal called *Mookervaart* (main stream) was dug in Ommelanden (areas outside the walled town) to provide a better water source for Batavians (Blussé, 1986). The water supply increased but the stagnant pools remained

and during dry season these pools became a breeding place of *Anopheles sundaicus*, a vector of malaria (Brug, 1997). A year later, a malaria epidemic struck Batavia causing more than 1,000 people to die (Brug, 1997), though only the Europeans had a sudden and high death toll from malaria, while the Chinese and Indonesians were less affected by the disease (Vlekke, 1943). Europeans were thought to be strongly affected as their houses were clustered close together along the canal banks, similar to the prevalent design in the Netherlands (Jayapal, 1993). A series of public health fatalities in the ensuing decades culminated in 1775 with more than 3,000 people dying from malaria (Brug, 1997), changing Batavia's title from 'the Queen of the East' to 'the Graveyard of the West' (Blussé, 1986). Nothing significant was implemented by the company to deal with this on-going crisis (Argo, 1999).

The exploration, and further exploitation, of Ommelanden had a significant role in escalating the flood problems. Once Ommelanden was relatively safe from Bantenese attack, private initiatives to open industry outside Batavia started (Kanumoyoso, 2011). For example, the Chinese Kapitan Phoa Bigam dug a canal in 1648 to float timber from the woods catchment downstream to the harbour (Niemeijer, 2003). Starting in 1721, the emergence of sugar industry and rice paddy fields in the catchment areas degraded the environment, increasing runoff and pollution (Kanumoyoso, 2011). Economic motives to profit from farming activities created massive deforestation in Ommelanden. Sugar mills needed water to operate the plants, with firewood for fuel, therefore they were ideally located near rivers and forests. Private sectors continued to search for virgin forests for the mills (Boomgaard, 2005). Moreover, rice paddy fields needed constant water throughout the year, therefore, people began to build small dams to store water for their farms (Niemeijer, 2003). These practices changed the course of the rivers, while deforestation increased runoff to downstream areas, including Batavia.

In this period, policy responses to flood crises were slow and this can be attributed to several reasons. First, Batavia was established as a trading port, not as a colony (Abeyasekere, 1989); only policies supporting this function were sought. Second, VOC was the sole manager of the town. The company set policies to segregate Batavia's communities; only those working for the companies were included in social affairs (Vlekke, 1943). This policy did not address the majority of the community, including the so-called private citizens (Europeans who were not working for the company), Chinese, and Indonesians. Third, approval from the Netherlands' government was required for Batavia's strategic policies (Blussé, 1986). This procedure created substantial lag time between incidents and policy responses. Some VOC's elites proposed the creation of a city council, or *vroedschap*, to the government, but they did not succeed (Blussé, 1986).

4.3.2 Colonial times: Moving to Weltevreden (1810-1945)

The collapse of VOC in the late 18th century was followed by major reforms in Batavia's polity. Under the leadership of Governor General Herman W. Daendels (1808-1811), the colonial administration was moved to Weltevreden (Sutherland, 1979), six kilometres south of the old town. He also ordered the destruction of the wall surrounding the town. Whatever the cause for the high death rate, Batavians could easily see that the walled town was extremely unhealthy and practically inhabitable (Abeyasekere, 1989). The well-to-do people then began moving southwards, while the poor who depended on seasonal labour remained in the deserted old town (Jayapal, 1993). Living in the south was considered healthier[8] and signified a new era of Dutch

[8] The mortality rate of Europeans declined significantly because they moved from the Malaria-ridden lower town to an area less subject to flooding and with better access to water via deeper artesian wells (Abeyasekere, 1989).

occupation in Batavia: from merely a trading port to a colonial capital of the Netherlands (Abeyasekere, 1989).

Since then, the colonial government exercised different types of polity in Batavia. The first one was forced cultivation system, or *cultuurstelsel*[9], (1830-1870) (Furnivall, 1939). Insignificant material gains to the colony and declining welfares among the natives resulted in the abolishment of this system in 1870 and its replacement with the Liberal Democratic system (Carey, 1980). The new system allowed private sectors to take over economic activities once controlled by the government. The new policy resulted in more money remaining in the colony, though with no significant improvements in the material living standard of the colony, particularly for the natives (Furnivall, 1939).

The beginning of the 20th century saw the introduction of a layer of new policy called 'ethical policy' (Abeyasekere, 1989). The ethical policy was proclaimed as a moral obligation towards improving the welfare of the colony. The government of the Netherlands disbursed money that can be used for education and infrastructure development in Batavia (Vlekke, 1943), and enabled local initiatives in the political arena. However, this decentralisation of power was also viewed as the colonial government's desire to slough off its urban responsibilities, due to the colony's growing financial and administrative burden to the government (Abeyasekere, 1989).

The combination of laissez-faire and ethical policies had a particular impact on water policies. This was the first time after three centuries of colonisation, water (particularly drinking water and sanitation) has been high on the colonial government's agenda (Kooy and Bakker, 2008). They wanted to create a hierarchy of decent colonies,

[9] In the Forced Cultivation system, farmers were mobilised to plant high-value crop that had to be sold at low fixed prices (Vlekke, 1943).

while maintaining their high position as the colonial government (Milone, 1987). As a result, some investments were made in the water and sanitation sector, such as transferring artesian wells to the natives in 1920 (as the wells were redundant for Europeans who now enjoyed superior spring water) and Kampung Improvement Programme (KIP) in the natives' settlements in 1928 (van der Heiden, 1990; Hadimadja, 2012).

The case was different for flood policy. Compared with other water issues, flood has been the company's ultimate concern since the inception of Batavia (Argo, 1999). However, only after capital was available did the company start to make a comprehensive flood alleviation plan for the city.

The flood control plan was a result of favourable political conditions triggered by a flood crisis in 1918. Flooding in Weltevreden was more problematic as more people crowded the city[10] (Gunawan, 2010). At least two major floods (in 1854 and 1878) were recorded before the 1918 flood (Sedlar, 2016). Some canals were dug upstream to divert flood water as a response to 1878 flood (Abeyasekere, 1989). However, this response was relatively smaller in scale in comparison to the policy response following the 1918 flood. As more capital was available in Batavia from liberal and ethical policies, large infrastructure could be built to alleviate flooding. Policy responses to flood were particularly important to secure private investment in Batavia at that time. The core of the flood control plan was to build the West Flood Canal, or *bandjirkanaal*, to carry surplus water from Ciliwung River westward of the city and to the sea. The canal was an engineering triumph and presented signs of

[10] Although more people came to Batavia, high mortality rate due to persistent unhealthy conditions restricted the town's population growth (Hugo, 1980).

modernisation in Batavia, while also providing an abundance of water from a distant river (Argo, 1999).

4.3.3 Early independence: Soekarno's Jakarta (1945-1966)

In the early years of Indonesia's independence in 1945, Soekarno, the first president of Indonesia, was a central figure in deciding the development of Jakarta. As an architect, he believed that architecture and town planning could serve to create an ideal society (Leclerc, 1993). His vision was to transform Jakarta into an international city, a show-piece of Indonesia that is full of magnificent structures (Crouch, 1980). He realised his vision, which was not supported by the economic reality, by creating grand symbols to show off to the world that Jakarta was an equal to any great modernity. His approach was criticised by some scholars: '[Jakarta] was strong on rhetoric and symbols and weak on revolutionary reality' (Abeyasekere, 1989: 167). As resources were directed to achieve his vision, limited resources were available for the government to address basic services.

With the help of international scholars, Jakarta's first attempt to create a master plan was initiated in this period and finished in 1960 (Forbes, 1990). The master plan included the expansion of industrialised estate, investment in housing programmes, an extension of water supply, drainage, rubbish collection and the preservation of green areas in the southern part of the city (Abeyasekere, 1989). Soekarno played a major role in designing the master plan as he imposed his own priorities on the planning team. However, staff shortage and the political condition hindered the plan's execution (Tambunan, 1996). It was impossible even to have it discussed, much less approved. Some observers found that this was actually good because the plan was unrealistic. The master plan was then allowed to slip into oblivion (Abeyasekere, 1989).

Jakarta's early development as an independent city affected the severity of flood problems within the city. One of Soekarno's grand projects[11] was the construction of a 300-hectare sports complex in Senayan in 1962. The construction required people living in Kampung Senayan to move to other areas, such as Kemang and Tebet (Gunawan, 2010). Those two areas had been designated as green areas for stormwater infiltration since colonial times, and therefore only five percent of the land in these areas should be built on. Moreover, the emergence of new towns[12], such as Grogol, Rawamangun, and Kebayoran Baru, as a response to the housing crisis exacerbated flood problems as they were built on dried swamps (Gunawan, 2010). Those newly developed areas that were not in accordance with the city planning, at least the plan from colonial times, have been frequently inundated since then (Silver, 2008; Rudi, 2015).

To address the flooding problem, Soekarno created an institution called *Kopro Banjir* (*Komando Proyek Penanggulangan Banjir* Jakarta or Command of the Flood Mitigation Project) in 1965, in which he primarily used a flood control plan created during colonial time (Caljouw et al., 2005; Gunawan, 2010). A long-term project was announced by the Department of Public Works, namely:

> *the construction of 89 kilometres of canals, and the dredging of 750,000 cubic metres of earth in rivers and estuaries, as well as the construction of pumps, bridges, and flood control gates and the relocation of residents from an area of 478 hectares (Sethuraman, 1976: 39).*

However, the plan was not implemented due to funding constraints (Caljouw et al., 2005).

[11] Such grand projects are also popularly called as '*proyek mercusuar'* (lighthouse project). Suharto, who replaced Soekarno, used the term to refer to grand projects that would demonstrate Indonesian's status in the world (Bourchier and Hadiz, 2003).

[12] During this period, the government specified eight new towns within Jakarta: Ancol (803.3 hectares), Kampong Gusti/ Pluit (1,415.6 hectares), Jelambar (571.6 hectares), Tomang Barat (645.7 hectares), Tanah Kusir (428.13 hectares), Tebet (288.96 hectares), Kebayoran Baru (801.6 hectares) and Rawamangun (470.5 hectares). By the end of 1960, the total area of Jakarta was 590 km^2, with 180 km^2 dense region occupied by 65 percent of people (the total population was 3.6 million in 1966) (Gunawan, 2010).

4.3.4 The New Order era (1966-1998)

When President Suharto (1966-1998) came into power, the New Order[13] era begun; the role of Ali Sadikin (1966-1977) to govern Jakarta early in this period was indispensable. His main task was to deal with the massive population increase[14] resulting in squatters in many unoccupied lands, even in dangerous places, for example top of levees, under bridges and along canals (Hadimadja, 2012). About 70,000 people squatted illegally on the city fringes (Abeyasekere, 1989). Clearing illegal squatters for new projects, such as road widening and river normalisation, was expensive and time-consuming. Illegal occupation of empty urban spaces was also partly due to a policy not to disclose city planning to the public to avoid land speculation. His attempt to reduce urban influx by introducing the 'closed Jakarta' policy was unfortunately not successful (Hadimadja, 2012). This urbanisation has been described as a failure of the national government to provide work outside Jakarta (Mulyana, 2012).

Flooding was still a major problem in this era and a variety of responses were observed. *Kopro Banjir* created in 1965 was transformed to PBJR (*Proyek Pengendalian Banjir Jakarta Raya* or Jakarta Flood Control Project) in 1972 (Gunawan, 2010). The latter covered surrounding areas of Jakarta, contributing to runoff in the catchment. Large infrastructure was constructed in the 1960s such as Pluit Dam, Setiabudi Dam, Melati Dam and Tomang Dam (Hadimadja, 2012). A collaboration study between the Department of Public Works and NEDECO, a Dutch consultant, was conducted in 1973. They proposed to continue the West Flood Canal, built in 1918, to the sea and construct the East Flood Canal to divert Ciliwung River eastward of the city (NEDECO, 1973). At least two major floods inundated Jakarta

[13] The New Order (Order Baru) is a term coined by President Suharto to refer to characterise his regime as he came to power in 1966. He used the term to contrast his rule with that of his predecessor, Soekarno (Legge, 1968).
[14] In 1966, Jakarta was inhabited by 3.6 million people (Abeyasekere, 1989).

during this time: in 1976 and 1979. Due to funding constraints, Cengkareng and Cakung drains, which were much smaller in scale, were built to replace the West Flood Canal and East Flood Canal, respectively (Gunawan, 2010). Sadikin asserted his pessimism in dealing with the flood issue: unless the flood alleviation master plan is fully implemented, not fragmented, this perennial problem of Jakarta will never be accomplished (Liputan 6, 2014). However, the cost to eliminate flooding was too expensive; it was estimated to be around USD 800 million in 1972 (Hadimadja, 2012).

Population growth unfortunately did not pair with improved urban services. Neo-liberal policies were pursued to provide water and sanitation services to the people, restricted to those who could pay (Kooy and Bakker, 2008). The canal systems built during the colonial period continued as the main site for bathing and laundry (Argo, 1999). The limited urban services, however, were rationalised by the government as a mean to curb excessive urbanisation (Argo, 1999). Inspired by Kampung Improvement Programme (KIP) in the 1920s, Sadikin conducted a similar programme in 1968 (Hadimadja, 2012). The programme aimed to upgrade the physical environment of these kampungs, such as lining drains, providing water hydrants and toilet blocks, without disturbing the social arrangements in them. Sadikin prioritised improvement in the oldest and the poorest kampungs. The programme was a huge success and was replicated in many areas in Indonesia. However, kampungs built on illegal land or in unsafe areas were excluded (Hadimadja, 2012).

City planning is essential to control development in Jakarta. As a military-bred governor, Sadikin was strict in implementing the master plan. He asserted that *'I don't want to "prostitute" myself. If we want to save Jakarta, we must obey the city planning'* (Gunawan, 2010: 84). However, Jakarta's Master Plan 1965-1985 fell far behind the needs of the growing population. While sectoral plans were in place for water supply,

sewage, and transport, the lack of coordination in implementing the plan was deemed problematic (Castles, 1989). This has been passed down all the way to the current administration. One of the achievements in planning was the recognition of a regional planning framework called Jabotabek (Jakarta-Bogor-Tangerang-Bekasi). The main idea was to curb the growth of Jakarta in favour of other cities and to incorporate regional solutions to the flooding problem (Caljouw et al., 2005).

After Sadikin's era, the flood control plan as reflected in Jakarta's Master Plan 1985-2005 was still largely devoted to flood control and drainage. Several priorities include the construction of Depok Dam, improving coordination between various agencies, and regulating urban construction in the southern part of the city (Pemda Jakarta, 1991). Despite city planning, Jakarta continued to experience rapid growth by the building of new towns and superblocks under the control of President Suharto[15] (1967-1998) (Pratiwo and Nas, 2005).

4.3.5 Contemporary Jakarta (1998-2016)

Political and financial crises in 1998 forced Suharto to step down from the presidency after 32 years. This moment signified a new political regime in Indonesia, from New Order to democracy. It entailed the decentralisation of power from central to local governments, allowing local governments greater authority and resources to manage their own jurisdiction (Bunte and Ufen, 2009).

Between 1998-2016 floods were more frequent and immense, occurring in 1996, 2002, 2007 and 2013. Unlike the insignificant response to the 1996 flood due to unfavourable political and economic environments, the 2002 flood was able to trigger the implementation of the East Flood Canal that had been delayed for 30 years. Jakarta

[15] Argo (1999) argued that Suharto was much more realistic in terms of planning, in comparison with Soekarno. However, corruption flourished during Suharto's New Order regime. This practice, we argue, contributed to the lack of implementation of flood control plan that required large investment.

had largely recovered from the Asian crisis and capital was now available to fund the project. However, the canal was only finished in 2010 because of land acquisition and funding problems (Simanjuntak et al., 2012).

A major flood in 2007 was one of the worst floods in Jakarta's history. The government responded by conducting a river dredging project assisted by the World Bank (The World Bank, 2008) and undertaking flood control research in collaboration with the government of the Netherlands (Ministry of Public Works, 2011; NL Agency, 2012). When another flood hit Jakarta in 2013 and submerged the city's central business district, the government made serious efforts by conducting river canalisation in a 19-km stretch of Ciliwung River (PU, 2016). A new discourse about land subsidence, as discussed in the introduction, emerged after the 2013 flood, despite the fact that subsidence was recognised as early as 1926 in academic circles (Schepers, 1926; Suharto, 1971). To deal with the increased risk of flooding due to subsidence and sea level rise, the NCICD (National Capital Integrated Coastal Development) plan was launched, consisting of the construction of a sea wall, a retention basin, and land reclamation in Jakarta Bay (NCICD, 2013). Many stakeholders (primarily NGO activists and concerned academics) doubt the efficacy of this mega structure to deal with the flooding threats (Octavianti and Charles, 2018a).

Other than infrastructure measures, non-structural measures to control flood also emerged in policy discourses. Governor Sutiyoso (1997-2007) coined the term 'megapolitan' to refer to Jakarta and its surrounding areas (Sutiyoso, 2007). He blamed rapid development in Puncak area (uplands of Jakarta) as the culprit of the 2002 major flood. The central government was involved by enacting regional spatial planning law for this area, Law No 5 Year 2008 for Jabodetabekpunjur (with the inclusion of Depok-Puncak-Cianjur). In 2014, Governor Joko Widodo (2012-2014) signed a pact with other

regional leaders to take real action to reduce the risk of flooding in Jakarta (Syailendra, 2014) while Bogor has been conducting a moratorium on hotels and villas development in its city centre (LG8). However, it seems that these non-structural measures are only secondary and complementary to the main infrastructure measures.

A remarkable direction of spatial planning was evident in this period. There was a slight decrease in population growth within Jakarta as people preferred to live in surrounding cities: Bogor, Tangerang and Bekasi (Panggabean, 2012). Northward development by the creation of a waterfront city (Sidarta, 1996; Pemda Jakarta, 2012) is now pursued by the government and developers. This development was supported by a law, Presidential Decree No 52 Year 1995 about Reclamation of North Coast of Jakarta. Jakarta is land constrained thus it cannot expand to the west, south or east. The creation of new land by reclamation was perceived by the government as a way to provide new urban space (Pemda Jakarta, 2012). However, this waterfront area exposes people and assets to environmental hazards, such as land subsidence, sea level rise, and coastal flooding.

4.4 The lock-in of infrastructural measures

In this section, we analyse the development of flood policy described in the previous section against the historical institutionalism framework. We argue that policy responses to flood events were reproduced over times with only marginal alterations to the main infrastructural ideas.

Some flood crises (1621, 1918, 2003, and 2013) were able to create critical junctures, which are 'the *relatively* short periods of time during which there is a *substantially* heightened probability that agents' choices will affect the outcome of interest' (Capoccia and Kelemen, 2007: 348, emphasis in original). The main outcome of those crises was instigating the implementation of old policies, although they were

not able to shift the policy response from infrastructural approach. We also observe that conducive political and economic conditions are necessary in order for flood crises to be influential. For example, the introduction of ethical policy in the beginning of 20th century was the political condition needed to facilitate the construction of the West Flood Canal by the colonial government, as a response to a major flood in 1918. Similarly, the East Flood Canal was constructed in response to the 2002 flood, when under the right economic condition when Jakarta's economy had recovered from the 1998 financial crisis.

An attempt to shift the preferences to non-structural measures, for instance, controlled development in the region, was evident on several occasions. It was started in 1970s with the introduction of the Jabotabek concept, then in 2002 with the megapolitan model and in 2013 when the ruling governor signed a pact with other local leaders to take real action. However, those attempts were still unable to break the strong belief policymakers have in infrastructural solutions.

An analysis of policy responses to flooding, as summarised in Table 4.2, suggests that infrastructural approach from colonial times, especially canalisation, has made a resurgence in contemporary Jakarta. No large infrastructure was built between 1945 to 1998 (early independence and New Order era). Sadikin was able to construct several dams within the city during the oil boom in 1973; since then the flood control plan of 1972, which was dominated by infrastructural solutions, had not been fully implemented. This was mainly due to unstable economic conditions prior to the Asian financial crisis. However, during the New Order era, it may have been corruption (Brown, 2006; Greenless, 2008) and Suharto's nepotism and cronyism (Pratiwo and Nas, 2005) in Jakarta's urban development sector that contributed to the poor implementation of the plan.

Policy responses, especially to the recent floods (2002, 2007 and 2013), perpetuate lock-ins on infrastructural policies that have created institutional stability through a positive feedback cycle. This 'positive feedback' is the main element characterising a path-dependent institution (Pierson, 2000). This causal link between a policy and its impact strengthens the preference of similar policies over time, that is, the ongoing canalisation project. The canalisation is technically simple and provides quick alleviation of flooding within the design limits; more importantly, its quality of being readily implemented matches well with the short political cycles (Figure 4.1). This is related to the political setup in Jakarta. The western-style parliamentary system attempted by the Indonesian government in the early years of independence has historically made politicians emphasise short-term goals to acquire political support at the expense of long-term goals (Jayapal, 1993). They engage in fierce rhetoric and excessive use of power (Argo, 1999). Canalisation, therefore, fulfils this goal to acquire political support.

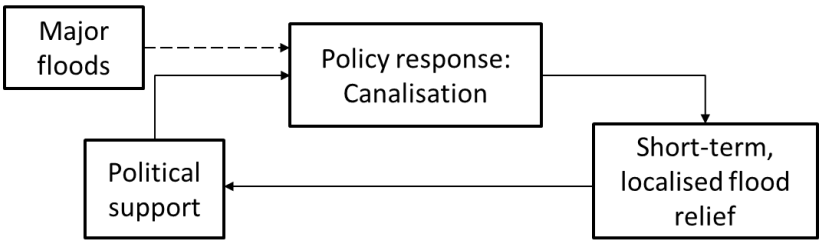


Figure 4.1 Positive feedback of Jakarta's flood policy: Major floods were almost always responded by infrastructural approach that gives fast yet unsustainable relief

Canalisation only treats the flooding as an end-of-pipe problem, and therefore does not address the root cause of the flood, which is perceived locally to be a combination of more impervious surfaces and increased rainfall intensity (AC6, LG1, Kompas, 2013). It requires continual investment in maintenance that is not keeping pace, as one informant noted: '*Within the last four months [June-September 2016], there have been at least five dike failures – Pantai Mutiara, Muara Angke, Pondok*

Labu, Pesanggrahan, and Kemang' (NG7). Moreover, it continues the colonial practice of transferring the flood problems to poorer areas, providing protection only to businesses and elite areas.

We have identified at least three factors for keeping this preference for an infrastructural approach to floods. First, decades of investment in flood mitigation infrastructure have created sunk costs that are too 'costly' to be recovered (Stinchcombe, 1968). Pursuing the same path was considered by policymakers as a consistent approach to flood management in order to get the most out of the 'lost' capital. There continues to be an emphasis on infrastructure in flood management budgets, such was highlighted by an informant: '*for infrastructures, such as normalisation or canalisation, [the total budget allocated] is IDR 5.4 trillion [approximately USD 400 billion], whilst for catchment management [the budget allocated] is only IDR 15 billion [approximately USD 1.1 million]*' (NG3). An informant suggested that the budget plan should shift the emphasis to behavioural and environmental adaptations, rather than just infrastructural solutions: '*we need to change the budgeting plan's nomenclature, funding is needed for public engagement to create behaviour change'* (NG6).

Second, borrowing insights from sociological theorists, we argue that policy makers are hindered by cultural constraints in making decisions. They have to follow the 'script' or 'shared cognitions' that have been established in the society over a long period of time to gain legitimacy (Stinchcombe, 1997) –at least legitimacy gained from their circles. This constraint has created, 'new problems … solved using the same cultural template' (Thelen, 1999: 387). One of the most notable cases of 'shared cognition' is institutionalised rent-seeking behaviours. Not only do individuals shape institutions, but institutions also shape the way individuals behave. The bureaucracy in

the Indonesian New Order Regime during President Soeharto's time (1967-1998) developed this rent-seeking motivation (McLeod, 2000). In the water sector, infrastructure is viewed as the best way to pocket extra income for many individuals or groups. Poor accountability in budget plans and reports strengthen this preference in that era. An informant confirmed that for 'old-thinking' bureaucrats, a flood is a blessing as it mobilises infrastructure funding. This finding also echoes that of Suhardiman and Mollinga (2017) who found institutionalised corruption in Indonesian irrigation sector.

Third, the ongoing canalisation project may be a reflection of the unconscious bias to pursue the same approach as the colonial government. As an attempt to escape imperialism, Soekarno tried to create an image of the modern city, that is Jakarta (Pratiwo and Nas, 2005). However, he has been criticised for spending too many resources to create modern monuments in the midst of under-resourced urban services (Abeyasekere, 1989), which echoed the colonial government approach to prioritise European communities over the natives. This unconscious bias seems to be the case for the canalisation project. As discussed earlier, colonial governments often used 'imperial science' to justify their superiority over the colony (Adas, 1989). Colonial expertise embedded in the city's canal system has made the current Jakarta government, unconsciously, pursue a similar approach to what the colonial government did during colonial times (Kusno, 2013). 'Such an inheritance is so embedded that the post-colonial governments have not successfully broken it. What seems to be a colonial matter, persist today' (Argo, 1999: 73). Jakarta is no longer under colonial rule, however 'the western spirit … remained the driving forces behind the structure of society' (Abeyasekere, 1989: 124), and this has been reflected in the ongoing river canalisation project.

While the colonial legacy of infrastructure in Jakarta's flood policy may have had its limitations in addressing the current situation, it is not to say that it was inappropriate at the time. Jakarta's low-lying areas are prone to flooding; this can be seen in the 1621 flood when there were only 10,000 people living in Batavia. The Dutch's very first attempt to build a canal system as a response to this flood may have been the most appropriate policy, and technology, at that the time. However, as Jakarta has developed considerably, it is important to re-examine whether or not these approaches are still the most appropriate.

Population growth in the city has contributed to the severity of the flood condition today. Figure 4.2 shows how Jakarta's population increased dramatically after Indonesia declared its independence in 1945. The population in 1949 (1.3 million people) was more than double that of 1945 (600,000 people). Indeed, independence ignited hope that motivated people to search for a better life in the capital, but uncontrolled urbanisation influx encroached the city's water ecology to cope with a surplus of water. Canals are now easily clogged from domestic waste thrown into them. We argue that the decisions made under colonial rule played a role in influencing Jakarta's flood mitigation today.

Focusing on the continuation of infrastructural measures in Jakarta, one may argue that during colonial times canal building was deemed necessary basic infrastructure. Nonetheless, does the accumulation of assets and the increasing number of people living in the megacity today justify the continuation of infrastructural measures? The city has had no space nor time to implement (and experiment on) other measures of flood mitigation, meanwhile, there is insufficient evidence to show that relying on infrastructure will provide long-term protection with the changing nature of the city and the environment.

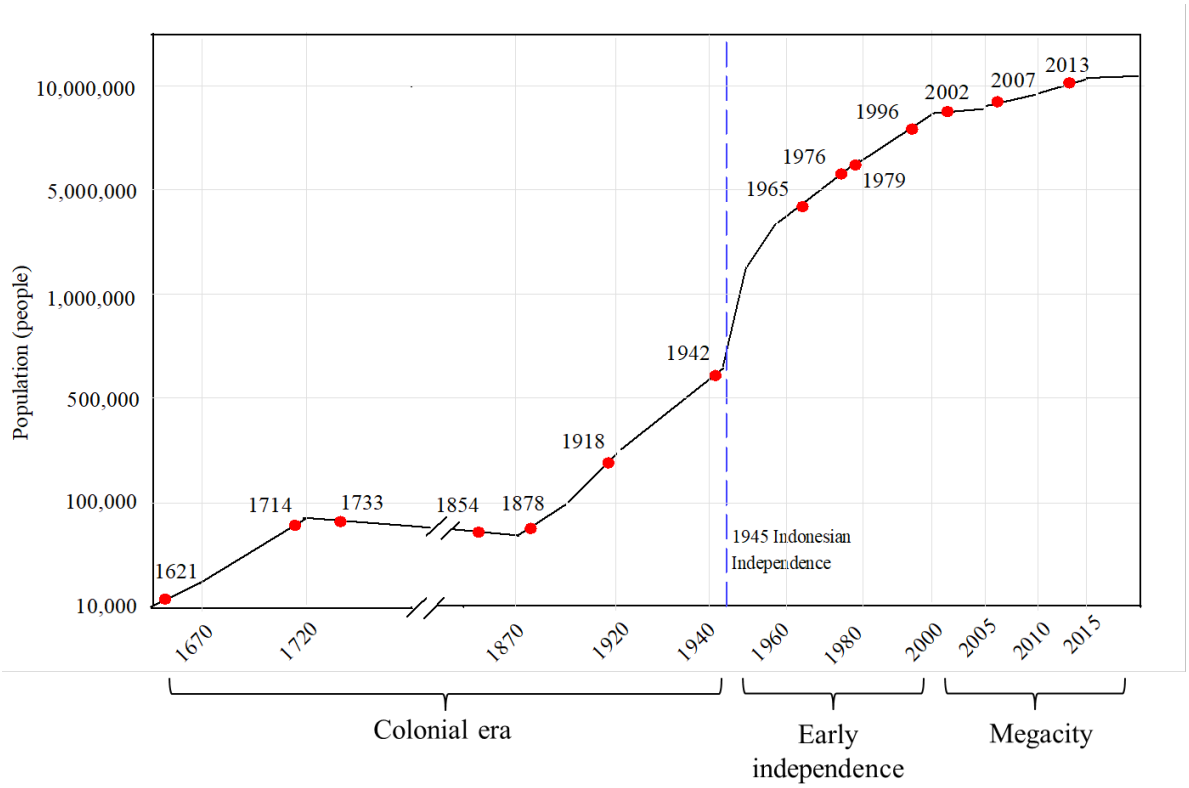


Figure 4.2 Population growth in Jakarta and major flood events (red dots) (Data: Heuken, 1983; Gunawan, 2010; BPS, 2015)

The NCICD plan is influenced by infrastructural values embedded in the city's canalisation system. It is similar in logic to the existing structural approach, or what Campbell (1997) termed institutional bricolage, in which 'an innovative process whereby new institutions differ from but resemble old ones' (p.22). Policymakers' tendency to minimize decision-making costs rather than maximize goal attainment when coping with policy choices (Cohen et al., 1972) reflects the importance of maintaining status quo. NCICD might be an attempt to maintain status quo in structural measures. This may also be due to internalised cultural constraints which then become a limitation to policymakers (DiMaggio and Powell, 1991). Even when they attempt to redesign the institution, the emergent institutional forms will tend to be 'isomorphic' with the existing ones (Thelen and Conran, 2016). In other words, there is a considerable impact of policy inheritance reflected in the NCICD. Another factor that

may also contribute to its persistence is the learning effects of pursuing the same path for so long; knowledge gained in the operation of a particular system leads to higher returns from its continuing use (Arthur, 1994).

Policy preference to the NCICD demonstrates that curative over preventive measures tend to be chosen to cope with water-related disasters. The role of groundwater extraction has not been addressed, but rather the response to the crisis was the proposal to build a massive sea wall. A supporter of the NCICD argued that: '*NCICD is different, we have moved on from incremental policy responses to one that is massive'* (KI6). The scale of the plan is no doubt unprecedented but, by and large, the plan still resembles the old structural approach.

Finally, as a perennial problem for Jakarta, flooding is always 'floating' in the government agenda, but only major floods can push the problem to the decision agenda[16] where flood has a greater chance to trigger policy actions. Tracing the evolution of flood policy, we can say that flooding has always been the government's top water-related priority. This is attributed to flooding's destructive nature and the loss of life it causes (LG2). However, water-related policies are interdependent: poor sanitation has caused severe pollution and waterborne disease outbreaks during floods (Abeyasekere, 1989); insufficient water supply provision has led to excessive groundwater extraction and land subsidence (Abidin et al., 2011). These interactions of water issues suggest that flooding should not be considered in isolation with other water policies in a dynamic urban environment.

[16] We adopted this idea of government and decision agenda from Kingdon (2014). According to him, a government agenda is 'the list of subjects that are getting attention', while decision agenda is 'the list of subjects within the governmental agenda that are up for an active decision' (p.4).

4.5 Conclusion

In this paper, we have demonstrated how flood policy in Jakarta has been dependent on infrastructural solutions. Colonialism has played a significant role in this policy preference. The colonial government used their water expertise to establish their superiority in the colony, from transforming Batavia into a canal city in the early 17th century to a construction of the large West Flood Canal in 1918. In each political regime, flood plans were partly implemented due mainly to funding constraints. This implementation deficit characterising most developing countries meant ideas are 'recycled' into subsequent plans. As a result, engineering driven solutions dominate even today.

By employing an historical institutionalism approach, we found that although critical junctures were evident in the pathways, they did not create radical change to the flood management institutions. Strong positive feedback cycles reproduced similar responses to flooding. This, we argue, is a result of concerted efforts to sustain the pattern over time, cultural constraints hindering innovation, and unconscious bias towards colonial science. A recent proposal to build a 32-km offshore sea wall to protect the sea from flooding (the NCICD plan) emerged when a major flood hit the city in 2007. The massive scale of the sea wall advances the path-dependency of infrastructure measures.

By tracing a flood history spanning almost four centuries, we agree that massive land transformation, not only in Jakarta but also in the surrounding areas, has a major role in flood events. Managing flood risks means managing growth and development beyond the city's political boundaries; that is part of the politics of planning. This also suggests that long-term mitigation of flooding cannot be achieved by merely constructing infrastructures within the city and downstream (i.e. seawall).

We hope this paper is a useful conceptual contribution not only to the historical institutionalism scholarship but also to the literature on the politics of flood management and planning. Flood management, like virtually all policy domains, is shaped by political relationships manifested over time in institutional rules and norms. The historical institutionalism approach helps to illuminate the causes of flooding and patterns of flood policies in Jakarta, and most importantly, sheds light at the extent the current policy has been influenced by old structural values. However, this finding should not discourage policy entrepreneurs to advocate change because path dependence or lock-in does not necessarily mean that future paths are predetermined by these historical circumstances.

Chapter 5. Disaster capitalism? Examining the politicisation of land subsidence crisis in pushing Jakarta's seawall megaproject

Abstract

This paper offers an analysis of 'disaster capitalism', in which fear of disaster is exploited to facilitate the entry of a capitalist project, with regard to Jakarta's flood policy. After a major flood hit the city in 2013, the Indonesian government launched a flagship megaproject, the National Capital Integrated Coastal Development (NCICD), as *the* solution for the city's sinking problem. The plan involves closing Jakarta Bay by means of a 32-kilometre offshore sea wall and reclaiming 5100 hectares (ha) of land. Following a corruption scandal in a related reclamation project (for 17 artificial islands), the NCICD plan was evaluated for six months in 2016. Although many criticisms of the plan surfaced during the evaluation period, they were not able to bring about radical change, i.e. cancellation of the project. Informed by the concept of 'critical juncture' (an analytical approach focusing on a short period of time in which actors' decisions have a higher probability of affecting a particular outcome), we analyse the extent to which the framing of the sinking crisis by political actors can explain such a 'near-miss' critical juncture, where change is both possible and plausible but not achieved. Drawing data from newspaper discourse, interviews, and policy documents, we find that the project's proponents have eloquently framed the sinking crisis in order to ensure preference for the seawall policy, including the project concerning the 17 islands that was claimed by the critics as the capitalist part of the project. It can be concluded that the 'disaster capitalism' notion helps understand this 'near-miss' outcome.

Keywords

Seawall; land subsidence crisis; critical juncture; disaster capitalism; Jakarta

5.1 Introduction

The way in which society perceives natural disasters has significantly changed over time. In the past, the general public accepted disasters as an act of God thus defying explanation and redress (Rosenthal, 1998). However, in today's risk society, disasters are no longer understood as unfortunate incidents, and people demand that governments act in the aftermath or during an ongoing crisis[17]. A crisis can be perceived not only as a threat but also as an opportunity; in this sense, while it disrupts social routines, it also opens up political space to redefine problems and propose policy innovations. Further, a crisis generates what Boin et al. (2009, p.81) refer to as a 'framing contest', in which actors can 'interpret events, their causes and the responsibilities and lessons involved in ways that suit their political purposes and visions of future policy directions'. The ability of a crisis to delegitimise power and authoritative relationships increases the likelihood of policy change particularly in comparison to regular conditions (cf. Klein, 2007). Comparing 16 cases of water policy transitions worldwide, Meijerink and Huitema (2010, p.2) observe that reforms 'tend to occur only after the existing paradigm (…) has been put to the test by disastrous events'.

However, the nexus of crisis, disaster, and policy change does not necessarily transpire, even in the case of repeated disasters whose frequent occurrences help to reinforce lessons learned. For instance, Meijerink (2005), who studied flood policy transition in the Netherlands, found that none of the shock events were able to alter the state's core dominant policy on hard structures. Droughts also provide an opportunity for water reforms, but their existence does not guarantee success (Grafton and Horne,

[17] In this work, we use the term 'crisis' and 'disaster' interchangeably. Crisis can lead to disaster if the event is neglected or mismanaged (Shaluf et al., 2003). However, both disaster and crisis share many features (e.g. sudden nature of the event and damage caused) and, therefore, they can be used interchangeably up to a certain extent (Al-Dahash et al., 2016).

2014); for example, the market-oriented reforms achieved during Australia's Millennium Drought were reversed once the drought had ended (Crase et al., 2009; Grafton and Horne, 2014). Dynamics and outcomes of crisis episodes are hard to predict (Boin et al., 2005) because they are influenced by many factors, such as the political context, the particular crisis faced and the availability of resources to enable an appropriate response. Hence, the occurrence of a shock event or the prevalence of a crisis discourse does not guarantee a radical policy change.

Building on this scholarship, this paper seeks to investigate the process of unmaterialised policy change in the wake of a crisis. We further discuss how this outcome can be linked to, or perhaps explained by, the 'disaster capitalism' notion, in which fear of disaster are exploited to facilitate entry for a capitalist project. To this end, the case of the sinking crisis in Jakarta, Indonesia, is analysed in this paper.

Jakarta is one of the fastest sinking cities in the world (Deltares, 2015), together with California's San Joaquin Valley, Mexico City and a few others (Ruggeri, 2017). While flooding is a notorious feature of the city, land subsidence has only recently been recognised in the public sphere. Parts of north Jakarta are subsiding at an average rate of 15 cm per year (Abidin et al., 2011); with the greatest total subsidence of 4.1 m between 1974 and 2010 being observed in Muara Baru (Ministry of Public Works, 2011). In the academic literature, subsidence was recognised as early as 1926 (Schepers, 1926; Suharto, 1971), but its impacts were only apparent in 1978 via the cracking of permanent constructions (Abidin et al., 2008). Since then, academics have associated intensified flooding (Brinkman and Hartman, 2009) and increased inland seawater intrusion (Soekardi et al., 1986; Onodera et al., 2009) with land subsidence. Unlike flooding, subsidence on its own, due to its unnoticeable nature, was not able to attract policymakers' attention sufficiently for them to act.

However, the land subsidence issue reached policy circles only after a major flood hit Jakarta in 2007. The flood was one of the worst in the city's history as it inundated 60% (400 km^2) of the city within just 24 hours, killed 79 people, displaced 500,000 people and caused almost USD 680 million in losses (Bappenas, 2007). As a response, a study called Jakarta Coastal Defence Study (JCDS) was conducted to find the cause of the flood and to formulate a flood alleviation programme accordingly. The study found that land subsidence was one of the main factors in worsening the flood (Ministry of Public Works, 2011; NL Agency, 2012). Subsidence then reached a wider audience as the study became a wake-up call for the people and national elites.

The significance of Jakarta as the economic and political capital of Indonesia has made protecting the city from sinking a necessity. After another major flood hit the city in 2013, the Government of Indonesia in collaboration with the Government of the Netherlands launched the National Capital Integrated Coastal Development (NCICD) plan. This USD 40 billion project, designed by a consortium of Dutch firms, consists of a 32-km offshore sea wall, 1250-ha land reclamation, and a 7500-ha water retention basin (see Figure 5.1). The main focus of the NCICD is the offshore seawall, whereas the land reclamation (and a separate toll road project that will be built on the seawall) is justified because it brings private funding for the seawall. The NCICD project is divided into three phases: (i) phase A (originally planned for 2014-2018) focuses on strengthening existing dikes in the coastal line of Jakarta, (ii) phase B (2018-2040) involves building the main offshore seawall and land reclamation, and (iii) phase C (2030 onwards) involves building the eastern part of the offshore seawall (NCICD, 2013). As the seawall will close Jakarta Bay, the NCICD, unsurprisingly, has received a great deal of criticism, especially with regard to its social and environmental aspects.

For example, the poor water quality of the retention lake may lead to environmental degradation and pose health risks to coastal communities.

Connections between sinking, land subsidence and flooding threats should not be confused. In this paper, we refer to sinking as a result of an increased risk of flooding due to land subsidence and sea-level rise. The NCICD masterplan (NCICD, 2013) has clearly explained the rationale of the seawall. It is predicted that many rivers in Jakarta will not be able to flow under gravity due to subsidence. The offshore seawall will contain the river water and a pumping system – predicted to be the largest in the world with 730 m^3/s – that will pump the water out to the sea. However, a *direct* relationship between the solution of the seawall and land subsidence, or simply sinking, has been portrayed in the media. In a later section, we will analyse the development, and simplification, of the land subsidence issue to understand how it has been linked to the sinking crisis and the seawall in a particular period of time.

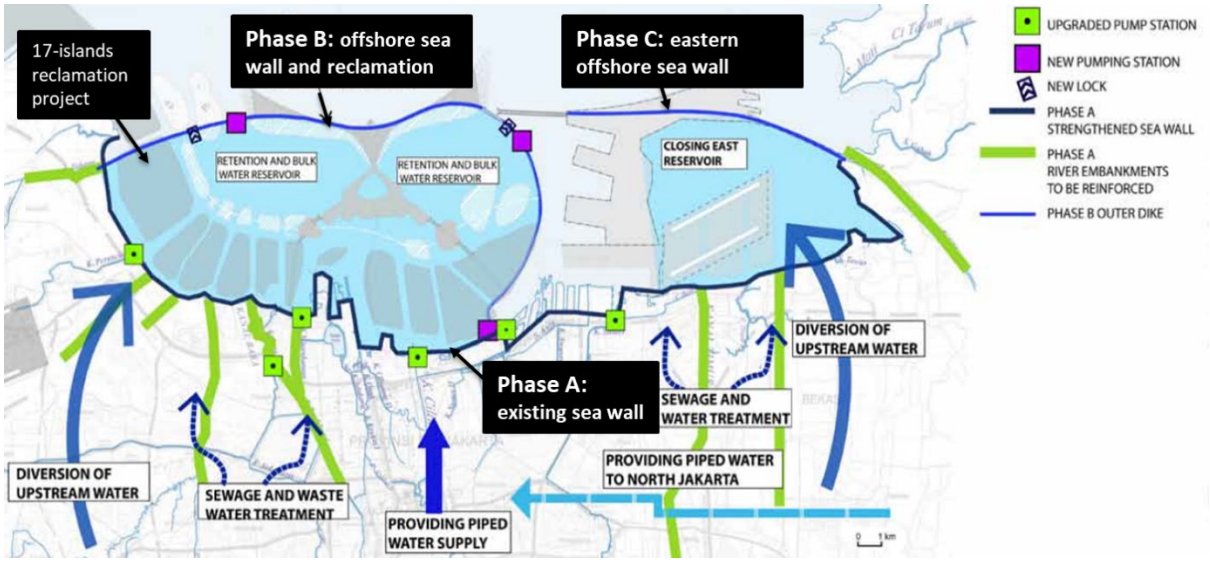


Figure 5.1 A map showing the NCICD plan in Jakarta Bay with phases A, B, C and the 17 islands' reclamation project (Source: The Coordinating Ministry of Economic Affairs, 2014)

Ever since its launch, there has been little, if any, contention about the NCICD. Its safety narratives dominated the public discourses and, thus, silenced the nuanced voices criticising the project (Octavianti and Charles, under review/Chapter 6). It is

only after a corruption scandal related to the 17 artificial islands reclamation project that surfaced in March 2016, that the criticism surrounding the NCICD plan did become intense. Both the 17 islands and the NCICD plan are located in Jakarta Bay (see Figure 5.1), but they have different policy routes. The islands are merely for urban development purpose legitimised by a presidential decree in 1995, whereas the NCICD is a disaster preparedness plan launched in 2013. Following the corruption scandal, President Widodo ordered the NCICD plan to be evaluated for six months along with integrating the 17 islands' reclamation project to the NCICD plan –making the total reclamation area of 5100 ha. This integration was a painful addition to the seawall plan because, at times, the islands are more disputed than the NCICD.

The six-month evaluation period was extremely important in determining the fate of this megastructure. The outcome of the evaluation was the government pledging their commitment to the project's phase A, which most stakeholders including the critics have agreed upon, and delayed decisions on phase B and C until further studies are completed[18]. On the one hand, this decision seems rational – conducting thorough studies before making an important decision. On the other, it can be seen as a political manoeuvre to stall time before making a highly controversial decision in relation to the upcoming political year in 2019. Opponents expressed their concern about the 'indecisive' outcome, or what we label as a 'near-miss' outcome. They initially hoped that this critical period could provide a momentum to cancel the offshore seawall and the reclamation plans (Phases B and C), but such a policy change unfortunately did not materialise. Informed by the concept of 'critical juncture', this paper seeks to investigate why such a rare opportunity was not able to generate policy change, i.e. cancelling

[18] At the time of writing, the studies had been completed with minor alteration on design and are now being reviewed by the relevant government's agencies. Unfortunately, they are not publicly available.

phases B and C, despite the many criticisms the project received. Furthermore, we attempt to understand to what extent the disaster capitalism notion can offer an answer to such an indecisive outcome: how did actors frame the sinking crisis to justify the ambitious project? Our argument is that the problematisation of land subsidence to the sinking crisis was used to maintain policy preference on the seawall and the reclamation project embedded in it. The disaster capitalism notion is, therefore, evident in explaining the near-miss outcome.

This paper proceeds as follow. The next section reviews the literature surrounding policy change, particularly, in the field of crisis-related policymaking process, and critical juncture. After describing our methods of data collection, we proceed with an analysis of the development of the critical juncture and the respective role of land subsidence and political agencies in the NCICD policymaking process. Thereafter, we discuss the politics of idea on how the actors framed the sinking crisis, and analyse policy alternatives other than the seawall. We then discuss the potential causes and broader impacts of the near-miss event in the penultimate section, before presenting our concluding remarks.

5.2 Literature review

This section will review literature in two areas: (i) crisis-related policymaking process, including a brief description of the disaster capitalism notion, and (ii) factors constituting a critical juncture.

Crisis-induced policy change – to adopt Sabatier's (1999) oft-used taxonomy – has taken an ample portion in policy literature. Main public policy theories, namely Advocated Coalition (Sabatier and Jenkins-Smith, 1999) and Punctuated Equilibrium (Baumgartner and Jones, 1993; True et al., 1999), share a focus on a major policy change (Schlager, 1999), and crisis plays a vital role in inducing this change. Most

public policies are characterised by continuity or incremental changes (Thelen and Steinmo, 1992). In the wake of a crisis, the possibility to fundamentally alter policies is higher as players or policy entrepreneurs exploit the 'fluid' moment (Kingdon, 2014). A range of action is possible, from defending and strengthening their authority to sowing the seeds of new policies (Keeler, 1993). Boin et al. (2009, p.83) postulate a theory of crisis exploitation to understand 'the purposeful utilisation of crisis-type rhetoric to significantly alter levels of political support for public office-holders and public policies'. In exploiting this crisis-induced opportunity space (cf. Alink et al., 2001), policy entrepreneurs are involved in a framing contest (Boin et al., 2009), in which they offer a frame and manipulate, or even fight, to have their frame accepted as the dominant narrative (Stone, 2001; Brändström and Kuipers, 2003; De Vries, 2004).

Here, we will focus on policy change, which 'occurs when there is ability to overcome dominant perception (frame) and to substitute an alternative construction of the reality being confronted with policy' (Peters et al., 2005, p.1284). Change to core belief is important to be emphasised here and this radical change has not always materialised in the face of a crisis, like most public policy theories suggest. After a major flood, for example, awareness of flood protection usually dramatically climbs onto the government's agenda. As a consequence, additional financial resources are often allocated for related-agencies to mitigate flood hazards. Without alteration on the basic principles and preferences in managing flood risk, this policy response cannot be considered as a policy change, as in the case of the establishment of the Delta Committee following the devastating 1953 storm surge in the Netherlands. The institution's approach remained the same with the country's previous measures on using hard infrastructure to fight water (Meijerink, 2005). This is also the case for Jakarta's seawall. Albeit its unprecedented scale, the seawall is in line with the city's consistent

infrastructural measures to deal with the perennial flooding problem (Octavianti and Charles, in press/Chapter 4). What makes NCICD different from the previous measures is that this project brings an element of (what critics call) capitalism through the land reclamation project. The privately led reclamation is justified to fund the significant portion of the seawall.

The disaster capitalism terminology is used by Klein (2007) in her book *The shock doctrine: The rise of disaster capitalism*[19], where she explored how capitalism came to dominate the world with the help of violent shock tactics in times of natural disaster or other calamities. For example, Klein argue that the 2004 tsunami paved the way for the Government of Sri Lanka to force the fishermen off beachfront property, so it could be sold to hotel developers. Another example is how the destruction of New Orleans by Hurricane Katrina allowed most of the city's public schools to be replaced by privately run charter schools. She paints a disturbing portrait on the use of terror, including deliberately creating a crisis, to achieve a capitalist system, for example, the use of torture in Chile and Argentina's military dictatorship to break down resistance to a free market. Whilst we are not fully convinced by her arguments, we see the value of her main argument that 'countries are shocked –by wars, terror attacks, coups d'état and natural disasters. And then they are shocked again –by corporations and politicians who exploit the fear and disorientation of this first shock to push through economic shock therapy' (Klein, 2007, p.25).

We observe two factors that make the notion of disaster capitalism different from other crisis-related policy theory, particularly Boin et al.'s (2009) crisis exploitation theory. First, the outcome of a crisis in the former approach is focused on

[19] This book has unsurprisingly sparked debates. Some prominent actors, such as the Columbia University's Centre for Sustainable Development Earth director Jeffrey Sachs, did not agree to most of the account of himself portrayed in the book (Pilkington, 2008).

establishing a capitalist system or pursuing a capitalist project, while the latter does not specify the outcome of a crisis. Second, the theory of crisis exploitation focuses on the use of discourse as an exploitation strategy, but disaster capitalism uses both discourse and action on the ground to achieve the so-called 'shock therapy'. To our understanding, if discourse on the threat of dike failure is sufficient for the government to set the agenda, as crisis exploitation theory would have it, disaster capitalism may seek to give it an extra push by, for example, intentionally creating a rupture in the dike which in turn would cause its failure, so that a capitalist project can proceed. This may sound extreme and, therefore, in this paper we carefully employ insights from disaster capitalism to understand the extent to which players exploit the fear of the sinking crisis to push reclamation as a capitalist project and whether this idea can offer an answer to the near-miss critical juncture to cancel the whole project.

We then move to review literature in critical juncture scholarship as this concept provides the analytical framework for this study. According to Capoccia and Kelemen (2007), critical junctures are ‘the *relatively* short periods of time during which there is a *substantially* heightened probability that agents’ choices will affect the outcome of interest’ (Capoccia and Kelemen, 2007, p.348, emphasis in original). Critical juncture has been widely used in many disciplines and has been imported to political science in the area of historical institutionalism to answer critics on the incapability of historical institutionalism to explain institutional change (Peters et al., 2005). Critical juncture interrupts a stable institution’s path; during the juncture, a new objective in the policy was assigned and political resources evolve to sustain those new policies (North, 1990; Steinmo et al., 1992). In water policy, the approach has been used, for example, to explain water reforms in Australia’s Murray-Darling Basin (Marshall and Alexandra, 2016). Analysing the environmental water recovery in the basin, they found that crisis-

induced opportunity to introduce policy innovation is limited without the presence of active policy entrepreneurs.

Literature on critical juncture can be broadly grouped based on two dominant factors contributing to the outcome: antecedent conditions (Lipset and Rokkan, 1967; Slater and Simmons, 2010) and political agencies (Ertman, 2010; Nichols and Myers, 2010). Antecedent conditions are an important backdrop during a critical juncture (Mahoney, 2001). They define a range of institutional alternatives available to policymakers and at the same time limit the alternative options (Capoccia, 2016). Scholars of critical juncture use antecedent condition to build a discussion on 'divergence': ‘a “common exogenous shock” affects a set of cases (typically countries), causing them to “diverge” (Capoccia, 2016, p.93). Multiple case studies were employed in this sense to analyse the extent to which their different antecedent conditions cause them to diverge after a shock. This study scrutinises critical juncture development of a single case study and therefore it provides different empirical insights.

We focus on land subsidence as an antecedent condition and examine the development of the discourse through mass media. The exploitation of this issue is principally acted out in two areas: the mass media and official inquiries (Boin et al., 2009). We emphasise the utilisation of mass media in this research but have also consulted official reports and other documentations. Mass media has agenda setting power for which it prompts policymakers to take action and satisfy the public’s interest and demand for answers (Birkland, 1997). Authors have suggested that media do not reflect reality but rather shape it (Miles and Morse, 2007). Furthermore, their focus on a few issues leads the public to perceive those issues as more important than others (McCombs et al., 2005). Therefore, media constitutes a prime arena where framing contest takes place. Both status quo players and change advocates have to attract and

convince newsmakers of their particular crisis frame. Therefore, crisis communication skill that is supported by scientific evidence (see Parkhurst, 2017) is indispensable. The rival interpretation of the role of media in the wake of a crisis is that they pursue their own agenda in crisis reporting (see Streitmatter, 1997). This means that the actors' performances are less important than the degree to which their frames fit the pre-existing biases of the main media outlets.

The second determinant of critical juncture is the interaction of political agencies during the juncture. The role of key actors and their political interactions prior to deciding a path of institutional development are crucial. Like other scholars employing critical juncture (Barke and Jenkin-Smith, 1993), we emphasise analyses on political agencies and their actors rather than on institutions. This is also different from typical historical institutionalism analysis that overemphasises the role of bureaucrats and belittles politicians as creative actors (Peters et al., 2005). Agencies consist of political actors and they become creative when seeking political consensus and forming coalitions as they must compete to occupy limited 'political space' (Pierson, 2000). The importance of agencies and choices vary at every critical juncture (Collier and Collier, 1991).

Some authors have compared the concept of critical juncture with other policy frameworks. Richards and Smith (1997, p.66, emphasis added), for example, demonstrate that critical junctures are not interchangeable with other terms, such as window of opportunity, because they work in different stages of the policy process. They argue that critical juncture is 'a distinct (…) and lasting (…) *change* (…), brought about by exogenous and endogenous pressure', while windows of opportunity are '*spaces* for change created by exogenous and endogenous pressures'. In other words, critical juncture is the outcome of the utilisation of windows of opportunity. Therefore,

according to them, critical juncture is not interchangeable with terms such as crisis, turning points, unsettled times, window of opportunity (Kingdon, 2014), formatting moments, and punctuated equilibrium (Sabatier and Jenkins-Smith, 1993).

This relates to the temporality of a critical juncture, whether it is just a point or moment in a path-dependent process or whether the juncture itself is a process and thus may be better referred to as a time period. We follow explanation by Capoccia and Kelemen (2007, p.361) to determine the criticality of a juncture and solve this temporality issue. They argue that 'the briefer a critical juncture is relative to the duration of the path-dependent causal process that it instigates, the more critical it is'. We adopt this operationalisation to analyse critical juncture in this work that powerful actors took decisions during a *narrowly circumscribed period* rather than in a *moment* of choice.

However, contrary to Richards and Smith's (1997) argument that change is the key element of a critical juncture, Capoccia and Kelemen (2007) argue that change is not a necessary element of a critical juncture. Other outcomes include, among others, re-equilibration and near-miss. Re-equilibration refers to a condition where institutional change resulted from a critical juncture is not permanent and can therefore lead to the re-equilibration to the old path-dependent institutions. Whilst near-miss refers to a condition where change is possible and sought after, but it narrowly fails to occur (Capoccia, 2016). One example of this negative case is Nichols and Myers's (2010) on the theory of 'reconstructive presidency' in the United States. They argue that not all presidents have seized the opportunity to transform political order in a vulnerable regime.

After reviewing key literature in the field of crisis-related policy change and critical juncture, we hope to contribute to them in two ways. First, this paper offers a

view on crisis-related policymaking process and examines the potential role of disaster capitalism in that process. Our focus on land subsidence crisis gives a certain nuance to most policy work as its unnoticeable nature is less likely to push for immediate policy action, as opposed to flooding, for example. Second, we hope this paper can enrich empirical insights for critical juncture literature by the examination of a negative case. This near-miss phenomenon that has not been much investigated will be a fruitful contribution to this field. Moreover, our experimentation of the application of critical juncture concept in a contemporary event is hoped to bring new insights for critical juncture analysis.

5.3 Methods

Data collection for this study includes semi-structured interviews and newspaper analysis. Fieldwork was conducted in Jakarta from May to September 2016 and July 2017. Forty-five informants were interviewed using a snowball sampling approach; informants included government officials from central government (CG= 8) and local government (LG = 8), non-government organisation activists (NG=8), academics (AC=12), and other experts (KI= 9). We use the code of interviews (e.g. AC for academics) to refer to evidence coming from a particular interview. The expertise of the informants spans across urban development policy, conservation and environmental policy, water and wastewater policy, engineering and community engagement. The questions in the interviews were regarding the informants' views on the land subsidence problem, flood alleviation measures, and the NCICD plan. Interviews were audio-recorded with consent from the informants.

Newspaper articles were analysed to examine public discourse around land subsidence, flooding and NCICD. Knowledge on how the media gather and distribute the news is important in understanding public policy priorities for natural disasters

(McCombs et al., 1997; Tierney et al., 2006). We undertook an extensive article search in Google News using the keyword 'land subsidence Jakarta' and *'penurunan muka tanah* Jakarta' with a time span from 1 January 2007 to 31 July 2017. We screened articles both in English and Bahasa Indonesia published by local and international media. After the elimination of irrelevant articles, 405 articles remained. Such articles appear frequently in the following media: Kompas (65 articles), The Jakarta Post (26 articles) and Liputan 6 (20 articles). Subsidence was put as the core issue, and topics associated with it were then analysed. Newspapers constituting the primary media source provide insights into the dynamics of public discourse and capture interactions in the political area by accommodating contested views from various stakeholders (Protess and McCombs, 1991; Chan and Lee, 2014). It is anticipated that newspapers may only cover mainstream news (Newman, 2011). We expect marginalised views to be covered in the interviews by our attempt to interview informants with a variety of backgrounds. Lastly, data from publicly available information directly attributable to key governmental actors and institution were also collected, such as policy documents.

Before we proceed, a methodological caveat is in order. While attempts were made to accommodate views from a range of actors – both proponents and opponents of the project – it is recognised that there may be subjectivity in presenting those views in this paper. In addition, there may also be other antecedent conditions, such as the structure of the administration or the national political context, that contribute to the development of the juncture and the outcomes.

5.4 Critical juncture analysis

We begin this section by analysing the criticality of a juncture in the NCICD policymaking process before focusing on two areas of the juncture: antecedent conditions and political agencies.

5.4.1 Development of the critical juncture

Figure 5.2 shows the NCICD's policy process in chronological order. As most of the process has been discussed in the introductory section, this section only picks up some important milestones relevant for the analysis of the critical juncture. Prior to NCICD, the government published the Jakarta Coastal Defence Strategy (JCDS) plan in 2011 as a response to the 2007 flood[20]. The JCDS was similar to the current NCICD plan, but without the Garuda-bird shaped reclamation element. Compared with the 2007 flood, the damage caused by the 2013 flood was less severe[21] but the latter was able to push the seawall proposal. This is because the flood occurred at a crucial time and place. It happened just three months after Governor Widodo was sworn in October 2012 and the area flooded was also significant: the centre of government and business activities in central Jakarta. This flood exposed the deficiency of the current flood policy and provided a major opportunity to introduce a policy (Alink et al., 2001).

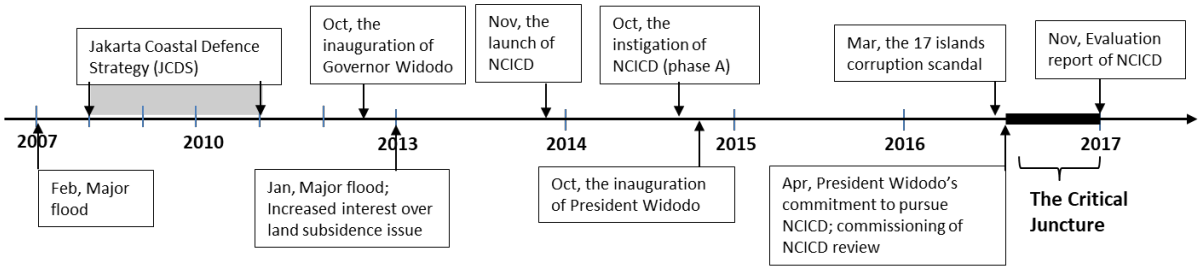


Figure 5.2 A timeline showing key events (i.e. flooding, administration change) related to the policy development of NCICD. The critical juncture that occurred during the evaluation period of the project is from April to November 2016.

The strengthening of the 4.5 km of the existing dikes (Phase A) was done in 2013 in a rush, just ten days before President Yudhoyono stepped down from the presidency (Elyda and Dewi, 2014). The ability to launch such massive infrastructure

[20] Other than the seawall, some important policies were implemented, such as the World Bank's dredging project known as JEDI (Jakarta Emerging Dredging Initiative) (The World Bank, 2015).
[21] The 2013 flood inundated 14% of the city with 20 people killed and 50,000 evacuees (BNPB, 2013), while the 2007 flood inundated 60% of the city with 79 people killed and 500,000 evacuees (Bappenas, 2007).

was a feat for the outgoing government. Following this, no significant policy progress for NCICD was made until a corruption case of the 17 islands project received wide press coverage in March 2016. A chairman of Jakarta's leading private developer bribed a Jakarta councillor who had a key role in passing the reclamation project's draft bylaw. The bribe was intended to lower the developer's 15% contribution clause in the bylaw to only 5% (Artharini, 2016)[22]. We see that political pressure towards NCICD was an unintended consequence (Pierson, 2000) of the 17 islands' corruption case. This ripple effect caused NCICD to be evaluated as the public questioned the benefit of this multibillion-dollar project.

Following the political chaos after the corruption case, President Widodo (former Governor of Jakarta) restated the importance of NCICD plan and decided to proceed with the plan:

> *It is estimated that all of North Jakarta will sink below sea level by 2030. As a result, 13 rivers passing through Jakarta cannot flow into Jakarta Bay. Therefore, management of Jakarta's water and environment must be integrated from upstream to downstream. Coastal development in North Jakarta, NCICD (...) a project that has been developed for long enough becomes an answer for Jakarta.*
>
> -President Widodo, 27 April 2016, in Kuwado (2016a)

He further ordered the NCICD plan to be evaluated for six months (from April to November 2016), and the 17 islands reclamation project to be integrated with the NCICD plan. We consider that this evaluation period is the critical juncture for the NCICD policy. In mid-November 2016, the President requested the Ministry of Planning to focus on Phase A (strengthening the existing sea walls along Jakarta's coastlines) (Pitoko, 2016). Decisions on the other two phases (phase B –main offshore

[22] The developer tried to influence the outcome of deliberations on two draft bylaws concerning North Jakarta Coastal Zoning plan. Based on the bylaw, the developer is required to hand over 15% of the reclaimed land to the city administration. The developer had promised the councillor that he could deliver IDR 2.5 billion (approximately USD 180,000) if he could pass the reclamation project's draft bylaw and lower the developer's contribution to only 5%. This request was accepted by the councillor (Heriyanto, 2016).

sea wall, land reclamation and retention basin, and phase C –eastern offshore sea wall) were delayed until further studies were completed.

The criticality of the above juncture can be analysed against the critical juncture criteria: duration of the juncture or 'temporal leverage' and probability of impactful decision or 'probability jump' (Capoccia and Kelemen, 2007). First, the duration of the juncture (6 months) is briefer that the NCICD policy process, from its inception since after the 2007 flood to just prior to the juncture. Conflict over ideas and underlying assumptions of NCICD was only evident during this evaluation period. This finding is aligned with Thelen and Conran (2016) who maintain that not all 'collisions' occurred were consequential. Collisions that occurred during the evaluation period were desirable to evaluate the plan.

The second aspect is the probability jump; it refers to the choices made during the juncture having a higher probability to affect the outcome of interest compared with the probability before and after the juncture (Capoccia and Kelemen, 2007). Before the juncture that was initiated by a corruption case in March 2016, NCICD had not shown significant progress since its launch in November 2013. During the critical juncture, a variety of responses, mainly critics from non-state actors, surfaced. Policymakers accommodated these critics by focusing on Phase A, the least controversial phase. After the juncture, no substantial decisions have been made and political tension on this issue has relaxed.

5.4.2 Land subsidence as an antecedent condition

The development of land subsidence discourse in the media worked as a powerful antecedent condition and became incredibly important in further policy chain. The land subsidence issue was used as a discursive tool to problematise the sinking threat as a definite crisis and helped justify NCICD as the solution. Subsidence has been

construed by the public to lead to sinking, and therefore to the worsening of flooding when combined with sea level rise as illustrated in Figure 5.3. Sinking is a larger disaster than flooding and thus a sinking threat posed a greater demand for relief that was answered by the NCICD proposal.

Interest over land subsidence increased substantially after the 2013 flood or precisely after the launch of the NCICD, although findings from the JCDS report confirming the subsidence threat were disseminated in 2011. Historical analysis of newspaper articles on land subsidence suggests that the issue was present infrequently prior to 2013 (Figure 5.4). Subsidence gained the highest interest during 2016 when the critical juncture was taking place. Further analysis of these subsidence-related articles reveals a strong association between land subsidence and the sinking threat followed by NCICD and reclamation topics.

The media played a crucial role in fostering a sense of vulnerability in Jakarta. Perceptions of crisis are likely to vary in a society reflecting different values and positions; therefore, the supporter of the project recognised a need to shape the perception of the public of the crisis through the media. Provocative titles, such as *Jakarta Bisa Tenggelam* (Jakarta could sink) (Kompas, 2010) and *Benarkah 14 tahun lagi Jakarta Utara akan tenggelam?* (Will North Jakarta sink in 14 years?) (Harap, 2016) aimed to make people question their safety in the city. The use of such emotive labels (Wagner-Pacifici, 1994; Howarth et al., 2000) was meant to facilitate the introduction of NCICD as a megaproject that was likely to ignite dispute. With regard to the argument of Boin et al. (2009) on the role of political actors vs. media, we observe that within the subsidence discourse, the pre-existing biases of the media (e.g. the media's political stance in news coverage) was not evident. Rather, the political actors and their crisis frames played an important role in shaping the discourse. It is

worth noting, however, that media bias may be more prevailing in the case of the reclamation scandal, which is a different issue.

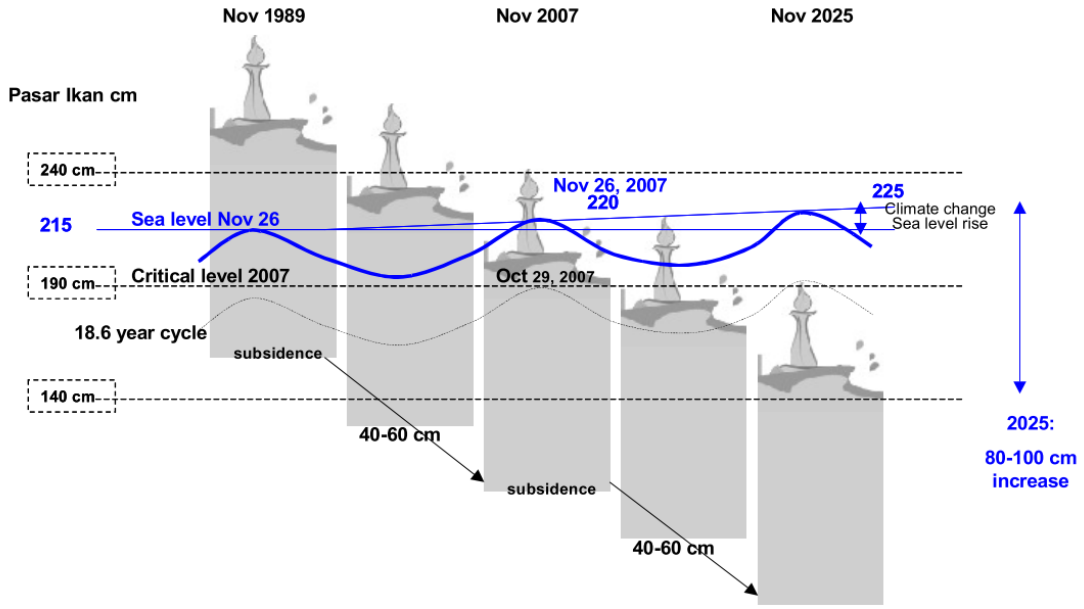


Figure 5.3 Illustration of the impact of tides and subsidence on increasing the city's sinking risk.

Note for Figure 5.3: The combination of land subsidence at a rate of 40-60 cm/18 years and rise of sea level at a rate of 5 cm/18 years has caused *Pasar Ikan*, the reference point, to sink. The use of the National Monument (Monas), the symbol of Jakarta, to represent its sinking demonstrates the significance of the sinking threat to Jakarta as the capital city of Indonesia (Source: Brinkman and Hartman, 2009).

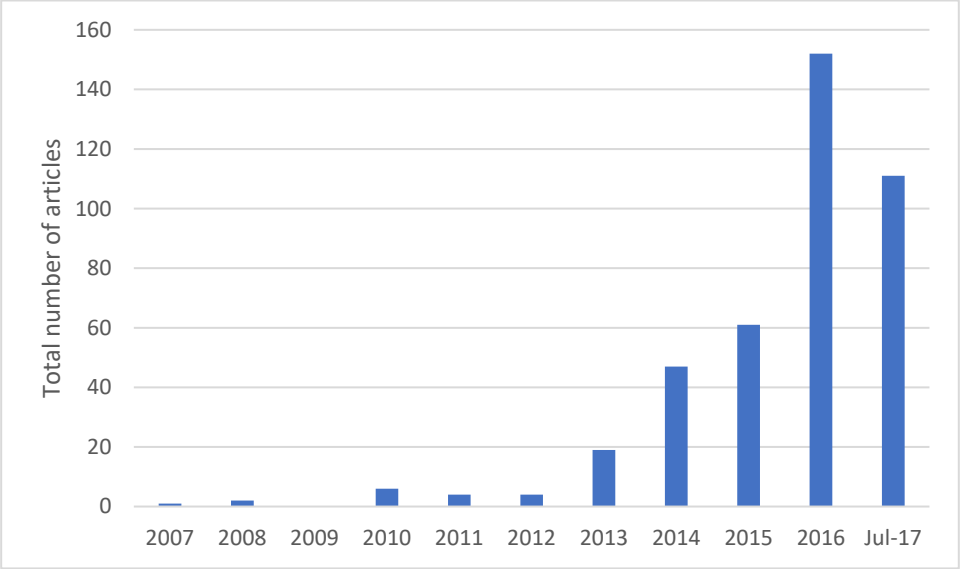


Figure 5.4 Number of newspaper articles containing land subsidence increased substantially after the 2013 major flood (it reached its peak in 2016 when the critical juncture was taking place).

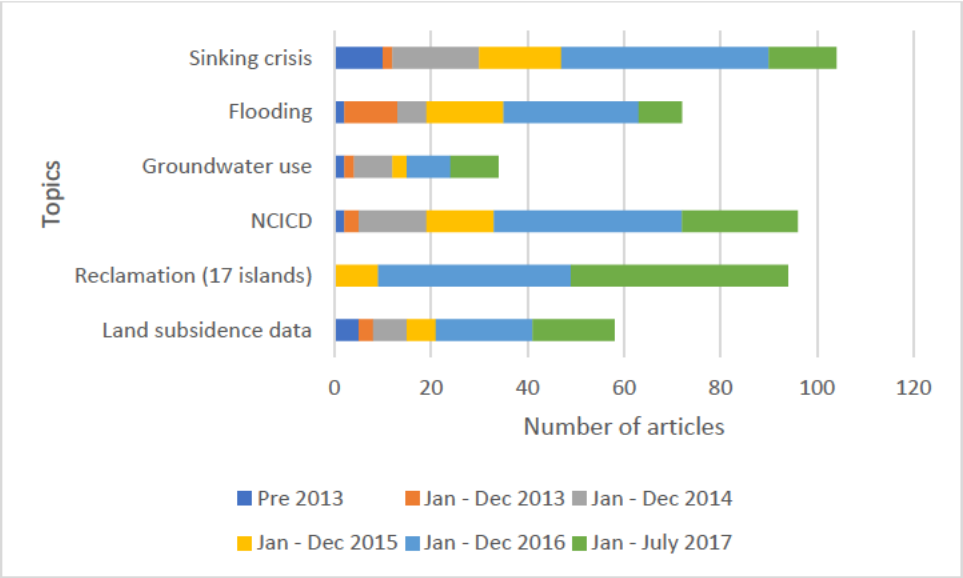


Figure 5.5 Distribution of topics associated with land subsidence per year (2007-July 2017). Problematisation of subsidence as a crisis is the highest followed by the NCICD and reclamation topics.

Our other analysis (Octavianti and Charles, under review/Chapter 6) shows that there are three dominant discourses on NCICD: safety, socio-environment and economic discourses. The safety discourse has been used by the proponents of NCICD (government, consultants, developers and some academics) to push the megaproject. A power play emerged from the struggle of different actors to establish the dominant discourse or storyline:

> *If no measures are taken, a large part of the coastal zone is under threat of permanent inundation. In this area, the lives of 4.5 million people are at stake. Material damage due to permanent inundation is calculated at USD 103 billion for loss of land and buildings only. The damage to the economy will be even greater.*
>
> (The Coordinating Ministry of Economic Affairs, 2014, p.23).

The characteristic of a disaster affects the policy response it triggers. For instance, Birkland (2006) shows that the scientific, social and political responses to earthquakes are more well-ordered than are the responses to hurricanes in the US political context. More attention paid to earthquake mitigation than those to hurricanes may be caused by the difficulty in creating an insurance programme for earthquakes

(Birkland, 2006). In Jakarta, both flooding and land subsidence are important exogenous drivers, but they have different characteristics in terms of policy impact. Unlike the immediate threat of a flood, land subsidence is a gradual phenomenon that does not create the urgency of actions and therefore is not an efficient focusing event. This temporal characteristic of the land subsidence crisis is similar to that of drought and climate change. The boiling frog analogy describes the inability or unwillingness (Birkland, 2006) to respond to threats that arise gradually (Gore and O'Connor, 2007). Policy responses to such crises are usually limited to incremental changes. Without the flood, land subsidence may never receive such significant attention.

This section has discussed the process of land subsidence problematisation and the landscape of the crisis discourse that works as a powerful antecedent condition. The discourse has been eloquently used by influential actors to push a particular solution, which we now turn to.

5.4.3 The role of political agencies

While exogenous factors, like crises, can provide powerful catalysts for policy change, active and disruptive policy entrepreneurs are required to reinforce institutional innovation (Marshall and Alexandra, 2016). Here we discuss the extent to which political agencies play this role in providing, and pushing, answers for the land subsidence crisis. His decision on NCICD is one of President Widodo's important moves in his presidency. His action to meet critics' concern by commissioning a review demonstrates his political manoeuvre to prevent a potential collapse in public confidence. Analysing it from a broader political context, President Widodo's aim to distribute economic growth in the eastern part of Indonesia (PresidenRI, 2016) might also affect his stance towards the NCICD project. This should be analysed within the context of the next presidential election in 2019. The question is whether his decision

on NCICD as a politically difficult project will help or hinder his re-election. He must compromise long-term plans like NCICD to shorter policy objectives, particularly concerning the election. Although pursuing phase A is considered as a sensible decision, the impression left is that he is stalling for time.

Various political agencies were involved in the policy development of NCICD. At least five stakeholders play an important role in this policy-making process: the Indonesian government, foreign experts, private sectors, NGO activists, and academics. Unlike the JCDS project that was under the authority of the Jakarta Province, NCICD is a national-level project and therefore the local government tends not to intervene in the policymaking process (LG1). The Coordinating Ministry of Economic Affairs was the lead agency in this process prior to the corruption scandal. They coordinated meetings among central government, local government, other governmental agencies, and consultants (KI6). Their authority was then transferred to the Ministry of Planning (*Bappenas*) whose primary task was to conduct an evaluation study. Bappenas has been playing a critical role since the 2007 flood by seeking Dutch assistance in the JCDS study and by creating seminars to disseminate findings from JCDS and promoting NCICD (Bappenas, 2016).

The role of private (Kurniawan, 2016) and foreign interests (Alexander, 2015) was prominent in this policymaking process. Private contributions are needed to fund the sea wall through the issuance of land reclamation permits, while foreign involvement is required for technology transfer. Both private and foreign actors do not have the power to translate their innovations or contribution into legitimised policy and therefore they need to build a close relationship with policymakers. Critics charge that they have gone far by taking a leading role in driving the policymaking process (Bakker et al., 2017; AC4; NG3). NGO activists, primarily from Rujak Centre and Ciliwung

Institute, and some academics have argued that the NCICD will only benefit particular stakeholders at the expense of marginal communities, especially fishing communities (NG3). There is no consensus among academics regarding their stance towards the project. Most of them share similar thoughts to those of NGO activists, while some, particularly those who have a role in the bureaucracy, strongly support the project. The rest are rather neutral and thus neither give staunch support nor reject the project. The central role of experts and their lack of consensus is partly the reason why this project seems to be locked in the 'for or against' binary, given the highly technical nature of the project.

There are two types of interaction worth highlighting here; the first one is between policymakers and the Dutch firms. A Memorandum of Understanding in the field of water between the Government of Indonesia and the Netherlands has existed since 2001, with a recent update in 2015. The memorandum 'lays the framework for intensive cooperation', such as 'staff training, educational programmes, and exchanging experts' (Colven, 2017, p.259). For example, the provincial government of Jakarta sending its staff to the Netherlands to do a range of internships, workshops and conferences in order to learn the 'best water management practices' adopted by Dutch engineers and policymakers (Dutch Water Sector, 2014 cited in Colven, 2017, p.259).

A high-level partnership around NCICD has been established between the Governments of Indonesia and the Netherlands since the 2013 flood. Leaders of the two countries often visited each other. The most remarkable visit was when the Dutch Prime Minister, Mark Rutte, led a large trade delegation to Indonesia in 2016. The delegation included two Dutch ministers, one Dutch vice minister, and about 110 Dutch businesses – almost half of them were companies in the water sector (Government of the Netherlands, 2016). This demonstrates the concept of economic diplomacy that the

Dutch government officially promotes through its Netherlands Water Partnership (NWP) institution (Bakker et al., 2017). The Dutch government has committed to provide a total budget of €8 million for general consultancy and the Knowledge Management unit of the NCICD organisation. They financed the NCICD Master Plan through overseas development assistance (ODA). This aid relationship is expected to transform gradually into trade relations ('from aid to trade'). This ODA money will be used to develop a financial strategy to attract public and private investors to participate in the prestigious project (Bakker et al., 2017). According to a survey by Aidenenvironment (2015), Indonesia is the most important client for the Dutch water business as it made up more than 30% of its business turnover as per December 2015.

Another political interaction observed is between policymakers, especially former Governor of Jakarta, Basuki Tjahja Purnama, and private property developers. This interaction is specifically concerning the disputed permit of the reclamation project of the 17 islands. Governor Purnama strongly supported the reclamation of Jakarta Bay. He was even allegedly involved in the corruption (Carina, 2016), but later proven innocent. Purnama asserted that his administration could not cancel the 17 islands reclamation because the plan was based on a legally binding regulation, the 1995 Presidential Decree. He further argued that if the current government cancelled the developers' permits, it would be required to pay high levels of compensation to developers. Therefore, Purnama attempted to gain as much benefit from the project by increasing the additional contribution from 5 to 15%. From this contribution alone, Jakarta could earn up to IDR 179 trillion (approximately USD 13 billion) (Belarminus, 2016) to build infrastructure, such as road and low-cost apartments (*rumah susun*). Due to his strong support to the reclamation project and his policy of forcibly evicting people living on 'illegal' land, he has been labelled by some groups as the 'governor for

developer' (NG5; Kuwado, 2016a). Reclamation was a contested topic for a recent gubernatorial election held in February 2017, in which Anies Baswedan, a new candidate, beat Purnama, the incumbent. In his campaign, Baswedan pledged to cancel the reclamation; a stark difference with Purnama's position to keep the reclamation going (Wardi, 2017).

At the national-level politics, a cabinet reshuffle replacing the Coordinating Minister of Maritime Affairs in July 2016 was allegedly related to this reclamation dispute (Jamil, 2016). According to the opponent of the project (NG2; AC10), Rizal Ramli was replaced by Luhut Pandjaitan because Ramli was brave enough to cancel the reclamation permit of one of the 17 islands (Island G) one month before the reshuffle. Pandjaitan, the successor, regranted the permit to the developer in September 2017. He suggested that land reclamation is a solution to subsidence and warned Baswedan regarding his intention to cancel the reclamation project. The quote below demonstrates how Pandjaitan conflated the 17 islands reclamation and the seawall projects:

> *If you want to stop it [reclamation], do it. If Jakarta is sinking or subsiding further, you [new governor who is opposed to the reclamation] must take the responsibility.*
>
> -Minister Pandjaitan, 8 May 2017, in Ihsanuddin (2017)

The framing contest during this juncture took place in a number of forums, such as focus group discussions with experts, organised both by status quo players (primarily government, consultants and developers) and by change advocates (a coalition of NGOs activists, concerned academics). The purpose of such discussions was not only to collect diverse perspectives on the plan but also to exploit multiple venues to promote each coalition's ideas or 'venue shopping', following True et al. (1999).

The interaction of stakeholders involved and their main narratives about NCICD, measured by the frequency of newspaper articles, can be divided into three stages: pre-, during, and post-critical juncture (Figure 5.6). Policymakers have been

constantly promoting NCICD to solve the sinking crisis in the three stages. The promotion of Dutch expertise in the project was notable in the pre-critical juncture. However, the social and environmental impacts of NCICD voiced by NGOs and some concerned academics gained more space during and after the juncture, weakening the discourse on the excellence of the Dutch. This shows that the constrained environment was relaxed during the evaluation period thus creating an opportunity for the critics to actively voice their concerns, challenging the advocates' narratives and swaying public opinion. Developers' narratives were quite dominant before the critical juncture to promote the aspiration of a world-class city. However, during the juncture, their main narrative changed to emphasizing the difficulty to cancel the project due to its legal status. The narrative shift indicates that developers were negotiating the fate of the reclamation with policymakers.

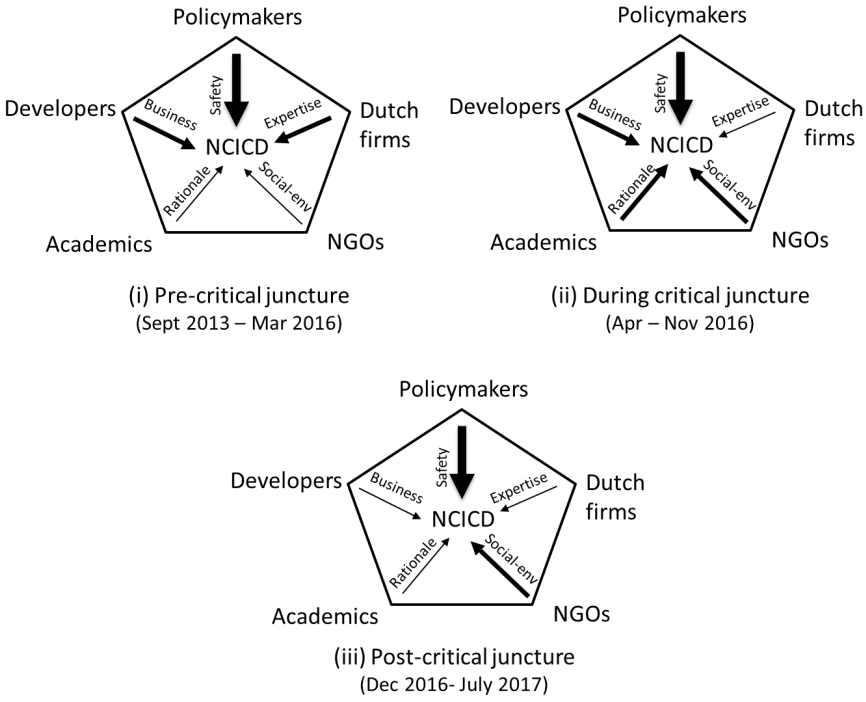


Figure 5.6 Three stages (pre, during, and post-critical juncture) of political interaction in the NCICD policymaking process.

Note for Figure 5.6: Each stakeholder promoted one main narrative as shown inside the pentagon. The changing of dominance of the narratives in the three stages is depicted with the weighs of arrows: light, medium, and bold.

5.5 The politics of ideas

This section presents an analysis (i) of the extent to which the notion of disaster capitalism is relevant to describe Jakarta's sinking crisis and (ii) of the policy options other than the NCICD plan.

Some authors (e.g. Hogan and Doyle, 2007) maintain that decisions taken at the critical juncture are ultimately shaped by the interests of political agencies, and to a lesser extent by antecedent conditions. Ertman (2010, p.1008), for example, argues that personal choices made by influential actors were the main factor in the critical juncture, rather than a 'long and continuous build-up pressure'. In Jakarta, the decisions of influential actors dominate in the selection of a future path (on whether or not to proceed with NCICD), but the problematisation of land subsidence as a sinking crisis has played a significant role in legitimising this ambitious idea. Land subsidence is not just an antecedent condition but, using Slater and Simmons's (2010) term, it is a 'critical antecedent'. As an exogenous shock, it opens the door for institutional innovation in the form of NCICD. The role of agency to push the NCICD idea is extremely important as argued by Peters et al. (2005, p.1296): 'ideas without agency cannot be effective but agencies without ideas cannot provide any direction to change'. In the process of institutionalising NCICD ideas, we argue that land subsidence as an antecedent condition was constructed to empower certain political forces for change. Both exogenous (crisis) and endogenous (inherent characteristics of the agency) factors have combined in creating and using the current junctures.

Analysing deeper the use of crisis to win the framing contest, we observe that the proponents of NCICD (government, consultants, developers and some academics) did not blame the responsible authorities for subsidence. Conversely, the opponents (NGOs and concerned academics) framed the sinking crisis as a government's failure to

manage groundwater usage. They did so because the alternative solutions they offered were related to this groundwater issue, which will be discussed further below. The blame was diffused – not focused on any particular individuals or the policies they embody. The preference for the NCICD plan by national elites may be partly attributed to a no-blame strategy (Bovens, 1998) that serves to get policymakers 'off the hook' and leave existing policies intact.

Revisiting the disaster capitalism notion, we ask to what extent the notion is prevalent in Jakarta's sinking crisis. We analyse it in two steps: the sinking crisis utilisation and the addition of the reclamation project. First, our previous discussion has demonstrated how actors have skilfully capitalised on the sinking crisis to push for the NCICD project. Here, we emphasise how this crisis framing could survive during the juncture. The continued power of the framing can be explained by Molle's (2008) analogy of the snowballing effect. He describes a new concept as a snowball that needs a big initial push to maintain its momentum once launched downhill. The key in this process is to make the concept self-sustained. The corruption scandal creating the juncture initiated the sunshine (or rainy) period to melt the ball. But the intensive problematisation of the sinking crisis (see Figure 5.6 –how the government maintains a safety discourse in the pre-, during and post-critical juncture phases) enabled the ball to maintain its shape, and its discursive power.

We see that the crisis framing has been supported by the political use of uncertainty. Policymakers took advantage of the unknown sinking threats to create their storyline. Actors intensely promoted NCICD as the infrastructural saviour from sinking, such as the former Governor Purnama (also known as Ahok): *Ahok sebut tanggul raksasa bisa hindari Jakarta tenggelam* (Ahok said Giant Sea Wall [NCICD] can prevent Jakarta from sinking) (Juniman, 2016). Because of this uncertainty embedded

in how sinking may materialise in the future, people were convinced of the only solution floating on the agenda. Furthermore, national elites believed in the expertise of Dutch engineers as the world's water experts. Such policy lessons from foreign experts are often put forward as politically neutral truths, but this may, and is often, not the case (Robertson, 1991). The Dutch have a strong historic relationship with Jakarta as they governed the first three centuries of water management in the city (Octavianti and Charles, in press/Chapter 4). Thus, their involvement is justified and fits well to answer the future sinking threat.

Second, the addition of the 17 islands reclamation project to the NCICD plan reduced the safety elements (protection from sinking) that this project originally aimed at (NG1; KI4). The central government changed the concept of *coastal defence* (JCDS) to *coastal development* (NCICD) with a current tagline of 'changing threat into opportunity' (NCICD, 2014). Although the new concept contains the same seawall proposal, it is much more attractive for private funding because of the reclamation element. This suggests that NCICD facilitates the approval of this highly disputed reclamation project.

Although we do not fully endorse Klein's notion of disaster capitalism, we argue that this notion prevails to a considerable extent in the NCICD case. The narrative in the media supported by the seemingly self-evident facts about the sinking crisis justified the reclamation project embedded in the NCICD. Based on our evidence here, we cannot say definitely that the NCICD plan was *deliberately* created to facilitate a broader capitalism agenda, but we can conclude that the sinking crisis has been politicised to pave the way for the NCICD project.

We now discuss the policy alternatives available other than the NCICD plan. The NCICD master plan only offered two responses to the sinking problem: (i) doing

nothing which means abandoning north Jakarta and losing USD 103 billion, or (ii) pursuing NCICD. Of course, doing nothing is not an option anyone would pursue, although there is an idea to move the capital city from Jakarta[23].

During a critical juncture, a broader than normal range of feasible options surfaces (Pierson, 2000). This can be seen in Jakarta where some alternatives, mainly proposed by academics, to the sinking problem surfaced in the public sphere. One alternative is to invest in several smaller projects to stop subsidence in the first place. These demands were far from new as they had been voiced many times in different 'venues' but only made it to political centre stage during the critical juncture. Critics argue that NCICD does not contain a plan to solve subsidence itself, although the subsidence problem and its link to groundwater extraction were recognised in the plan. The disconnection between the problem (subsidence) and the solution pursued (seawall) was highlighted by an informant:

> *NCICD is a severe logical fallacy (…) If we succeed in stopping subsidence, why do we need phase B and C [creating an outer sea wall]? It is like treating cancer with cold medicine, doesn't make any sense (NG7).*

Land subsidence is purported to be caused by overexploitation of deep groundwater due to insufficient water services. Abidin et al. (2008) report a correlation between the lowering of groundwater levels and the occurrence of land subsidence. They further argue that there is a strong correlation between land subsidence and urban development activities in the city (Abidin et al., 2011). However, the relative contribution of other factors, namely natural consolidation of alluvial soil and tectonic activities (Rismianto and Mak, 1993; Murdohardono and Sudarsono, 1998), are not yet

[23] This idea came up because of the overcrowding problem in the city of 10 million and regular traffic congestion. The National Ministry of Planning (Bappenas) confirmed that only presidential and ministerial offices would be moved, and Jakarta would remain a business centre. Two candidate areas are Palangkaraya, Kalimantan and Jonggol, West Java. The first president of Indonesia, Soekarno, had actually planned to base the central government in Kalimantan in 1957, but this never happened (Chan, 2017).

known. Most people in Jakarta use a mix of water sources (Kooy et al., 2016) to complement the unreliable piped water services that serve 60% of the population (PAM Jaya, 2016). Progress in drinking water services has been limited, with only a 12% increase in coverage in 17 years (PAM Jaya, 2016). This is due to several causes, such as shortages of raw water, illegal water use and lack of integration among stakeholders under the public-private partnership scheme (Bakker et al., 2008). To complicate things, some people who have water connections opt out from the system because of the unreliable quality and quantity of water, and thus prefer to use other water alternatives, primarily groundwater (Furlong and Kooy, 2017). The sanitation service is even worse, serving only 7% of the population (PAL Jaya, 2016). This results in river water that is highly polluted and costly to treat. These poor water supply and sanitation services contribute to subsidence.

The consultant who designed the project also highlights the importance of dealing with the subsidence issue: *'Unless subsidence stops, NCICD won't work'* (KI5). This contrasts with the public discourse that portrays NCICD as a direct solution to land subsidence, as illustrated by the headline: 'NCICD expedited to prevent land subsidence' (Oktara, 2017). Policy entrepreneurs who simplified this complex story of NCICD have left an impression in the public realm that NCICD is an all-encompassing solution for all water problems, including land subsidence (e.g. Ihsanuddin, 2017).

While the amplification of the land subsidence issue in public discourse has made the society aware of the problem, no significant efforts to stop subsidence have been made[24]. A firm conclusion regarding the cause of subsidence has not yet been

[24] In March 2018, the current Governor Baswedan formed a team to monitor the use of groundwater, absorption wells and sewage treatment in high-rise buildings in central Jakarta (Hasyim, 2018). This was a response to the city's excessive groundwater use that was exposed in international media (e.g. Kimmelman, 2017)

reached, but providing 100% piped water supply is a no-regret policy[25] in Jakarta and should slow down subsidence. Providing water connection, however, does not suffice on its own as it should be accompanied with good and reliable services (Furlong and Kooy, 2017). Some cities, such as Tokyo (Nakajima et al., 2010) and Taipei (Liu et al., 2010), have been successful in stopping subsidence by implementing effective groundwater management and timely development of water supply facilities from surface water sources. A local regulation in Jakarta (Perda 10/1998) has already been in place since 1998 to regulate groundwater usage by pricing; however, law enforcement of this regulation is still weak. Informants hypothesised that the government has exploited the unclear cause of subsidence to stall a decision to take a serious action towards water supply provision (AC10). We argue that it is important to investigate the cause of subsidence and simultaneously provide piped water supply to the people.

5.6 The 'near-miss' critical juncture

In this section, we discuss factors that caused the near-miss outcome and broader impacts of the juncture. While the corruption scandal enabled the voice of critics to be heard in the public sphere, it was unable to change the adoption of the seawall project. We see that delaying the decision as the outcome of the juncture was just a way to meet the concerns of the public about the project after the corruption scandal was exposed. The intensely politicised process of crisis appears only to perfect the existing frames so that the idea can be self-sustained.

The opponents managed to use *political crisis* –the type of crisis that the proponent chose to avoid– to dismantle the well-entrenched NCICD idea. However, this strategy was not sufficient to trigger policy change as it was defeated by the more

[25] No-regret policy is a common term used in decision-making process, particularly in climate-related policy. It has 'no hard trade-offs with other policy objectives' (Martin, 2012). The benefits of pursuing this option should equal or exceed its costs to society.

powerful utilisation of the *sinking crisis* by the proponents. An informant told us how difficult it is to defeat the powerful narratives built by the proponent:

> *I wanted to make a counterargument [for NCICD through my NGO]. But my boss said, 'Are you sure? That's a big narrative that is supported by huge funds. Are you sure you want to fight that narrative? (…) Because if you discuss this with the capital we have, we definitely are defeated. This is very big politics and involves so many interests'. (…). But we will continue to fight.*
>
> An NGO activist (NG8)

The inertia of the infrastructural approach in Jakarta's flood policy (Octavianti and Charles, in press/Chapter 4) has also contributed to this near-miss event. Jakarta's floods are political in nature, but they have been depoliticised by treating them as acts of nature that require technical responses (Padawangi and Douglass, 2015). Since the colonial era in the 16th century, Jakarta has consistently pursued infrastructural approach to deal with the flood problem. The infrastructural belief inspired some contemporary projects, such as an ongoing river canalisation project, although some authors (e.g. Gunawan, 2010) have cast doubt on the efficacy of such an approach. Continued reliance on infrastructure has created a path dependence and barriers to future changes (Schön and Rein, 1994). The giant seawall was able to survive during the critical juncture because it fits with the dominant values of infrastructure for safety reason –although in terms of technical and financial feasibility, the seawall is subject of much debate.

Another potential cause of this near-miss outcome is that the government and the critics were addressing different sets of problems. The former viewed the need to deal with the *flooding threat* by building the outer seawall, while the latter emphasized the need to deal with the root cause of sinking, which is *subsidence.* These different perceptions and problem definitions have led to unclear policy proposals from the critics. It implies that policy alternatives were not ready to be proposed on time, which

is extremely important given the limited period of a critical juncture (Olsson et al., 2006).

Although the current critical juncture did not result in policy change, it had an immediate impact on the broader political environment, as it successfully put the water policy issue on the government's agenda. The triggered impacts did not necessarily align with the timeline of the juncture. Investments in drinking water and sanitation are not only complicated and expensive but also, more importantly, invisible in terms of physical structures. This invisibility is a problem in the 'politics of visibility' prevailing in the Indonesian political context where local leaders usually use their first five-year administration to do actions that are visible, such as creating parks and canals (Shore and Wright, 2011). The push from NCICD was able to motivate local government to take substantial decisions in the water sector.

The former Governor Purnama has used the opportunity to merge two municipally owned companies dealing with water and wastewater (Nastitie, 2015). The implications of this new institutional setting are substantial especially for the wastewater sector, since a portion of wastewater charge will also be included in the water tariff (LG7). The integration of groundwater management has been discussed as well but not yet agreed upon by the stakeholders involved (LG5). Intense water policy debates during the juncture have also contributed directly and indirectly to spur action for both the drinking water and wastewater sectors. Regarding sanitation, two zones (Pluit and Duri Kosambi), out of 14 zones of wastewater areas in Jakarta, are planned to be constructed within the next five years (Kaban, 2016). This resurrection from investment dormancy was primarily pushed by the government's vision, but also the technical need, to have cleaner rivers flowing to the future NCICD's retention basin.

Meanwhile, in the drinking-water sector, the subsidence issue has helped increase the urgency of having a 100% supply of piped water to stop groundwater extraction. Drinking water services in Jakarta are operated under a Public-Private Partnership (PPP) scheme. There is very little political support to invest in the sector, both in infrastructure (e.g. raw water, distribution network), and in institutions (e.g. water tariff). The contract is now being renegotiated between the private companies and the government to provide universal access to Jakarta citizens (Viva News, 2016).

Land subsidence will continue to be a latent problem because of its silent nature. Prolonged politicisation of this problem, as observed throughout 2017, did not and is less likely to occur unless a major flood hits Jakarta again. In the long run, other critical junctures may increase policy learning and add more incremental changes leading to 'partial transition' (Meijerink and Huitema, 2010). This accumulation of small changes may also completely deflect the current policy path. The worst possibility is that these future junctures are not able to accumulate learning and thus existing governance will never be enhanced. Meijerink and Huitema (2010) observed that policy entrepreneurs are more interested in institutionalising their policy ideas rather than in preparing the ground prior to the critical moment. Therefore, while waiting for another juncture to occur, change advocates can start creating spaces for social learning to diversify the 'ways of knowing' the sinking crisis and unlock the fixation on particular meanings.

5.7 Conclusion

A crisis can create the need for and the opportunity to push 'a wholesale overturning' in the intellectual underpinning of a policy (Hall, 1993). However, for Jakarta's flood policy, a political crisis (triggered by a corruption scandal) was not sufficient to introduce a radical change to scrap the city's ambitious seawall plan (NCICD). We refer to this result as a 'near-miss' outcome as change was possible and

sought after but narrowly failed to materialise. Having examined the public discourse around the land subsidence issue and analysed political interactions during the project's evaluation period, or the critical juncture, we find that the project's proponents have convincingly used the sinking crisis to justify the seawall plan. Therefore, the notion of 'disaster capitalism', whereby actors exploit the fear of disaster to justify a capitalist project, prevailed to a large extent to sustain the preference for the NCICD plan, and thus offer an explanation for the near-miss outcome. The disputed 17 islands reclamation project, claimed by the critics as the capitalist element of the project, has also benefited from this use of crisis framing. Our analysis of the 'policy game of crisis exploitation' (Boin et al., 2009, p.100) suggests that even in the wake of threatening crisis episodes radical change does not necessarily occur. In addition to the powerful discourse built by the proponents of the NCICD, the near-miss outcome was attributable to other factors such as the project's fit with the city's infrastructural approach in the management of flood risks, and the lack of policy alternatives offered by the critics.

This study examined the beginning of the NCICD policymaking process that is still ongoing and may continue during the next decade. The National Ministry of Planning (Bappenas) even stated that the fate of the offshore sea wall may only be decided in 2025 (Syarizka, 2017). It seems that the NCICD project is here to stay until a crisis, be it political or natural, generates another critical juncture. Future junctures, if unable to introduce a policy change, will at least accumulate learning and contribute to shaping a new policy context for the management of flood risk in Jakarta.

We hope our attempt to unpack the politicisation of the land subsidence issue illuminates how actors work to channel particular interests. Much of the attention given to the NCICD, however, should not undermine the urgency of stopping the subsidence

problem in the first place. Without serious policy instruments to stop subsidence immediately, it may be too costly or worse, too late, to fix the problem.

Chapter 6. Rethinking water security: How does flooding fit into the concept?

Abstract

Since first introduced in 2000, 'water security' has grown into a vibrant research area, with the majority of studies examining water supply security. Although protection to water-related hazards is recognised as a dimension in water security, only a few scholars have explicitly put flood-related research under the banner of water security. This paper seeks to theorise the position of flooding in the water security conception using the securitisation lens, which also influenced early works in the water security field. Securitisation is a process of perceiving an issue as a threat, enabling the pursuit of extraordinary measures outside normal politics. I find that water supply security and flood security have the same theoretical root: fear of an unknown future. They are based on the notion that threats to the shortage of water and surplus of water, respectively, create the need for robust policies, which often translate into climate-proofing infrastructures. Here I propose a conceptual tool to assess the likelihood of a threat to undergo a securitisation process and to help answer why a threat was securitised while others not. This tool is deployed to examine the case of flooding and sinking in Jakarta, Indonesia.

Keywords

Water security, securitisation theory, fear, Jakarta, sinking, seawall plan

6.1 Introduction

The burgeoning of water security research in the past two decades has been fuelled by the increasingly recognised challenges of dwindling water resources due to climate change and population growth. Studies cover a range of scales from the

household (e.g. Wutich and Ragsdale, 2008; Jepson et al., 2017) to the global scale (e.g. Vörösmarty et al., 2010), departing from engineering perspective (e.g. Dong et al., 2010) to social science (e.g. Boelens and Seemann, 2014), in addition to various water sectors. UN Water (2013) uses the following working definition of water security: 'the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability.'

Despite its recognition, resilience to water-related disasters, particularly flooding, is felt less suitable to fit the conversation in the water security field. One explanation for this is that flood has its own active field in disaster studies dominated by engineering; as a result, scholars do not feel the need to pick up on the 'buzzwords' of water security. By conducting a systematic analysis of 124 articles, book and book chapters published between 2010-2015 in place-based water security research, Gerlak et al. (2018) found that the field has been dominated by research related to water scarcity. Half of the database proposed indicators to measure water security; the majority of them (91%, N=52) identified sufficient quantity as an indicator contributing to water security while the risks of floods and sea-level rise were only mentioned in 10 publications (18%).

In the water security scholarship, the 'securitisation' approach has been associated with safeguarding water sources through means such as military measures. In the word of Buzan et al. (1998, p.26), securitisation can be understood as 'the staging of existential issues in politics to lift them above politics'. However, the link between water security and securitisation has not been adequately and conceptually explored in

the literature (see Fischhendler, 2015). Using the securitisation theory, which is approached through the political ecology perspective, this paper asks: (i) how is flooding conceptualised and understood in water security? (ii) in what ways does securitisation theory further the water security concept? and (iii) what are the roles and implications of large infrastructure in the securitisation effort? This paper seeks to make a conceptual contribution by theoretically unpacking the fitness of flooding into the water security notion. For security studies, it contributes to the growing literature that views security beyond the military and technocracy perspectives but one that is more social in its meaning (Rappert, 2007).

Flood events in Jakarta, Indonesia will serve as a case study to illustrate this point. The examination of compounding water hazards in Jakarta, including the problematisation of the sinking threat and a seawall proposal as a source of security, allows us to investigate the messy entanglement of flooding with other elements in water security. Although these relations are constrained, they do shape broader urban politics. Jakarta is known internationally as 'the fastest sinking city in the world' (Lin and Hidayat, 2018) with high inequities (Oxfam, 2017) and uneven vulnerabilities to environmental hazards (Kamil and Murakami, 2011). This article will unpack this notion and generate empirical evidence to demonstrate the link between water supply security and flood security. Whilst at a glance they may not be compatible, both security demands develop from the same foundation of fear: fear of not having enough water and fear of having too much water, respectively. Therefore, in some contexts it may be more appropriate to call this *water insecurity* rather than water security.

In the following section of literature review, I seek to unravel the emergence and development of water security research and introduce the current thinking and debate in the securitisation scholarship. An examination of the literature in both scholarships is

useful to theoretically position flooding within the concept of water security, which I argue, stems from insecurities demanding a security policy. I then introduce a conceptual tool called 'determinants of securitisation' to assess whether and how a threat is likely to be securitised. The tool is then deployed to assess flood events and the sinking threat in Jakarta, followed by a closer examination of a seawall proposal in the city. The penultimate section reflects on the contestation with regards to securitisation moves, on the potential of desecuritisation and its relation to depoliticisation, before the concluding remarks presented in the last section.

6.2 Water security and securitisation theory

6.2.1 Water security research

Water security has been widely used in both academic and policy discourse. While it is difficult to determine the single point of origin of the term, Staddon and James (2014) note that early publications in the field can be associated with water conflict in the Middle East in the early 1990s (e.g. Shuval, 1992). In that era, other regions from the Mekong basin in Asia to the Ethiopian Highlands were also experiencing scarcity, which triggers stakeholders to question the efficacy of their status quo in water management. Pairing water with 'security' has taken water higher in many political agendas and implies a recognition of a geopolitical urgency especially concerning shared water sources.

The volume of articles produced under the 'water security' umbrella term in the last two decades is impressive. Some authors (Cook and Bakker, 2012; Gerlak et al., 2018; Hoekstra, 2018; Scott et al., 2018) have critically reflected on the scholarship and observe that the term 'has too many disciplinary, sectoral, ideological and geographic roots to be conveniently pinned down' (Zeitoun et al., 2013, p.4). Nevertheless, it has a distinct identity to separate itself from previous terms that have lost coherent meaning

in water research, such as integrated water resources management and water governance. International agencies, such as the Global Water Partnership (GWP), have been fundamental in mainstreaming the term more widely. The diverse meaning of water security depends on 'institutional agendas, objectives, disciplinary approaches, theoretical leanings, political preferences, views of justice and equity and geographic settings' (Gerlak et al., 2018, p.86). Broad interpretations of this term as proposed by Cook and Bakker (2012) and Zeitoun's (2011) sustainable water security web are arguably less workable than tailored, contextualised definitions of water security. Therefore, I refrain from seeking a perfect singular definition of water security that can adequately capture the complexity of it. However, to introduce the term to the readers, in the introduction section, I use a working definition of water security by UN Water (2013).

To date, some authors observe that the notion of water security is narrowly referred to just water supply security (e.g. Lundqvist et al., 2003; Padowski et al., 2016; Grafton, 2017), despite the many domains that the term contains. Jepson (2014, p.108) conceptualises four domains of water security: '(1) human development; (2) ecological sustainability; (3) geopolitics and international relations; and (4) vulnerability and risk', which overlap with four interrelated themes observed by Cook and Bakker (2012). The diverse domains constituting water security point to the synergies and trade-offs arisen from the converged or conflicted values in the society (Pahl-wostl et al., 2013). Although flood is included in the domain, there remains a missing theoretical foundation to articulate the position of flood within water security. This article differs from previous studies looking at flood (in)security, such as Warner (2008), in the way that 'water security' is treated as a concept and not just in passing.

Water security is included within the larger conceptual realm of security studies, although securitisation is more resonant in the context of transboundary water sources (Dinar, 2002; Zikos et al., 2015). Influencing early works of water security, securitisation has been viewed quite negatively. Lankford (2013), for example, interprets securitisation in a controlling sense by pursuing forms of appropriation without necessarily making human and ecology more water secure. Leb and Wouters (2013) also argue that 'cooperation and not securitisation is at the heart of achieving effective water security'. Securitisation is often viewed through a narrow framing of militarisation, that is safeguarding water in volumetric terms through armed forces. While this may be the case in conflicted regions, in most cases securitisation can be understood in a much broader sense as I discuss below.

6.2.2 Security studies

The securitisation theory, which also started gaining attention two decades ago like water security, has been used as a lens to discuss a wide range of security issues from military affairs to non-military issues, such as environment, gender and migration (Huysmans, 1998). The main questions addressed in the theory are: what comprises security, security for whom, and from what. Built upon a mixture of theories in International Relations, it echoes other disciplines such as human geography and cultural and media studies and has been expanding its scope from international security to security studies at the level of sub-state (Rappert, 2007). The expansion also comes with debates on theoretical questions and methodological challenges. Of the many theoretical approaches and schools in security studies, the so-called 'Copenhagen School' and the 'Welsh/ Paris School' are the most prominent and influential.

The Copenhagen School (Buzan et al., 1998) was among the first in giving fresh impetus to security studies while still being Europe-centric in their approach,

specifically on issues of identity and migration (Wilkinson, 2007). In this school, security is understood as a speech act that articulates a specific utterance to change a situation (Austin, 1962). With the right context, stage and audience, declaring something a security issue enables the mobilisation of extraordinary measures (Buzan et al., 1998). Scholars in this school view securitisation 'as a failure to deal with issues of normal politics' (Wæver, 1995, p.29) and therefore prefer for desecuritisation whereby issues are treated in the ordinary public sphere. However, desecuritisation is often not possible in the unregulated period of exception (Warner, 2008). Despite their substantial contribution to the theory, the school's focus on limiting security to speech act is contended by some scholars as 'too thin and too formal to capture the concrete dynamics, strategies, and forms that securitising acts can take' (Williams, 2011, p.212). Furthermore, the important elements of context and audience are left underdeveloped in the theory.

The second strand of research in securitisation theory, what Warner (2008) calls as, the Welsh (e.g. Booth, 1997)/Paris (e.g. Huysmans, 1998; Bigo, 2002) school, stems from their distrusts in the state (and private sectors) to provide security for individual or group. They assert that governance brings increased control but not the expected co-production of security. In reconceptualising securitisation, the school made human emancipation their focus. UNDP's (1994) view on human security, calling for the shift of focus from the state to the individual, affected the development of this school. Viewing security and emancipation as two sides of the same coin, Booth (1999, p.46) postulates that emancipation 'offers a theory of progress for politics, it provides a politics of hope and gives guidance to a politics of resistance (…) Emancipation is the only permanent hope of becoming'. Unlike the methodological principle of the Copenhagen School, Balzacq (2011) argues that securitisation moves can be either

discursive or non-discursive. He emphasises that securitisation is an argumentative process, not merely self-referential performance. By referring to the individual and not the state, the understanding of social construction of security in this school is arguably more dynamic, nuanced and represent its complexity.

Concerns of the Welsh/Paris scholars are also shared by political ecologists who see that the human vulnerability to floods are conditioned by their systemic political economy condition (Bryant and Bailey, 1997). They underscore the need for social resilience to all kinds of hazards that have been underestimated, and therefore promote investing in local preparedness to improve social resilience (Hilhorst, 2003). This also works as a critique to American liberal school of human geographers (White, 1974; Burton et al., 1978) who promote the shift from physical structure of flood defences to human behaviour and choice through, for example, zoning and subsidies. While political ecologists have criticised the uneven distributional impacts of flood defences, leaving flood mitigation and adaptation policies to the concerned individuals to choose at their disposal may be harmful. They argue that disadvantaged groups may end up in the most hazard-prone locations because of their unfavourable position in the political economy (Hewitt, 1983; Blaikie et al., 1994).

The employment of securitisation theory in studying environmental conflict has been fruitful in understanding the complexity and uncertainties of the environment. The theory can help analysts to investigate why some issues gain more attention and mobilise actions while others are largely ignored. In water scholarship, characteristics of security studies can be seen in international hydropolitical studies in the context of water shortage (Turton, 2001; Jägerskog, 2003) although the term ‘water security’ was not necessarily used.

This paper focuses on large infrastructure or technology, which is also an important theme in security studies (Rappert, 2007). The scholarship departed from military affairs, and as a result, the application of technology has been framed as if to achieve security in war-like conditions. However, it has now been widened to include other types of security. One of the more challenging issues in examining the role of technology in security study when fostering public trust in the government and experts (or broader epistemic communities) in today's modern society. Whilst technology acts as an instrument in policy decisions, it also influences, if not determines, the options available for decision-makers (Leonard, 2007) shaping future pathways.

The review of relevant literature in both water security and security studies above has informed us of overlapping ideas in both scholarships and how they can be used to theorise about the position of flooding, which is often securitised, within the concept of water security. I use a political ecology perspective in interpreting the securitisation theory, as it helps me foreground the political struggles that a flood mitigation project may cause.

6.3 How does flooding fit in the concept of water security?

6.3.1 The politics of fear

This section offers an explanation on how underlying human fears influence thoughts surrounding water security policy. It also serves as a theoretical foundation to argue that flooding does fit well within water (supply) security as they emerge from the same water-related anxiety.

Fear does not quite fit in well with the vision of modernity, given the commitment for the freedom from fear by the Human Security agenda (UNDP, 1994). On the contrary, traditional thinkers do not view fear completely negatively; they illuminate a more nuanced and potentially more productive view of fear. For instance,

Thomas Hobbes theorises that a human has multiple and often contradictory forms of fear, and the absence of which could be dangerous (Blits, 1989).

'The politics of unease' legitimises all kinds of extraordinary measures to address fear, bringing increased control of individual behaviour (Bigo, 2002). It starts when our logical rigour has been convinced of the criticality of a problem and its consequences as narrated by securitising actors or 'conflict entrepreneurs' (Friis, 2000). As 'the most socially volatile emotions' (Williams, 2011, p.215), fear evokes our understanding of 'known knowns, known unknowns, and unknown unknowns' (quoted from Donald Rumsfeld' popular trilogy) and thus operates at the limits of our knowledge of the problematised issue. To convince a society of the urgency of an issue, securitisation moves must pay closer attention to their logical consistency as well as to the dynamics of social power (Weldes et al., 1999). Even the most technical discourses and practices will contain fear if they are relating to security to ensure this consistency (Williams, 2011). Furthermore, much of the current debate on security matters are framed around the potential absence of direction and a process of social dislocation to create a certain dynamic in society.

Water security policy related to flood and drought[26], are both triggered by fear. The former is sourced from the fear of excess water and how to *secure people* (and assets) *from water*, whilst the latter is from the fear of water shortage and how to *secure water for people*. Considering that the construction of insecurities creates demand for security, it seems more appropriate to call the relevant securitisation process as the politics of water *insecurity,* rather than water security. In line with Boelens (2013), Conway (2013) and Grey et al. (2013), I perceive water security and water insecurity as

[26] Drought is different from water scarcity. The former is a natural hazard, caused by climatic variability; while the latter refers to insufficient water resources, with can be prevented by water management. However, separating 'natural (drought) and human (water scarcity)' in practice is not easy as they often occur simultaneously (van Loon and van Lanen, 2013, p.1483).

not necessarily opposites as they have different conceptions and impacts. For example, the headline 'Jakarta is sinking so fast, it could end up underwater' in the New York Times (Kimmelman, 2017), coupled with a picture of a flooded, abandoned mosque outside of the current dike played a central role in inciting fear and legitimating a seawall plan. These outcomes may not have been achieved had the seawall been narrated to create 'less flooding' in the coastal areas. The 'if-then' character of security logic postulated by the Copenhagen School may explain this: 'If we don't build the seawall, then Jakarta will sink' logic mobilises radical fear in the unforeseeable future, in which our knowledge is limited (Blits, 1989). Securitisation has been responsible for distorting and shaping our perception of risk that demands narrow technological solutions in dealing with this fear (Durodie, 2012).

While the exploitation of fear has been used to legitimise many controversial projects (e.g. desalination plants in Australia (Head, 2014)), it has induced positive behaviour change as seen during the drought in Cape Town, South Africa. The announcement of 'day zero' -when dam levels would be so low (below 13.5%) that the government would turn off the taps in Cape Town and send people to communal water collection points- has been successful in convincing residents to conserve water. The city's water use reduced significantly from 600 million litres per day in mid-2017 to 507 million litres per day at the end of April 2018 (Mahr, 2018). Day zero as an apocalyptic notion has made water conservation the new normal.

6.3.2 Identity of flood water

Having theorised about the fitness of flooding within water security, I now review the different characteristics of flood water and other 'waters' before discussing how they interact with other elements of urban water.

The perception of flood water as invaluable and destructive determine its physical materiality and social functioning. Different types of flooding (coastal, fluvial, pluvial) have different water identities. Although fluvial flooding (runoff from upstream areas) and pluvial flooding (from extreme rainfalls and related to the incapacity of a drainage system) seem to have similar characteristics or are perceived similarly, they are in fact, different. The former may present itself in the form of flash floods, which is more frightening, as they sweep everything in their path, whilst the latter is more of a local and contained phenomenon. Flooding resulted from dike failures may also share similar characteristics to flash floods. Overtopping of dikes in coastal areas creates a coastal flood that has a different identity to other types of floods. The limitless quantity of seawater incites a different fear in human -although high-tides coastal communities may be able to predict the severity of flooding based on experience. Flooding is often characterised by its flow of water (particularly in a flash flood), but its stagnation is also of major importance. Camargo and Cortesi (2019) assert that this special character of flood water has been missing from water literature, including the popular hydrosocial scholarship.

Flood plays major role in disrupting the operation of water and wastewater services as well as the broader national security, although it has a positive role in supporting the ecosystem. During a flood, water supply services are often interrupted due to the pressure changes in the water mains. Therefore, it is not uncommon to find that people experience water scarcity during flooding. Groundwater as the main source of water in many places is also negatively affected during flood events as it is prone to contamination by flood water, even a few days after the flood.

Furthermore, flood water is highly likely to be contaminated with sewage as the sewer systems, both onsite (e.g. septic tanks) and offsite (the networks), do not have the

capacity to take on the water entering their system from the inundation. Flood water intercepts the sewer systems through the cover of the tank, underground pipe joints, and the outlet pipes. If contaminated with sewage, flood water poses the risk of contaminating water supplies, nearby watercourses and land for food production as well as grazing livestock. Major floods inundating a large part of a city can influence the national economic productivity due to the submerged road access and assets, as documented in Bangkok and Jakarta.

Even so, flooding has an important role in nutrition distribution in floodplain. For instance, the annual flood in lower Nile was vital in supporting fishing industries as the flood 'delivered about 7-11 x 10^3 t of biologically available phosphorus (P), at least 7x 10^3 t of inorganic nitrogen (N), and 110 x 10^3 t of silica (Si) to the Mediterranean coastal waters off Egypt' (Nixon, 2003, p.30). The construction of the Aswan High Dam in 1965 reduced 90% of the flow of the Nile and resulted in the collapse of the Egyptian fishery. While agricultural drainage and human sewage now support the nutrient demands in the delta, the nature of the current productive system appears to be different to when fertility was provided by the flood (Nixon, 2003).

6.3.3 A framework

Some authors have looked at the possible factors that encourage the use of securitisation, but Sjöstedt (2010) asserts that their arguments to support the assumption that securitisation does not happen arbitrarily seem anecdotal. Here I postulate a conceptual tool to assess conditions or variables that urge the use of securitisation as a political strategy. However, it does not offer a fully grounded analytical framework for the investigation of the whole securitisation process. This tool may help guide researchers to understand why a particular threat was securitised, to further inform future strategies when the next threat comes.

The framework, what I call as 'determinants of securitisation', is a function of the characteristics of threat (types, impact, uncertainty) and the capacity of state (experience, expertise, political context) (Figure 6.1). It highlights combined readings of the biophysical and social processes to better understand how and why securitisation occurs. Every determinant here is considered as in spectrum representing the likelihood of a threat to receive the securitisation treatment. For example, a threat that has a visible impact and higher uncertainties is more likely to be securitised than a threat whose impact is invisible and its uncertainties low. As a threat may sit in a different position in each determinant, one may treat this tool as a scale.

Understanding the contextual background of the state is essential because the success of securitisation is dependent on the political 'sphere' in which the threat occurs. A securitised state, i.e a dictator regime, may make it difficult for non-state actors to 'speak security' (Wilkinson, 2007) or to counter securitisation moves as in the case of Egypt's Toshka channel and Turkey's Ilisu dam (Warner, 2008).

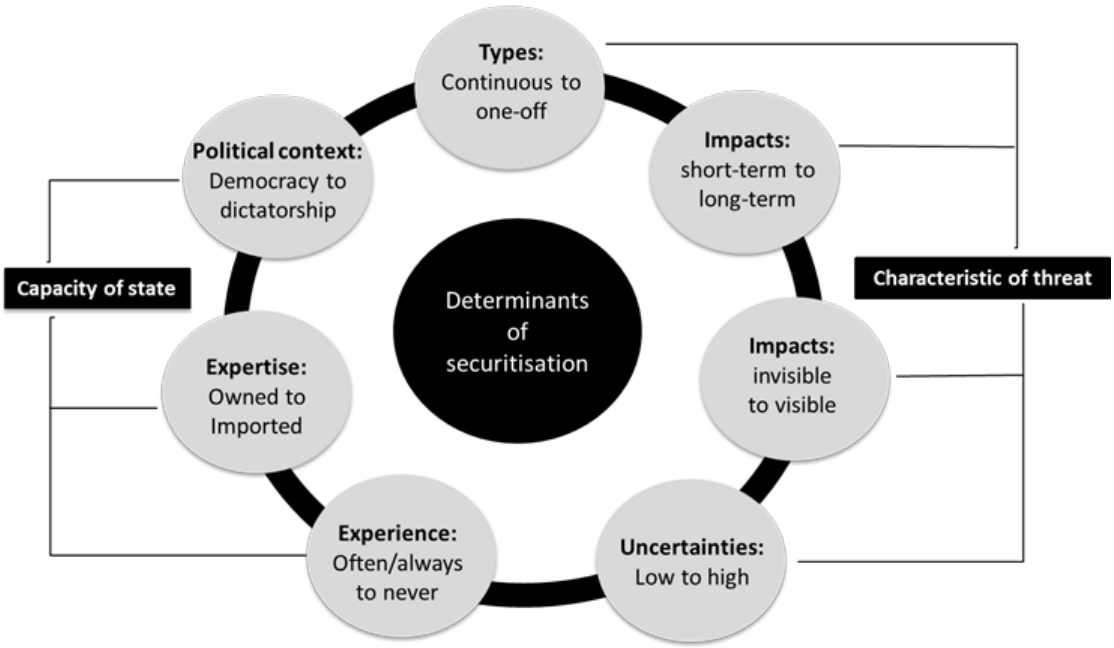


Figure 6.1 An organising framework reflecting seven key areas of 'determinants of securitisation'

Not all threats are 'securitise-able' or even worth the effort to be securitised. Those with major impacts are likely to be securitised or to be considered as security issues. A threat that is less likely to undergo a securitisation process will be dealt with in normal politics, not in a securitised mode of politics. The former is characterised by slower process and deliberation (Buzan et al., 1998), while the latter is a condition where alternatives are excluded, uncertainties and ambiguities are dispelled, debates are trumped and actors consultation is reduced (Warner, 2008). Pathways following securitisation moves will be discussed in the penultimate section.

Securitisation can be institutionalised, particularly for a recurring threat, therefore, actors do not need to talk about security all the time to trigger the desired response. In the Netherlands, when flooding occurs, it is declared a crisis easily and actors (those for and against) agree on the urgency of protecting lives and assets, although convergence on how it should be done may not be the case. 'By saying "defence" (or in Holland, "dikes"), one has implicitly said security and priority' (Buzan et al., 1998, p.27). But if the threat comes in a different magnitude, as we shall in the case of Jakarta, a different mechanism for securitisation may occur.

Taking inspiration from the Multiple Stream theory (Kingdon, 2003) and the Punctuated Equilibrium theory (True et al., 1999) in examining policy process, I underscore the importance of time as securitisation is a time-dependent action. When a threat arises, a securitisation move can only succeed if the impact of the threat is still endured and a solution is proposed during this window of opportunity.

Hydrologic events are characterised by the fast-moving and stochastic nonequilibrium conditions resulting in random rainfall events. Considering this natural phenomenon, different types of hydrological hazards have different patterns of policy responses. As illustrated in Figure 6.2, a window of opportunity for a flood event opens

wide immediately after the flood and diminishes over time. This stands in contrast with that of drought; where it only slowly opens once the impact of drought starts to intensify. While drought affects the hydrologic process, it is considered a climatological hazard, which is 'a hazard caused by long-lived, meso- to macro-scale atmospheric processes ranging from intra-seasonal to multi-decadal climate variability' (CRED, 2009). More rapid occurrences of flood events allow unused proposals to be re-cycled for the next events.

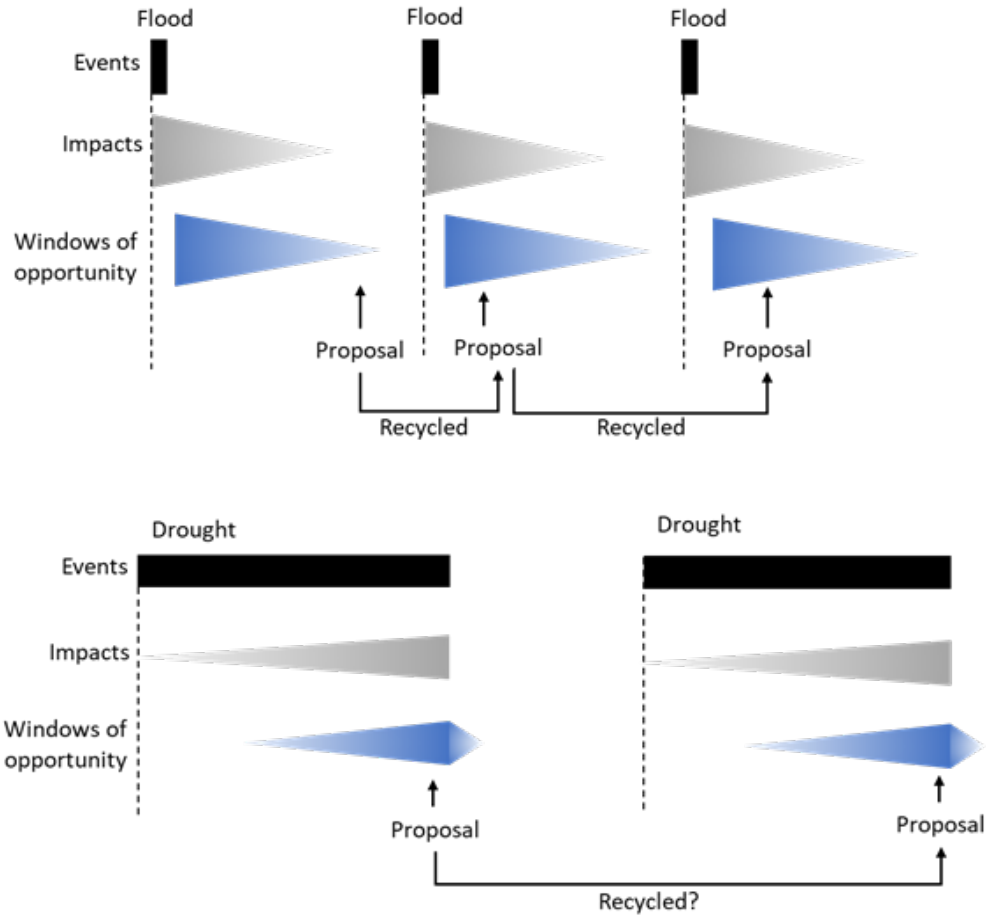


Figure 6.2 Different threats and different patterns of window of opportunity for policy response

6.4 Case study: Sinking problem and seawall solution in Jakarta, Indonesia

Jakarta, the capital city of Indonesia, is a typical deltaic megacity. Deltas are rich in nutrients as rivers have been depositing sediments, and thus they offer fertile land for agriculture. This invites people to settle and build livelihoods. Unsurprisingly,

18 out of 23 megacities today are located in deltas (Pelling and Blackburn, 2013), and many parcels of land have been transformed from agriculture to serving housing and commercial purposes (Seto, 2011). However, this vitality of deltas is becoming increasingly threatened by environmental hazards. Low lying areas have made deltas prone to flooding (fluvial, pluvial, coastal), land subsidence and sea-level rise (Shatkin, 2019).

As a megacity with a population just above 10 million, Jakarta has to deal with myriad urban water challenges from lack of basic water services to compounded water-related hazards. The municipal water companies operated under a private-partnership scheme are only able to supply around two-third of the population. Residents complain of intermittent services and sometimes poor water quality. As a result, many use groundwater as their main water supply (Kooy et al., 2016) and packaged water as their main source of drinking water (Kooy and Walter, 2019). Moreover, Jakarta has one of the worst wastewater services in urban Asia, with the centralised system serving only 7% of the population (Kompas, 2015). The majority use septic tanks that come with the risk of contaminating groundwater.

Built on a delta with historically uncontrolled spatial growth, Jakarta has been suffering from flooding even with a population of only 10,000 people in the 17th century (Octavianti and Charles, 2018b). Observers note that floods in the past two decades have been more severe compared with the previous floods in Jakarta, disrupting livelihood and economic activities in the city. An investigation of a major flood in 2007, which killed 79 people, displaced 500,000 people and caused almost $680 million worth of damage (Bappenas, 2007), found that the northern parts of the city are subsiding and hence, worsening the floods (Bappenas, 2007). The subsidence

rate they found was staggering; at 15 cm/ year (Abidin et al., 2011), this makes Jakarta the fastest sinking city in the world.

The way this information is communicated to the public created a sense of doomsday in Jakarta, such as through headline 'Special investigation: Jakarta is sinking in 2030' (e.g. Harap, 2016). In comparison to the subsidence rate, sea-level rise, which is predicted to be at 3 mm/year (PU, 2011), has not been the main focus of Jakarta's government, and not much exists in terms of discourse in its disaster preparedness plan.

To tackle this pressing issue, the Government of Indonesia, in collaboration with the Government of the Netherlands, launched a mega-project, NCICD (National Capital Integrated Coastal Development) in November 2013 after a major flood hit the city's central business district earlier that year. The main element of the project is the construction of a 32-km offshore seawall, to create a 10,000 ha coastal lagoon that will be used to drain all 13 rivers currently flowing through the metropolitan areas. According to the master plan (NCICD, 2013), the lagoon will allow the sea level to be reduced up to 3 meters. This reduction is needed as the river water may no longer be able to flow under gravity due to subsidence in some river stretches. To fund the project, reclamation plan in the form of the mythical 'Garuda' bird is designed for the lagoon. Opponents of the project (concerned academics and NGO activists) argue that it will likely cause more harm than good (see discussion in section 6.5). They maintain that the ongoing effort to strengthen the existing sea dikes is sufficient for Jakarta's disaster preparedness plan and resources should be directed to provide water provision to tackle the problem of subsidence, which has not been dealt with in the current plan. Experts have not agreed on the main cause of subsidence but there is a correlation found between subsided areas and declining groundwater table in northern parts of Jakarta (Abidin et al., 2011).

The contestation became worse following a corruption case in the issuance of permits for the 17 islands[27] project, another part of the reclamation project that was added to NCICD in 2016. In June 2019, the Government of Indonesia signed MoUs with partners (South Korean and Dutch governments) to undertake the seawall construction (Anwar, 2019). This marked a new chapter for the USD 40 billion (total cost, valuation in 2014) project after its dormancy for several years.

The data for this study were collected mainly from two sources[28]. The first is key informant interviews with 48 informants ranging from central and local government officials, NGO representatives, to academic and individual experts. Interviews were conducted between May and September 2016, July 2017 and February 2018. The other data source is planning documents and newspaper articles. I did not set out to investigate the 'objective' distributive effects of the seawall proposal; my interpretation of the seawall was informed by informants and documents that are interpreted through my political ecology stance.

6.4.1 Employing the framework

In Jakarta, discourse related to 'water security' refers only to water supply security, i.e. the percentage of raw water from within its jurisdiction[29], despite parts of the city are almost always inundated every rainy season. Nevertheless, past severe floods were able to instigate flood mitigation projects (Octavianti, 2019), such as river

[27] The 17 islands reclamation project was legalised through a presidential decree in 1995 with the aim to alleviate urbanisation pressure in the city by increasing housing and business areas. In September 2018, a newly elected governor of Jakarta, Anies Baswedan, revoked permits for this project, but later in June 2019 he approved the issuance of 932 building permits on Islands C and D. He argued that he had kept his promise of stopping further reclamation (of 13 islands) and that the artificial islands – C, D, G and N – would be made available for public (Aqil, 2019).

[28] More information regarding data collection can be found on Octavianti and Charles (2018a).

[29] Referring to this definition, Jakarta's water security status is low at 3% (PU, 2011). It imports 80% of its water needs from the Jatiluhur reservoir located 100 km from the city. Transferred in an open canal, the water is vulnerable to pollution along the way. The coastal lagoon as part of the NCICD plan was initially planned to be a drinking water reservoir but this plan was later abolished considering the poor water quality it may have from the highly polluted metropolitan catchment.

canalisation, indicating that they may have undergone securitisation. This may be a signal that flood events have been institutionalised to be dealt with securitised moves, without the need to declare a crisis. Another possible explanation is that the seemingly extraordinary measures were part of a bigger flood mitigation plan. They 'wait' for their time to be 'pushed' to the decision agenda during a window of opportunity. The identification of land subsidence problem in 2011 leading to the problematisation of sinking gave a renewed spur to the securitisation 'routine' in Jakarta's flood risk management.

Using the framework proposed earlier, I infer that flooding and land subsidence have different characteristics that affect the capacity of the state in dealing with them. Jakarta has been dealing with floods since its inception and has been building its expertise, although it still requires financial and technical assistances from international partners, such as the World Bank and JICA (Japan International Cooperation Agency). Subsidence on the other hand, it has no experience with, let alone expertise. With regards to its political sphere, Indonesia is still currently transitioning into becoming a fully democratic country after a three-decade-long dictatorship ended in 1998 (Hadiz, 2004). Public involvement in the decision-making process has yet to become part of the Indonesian democracy, which is still largely superficial, hinging on the election of the president, local leaders and member of parliaments.

Flooding is considered more urgent than land subsidence because its impact is immediate and visible, unlike land subsidence whose impacts are invisible and cumulative. This makes flooding a more efficient hazard in triggering a policy response, in comparison to land subsidence. Nevertheless, its creeping nature and the high uncertainties associated with it makes land subsidence a perfect match for flooding (see

Figure 6.3). Problematised as sinking, both flooding and land subsidence have now merged and are powerful threats legitimising the controversial seawall plan.

Zooming in to the patterns of policy responses to both hazards, while a flood can open a window of opportunity right after an event, land subsidence (problematised as sinking threat) cannot open a window by itself; it needs a flood to open a window. As the impact of land subsidence worsens over time, the opening of the window post floods is getting bigger (see Figure 6.4). The 2007 flood enabled the recognition of land subsidence and created the JCDS (Jakarta Coastal Defence Strategy) proposal in 2011 whose ideas were recycled in the current NCICD plan proposed following a severe flood in 2013 (discussed below).

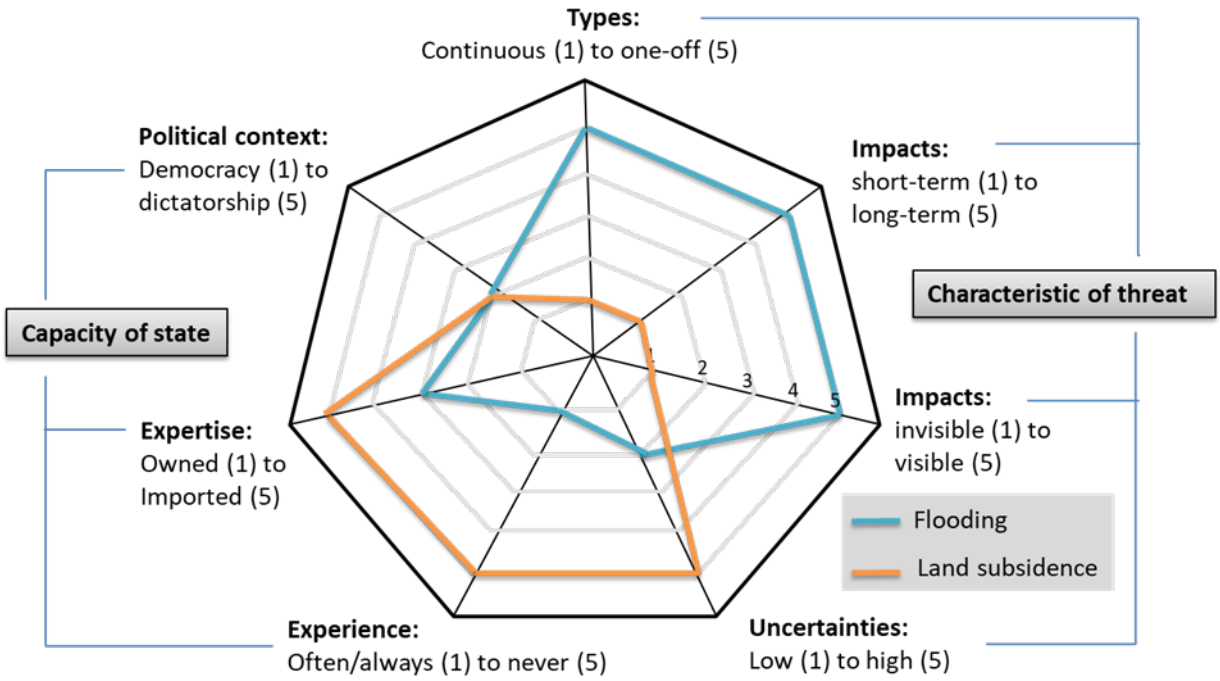


Figure 6.3 Jakarta's flooding and land subsidence complimenting each other to become a perfect candidate for securitisation

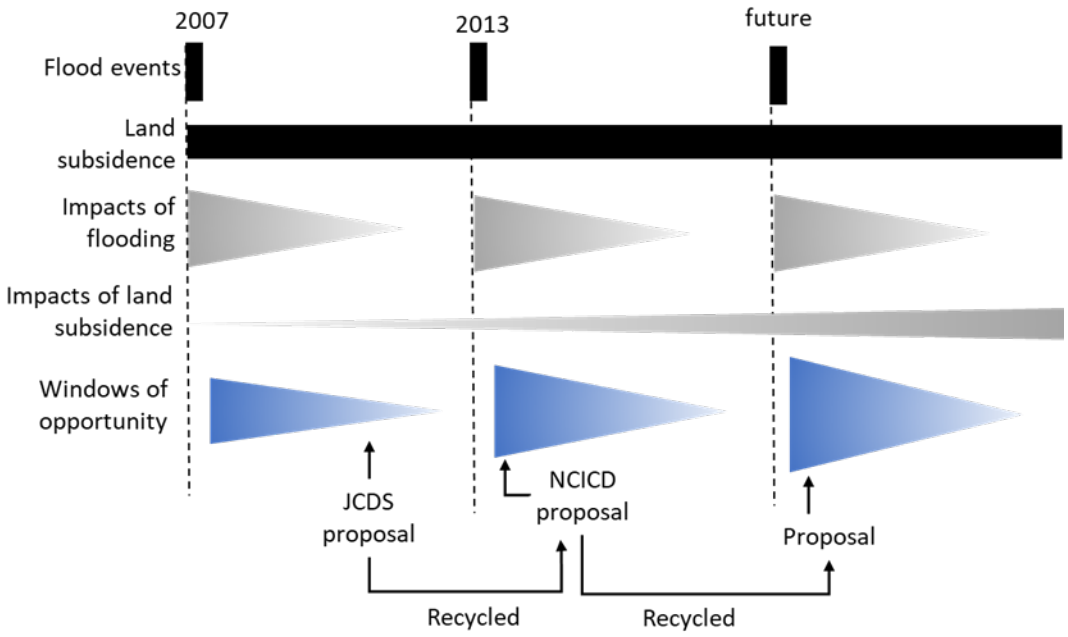


Figure 6.4 Illustration of the combined windows of opportunity for sinking (flood events and land subsidence) in Jakarta. The windows are getting bigger over time as the impact of subsidence is cumulative but can only be opened if a major flood hits.

6.5 Manifesting hope in the seawall

Focusing now on the seawall, I perceive that hope is manifested in the seawall to tackle Jakarta's sinking fear. Water scholars often associate a 'securitised' approach to water security as depoliticised decisions mainly influenced by universal economic logic (Boelens and Vos, 2012). Jakarta's seawall seems to fit this conception and so do many large reservoirs proposed or built to meet growing water demand worldwide.

As experts take the central role, users are left with remnant responsibilities of 'simply' acting in emergencies. In a water-secure area, people will start thinking of wider systems to support their water service when they experience interruptions in their water supply, and they will start evaluating their flood protection only when flood water inundates their neighbourhood. Our ignorance is partly sourced from the convenience given by the so-called 'big water systems' (Perry and Praskievicz, 2017). Of course, less fortunate groups do not enjoy this luxury of free-flowing water supply and flood-free houses, and they need to keep thinking of new ways to survive. But when a

different threat is about to happen, people will start thinking of possibilities. The limit of our knowledge and our trust in government as the security provider make us place our hope in any solution they propose, that is the seawall in Jakarta's case.

The problematisation of fear and the endorsement of a solution is usually done by the same actors; this sheds light on the role of experts in playing the dynamics of fear and hope in society. Taking insights from the Science and Technology Studies, I assert that the seawall scientific justification is 'thick with politics'(Bijker, 2007), meaning that the role of scientists and engineers is key in defining threats and formulating responses. These scientific assessments are (made) impenetrable to non-experts. Our perspective of threat is constructed through scientific experiments and their representation and debate on the relative truths of things. In many securitisation projects, a 'technological fix' to threats have been successful in justifying the expenditure of public funds (Rappert, 2007).

The role of foreign experts is central in conceiving the seawall plan. The phenomena of land subsidence in Jakarta has been documented as early as 1926 (Schepers, 1926) but it only received attention following an investigation by a team of experts from the Netherlands in 2011, thus conceiving the JCDS (Jakarta Coastal Defence Strategy) plan. Only after another major flood in 2013 inundated central business districts of Jakarta and three months after a new governor (Joko Widodo, now President of Indonesia) took office, did the NCICD plan was adopted from the JCDS with a new vision of development. In addition to solving the crisis, technological sophistication in large scale projects like NCICD comes with a sense of the apex of the profession (Rappert, 2007) as it will become one of the largest seawalls in the world. However, disputes over ideas and expertise from different epistemic communities regarding NCICD were evident. The opponents comprising of concerned academics and

NGOs activists criticise the socio-environmental costs of NCICD, discussed below. Alternatives proposed by this alliance (e.g. focusing on water supply and creating small scale river dikes) however, did not receive much interests in the policy circle.

Seen as both enabling and, at the same time, undermining the conditions of security, technology occupies a rather problematic space. It enables security by giving people certain protections from threat; however, residual risks are often left unacknowledged and untreated, engendering a false sense of protection. Moreover, large infrastructure is vulnerable to attacks like many other large-scale integrated systems, e.g electronic banking, transportation, food supply and energy delivery (Rappert, 2007). Our reliance on large scale water infrastructure leads to higher insecurities from other threats. This places states in an ambivalent position: whether or not to accrue the benefits of technologies which carry with them serious security risks.

6.5.1 Impacts of the seawall

I have argued earlier that water security and flooding stems from the same foundation of fear but the variables used to assess the 'security-ness' in both sectors may not be the same. In water supply, availability, affordability, accessibility and quality are widely used as parameters to measure progress (JMP, 2018), and water insecurity is the condition when any of these dimensions is not achieved (Young et al., 2018). To assess the benefits and impacts of projects or responses to water-related hazards for flooding, it may be sensible to adopt the classic three pillars of sustainable development, which are environmental sustainability, social equity, and technical feasibility (relating to economic viability). However, instead of assessing the seawall impacts in silo on the three aspects, I would see them interact to produce an overall impact that are sourced from biophysical changes. This assessment is influenced by my readings on political ecology.

Since water is captured at the estuary, the water quality of the coastal lagoon will be greatly affected by contamination from land. The Greater Jakarta Bay is notorious for being highly polluted from untreated domestic and industrial wastewater (Suwandana et al., 2011). Some toxic chemicals, such as heavy metals (Williams et al., 2000) and organic compounds (Rinawati et al., 2012), are found in high concentrations in the bay. Although in the early construction phase of the seawall sea water will be pumped out of the lagoon, the coastal sediments may still contain the accumulated pollutants (Rinawati et al., 2012), which may be released into the water column and pollute the lagoon (Barceló-Quintal et al., 2012). Hosono et al. (2011), however, observed that zinc (Zn) and lead (Pb) levels in the bay has decreased from 1990 onwards. This can be attributed to stricter environmental regulations, although the levels observed are still above the regulated value.

This situation is exacerbated by the alteration of the hydrological regime, for example the reduced flushing effect (Suh et al., 2011) that causes pollution to be trapped within the lentic environment. The changing of wave-tidal-circulation system in the coastal areas also affects the ecosystem there, including the loss of mangrove forest (Breckwoldt et al., 2016). Ten estuary reservoirs in Korea experienced water quality deterioration and eutrophication due to this kind of modification (Kang and Jang, 2013). The installation of sluice gates to minimise these damages by controlling water circulation between the freshwater and the ocean has little impact, especially if inner mixing of the reservoir is dominated by riverine discharges (Suh et al., 2011). A by-pass channel can be created to divert heavily polluted water from entering the reservoir (Yang and Ferguson, 2010) but this mechanism will need a large amount of investment and might even complicate the problems (Wang et al., 2008). Moreover, sedimentation is likely to occur due to the particulates being carried out by the river flow and

deposited in the lagoon (Gregory, 2006). The lagoon depth will be decreased accordingly and thus sustainable dredging should be conducted to mitigate the problem. Moreover, to maintain the water level in the reservoir and meet the safety standards in the rivers, pumping stations with a high capacity of 730 m^3/s are needed. It will require a stable energy supply and meticulous maintenance, which is challenging given the country's poor track record in maintenance. There also have been some concerns with regards to the amount of materials needed to build the 32km seawall as well as to reclaim more than 5,000 ha land. The materials are likely to come from Pati, East Java, which will cause further environmental degradation there (Batubara et al., 2018).

Fishing communities are groups that have been negatively impacted by the biophysical change in the bay. The ongoing reclamation project has caused them to lose housing -some were fortunate enough to be relocated to nearby subsidised low-cost apartments- and their only source of income (Charles et al., in press) Once the offshore seawall is in place, they may still be able to fish but only outside of the seawall, meaning that the operational costs will increase significantly. While they will be offered blue-collared job in the reclamation areas as stated in the masterplan (NCICD, 2014), many fishers perceive this offer as uncertain and a contradiction their identity as fishers. It is worth noting that the social equity discussion is still around in the ongoing reclamation project but not on the seawall, which many still believe will occur in the unforeseeable future. Issues on social equity are much more complicated when considering the whole flood mitigation projects in Jakarta (see Padawangi and Douglass, 2015; van Voorst, 2016). The selectivity of who gets priority in flood protection reproduce inequity in many cases. Protests of securitisation moves may not be oriented against the very idea of development or flood protection, but against its modality, distribution effects and residual risks (Warner, 2008).

6.6 To desecuritise or not to desecuritise?

Securitisation is an opportunity used by political actors to gain -mainly- credibility and financial benefits, implying that not all threats can be securitised. Once a threat has been securitised, the questions are then: would it be possible to-desecuritise it? does de-securitisation automatically re-politicise the issue? what are the wider implications of securitisation? This section offers my critical reflection on these questions.

6.6.1 Desecuritisation

Many scholars working on natural resources (e.g. Aradau, 2004) argue that securitisation is largely negative for decision making. It predicates its moves on the incitement of fear, and given the acuteness of environmental problems (Levy, 1995), justifies the exclusion of public opinion. Securitisation approach is believed to cause less cooperation and even a full halt in the discourse, and thus creates additional political frictions (Wæver, 1995; Buzan et al., 1998). Water conflict is often seen as the result of securitisation practices (Stetter et al., 2011). Considering these problematic side effects of securitisation, the Copenhagen School suggests avoiding the transformation of an issue, into a security issue or to 'desecuritise' as many issues as possible.

Desecuritisation is an attempt by a political community to 'downgrade or cease to treat something as an existential threat' (Buzan and Wæver, 2003, p. 489). This process brings securitised issues back into the sphere of normal politics (Huysmans, 2002) to halt the negative spiral of securitisation (Floyd, 2008). Normal politics allows for greater deliberation and foster institutional development as part of a democratic process in comparison with the silence and speed in tacking security matters (Aradau, 2004; Coskun, 2008; Browning and Mcdonald, 2011). However, I would argue that

desecuritisation is not always possible and desirable, and may instead result in the downplay of a very real existential threat.

Another potential path is asecuritisation that 'involves placing issues of vital or strategic importance on a distinct and alternative track to de/securitization, beyond a sphere where a priori references to security frame decision-making' (Zikos et al., 2015, p.311). It carries a new security-logic in a newly emerged asecuritised system that has different points of reference or concerns than before (Albert, 1998). In other words, asecurity does not necessarily deny any securitisation logic. In my view, however, asecuritisation is likely to go down the route of desecuritisation before it can acquire new security logic. Investigating the water conflict in Cyprus, Zikos et al. (2015) illustrate that asecuritisation of water can lay the foundation for increased cooperation between rival communities to improve water security in the island by working towards a unified identity of perceived threats.

In line with Roe (2004, 2012), I would argue that undoing securitisation moves or transforming a securitised issue into an asecurity one is not easy. This process involves taking power away from an institutional actor and potentially delaying crucial decisions, which may have lost momentum by the time they are considered. The process requires a well-coordinated and accountable collective security apparatus from the political elite and civil society (Béland, 2005; Coskun, 2009). Moreover, while some have emphasised benefits of desecuritisation, specificities regarding this process remain unclear (Aradau, 2004; Floyd, 2007). The first step to unravel the mechanism of desecuritisation is by understanding the beliefs embedded in and the values related to the problematisation of an issue as a security concern (Dinar, 2002). This implies that securitised and desecuritised moves 'are connected by spatial and temporal links, influence each other and to a degree depend on each other' (Warner, 2008, p.257).

Securitisation has been associated with depoliticising issues under scrutiny, but desecuritisation cannot equate to their re-politicisation. Issues become depoliticised because of the asymmetry of power in favour of security professionals that cuts out politics (Forsyth, 2003). Multiple meanings attached to a threat are normalised during a securitisation process. Desecuritisation, however, may lead to another technocracy approach and hence depoliticising results. As observed by Aggestam (2015) in Israel-Palestine water conflict, a technocratic turn was pursued to desecuritise the issue. This runs the risk of depoliticising conflict dynamics, inhibiting alternative ideas and practices, and ultimately contradicts the normative assumption to return to normal politics. This also has empowered certain actors (experts) and marginalised others. She demonstrates that desecuritisation can have a problematic result: securitisation that 'is technical, managerial and instrumental, rather than genuinely political or ethical' (Fischhendler, 2015, p.252).

Coskun (2008, 2009) argue that expanding the number of actors involved in the policy-making process beyond elite-based groups can be a way to desecuritise an issue. The emergence of new non-state actors, such as civil society (NGOs, CBOs,) the market (private insurance, consultants), international actors will create a new power constellation and rivalry for funding in some cases (Aggestam, 2015). Disasters can influence social networks and resources (Hilhorst, 2003) and are therefore often perceive as opportunities, even as far as theorising it as crisis or counter-securitising moves. Selby (2003) and Trottier (2007) have noted that in some cases some actors have been empowered and more influential (international experts) than others (local NGOs) implying that more actors do not necessarily mean better distribution of power.

In contrast to some authors who perceive securitisation as wholly negative, Roe (2012) seeks to examine arguments behind this unverified assumption. They argue that

securitisation enables marginalised players to voice their opinion and increases the possibility to change the status quo. I would argue that positive and negative securitisations can be better assessed by weighing concerns to gains achieved through the process. Not all appeals into security results in a confrontational logic and identification of enemies, instead some of them promoted quick and effective actions (Floyd, 2007). Trombetta (2011) found that securitisation of some environmental issues has mobilised actions and produced forms of cooperation rather than conflict.

I am more inclined to subscribe to Hobbes' view on understanding how fear functions productively and posit that the *right amount of fear* may be useful to make people aware and be mindful of issues around them, as in the case of South African drought. Looking at securitisation based on the dichotomy of 'security' and 'normal' politics provides at best limited guidance. However, this must be understood and practised within a context. Different contexts can have different logics of security and they can challenge each other. As new actors, capacities and threats change, so does the logic of security (Huysmans, 2002).

Finally, it is worth noting here that a successful securitisation attempt does not necessarily mean a policy change or a declaration to embark on a certain policy. Conflict entrepreneurs may already reap the desired effect of landing the issue high on the agenda (Warner, 2008) or achieving any uttered or non-uttered target. Even if a consensus of what crisis is has been reached, it may be made without being followed up by an action. As argued by the Copenhagen School, actors do not focus on the truth statement in the discourse but the 'truth effect' of the speech acts and derived practices (Buzan et al., 1998). Reflecting on this, if undoing securitisation seems difficult or impossible, other counter-securitisation acts, such as making the best use of securitisation momentum, are worth trying. In the case of Jakarta, the problematisation

of the sinking threat has pushed for the legitimation of the seawall plan but also has put water, particularly wastewater, higher in the political agenda. Some efforts on pushing the construction of centralised wastewater service in the city that had been left dormant for decades now gained momentum, although some challenges remain.

6.7 Conclusion

In the attempt to theoretically situate flooding in the concept of water security, this paper has demonstrated that water supply security and flood security are both underpinned from the anxiety of an unknown future, despite the different materiality and social functioning of both waters. Responses to meet these demands of security are often pursued through depoliticised measures such as dams for meeting water supply and dikes for giving protection from floods. Furthermore, the 'flowing' characteristic of water supply as depicted in many hydropolitics articles do suit flood water but it is also characterised by stagnation -when flood water is 'trapped' in subsided areas.

Early works on water security research have been influenced by securitisation theory but the growing scholarship of water security has diluted this impact. I found that the securitisation lens is useful to unpack and further the water security conception, particularly in illuminating its link to water-related hazards. A conceptual tool 'determinants of securitisation', is proposed here to assess the likelihood of a threat to undergo a securitisation process or to examine why a threat was securitised while others were not. Using Jakarta's sinking crisis as a case study, this paper presented empirical insights to understand the relationship between water security and securitisation. Large infrastructures like the seawall seek to procure legitimacy by using effects created through the securitisation of fear. Moreover, this process gave a push to the already institutionalised flood risks in the city.

This paper has focused on theorising flood in water security. Other domains, notably sanitation and water for the ecosystem, remain to be explored. They have been explicitly recognised in many definitions of water security but research on these issues feels less suited to be put under the water security banner. Furthermore, it would be interesting to see how politics of fear operating at the macro level, as we have discussed in this paper, manifests in everyday life. It has been known that state protection has an oppressive side but it is not so clear if flood victims are better off if condemned to the alternative including self-help (Béland, 2005). Bridging the macro and micro politics will give us insights to better understand what security means for the people and how they feel about securitisation moves.

Chapter 7. Conclusion

> *Jakarta is a city that is both powerful and painful ... all the progress in the nation can be seen here. The national politics is here. Technologies begin here. New lifestyles develop here. Hedonism triumphs here. Big businesses proliferate here. And poverty also reproduces very well here.*
>
> -Joko Widodo, Governor of Jakarta, 2012 as cited in Kusno (2015)

The above quote by Joko Widodo, the current President of Indonesia, encapsulates the messy reality of Jakarta, whose water politics is investigated in this study. This chapter concludes my arguments and discusses them further to construct water politics. This discussion is followed by my reflections on the theoretical frameworks employed, policy recommendations and suggestions for future research.

7.1 Revisiting the research questions

This thesis has explained the intricate political power relationships embedded in the NCICD project, which was said to solve Jakarta's sinking problem. The main research question asked were: *How do relations of power drive large infrastructure investments in Jakarta, and how does this contribute and respond to the problem of water security?* This question was elaborated into three sub-questions:

1. *How does Jakarta's flood policy evolution characterise its current policy decision?*
2. *How has the exploitation of the fear of sinking facilitated the promotion of the NCICD policy?*
3. *How is flooding conceptualised and understood in water security? In what ways does securitisation theory further the water security concept? And what are the roles and implications of large infrastructure in the securitisation effort?*

Those research questions have been revisited and sharpened as themes emerged throughout the research process. Following the three-paper route, the framing of each

substantive chapter is adjusted to match a certain journal's audience. Water security as framework is only used in the last substantive chapter (Chapter 6) as the first two chapters (Chapter 4 and 5) do not require such framework.

I traced the evolution of Jakarta's flood-related institutions that shape the contemporary flood policy in Chapter 4. Using the lens of historical institutionalism, the chapter revealed that the NCICD policy is the product of long-term socio-biophysical processes, that is, creating an infrastructural trajectory for flood mitigation effort since the 16th century. The 'positive feedback' mechanism, a concept in historical institutionalism, explains the persistence of this engineering-driven solution. The process suggests a causal link between a policy and its impact that strengthens the preference for similar policies over time. Three factors were particularly important in supporting this positive feedback mechanism: 'sunk costs' that are too costly to be recovered, 'shared cognition' among bureaucrats, and unconscious bias to the colonial expertise. This explanation provides the answer to the first sub-research question (*How does Jakarta's flood policy evolution characterise its current policy decision?).*

Moving on to the contemporary era, Chapter 5 employs the historical institutionalism approach but focuses on the application of its critical juncture concept (a short period of time in which actors' decisions have a higher probability of affecting a particular outcome). The evaluation period of NCICD (6 months, from April to November 2016), which acted as the critical juncture, was not able to bring about radical change to cancel the project. This 'near-miss' outcome is explained through the exploration of Klein's (2007) 'disaster capitalism' notion, which is the use of fear to enable the entry of a capitalist project. By analysing the development of the land subsidence issue and the interaction between political agencies, the chapter demonstrates how advocates have skilfully framed the sinking crisis to ensure

preference for NCICD, including the 17-island reclamation project. The notion of disaster capitalism prevails to a large extent to sustain the NCICD plan and offers an explanation for the near-miss outcome. This explanation presents the answer to the second sub-research question (*How has the exploitation of the fear of sinking facilitated the promotion of the NCICD policy?).*

Informed by the securitisation theory that is viewed through the political ecology lens, the final empirical chapter (Chapter 6) examines how flooding fits in the concept of water security. I observe that water supply security and flood security have the same theoretical root in the fear of an unknown future; the exploitation of this fear legitimises extraordinary measures, such as large water infrastructures. A conceptual tool was developed in the paper to evaluate how and why a threat is likely to be, or has been, securitised. The tool was then deployed in Jakarta's case to demonstrate how flooding and land subsidence create different policy responses. I also offer my critical reflection on desecuritisation strategies that do not automatically lead to repoliticisation. This explanation provides the answer to the last set of sub-research question *(How is flooding conceptualised and understood in water security? in what ways does securitisation theory further the water security concept? and what are the roles and implications of large infrastructure in the securitisation effort?).*

To answer the main research question (*How do relations of power drive large infrastructure investments in Jakarta, and how does this contribute and respond to the problem of water security?*), I pull together and elaborate findings from all empirical chapters and conclude three points.

First, relations of power among stakeholders manifested and enhanced in flood-related institutions over time is responsible in sustaining the engineering-driven solution

for flood control in Jakarta. NCICD advances, if not culminates, this approach and therefore is the product of the past, resulting from complex socio-biophysical processes. This finding confirms the apolitical nature of large infrastructure in solving the, essentially, water governance problem. I have argued throughout the thesis that the problematisation of subsidence as a flooding problem, and not as a water supply issue, has shifted the main problem to legitimise the seawall project. A seawall is an easier and more attractive option rather than dealing with intricate institutional challenges.

Second, the pursuit of large infrastructure in the name of improving water security has the potential to reproduce inequity and injustices in the city. Insecurities have been blamed and steered towards disadvantaged groups in society, e.g. 'squatters' in the river banks and traditional fishers. As the thesis has interrogated the social distributional issues and power asymmetries manifested in the NCICD project, I arrive at the conclusion that we should not avoid the politics but use it to give a greater voice to those who are water insecure. Protecting the interest of the marginalised communities should not be presented as romantic, quixotic and unrealistic (Harvey, 2010; Jessop, 2012). In agreement with Budds (2009, p.428), this discussion on the socio-political side of Jakarta's water insecurity 'may neither adequately reflect the entire situation nor influence policy-making'. Nevertheless, illuminating the social aspect of the dominant sphere of the physical-scientific approach 'would be a step in the right direction'.

Finally, this thesis (as the title 'The illusion of solution?' implied) was motivated by my scepticism of the NCICD plan and whether Jakarta needs such an unprecedented scale of seawall when other alternatives received short shrift. As readers have pointed out, I have argued that the offshore 'giant' seawall is not what Jakarta needs in the first place. The plan may instead create a false sense of security with a great deal of unexplored externalities, making the future generation bear the

consequences. After all, we should remember that ‘security is not a number, it is a feeling’ (de Vriend, 2007 as cited in Warner (2008, p.217).

7.2 Reflection on the politics of water security

Insights from how large infrastructure had been pursued in Jakarta’s case above inform us how political power relations drive water security policies. Reflecting on these and situating them on broader literature on water security, I conclude that the politics of water security is the politics of fear and in consequently meeting demand for security through the prescription of infrastructure. Fear is built from memories of past floods and ultimately from the construction of future uncertainties, where our knowledge is limited. Once crisis mode was activated, panic politics prevailed, enabling the state to impose its rationality to push for solution. This conclusion however only seems to prevail within the context of water hazards, e.g. flood and drought, and may not be applicable in other water security domains, such as agriculture.

This ‘rational politics’, to borrow Karvonen's (2011) notion, made the pursuit of infrastructure appear as the most effective approach to mediate human-nature relations and prevented considerations of the shortcomings of infrastructure. Such an approach focuses only on discrete issues (flood mitigation) without recognising the interconnectedness and complexity of broader hydrosocial relations. Rational politics has depoliticised issues of power difference and inevitably creates asymmetric power in society. However, this mode of water politics worldwide is increasingly challenged by ‘populism’, whereby social power grew to unmask and contest the hegemony of infrastructural solutions. Findings in this thesis also confirm Warner's (2008, p.314) observation that ‘states will continue to find themselves confronted by counter-securitising moves and stories, polarising the debate’.

7.3 Theoretical reflections

Having revisited the research questions, I now reflect on the employment of each theory used in this thesis.

7.3.1 Historical institutionalism

Historical institutionalism is methodologically committed to the in-depth study of events and cases over time. It uses narratives to identify the mechanisms that shape political contestation. This narrative approach, however, has been criticised as encouraging analysts to conduct too descriptive an account of analysis, or what rational choice theorists called as 'merely telling stories' (Levi, 1997, p. 21). Thelen (1999) refutes this critique and argues that it is misplaced and exaggerated. The chronological approach pursued in this paper (section 4.3) for some readers may be too descriptive as critics claim, although such an approach has been justified in the methodology section of the paper. Therefore, I would suggest for future research to undertake contingency analysis to answer: 'how inevitable was the selection of the particular paths amongst other alternatives?' or 'what would happen if actors chose a different path?' Historical institutionalists tend to accord history as the most logical and rational choice at any given time (Peters et al., 2005) as they attempt to generate convincing explanations for why a particular path was chosen over another. Contingency analysis, or counterfactual analysis, can reduce this bias and detach the path dependency analysis from notions of randomness (Bennett and Elman, 2006).

Furthermore, I observe that a path dependency study needs to incorporate critical juncture into the analysis. This is to challenge, what critics say as, the most significant limitation of the historical institutionalism theory to explain political and policy change (Peters et al., 2005). The theory has historically focused on the structural variable to sustain institutional stability. Therefore, it is well suited for explaining the

persistence of policies but much less capable of explaining changes in those same policies (Clemens and Cook, 1999). By the inclusion of critical juncture, which focuses on institutional change, one is better equipped to analyse the path dependency phenomenon.

Regarding the application of the critical juncture concept in Chapter 5, one of the main challenges I encountered was distinguishing 'critical juncture' from Kingdon's (2003) renown 'window of opportunity' concept. While I have attempted to draw a conceptual line between the two (see section 5.2), many articles have used them interchangeably, which may lead to confusions in their operationalisation.

7.3.2 Political ecology

Two points have emerged upon my reflection on the use of political ecology in interpreting the securitisation theory in Chapter 6. Following the structuralist view of political ecology (e.g. Blaikie and Brookfield, 1987), I sought to depart my analysis on the NCICD project based on close examinations of environmental changes; however, I am aware that the employment of political ecology in the paper was limited as it was used as a lens to interpret securitisation theory rather than the main theoretical framework. Therefore, for future research I will consider employing political ecology more completely as a framework to illuminate the complexity associated with biophysical changes and how they relate to the policy-making process.

Second, there is a risk to fall on both technological and environmental determinism thinking when taking insights from both political ecology and STS. Technological determinism believes that a technology determines the patterns of human culture and societal development, while environmental determinism argues that ecological and geographical factors alone are responsible for shaping society. For my work, the two concepts are related because technology (NCICD) has the potential to

alter the biophysical environment that further affects the society. I have attempted to avoid this simple causal formulation, whereby technology determines society, in my analysis by considering the intertwined relationship between technology and society. As Murphie and Potts (2003, p.22) argue, 'technologies do not determine; rather they operate, and are operated upon, in a complex social field'. Moreover, future analysts may benefit from considering 'environmental possibilism' theory, which is an emerging thinking in cultural geography (Fekadu, 2014). It postulates that the environment sets certain constraints or limitations to societal development and human culture, but it does not define them.

7.4 Policy recommendations

Towards the completion of this thesis, on 26 September 2018, Governor Anies Baswedan revoked the reclamation permits for 13 out of 17 islands in Jakarta Bay. Permits for the remaining four (island C, D, G and N) were not revoked because (some parts of) those islands have been built and its utilisation will be discussed further (Jakarta Post, 2018). For other projects within NCICD (especially the seawall), there is yet progress on this decision as the relevant government agencies are still reviewing the project's feasibility studies. Based on the recognition of this status and the existing socio-political landscape in Jakarta, I propose two policy recommendations.

7.4.1 Prioritising problems on the mainland

This thesis has revealed how the government has shifted the subsidence problem as a flooding problem while in fact it is a problem in water supply provision. Therefore, my first and foremost policy recommendation is to deal with the long-avoided institutional challenges related to the root cause of sinking in the mainland, and not instead focus on building a new waterfront area in the bay. This should also be accompanied by an expansion of wastewater services and dike reinforcement in the

coastal line (phase A of NCICD), which, as experts argue, is sufficient in providing coastal defence for the foreseeable future as long as subsidence can be slowed down.

Building infrastructures for water and wastewater services for Jakarta are not only a massive investment but also less attractive because of their invisibility and a very long pay-back period (OECD, 2011). Therefore, the government should focus on unlocking infrastructural delivery in these water and sewage services, shifting their priority from the seawall. Furthermore, pursuing this pathway also aligns with President Widodo's mission to accelerate basic infrastructure delivery, such as road networks, ports, water and wastewater, in Indonesia (Kannan et al., 2017). This recommendation is in line with Lankford's (2013) suggestion on transforming 'hydraulic mission' towards a more inclusive 'hydraulic vision'.

One way to get this started is to build dialogues between different governmental agencies. My research revealed that water management in Jakarta it is still operated within a cocoon-like policy model. Different institutional setup for water services, e.g. the public-private partnership for water supply service and the municipal corporation for wastewater service, partly contributes to this problem. Hence, there is a need to improve communication between different levels of governmental agencies (horizontally and vertically) to better unify the decision-making process for water-related issues in Jakarta. The government can also benefit from clear data-sharing protocol as well as integrated plans and investments.

Moreover, improved communication between governmental agencies can expand the knowledge horizon of 'old' bureaucrats. As discussed in Chapter 4, lock into infrastructural measures was partly caused by long-established behaviours within flood-related institutions. Government officials can be 'the key players in destabilizing long-standing policy communities once they perceive the institutional arrangements to

be too costly' (Richardson, 2000, p.1021). It is therefore not impossible that building dialogues within the government can divert and eventually break the path-dependency of existing institutions.

7.4.2 Preparing for an alternative, prescriptive solution

One of my informants admitted that policymakers tend to choose NCICD because it offers a policy prescription to Jakarta's sinking problem, which is a complex environmental issue. Their trust in experts who promoted the project has made them reluctant to explore other options. Therefore, to win the policy debate, I suggest policy entrepreneurs who are against the NCICD project to prepare for a policy prescription and push the agenda to the government at the right time.

My research has shown that the opponents negated the benefits of NCICD without necessarily promoting a clear alternative. While this is understandable because their angle in viewing subsidence is different to that of the proponent (Chapter 5), I argue that they need to prepare a clear prescriptive policy supported by, for example, a pathway analysis (see 'potential research avenue' below). Currently, one distinct alternative (decentralised wall in subsided areas (Huda, 2013; Mariani, 2016)) bring very little discussion in the policy circle.

Borrowing Kingdon's (2003) 'pet solution' notion, the critics should prepare an alternative far before a critical juncture is available. The solution should be treated as a pet: nurtured through careful research and discussion, as well as introduced in different policy communities. When the time has come, the solution can be pushed to occupy the government's agenda. This research has noted that amplification provided by international media can provide a greater push than the coverage reached by the national media. As society becomes more aware of politics, a discourse strategy should be formulated to popularise the policy alternative by, for instance, making use of the

'digital existence' of the middle class. On a higher level, policy entrepreneurs should make use of the upcoming political year (the presidential election) to promote this alternative to NCICD. A valuable lesson can be learned from the recent Jakarta's gubernatorial election in 2017. Critics of the 17-island reclamation plan teamed up with the opposition, Anies Baswedan. In his political campaign, Baswedan strategically used the reclamation issue to attack the incumbent, Basuki Purnama, and promised to cancel the reclamation if elected as the governor. After a thorough examination he finally revoked the permits of 13 islands in September 2018.

7.5 Potential research avenues: Expanding the temporal and spatial scale

I propose two agendas for future research, which are still in the corridor of water security but not limited to its politics. While these research ideas were developed with Jakarta's waters in mind, they are still of relevance to other geographical focus.

7.5.1 Exploring the 'adaptive pathway analysis'

This thesis has focused on the past (how past decisions have limited innovation), the present (how political power relationships materialise in the seawall proposal), but not the future. Therefore, I propose to explore the potential of pathway analysis to support the decision-making process under deep uncertainties. The adaptive pathway approach (Hallegatte, 2009; Haasnoot et al., 2012, 2013), in which different futures and their implications are explored in a sequence of policy actions, can be a fruitful research avenue.

As indicated in Chapter 6, there were polarised views in perceiving the solution for Jakarta's sinking problem, whether building the offshore seawall to immediately mitigate flooding or working towards water supply provision to slow down subsidence in the long run. This pathway analysis can inform policymakers on how key variables of different pathways interact over time for an ensemble of plausible future. The

outcome of this analysis is a ranking of policy options, which can meet the policymakers' demand for prescriptive policies.

However, future pathway analysis may lead to a simplistic analysis, or even guesswork without careful data collection and justification. It is difficult to predict how society will behave toward a certain policy action at a given time in the future. Therefore, incorporating externalities of policy actions on the people and on subsequent investments is of major importance in this research field to avoid a reductionist thinking. Such an investigation can shed a new light in analysing the competing priorities in Jakarta's water sectors, with different institutional settings and challenges.

7.5.2 Analysing the multiple facets of institutions

This thesis has addressed the institutional topic in Chapter 4, but other avenues of institutional analysis warrant further research. The fragmented characteristics of Jakarta's water-related institutions (Padawangi and Douglass, 2015) together with the long-developed public administration and bureaucracy can be investigated further to understand how such arrangements play a part in narrowing the preference for large infrastructure. Also, it will be interesting to understand the interaction between stakeholders managing different types of water (water supply – the public private partnership scheme, wastewater – municipal agency, and flooding – a mix of institutions at different levels) and how they can work together to improve the city's water security.

Future research can also employ the 'politics of scale' approach to investigate: How the conceptualisation of scale in Jakarta Metropolitan Area/JMA (beyond the political boundary of Jakarta) relates to the achievement of water security for and in Jakarta? This research idea responds to a call from political geographers to look more closely at how power is mobilised at the site of the border (Paasi, 2004; Agnew, 2007;

Popescu, 2011). Flooding in Jakarta has been widely associated with uncontrolled development in the upstream areas (Chapter 4). Jakarta as the special regency inherently has more power and wealth compared with other cities in the JMA, but decentralisation has increased the power of local governments to manage their own jurisdictions. It will be interesting to know how multiple and mismatched scales of flood governance in JMA will contribute to characterise the fragmented institutional settings.

References

Abbott, A. 1990. Conceptions of time and events in social science methods: Casual and narrative approaches. *Historical Methods* 23: 140–50.

Abeyasekere, S. 1989. *Jakarta: A history*. Singapore: Oxford University Press.

Abidin, H.Z.; Andreas, H.; Djaja, R.; Darmawan, D. and Gamal, M. 2008. Land subsidence characteristics of Jakarta between 1997 and 2005, as estimated using GPS surveys. *GPS Solutions* 12(1): 23–32, https://doi.org/10.1007/s10291-007-0061-0.

Abidin, H.Z.; Andreas, H.; Gumilar, I.; Fukuda, Y.; Pohan, Y.E. and Deguchi, T. 2011. Land subsidence of Jakarta (Indonesia) and its relation with urban development. *Natural Hazards* 59(3): 1753–1771, https://doi.org/10.1007/s11069-011-9866-9

Abraham, T.K. 2018. Jakarta to topple Tokyo as world's biggest city by 2030. *Bloomberg*. https://www.bloomberg.com/news/articles/2018-10-09/jakarta-to-topple-tokyo-as-world-s-most-populous-city-by-2030 (accessed 10 October 2018)

Adas, M. 1989. *Machines as the measure of men: Science, technology and ideologies of Western dominance*. Ithaca, NY: Cornell University Press.

ADB. 2013. *Asian water development outlook 2013: Measuring water security in Asia and the Pacific*. Mandaluyong City, Philippines, http://www.adb.org/sites/default/files/pub/2013/asian-water-development-outlook-2013.pdf.

Aggestam, K. 2015. Desecuritisation of water and the technocratic turn in peacebuilding. *International Environmental Agreements: Politics, Law and Economics* 327–340, https://doi.org/10.1007/s10784-015-9281-x.

Agnew, J. 2007. Know-where: Geographies of knowledge of world politics. *International Political Sociology* 1: 138–148.

Aidenenvironment. 2015. Positioning survey for the Dutch water sectorAmsterdam, the Netherlands: Aidenenvironment, 2015, http://www.aidenvironment.org/media/uploads/documents/Benin_Country_Report_Positioning_Study_Water_OS_1.pdf.

Al-Dahash, H.; Thayaparan, M. and Kulatunga, U. 2016. Understanding the terminologies: Disaster, crisis and emergency. In *The 32nd Annual ARCOM Conference*, pp. 1191–1200. Manchester, UK: Association of Researchers in Construction Management.

Albert, M. 1998. Security as boundary function: Changing identities and securitization in world politics. *International Journal of Peace Studies* 3(1): 24–46.

Alexander, H.B. 2015. Investasi Belanda untuk kawasan terpadu pesisir dianggap hanya "akal-akalan" (Dutch investment for coastal integrated areas considered only a "trick"). *Kompas*. 7 June 2015,

http://properti.kompas.com/read/2015/06/17/154121721/Investasi.Belanda.untuk.Kawasan.Terpadu.Pesisir.Dianggap.Hanya.Akal-akalan..

Alink, F.; Boin, A. and T'Hart, P. 2001. Institutional crises and reforms in policy sector : The case of asylum policy in Europe. *Journal of European Public Policy* 8(2): 286–306, https://doi.org/10.1080/13501760151146487.

Anwar, M.C. 2019. Wah, Cegah Jakarta Tenggelam, RI Gandeng Korsel dan Belanda (Wow, Prevent Jakarta from sinking, Indonesia partners with South Korea and the Netherlands). *CNBC Indonesia*. https://www.cnbcindonesia.com/market/20190628143713-17-81404/wah-cegah-jakarta-tenggelam-ri-gandeng-korsel-dan-belanda (accessed 28 June 2019)

Aon Benfield. 2012. 2011 Thailand floods event recap report. March. London, UK.

Aqil, A. 2019. Anies approves buildings on controversial reclaimed islets. *The Jakarta Post*. https://www.thejakartapost.com/news/2019/06/14/anies-approves-buildings-on-controversial-reclaimed-islets.html (accessed 14 June 2019)

Aradau, C. 2004. Security and the democratic scene: Desecuritization and emancipation. *Journal of International Relations and Development* 7: 388–413, https://doi.org/10.1057/palgrave.jird.1800030.

Argo, T.A. 1999. Thirsty downstream: The provision of clean water in Jakarta, Indoensia. University of British Columbia; Vancouver, Canada.

Artharini, I. 2016. KPK turun tangan, proyek reklamasi teluk Jakarta terancam? (Intervened by KPK, the reclamation project in Jakarta Bay is threatened?). *BBC Indonesia*. 4 April 2016, http://www.bbc.com/indonesia/berita_indonesia/2016/04/160403_indonesia_kpk_reklamasi.

Arthur, B. 1994. *Increasing returns and path dependence in the economy*. Ann Arbor: University of Michigan Press.

Austin, J. 1962. *How to do things with words: The William James lectures delivered at Harvard University in 1955*. Oxford: Clarendon Press.

Bakker, K. 2012. Water: Political, biopolitical, material. *Social Studies of Science* 42(4): 616–623, https://doi.org/10.1177/0306312712441396.

Bakker, K.; Kooy, M.; Shofiani, N.E. and Martijn, E.J. 2008. Governance failure: Rethinking the institutional dimensions of urban water supply to poor households. *World Development* 36(10): 1891–1915, https://doi.org/10.1016/j.worlddev.2007.09.015.

Bakker, K.J. 2003. A political ecology of water privatization. *Studies in Political Economy* 70(1): 35–58, https://doi.org/10.1080/07078552.2003.11827129.

Bakker, M.; Kishimoto, S. and Nooy, C. 2017. *Social justice at bay: The Dutch role in Jakarta's coastal defence*. Amsterdam, Netherlands, https://www.somo.nl/wp-content/uploads/2017/04/Social-justice-at-bay.pdf.

Balzacq, T. 2011. *Securitization theory: How security problems emerge and dissolve*. Abingdon, Oxon: Routledge.

Bappenas. 2007. Hasil penilaian kerusakan dan kerugian pascabencana banjir awal februari 2007 di wilayah Jabodetabek (Damage and loss assessment report in Jabodetabek area caused by the early 2007 flood). Jakarta, http://www.bappenas.go.id/files/8913/5441/6576/hasil-penilaian-kerusakan-dan-kerugian-pasca-bencana-banjir-awal-februari-2007-di-wilayah-jabodetabek__20081123211335__1300__0.pdf.

Bappenas. 2016. Hasil kajian NCICD Bappenas akan rampung Oktober ini (Bappenas will finish the NCICD review this October). https://www.bappenas.go.id/id/berita-dan-siaran-pers/hasil-kajian-ncicd-bappenas-rampung-oktober-ini/ (accessed 25 July 2017)

Barceló-Quintal, I.D.; Solís-Correa, H.E.; Avila-Pérez, P.; López-Galván, E.; Gómez-Salazar, S. and García-Albortante, J. 2012. Determination of distributions of Cd, Cu, and Pb concentrations in sediments of a Mexican reservoir to infer their environmental risk. *Biological trace element research* 148(1): 122–32, https://doi.org/10.1007/s12011-012-9458-x

Barke, R.P. and Jenkin-Smith, H.C. 1993. Politics and scientific expertise: Scientists, risk perception, and nuclear waste policy. *Risk Analysis* 13(4): 425–439.

Batubara, B.; Kooy, M. and Zwarteveen, M. 2018. Uneven urbanisation: Connecting flows of water to flows of labour and capital through Jakarta's flood infrastructure. *Antipode2* 0(0): 1–20, https://doi.org/10.1111/anti.12401.

Baumgartner, F.R. and Jones, B.D. 1993. *Agendas and instability in American politics*. Chicago, USA: University of Chicago Press.

Beinart, W. and Hughes, L. 2007. *Environment and empire*. Oxford, UK: Oxford University Press.

Béland, D. 2005. Insecurity, citizenship, and globalization: The multiple faces of state protection. *Sociological Theory* 23(1): 25–41.

Belarminus, R. 2016. Ahok: DKI bisa dapat Rp 179 triliun dari kontribusi tambahan reklamasi (Ahok: DKI/ Jakarta can get IDR 170 trillion from additional contribution of reclamation). *Kompas*. 22 June 2016, http://megapolitan.kompas.com/read/2016/06/22/14455851/ahok.dki.bisa.dapat.rp.179.triliun.dari.kontribusi.tambahan.reklamasi.

Bennett, A. and Elman, C. 2006. Complex causal relations and case study methods: The example of path dependence. *Political Analysis* 14(3): 250–267, https://doi.org/10.1093/pan/mpj020.

Bichsel, C. 2016. Water and the (infra-)structure of political rule: A synthesis. *Water Alternatives* 9(2): 356–372.

Bigo, D. 2002. Security and immigration: Toward a critique of the governmentality of unease. *Alternatives* 27: 63–92.

Bijker, W.E. 2007. Dikes and dams, thick with politics. *History of Science Society* 98(1): 109–123, http://www.jstor.org/stable/10.1086/512835.

Bijker, W.E.; Hughes, T.P. and Pinch, T. 2012. *The social construction of technological systems: New directions in sociology and history of technology*. Ministry of Marine Affairs and Fisheries and Marine Protected Areas Governance Program.

Birkland, T.A. 1997. *After disaster: Agenda-setting, public policy and focusing events*. Washington D.C.: Georgetown University Press.

Birkland, T.A. 2006. *Lessons of disaster: Policy change after catastrophic events*. Washington, D.C: Georgetown University Press.

Blaikie, P.; Cannon, T.; Davis, I. and Wisner, B. 1994. *At risk: Natural hazards, people's vulnerability and disasters*. London and New York: Routledge.

Blanchet, T. 2015. Path dependence and change in the governance of organized systems The case of water services in three German municipalities (1990-2010). Free University of Berlin, Berlin, Germany.

Blits, J.H. 1989. Hobbesian fear. *Political Theory* 17(3): 417–431.

Blussé, L. 1986. *Strange company: Chinese settlers, mestizo women and the Dutch in VOC Batavia*. Dordrecht-Holland; Riverton-N.J.: Foris Publications.

BNPB. 2013. Jakarta Flood Information - 18th January 2013. http://www.google.org/crisismap/2013-jakarta-flood-en (accessed 1 May 2015)

Boelens, R. 2013. The shotgun marriage: Water security, cultural politics, and forced engagements between official and local rights frameworks. In Water Security: Principles, Perspectives and Practices.

Boelens, R.; Hoogesteger, J.; Swyngedouw, E.; Vos, J. and Wester, P. 2016. Hydrosocial territories: A political ecology perspective 41(1): 1–14, https://doi.org/10.1080/02508060.2016.1134898

Boelens, R. and Seemann, M. 2014. Forced engagements: Water security and local rights formalization in Yanque, Colca Valley, Peru. *Human Organization* 73(1): 1–12.

Boelens, R. and Vos, J. 2012. The danger of naturalizing water policy concepts : Water productivity and efficiency discourses from field irrigation to virtual water trade. *Agricultural Water Management* 108: 16–26, https://doi.org/10.1016/j.agwat.2011.06.013.

Boin, A.; 't Hart, P.; Stern, E. and Sundelius, B. 2005. *The politics of crisis management: Public leadership under pressure*. Cambridge, UK: Cambridge University Press.

Boin, A.; T'Hart, P. and Mcconnell, A. 2009. Crisis exploitation: Political and policy impacts of framing contests. *Journal of European Public Policy* 16(1): 81–106, https://doi.org/10.1080/13501760802453221.

Boomgaard, P. 2005. The long goodbye? Trends in Forest exploitation in the Indonesian Archipelago. In Boomgaard, P.; Henley, D. and Osseweijer, M. (Eds), Muddied waters. Historical and contemporary perspectives on management of forests and fisheries in island Southeast Asia., pp. 211–234. Leiden: KITLV Press.

Booth, K. 1997. Security and self: Reflections of a fallen realist. In Krause, K. and Williams, M.C. (Eds), Critical security studies: Concepts and cases, Minnesota: University of Minnesota Press.

Booth, K. 1999. Three tyrannies. In Dunne, T. and Wheeler, N.J. (Eds), Human rights in global politics, pp. 31–70. Cambridge: Cambridge University Press.

Bourchier, D. and Hadiz, V. 2003. *Indonesian politics and society: A reader*. London, UK: Routledge Curzon.

Bovens, M. 1998. *The quest for responsibility: Accountability and citizenship in complex organizations*. Cambridge, UK: Cambridge University Press.

Bowden, G. 1995. Coming of age in STS: Some methodological musings. In Jasanoff, S.; Markle, G.E.; Peterson, J.C. and Pinch, T. (Eds), *Handbook of science and technology studies*, pp. 64–79. SAGE Publications.

Bozek, C.M. and Burdick, D.M. 2005. Impacts of seawalls on saltmarsh plant communities in the Great Bay Estuary, New Hampshire USA. *Wetlands Ecology and Management* 13(5): 553–568, https://doi.org/10.1007/s11273-004-5543-z.

BPS. 2015. *Statistik Daerah Provinsi DKI Jakarta 2015*. Jakarta, Indonesia: Badan Pusat Statistik Provinsi DKI Jakarta.

Brändström, A. and Kuipers, S. 2003. From 'normal incidents' to political crises: Understanding the selective politicization of policy failures. In Government and Opposition, pp. 279–305. Oxford, UK: Blackwell Publishing Ltd.

Braun, V. and Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology* 3(2): 77–101.

Breckwoldt, A.; Dsikowitzky, L.; Baum, G.; Ferse, S.C.A.; Wulp, S. Van Der; Kusumanti, I.; Ramadhan, A. and Adrianto, L. 2016. A review of stressors, uses and management perspectives for the larger Jakarta Bay Area, Indonesia. *Marine Pollution Bulletin* 110(2): 790–794, https://doi.org/10.1016/j.marpolbul.2016.08.040.

Brinkman, J.J. and Hartman, M. 2009. Jakarta flood hazard mapping framework. In *The International Conference on Urban Flood Management*, pp. 1–9, http://library.wur.nl/WebQuery/titel/1939477.

Brooks, D.B.; Brandes, O.M. and Gurman, S. 2009. *Making the most of the water we have: The soft path approach to water management*. London, UK: Earthscan.

Brown, R.A. 2006. Indonesian corporations, cronyism, and corruption. *Modern Asian Studies* 4: 953–992, https://doi.org/10.1017/S0026749X06002216.

Browning, C.S. and Mcdonald, M. 2011. The future of critical security studies: Ethics and the politics of security. *European Journal of International Relations* 19(2): 235–255, https://doi.org/10.1177/1354066111419538.

Brug, P.H. van der. 1997. Malaria in Batavia in the 18th century. *Tropical Medicine and International Health* 2(9): 892–902.

Bryant, R.L. and Bailey, S. 1997. *Third world political ecology*. London: Routledge.

Buckley, R.B. 1893. *Irrigation works in India and Egypt*. London and New York: Spon & Chamberlain.

Budds, J. 2009. Contested H2O: Science, policy and politics in water resources management in Chile. *Geoforum* 40(3): 418–430, https://doi.org/10.1016/j.geoforum.2008.12.008.

Budds, J. and McGranahan, G. 2003. Are the debates on water privatization missing the point? Experiences from Africa, Asia and Latin America. *Environment and Urbanization* 15(2): 87–114, https://doi.org/10.1630/095624703101286763.

Bunte, M. and Ufen, A. (Eds). 2009. *Democratization in post-Suharto Indonesia*. London and New York: Routledge.

Burton, A.M. 2005. *Archive stories : facts, fictions, and the writing of history*. Durham, NC: Duke University Press.

Burton, I.; Kates, R.W. and White, G.F. 1978. *The environment as hazard*. New York: Oxford University Press.

van Buuren, A.; Ellen, G.J. and Warner, J.F. 2016. Path-dependency and policy learning in the Dutch delta: Toward more resilient flood risk management in the Netherlands? *Ecology and Society* 21(4): 43.

Buzan, B. and Wæver, O. 2003. *Regions and power: The structure of international security*. Cambridge: Cambridge University Press.

Buzan, B.; Wæver, O. and de Wilde, J. 1998. *Security: A new framework for analysis*. Boulder, CO: Lynne Rienner.

Caljouw, M.; Nas, P.J.M. and Pratiwo. 2005. Flooding in Jakarta: Towards a blue city with improved water management. *Bijdragen tot de Taal-, Land-en Volkenkunde (BKI)* 161(4): 454–484.

Camargo, A. and Cortesi, L. 2019. Flooding water and society. *WIREs Water* (July): 1–9, https://doi.org/10.1002/wat2.1374.

Campbell, J. 1997. Mechanisms of evolutionary change in economic governance: Interaction, interpretation and bricolage. In Magnusson, L. and Ottosson, J. (Eds), Evolutionary Economics and Path Dependence, pp. 10–32. Cheltenham, UK: Elgar.

Capoccia, G. 2016. Critical junctures. In Fioretos, O.; Falleti, T.G. and Sheingate, A. (Eds), *The Oxford handbook of historical institutionalism*, pp. 89–112. Oxford, UK: Oxford University Press, https://doi.org/10.1017/CBO9781107415324.004.

Capoccia, G. and Kelemen, R.D. 2007. The study of critical junctures: Theory, narrative and counterfactuals in Historical Institutionalism. *World Politics* 59(3): 341–369, http://www.jstor.org/stable/40060162.

Carey, P.B.R. 1980. Aspects of Javanese history in the nineteenth century. In Aveling, H. (Ed), The development of Indonesian society: From the coming of Islam to the present day, pp. 45–105. New York, USA: St Martin Press.

Carina, J. 2016. Ahok: Reklamasi jadi mainan baru buat yang fitnah saya (Ahok: Reclamation is a new way for slander me). *Kompas*. 19 May 2016, http://megapolitan.kompas.com/read/2016/05/19/14352351/ahok.reklamasi.jadi.mainan.baru.buat.yang.fitnah.saya.

Castles, L. 1989. Jakarta: The growing centre. In Hill, H. (Ed), Unity and Diversity: Regional Economic Development in Indonesia., pp. 233–5. Singapore: Oxford University Press.

Castree, N. 2002. False antitheses? Marxism, nature and actor-networks. *Antipode* 34(1): 111–146, https://doi.org/10.1111/1467-8330.00228.

Chakraborty, S.K. 2010. Coastal environment of Midnapore, West Bengal: Potential threats and management. *Jounral of Coastal Environment* 1(1): 27–40.

Chan, F. 2017. Indonesia's plan to move capital from Jakarta revives debate. *The Straits Times*. 10 July 2017, http://www.straitstimes.com/asia/se-asia/indonesia-studying-plan-to-relocate-capital.

Chan, M. and Lee, F.L.F. 2014. Selective exposure and agenda setting: Exploring the impact of partisan media exposure on agenda diversity and political participation participation. *Asian Journal of Communication* 24(4): 301–314, https://doi.org/10.1080/01292986.2014.903424.

Charles, K.J.; Octavianti, T.; Remmington, G. and Hylton, E. n.d. Equity and urban water security. In Water Science Policy and Management: The Global Challenge, Wiley.

Choi, M.; Furlong, E.T.; Moon, H.B.; Yu, J. and Choi, H.G. 2011. Contamination of nonylphenolic compounds in creek water, wastewater treatment plant effluents, and sediments from Lake Shihwa and vicinity, Korea: Comparison with fecal pollution. *Chemosphere* 85(8): 1406–1413, https://doi.org/10.1016/j.chemosphere.2011.08.016.

Clark, N. 1987. Similarities and differences between scientific and technological paradigms. *Futures* 19(1): 26–42, https://doi.org/10.1016/0016-3287(87)90037-1.

Clemens, E.S. and Cook, J.M. 1999. Politics and institutionalism: Explaining durability and change. *Annual Review of Sociology* 25(1): 441–466, https://doi.org/10.1146/annurev.soc.25.1.441.

Clochester, M. 1993. Pirates, squatters and poachers : The political ecology of dispossession of the native peoples of Sarawak. *Global Ecology and Biogeography Letters* 3(4/6): 158–179, https://doi.org/10.2478/s11756-006-0126-5.

Coffey, A. and Atkinson, P. 1996. *Making sense of qualitative data: Complementary research strategies*. Thousand Oaks: SAGE Publications.

Cohen, C. and Werker, E.D. 2008. The political economy of "natural" disasters. *Journal of Conflict Resolution* 52(6): 795–819.

Cohen, M.D.; March, J.G. and Olsen, J.P. 1972. A garbage can model of organizational choice. *Administrative Science Quarterly* 17(1): 1–25.

Cole, A.L. and Knowles, J.G. 2001. *Lives in context: The art of life history research*. Walnut Creek, CA: AltaMira Press.

Collier, D. 2011. Understanding process tracing. *Political Science and Politics* 4(4): 823–830, https://doi.org/10.1017/S1049096511001429.

Collier, R.B. and Collier, D. 1991. *Shaping the political arena: Critical junctures, the labor movement, and regime dynamics in Latin America*. Princeton, NJ: Princeton University Press.

Colven, E. 2017. Understanding the allure of big infrastructure: Jakarta's Great Garuda Sea Wall project. *Water Alternatives* 10(2): 250–264.

Conway, D. 2013. Water security in a changing climate. In Lankford, B.; Bakker, K.; Zeitoun, M. and Conway, D. (Eds), Water Security: Principles, Perspectives, and Practices, pp. 80–100. Abingdon, Oxon: Routledge.

Cook, C. and Bakker, K. 2012. Water security: Debating an emerging paradigm. *Global Environmental Change* 22(1): 94–102, https://doi.org/10.1016/j.gloenvcha.2011.10.011.

Coskun, B.B. 2008. Analysing desecuritisations: Prospects and problems for Israeli – Palestinian reconciliation. *Global Change, Peace & Security* 20(3): 393–408, https://doi.org/10.1080/14781150802394337.

Coskun, B.B. 2009. Cooperation over water resources as a tool for desecuritisation: The Israeli – Palestinian environmental NGOs as desecuritising actor. *European Journal of Economic and Political Studies* 2(2): 97–115.

Crase, L.R.; Keefe, S.M.O. and Dollery, B.E. 2009. The fluctuating political appeal of water engineering in Australia. *Water Alternatives* 2(3): 440–447.

CRED. 2009. General classification of disastersBrussels: CRED (Centre for Research on the Epidemiology of Disasters), 2009, https://www.emdat.be/classification (accessed 1 September 2019)

Crouch, H. 1980. The trends to authoritarianism: The post-1945 period. In Aveling, H. (Ed), The Development of Indonesia's Society: From the Coming of Islam to the Present Day, pp. 166–20. New York, USA: St Martin's Press.

Crow-Miller, B.; Webber, M. and Molle, F. 2017. The (re)turn to infrastructure for water management? *Water Alternatives* 10(2): 195–207.

Deltares. 2015. *Sinking cities: An intergtrated approach towards solutions*. Deltares18 3. Delft/

Utrecht, The Netherlands, https://doi.org/10.1046/j.1365-2451.2002.00341.x.

Demeritt, D. 2001. Being constructive about nature. In Castree, N. and Braun, B. (Eds), Social Nature: Theory, Practice, and Politics, Oxford, UK: Blackwell.

Denzin, N.K. 1989. Interpretive biography. In Qualitative Research Methods, Newbury Park, CA: SAGE Publications.

Denzin, N.K. 2014. Writing and/as analysis of performing the world. In Flick, U. (Ed), The SAGE handbook of qualitative data analysis, London, UK: SAGE Publications.

DiMaggio, P.J. and Powell, W.W. 1991. *The new institutionalism in organizational analysis*. Chicago, USA: University of Chicago Press.

Dinar, S. 2002. Water, security, conflict, and cooperation. *SAIS Review* 22(2): 229–253.

Dong, Q.; Ai, X.; Cao, G.; Zhang, Y. and Wang, X. 2010. Study on risk assessment of water security of drought periods based on entropy weight methods. *Kybernetes* 39(6): 864–870.

Dudal, R. 2005. Soils of Southeast Asia. In Gupta, A. (Ed), The Physical Geography of Southeast Asia, p. 103. Oxford, UK: Oxford University Press.

Dunn, K. 2010. Interviewing. In *Qualitative Research Methods in Human Geography*, Ontario, Canada: Oxford University Press.

Durodie, B. 2012. *Risk case studies: The concept of risk*. Swindon, UK, https://doi.org/10.1108/eb016713.

Elyda, C. and Dewi, S.W. 2014. Outgoing government launches controversial sea wall project. *The Jakarta Post*. 10 October 2014, http://www.thejakartapost.com/news/2014/10/10/outgoing-government-launches-controversial-sea-wall-project.html.

Ertman, T. 2010. The Great Reform Act of 1832 and British democratization. *Comparative Political Studies* 43(8–9): 1000–1022, https://doi.org/10.1177/0010414010370434.

Fekadu, K. 2014. The paradox in environmental determinism and possibilism: A literature review. *Journal of Geography and Regional Planning* 7(7): 132–139, https://doi.org/10.5897/JGRP2013.0406.

Fetterman, D.M. 2008. Key informant. In Given, L.M. (Ed), The SAGE Encyclopedia of Qualitative Research Methods, pp. 478–479. SAGE Publications.

Fielding, N. and Fielding, J. 1986. *Linking data*. London, UK: SAGE Publications.

Fioretos, O.; Falleti, T.G. and Sheingate, A. 2016. *Historical institutionalism in political science*. Oxford handbook of historical institutionalismMay, https://doi.org/10.1093/oxfordhb/9780199662814.013.1.

Fischhendler, I. 2015. The securitization of water discourse: theoritical foundations, research gaps and objectives of the special issue. *International Environmental Agreements: Politics, Law and Economics* 15: 245–255, https://doi.org/10.1007/s10784-015-9277-6.

Floyd, R. 2007. Towards a consequentialist evaluation of security: Bringing together the

Copenhagen and the Welsh Schools of security studies. *Review of International Studies* 33: 327–350, https://doi.org/10.1017/S026021050700753X.

Floyd, R. 2008. The environmental security debate and its significance for climate change. *The International Spectator* 43(4): 51–65, https://doi.org/10.1080/03932720802280602.

Forbes, D. 1990. Jakarta towards 2005: Planning mechanisms and issues. *Bulletin of Indonesian Economic Studies* 26(3): 111–120, https://doi.org/10.1080/00074919012331335875

Forsyth, T. 2003. *Critical political ecology: The politics of environmental science*. London, UK: Routledge.

Friis, K. 2000. From liminars to others: Securitization through myths. *Peace and Conflict Studies* 7(2).

Furlong, K. and Kooy, M. 2017. Worlding water supply: Thinking beyond the network in Jakarta. *International Journal of Urban and Regional Research* 888–903, https://doi.org/10.1111/1468-2427.12582.

Furnivall, J.S. 1939. *Netherlands India: A study of plural economy*. Cambridge: The University Press.

Gandy, M. 2004. Rethinking urban metabolism: water, space and the modern city. *City* 8(3): 363–379.

Geertz, C. 1973. *The interpretation of cultures: Selected essay*. New York, USA: Basic Books.

Gerlak, A.K.; House-Peters, L.; Varady, R.G.; Albrecht, T.; Zúñiga-Terán, A.; de Grenade, R.R.; Cook, C. and Scott, C.A. 2018. Water security: A review of place-based research. *Environmental Science and Policy* 82: 79–89, https://doi.org/10.1016/j.envsci.2018.01.009.

Gerschenkron, A. 1962. *Economic backwardness in historical perspective*. Cambridge, Massachusetts, USA: Harvard University Press.

Gibbs, G.R. 2012a. Thematic coding and categorizing. In *Analyzing qualitative data*, pp. 38–55. London, UK: SAGE Publications.

Gibbs, G.R. 2012b. Analytic quality and ethics. In *Analyzing qualitative data*, pp. 90–104. London, UK: SAGE Publications.

Gilmartin, D. 1994. Scientific empire and imperial Science: Colonialism and irrigation technology in the Indus Basin. *The Journal of Asian Studies* 53(4): 1127–1149, http://www.jstor.org/stable/2059236.

Gore, A. and O'Connor, J. 2007. *An Inconvenient Truth: The Crisis of Global Warming*. London, UK: Bloomsbury.

Government of the Netherlands. 2016. The Netherlands to assist Indonesia in coastal reinforcement and port development. https://www.government.nl/latest/news/2016/11/23/the-netherlands-to-assist-indonesia-in-coastal-reinforcement-and-port-development (accessed 2 October 2017)

Grafton, R.Q. 2017. Responding to the 'wicked problem' of water insecurity. *Water Resources Manag* 31: 3023–3041, https://doi.org/10.1007/s11269-017-1606-9.

Grafton, R.Q. and Horne, J. 2014. Water markets in the Murray-Darling Basin. *Agricultural Water Management* 145: 61–71, https://doi.org/10.1016/j.agwat.2013.12.001.

Graham, J.D. and Wiener, J.B. 1995. Confronting risk trade-offs. In Risk vs. Risk. Trade-offs in Protecting Health and Environment, pp. 1–41. Cambridge, Massachusetts, USA: Harvard University Press.

Greenless, D. 2008. Suharto's legacy of development and corruption. *The New York Times*. 28 January 2008, http://www.nytimes.com/2008/01/28/world/asia/28iht-suharto.1.9542684.html.

Gregory, K.J. 2006. The human role in changing river channels. *Geomorphology* 79(3–4): 172–191, https://doi.org/10.1016/j.geomorph.2006.06.018

Grey, D.; Garrick, D.; Blackmore, D.; Kelman, J.; Muller, M. and Sadoff, C. 2013. Water security in one blue planet: Twenty-first century policy challenges for science. *Philosophical Transactions of the Royal Society*, https://doi.org/10.1098/rsta.2012.0406.

Grey, D. and Sadoff, C.W. 2007. Sink or swim? Water security for growth and development. *Water Policy* 9(6): 545–571, https://doi.org/10.2166/wp.2007.021.

Gunawan, R. 2010. *Gagalnya sistem kanal: Pengendalian banjir Jakarta dari masa ke masa (The failure of the canal system: Jakarta's flood control strategy from time to time)*. Jakarta, Indonesia: Kompas.

de Haan, F. 1935. *Oud Batavia*. Bandung, Indonesia: A.C.Nix.

Haasnoot, M.; Kwakkel, J.H.; Walker, W.E. and Maat, J. ter. 2013. Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world. *Global Environmental Change* 23(2): 485–498, https://doi.org/10.1016/j.gloenvcha.2012.12.006.

Haasnoot, M.; Middelkoop, H.; Offermans, A.; Beek, E. Van and Deursen, W.P.A. Van. 2012. Exploring pathways for sustainable water management in river deltas in a changing environment. *Climatic Change* 115: 795–819, https://doi.org/10.1007/s10584-012-0444-2.

Hadimadja, R.K. 2012. *Ali Sadikin: Membenahi Jakarta menjadi kota yang manusiawi (Ali Sadikin: Improving Jakarta into a humane city)*. Jakarta, Indonesia: Ufuk Press.

Hadiz, V.R. 2004. Decentralization and democracy in Indonesia: A critique of neo-institutionalist perspectives. *Development and Change* 35(4): 697–718.

Hall, J. and Borgomeo, E. 2013. Risk-based principles for defining and managing water security Risk-based principles for defining and managing water security. *Phil. Trans. R. Soc. A* 371(20120407), http://dx.doi.org/10.1098/rsta.2012.0407.

Hall, P.A. 1993. Policy paradigms, Social learning , and the state: The case of economic policymaking in Britain. *Comparative Politics* 25(3): 275–296.

Hallegatte, S. 2009. Strategies to adapt to an uncertain climate change. *Global Environmental*

Change 19(2): 240–247, https://doi.org/10.1016/j.gloenvcha.2008.12.003.

Hammond, M. and Wellington, J. 2013. *Research methods: The key concepts*. London and New York: Routledge.

Harap, L. 2016. Benarkah 14 tahun lagi Jakarta Utara akan tenggelam? (Will North Jakarta sink in 14 years). *Merdeka*. 20 April 2016.

Haraway, D. 1991. *Simians, cyborgs and women. The reinvention of nature*. London: Free Association Books.

Harbers, H. 2005. Political materials – Material politics. In Harbers, H. (Ed), *Inside the politics of technology: Agency and normativity in the co-production of technology and society*, pp. 258–273. Amsterdam, the Netherlands: Amsterdam University Press.

Harvey, D. 2010. *The enigma of capital: And the crises of capitalism*. Oxford, UK: Oxford University Press.

Hasyim, I. 2018. Anies Baswedan cracks down on buildings for groundwater misuse. *Tempo*. 12 March 2018, https://en.tempo.co/read/news/2018/03/12/057916549/Anies-Baswedan-Cracks-Down-on-Buildings-for-Groundwater-Misuse.

Head, B.W. 2014. Managing urban water crises: Adaptive policy responses to drought and flood in Southeast Queensland, Australia. *Ecology and Society* 19(2): 33, https://doi.org/33 10.5751/es-06414-190233.

Hedstrom, P. and Swedborg, R. 1998. Social Mechanisms: An Introductory Essay. In Hedstrom, P. and Swedborg., R. (Eds), Social Mechanisms: An Analytic Approach to Social Theory, pp. 3–24. Cambridge, UK: Cambridge University Press.

van der Heiden, C.N. 1990. Town planning in the Dutch Indies. *Planning Perspectives* 5(1): 63–84, https://doi.org/10.1080/02665439008725695.

Heming, L.I.; Waley, P. and Rees, P. 2001. Reservoir resettlement in China: Past experience and the Three Gorges Dam. *The Geographical Journal* 167(3): 195–212, https://doi.org/10.1111/1475-4959.00018.

Heriyanto, D. 2016. Q&A: The problem with Jakarta's land reclamation. *The Jakarta Post*. 7 April 2016, http://www.thejakartapost.com/academia/2016/04/07/qa-the-problem-with-jakartas-land-reclamation.html.

Heuken, A. 1983. *Historical sites of Jakarta*. Jakarta, Indonesia: Cipta Loka Karya.

Hewitt, K. 1983. *Interpretations of Calamity from the viewpoint of human ecology*. London and Sydney: Allen & Unwin.

Heynen, N.; Kaika, M. and Swyngedouw, E. (Eds). 2006. *In the nature of cities: Urban political ecology and the politics of urban metabolism*. Studies in comparative history,. Abingdon, UK: Routledge, https://doi.org/10.5822/978-1-59726-986-5.

Hilhorst, D. 2003. Responding to disasters: Diversity of bureaucrats, technocrats and local people. *International Journal of Mass Emergencies and Disasters* 21(1): 37–55.

Hoekstra, A. 2018. Urban water security: A review. *Environmental Research Letters* 13: 1–15, https://doi.org/Enhttps://doi.org/10.1088/1748-9326/aaba52.

Hogan, J. and Doyle, D. 2007. The importance of ideas: An a priori critical juncture framework. *Canadian Journal of Political Science/Revue canadienne de science politique* 40(4): 883–910, https://doi.org/10.1017/S0008423907071144.

Hosono, T.; Su, C.-C.; Delinom, R.; Umezawa, Y.; Toyota, T.; Kaneko, S. and Taniguchi, M. 2011. Decline in heavy metal contamination in marine sediments in Jakarta Bay, Indonesia due to increasing environmental regulations. *Estuarine, Coastal and Shelf Science* 92(2): 297–306, https://doi.org/10.1016/j.ecss.2011.01.010

Howarth, D.; Norval, A.J. and Stavrakakis, Y. 2000. *Discourse theory and political analysis: Identities, hegemonies and social Change*. Manchester, UK: Manchester University Press.

Huang, S.; Tu, J.; Liu, H.; Hua, M.; Liao, Q.; Feng, J.; Weng, Z. and Huang, G. 2009. Multivariate analysis of trace element concentrations in atmospheric deposition in the Yangtze River Delta, East China. *Atmospheric Environment* 43(36): 5781–5790, https://doi.org/10.1016/j.atmosenv.2009.07.055.

Huda, N.N. 2013. Muslim Muin Ph.D.: "Jakarta tak perlu bangun Giant Sea Wall" (Muslim Muin Ph.D: 'Jakarta does not need Giant Sea Wall'). *ITB*. https://www.itb.ac.id/news/3918.xhtml (accessed 1 August 2016)

Hugo, G.J. 1980. Population movements in Indonesia during the colonial period. In Fox, J.J. (Ed), Indonesia: the Making of a Culture, pp. 95–136. Canbera, Australia: Australia National University.

Huysmans, J. 1998. Security! What do you mean? From concept to thick signifier. *European Journal of International Relations* 4(2): 226–255.

Huysmans, J. 2002. Defining social constructivism in security studies: The normative dilemma of writing security. *Alternatives* 27: 41–62.

Ihsanuddin. 2017. Luhut minta Anies-Sandi tanggung jawab jika Jakarta tenggelam karena stop reklamasi (Luhut asked Anies-Sandi to be responsible if Jakarta sinks because reclamation is revoked). *Kompas*. 8 May 2017, http://nasional.kompas.com/read/2017/05/08/17405281/luhut.minta.anies-sandi.tanggung.jawab.jika.jakarta.tenggelam.karena.stop.reklamasi.

Ikeberry, G.J. 1994. History's heavy hand: Institutions and the politics of the state. In *Conference on New Perspectives on Insitutions*, p. 32, https://scholar.princeton.edu/sites/default/files/HistorysHeavyHand_0.pdf.

Jägerskog, A. 2003. Why states cooperate over shared water: The water negotiations in the Jordan River Basin. Linköping University.

Jakarta Post. 2018. Anies revokes reclamation project permits. *Jakarta Post*. http://www.thejakartapost.com/news/2018/09/26/anies-revokes-reclamation-project-

permits.html (accessed 26 September 2018)

Jamil, A.I. 2016. Pencopotan Rizal Ramli dinilai untuk muluskan proyek reklamasi (The dismissal of Rizal Ramli is suspected to prune the reclamation project). *Republika*. 2016, http://nasional.republika.co.id/berita/nasional/umum/16/07/27/oaz2y5361-pencopotan-rizal-ramli-dinilai-untuk-muluskan-proyek-reklamasi.

Jayapal, M. 1993. *Old Jakarta*. Kuala Lumpur: Oxford University Press.

Jepson, W. 2014. Measuring "no-win" waterscapes: Experience-based scales and classification approaches to assess household water security in colonias on the US-Mexico border. *Geoforum* 51: 107–120, https://doi.org/10.1016/j.geoforum.2013.10.002.

Jepson, W.; Budds, J.; Eichelberger, L.; Harris, L.; Norman, E.; Reilly, K.O.; Pearson, A.; Shah, S.; Shinn, J.; Staddon, C.; Stoler, J.; Wutich, A. and Young, S. 2017. Advancing human capabilities for water security: A relational approach. *Water Security* 1: 46–52, https://doi.org/10.1016/j.wasec.2017.07.001.

Jessop, B. 2012. Economic and ecological crises: Green new deals and no-growth economies. *Development* 55(1): 17–24, https://doi.org/10.1057/dev.2011.104.

JMP. 2018. *Drinking water, sanitation and hygiene in schools: Global baseline report 2018*, file:///C:/Users/octav/Downloads/JMP WASH in Schools WEB final.pdf.

Juniman, P.T. 2016. Ahok sebut tanggul raksasa bisa hindari Jakarta tenggelam (Ahok said Giant Sea Wall can prevent Jakarta from sinking). *CNN Indonesia*. 29 April 2016, https://www.cnnindonesia.com/nasional/20160429125752-20-127535/ahok-sebut-tanggul-raksasa-bisa-hindari-jakarta-tenggelam/.

Kaban, J.S.P. 2016. City targets to complete 14 IPAL construction in 2022. *Berita Jakarta*. 9 June 2016, http://www.beritajakarta.com/en/read/15223/City-Targets-to-Complete-15-IPAL-Construction-in-2022#.WHzUKo_XIaE.

Kaika, M. 2005. *City of flows: Modernity, nature, and the city*. New York: Routledge.

Kamil, I. and Murakami, K. 2011. Evaluation of vulnerability against flood disaster in Jakarta 11(45): 229–230.

Kang, H. and Jang, J.-H. 2013. Water quality modeling for the water quality conservation of estuary reservoir in Korea. *Desalination and Water Treatment* (April): 1–15, https://doi.org/10.1080/19443994.2013.860404

Kannan, R.; Morris, N.; Sibarani, A.L. and Handari, A. 2017. The impact of Indonesia's infrastructure delivery. Jakarta, Indonesia.

Kanumoyoso, B. 2011. Beyond the city wall: Society and economic development in the Ommelanden of Batavia, 1684-1740. Leiden University; Leiden, The Netherlands.

Karvonen, A. 2011. *Politics of urban runoff: Nature, technology, and the sustainable city*. Cambridge, MA: MIT Press.

Keeler, J.T.S. 1993. Opening the window for reform: Mandates, crises, and extraordinary

policy-making. *Comparative Political Studies* 25(4): 433–486.

Kidd, W.; Legge, K. and Harari, P. 2010. *Politics and power*. Basingstoke: Palgrave Macmilla.

Kimmelman, M. 2017. Jakarta Is Sinking So Fast, It Could End Up Underwater. *The New York Times*. 21 December 2017, https://www.nytimes.com/interactive/2017/12/21/world/asia/jakarta-sinking-climate.html.

Kingdon, J.W. 2003. *Agendas, alternatives, and public policies*. New York ; London: Longman.

Kingdon, J.W. 2014. *Agendas, Alternatives, and Public Policies*. Harlow: Pearson Education Limited.

Klein, N. 2007. *The shock doctrine: The rise of disaster capitalism*. New York, USA: Penguin Books.

Kompas. 2010. Jakarta cisa tenggelam (Jakarta could sink). *Kompas*. http://lipsus.kompas.com/topikpilihanlist/981/2/regional.kompas.com (accessed 16 January 2017)

Kompas. 2015. 2020, Palyja will increase its coverage area to 95 percent! (2020, Palyja Targetkan Cakupan Layanan Mencapai 95 Persen!). 20 March 2015, http://megapolitan.kompas.com/read/2015/03/20/18175821/2020.Palyja.Targetkan.Cakupan.Layanan.Mencapai.95.Persen (accessed 1 May 2015)

Kompas. 2016. Tanah Jakarta terus turun, pemakaian air tanah harus dihentikan (Jakarta's land continues to subside, the use of groundwater must be stopped). 18 March 2016, http://properti.kompas.com/read/2016/03/18/120000621/Tanah.Jakarta.Terus.Turun.Pemakaian.Air.Tanah.Harus.Dihentikan (accessed 1 January 2017)

Kooy, M. and Bakker, K. 2008. Splintered networks: The colonial and contemporary waters of Jakarta. *Geoforum* 39(6): 1843–1858, https://doi.org/10.1016/j.geoforum.2008.07.012.

Kooy, M. and Walter, C.T. 2019. Towards A Situated Urban Political Ecology Analysis of Packaged Drinking Water Supply 1–18, https://doi.org/10.3390/w11020225.

Kooy, M.; Walter, C.T. and Prabaharyaka, I. 2016. Inclusive development of urban water services in Jakarta: The role of groundwater. *Habitat International*, https://doi.org/10.1016/j.habitatint.2016.10.006.

Krause, F. 2012. Managing floods, managing people: A political ecology of watercourse regulation on the Kemijoki. *Nordia Geographical Publications* 41(5): 57–68.

Krause, F. and Strang, V. 2016. Thinking relationships through water. *Society & Natural Resources* 29(6): 633–638.

KRCC. n.d. Korea's green hope: Saemangeum. Jeollabuk-do, http://www.isaemangeum.co.kr/eng/down/saemangeum_pdf_eng.pdf.

Kuhn, T.S. 1962. *The structure of scientific revolutions*. II 2. Chicago, USA: The University of Chicago.

Kurniawan, D. 2016. Pemerintah harapkan peran swasta dalam pembangunan infrastruktur

(Government expects private sector's role in infrastructure development). *Gatra*. 27 October 2016, https://www.gatra.com/ekonomi/industri/224139-dukungan-dan-partisipasi-swasta-krusial-bagi-pembangunan-infrastruktur-di-indonesia.

Kusno, A. 2013. The post-colonial unconscious: Observing mega-imagistic urban projects in Asia. In Bharne, V. (Ed), The emerging Asian city : concomitant urbanities and urbanisms, pp. 168–178. Abingdon, UK: Routledge.

Kusno, A. 2015. Power and time turning: The capital, the state and the kampung in Jakarta. *International Journal of Urban Sciences* 19(1): 53–63, https://doi.org/10.1080/12265934.2014.992938.

Kuwado, F.J. 2016. Rizal Ramli: Ahok itu gubernur DKI atau karyawan pengembang? (Rizal Ramli: Ahok is Jakarta's governor or an employment of the developer?). *Kompas*. 19 July 2016, http://nasional.kompas.com/read/2016/07/19/15020861/rizal.ramli.ahok.itu.gubernur.dki.atau.karyawan.pengembang..

Lankford, B. 2013a. Infrastructure hydromentalities: Water sharing, water control, and water (in)security. In Lankford, B.; Bakker, K.; Zeitoun, M. and Conway, D. (Eds), Water Security: Principles, Perspectives and Practices, pp. 256–272. Abingdon, UK: Routledge.

Lankford, B. 2013b. A synthesis chapter: The incodys water security model. In Lankford, B.; Bakker, K.; Zeitoun, M. and Conway, D. (Eds), Water Security: Principles, Perspectives and Practices, pp. 336–351. Abingdon, Oxon: Routledge.

Larkin, B. 2013. The politics and poetics of infrastructure. *The Annual Review of Anthropology* 327–343, https://doi.org/10.1146/annurev-anthro-092412-155522.

Lautze, J. and Manthrithilake, H. 2012. Water security: Old concepts, new package, what value? *Natural Resources Forum* 36(2): 76–87, https://doi.org/10.1111/j.1477-8947.2012.01448.x.

Leb, C. and Wouters, P. 2013. The water security paradox and international law: Securitisation as an obstacle to achieving water security and the role of law in desecuritising the world's most precious resource. In Lankford, B.; Bakker, K.; Zeitoun, M. and Conway, D. (Eds), Water Security: Principles, Perspectives and Practices, pp. 26–45. Abingdon, Oxon: Routledge.

Lebel, L.; Garden, P. and Imamura, M. 2005. The politics of scale, position, and place in the governance of water resources in the Mekong Region. *Ecology and Society* 10(2): 20, https://doi.org/10.5751/ES-01543-100218.

Leclerc, J. 1993. Mirrors and the lighthouse. A search for meaning in the Monuments and great works of Sukarno's Jakarta, 1960-1966. In Nas, P.J.M. (Ed), Urban Symbolism, pp. 38–58. Leiden, The Netherlands: E.J. Brill.

Leftwich, A. 2004. *What is politics: The activity and its study*. Cambridge, UK: Polity Press.

Legge, J.D. 1968. General Suharto's New Order. *International Affairs (Royal Institute of International Affairs 1944-)* 44(1): 40–47, http://www.jstor.org/stable/2613527.

Leitner, H.; Colven, E. and Sheppard, E. 2017. Ecological security for whom? The politics of flood alleviation and urban environmental justice in Jakarta, Indonesia. In Heise, U.; Niemann, M. and Christensen, J. (Eds), The Routledge Companion to the Environmental Humanities, pp. 194–205. London: Routledge.

Leitner, H. and Sheppard, E. 2017. From kampungs to condos? Contested accumulations through displacement in Jakarta. *Environment and Planning A* 0(0): 1–20, https://doi.org/10.1177/0308518X17709279.

Leonard, S. 2007. The "securitization" of asylum and migration in the European Union: Beyond the Copenhagen School's framework. University of Wales.

Levi, M. 1997. A model, a method, and a map: Rational choice in comparative and historical analysis. In Lichbach, M.I. and Zuckerma, A.S. (Eds), Comparative politics: Rationality, culture, and structure, pp. 19–41. Cambridge, UK: Cambridge Unviersity Press.

Levy, M.A. 1995. Is the environment a national security issue? *International Security* 20(2): 35–62.

Libecap, G.D. 2010. Institutional path dependence in climate adaptation: Coman's "some unsettled problems of irrigation." Santa Barbara, CA.

Lin, M.M. and Hidayat, R. 2018. Jakarta, the fastest-sinking city in the world. *BBC Indonesia*. https://www.bbc.co.uk/news/world-asia-44636934 (accessed 3 September 2018)

Lipset, S.M. and Rokkan, S. 1967. Cleavage structures, party systems, and voter alignments: An introduction. In Party Systems and Voter Alignments, pp. 1–64. New York, USA: Free Press.

Liputan 6. 2014. Ali Sadikin "pesimis" urus banjir Jakarta (Ali Sadikin is pesimistic dealing with Jakarta's flood). *Liputan 6*. 26 January 2014, http://news.liputan6.com/read/810321/ali-sadikin-pesimis-urus-banjir-jakarta.

Liu, C.W.; Chou, Y.L.; Lin, S.T.; Lin, G.J. and Jang, C.S. 2010. Management of high groundwater level aquifer in the Taipei Basin. *Water Resources Management* 24(13): 3513–3525, https://doi.org/10.1007/s11269-010-9617-9.

Loftus, A. 2009. Rethinking political ecologies of water. *Third World Quarterly* 30(5): 953–968, https://doi.org/10.1080/01436590902959198.

Loftus, A. and March, H. 2016. Financializing desalination: Rethinking the returns of big infrastructure. *International Journal of Urban and Regional Research* 40(1): 46–61, https://doi.org/10.1111/1468-2427.12342.

Loftus, A.J. and McDonald, D.A. 2001. Of liquid dreams: A political ecology of water privatization in Buenos Aires. *Environment and Urbanization* 13(2): 179–199.

van Loon, A.F. and van Lanen, H.A.J. 2013. Making the distinction between water scarcity and

drought using an observation-modeling framework. *Water Resources Research* 49: 1483–1502, https://doi.org/10.1002/wrcr.20147.

Lundqvist, J.; Appasamy, P. and Nelliyat, P. 2003. Dimensions and approaches for Third World city water security. *Philosophical Transactions of the Royal Society B* 358: 1985–1996, https://doi.org/10.1098/rstb.2003.1382.

Magstadt, T.M. 2016. *Understanding politics: Ideas, institutions, and issues*. 12th ed. Australia: Wadsworth.

Maharani, D. 2013. Ini 4 penyebab banjir Jakarta (These are the four causes of Jakarta floods). *Kompas*. 22 January 2013, https://megapolitan.kompas.com/read/2013/01/22/1053289/Ini.4.Penyebab.Banjir.Jakarta..

Mahoney, J. 2000. Path dependence in historical sociology. *Theory and Society* 29(4): 507–548.

Mahoney, J. 2001. Path-dependent explanations of regime change: Central America in comparative perspective. *Studies in Comparative International Development* 36(1): 111–141.

Mahoney, J. and Rueschemeyer, D. 2003. *Comparative historical analysis in the social sciences*. New York, USA: Cambridge University Press.

Mahr, K. 2018. How Cape Town was saved from running out of water. *The Guardian*. 2018, https://www.theguardian.com/world/2018/may/04/back-from-the-brink-how-cape-town-cracked-its-water-crisis%0A%0A.

Marcussen, M. 2000. *Ideas and elites: The social construction of economic and monetary union*. Aalborg, Denmark: Aalborg University Press.

Mariani, E. 2016. Cheaper solution for subsidence offered. *Jakarta Post*. http://www.thejakartapost.com/news/2016/05/20/cheaper-solution-subsidence-offered.html (accessed 1 August 2017)

Marshall, G.R. and Alexandra, J. 2016. Institutional path dependence and environmental water recovery in Australia's Murray -Darling Basin. *Water Alternatives* 9(3): 679–703.

Martin, S. 2012. Examples of "no-regret", "low-regret" and "win-win" adaptation actions. Scotland, https://www.climatexchange.org.uk/research/projects/examples-of-no-regret-low-regret-and-win-win-adaptation-actions/.

Mason, N. and Calow, R. 2012. Water security: From abstract concept to meaningful metrics. 357. London, UK.

McCombs, M.; Overholser, G. and Jamieson, K.H. 2005. The agenda setting function of the press. In Overholser, G. and Jamieson, K.H. (Eds), The Press, pp. 156–168. Oxford, UK: Oxford University Press.

McCombs, M.; Shaw, D.L. and Weaver, D.L. 1997. *Communication and democracy: Exploring the intellectual frontiers in agenda-setting theory*. Mahwah, NJ: Lawrence Erlbaum Associates.

McCully, P. 1996. *Silenced rivers: The ecology and politics of large dams*. London and New York: Zed Books.

McEvoy, J. 2014. Desalination and water security: The promise and perils of a technological fix to the water crisis in Baja California Sur, Mexico. *Water Alternatives* 7(3): 518–541, https://doi.org/10.1007/s10909-015-1365-z.

McLeod, R.H. 2000. Soeharto's Indonesia: A better class of corruption. *Agenda: A Journal of Policy Analysis and Reform* 7(2): 99–112, http://www.jstor.org/stable/43199068.

Meacham, M. 2009. Path dependency of infrastructure: Implications for the sanitation system of Phnom Penh, Cambodia. Stockholm University; Stockholm, Sweden.

Meehan, K.M. 2014. Tool-power: Water infrastructure as wellsprings of state power. *Geoforum* 57: 215–224, https://doi.org/10.1016/j.geoforum.2013.08.005.

Meijerink, S. 2005. Understanding policy stability and change. The interplay of advocacy coalitions and epistemic communities, windows of opportunity, and Dutch coastal flooding policy 1945 – 2003. *Journal of European Public Policy* 12(6): 1060–1077, https://doi.org/10.1080/13501760500270745.

Meijerink, S. and Huitema, D. 2010. Policy entrepreneurs and change strategies: Lessons from sixteen case studies of water transitions around the globe. *Ecology and Society* 15(2): 17, https://doi.org/21.

Merriam, S.B. 2009. *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.

Miles, B. and Morse, S. 2007. The role of news media in natural disaster risk and recovery. *Ecological Economics* 63: 365–373, https://doi.org/10.1016/j.ecolecon.2006.08.007.

Miles, M.B. and Huberman, A.M. 1994. *Qualitative data analysis: An expanded sourcebook*. 2nd ed. Thousand Oaks: SAGE Publications.

Milone, P.D. 1987. Indische culture, and its relationship to urban life. *Comparative Studies in Society and History* 9: 407–426.

Ministry of Public Works. 2011. ATLAS Pengamanan Pantai Jakarta, ATLAS Securing Jakarta's coastal area. Jakarta, Indonesia.

Molle, F. 2008. Nirvana concepts, narratives and policy models: Insights from the water sector. *Water Alternatives* 1(1): 131–156.

Monalisa. 2015. Normalisasi Ciliwung dengan beton justru tambah masalah (Ciliwung normalisation with concrete is a new problem). *Antara News*. http://www.antaranews.com/berita/522723/normalisasi-ciliwung-dengan-beton-justru-tambah-masalah (accessed 1 February 2017)

Monstadt, J. 2009. Conceptualizing the political ecology of urban infrastructures: Insights from technology and urban studies. *Environment and Planning A* 41(8): 1924–1942, https://doi.org/10.1068/a4145.

Moore, B. 1966. *Social origins of dictatorship and democracy*. Boston: Beacon Press.

Moore, S. 2017. The political economy of flood management reform in China. *International Journal of Water Resources Development* 34(4): 566–577, https://doi.org/10.1080/07900627.2017.1348937.

Morita, A. 2017. Multispecies infrastructure: Infrastructural inversion and involutionary entanglements in the Chao Phraya Delta, Thailand. *Ethnos, Journal of Anthropology* 82(4): 738–757, https://doi.org/10.1080/00141844.2015.1119175.

Motte, R. De. 2013. Liquid dynamics: The hydrosocial cycle and the radical politics of water. University of Manchester.

Mulyana, W. 2012. *Decent work in Jakarta: An integrated approach*. Jakarta, Indonesia, http://ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/publication/wcms_174991.pdf.

Murdohardono, D. and Sudarsono, U. 1998. Land subsidence monitoring system in Jakarta. In *Symposium on Japan– Indonesia IDNDR project: volcanology, tectonics, flood and sediment hazards*, pp. 243–256. Bandung, Indonesia.

Murphie, A. and Potts, J. 2003. *Culture and technology*. Basingstoke: Palgrave.

Murphy, A.B.; de Blij, H.J.; Turner, I.L.; Gilmore, R.W. and Gregory, D. 2005. The role of geography in public debate. *Progress in Human Geography* 29(2): 165–193, https://doi.org/10.1191/0309132505ph538oa.

Murphy, J. 2009. Environment and imperialism: Why colonialism still mattersLeeds, UK: Sustainability Research Institute. University of Leeds, 2009.

Mustafa, D. 2001. Colonial law, contemporary water issues in Pakistan. *Political Geography* 20: 817–837.

Mustafa, D. 2013. *Water resource management in a vulnerable world : the hydro-hazardscapes of climate change*. London, UK: I.B. Tauris.

Nakajima, H.; Kaneko, H. and Tsuchida, M. 2010. The management of land subsidence and groundwater conservation in Tokyo. *Journal of Groundwater Hydrology* 52(1): 35–47, https://www.jstage.jst.go.jp/article/jagh/52/1/52_1_35/_article/-char/ja/.

Nastitie, D.P. 2015. Operator air bersih dukung penggabungan PAM Jaya dan PAL Jaya (Clean water operators support the merger of PAM Jaya and PAL Jaya). *Kompas*. 12 November 2015, http://print.kompas.com/baca/2015/11/12/Operator-Air-Bersih-Dukung-Penggabungan-PAM-Jaya-d.

NCICD. 2013. Pengembangan Terpadu Pesisir Ibukota Negara (National Capital Integrated Coastal Development). November. Jakarta, http://en.ncicd.com/ncicd/downloads/.

NCICD. 2014. Master Plan: National Capital Integrated Coastal Development. Jakarta, http://en.ncicd.com/news/downloads/.

NEDECO. 1973. Masterplan for flood control and drainage system of Jakarta. Jakarta.

Newman, A.L. 2016. Oxford Handbooks Online Sequencing , Layering , and Feedbacks in Global Regulation (December 2017): 1–19, https://doi.org/10.1093/oxfordhb/9780199662814.013.38.

Newman, N. 2011. Mainstream media and the distribution of news in the age of social discovery. September. Oxford, UK.

Nichols, C. and Myers, A.S. 2010. Exploiting the opportunity for reconstructive leadership: Presidential responses to enervated political regimes. *American Politics Research* 38(5): 806–841, https://doi.org/10.1177/1532673X09357502.

Niemeijer, H.E. 2003. The closure of the Bendungan; The colonial port city of Batavia/ Jakarta and its primary hinterland in the seventeenth centuryUnpublished paper, 2003.

Nixon, S.W. 2003. Replacing the Nile: Are anthropogenic nutrients providing the fertility once brought to the Mediterranean by a great river? *Ambio* 32(1): 30–39.

NL Agency. 2012. Jakarta Coastal Development Strategy, End-of-project review final mission report. April. The Netherlands.

North, D.C. 1990. *Institutions, institutional change and economic performance*. Cambridge, MA: Cambridge University Press.

Noy, C. 2008. Sampling knowledge: The hermeneutics of snowball sampling in qualitative research. *International Journal of Social Research Methodology* 11(4): 327–344.

Obertreis, J.; Moss, T.; Mollinga, P.P. and Bichsel, C. 2016. Water, infrastructure and political rule: Introduction to the special issue. *Water Alternatives* 9(2): 168–181.

Octavianti, T. 2019. Examining flood policy change in Jakarta, Indonesia using the Multiple Stream model. In Penning-Rowsell, E. and Becker, M. (Eds), *Flood Risk Management: Global Case Studies of Governance, Policy and Communities*, pp. 79–90. Abingdon, UK: Routledge.

Octavianti, T. and Charles, K. 2018a. Disaster capitalism? Examining the politicisation of land subsidence crisis in pushing Jakarta's seawall megaproject. *Water Alternatives* 11(2): 394–420.

Octavianti, T. and Charles, K. 2018b. The evolution of Jakarta's flood policy over the past 400 years: The lock-in of infrastructural solutions. *Environment and Planning C: Politics and Space* 37(6): 1102–1125, https://doi.org/10.1177/2399654418813578.

OECD. 2011. *Meeting the challenge of financing water and sanitation: Tools and approaches*. OECD Studies on Water. OECD Publishing, https://doi.org/10.1787/9789264120525-en.

OECD. 2013. Water security for better lives. Paris.

Oktara, D. 2017. NCICD project expedited to prevent land subsidence. *Tempo*. 17 August 2017, https://en.tempo.co/read/news/2017/08/17/056900873/NCICD-Project-Expedited-to-Prevent-Land-Subsidence.

Olson, R.S. 2000. Towards a politics of disaster: Losses, values, agendas, and blame.

International Journal of Mass Emergencies and Disasters 18: 265–287.

Olsson, P.; Gunderson, L.H.; Carpenter, S.R.; Ryan, P.; Lebel, L.; Folke, C. and Holling, C.. S. 2006. Shooting the rapids: Navigating transitions to adaptive governance of social-ecological systems. *Ecology and Society* 11(1): 18.

Onodera, S.; Saito, M.; Sawano, M.; Hosono, T.; Taniguchi, M.; Shimada, J.; Umezawa, Y.; Lubis, R.F.; Buapeng, S. and Delinom, R. 2009. Erratum to "Effects of intensive urbanization on the intrusion of shallow groundwater into deep groundwater: Examples from Bangkok and Jakarta." *Science of The Total Environment* 407(9): 3209–3217, https://doi.org/10.1016/j.scitotenv.2009.01.049

Osti, G. 2017. The anti-flood detention basin projects in Northern Italy. New wine in old bottles? *Water Alternatives* 10(2): 265–282.

Oxfam. 2017. Towards a more equal Indonesia. Jakarta, https://d1tn3vj7xz9fdh.cloudfront.net/s3fs-public/bp-towards-more-equal-indonesia-230217-en_0.pdf.

Paasi, A. 2004. Place and region: Looking through the prism of scale. *Progress in Human Geography* 28(4): 536–546.

Padawangi, R. and Douglass, M. 2015. Water, water everywhere: Toward participatory solutions to chronic urban flooding in Jakarta. *Pacific Affairs* 88(3): 517–550.

Padowski, J.C.; Carrera, L. and Jawitz, J.W. 2016. Overcoming urban water insecurity with infrastructure and institutions. *Water Resources Management* 30: 4913–4926, https://doi.org/10.1007/s11269-016-1461-0.

Pahl-wostl, C.; Palmer, M. and Richards, K. 2013. Enhancing water security for the benefits of humans and nature — the role of governance. *Current Opinion in Environmental Sustainability* 5: 676–684, https://doi.org/10.1016/j.cosust.2013.10.018.

PAL Jaya. 2016. Cakupan layanan air limbah (Wastewater service coverage). Jakarta, Indonesia.

PAL Jaya. 2018. Cakupan layanan air limbah (Wastewater service coverage). http://www.paljaya.com/jasa-layanan-kami/air-limbah-sistem-perpipaan (accessed 1 August 2018)

Palmer, M.A. 2010. Water resources: Beyond infrastructure. *Nature* 467: 534–535, https://doi.org/10.1038/467534a.

PAM Jaya. 2016. Cakupan layanan air bersih (Water service coverage).

PAM Jaya. 2018. Cakupan layanan air bersih (Water service coverage). http://pamjaya.co.id/id/service-info/service-coverage (accessed 1 August 2018)

Panggabean, V.A. 2012. Tren pertumbuhan penduduk Jakarta terus menurun (Population growth declining trend). *Merdeka*. 9 August 2012, https://www.merdeka.com/jakarta/tren-pertumbuhan-penduduk-jakarta-terus-menurun.html (accessed 1 February 2017)

Parkhurst, J. 2017. *The politics of evidence: from evidence- based policy to the good governance of evidence*. Abingdon, UK: Routledge.

Patton, M.Q. 2002. *Qualitative research & evaluation methods*. 3rd ed. London, UK: SAGE Publications.

Peet, R. and Watts, M. 1996. *Liberation ecologies: Environment, development, social movements*. London: Routledge.

Pelling, M. and Blackburn, S. (Eds). 2013. *Megacities and the coast: Risk, resilience and transformation*. London: Routledge.

Pemda Jakarta. 1991. *Jakarta 2005*. 2nd ed. Jakarta, Indonesia: Pemerintah Daerah Khusus Ibukota Jakarta.

Pemda Jakarta. 2012. Perda No 1 Year 2012 Rencana Tata Ruang Wilayah 2030 (Spatial Planning 2030)Jakarta, Indonesia, 2012, http://www.jakarta.go.id/jakv1/application/public/download/bankdata/PERDA_NOMOR_1_TAHUN_2012_TTG_RTRW_2030.pdf.

Penning-Rowsell, E.C. and Johnson, C. 2015. The ebb and flow of power: British flood risk management and the politics of scale. *Geoforum* 62: 131–142, https://doi.org/10.1016/j.geoforum.2015.03.019.

Perry, D.M. and Praskievicz, S.J. 2017. A new era of big infrastructure? (Re)developing water storage in the U.S. West in the context of climate change and environmental regulation. *Water Alternatives* 10(2): 437–454.

Peters, B.G.; Pierre, J. and King, D.S. 2005. The politics of path dependency: Political conflict in historical institutionalism. *The Journal of Politics* 67(4): 1275–1300, https://doi.org/10.1111/j.1468-2508.2005.00360.x.

Phien-wej, N.; Giao, P.H. and Nutalaya, P. 2006. Land subsidence in Bangkok, Thailand. *Engineering Geology* 82(4): 187–201, https://doi.org/10.1016/j.enggeo.2005.10.004.

Pierson, P. 1996. The path to european integration: A historical institutionalist analysis. *Comparative Political Studies* 29(2): 123–163.

Pierson, P. 2000. Not just what, but when: Timing and sequence in political processes. *Studies in American Political Development* 14(1): 72–92, https://doi.org/10.1017/S0898588X00003011.

Pierson, P. 2003. Big, slow-moving, and ... invisible. In Mahoney, J. and Rueschemeyer, D. (Eds), Comparative historical analysis in the social sciences, pp. 177–207. New York, USA: Cambridge University Press.

Pierson, P. 2016. Power in historical institutionalism. In Fioretos, O.; Falleti, T.G. and Sheingate, A. (Eds), *The Oxford handbook of historical institutionalism*, pp. 125–147. Oxford, UK: Oxford University Press, https://doi.org/10.1093/oxfordhb/9780199662814.013.7.

Pierson, P. and Skocpol, T. 2002. Historical institutionalism in cntemporary political science. In Katznelson, I. and Milner, H. V. (Eds), Political science: The state of the discipline, pp. 693–721. New York, USA: W. W. Worton.

Pilkington, E. 2008. How to save the world. *The Guardian*. 5 April 2008, https://www.theguardian.com/theguardian/2008/apr/05/climatechange.usa.

Pitoko, R.A. 2016. Kajian Bappenas keluar, tanggul raksasa 4,5 kilometer tetap dibangun (The Bappenas review, the 4.5 kilometer giant seawall will still be built). *Kompas*. 15 November 2016, http://properti.kompas.com/read/2016/11/15/183000021/kajian.bappenas.keluar.tanggul.raksasa.4.5.kilometer.tetap.dibangun.

Polanyi, K. 1944. *The great transformation*. Boston: Beacon Press.

Popescu, G. 2011. *Bordering and ordering the twenty-first century*. New York, USA: Rowman and Littlefield.

Porter, J. and Demeritt, D. 2012. Flood-risk management, mapping, and planning: The institutional politics of decision support in England. *Environment and Planning A* 44: 2359–2378, https://doi.org/10.1068/a44660.

Postel, S. and Richter, B. 2003. *Rivers for life: Managing water for people and nature*. Washington D.C., USA: Island Press.

Pratiwo and Nas, P.J.M. 2005. Jakarta: Conflicting directions. In Nas, P.J.M. (Ed), Directors of Urban Change in Asia, pp. 68–82. London and New York: Routledge.

PresidenRI. 2016. Mewujudkan pembangunan Indonesia-sentris (Realising an Indonesia-centric Development). http://presidenri.go.id/pembangunan-infrastruktur-2/mewujudkan-pembangunan-indonesia-sentris.html (accessed 25 July 2017)

Protess, D. and McCombs, M.E. 1991. *Agenda setting: Readings on media, public opinion, and policymaking*. Hillsdale, N.J.: Erlbaum.

PU. 2011. ATLAS: Jakarta coastal defence. September. Jakarta, http://en.ncicd.com/ncicd/downloads/.

PU. 2016. Normalisasi Kali Ciliwung Sudah Capai 47 Persen Rampung Akhir 2016. http://pu.go.id/main/view_pdf/10820 (accessed 1 February 2017)

Putri, P.W. 2014. *Black water - Grey settlements. Domestic wastewater management and the socio-ecological dynamics of Jakarta's kampungs*. KU Leuven; Leuven, Belgium.

Putri, P.W. and Rahmanti, A.S. 2010. Jakarta waterscape : From structuring water to 21st century hybridnNature ? *Nakhara* 6: 59–74.

Rappert, B. 2007. *Technology and security: Governing threats in the new millennium*. Basingstoke: Palgrave Macmillan.

REACH. 2018. REACH: Improving water security for the poor. *University of Oxford*. https://reachwater.org.uk/ (accessed 1 August 2018)

Resink, G.J. 1968. *Indonesia's history between the myths: Essays in legal history and historical theory*. The Hague: W. van Houve Publisher.

Richards, D. and Smith, M.J. 1997. How departments change: Windows of opportunity and critical junctures in three departments. *Public Policy and Administration* 12(2): 62–79, https://doi.org/10.1177/095207679701200206.

Richardson, J. 2000. Government, interest groups and policy change. *Political Studies* 48: 1006–1025.

Rijke, J.; Herk, S. Van; Zevenbergen, C. and Ashley, R. 2012. Room for the River: Delivering integrated river basin management in the Netherlands. *International Journal of River Basin Management* 10(4): 369–382, https://doi.org/10.1080/15715124.2012.739173.

Rinawati; Koike, T.; Koike, H.; Kurumisawa, R.; Ito, M.; Sakurai, S.; Togo, A.; Saha, M.; Arifin, Z. and Takada, H. 2012. Distribution, source identification, and historical trends of organic micropollutants in coastal sediment in Jakarta Bay, Indonesia. *Journal of hazardous materials* 217–218: 208–16, https://doi.org/10.1016/j.jhazmat.2012.03.023

Rismianto, D. and Mak, W. 1993. Environmental aspects of groundwater extraction in DKI Jakarta: Changing views. In *The 22nd annual convention of the Indonesian association of geologists*, pp. 327–345. Bandung, Indonesia.

Robertson, D.B. 1991. Political conflict and lesson-drawing author. *Journal of Public Policy* 11(1): 55–78.

Roe, P. 2004. Securitization and minority rights: Conditions of desecuritization. *Security Dialogue* 35(3): 279–294, https://doi.org/10.1177/0967010604047527.

Roe, P. 2012. Is securitization a 'negative' concept? Revisiting the normative debate over normal versus extraordinary politics. *Security Dialogue* 43(4): 249–266, https://doi.org/10.1177/0967010612443723.

Romero-lankao, P. and Gnatz, D.M. 2016. Conceptualizing urban water security in an urbanizing world. *Current Opinion in Environmental Sustainability* 21: 45–51, https://doi.org/10.1016/j.cosust.2016.11.002.

Rosenthal, U. 1998. Future disasters, future definitions. In Quarantelli, E.L. (Ed), What is a Disaster? Perspectives on the Question, pp. 146–60. London, UK: Routledge.

Rudi, A. 2015. Ketika daerah resapan air dijadikan perumahan elite... (When water catchment areas become elite housing ...). *Kompas*. 12 February 2015, http://megapolitan.kompas.com/read/2015/02/12/08521131/Ketika.Daerah.Resapan.Air.Dijadikan.Perumahan.Elite..

Ruggeri, A. 2017. The ambitious plan to stop the ground from sinking. *BBC News*. 1 December 2017, http://www.bbc.com/future/story/20171130-the-ambitious-plan-to-stop-the-ground-from-sinking.

Sabatier, P.A. (Ed). 1999. *Theories of the policy process*. Boulder, CO: Westview Press.

Sabatier, P.A. and Jenkins-Smith, H. 1999. The advocacy coalition framework: An assessment. In Sabatier, P. (Ed), Theories of the Policy Process, pp. 117–166. Boulder, CO: Westview Press.

Sabatier, P.A. and Jenkins-Smith, H.C. 1993. *Policy change and learning: An advocacy coalition approach*. Boulder, CO: Westview Press.

Sachs, J.D.; Mellinger, A.D. and Gallup, J.L. 2001. The geography of poverty and wealth. *Scientific American*, www.sciam.com.

Sadoff, C.W.; Hall, J.W.; Grey, D.; Aerts, J.C.J.H.; Ait-Kadi, M.; Brown, C.; Cox, A.; Dadson, S.; Garrick, D.; Kelman, J.; McCornick, P.; Ringler, C.; Rosegrant, M.; Whittington, D. and Wilberg, D. 2015. *Securing water, sustaining growth: Report of the GWP/ OECD Task Force on Water Security and Sustainable Growth*. Oxford.

Sawarendro. 2015. Sawarendro: Reklamasi adalah misi (Sawarendro: Reclamation is a mision). *National Geographic Indonesia*. 10 December 2015, http://nationalgeographic.co.id/opini/2015/12/reklamasi-adalah-misi.

Schatzki, T.. R. 1996. *Social practices: A Wittgensteinian approach to human activity and the social*. Cambridge, UK: Cambridge University Press.

Schepers, J. 1926. De Primaire Kringen Ia En II, Benevens Het Stadsnet Van Batavia En Weltevreden. De Nauwkeurrig- heidswaterpassing Van Java. *Topografische Dienst In Neder- lansch-Indie. Weltevreden Reproductiebedrijf Top.Dienst* 1.

Schlager, E. 1999. A comparison of frameworks, theories and models of policy processes. In Sabatier, P.A. (Ed), Theories of the policy process, pp. 233–260. Boulder, CO: Westview Press.

Schlager, E. and Blomquist, W. 1996. A comparison of three emerging theories of the policy process. *Polit. Res. Quart* 49: 651–672..

Schön, D.A. and Rein, M. 1994. *Frame reflection: Towards the resolution of intractable policy controversies*. New York, USA: Basic Books.

Scott, C.A.; Albrecht, T.R.; de Grenade, R.; Zuniga-Teran, A.; Varady, R.G. and Thapa, B. 2018. Water security and the pursuit of food, energy, and earth systems resilience. *Water International* 43(8): 1055–1074, https://doi.org/10.1080/02508060.2018.1534564.

Scott, R.W. 1995. *Institutions and Organisations*. Thousand Oaks: SAGE Publications.

Sedlar, F. 2016. Inundated infrastructure: Jakarta's failing hydraulic infrastructure. *Michigan Journal of Sustainability* 4: 33–45, https://doi.org/http://dx.doi.org/10.3998/mjs.12333712.0004.004.

Sehring, J. 2009. Path dependencies and institutional bricolage in Post-Soviet water governance. *Water Alternatives* 2(1): 61–81.

Selby, J. 2003. *Water, power and politics in the Middle East: The other Palestinian-Israeli conflict*. London: I.B. Tauris.

Sethuraman, S. V. 1976. *Jakarta; Urban development and employment*. Geneva, Switzerland: International Labour Office.

Seto, K.C. 2011. Exploring the dynamics of migration to mega-delta cities in Asia and Africa: Contemporary drivers and future scenarios. *Global Environmental Change* 21: S94–S107, https://doi.org/10.1016/j.gloenvcha.2011.08.005.

Shaluf, M.I.; Ahmadun, F. and Said, A.M. 2003. A review of disaster and crisis. *Disaster Prevention and Management* 12(1): 24.

Shatkin, G. 2019. Futures of crisis, futures of urban political theory: Flooding in Asian coastal megacities. *International Journal of Urban and Regional Research* 208–226, https://doi.org/10.1111/1468-2427.12758.

Sherwell, P. 2016. $40bn to save Jakarta: The story of the Great Garuda. *The Guardian*. 22 November 2016, https://www.theguardian.com/cities/2016/nov/22/jakarta-great-garuda-seawall-sinking.

Shore, C. and Wright, S. 2011. Conceptualising policy: Technologies of governance and the politics of visibility. In Shore, C.; Wright, S. and Pero, D. (Eds), Policy Worlds: Anthropology and the Analysis of Contemporary Power, New York, USA: Berghahn Books.

Shuval, H.I. 1992. Approaches to resolving the water conflicts between Israel and her Neighbors — a regional water-for-peace plan. *Water International* 17(3): 133–143, https://doi.org/10.1080/02508069208686133.

Sidarta, M. 1996. Jakarta waterfront city development. *Journal Perencanaan Wilayah dan Kota* 21: 38–45.

Silver, C. 2008. *Planning the megacity: Jakarta in the twentieth century*. London and New York: Routledge.

Silver, C. 2014. Spatial planning for sustainable development: An action planning approach for Jakarta. *Jurnal Perencanaan Wilayah dan Kota* 25(2): 115–125.

Silverman, D. 2013. *Doing qualitative research*. London, UK: SAGE Publications.

Simanjuntak, I.; Frantzeskaki, N.; Enserink, B. and Ravesteijn, W. 2012. Evaluating Jakarta's flood defence governance: The impact of political and institutional reforms. *Water Policy* 14(4): 561, https://doi.org/10.2166/wp.2012.119

Sismondo, S. 2007. Science and technology studies and an engaged program. In Hackett, E.J. (Ed), The Handbook of Science and Technology Studies, pp. 13–32. Cambridge, MA: MIT Press.

Sjöstedt, R. 2010. Health issues and securitization HIV/AIDS as a US National Security threat. In Balzacq, T. (Ed), Securitization theory: How security problems emerge and dissolve, pp. 150–169. London: Routledge.

Slater, D. and Simmons, E. 2010. Informative regress: Critical antecedents in comparative

olitics. *Comparative Political Studies* 43(7): 886–917, https://doi.org/10.1177/0010414010361343.

Soekardi, P.; Djaeni, A.; Soefner, H.; Hobler, M. and Schmidt, G. 1986. Geological aspect of the aquifer system and the groundwater situation of the Jakarta Artesian Basin. In *Seminar on geological mapping in the urban development, economic and social commission for Asia and the Pacific*, Bangkok, Thailand.

Staddon, C. and James, N. 2014. Water security: Genealogy of a new paradigm for water management? In Schneier-Madanes, G. (Ed), *Globalised Water: A Question of Governance*, pp. 261–276. Dordrecht: Springer, https://doi.org/10.1007/978-94-007-7323-3.

Star, S.L. 1999. The ethnography of infrastructure. *American Behavioral Scientist* 43(3): 377–391.

Steinmo, S. 2008. What is historical institutionalism? In Porta, D. Della and Keating, M. (Eds), Approaches in the social sciences, pp. 150--178. Cambridge, UK: Cambridge University Press.

Steinmo, S.; Thelen, K. and Longstreth, F. (Eds). 1992. *Structuring Politics: Historical Institutionalism in Comparative Analysis*. New York, USA: Cambridge University Press.

Stetter, S.; Herschinger, E.; Teichler, T. and Albert, M. 2011. Conflicts about water: Securitizations in a global context. *Cooperation and conflict* 46(4): 441–459, https://doi.org/10.1177/0010836711422462.

Steward, J.H. 1955. *Theory of cultural change*. Urbana, IL: University of Illinois.

Stinchcombe, A.L. 1968. *Constructing social theories*. New York, USA: Harcourt, Brace and World.

Stinchcombe, A.L. 1997. On the virtues of the old institutionalism. *Annual Review of Sociology* 23(1): 1–18, https://doi.org/10.1146/annurev.soc.23.1.1.

Stone, D. 2001. *Policy paradox: The art of political decision making*. 2nd ed. New York, USA: W.W. Norton & Company.

Strang, V. 2014. *Fluid consistencies. Material relationality in human engagements with water*. Archaeological Dialogues21 2, https://doi.org/10.1017/S1380203814000130.

Strang, V. 2016. Infrastructural relations: Water, political power and the rise of a new "despotic regime." *Water Alternatives* 9(2): 292–318.

Streeck, W. and Thelen, K. 2005. Introduction: Institutional change in advanced political economies. In Streeck, W. and Thelen, K. (Eds), Beyond continuity. Institutional change in advanced political economies, pp. 1–39. Oxford, UK: Oxford University Press.

Streitmatter, R. 1997. *Mightier than the Sword: How the News Media Have Shaped American History*. Boulder, CO: Westview Press.

Stuart, J. and Barnes, J. 2005. Conducting ethical researchp. 33. NESS (National Evaluation of

Sure Start), 2005, http://www.ness.bbk.ac.uk/support/GuidanceReports/documents/165.pdf.

Suh, S.W.; Lee, H.W. and Kim, H.J. 2011. Hydrodynamic and water quality changes due to Saemangeum project in Korea. In *The Sixth International Conference on Asian and Pacific Coasts (APAC 2011)*, pp. 1–8. Hong Kong: APAC.

Suhardiman, D. and Mollinga, P.P. 2017. Institutionalised corruption in Indonesian irrigation : An analysis of the upeti system. *Development Policy Review* 35: 140–159, http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1467-7679/issues.

Suharto, P. 1971. Precise leveling in Indonesia. Institute of Technology Bandung.

Sultana, F. 2016. Reflexivity. In Richardson, D.; Castree, N.; Goodchild, M.F.; Kobayashi, A.; Liu, W. and Marston, R.A. (Eds), *The International Encyclopedia of Geography*, pp. 462–463. John Wiley & Sons, https://doi.org/10.1016/B0-08-044854-2/00385-0.

Sutherland, C. 2005. Nation-building through discourse theory. *Nations and Nationalism* 11(2): 185–202.

Sutherland, H. 1979. *The making of a bureaucratic elite: The colonial transformation of the Javanese priyayi*. Singapore: Published for the Asian Studies Association of Australia by Heinemann Educational Books (Asia).

Sutiyoso. 2007. *Megapolitan*. Jakarta, Indonesia: Elex Media Computindo.

Suwandana, E.; Kawamura, K.; Tanaka, K.; Sakuno, Y. and Raharjo, P. 2011. Escherichia Coli and biophysicochemical relationships of seawater and Water Pollution Index in the Jakarta Bay. *American Journal of Environmental Sciences* 7(3): 183–194.

Swyngedouw, E. 1999. Modernity and hybridity: Nature, regeneracionismo, and the production of the Spanish waterscape, 1890-1930. *Annals of the Association of American Geographers* 89(3): 443–465, http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Modernity+and+Hybridity:+Nature,#3.

Swyngedouw, E. 2009. The political economy and political ecology of the hydro-social cycle. *Journal of Contemporary Water Research & Education* (142): 56–60.

Swyngedouw, E. 2015. *Liquid power: Contested hydro-modernities in twentieth-century Spain, 1898-2010*. Cambridge, MA; London: The MIT Press.

Swyngedouw, E. and Heynen, N.C. 2003. Urban political ecology, justice and the politics of scale. *Antipode* 898–918.

Syailendra. 2014. Jokowi rembuk banjir di Katulampa, ini hasilnya (Jokowi discussed flood in Katulampa, this is the result). *Tempo*. 20 January 2014, https://m.tempo.co/read/news/2014/01/20/083546656/jokowi-rembuk-banjir-di-katulampa-ini-hasilnya (accessed 1 February 2017)

Syarizka, D. 2017. Bappenas: Pemerintah belum putuskan pembangunan tanggul laut raksasa

(Bappenas: Government has not yet Decided on the Construction of Giant Sea Wall). *Bisnis*. 11 January 2017, http://industri.bisnis.com/read/20170111/45/618323/bappenas-pemerintah-belum-putuskan-pembangunan-tanggul-laut-raksasa.

Tambunan, R. 1996. Master Plan 65-85 (Master Plan 1965-1985). *Media Jaya* 19(4): 48–57.

The World Bank. 2008. Project Information Document (PID) Concept Stage - Jakarta Urgent Flood Mitigation Project. Jakarta, Indonesia, http://documents.worldbank.org/curated/en/911741468040156450/pdf/PID0JEDI1concept0stage.pdf.

The World Bank. 2015. Jakarta Urgent Flood Mitigation Project, http://projects.worldbank.org/P111034/jakarta-urgent-flood-mitigation-project?lang=en.

Thelen, K. 1999. Historical institutionalism in comparative politics. *Annual Review of Political Science* 2: 369–404.

Thelen, K. and Conran, J. 2016. Institutional change. In Fioretos, O.; Falleti, T.G. and Sheingate, A. (Eds), *The Oxford handbook of historical institutionalism*, pp. 51–70. Oxford, UK: Oxford University Press, https://doi.org/10.1093/oxfordhb/9780199662814.013.3.

Thelen, K. and Steinmo, S. 1992. Historical institutionalism in comparative politics. In Steinmo, S.; Thelen, K. and Longstreth, F. (Eds), Structuring Politics: Historical Institutionalism in Comparative Analysis, pp. 1–32. New York, USA: Cambridge University Press.

Tierney, K.; Bevc, C. and Kuligowski, E. 2006. Metaphors matter: Disaster myths, media frames, and their consequences in Hurricane Katrina. *The Annals of the American Academy* (March): 57–81, https://doi.org/10.1177/0002716205285589.

Tinju Tinja. 2018. Learn the impact of open defecation in Indonesia. http://www.tinjutinja.com/pelajari-dampak-babs-di-indonesia-provinsi/dki-jakarta (accessed 1 August 2018)

Trombetta, M.J. 2011. Rethinking the securitization of the environment: old beliefs, new insights. In Balzacq, T. (Ed), Securitization Theory: How security problems emerge and dissolve, pp. 135–149. Abingdon, Oxon: Routledge.

Trottier, J. 2007. A wall, water and power: The Israeli "separation fence." *Review of International Studies* 33(1): 105–127.

True, J.L.; Jones, B.D. and Baumgartner, F.R. 1999. Punctuated-Equilibrium Theory: Explaining Stability and Change in Public Policymaking. In Sabatier, P.A. (Ed), Theories of the Policy Process, pp. 155–187. Boulder, CO: Westview Press.

Trust. 2008. Cyclone Sidr. http://www.trust.org/spotlight/cyclone-sidr/ (accessed 1 May 2015)

Turton, A. 2001. Towards hydrosolidarity: Moving from resource capture to cooperation and alliances2001.

Tyas, H.H. 2016. Proyek pembangunan NCICD Indonesia-Belanda (NCICD Construction Project Indonesia-the Netherlands). *Semarak News*. 24 November 2016, https://semarak.news/2016/11/24/10865-proyek-pembangunan-ncicd-indonesia-belanda.html.

UN Habitat. 2016. *Urbanization and development: Emerging futures*. Nairobi, Kenya, https://unhabitat.org/wp-content/uploads/2014/03/WCR- Full-Report-2016.pdf.

UN Water. 2013. What is water security? Infographic. *UN Water*. http://www.unwater.org/publications/water-security-infographic/ (accessed 1 October 2017)

United Nations. 2018. *World Urbanization Prospects: The 2018 Revision, Key Facts*, https://doi.org/(ST/ESA/SER.A/366).

United Nations Development Program (UNDP). 1994. *Human development report*. New York: Oxford University Press.

Valkenburg, S. van. 1936. Agricultural regions of Asia. Part IX--Java Author. *Economic Geography* 12(1): 27–44, http://www.jstor.org/stable/140261.

Varady, R.G.; Zuniga-Teran, A.A.; Garfin, G.M.; Martín, F. and Vicuña, S. 2016. Adaptive management and water security in a global context: Definitions, concepts, and examples. *Current Opinion in Environmental Sustainability* 21: 70–77, https://doi.org/10.1016/j.cosust.2016.11.001.

Viva News. 2016. PAM Jaya restrukturisasi kontrak dengan operator (PAM Jaya restructures contract with the operators). 2016, http://bisnis.news.viva.co.id/news/read/799563-pam-jaya-restrukturisasi-kontrak-dengan-operator.

Vlekke, B.H.M. 1943. *Nusantara: A history of the East Indian archipelago*. Cambridge, Massachusetts, USA: Harvard University Press.

van Voorst, R. 2016. Formal and informal flood governance in Jakarta, Indonesia. *Habitat International* 52: 5–10, https://doi.org/10.1016/j.habitatint.2015.08.023.

Vörösmarty, C.J.; McIntyre, P.B.; Gessner, M.O.; Dudgeon, D.; Prusevich, A.; Green, P.; Glidden, S.; Bunn, S.E.; Sullivan, C. a; Liermann, C.R. and Davies, P.M. 2010. Global threats to human water security and river biodiversity. *Nature* 467(7315): 555–561, https://doi.org/10.1038/nature09549.

De Vries, M.S. 2004. Framing crises: Response patterns to explosions in fireworks factories. *Administration & Society* 36(5): 594–614, https://doi.org/10.1177/0095399704268622.

Wæver, O. 1995. Securitization and desecuritization. In Lipschutz, R.D. (Ed), On Security, New York: Columbia University Press.

Wagner-Pacifici, R. 1994. *Discourse and destruction: The city of Philadelphia versus MOVE*. Chicago, USA: University of Chicago Press.

Walton, S. and Boon, B. 2014. Engaging with a Laclau & Mouffe informed discourse analysis:

A proposed framework. *Qualitative Research in Organizations and Management: An International Journal* 9(4): 351–370, https://doi.org/10.1108/QROM-10-2012-1106.

Wang, Z.; Wang, Z. and de Vriend, H.J. 2008. Impact of water diversion on the morphological development of the Lower Yellow River. *International Journal of Sediment Research* 23(1): 13–27, https://doi.org/10.1016/S1001-6279(08)60002-5

Wardi, R. 2017. Anies-Sandi akan hentikan proyek reklamasi (Anies-Sandi will stop the reclamation project). *Berita Satu*. 12 April 2017, http://www.beritasatu.com/aktualitas/424876-aniessandi-akan-hentikan-proyek-reklamasi.html.

Warner, J.F. 2008. The politics of flood insecurity: Framing contested river management projects. Wageningen Universiteit.

Warner, J.F.; Hoogesteger, J. and Hidalgo, J.P. 2017. Old wine in new bottles: The adaptive capacity of the hydraulic mission in Ecuador. *Water Alternatives* 10(2): 322–340.

Weldes, J.; Laffey, M.; Gusterson, H. and Duvall, R. 1999. Introduction: Constructing insecurity. In Cultures of insecurity: States, communities, and the production of danger, Minneapolis: University of Minnesota Press.

Werners, S.E.; Matczak, P. and Flachner, Z. 2010. Individuals matter: Exploring strategies of individuals to change the water policy for the Tisza River in Hungary. *Ecology and Society* 15(2): 24.

Whatmore, S.J. 2003. Generating materials. In Pryke, M.; Rose, G. and Whatmore, S. (Eds), Using social theory: Thinking through research, pp. 89–104. London, UK: SAGE Publications.

White, G.F. 1974. *Natural hazards: Local, national, global*. Oxford: Oxford Unversity Press.

Wilkinson, C. 2007. The Copenhagen School on tour in Kyrgyzstan: Is securitization theory useable outside Europe? *Security Dialogue* 38(1): 5–25, https://doi.org/10.1177/0967010607075964.

Williams, M.C. 2011. The continuing evolution of securitization theory. In Balzacq, T. (Ed), Securitization Theory: How security problems emerge and dissolve, pp. 212–222. Abingdon, Oxon: Routledge.

Williams, T.M.; Rees, J.G. and Setiapermana, D. 2000. Metals and trace organic compounds in sediments and waters of Jakarta Bay and the Pulau Seribu Complex , Indonesia. *Marine Pollution Bulletin* 40(3): 277–285.

Winner, L. 1980. Do artifacts have politics? *American Academy of Arts & Sciences* 121–136, http://www.jstor.org/stable/20024652.

Wolcott, H.F. 2009. *Writing up qualitative research*. Thousand Oaks: SAGE Publications.

World Bank. 2018. World urbanization prospects 2018. https://population.un.org/wup/ (accessed 10 October 2018)

World Bank Group. 2017. Improving service levels and impact on the poor: A diagnostic of water supply, sanitation, hygiene and poverty in Indonesia. Washington D.C..

Wutich, A. and Ragsdale, K. 2008. Water insecurity and emotional distress: Coping with supply, access, and seasonal variability of water in a Bolivian squatter settlement. *Social Science and Medicine* 67(12): 2116–2125, https://doi.org/10.1016/j.socscimed.2008.09.042.

Yang, S. and Ferguson, S. 2010. Coastal reservoirs can harness stormwater. *Water Engineering Australia* 8: 25–27.

Yin, R.K. 2014. *Case study research: Design and methods*. 5th ed. California, USA: SAGE Publications.

Young, S.L.; Collins, S.M.; Boateng, G.O.; Neilands, T.B.; Jamaluddine, Z.; Miller, J.D.; Brewis, A.; Frongillo, E.A.; Jepson, W.E.; Melgar-quiñonez, H. and Schuster, R.C. 2018. Development and validation protocol for an instrument to measure household water insecurity across cultures and ecologies: the Household Water InSecurity Experiences (HWISE) Scale. *BMJ Open*, https://doi.org/10.1136/bmjopen-2018-023558.

Zeitoun, M. 2011. The global web of national water security. *Global Policy* 2(3): 286–296, https://doi.org/10.1111/j.1758-5899.2011.00097.x.

Zeitoun, M.; Lankford, B.; Bakker, K. and Conway, D. 2013. Introduction: A battle of ideas for water security. In Lankford, B.; Bakker, K.; Zeitoun, M. and Conway, D. (Eds), Water Security: Principles, Perspectives and Practices, Abingdon, UK: Routledge.

Zeitoun, M.; Lankford, B.; Krueger, T.; Forsyth, T.; Carter, R.; Hoekstra, A.Y.; Taylor, R.; Varis, O.; Cleaver, F.; Boelens, R.; Swatuk, L.; Tickner, D.; Scott, C.A.; Mirumachi, N. and Matthews, N. 2016. Reductionist and integrative research approaches to complex water security policy challenges. *Global Environmental Change* 39: 143–154, https://doi.org/10.1016/j.gloenvcha.2016.04.010.

Zikos, D.; Sorman, A.H. and Lau, M. 2015. Beyond water security: Asecuritisation and identity. *International Environmental Agreements: Politics, Law and Economics* 15: 309–326, https://doi.org/10.1007/s10784-015-9280-y.

Appendices

Appendix 1: Co-authorship statement

Following a four-paper route, I collaborated with my supervisor, Dr. Katrina Charles, in writing the first two journal papers (Chapter 4 and 5), whilst the last paper (Chapter 6) is authored by myself.

I, Thanti Octavianti, conceptualised the idea in each journal paper, collected and analysed the data and wrote each manuscript. Dr. Katrina Charles provided critical feedback that helped shape the analysis and presentation of the manuscript.



Statement from Dr. Katrina Charles:

I confirm that the above details are correct to the best of my knowledge and that the leading role of Thanti Octavianti in each of these papers is beyond dispute.



Appendix 2: Detail of key informants (experts and ordinary people)

Notes:

- The list is organised in chronological order
- Most of the interviews were conducted face-to-face. If not, 'phone' under the 'location' column is used to denote this format
- Language (L) : E (English); I (Bahasa Indonesia)
- Media recording (M) : D (Digital), Nt (Note taking)

No	Code		Affiliation	Position	Interview		
					Date	Location	L/M
1	KI001	Individual expert	The Jakarta History of Museum	Historian	12-May-16	Jakarta	I/D
2	AC001	Academic	Universitas Indonesia	Lecturer	13-May-16	Jakarta	I/D
3	AC002	Academic	Universitas Indonesia	Historian	22-May-16	Jakarta	I/D
4	KI002	Individual expert	Urban and Regional Development (URDI)	Executive director	26-May-16	Jakarta	I/D
5	NG001	NGO	Ciliwung Institute	Activist	03-Jun-16	Jakarta	I/D
6	NG002	NGO	Ciliwung Institute	Activist	03-Jun-16	Jakarta	I/D
7	NG003	NGO	Yayasan Pranata Air	Activist	13-Jun-16	Jakarta	I/D
8	LG001	Local Government	Jakarta Provincial Government	Deputy Governor	18-Aug-16	Jakarta	I/D
9	CG001	Central Government	Ministry of Public Works and Housing	Minister's staff	18-Aug-16	Jakarta	I/D
10	LG002	Local Government	Water Management Agency	Director	22-Aug-16	Jakarta	I/Nt
11	LG003	Local Government	Regulatory Body (water supply)	Staff	23-Aug-16	Jakarta	I/D
12	NG004	NGO	Anexact	Researcher	25-Aug-16	Jakarta	I/D

13	KI003	Individual expert	World Bank, Jakarta office	Researcher	25-Aug-16	Jakarta	E/D
14	AC003	Academic	Universitas Indonesia	Lecturer	26-Aug-16	Depok, Indonesia	I/D
15	NG005	NGO	Rujak Centre	Activist	26-Aug-16	Jakarta	I/D
16	CG002	Central Government	Ministry of Environment and Forestry	Director	29-Aug-16	Jakarta	I/D
17	AC004	Academic	Universitas Trisakti	Lecturer	30-Aug-16	Jakarta	I/D
18	NG006	NGO	Ciliwung Merdeka	Activist	31-Aug-16	Jakarta	I/D
19	AC005	Academic	Universitas Tarumanegara	Lecturer	31-Aug-16	Jakarta	I/D
20	KI004	Individual expert	World Bank, Jakarta office	Researcher	05-Sep-16	Jakarta	E/D
21	CG003	Central Government	Ministry of Environment and Forestry	Director	05-Sep-16	Jakarta	I/D
22	CG004	Central Government	Ministry of Public Works and Housing	Director	07-Sep-16	Jakarta	I/D
23	CG005	Central Government	Ministry of Environment and Forestry	Director	07-Sep-16	Jakarta	I/D
24	LG004	Local Government	Jakarta Provincial Government	Director	15-Sep-16	Jakarta	I/D
25	LG005	Local Government	PAM Jaya (water supply)	Director	16-Sep-16	Jakarta	I/D
26	AC006	Academic	Universitas Trisakti	Lecturer	16-Sep-16	Jakarta	I/D
27	LG006	Government	Jakarta Provincial Government	Director	16-Sep-16	Jakarta	I/D
28	KI005	Consultant	Deltares	Team Leader	22-Sep-16	Jakarta	E/D
29	NG007	NGO	Rujak Centre	Activist	23-Sep-16	Jakarta	I/D
30	AC007	Academic	Institut Teknologi Bandung	Lecturer	26-Sep-16	Bandung, Indonesia	I/D
31	AC008	Academic	Institut Teknologi Bandung	Lecturer	27-Sep-16	Bandung	I/D
32	AC009	Academic	Institut Teknologi Bandung	Lecturer	27-Sep-16	Bandung	I/D

33	KI006	Consultant	Witteven Bos	Individual expert	29-Sep-16	Bandung	I/D
34	AC010	Academic	Institut Teknologi Bandung	Lecturer	30-Sep-16	Bandung	I/D
35	LG007	Local Government	PAL JAYA (wastewater)	Director	04-Oct-16	Jakarta	I/D
36	KI007	Industry	PALYJA (water supply)	Corporate communication	04-Oct-16	Jakarta	I/D
37	CG006	Central Government	Ministry of Public Works and Housing	Director	06-Oct-16	Jakarta	I/D
38	LG008	Local Government	Bogor City Government	Mayor	26-Oct-16	Oxford	I/D
39	KI008	Political economist	A consulting firm	Analyst	12-May-17	Oxford	I/D
40	CG007	Central Government	BPDAS Ciliwung - Citarum	Director	05-Jul-17	Bogor, Indonesia	I/D
41	KI009	Industry	Aetra (water supply)	Corporate communication	07-Jul-17	Jakarta	I/D
42	CG008	Central Government	BBWS Ciliwung - Cisadane	Staff	10-Jul-17	Phone	I/D
43	NG008	NGO	Rujak Centre	Activist	16-Aug-17	Oxford	I/D
44	AC011	Academic	Singapore University of Social Science (SUSS)	Lecturer	17-Aug-17	Oxford	I/D
45	AC012	Academic	Institut Teknologi Bandung	Lecturer	31-Aug-17	Oxford	I/D
46	NG009	NGO	Urban Poor Consortium (UPC)	Activist	24-Feb-18	Phone	I/D
47	NG010	NGO	International NGO Forum on Indonesian Development (INFID)	Director	24-Feb-18	Phone	I/D
48	KI010	Political economist	A consulting firm	Analyst	24-Feb-18	Phone	I/D

All interviews with ordinary people (mostly senior citizens) were held in Jakarta and conducted face-to-face in Bahasa Indonesia. Although insights from the interviews were not formally incorporated in the thesis, they have significantly informed my thinking throughout the research process.

No	Code	Age (at interview)	Home location	Occupation	Date of interview
1	OP1	65	Muara Baru, North Jakarta	Retiree	12-May-2016
2	OP2	63	Luar Batang, North Jakarta	Entrepreneur	16-May-2016
3	OP3	66	Halim, East Jakarta	Shop retailer	17-July-2016
4	OP4	68	Jatinegara, East Jakarta	Retiree	4-Aug-2016
5	OP5	59	Condet, East Jakarta	Retiree	4-Aug-2016
6	OP6	60	Mampang, South Jakarta	Shop retailer	4-Aug-2016
7	OP7	57	Pal Batu, South Jakarta	Employee	5-Aug-2016
8	OP8	59	Pengadegan, South Jakarta	Shop retailer	5-Aug-2016
9	OP9	65	Kembangan, West Jakarta	Street food vendor	8-Aug-2016
10	OP10	63	Meruya, West Jakarta	Informal parking attendant	8-Aug-2016
11	OP11	61	Matraman, East Jakarta	Retiree	10-Aug-2016
12	OP12	55	Karet, Central Jakarta	Housewife	11-Aug-2016
13	OP13	62	Duren Sawit, East Jakarta	Housewife	11-Aug-2016
14	OP14	55	Kalibata, South Jakarta	Teacher	12-Aug-2016
15	OP15	65	Cengkareng, West Jakarta	Retiree	18-Aug-2016
16	OP16	62	Halim, East Jakarta	Retiree	20-Aug-2016
17	OP17	68	Menteng, Central Jakarta	Retiree	24-Aug-2016

Appendix 3: Interview guide

This document provides general guides to interviews for experts and ordinary people. Following a semi-structure format of interview, the questions were tailored to the expertise and concern of the experts and ordinary people, respectively.

For experts

Name of interviewee	Date	Time	Reference code	Recorded?
				Y/N

Section: Introduction	Timing: less than 5 minutes	
		Done
Welcome and thank you	Personal introduction to the interviewee, and thank him/her for participating in the survey	
Recording	Confirm that the interviewee is happy that the conversation is being recorded[30]. Ask if they would like a copy of the transcript after it is produced (could be about a week to 10 days). Ask if they approve of their name or job title added to quotations	
Introduction to the project	Summary of information from Participant Information Sheet (e.g. background and aims of the study, overview of interview process, publication of data)	
Context	Participatory pathway to reconstruct past water-related timeline in Jakarta from colonial era to present, thus information from participants is essential in creating this pathway	
Their details	Ask the interviewee's details	

Topic	Sought outcomes	Example prompt questions	Prompt examples	Done
Introduction and drivers Timing: 15 minutes	To establish the expert's opinion of the most pressing water issue in Jakarta	In your opinion, what is the most pressing water issue in Jakarta?	e.g. flooding, water for the poor, poor sanitation, poor river water quality, new development	
		How about in policymakers' view?		
	To establish the expert's opinion of how investment priority changed	What is government approach to solve the problem? Has it changed over time?	e.g. government is constructing more canals to alleviate flooding	

[30] If the interviewee does not wish to be recorded, it will be necessary to take notes of the conversation. This inevitably will slow the discussion and probably reduce the amount of information that can be collected. Explain to the interviewee that there may be gaps in the conversation while I make notes.

	over time to improve water security in Jakarta			
		When was more investment available for the poor?	In terms of drinking water, sanitation, flooding	
	To establish the expert's opinion of investment pattern for future water-related pathway	What issue would you prioritise to improve water security in Jakarta? Is it investment in infrastructure, institution, or in information?	e.g. infrastructure = creating more canals; institution = giving more authority to particular institution; information = provide data access for the public	
Water supply and urban development Timing: 15 minutes	To establish the expert's opinion of the urban development factors affecting water security	When did population and economic grow (including industry spill over in surrounding cities) affect Jakarta's water security?	Elaborate: Do you think water availability is a key factor investment in Jakarta?	
		How has the policy changed to regulate urban development (economic activities - housing, office building, shopping malls, and industries)?	e.g. any restriction applied to new developments with regards to water use	
		How do you think the creation of waterfront city (and reclamation) affect the city's water security?		
	To establish the expert's opinion on the recent water supply issues in Jakarta: the cancellation of the Water Act 7/2004 and service provide transformation	What elements made the Water Act 7/2004 being cancelled?	Elaborate: Why now (window of opportunity)?	
		Why does Jakarta government intend to transform the water supply service from public to PPP in 1998 and now back to public?		
Flooding and water scarcity	To establish the expert's opinion of the flooding policy in Jakarta	How do you think Jakarta's flooding policy has changed over time?	e.g. creating more canals, more green spaces, working with upstream areas	

Timing: 20 minutes				
		Which flood event has created policy change in Jakarta?		
		River embankment clearance from illegal housing has been an issue since 1960s but it was only implemented by the recent governor. Why do you think that happened?		
	To establish the expert's opinion of some solutions available to get rid of flooding	Do you think the canal system is effective in alleviating flooding?	Elaborate: the NCICD project	
		How do you see Jakarta cooperation/ negotiation with upstream areas (Bogor and Depok) to alleviate flooding?		
	To establish the expert's opinion of water scarcity issue in Jakarta	When was the water scarcity issue greatest in Jakarta? What is water scarcity like in normal year? How's that changed?	e.g. less rainfall, dried well	
		Do you think water scarcity is a problem in Jakarta?		
Sanitation and aquatic environment Timing: 10 minutes	To establish the expert's opinion of the changing practice of sanitation and hygiene and its impacts on environment	How has the practice of sanitation and hygiene improved in Jakarta?	e.g. no open defecation in river	
		Do you think government has paid enough attention on wastewater/ sanitation issues?	Elaborate: WWTPs construction for the sake of the NCICD project	
		Was there any major government to improve river quality?		
		How do you see people interaction with water changing over time?		

For ordinary people

Name of interviewee	Date	Time	Reference code	Recorded?
				Y/N

Section: Introduction	Timing: less than 5 minutes	
		Done
Welcome and thank you	Personal introduction to the interviewee, and thank him/her for participating in the survey	
Recording	Confirm that the interviewee is happy that the conversation is being recorded. Ask if they would like a copy of the transcript after it is produced (could be about a week to 10 days). Ask if they approve of their name or job title added to quotations	
Introduction to the project	Summary of information from Participant Information Sheet (e.g. background and aims of the study, overview of interview process, publication of data)	
Their details	Ask the interviewee's details	

Topic	Sought outcomes	Example prompt questions	Prompt examples	Done
Introduction and drivers Timing: 15 minutes	To understand the participant's knowledge of Jakarta	How long have you lived in Jakarta?	Asking for details where and whether s/he has moved within the city	
		What brings you to Jakarta? (if immigrant)		
	To establish the participant's opinion of the importance of water issues in participant's life without the interviewer asking about water	How do you feel living in Jakarta for X years?	Elaborate factors that make them happy/ unhappy living in Jakarta	
		If you are happy living in Jakarta, is there any factors that make you unhappy? [Vice versa, if unhappy, what makes them happy]		
	To establish timeline of major events in participant's life as an anchor to dig deeper when discussing water-related issues later	Could you please tell me your major life events? E.g. shock to your household and how did it affect your life as a whole?	e.g. illness, death, loss of assets	

		Which period of life was easier for you?	e.g. saving more money than usual	
		How do you see your life quality changed over time? What makes it better/ worse?	e.g. more access to health facilities available; key events: marriage, child born, new employment	
	To establish the participant's opinion of the changing of community's life quality	Could you tell me about your neighbourhood environment?	Any major changing in the neighbourhood from time to time, e.g. the creation of canals to get rid of flooding has improved the life quality of community significantly	
Environment Timing: 20 minutes	To establish the participant's experience of their interaction with environment, especially water	Could you tell me about environment quality (water quality, air quality) back in your childhood?	Elaborate to green spaces for recreational space	
		Have you ever played in the river? Did your parents allow you to play there?		
		Do you remember if there were other activities taking place in the river?	e.g. washing, bathing, fishing	
	To understand if environment change affects aquatic ecosystem	What do you remember about the river?	Elaborate to any extinct fish/plant species in the river	
	To establish the participant's opinion/experience of the changing of environmental issues over their lifetime	What was the most prominent environmental issue in your childhood, teenager and adulthood?	e.g. poor water quality due to industrial discharge (colour)	
Health Timing: 1 hour	To establish the participant's health condition that may be caused by poor environmental condition	I am interested to know about any health issues that may relate to the local environment or water, if you are comfortable talking about them. When you were young, were you were aware of many illnesses or deaths related to water or the local environment?	e.g. diarrheal diseases, drowning, typhoid, dengue fever, malaria	

		Do you think these conditions have changed?		
Sub: flooding	To establish the participant's experience on flooding	Have you ever experienced flooding? When was the major flood? How severe was it (frequency, period)?		
	To establish the participant's opinion of the improvement of flooding due to government measures	Has it changed now (better/ worse)? Why?	Note: Relate the changes to dates or any participant's life event	
		How did the flood event affect your everyday life?	e.g. fleeing their house, loss of assets, missing work	
Sub: water supply and water scarcity	To seek understanding if water quality is a problem	When you were younger, were did you get your drinking water? How about now?		
		Have you got any concern with your drinking water in the past and present?	Elaborate: how they treat water before drinking (e.g. boiling, filtering)	
		Was there any water supply outbreak (e.g. colour, chlorine smell) in your areas?		
	To establish the participant's experience on water scarcity	During dry season, was there any water scarcity issue? How severe was it?	e.g. dried well, intermittent access to piped water	
		How did the scarcity affect other things?	e.g. the river became smelly because of less water and poor water quality	
		Do you think water scarcity is a problem in Jakarta?		
Sub: sanitation	To understand the common sanitation facilities in the participant's area	When you were a child, what were the hygiene and sanitation practices in your community? How have they changed over time?	Elaborate: bathing, washing, using public facilities (e.g. mosques, river), open defecation Note: Relate the changes to dates or any participant's life event	
		What happened to the waste	Elaborate: frequency of septic tank pumping and issues of pollution potency	

	To understand the participant's neighbourhood and environment	Have the drainage in your neighbourhood been cleaned? Was it by you, your community or government?		
		What has changed over time?		
	To understand how government solved the common health problems in their community	Do you remember any government programmes to deal with these health problems you mentioned? i.e. mosquitoes, water, sanitation, flooding	e.g. Kampung improvement programme Note: relate the changes to dates or any participant's life event	
	To establish the participant's opinion on how environmental quality affect health in general	Compared with your lifetime, do you see the health of young people today is better or worse?		
Employment Timing: 20 minutes	To understand the common employment in the participant's area	When you were younger, what was the common employment in your area?	e.g. farmers, fisherman, factory workers	
	To establish the participant's opinion on factors affecting their employability and to seek if environment affects their employability	What affect your ability to be employed?	e.g. skills/ education, location of home, condition of home	
		Where was your working place? How long did you need to travel to work?		
		Was there any condition that you need to travel to work longer than usual? If yes, when was it?	e.g. flooding, unexpected traffic congestion	
	To establish the participant's experience of any changing of employment with regards to urban development or other major events, e.g. flooding, industrialisation	Was there any big shift of employment? When was it? Why that happened?		

		Are you aware of any industrial growth (including commercial activities, e.g. shopping mall happening in the city)?	In the periphery and the centre of Jakarta	

Note: Relate changes (e.g. improvement in health issues) to dates or any participant's life event

Appendix 4: Attendance at conferences, workshops, and meetings that informed this research

Notes:

Language : E (English); I (Bahasa Indonesia)

Forms of participation : 1 (presenter of a paper/ research findings); 2 (active participants); 3 (attendee)

Date	Location	Events	Form of participation / Language
2015, 25 October	Oxford	The OX-ID Forum Organised by the Indonesian community in Oxford, the forum discussed environmental sustainability issues in Indonesia, including Jakarta.	3/ E
2015, 9 - 11 December	Oxford	The REACH Water Security conference The conference was organised by the Oxford's REACH programme. The conference discussed the risk-based analysis of water security with case studies in three countries (Kenya, Ethiopia and Bangladesh).	3/ E
2016, 14 - 16 April	Oxford	The Southeast Asia Studies Symposium The symposium was organised by the Project Southeast Asia, University of Oxford. The topic of the 2016 symposium was 'Human and Environmental Welfare in Southeast Asia'. I presented some research findings from the historical paper (Chapter 4).	1/ E
2016, 10 - 14 July	Singapore	The Singapore International Water Week I particularly attended some sessions held under the 'sustainable urban water' theme.	3/E
2016, 25 – 27 July	Surabaya, Indonesia	The Preparatory Committee (PrepCom3) of the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) I attended some meetings, particularly on urban water and inequity, held by different organisations (e.g. the Indonesian Ministry of Public Works, NGO representatives on urban justice) during the event.	3/E
2016, 30 May	Jakarta	Focus group discussion (FGD) on the 17-island reclamation project The FGD was organised by the Indonesian Ministry of Environment and discussed the differing views of relevant stakeholders (fishers,	2/ I

		developers, academics, policymakers from different ministries) on the reclamation project, which was suspended following a corruption scandal in March 2016.	
2016, 19 September	Bandung, Indonesia	Focus group discussion (FGD) on NCICD The FGD was organised by the Indonesian Ministry of Planning (*Bappenas*) and discussed the benefits and costs associated with the NCICD plan. Participants included academics, consultants and policymakers.	2/I
2017, 10 May	Oxford	The Southeast Asia Seminar The seminar was organised by the Asian Studies Centre at St Antony's College, Oxford University. I presented my early findings from the historical pathway paper (Chapter 4).	1/E
2017, 30 August - 1 September	London	The RGS-IBG Annual International Conference 2017 The conference was organised by the Royal Geographical Society. I presented some research findings from the critical juncture paper (Chapter 5).	1/ E
2017, 15 August	Oxford	The PhD Masterclass (part of the 9th EUROSEAS conference – below) Three Southeast Asian scholars commented my work (an early draft of Chapter 5) and discussed the paper with other 15 PhD researchers.	1/E
2017, 16-18 August	Oxford	The 9th EuroSEAS Conference I presented some research findings from the critical juncture paper (Chapter 5).	1/E
2017, 11-14 December	Cape Town, South Africa	The International Young Water Professionals Conference The conference was organised by the International Water Association. I presented some research finding from the historical paper (Chapter 4).	1/E
2018, 9-12 July	Putra Jaya, Malaysia	The British Council Early Career Researcher Links workshop 'The potential for groundwater in Malaysia's resilient urban future' The workshop was organised by some research institutions from the UK and Malaysia. I presented some research findings from the critical juncture paper (Chapter 5).	1/E
2019, 27–29 March	Oxford	The REACH Water Security and Poverty conference The conference was organised by the Oxford's REACH programme. It discussed key results to	3/E

		date from REACH in Bangladesh, Kenya and Ethiopia.	
2019, 16-21 September	Berlin, Germany	'Transformative human-environment research & participatory methods: From co-production to co-producing' summer school The programme was organised by IRI-THesys, Humboldt-Universität zu Berlin and funded by DAAD. It explored theoretical and methodological alternatives to study the interactions between human and environment. I presented some research findings from the critical juncture paper (Chapter 5).	1/E
2019, 21-25 October	Sao Paulo, Brazil	The British Council-FASESP Researcher Links workshop 'Urban water security in Brazil: From infrastructure to social action' The workshop was organised by researchers from the University of East Anglia and UFABC, Sao Paulo. It discussed on social relations and action as routes to water security, rather than the traditional focus on providing water. I presented some research findings from the last paper (Chapter 6).	1/E

Appendix 5: A published paper developed separately from the thesis

Octavianti, T. and Charles, K. 2019. De- and re-politicisation of water security as examined through the lens of the hydrosocial cycle: The case of Jakarta's sea wall plan. *Water Alternatives* 12(3): 1017-1037.

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De- and Re-politicisation of Water Security as Examined Through the Lens of the Hydrosocial Cycle: The Case of Jakarta's Sea Wall Plan

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ABSTRACT: This article asks how the pursuit of major engineering works causes changes in existing water-society relations. We employ the concept of the hydrosocial cycle postulated by Linton and Budds (2014) as an analytical framework and draw specific insights from political ecology and science and technology studies (STS). Using as a case study a sea wall megaproject plan in Jakarta, Indonesia, we find that such a project can depoliticise the city's water security issues by rendering them technical and by dehumanising citizens and discounting the future. Using scientific language and logic, policymakers discourage the exploration of alternatives other than the sea wall. To repoliticise these water issues, we mobilise the concept of the hydrosocial cycle and tailor it to the context of large infrastructure. We identify departure points that may improve the current socio-natural process in Jakarta, particularly the empowerment of the middle class to voice their project-related concerns, and the recognition of the different capacities of each group in society to adapt to water-related hazards.

KEYWORDS: Water security, political ecology, hydrosocial cycle, sea wall plan, Jakarta, Indonesia

INTRODUCTION: LARGE INFRASTRUCTURE FOR A WATER-SECURE CITY

As the world becomes more urbanised,[1] the goal to achieve a water-secure city has never been more relevant. Water security has gradually been replacing Integrated Water Resources Management (IWRM) as a water management paradigm (Cook and Bakker, 2012; del Moral et al., 2014); it has gained increased interest in both academic scholarship and policy circles since its introduction in 2000. Some review articles (e.g. Cook and Bakker, 2012; Zeitoun et al., 2016) have captured the diverse conceptualisations of water security research, and as water challenges grow such scholarly attention appears to be continuing (e.g. Gober et al., 2015; Jepson et al., 2017). Focusing on the urban context, we follow Grasham et al.'s (2019: 3) definition of water security as "a tolerable and equitable level of chronic or intermittent water-related risk for urban dwellers". To date, water security research has covered a wide range of sectors (e.g. drinking water, water-related hazards, agriculture) at a variety of scales including those determined by political boundaries such as city and state, and natural boundaries such as

[1] According to the UN (2018), 68% of the world's population is projected to be urban by 2050, as compared to 55% in 2018 and 30% in 1950. This figure suggests that we now live in an 'urban age'. This widely adopted figure is, however, contended by Brenner and Schmid (2014: 731). They argue that the urban age thesis "is empirically untenable (a statistical artefact) and theoretically incoherent (a chaotic conception)" because there is no specific rule for drawing the boundaries of an urban, or urbanising, area. As a result, many countries differ in their classification of urban-rural areas.

catchment areas. In this paper, we are interested in analysing water security problems at a megacity level, with a megacity being defined as one with a population of more than 10 million (UN, 2018). As large and powerful political entities and as centres of economic growth, one of the main approaches to the enhancement of megacity water security is that of building large-scale hydraulic structures.

Some scholars, such as Linton and Budds (2014), have noted that in the past decade the hydraulic mission – which is the use of engineering works to exploit waterways in the service of humanity (Molle et al., 2009) – has given way to modes of water governance. Others, such as Crow-Miller et al. (2017), have observed the contrary, noting the large-scale water structures that are being built, or are planned, around the world. This trend demonstrates the (re)turn to investing in infrastructure for water management. Recent projects include south-to-north water transfer in China, interbasin water transfer in São Francisco, Brazil, the trans-Andean tunnel in Peru, and the sea walls in Jakarta and Dhaka. The justification of most of these projects has been the enhancement of water security in urban areas; dense with people and assets, these urban areas would receive more water and would be more protected from environmental hazards. Eighteen out of the 23 megacities are located in coastal areas and are therefore prone to water-related hazards (Pelling and Blackburn, 2013), further justifying the construction of such large infrastructures. The hydraulic mission is now being promoted as a way to guarantee water security in the face of increasing climate instability. Scott (1998) suggests that the construction of large infrastructures is a 'state simplification', meant to reduce the difficulty of solving complex water problems.

Discussion of water security and infrastructure in this paper is anchored in the concept of hydrosociality (Jepson et al., 2017), which has broadened the framework of the traditional hydrologic cycle to encompass the co-construction of water and society (Swyngedouw, 2009). Hydrosociality deliberately attends to water's social and political nature (Linton and Budds, 2014). Developed within the political ecology tradition and inspired by science and technology studies (STS), hydrosociality is characterised by its discussion of power and politics (de la Motte, 2013; Boelens, 2014; Meehan, 2014). (A number of theoretical developments in hydrosociality will be reviewed in the next section.) Here we use the term hydrosocial cycle, as postulated by Linton and Budds (2014), as a lens to analyse water security. Employing a relational-dialectical approach, Linton and Budds conceptualise the hydrosocial cycle as the "process of making and remaking (…) the social construction and production of water" (ibid: 171). A sea wall megaproject in Jakarta, Indonesia, is a vivid example of the way in which technological intervention changes existing hydrosocial relations.

Through the lens of the hydrosocial cycle, this paper seeks to explore the political ecology of water security by (i) examining the extent to which large infrastructure can change the existing water-society relations, and (ii) investigating how the state exercises its power through infrastructure. These issues matter because policymakers tend to think that they have solved the problems by pursuing large infrastructure, while in fact such large projects enhance water security for only a particular group and usually at the expense of other groups. Our main argument in this paper is that major engineering work has the potential to depoliticise the core business of water security in sustaining livelihoods. To repoliticise the issue, we propose to refine the concept of the hydrosocial cycle by placing a greater emphasis on the role of infrastructure and by exploring the heterogeneity within a society in terms of how different groups participate in, and are affected by, the cycle. This paper contributes to a wider conceptualisation of water, society and technology, and advances understanding of how infrastructure manifests the intricate connections between water security and power relations. As the power relations produced in the construction of basic infrastructure – such as the piped-water networks that many developing cities are urged to build (Khatri and Vairavamoorthy, 2007; McDonald et al., 2011) – are very different from those produced in the construction of large infrastrucutre, we do not consider the former in this article (Kooy, 2008; Warner, 2008; Bichsel, 2016; Obertreis et al., 2016).

This paper presents a literature review on hydrosocial research deriving from political ecology and STS, followed by an introduction to the case study and our research methods. Next, we discuss three

mechanisms by which infrastructure can depoliticise water and we analyse the role of state power in shaping this policy. Following that, the concept of the hydrosocial cycle is refined by emphasising the role played by a major water engineering project in changing water-society relations. The final section presents our concluding remarks.

HYDROSOCIALITY: WATER-SOCIETY-INFRASTRUCTURE

Some authors have argued that hydrosociality is the basis of water security (Jepson et al., 2017; Staddon et al., 2017). In this paper, we attempt to link water security and infrastructure in order to contribute to this conceptualisation, as large infrastructure generates unevenly distributed positive and negative consequences (Swyngedouw, 2009). The hydrosocial concept was inspired by the political ecology of water tradition as well as by the social study of science (Swyngedouw, 2004; Kaika, 2005; Budds, 2009; Linton, 2010). It emerged from criticism of the concept of the hydrological cycle as being not sufficient to understand the social aspects of water (Mollinga, 2014). Hydrologists tend to understand water as "behaving in a consistent, uniform and rational manner" (Budds, 2009: 420). According to the hydrosocial concept, water is important to human life not only because of its physical materiality – depicted as H_2O by Swyngedouw (2005), Budds (2009) and Jepson et al. (2017) – but also because of its social functioning.

Hydrosociality is not the only framework by which the relations between water and society are examined. Similar ideas with different conceptualisations and trajectories of analysis are shared by other approaches, such as waterscape (e.g. Baviskar, 2007; Loftus, 2007, Karpouzoglou and Vij, 2017), socio-natures (Castree and Braun, 2001), and socio-hydrology (Sivapalan et al., 2012; Wesselink et al., 2017). Karpouzoglou and Vij (2017) view waterscape as a perspective (rather than a theoretical framework) that emphasises the geographical situatedness in producing unequal hydrosocial relations. Castree and Braun (2001) develop socio-natures as an analytical lens through which to investigate the diverse social construction of nature and to examine how this process affects livelihoods, ecologies and politics. Unlike the approaches that have previously emerged from the social science root, socio-hydrology was developed among natural scientists, particularly hydrologists, who viewed the need to address the complexity and interdependence of water-related societal challenges. Developed from the positivist paradigm, socio-hydrology research focuses on incorporating human behaviour into socio-hydrological models (Wesselink et al., 2017). While both overlapping and having notable differences, these perspectives should be viewed as mutually reinforcing approaches to better understand the interaction between water and people.

The concept of hydrosociality itself has been developed in many ways. As a territory, hydrosociality consists of "a spatial configuration of people, institutions, water flows, hydraulic technology and the biophysical environment that revolve around the control of water" (Boelens et al., 2016: 1). As an assemblage, hydrosociality provides a bridge between a specific kind of water and a particular kind of social relationship (Linton, 2010). As a cycle – which is the focus of this article – hydrosociality is much more concerned with the cyclical making and remaking of that relationship as it travels through the social and water domains. This is the hybrid physical-social process that enables discussion on the production of social inequality and the power relations therein (Swyngedouw, 2009). The hydrosocial cycle also touches on the role of technology, albeit very lightly.

Focusing on the power and politics manifested in large infrastructures, we specifically draw insights from the STS traditions, especially the Large Technical Systems (LTS) school (Ewertsson and Ingelstam, 2004). We use this framework to examine the creation, development and consequences of technological innovation in its cultural and social contexts (Morita, 2017). From the STS perspective, infrastructure can be seen as a process (Carse, 2012), as relations between things (Larkin, 2013), as an inhabitable ground (Butler, 2014), as a source of possibilities (Corsín Jiménez, 2014), and as a political machine and a work in progress (Jensen and Morita, 2015). Despite these diverse conceptualisations, there is an agreed need

to perceive infrastructure beyond its physical qualities, since it can create new polities and can shape societies and environments (Jensen and Morita, 2015).

Wittfogel (1957) was among the first authors to articulate the relationship between water and power. Referencing Karl Marx, he argues that a labour-intensive water infrastructure requires a coordinated system or a large centralised authority, creating a 'hydraulic society'. Wittfogel's technological determinism, however, has simplified the complex realities of the relationship (Peet, 1988; Livingstone, 2011). Hydrosocial studies were partly inspired by his work but there is a fundamental dissimilarity amongst them. Wittfogel considers humanity and nature to be separable and believes them to maintain discrete identities despite their interaction; by contrast, hydrosocialists maintain that they are internally related and are co-constitutive of each other (Swyngedouw, 2009; Obertreis et al., 2016).

Discussion of technology and society as explored in the STS literature can be a means to challenge large infrastructure's promise of water security. While promoters of large infrastructure foster the hope of livelihood betterment through technology, critiques that reveal the disappointment of that hope are not uncommon. The neediest group is likely to experience continued inequities, and even a deterioration in their living conditions. Human "freedom is annihilated by the rational-technological-instrumental imperative" (Harbers, 2005: 12). In the current STS discussions, the use of the terms 'activism', 'intervention' and 'engagement' signals a desire to critically address the way science and technology affect changes and redress inequities in particular cultural and institutional circumstances (Sismondo, 2007). In his discussion of the social aspects of technology, Latour (1987) suggests that a technological artefact will function "when all the relevant people are convinced". Elaborating on the definition of "relevant people", Geels (2005) suggests two basic groups: the "system builders" or "heroes" who can intervene in the system, and the "faceless automata following iron rules, institutions or given/functions" who can do nothing to influence the system. This insight is of interest here because it embraces the idea of human agency, which is lacking in much STS literature (Furlong, 2014).

While large infrastructure is portrayed as an apolitical means to achieve water security, it should not be assumed that scientists and engineers behind the infrastructure are not political actors; they act politically – consciously or not – through knowledge generation. The politics is thus often subtle and can be disguised as numerical justification (Gutiérrez, 2010; Zwarteveen, 2017; Landström and Whatmore, 2018). Scientific evidence is increasingly perceived by society as being socially constructed and politically motivated (Linton and Budds, 2014). Because of the domination of scientific and technical knowledge in many societies, engineers and other scientists are often positioned to exert a powerful influence on political agendas by, for example, foregrounding positive projected calculations and the stability of the system, and guaranteeing the outcome (Latour, 1987; Gutiérrez, 2010).

Some authors have analysed how depoliticisation occurs in environmental policies. One of the earliest authors looking at this issue is Ferguson (1994) who examines development projects in Lesotho. He investigates how ahistorical descriptions were used to characterise 'underdeveloped' countries and how technical solutions were proposed by experts with little information about the 'target group'. (Towards the end of this paper we shall refer to Ferguson's arguments, in discussing our findings from Jakarta's case). In a similar vein, Li (2007) explores experts' attempts to alleviate poverty in the highlands of Sulawesi, Indonesia, through community participation in the integration of conservation and development. She demonstrates how experts have devised technical solutions to conditions of poverty and injustice that are, in fact, rooted in the political economy. Studying water supply issues in India, Joy et al. (2014) argue that water problems are problems of justice because mainstream approaches to water allocation and legislation tend to normalise their distributional implications in such a way that the least powerful group suffers from exclusion and lack of access. Scientific findings have been used by engineers and natural scientists to justify water allocations that thereby appear to be inevitable and natural. Lastly, Atkins (2019) investigates the conflict that arose from the construction of the Belo Monte Dam in Brazil. Its proponents foregrounded the dam within the depoliticised context of economic benefits, which were then countered by the dam's opponents who brought forward the issue of political corruption. Atkins

asserts that this effort to repoliticise the dam's construction can influence developments beyond its immediate site and impacts. We build our arguments from this scholarship in our analysis of the depoliticisation mechanisms that affect large water infrastructure.

This section has discussed relevant insights from the hydrosocial literature and has reviewed research in STS scholarship that specifically addresses studies of infrastructure. To our knowledge, a conceptualisation of water security that pays close attention to infrastructure has not been widely undertaken and hence we hope this paper can contribute to scholarship in this area.

A MEGA SEA WALL IN JAKARTA BAY

In examining how large infrastructure may affect water-society relations, we use a sea wall megaproject in Jakarta, Indonesia, as a case study. The sea wall is part of a flagship megaproject of the National Capital Integrated Coastal Development (NCICD) that was proposed to save Jakarta from sinking. As a delta city, 40% of Jakarta's area is located below sea level (Firman et al., 2011). If this combines with land subsidence at an average rate of 15 cm per year (Abidin et al., 2011) – which is among the fastest in the world – together with eustatic sea level rise at a rate of 3 millimetres per year (Deltares, 2015), Jakarta's risk of sinking is extremely high.

In November 2013, the Indonesian government launched the NCICD project, consisting of the construction of a 32 km offshore sea wall, reclamation of 1250 hectares (ha) of land and the construction of a 7500 ha retention lake (NCICD, 2014), at a total cost of US$40 billion. The offshore sea wall will function to reduce coastal flooding caused by sea level rise. The combined operation of a huge pumping system and a large retention lake (to reduce the mean sea level in the bay) is expected to minimise the risk of riverine flooding. It is predicted that some rivers in Jakarta will not be able to flow under gravity due to subsidence in the northern part of the city; therefore, the river water will be contained in the retention lake and pumped out to sea. To attract private funding, land reclamation was added to the plan. At the time of the launch of the NCICD project, the lake was also projected to be a water supply reservoir (ibid), but this plan was subsequently dropped because of the high cost of water treatment.

Since its launch, the NCICD project has undergone some changes. In 2016, a project to construct 17 artificial islands in Jakarta Bay was integrated with the NCICD plan by the Government of Indonesia, following a corruption scandal involving the islands' construction. The total reclamation area then became 5100 ha. In September 2018, the newly elected governor of Jakarta, Anies Baswedan, was faithful to his campaign promise to revoke the permits for the building of the 17 islands, which were opposed because of their anticipated massive environmental costs. In June 2019, however, he approved the issuance of 932 building permits on Islands C and D. He asserted that he had already kept his promise of stopping further reclamation (of 13 islands) and that the artificial islands – C, D, G and N – would be made available for public use (Aqil, 2019). In June 2019, the Indonesian Ministry of Public Works and Public Housing signed memorandums of understanding (MoUs) on the second phase of the NCICD project with Dutch and South Korean partners; the media release, however, did not give details of this 'second phase' (Iswara, 2019). It may refer to Phase B of the NCICD project, which is the construction of the offshore sea wall as outlined in the NCICD Masterplan (NCICD, 2014). At the time of writing, Phase A of the NCICD project – the strengthening of 20.1 km of the existing sea wall – is still underway, with funding from national and local governments and the private sector (Anwar, 2019). In the absence of a satisfying feasibility study the NCICD project was suspended, but this study has now been conducted by the Dutch and Korean partners, and the signing of the MoUs marks a new chapter for the NCICD project (NCICD, 2014).

The fundamental critique of the NCICD plan is that it does not contain concrete policy action aimed at solving land subsidence. The main cause of sinking is still debatable; the Jakarta Mining Agency data shows that "80 percent of the city's land subsidence is caused by building particularly high-rise towers, 17 percent by groundwater exploitation and 3 percent by natural causes" (Rukmana, 2008: 103). In 2016,

the first author of this paper attended a focus group discussion of experts in Bandung, Indonesia, comprised of university professors and practitioners; this forum agreed that lack of data made it impossible to determine the relative contributions of other factors, namely natural consolidation of alluvial soil and tectonic activities. Abidin et al. (2008, 2011), however, identify a correlation – if not a causal relationship – between the occurrence of land subsidence and the lowering of groundwater levels. An interviewee explained that it was difficult to determine the exact contribution of each factor as they are interrelated. Groundwater exists in the pore spaces between grains of soil and rock; as the water is extracted, the volume of the soil decreases resulting in the consolidation of the soil structure, especially soft alluvial soils like those of Jakarta. Subsidence is exacerbated when heavy loads (such as high-rise buildings) are added to the surface.

The urgent need to stop the subsidence is acknowledged in the master plan: "Not stopping subsidence means that Jakarta's coastal zone is subsiding deeper and deeper below sea level, making solutions for the flooding problems increasingly difficult and expensive" (NCICD, 2014: 35). Subsidence is mentioned more than 50 times in the master plan, yet the plan does not include a strategy to stop the subsidence itself but merely treats symptoms, with the offshore sea wall being presented as a solution. According to an interview with a government official, conducted in the course of this research, resources of time, energy and capital are focused on the pursuit of the NCICD plan, and consistent water supply and a ban on groundwater use have apparently become secondary objectives in Jakarta's water policy.

This paper drew data from policy document analysis as well as from interviews with key informants held in between May and September 2016, July 2017 and February 2018. A total of 48 key informants were interviewed, including central and local government officials, NGO activists, academics and individual experts. We asked for their professional assessments of the NCICD project according to their areas of expertise. Insights from interviews were then compared with NCICD policy documents. Drawing on informants' risk perceptions and on our own interpretations, we now will explore the externalities of the project which are poorly addressed in the public domain.

THE POLITICS OF WATER SECURITY: DEPOLITICISATION

Depoliticising water is a powerful strategy for dramatically transforming the existing hydrosocial configurations (Sultana, 2013). This is especially the case if stakeholders' interests strongly diverge from those of more powerfully represented political actors (Delgado, 2011). The sea wall produces new socio-natural relationships which transform the existing technological, institutional and symbolic arrangements. As observed in other studies (Swyngedouw, 2013; Joy et al., 2014), this depoliticisation affects the powerless group because the process produces, or worsens, social inequality. The first half of the subsequent section offers three mechanisms of depoliticisation in the process of enhancing water security through the construction of Jakarta's giant sea wall. The second half discusses power relations between state and society within the context of capitalist development in Jakarta.

Mechanisms of depoliticisation

As water problems become more complex, depoliticisation continues to occur in many forms (Sultana, 2013; Swyngedouw, 2013). Joy et al. (2014) maintain that the mainstream approaches to water management still tend to "normalise and naturalise" the distributional implications of water problems. There are a variety of ways in which water depoliticisation may occur. We identify three interrelated mechanisms by which water security problems in Jakarta can be depoliticised by the construction of large infrastructure: rendering the issue technical, dehumanising the people, and discounting the future.

First and most importantly, depoliticisation occurs through framing water insecurity as a technical problem that can be solved by mobilising the right expertise. Li (2007), as quoted in Joy et al. (2014: 8), notes that "questions that are rendered technical are simultaneously rendered non-political". In Jakarta, rendering water insecurity as merely a technical matter does not solve the main problem, which is

essentially a governance issue. As we have discussed above, policies to stop subsidence are not integrated with the NCICD plan. The sea wall may reduce vulnerability to flooding but it treats just a symptom of the problem. As the ground continues to subside, the sinking will continue to be a threat. Over-extraction of groundwater is purported to be the culprit of land subsidence in Jakarta (see above discussion for the interrelated causes of subsidence). This extraction from a deep aquifer, especially for supply to high-rise buildings, is caused by poor quantity and quality of piped-water services, a factor which accounts for why many people still use groundwater despite their access to piped water (Kooy et al., 2016); low water service coverage (only 60% of people covered by the water service) is another important factor (PAM Jaya, 2016). From this we can infer the centrality of water governance issues to the problem of land subsistence. The political focus and resources given to the sea wall policy have diverted attention from solving the main governance problem and have assured policymakers and particularly the public that the problem is being solved.

The NCICD plan, in addressing the problem of flooding, claims "to provide a solution for long-term protection of Greater Jakarta against flooding from the sea" and to contribute to the alleviation of riverine flooding (NCICD, 2014: 11). Hydrologically, there are three types of flooding in Jakarta: riverine, coastal and local. Many of the recent major flood events have resulted from riverine flooding, as was the case in February 2007. This type of flooding is caused by heavy but brief storms from upstream catchment areas during the December to May wet season (Budiyono et al., 2015). Coastal flooding is caused by high tides in combination with subsidence, as occurred in November 2007; this type of flooding is predicted to get worse as the northern parts of the city continue to subside (Budiyono et al., 2016). Local flooding occurs when the drainage system is not able to capture, store or drain heavy rainfalls that occur within Jakarta's localities; this was the case in the flood event of January 2013. The impact of climate change cannot be proven (Brinkman and Hartman, 2009) but there are indications that these flooding events are becoming more frequent.

The large lagoon that is part of the NCICD plan is intended to buffer river outflows and thus counteract the increased coastal flooding that is being aggravated by subsidence; the control of river outflows in the coastal areas, however, is dependent on the flow from the wider catchment. It is therefore important to view flooding not only from the perspective of its biophysical characteristics but also from an urban governance perspective. Poor maintenance of infrastructural systems (e.g. canals and gates), as well as uncontrolled growth of the city are among the main factors contributing to riverine flooding. This planning problem has been highlighted by many authors (e.g. Steinberg, 2007; Octavianti and Charles, 2018a), especially as it affects Jakarta's water recharge areas in the southern parts of the city. This is exacerbated by the "socio-political, historical and spatial marginalisation in the city that has experienced centuries of colonial rule" and by post-independence in-migration (Goh, 2019: 251). However, policies to restrict development in the designated green areas have been weakly implemented (Gunawan, 2010). In public discourse the types and causes of flooding tend to be conflated, and the NCICD plan is believed by policymakers and by ordinary citizens to be able to reduce the intensity of flooding; the rapid development in the south may therefore not be slowed down anytime soon. The sea wall policy may even foreclose the opportunity to govern flooding issues that are related to spatial growth.

In addition to not solving the main problem, rendering the issue technical may cause overreliance on a vulnerable system. Currently, the northern flat part of Jakarta relies on a polder system to keep the area dry. Many flood events in this area have been caused by broken pumps, such as the 2008 flooding of the toll road running from the city centre to the Soekarno-Hatta International Airport (*The Jakarta Post*, 2008). In 2014, in another example, 16 (out of 92) pumps were broken (Fajri, 2014). The NCICD plan will depend on a well-operated pumping system to maintain reduced sea levels in the bay. The capacity of the pumps used is expected to be at least 730 m^3/s (NCICD, 2014), which is the largest in the world, larger even than the 600 m^3/s New Orleans' pumps (Locke, 2009). Securing a sustainable supply of energy for the pump operation is also important; it is a matter for consideration given the operation of a nearby power plant in Muara Karang may be disrupted by the reclamation site (*The Jakarta Post*, 2016). As

commented by a consultant in an interview conducted as part of this research, from these findings one can infer how this megastructure creates an interdependency with a vulnerable pumping system in a country that does not have a good track record in maintaining infrastructure.

Second, large infrastructure can dehumanise the anthropocentric nature of water security by abstracting the social element from the water security equation, what Linton (2014) calls a 'modern water' phenomenon. Processes of socio-environmental change are never socially or ecologically neutral (Keil, 2000), and different groups in a society have different capacities for adapting to certain interventions; improvement in one place or in one group often leads to a deterioration elsewhere. 'Organic' social differentiation based on wealth and power relations usually define the distribution of water risks (Swyngedouw, 2009), and the powerless group often bears the so-called inevitable consequences of infrastructure development.

We illustrate this connection between dehumanisation and water depoliticisation using the fishers' case in Jakarta Bay. Because the offshore sea wall will close the bay, with the space between the coastline and the sea wall utilised for land reclamation, the fishers will not be able to continue fishing there (van der Wulp et al., 2016). The narrative according to which the fishers will be evicted asserts that the water has been highly polluted and thus the fish caught are poisonous, and there is thus no future in the fishing industry. The government will compensate the fishers for their loss of income by offering them blue collar jobs on the newly artificial islands, on which a low-cost subsidised building will be allocated to them. This compensation clashes with many fishers' beliefs and identities, and is likely to worsen the already significant inequality in the city (Oxfam, 2017).

In Jakarta, the 'relevant people' in Latour's (1987) statement above can be interpreted as (i) the policymakers and the general public who must be convinced of the benefits of the infrastructure (as the first mechanism of depoliticisation has demonstrated), and (ii) the marginalised communities who must be convinced that they are part of the problem and that therefore their marginalisation or even eviction is fully justified. The latter attributes the main problem of subsidence and the related issue of water supply to other causes; it suggests that an implicit goal of the sea wall plan is the unification of a diversified urban society. As Larkin (2013) notes, the construction of large infrastructures suggests the increasing modernity of a city; this is a perceived value of the NCICD plan, which aims to transform Jakarta into a world class city (Wade, 2019). The danger in striving for this 'ideal' modern society is its aim of transforming a diverse socio-natural urban environment into a government-dominated system (Schmidt, 2014).

Third, depoliticisation occurs through discounting the long-term consequences of large-scale infrastructure. Construction usually takes place over many years, and the consequences can similarly play themselves out over decades. Policymakers most often do not address the long-term consequences or externalities of large infrastructures, either intentionally neglecting them or simply failing to detect them. The dominant positivist stance of engineers may hinder their inclusion of the seemingly abstract, non-quantified risks (Delgado and Zwarteveen, 2017; Zwarteveen, 2017). In an interview that was part of this research, a consultant commented that the manifesting of consequences outside of the spatiotemporal scope of assessment may also impede their detection. The tendency to deny the potential negative consequences of large infrastructure projects for future generations can be a violation of the widely acknowledged sustainability principle (Emas, 2015).

The coastal reservoir in Jakarta Bay that may end up as a large black lagoon serves as a harbinger of a possible negative future condition resulting from present decisions. Currently, Jakarta Bay is in poor environmental condition due to the domestic and industrial wastewater discharge from the metropolitan area (van der Wulp et al., 2016). The closure of the bay by the creation of an offshore sea wall makes the cleaning of rivers imperative. According to the NCICD Master Plan (NCICD, 2014: 123), the project "creates the necessary momentum to implement sanitation measures" in the city by aiming to increase sewerage coverage to 75% by 2020, from its 2018 coverage of 7%, which is one of the lowest in urban

Asia (KPPIP, 2018). However, neither the Jakarta provincial government nor the central government has made any firm commitment to realising this ambitious target. According to a representative from PAL Jaya (Jakarta's wastewater agency), the city is struggling to find investors for its sewerage project, which will require up to 70 trillion Indonesian rupiahs (IDR) (US$5 billion). Without urgent measures to stop water contamination, the retention lake will turn into a large, polluted, anoxic lagoon or, as an NGO activist described it in an interview that was part of this research, "the biggest rubbish dump and toilet in the world".

Furthermore, considering the interdependent nature of water issues, problems in one sector may trigger problems in other sectors, leading to a vicious cycle if not carefully and immediately addressed. Environmental degradation, including the lake's poor water quality, may result in health risks for people in the area; this, in turn, could reduce perceived quality of life in the new waterfront city, which could then affect property prices and thus funding for the sea wall construction.

The three depoliticisation mechanisms may not be visible from the surface and may only be felt by the neediest groups in the society. We now seek to investigate how these mechanisms operate within the wider context of Jakarta's capitalist development.

State and society relations

In our previous analysis (Octavianti and Charles, 2018b), we have examined the political interactions between the many stakeholders involved in the NCICD policymaking process, including policymakers, private land developers, consultants, NGO activists and academics. Here, we focus on the power of the state, demonstrating how state power is consolidated through the NCICD plan and how Jakarta's spatial and capitalist development shapes the nature of the city's power relations.

The intricate relationship between state governance and water policy is a function of bureaucratic culture and sociopolitical structure (Nickum, 2010). Rather than viewing a state as an organised political entity (e.g. Fontana, 2010), we follow Ferguson's (1994) conception of the state as a mechanism for coordinating power relations or congealing power. State power in that sense refers to "a mode of power that relies on state institutions but exceeds them" (ibid: 273). There are several roles that a state adopts in a centralised government (Strang, 2016); it can act as 'other' than the people, as representative 'of' the people, and 'as' the people themselves. In a democratic political setting, the state acts as a representative of the people but it may shift towards enforcing autocratic behaviours. Where the state is very powerful, it can operate independently of the society it is meant to serve (Herzfeld, 1991).

Indonesian democracy is still 'young' as it emerged only in 1998, a result of the *Reformasi* (Reform) that followed the fall of the authoritarian Soeharto regime (1967-1998). In the name of securing the economic and political stability required for national development, Soeharto governed Indonesia through military and police force. He presided over a repressively controlled system and nurtured alliances with foreign and local capitalists (Robison and Hadiz, 2004). In this new era of democracy, however, Indonesia still "represents a particularly extreme example of oligarchic dominance and distortion (…). [T]he top 500 oligarchs are about 600,000 times richer than the average Indonesian" (Winters, 2012: 2), and the country is still controlled by a handful of elites who benefitted from years of association with the Soeharto regime. This is because capitalism was incubated within the state itself; democratisation provided a pathway to power for the oligarchs who had been incubated and nurtured in Soeharto's 'New Order' dictatorship (Hadiz and Robison, 2013). The civil society groups, while active and robust, are badly fragmented and poorly organised, and provide no effective counterbalance to the grip of the oligarchs (Aspinall, 2012).

As observed by Webber (2006), in the decade following the important milestone of the Reformasi, Indonesia's democracy took the form of patrimonial democracy; the effectiveness of the government was limited because power flowed directly from the leader and a handful of elites. Patrimonialism has deep roots in Indonesia's political history, but Webber was optimistic that electoral competition would

move it in a more liberal direction (see also Hadiz and Robison, 2013). Individual rights and freedoms are officially recognised and protected, but the exercise of political power is still limited by the rule of law. According to the Democracy Index assessment of 167 countries, Indonesia is a "flawed democracy". While having relatively "free and fair elections", Indonesia still has "significant weaknesses in other aspects of democracy, including problems in governance, an underdeveloped political culture and low levels of political participation" (The Economist Intelligence Unit, 2017: 54). One can argue, however, that Indonesia's democracy status has significantly improved; voter turnout in the 2019 presidential elections was 81%, or 158 million out of almost 200 million eligible voters (Farisa, 2019).

In line with Hadiz and Robison (2013: 40), we highlight the importance of looking beyond the question of "whether Indonesia has 'transitioned to democracy', or whether its democracy has now 'consolidated'"; we instead scrutinise the configurations of sociopolitical power shaping the evolution of Indonesian democracy. Given its political context, the NCICD case provides an interesting political arena in which to observe how the project's image is shaped by the confrontation between civil society groups and elite stakeholders.

Some authors have analysed the important transformations that Jakarta has undergone, and their insights can inform how the depoliticisation mechanisms discussed above operate and why they are effective. Tracing the arc of colonial, postcolonial and neoliberal politics, Kusno (2015: 53) contends that "the power of Jakarta (…) is attributed to its long entanglement in Dutch colonial connection centuries ago, while its recent fortunes or misfortunes owe to the forces of postcolonial nation-building and the current phase of capitalist modernisation". The development of neoliberal ideology from the time of Soeharto continues to influence the contemporary era (ibid, 2013).

Analysing Jakarta's development along with that of other mega urban regions in Southeast Asia, Douglass (2010) concludes that Jakarta has morphed from being an appropriator of rural surpluses (precolonial to late 1960s), to export-oriented industrialisation (late 1960s-1980s), to becoming a centre of retail consumption (1980s-1997). This last stage of development was made possible by the advent of a new era of megaprojects that occurred throughout the world from the mid-1980s onwards (Altshuler and Luberoff, 2003). In Jakarta, it created a significant new middle class and a new layer of built environment. Aspiring to become a world-class Asian city, the government began to promote privatisation and megaprojects by relaxing or even eliminating many of the regulations on land use, and in the process reducing public oversight. After the 1998 Asian financial crisis, Jakarta experienced a decade of renewed neoliberal reform together with the emergence of 'democratic' governance, a shift which has greatly affected its built environment and its citizens.

Investigating the linkages between Jakarta's flood infrastructure and wider spatial transformations, Batubara et al. (2018) find that the logic of capitalism underlies the infrastructural approach in the city and as a result (re)produces an uneven urbanisation. Their analysis also points out that the production of Jakarta's contemporary landscape is linked to Soeharto's New Order regime under a specific system of crony capitalism (Kunio, 1990), a mechanism that is evidenced by, for example, the issuing of permits to a crony of Soeharto to convert 831 ha of mangrove forest in northern Jakarta into the luxurious Pantai Indah Kapuk development. According to the 1985-2005 Jakarta spatial plan, this area was designated as 'protected forest area' important for rainwater retention (Leaf, 2015). This is not the only case where commercial projects have been built on designated green areas. Some recent governors have commented that removing such buildings would be 'impractical'. Clearly it is impossible to separate Jakarta's transformations from the influence of the powerful elites nurtured during the New Order era.

We argue that the massive changes that Jakarta has undergone spatially and politically in the past few decades affect the depoliticising of agendas and the normalisation of the NCICD plan. Public awareness of the 'crisis' of Jakarta's sinking and the resulting urgent need for action neutralises concern over the negative consequences the megaproject may have. The state uses scientific language – not the explicitly repressive approaches that were used in the New Order period – to justify and maintain the large

infrastructure policy. Framing the issue 'scientifically' is an approach to curbing social power that is not unrelated to an autocratic mode of governance. The state closes down the possibility of exploring other alternatives, depriving the public of the opportunity to engage with the policy process.

As some have demonstrated (e.g. Furlong, 2014; Bijker, 2017), science and technology increasingly shape how society works as well as how the state rules the people. Supported by scientific language and logic, the state is able to powerfully legitimise its proposal for large-scale infrastructure. The complex engineering works that the NCICD plan assembles act to silence civil society groups. In general, there is a modern trend to retreat from 'truth language' to 'trust language' (Elzinga, 1997); the public tends to trust the infrastructure without seeking the truth (if a genuine truth actually exists). By its fixation of meaning on the sinking problem and the sea wall solution, the state manages to narrow the solution down to the sea wall. The state's obligation is to protect its people, especially the most vulnerable groups; it may, however, be causing them harm by, for example, displacing them without proper compensation.

To add another layer of complexity, this sophisticated and complex flood defence was developed based on input from the Dutch consortium Deltares, and design work was done by the Dutch architecture firm KuiperCompagnons; local experts were only minimally involved (Salim et al., 2019). After the major flood of 2007 (one of the largest floods in Jakarta's history), the Government of Indonesia, through the Ministry of Public Works, asked for help from the Dutch government. The Netherlands is known as the world's water expert and during the colonial era was involved in early phases of Jakarta's development (Octavianti and Charles, 2018a) making them Indonesia's most suitable partner for solving this water problem. However, 'outsourcing' the entire design process to another country sparked suspicion among NGO activists and concerned academics (Colven, 2017). The complex modelling of the NCICD plan has been justified to the public unaccompanied by clear and sufficient information. Analysing newspaper articles addressing issues around the NCICD plan and land subsidence, Octavianti and Charles (2018b) argue that land subsidence has been problematised in such a way as to frame the NCICD plan as the only solution. It is not surprising to learn that a (simplified) scientific argument has been used to justify this megaproject. While scientists are truly concerned that complex scientific language may overwhelm the public, it is ironic that fear of Jakarta's sinking was exploited to capitalise the project.

Modern states have been characterised by the degree to which they control the development and deployment of water infrastructure (Molle et al., 2009). Swyngedouw (2015), for instance, in describing Spain's hydraulic state-making, observes how the priorities of local society and the environment have been subsumed to economic and political priorities. The state, as Walker (2014: 390) argues, should function "as coordinator of collective action and as an intermediary between the public and private spheres". The nature of the state's role, however, has changed. In Jakarta, the state has used scientific language to help slowly diminish its mediating role. Without intending to demonise the experts involved in the sea wall project, we merely suggest that weakened social power can possibly lead to autocratic management within water policy. To date, the NCICD plan has involved a dynamic policymaking process, relatively uncontested at the time of its launch in 2013, then highly debated following a corruption scandal in 2016. A political event like corruption acts as an efficient window of opportunity or critical juncture to strategically adjust the policy framework of a project like NCICD (Octavianti and Charles, 2018b). In the absence of such an event, the social and environmental impacts associated with the project can be cushioned by the promise of enhanced safety and development.

Having identified three mechanisms of depoliticisation, and the state-society power relations underpinning this process, we now reflect on Ferguson's (1994) findings on the process of depoliticisation in Lesotho's development projects. He argues that the promise of the elimination of poverty through agricultural transformation in Lesotho is "a point of entry for an intervention of a very different character" (ibid: 255). This also seems to be the case in Jakarta. A disaster preparedness scheme aimed at reducing Jakarta's risk of sinking serves as an entry point to the NCICD plan for wider political interests. Its reclamation element provides an opportunity for elites to access interesting development contracts and

concessions. Salim et al. (2019) suggest that the NCICD project allows New Order elites, now marginalised by democratisation, to form 'growth coalitions' which give them privileged access to contracts.

Ferguson (1994: 357) then hypothesises that the development apparatus works as a machine that is able, with the flick of a switch, to protect "even the most sensitive political operations" from the effects of politics, what he calls the "anti-politics machine". We argue that such a mechanism occurs to some extent in Jakarta. The complex nature of the sinking process and the scientific justification of the NCICD plan makes the workings of the plan inaccessible to most people. However, instead of viewing the NCICD plan as a form of anti-politics machine, we see it as one part of a series, or system, of anti-politics configurations. Jakarta's flood mitigation strategy has followed a characteristic infrastructural approach, including an ongoing 19 km canalisation project of major rivers and the construction of grand canals in the western (14.5 km) and eastern (23.6 km) parts of the city (Octavianti and Charles, 2018a). The NCICD program is the largest scheme in the city's history and supports the operation of the entire configuration of infrastructure.

Lastly, Ferguson (1994) observes that the expansion of state power in the depoliticisation process may actually weaken its power. In its role of overall coordinator, the state does not expand its power but instead expands the extent and reach of the loops around existing power relations. In Lesotho, the national government occupied a less powerful position than did the developmental agencies and donor countries. Similarly, in Jakarta some indicators of a reduction of the relative power of the state have also been observed. For example, Basuki Tjahaja Purnama, Jakarta's former governor, was criticised for not being able to revoke the reclamation permits given to private developers. He argued that the permits had been legally issued by a regulation that was in place prior to his tenure (Huda, 2016). The state, in this sense, handed over the future contingencies of the project to private developers (Wade, 2019). In the even longer run, state power over the megaproject is likely to be further reduced because of its accessibility only to (foreign) experts.

We have explained thus far how the present and potential depoliticisation actions have been influenced by Indonesia's political structure and Jakarta's capitalist development. In order to minimise externalities and inequalities caused by the pursuit of the sea wall's construction, we suggest a strategy for resituating politics in Jakarta's water security issues.

REPOLITICISING WATER THROUGH THE HYDROSOCIAL CYCLE

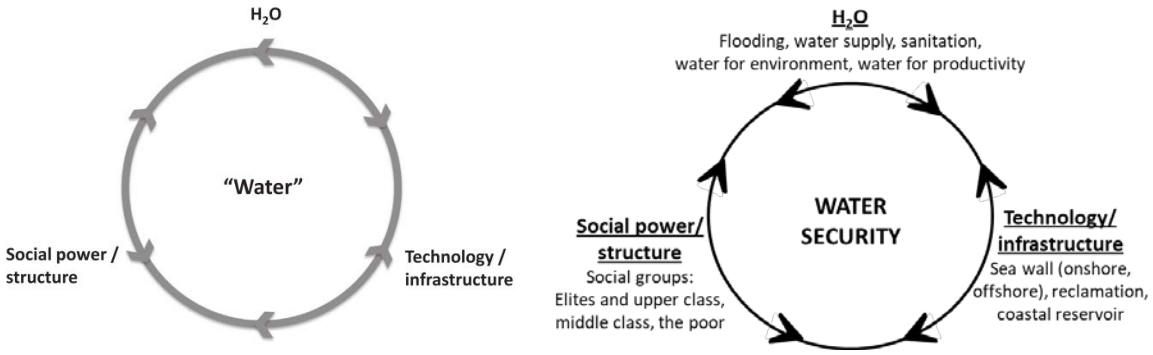
As water has specific contextualised meanings that link spatial and temporal scales and produce specific sources of power relations (Bakker, 2012), we tailor the concept of the hydrosocial cycle to the context of large infrastructure. Constituting more than just background, infrastructure can fundamentally change or even disrupt power relations. Infrastructure and water security are highly political; however, the repoliticisation proposed here is targeted not at infrastructure but at the issue of water security. Taking a step back and viewing the depoliticising mechanisms discussed above through the lens of the hydrosocial cycle, we are hoping to identify sites for repoliticisation of the issues.

The hydrosocial cycle concept represents water's broader social dimensions by internalising the politics of water, as opposed to simply treating water as the *object* of politics (Linton and Budds, 2014). Three components of the cycle – water's materiality (H_2O), technology/infrastructure, and social power/social structures – interact in a two-directional cyclic relationship (Figure 1a). 'Water' (identified in the centre of the circle) is the outcome of this socio-natural process; it acquires a new meaning from the co-constitution of ideas, discourse and power relations in any assemblage of socio-natural processes. The main characteristic of the hydrosocial cycle is that the socio-natural processes occur *internally*; this means "a shift from thinking of relations *between* things – such as the impacts of humans on water quality – to the relations *constituting* things – such as the cultural, economic and political processes that constitute the particular character of desalinated water, treated drinking water or holy water" (Linton and Budds, 2014: 173, emphasis in original). In mobilising the concept, we propose to refine 'water' to 'water

security' as a goal in the centre of the circle. This is not only to build an explicit connection between the hydrosocial cycle and water security but also to highlight the importance of the cycle as the basis for securing water. This suggests that any attempts to improve water security should not under-represent society as one of the elements of the cycle.

In the current discourse promoting the NCICD plan, the interaction between water and society is viewed as a linear relationship. The offshore sea wall – the main component of the plan – is sold to the public as a disaster preparedness scheme. Technology is believed to improve the materiality of water (H_2O) and to further improve people's overall livelihood. Such a linear perspective is problematic as it eliminates the capacity of the components' internal interaction to create the many externalities that have been discussed above. In Jakarta, we identify multiple assemblages emerging from socio-natural processes which, together, constitute what 'water security' feels like to the people. These include: the different types of water that together constitute 'urban' water, the different social groups and their power relations, and the different and corresponding elements of the megastructure. Below we examine the elements comprising Jakarta's hydrosocial cycle – technology, H_2O and society (Figure 1b) – and then discuss potential sites at which the whole constellation can be shifted.

Figure 1. a) The hydrosocial cycle as proposed by Linton and Budds (2014); b) our interpretation of the hydrosocial cycle as it operates in Jakarta's case.



In the hydrosocial cycle there is no beginning or end, as changes to any element affect the whole socio-natural process. It is our view, however, that in Jakarta it is likely to be large infrastructure that disrupts the process. It is worth remembering here that the NCICD plan is comprised of several elements: the onshore sea wall (the urgent need for which has been agreed to by both the proponents and opponents of the plan); the offshore sea wall (the main component of the plan); and the reclamation and coastal reservoir. While the offshore sea wall may initially fulfil its flood-control purpose, it is not clear how externalities have been incorporated into the policymaking process. The sea wall and reclamation will significantly alter the hydraulic conditions in the bay, which will in turn affect at least sediment deposition and wave-tide-circulation system. Therefore, it may improve the materiality of water in terms of protection from flooding, but there may also be severe consequences which in turn affect the social domain, further transforming the cycle.

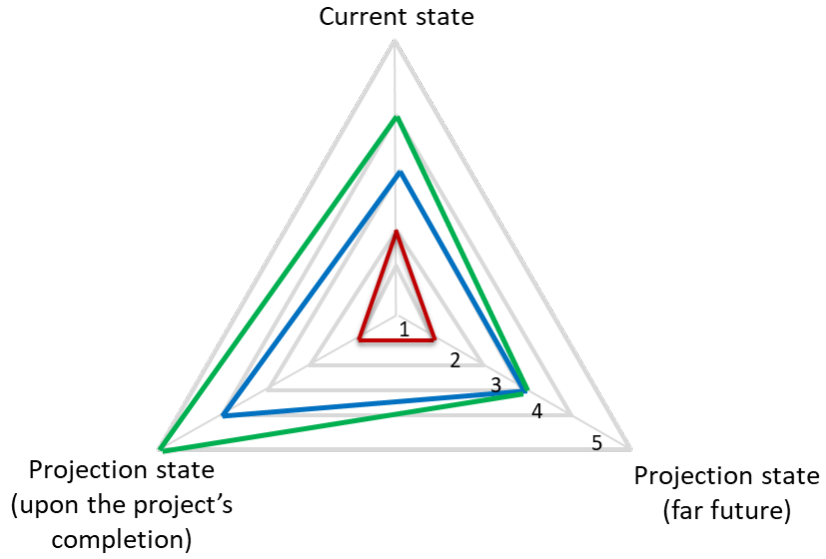
In terms of the materiality of water (H_2O), we have till now focused primarily on flooding, and have tended to underplay the interrelationship with other forms of urban water including drinking water, sanitation, water for environmental needs, and water for economic growth. Although all these types of water shape the experience of water security, in any given context one form of water tends to predominate; in a water-scarce area, for example, people will be likely to prioritise drinking water over safe sanitation facilities. The interactions of urban water in Jakarta are quite clearly producing the city's subsidence; it is also understood how the NCICD plan may affect these interactions. Briefly, as residents

and businesses have not had reliable access to water, they have been accessing groundwater as their main water source, a practice which has been purported to be the main reason for land subsidence. Furthermore, the offshore sea wall will close off Jakarta Bay and will trap the poor-quality water flowing from the metropolitan catchments. The inadequate sanitation system in the city is the main contributor to the deterioration of the coastal environment (van der Wulp et al., 2016). It is therefore of major importance to also acknowledge the effect on hydrosocial relations of the interaction of diverse types of water beyond the coastal areas.

The final element in the hydrosocial cycle is social structure and its embedded power. Urban areas have been characterised by large inequalities that stem from the city's historical transformations (OECD, 2018). Urban society is not uniform; it consists of heterogeneous groups that have unequal vulnerability to environmental shocks (Grasham et al., 2019). Environmental injustice can exacerbate existing social inequalities of class, gender, age and ethnicity (Nightingale, 2011). Elites and upper class individuals are powerful and have the capacity to reduce their vulnerability to environmental hazards. The poor communities have the least power to voice their concerns and have historically been marginalised. The 'middle class' is characterised differently in different cultures but generally lies between the two in terms of power and wealth.

The fishing community is likely to be the group most impacted by the construction of the sea wall. Over time, however, coastal communities – including elites living in the waterfront areas – may feel the impact of the poor management of coastal waters. Figure 2 shows the benefits and disadvantages of Jakarta's sea wall project on three social classes in three temporal scenarios. We predict that the NCICD project will yield only short-term benefits for the upper and middle classes. Upper class citizens may in the long term experience a massive reduction in water security if no steps are taken to mitigate the deterioration of the waterfront environment. While the figure is based on hypothetical calculations, such visualisations can aid in articulating the project's potential impacts on different groups over time. This is also in line with Salim et al.'s (2019) 'maladaptation' argument, which suggests that the project could increase vulnerability to climate shocks.

Figure 2. Illustration of the different levels of water security anticipated from the NCICD project for three social classes in Jakarta (upper/green, middle/blue and lower/red), over three different timescales: current state; projection state expected once the project is completed and fully functioning; and the long-term projection state ('1' is the lowest level of security and '5' is the highest).



A new articulation of water security is informed and co-constituted by the different types of water, the state of infrastructure and the interaction of social groups; this is set against external factors such as the historical political structure and its attendant discourses, and the involvement of foreign experts. It is a dynamic cyclical process which is continually transformed as changes occur to its components. The plurality in the society must be highlighted in order to prevent deterioration in socio-natural relations that may result from, or be exacerbated by, the introduction of large infrastructure. Addressing the situation in this way can create an entry point for making changes and can reveal the ways in which social inequalities can be produced and sustained through water.

Recognising social plurality is a basic political condition that enables rights to be debated and socially negotiated (Mouffe, 1993). For Fontana (2010: 4), "civil society is not one and harmonious, as in Plato's ideal Polis city, but a plurality of spaces, socio-political and physical/territorial". By appreciating this plurality, contestation of unequal treatment with regard to water security can have more political clout (Joy et al., 2014). We particularly want to highlight the need to shift the power base to the middle class[2] in order to influence the NCICD policy. The rise of the middle class in Indonesia has been consistent with the wider trend in other Southeast Asia's metropolitan regions; beginning in the mid-1980s, it has continued to grow since the 1997 financial crises. It has led to the increase in megaprojects in the region (and their consequences), as indicated by the proliferation of new towns in the Greater Jakarta (Firman, 2004). As the largest group within Indonesia's population, its middle class supports the economic growth of the country through its consumption, wealth creation and taxation. Liddle (2013) asserts that economic growth is beneficial for democracy as a progressive middle class demands rule of law and political participation. Their power is notably lower than that of the elite, but the middle class is usually more concerned with the quality of government services and can become a powerful voice in demanding improvements in governance (World Bank, 2017). Furthermore, in an era where people are increasingly connected through social media, their collective power is significant (Mahault et al., 2017). For all these reasons, it seems promising to appeal to the middle class for help in achieving collective water security by amplifying the marginalised voice of the poor.

In this section, we have argued the importance of recognising social diversity in conceptualising water security. It is a stance that should not be read as romanticising marginalised citizens; instead, we aim to show how inequality and insecurity are produced through infrastructure and how the groups with the least power are blamed for the collective insecurity.

CONCLUSION

This paper has sought to examine the political ecology of water security in the context of large infrastructure. We argue that major hydraulic works have the potential to depoliticise water security by rendering water issues as merely technical problems, dehumanising the people and discounting future consequences. The causes of water insecurity in Jakarta are political and structural, and not simply geographical and technical; stakeholders are therefore not a neutral instrument. As the paper has demonstrated, technology and society are inseparable, and they are important entities in the co-constitution of the socio-natural process. Unsurprisingly, however, large infrastructure has been devised to abstract the societal dimension in which the technology operates and used to purposely divert attention from the actual complex problem of sinking. These depoliticisation mechanisms have deep roots in Indonesia's political structure and in Jakarta's spatial and political transformation, especially during Soeharto's repressive New Order regime (1967-1998). These have had a strong influence on capitalist development in the city, including the capitalism value embedded in the NCICD policy.

[2] According to Rastogi et al. (2013), the 'middle class' (which is further divided into 'upper middle', 'middle' and 'emerging middle' class), refers to households whose monthly expenditures are between IDR1.5 and 5 million (US$100-340). In 2012, there were 109.2 million people in this group. This number is expected to be 168 million in 2020, which will make it the largest group (64%) in the country.

In the long term, depoliticisation may trigger autocratic management of Jakarta's water policy. This autocracy may appear to be subtler than the conventional authoritarian mode of governance, but may even so not provide opportunity for public involvement in the decision-making process or for the exploration of alternative strategies for water security. To avoid such an end, we propose to refine the concept of the hydrosocial cycle by tailoring it to the large-infrastructure context. Mainly, we suggest the recognition of social diversity and the empowerment of the middle class to voice their concerns with regard to the achievement of collective water security.

In framing water security as one face of a broader transformative politics, we borrow from Sultana and Loftus's (2012) insights on the human right to water. Rather than being an 'empty signifier', water security can be regarded as the focal point of a political struggle to achieve a water-secure future without exacerbating inequalities – an approach which positions people and politics at the centre of water security. As Butterworth et al. (2010: 74) suggest, there is an urgent need to "recognize water politics as a reality and also an opportunity… [and] a catalyst for public involvement and change". In the end, water security will be achieved by citizens, not by engineers, politicians and business people.

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REFERENCES

Abidin, H.Z.; Andreas, H.; Djaja, R.; Darmawan, D. and Gamal, M. 2008. Land subsidence characteristics of Jakarta between 1997 and 2005, as estimated using GPS surveys. *GPS Solutions* 12(1): 23-32.

Abidin, H.Z.; Andreas, H.; Gumilar, I.; Fukuda, Y.; Pohan, Y.E. and Deguchi, T. 2011. Land subsidence of Jakarta (Indonesia) and its relation with urban development. *Natural Hazards* 59(3): 1753-1771.

Altshuler, A. and Luberoff, D. 2003. *Mega-projects: The changing politics of urban public investment*. Washington, DC: The Brookings Institution and Lincoln Institute of Land Policy.

Anwar, M.C. 2019. Wah, Cegah Jakarta Tenggelam, RI Gandeng Korsel dan Belanda (Wow, Prevent Jakarta from sinking, Indonesia partners with South Korea and the Netherlands). CNBC Indonesia. www.cnbcindonesia.com/market/20190628143713-17-81404/wah-cegah-jakarta-tenggelam-ri-gandeng-korsel-dan-belanda (accessed 28 June 2019)

Aqil, A. 2019. Anies approves buildings on controversial reclaimed islets. *The Jakarta Post*. www.thejakartapost.com/news/2019/06/14/anies-approves-buildings-on-controversial-reclaimed-islets.html (accessed 14 June 2019)

Aspinall, E. 2012. Still an age of activism. Inside Indonesia 1-21. www.insideindonesia.org/index.php?option=com_content&view=article&id=2883:still-an-age-of-activism&catid=171&Itemid=129&tmpl=component&print=1&layout=default&page=

Atkins, E. 2019. Disputing the 'National Interest': The depoliticization and repoliticization of the Belo Monte Dam, Brazil. *Water* 11(103): 1-21.

Bakker, K. 2012. Water: Political, biopolitical, material. *Social Studies of Science* 42(4): 616-623.

Batubara, B.; Kooy, M. and Zwarteveen, M. 2018. Uneven urbanisation: Connecting flows of water to flows of labour and capital through Jakarta's flood infrastructure. *Antipode* 50(5): 1186-1205.

Baviskar, A. 2007. *Waterscapes: The cultural politics of a natural resources (Nature, culture, conservation)*. Delhi: Permanent Black.

Bichsel, C. 2016. Water and the (infra-)structure of political rule: A synthesis. *Water Alternatives* 9(2): 356-372.

Bijker, W.E. 2017. Sociohistorical technology studies. In Jasanoff, S.; Markle, G.E.; Peterson, J.C. and Pinch, T. (Eds), *Handbook of Science and Technology Studies*, pp. 229-256. SAGE Publications.

Boelens, R. 2014. Cultural politics and the hydrosocial cycle: Water , power and identity in the Andean highlands. *Geoforum* 57: 234-247.

Boelens, R.; Hoogesteger, J.; Swyngedouw, E.; Vos, J. and Wester, P. 2016. Hydrosocial territories: A political ecology perspective. *Water International* 41(1): 1-14.

Brenner, N. and Schmid, C. 2014. The 'urban age' in question. *Urban Worlds* 38(3): 731-55.

Brinkman, J.J. and Hartman, M. 2009. Jakarta flood hazard mapping framework. In The International Conference on Urban Flood Management, pp. 1-9, http://library.wur.nl/WebQuery/titel/1939477.

Budds, J. 2009. Contested H2O: Science, policy and politics in water resources management in Chile. *Geoforum* 40(3): 418-430.

Budiyono, Y.; Aerts, J.; Brinkman, J.J.; Marfai, M.A. and Ward, P. 2015. Flood risk assessment for delta mega-cities: A case study of Jakarta. *Natural Hazards* 75: 389-413.

Budiyono, Y.; Aerts, J.C.J.H.; Tollenaar, D. and Ward, P.J. 2016. River flood risk in Jakarta under scenarios of future change. *Natural Hazards and Earth System Sciences* 16: 757-774.

Butler, J. 2014. Rethinking vulnerability and resistance. Plenary Conference at the XV Simposio de la Asociación Internacional de Filósofas (IAPh), Universidad de Alcalá (Madrid), 24th June, pp. 1-19, 2014, www.institutofranklin.net/sites/default/files/files/Rethinking Vulnerability and Resistance Judith Butler.pdf

Butterworth, J.; Warner, J.; Moriarty, P.; Smits, S. and Batchelor, C. 2010. Finding practical approaches to integrated water resources management. *Water Alternatives* 3(1): 68-81.

Carse, A. 2012. Nature as infrastructure: Making and managing the Panama Canal watershed. *Social Studies of Science* 42(4): 539-563.

Castree, N. and Braun, B. 2001. *Social nature: Theory, practice, and politics*. Oxford: Blackwell Publishing Ltd.

Colven, E. 2017. Understanding the allure of big infrastructure: Jakarta's Great Garuda Sea Wall project. *Water Alternatives* 10(2): 250-264.

Cook, C. and Bakker, K. 2012. Water security: Debating an emerging paradigm. *Global Environmental Change* 22(1): 94-102.

Corsín Jiménez, A. 2014. The right to infrastructure: A prototype for open source urbanism. *Environment and Planning D: Society and Space* 32(2): 342-362.

Crow-Miller, B.; Webber, M. and Molle, F. 2017. The (re)turn to infrastructure for water management? *Water Alternatives* 10(2): 195-207.

de la Motte, R. 2013. *Liquid dynamics: The hydrosocial cycle and the radical politics of water*. University of Manchester.

del Moral, L.; Pita, M.F.; Pedregal, B.; Hernández-Mora, N. and Limones, N. 2014. Current paradigms in the management of water: Resulting information needs. *Publicationes Instituti Geographici Universitatis Tartuensis* 110: 21-31.

Delgado, J.R.V. 2011. *The ethno-politics of water security: Constructions of ethnicity and gender in strategies to control water in the Andes of Peru*. Wageningen University.

Delgado, J.R.V. and Zwarteveen, M. 2017. Queering engineers? Using history to re-think the associations between masculinity and irrigation engineering in Peru. *Engineering Studies* 9(2): 140-160.

Deltares. 2015. *Sinking cities: An intergtrated approach towards solutions*. Deltares18 3. Delft/ Utrecht, The Netherlands, https://doi.org/10.1046/j.1365-2451.2002.00341.x.

Douglass, M. 2010. Globalization, mega-projects and the environment urban form and water in Jakarta. *Environment and Urbanization Asia* 1(1): 45-65.

Elzinga, A. 1997. The science-society contract in historical transformation: With special reference to "epistemic drift". *Social Science Information* 36(3): 411-445.

Emas, R. 2015. *The concept of sustainable development: Definition and defining principles*. Brief for GSDR, https://doi.org/10.1016/j.marpol.2014.01.019

Ewertsson, L. and Ingelstam, L. 2004. Large technical systems: A multidisciplinary research tradition. In Olsson, M.O. and Sjostedt, G. (Eds), *Systems approaches and their application: Examples from Sweden*, pp. 291-309. Stockholm: Kluwer.

Fajri, F. Al. 2014. 16 Pompa rusak, Jakarta Utara terancam banjir besar (16 Pumps are broken, North Jakarta is threathened by major floods). *Warta Kota*. 14 November 2014. http://wartakota.tribunnews.com/2014/11/14/16-pompa-rusak-jakarta-utara-terancam-banjir-besar

Farisa, F.C. 2019. KPU Sebut Partisipasi Pemilih pada Pemilu 2019 Capai 81 Persen (KPU notes voter participation in the 2019 election reaches 81 percent). Kompas.

Ferguson, J. 1994. *The anti-politics machine: "development", depoliticization, and bureaucratic power in Lesotho.* Minneapolis; London: University of Minnesota Press.

Firman, T. 2004. New town development in Jakarta Metropolitan Region: A perspective of spatial segregation. *Habitat International* 28(3): 349-368.

Firman, T.; Surbakti, I.M.; Idroes, I.C. and Simarmata, H. a. 2011. Potential climate-change related vulnerabilities in Jakarta: Challenges and current status. *Habitat International* 35(2): 372-378.

Fontana, B. 2010. Political space and hegemonic power in Gramsci. *Journal of Power* 3(3): 341-363.

Furlong, K. 2014. STS beyond the "modern infrastructure ideal": Extending theory by engaging with infrastructure challenges in the South. *Technology in Society* 38: 139-147.

Geels, F. 2005. Co-evolution of technology and society: The transition in water supply and personal hygiene in the Netherlands (1850-1930)-a case study in multi-level perspective. *Technology in Society* 27(3): 363-397.

Gober, P.A.; Strickert, G.E.; Clark, D.A; Chun, K.P.; Payton, D. and Bruce, K. 2015. Divergent perspectives on water security: Bridging the policy debate. *The Professional Geographer* 67(1): 62-71.

Goh, K. 2019. Urban waterscapes: The hydro-politics of flooding in a sinking city. *International Journal of Urban and Regional Research* 43(2): 250-272.

Grasham, C.F.; Korzenevica, M. and Charles, K.J. 2019. On considering climate resilience in urban water security: A review of the vulnerability of the urban poor in sub-Saharan Africa. *WIREs Water* 1-11, https://doi.org/10.1002/wat2.1344

Gunawan, R. 2010. *Gagalnya sistem kanal: Pengendalian banjir Jakarta dari masa ke masa (The failure of the canal system: Jakarta's flood control strategy from time to time)*. Jakarta, Indonesia: Kompas.

Gutiérrez, R.A. 2010. When experts do politics: Introducing water policy reform in Brazil. *Governance: An International Journal of Policy, Administration and Institutions* 23(1): 59-88.

Harbers, H. 2005. Introduction: Co-production, agency and normativity. In Inside the politics of technology: Agency and normativity in the co-production of technology and society Harbers, Hans, pp. 10-27. Amsterdam, the Netherlands: Amsterdam University Press.

Hadiz, V.R. and Robison, R. 2013. The political economy of oligarchy and the reorganisation of power in Indonesia. *Indonesia* (96): 35-57.

Herzfeld, M. 1991. *The social production of indifference: Exploring the symbolic roots of Western bureaucracy*. New York: Berg.

Huda, L. 2016. Kirim Surat ke Istana, Ahok: Reklamasi Tak Bisa Dibatalkan (Send a letter to the Presidential Palace, Ahok: Reclamation cannot be cancelled). Tempo. https://metro.tempo.co/read/787221/kirim-surat-ke-istana-ahok-reklamasi-tak-bisa-dibatalkan (accessed 1 August 2018)

Iswara, M.A. 2019. Jakarta's giant sea wall gets Dutch, Korean help. *The Jakarta Post*. www.thejakartapost.com/news/2019/07/03/jakarta-s-giant-sea-wall-gets-dutch-korean-help.html (accessed 3 July 2019)

Jensen, C.B. and Morita, A. 2015. Infrastructures as ontological experiments. *Engaging Science, Technology, and Society* 1: 81-87.

Jepson, W.; Budds, J.; Eichelberger, L.; Harris, L.; Norman, E.; Reilly, K.O.; Pearson, A.; Shah, S.; Shinn, J.; Staddon, C.; Stoler, J.; Wutich, A. and Young, S. 2017. Advancing human capabilities for water security: A relational approach. *Water Security* 1: 46-52.

Joy, K.J.; Kulkarni, S.; Roth, D. and Zwarteveen, M. 2014. Re-politicising water governance: Exploring water re-allocations in terms of justice. *Local Environment* 19(9): 954-973.

Kaika, M. 2005. *City of flows: Modernity, nature, and the city*. New York: Routledge.

Karpouzoglou, T. and Vij, S. 2017. Waterscape: A perspective for understanding the contested geography of water. *WIREs Water* 4(e1210): 1-5.

Keil, R. 2000. *Political ecology: Local and global*. London: Routledge.

Khatri, K.B. and Vairavamoorthy, K. 2007. Challenges for urban water supply and sanitation in the developing countries. UNESCO_IHEJune, https://doi.org/10.1201/9780203878057.ch7

Kooy, M.; Walter, C.T. and Prabaharyaka, I. 2016. Inclusive development of urban water services in Jakarta: The role of groundwater. *Habitat International* 73: 109-118.

Kooy, M.E. 2008. *Relations of power, networks of water: Governing urban waters, spaces, and populations in (post)colonial Jakarta*. University of British Columbia.

KPPIP. 2018. Pengolahan air limbah Jakarta (Jakarta's wastewater treatment plan). https://kppip.go.id/proyek-prioritas/air-dan-sanitasi/pengolahan-air-limbah-jakarta/ (accessed 1 August 2018)

Kunio, Y. 1990. Kapitalisme semu Asia Tenggara. Jakarta: LP3ES.

Kusno, A. 2013. The post-colonial unconscious: Observing mega-imagistic urban projects in Asia. In Bharne, V. (Ed), *The emerging Asian city : Concomitant urbanities and urbanisms*, pp. 168-178. Abingdon, UK: Routledge.

Kusno, A. 2015. Power and time turning: The capital, the state and the kampung in Jakarta. *International Journal of Urban Sciences* 19(1): 53-63.

Landström, C. and Whatmore, S.J. 2018. Virtually expert: Modes of environmental computer simulation modeling. *Science in Context* 27(4): 579-603.

Larkin, B. 2013. The politics and poetics of infrastructure. *The Annual Review of Anthropology* 327-343, https://doi.org/10.1146/annurev-anthro-092412-155522

Latour, B. 1987. *Science in action: How to follow scientists and engineers through society*. Cambridge, MA: Harvard University Press.

Leaf, M. 2015. Exporting Indonesian urbanism: Ciputra and the development vision of market modernism. *South East Asia Research* 23(2): 169-186.

Li, T.M. 2007. *The will to improve: Governmentality, development, and the practice of politics.* Durham, NC: Duke University Press.

Linton, J. 2010. *What is water? The history of a modern abstraction*. Vancouver: UBC Press.

Liddle, R.W. 2013. Improving the quality of democracy in Indonesia: Toward a theory of action. *Indonesia* 96: 59-80.

Linton, J. 2014. Modern water and its discontents: A history of hydrosocial renewal. *WIREs Water* 1: 111-120.

Linton, J. and Budds, J. 2014. The hydrosocial cycle: Defining and mobilizing a relational-dialectical approach to water. *Geoforum* 57: 170-180.

Livingstone, D.N. 2011. Environmental determinism. In Agnew, J.A. and Livingstone, D.N. (Eds), *Sage Handbook of Geographical Knowledge*, pp. 368-380. London: SAGE Publications.

Locke, S.F. 2009. How it works: Protecting New Orleans with the world's largest flood pump. *Popular Science*. https://www.popsci.com/scitech/article/2009-08/saving-new-orleans-worlds-largest-water-pump (accessed 11 September 2018)

Loftus, A. 2007. Working the socio-natural relations of the urban waterscape in South Africa. *International Journal of Urban and Regional Research* 31(1): 41-59.

Mahault, B.; Saxena, A. and Nisoli, C. 2017. Emergent inequality and self-organized social classes in a network of power and frustration. *PLoS ONE* 12(2): 1-23.

McDonald, R.I.; Douglas, I.; Revenga, C.; Hale, R.; Grimm, N.; Grönwall, J. and Fekete, B. 2011. Global urban growth and the geography of water availability, quality, and delivery. *Ambio* 40(5): 437-446.

Meehan, K.M. 2014. Tool-power: Water infrastructure as wellsprings of state power. *Geoforum* 57: 215-224.

Molle, F.; Mollinga, P.P. and Wester, P. 2009. Hydraulic bureaucracies and the hydraulic mission: Flows of water, flows of power. *Water Alternatives* 2(3): 328-349.

Mollinga, P.P. 2014. Canal irrigation and the hydrosocial cycle: The morphogenesis of contested water control in the Tungabhadra Left Bank Canal, South India. *Geoforum* 57: 192-204.

Morita, A. 2017. Multispecies infrastructure: Infrastructural inversion and involutionary entanglements in the Chao Phraya Delta, Thailand. *Ethnos, Journal of Anthropology* 82(4): 738-757.

Mouffe, C. 1993. *The return of the political*. London: Verso.

NCICD. 2014. Mastre Plan: National Capital Integrated Coastal Development (draft). November. Jakarta, http://en.ncicd.com/ncicd/downloads/

Nickum, J. 2010. Water policy reform in China's fragmented hydraulic state: Focus on self-funded/managed irrigation and drainage districts. *Water Alternatives* 3(3): 537-551.

Nightingale, A.J. 2011. Bounding difference: Intersectionality and the material production of gender, caste, class and environment in Nepal. *Geoforum* 42(2): 153-162.

Obertreis, J.; Moss, T.; Mollinga, P.P. and Bichsel, C. 2016. Water, infrastructure and political rule: Introduction to the special issue. *Water Alternatives* 9(2): 168-181.

Octavianti, T. and Charles, K. 2018a. The evolution of Jakarta's flood policy over the past 400 years: The lock-in of infrastructural solutions. *Environment and Planning C: Politics and Space* 37(6): 1102-1125.

Octavianti, T. and Charles, K. 2018b. Disaster capitalism? Examining the politicisation of land subsidence crisis in pushing Jakarta's sea wall megaproject. *Water Alternatives* 11(2): 394-420.

OECD. 2018. *Divided cities: Understanding intra-urban inequalities*. Paris: OECD.

Oxfam. 2017. Towards a more equal Indonesia. Jakarta, https://d1tn3vj7xz9fdh.cloudfront.net/s3fs-public/bp-towards-more-equal-indonesia-230217-en_0.pdf

PAM Jaya. 2016. Cakupan layanan air bersih (Water service coverage).

Peet, R. 1988. Wittfogel on the nature-society dialectic. *Political Geography Quarterly* 7(1): 81-83.

Pelling, M. and Blackburn, S. (Eds). 2013. *Megacities and the coast: Risk, resilience and transformation*. London: Routledge.

Rastogi, V.; Tamboto, E.; Tong, D. and Sinburimsit, T. 2013. Asia's next big opportunity: Indonesia's rising middle-class and affluent consumers. BCG Perspectives, www.bcg.com/en-gb/publications/2013/center-consumer-customer-insight-consumer-products-indonesias-rising-middle-class-affluent-consumers.aspx

Robison, R. and Hadiz, V. 2004. *Reorganising power in Indonesia: The politics of oligarchy in an age of markets.* London; New York: Routledge Curzon.

Rukmana, D. 2008. The growth of Jakarta Metropolitan Area and the sustainability of urban development in Indonesia. *The International Journal of Environmental, Cultural, Economic and Social Sustainability* 4(1): 99-105.

Salim, W.; Bettinger, K. and Fisher, M. 2019. Maladaptation on the waterfront: Jakarta's growth coalition and the Great Garuda. *Environment and Urbanization Asia* 10(1): 63-80.

Schmidt, J.J. 2014. Historicising the hydrosocial cycle. *Water Alternatives* 7(1): 220-234.

Scott, J.C. 1998. *Seeing like a state: How certain schemes to improve the human condition have failed*. New Haven: Yale University Press.

Sismondo, S. 2007. Science and technology studies and an engaged program. In Hackett, E.J. (Ed), *The Handbook of Science and Technology Studies*, pp. 13-32. Cambridge, MA: MIT Press.

Sivapalan, M.; Savenije, H.H.G. and Blöschl, G. 2012. Socio-hydrology: A new science of people and water. *Hydrological Processes* 26(8): 1270-1276.

Staddon, C.; Sarkozi, R. and Langberg, S. 2017. Urban water governance as a function of the 'Urban Hydrosocial Transition'. In Karar, E. (Ed), *Freshwater governance for the 21st century*, pp. 81-102. Cham: Springer International Publishing.

Steinberg, F. 2007. Jakarta: Environmental problems and sustainability. *Habitat International* 31(3-4): 354-365.

Strang, V. 2016. Infrastructural relations: Water, political power and the rise of a new "despotic regime". *Water Alternatives* 9(2): 292-318.

Sultana, F. 2013. Water, technology, and development: Transformations of development technonatures in changing waterscapes. *Environment and Planning D: Society and Space* 31(1): 337-353.

Sultana, F. and Loftus, A. 2012. *The right to water: Politics, governance and social struggles*. London: Routledge.

Swyngedouw, E. 2004. *Social power and the urbanization of water*. Oxford: Oxford University Press.

Swyngedouw, E. 2005. Dispossessing H2O: The contested terrain of water privatization of water privatization. *Capitalism Nature Socialism* 16(1): 81-98.

Swyngedouw, E. 2009. The political economy and political ecology of the hydro-social cycle. *Journal of Contemporary Water Research & Education* (142): 56-60.

Swyngedouw, E. 2013. UN Water Report 2012: Depoliticizing water. *Development and Change* 44(3): 823-835.

Swyngedouw, E. 2015. *Liquid power: Contested hydro-modernities in twentieth-century Spain, 1898-2010*. Cambridge, MA; London: The MIT Press.

The Economist Intelligence Unit. 2017. Democracy Index 2016: Revenge of the "deplorables", www.eiu.com/Handlers/WhitepaperHandler.ashx?fi=Democracy-Index-2016.pdf&mode=wp&campaignid=DemocracyIndex2016

The Jakarta Post. 2008. Editorial: Flooded airport access. *The Jakarta Post*. 9 February 2008, www.thejakartapost.com/news/2008/02/09/editorial-flooded-airport-access.html

The Jakarta Post. 2016. Q&A: The problem with Jakarta's land reclamation. *The Jakarta Post*. 7 April 2016, www.thejakartapost.com/academia/2016/04/07/qa-the-problem-with-jakartas-land-reclamation.html

UN. 2018. *World Urbanization Prospects: The 2018 Revision, Key Facts*, https://doi.org/(ST/ESA/SER.A/366).

Wade, M. 2019. Hyper-planning Jakarta : The Great Garuda and planning the global spectacle. Singapore Journal of Tropical geography 40: 158-172.

Walker, G. 2014. Water scarcity in England and Wales as a failure of (meta)governance. *Water Alternatives* 7(2): 388-413.

Warner, J.F. 2008. The politics of flood insecurity: Framing contested river management projects. Wageningen University, the Netherlands.

Webber, D. 2006. A consolidated patrimonial democracy? Democratization in post-Suharto Indonesia. *Democratization* 13(3): 396-420.

Wesselink, A.; Kooy, M. and Warner, J. 2017. Socio-hydrology and hydrosocial analysis: Toward dialogues across disciplines. *WIREs Water* 4(e1196): 1-14.

Winters, J.A. 2012. Pathways to a people's president. *Inside Indonesia* 1-16,

www.insideindonesia.org/index.php?option=com_content&view=article&id=2884:_____pathways-to-a-people-s-president&catid=171&Itemid=129&tmpl=component&print=1&layout=default&page=

Wittfogel, K.A. 1957. *Oriental despotism: A comparative study of total power*. New Haven: Yale University Press.

World Bank. 2017. Indonesia's middle class vital for the country's future. Jakarta, www.worldbank.org/en/news/press-release/2017/12/04/indonesia-middle-class-vital-for-the-country-future

van der Wulp, S.A.; Dsikowitzky, L.; Hesse, K.J. and Schwarzbayer, J. 2016. Master Plan Jakarta, Indonesia: The Giant Seawall and the need for structural treatment of municipal waste water. *Marine Pollution Bulletin* 110(2): 686-93.

Zeitoun, M.; Lankford, B.; Krueger, T.; Forsyth, T.; Carter, R.; Hoekstra, A.Y.; Taylor, R.; Varis, O.; Cleaver, F.; Boelens, R.; Swatuk, L.; Tickner, D.; Scott, C.A.; Mirumachi, N. and Matthews, N. 2016. Reductionist and integrative research approaches to complex water security policy challenges. *Global Environmental Change* 39: 143-154.

Zwarteveen, M. 2017. Hydrocracies, engineers and power: Questioning masculinities in water. *Engineering Studies* 9(2): 78-94.

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