

WestminsterResearch

<http://www.westminster.ac.uk/westminsterresearch>

**Historic Institutionalism and Urban Morphology in Jakarta:
Moving Towards Building Flood Resiliency into the Formal
Planning and Development System**

Mathewson, D.

A copy of the final version of an article published in the Journal of Regional and City Planning, 29 (3), pp.188-209.

It is available from the publisher at:

<https://dx.doi.org/10.5614%2Fjrcp.2018.29.3.2>

This work is licensed under CC-BY-NC, a [Creative Commons Attribution-NonCommercial 4.0 International License](#).

The WestminsterResearch online digital archive at the University of Westminster aims to make the research output of the University available to a wider audience. Copyright and Moral Rights remain with the authors and/or copyright owners.

Whilst further distribution of specific materials from within this archive is forbidden, you may freely distribute the URL of WestminsterResearch: (<http://westminsterresearch.wmin.ac.uk/>).

In case of abuse or copyright appearing without permission e-mail repository@westminster.ac.uk



Historic Institutionalism and Urban Morphology in Jakarta: Moving Towards Building Flood Resiliency into the Formal Planning and Development System

David Wallace Mathewson¹

[Received: 23 February 2018; accepted in final version: 10 July 2018]

Abstract. *This paper examines issues around flooding and rapid urban development in Jakarta, specifically the manner in which the former has influenced the spatial growth of the city over time. It takes a historic-institutionalism perspective within the context of changing government responses to flood management, where previous approaches failed to take into consideration existing local ecology, flood patterns and natural drainage systems. Jakarta is slowly moving towards more sustainable and resilient approaches to flood management through pilot programmes aimed at reclaiming or restoring water bodies while creating urban green space to assist with water absorption, despite the local government not having incorporated sustainable flood management systems or mitigation measures into the formal planning system. This paper shows how flooding has influenced spatial development and urban morphology in the city historically, which has led the city administration to the realisation that new approaches are required. The methodology includes document and literature research, GIS as well as satellite based mapping and imagery to determine spatial development patterns and where additional mitigation measures may be required, as well as flooding and drainage documentation. The paper reveals a series of potential strategies for the initial stages of planning policy implementation and a potential framework for developing planning-incorporated measures at a wider scale across Jakarta's affected areas. This study has wide implications for a number of large developing cities in the Global South that face multiple development challenges in addition to flooding.*

Keywords. *Historic institutionalism, urban morphology, flood resiliency, urban planning.*

[Diterima: 23 February 2018; disetujui dalam bentuk akhir: 10 July 2018]

Abstrak. *Makalah ini mengkaji isu-isu seputar banjir dan pembangunan perkotaan di Jakarta yang cepat, khususnya bagaimana fenomena banjir mempengaruhi pertumbuhan spasial kota dari waktu ke waktu. Dibutuhkan perspektif historis-institusionalisme dalam konteks perubahan respons pemerintah terhadap manajemen banjir, yakni ketika pendekatan sebelumnya gagal mempertimbangkan ekologi lokal yang ada, pola banjir dan sistem drainase alami. Jakarta perlahan bergerak menuju pendekatan manajemen banjir yang lebih berkelanjutan dan tangguh melalui program percontohan yang bertujuan untuk merebut kembali atau memulihkan badan air sambil menciptakan ruang hijau perkotaan untuk membantu penyerapan air meski pemerintah daerah belum memasukkan sistem manajemen banjir berkelanjutan atau langkah-langkah mitigasi ke dalam sistem perencanaan formal. Makalah ini menunjukkan bagaimana banjir telah mempengaruhi perkembangan ruang dan morfologi perkotaan di kota secara historis yang telah menyebabkan pemerintah kota untuk menyadari akan perlunya pendekatan baru. Metodologi*

¹ Department of Planning and Transport, University of Westminster, M226, 35 Marylebone Road, London NW1 5LS, United Kingdom . E-mail: d.mathewson@westminster.ac.uk.

makalah mencakup penelitian dokumen dan literatur, pemetaan dan citra berbasis GIS dan satelit untuk menentukan pola pengembangan ruang apabila langkah-langkah mitigasi tambahan mungkin diperlukan, serta dokumentasi banjir dan drainase. Makalah ini mengungkapkan serangkaian strategi potensial untuk tahap awal implementasi kebijakan perencanaan dan kerangka potensial untuk mengembangkan langkah-langkah yang memasukkan perencanaan pada skala yang lebih luas di seluruh wilayah yang terkena dampak di Jakarta. Studi ini memiliki implikasi luas bagi sejumlah kota besar yang berkembang yang menghadapi berbagai tantangan pembangunan selain banjir.

Kata Kunci. *Institusionalisme historis, morfologi perkotaan, ketahanan banjir, perencanaan kota.*

Introduction

This study seeks to examine a gap in current ideas between the west and global south considering discourses around flooding and rapid urban development. An historic analysis of Jakarta was used to illustrate potential consequences for other cities in Southeast Asia facing similar challenges. This research examines the role of government responses to flooding, which have both shaped and reacted to the city's spatial and urban form over time in the form of policies, strategies or mitigation measures, for example where previous approaches failed to take into consideration existing local ecology, flood patterns and natural drainage systems. It also investigates the potential of urban morphological tools as a methodology to appreciate the changing form of the city and the relationship of spatial development to institutional decision-making on flooding historically.

This dual approach, the combination of historical institutionalism and urban morphology is useful because it could potentially link spatial outcomes and their implications for flooding to planning policy over time. It may also highlight changes in the city over time, while providing an understanding of the influence of institutional decision-making on the physical urban fabric of the city. These findings are preliminary, though they have the potential to develop in complexity if the research were to be developed further.

Jakarta is an emerging world city with a metropolitan population of between than 28 and 30 million people inhabiting a highly dense built-up area (Priatmodjo, 2016; Jakarta Open Data, 2017). It is a city that has undergone rapid urbanisation while being faced with significant challenges to sustainable development, including flooding, drainage, water and solid waste management, air pollution, seawater intrusion, land subsidence, natural hazards and disasters, traffic and congestion, access to affordable housing, as well as effective urban management and governance (Steinberg, 2007; Kops, 2012).

Methodology

A qualitative methodology utilising historic institutionalism and document analysis is employed to understand government responses over time in relation to urban development and flooding or, in absence of such decisions, failings of governance. The historic institutionalist analysis implies a description of formal and informal rules and norms (in this case specifically embedded in policy documents on flooding) over a period of time. It stands for an approach to understanding governance, politics and social change, for example as outlined by Steinmo (2008). In view of the purposes of this study, historic institutionalism helps to understand the specifics of the Indonesian

case and where governmental responses to flooding were found to have shaped the spatial layout of the city over time.

In addition, historic maps and satellite imagery are used together with an urban morphological analysis, initially based on those of M.R.G. Conzen, which remains relevant today because it can shed light on spatial development patterns historically in relation to document study on the issue, as noted by a number of authors, including Whitehand (2007), Ford (1993), Cybriwsky and Ford (2001), Kusno (2011), as well as Sanders and Baker (2016). This is partly because of the mixture of European, indigenous Javanese (*desas* and *kampungs*), postwar linear development and international high-rise and mega-project typologies that comprise the overall urban form of Jakarta (Cybriwsky and Ford, 2001). Conzen's analytical methodologies have been widely employed in Western urban design practice since at least since the 1970s, as described by Marzot (2002), in Sanders and Baker (2016, p. 213) and have become the industry standard for spatial mapping and analysis of development at the urban scale.

Two pilot projects for blue-green solutions in Jakarta, Waduk Pluit and Waduk Ria Rio, are reviewed using document research (Priatmodjo, 2016) in order to understand what efforts are currently being realised in the city with respect to flood resiliency and which recommendations could potentially be made at the strategic and policy level for implementation across the wider city. The difficulties associated with implementing such flood mitigation methods within a mega city in the developing world also become clear, in particular the necessity of responding to the proliferation of informal developments that often occupy waterfront land in Jakarta due to a lack of affordable housing and land tenure options in the city. This area of the research is also further developed to include additional current best-practice thinking both from the region and beyond, as the wider study moves forward.

The Problem of Flooding in Jakarta

Flooding in Jakarta results from a number of factors. The absence of effective flood control – a long-term challenge for the city administration – is partly caused by deforestation of Java's interior, leading to flash floods in Jakarta, as well as rising sea levels and salt water intrusion caused by depletion of ground water (Steinberg, 2008). In addition, the water capacity of the thirteen rivers and canals that crisscross the city, flowing northwards into the Java Sea (Priatmodjo, 2016), has been reduced for decades as a result of the ongoing historic development of informal settlements along the city's waterways, which has caused them to narrow. The dumping of refuse into the city's canals and rivers has caused further reduction in capacity and the uncontrolled growth of water hyacinth on existing water basins, which clogs water flow and allows silt to gather, reduces capacity even further (Priatmodjo, 2016; Steinberg, 2007; Steinberg, 2008). As if these problems were not enough, ground water absorption has been reduced in Jakarta due to widespread urbanisation and deforestation, made worse by a lack of green space in the city (currently only ten percent, though the Spatial Planning Act of 2007 requires thirty percent of total land area in Indonesian cities to be green open space) and uncontrolled development on the urban periphery (Steinberg, 2007; Priatmodjo, 2016). Fiisabiilillah and Maulana (2016) also indicate that between 80,000 and 100,000 hectares of agricultural land and wetlands are lost each year in Indonesia due to urban development and expansion. Within this context there has been a marked failure by the city administration to invest in infrastructure over several decades, manifested by an unfinished canal project left over from the time of the Dutch colonisation (Steinberg, 2007; Priatmodjo, 2016). However, the problems of flooding are not new to Jakarta and have been plaguing the city for centuries.

Indonesian Morphology: Jakarta

This section provides an initial urban morphological analysis of urban Jakarta, thereby pointing out physical aspects such as land use and building form. Though Jakarta's urban history dates back to the 5th century, when it was called Sunda Kelapa, a port city of the Tarumanagara kingdom, it was the Dutch who were responsible for the current layout of the historic centre, Batavia, capital of the Dutch East Indies, dating from the 17th century (Priatmodjo, 2016). Batavia was laid out (see Figures 1-4) by the Dutch in 1617-19 using their *waterstad* (water city) typology, loosely based on Amsterdam (Priatmodjo, 2016). This represents the first imposition of a European typology into the Javanese context and resulted in the total destruction of the previous indigenous city by Dutch Governor Jan Pieterszoon Coen. It also constitutes a reordering of the Javanese urban model, which had previously been based on Hindu-Buddhist cosmic orientations around a traditional open space (*alun-alun*) or palace (*keraton*) of the local ruler (Ford, 1993).

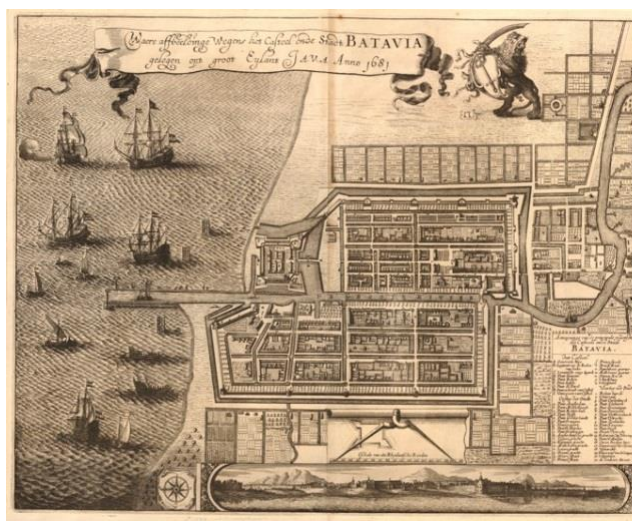


Figure 1. Batavia, 1681. Source: British Museum (2017).



Figure 2. Batavia and surroundings, 17th or 18th century. Source: Weduwe van Jacob van Meurs (2018).

narrow houses in the style of Amsterdam, ill-suited for the tropical climate (Ford, 1993). Despite the city's nickname as the 'Jewel of Asia', 'Pearl of the Orient' or 'Queen of the East', the city's beauty gradually disappeared after the early 19th century when the Dutch colonial government decided to relocate their administrative centre 4 km to the south to a new garden district called Weltevreden, today's Medan Merdeka (Priatmodjo, 2016). This shift southward had consequences for old Batavia, for it was virtually abandoned by the European community and given over to the Chinese and other Asian merchants and traders who were now allowed to occupy the colonial centre in its entirety. This northern area of Jakarta remains a predominantly Chinese district today.

The European elite neglected old Batavia as they sought the greener open spaces of Weltevreden, away from the compact and poorly drained old colonial centre. The new district was situated at some distance from old Batavia because swampy ground around the old centre and a dense network of indigenous villages in surrounding areas precluded the development of suburbs built close to the old centre (Ford, 1993). Weltevreden was developed around two large, open green spaces, the Koningsplein and Waterlooplein, both of which were beyond the smells of the canals in the old centre. In addition, the water wells in Weltevreden did not suffer from salt water intrusion, allowing for more easily sourced drinking water (Ford, 1993). This area with its large open, green spaces emulated the then current Romantic design trends in Europe, with low, neoclassical buildings erected in parklike settings. These early developments were later to be supplemented by Javanese-Dutch hybrid bungalows and public buildings that took account of the local climate (Ford, 1993). At this time the old city was fully abandoned and 17th century Dutch-style port cities fell out of fashion. By now the European elite had started to move inland to newly pacified areas that had been unsafe in earlier centuries (Ford, 1993), further isolating Europeans from the Chinese and Javanese. As a result of this development, the Koningsplein and the viceregal palace with the classical villas of Weltevreden became the contemporary equivalent of the Javanese *alun-alun* and *keraton* (Ford, 1993), serving as a pattern for other Indonesian cities of the period (see Figures 5-6).

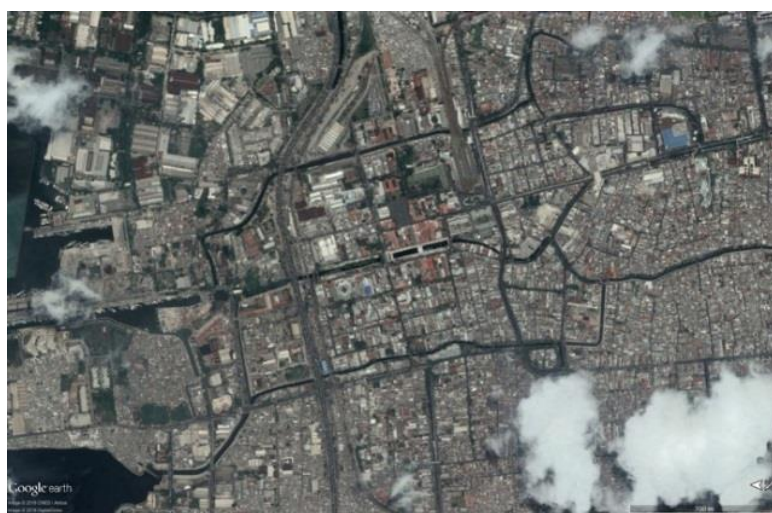


Figure 5. Kota Tua (formerly Batavia) today. Source: Google Earth (2018).

The migration of the colonial elite and associated administrative development to the south of the old colonial centre led to the development of what initially became a linear city, where built-up area flanked the main north-south trunk road (today's Jl. Gajah Mada) connecting Batavia in the

north to Weltevreden in the south. By the mid-19th century, this strip of developed land had grown into what Ford refers to as a ‘dumbbell’ shape with the old and new centres at either end (Ford, 1993) and lower-density development fanning out from the north-south trunk road towards the countryside. Later in the 19th century the land flanking the trunk road gradually filled-in with *kampung* (informal settlement) or *desa* (collections of rural villages) in what Ford calls a ‘new dumbbell-infill pattern’, which came to dominate the morphology of Indonesian cities and continues to do so to this day (1993, p. 377).



Figure 6. Medan Merdeka (Koningsplein and Weltevreden) today. Source: Google Earth (2018).

Following independence from the Netherlands in 1949, the new regime under President Soekarno promoted the concentration of power in central government hands, increasing Jakarta’s importance as the national capital (Ford, 1993). The government began to fund urban development projects in the city as Soekarno, who associated the regime with the Non-Aligned Movement, sought to rebuild Jakarta as a capital the developing world could be proud of, as conditions during the Japanese occupation during World War II had caused the deterioration of much of the city centre, while Weltevreden remained incomplete (Ford, 1993). This money was used to build monumental projects, such as the 161 m tall Monas (National Monument) on the newly rechristened Medan Merdeka (Independence Square), formerly the Koningsplein, in 1961. In addition, the National Stadium was built for the Asian Games of 1962, a series of wide boulevards and roundabouts with fountains and heroic statues were laid out, lined with important buildings, including the new Hotel Indonesia, the city’s first international standard luxury hotel, as well as a ‘Brasilia-style’ complex of government office buildings erected (Ford, 1993, p. 378).

Also during this period, a new residential district 6 km to the south of Medan Merdeka was built. Kebayoran Baru was to epitomise modernity and would be filled in with low-rise buildings laid out in spacious landscaped surroundings, with Western-style suburban housing (Ford, 1993). This repeat of a retreat to the south for elites was easily appropriated by the new regime and continued the development of monumental spine trunk roads, connecting Kebayoran Baru with Medan Merdeka to the north with more linear development. Much of this effort was to modernise the city and place it at the level of other emerging capitals that fulfilled Sukarno’s vision of a modern metropolis, such as Brasilia in Brazil (Ford, 1993), developed during the late 1950s. This effort also served to separate the city from uncomfortable associations with its colonial past (see Figure 7-9).



Figure 7. Diagram showing the spine link between old Batavia (Kota Tua) and Weltevreden (Medan Merdeka). Source: Google Earth (2018).

Soekarno was ousted in 1967, only to be followed by another authoritarian regime, the New Order of Soeharto, which pursued free market economics and was supported by the United States. This pro-capitalist, pro-Western, pro-development and pro-foreign-investment government facilitated the infiltration of the city by foreign corporations who built Western food chains like McDonald's, KFC and Pizza Hut, symbolically replacing the socially-oriented, state sponsored projects of the past (Ford, 1993). During this period, which was prosperous for the country due to a boom in tourism and oil revenues, the city's skyline began to rise as the first high-rises were built along its monumental roadways. Corporate banking headquarters in glass towers and high-rise apartments were built, along with air-conditioned shopping malls. For example, along Jl. Jenderal Sudirman, the city's main traffic spine, more than fifty mid- and high-rise towers were constructed between 1970 and 1990 (Ford, 1993). This wholesale redevelopment constituted a re-imaging of the post-colonial, modernist city into one with a more international appearance, something Ford refers to as "a dazzling veneer of Westernisation" (1993, p. 381).

Since the late 1960s, *kampungs* located near Jl. Jenderal Sudirman have received attention and funding for slum upgrading projects. These *kampung* improvement projects, some of which were financed by intergovernmental organisations such as the World Bank, have provided potable water, electricity, paved roadways, schools and limited urban services to many areas formerly neglected. Housing has also been improved, with shanties and bamboo structures replaced by permanent structures, reaching nearly 3 million *kampung* inhabitants by the early 1990s (Ford, 1993). Despite this, urban poverty remains a major challenge in Jakarta, with up to 30 percent of the city's inhabitants continuing to live in *kampungs* or on illegally occupied land along riverbanks, on empty or abandoned plots, or on floodplains (McCarthy, 2003).



Figure 8. Traditional Dutch houses, Kota Tua. Source: Mathewson, D.W. (2015).



Figure 9. The former Stadhuis (city hall), Kota Tua. Source: Mathewson, D.W. (2015).

From the 1950s, new satellite industrial and residential areas were developed around Jakarta in towns like Bogor, Bekasi and Tangerang. This extended the urban territory into an extended urban region including Depok, Tangerang and Bekasi, referred to as Jabodetabek (Rustiadi, et al., 2015). Ford argues that despite large acquisitions of territory since the 1950s, Jakarta was underbounded, with Jabodetabek containing 11.4 million inhabitants and the city itself 8.2 million by 1990 (Ford, 1993). The city has maintained its preeminent position economically and politically, despite processes of decentralisation since Soeharto's ouster and the implementation of democracy in 1998. Indeed, Ford writes that "most of the new urban development was confined to metropolitan Jakarta until the late 1980s," (1993, p. 383) and this continued until the 1990s when other regions of the country such as Sumatera and Kalimantan as well as other Javanese cities like Surabaya, Semarang and Medan began to demand more of a share in the country's economic development (see Figures 10-11).



Figure 10. Linear development along Jl. Jenderal Sudirman. Source: Google Earth (2017).



Figure 11. Linear development along Jl. R.S. Fatmawati. Source: Google Earth (2017).

Historic Institutional Responses: Jakarta

One of the primary assertions of this study is that the history of governmental responses in Jakarta is linked to the urban morphology and spatial development of the city over time. The efforts by the Dutch to lay out a new settlement along European lines resulted in the imposition of an alien urban model on the Javanese landscape. This typology was manifested in spatial segregation where the Dutch controlled the cities inhabited by Europeans and Chinese immigrants, the latter of which dominated the commercial activities of urban centres, while the former controlled the colonial administration and the military (Ford, 1993). In this model, the Javanese were considered hostile and thus too dangerous and unskilled to be allowed to inhabit European cities and were therefore relegated to their traditional urban centres inland or to *kampungs* and *desas* around Batavia and other burgeoning colonial settlements (Ford, 1993). Thus it appears that from an early era in colonial rule segregation was a spatial tool utilised by the Dutch. Those on the lowest economic or social rung of the ladder who inhabited *kampungs* and *desas* historically suffered

from significant environmental problems such as flooding, while the rich and well-off moved away from these problems around low-lying areas and waterways to higher ground (Ford, 1993). This pattern is apparent today with the large areas of *kampungs* and similar informal settlements clustered around canals and rivers in Jakarta.

In the first planning effort in Jakarta, directed by the Dutch Governor Jan Pieterszoon Coen in 1617-19, the original Javanese settlement of Jayakarta (City of Victory) was demolished (Silver, 2008) to be replaced with what was essentially a replica of Amsterdam on the Java Sea. In what Steinberg (2007) refers to as the first case of technocratic planning, this wholly European city was established complete with a rectilinear set of urban blocks and streets as well as canals named for Dutch cities and provinces, along with the straightening of the Ciliwung River into a large canal. Thus, the new city of Batavia was born. Chandramidi (2013) argues that this evidence indicates a government-driven, top-down approach to planning, with a focus on technical flood mitigation and water drainage measures.

Despite these efforts at planning a formal city, informal development nevertheless occurred, as already noted by Ford (1993), in the *kampungs* and *desas* that surrounded the new city outside of its walls. These areas developed spontaneously, without formal plans (Cybriwsky and Ford, 2001), much in the same way as rural villages develop organically. These informal areas were the first examples of unplanned development expanding inland from the coast. Chandramidi (2013) notes that this displays a lack of stakeholder or community engagement on the part of the government, i.e. the colonial administration at the time, a pattern which was apparently to be repeated. Further government-driven initiatives can be seen in the out-migration of Europeans south from old Batavia to Weltevreden (Chandramidi, 2013) and even as far as Bogor in the early 19th century. The colonial government moved its administration to Weltevreden at this time, while the viceroy built a summer palace at Bogor, where Dutch and other Europeans escaped from the heat (Cybriwsky and Ford, 2001). These planning efforts appear aimed at providing for the elite while ignoring the majority of the public at the time (Chandramidi, 2013).

During the colonial era already, as noted by Ford (1993), the canals built by the Dutch failed to drain properly and caused flooding. Caljouw et al. (2005) notes the stench of the canals at low tide that was already well-known during this period. The canals were also utilised as a dumping ground for waste, as noted by Steinberg (2007), Ford (1993) and Cybrinsky and Ford (2001), which was the cause of dysentery, typhoid and malaria outbreaks. This indicates a lack of understanding of basic health and hygiene by the government at the time, as well as the need to build in a manner that takes account of the existing climate and environment, in other words, building resiliency into the urban development process (Chandramidi, 2013). Despite these problems, planners had already been considering the perennial causes of flooding at least as far back as the early twentieth century. In 1922, De Haan published a document listing the causes of flooding in Batavia, including low land levels, minimal tidal changes, the eradication of forests upstream, erosion of canal and river banks as well as the use of these water bodies as destinations for solid waste dumping (Caljouw et al., 2005).

Caljouw (2005) notes that during the 19th century, government officials and local inhabitants appeared fatalistic in their acceptance and inevitability of flooding, noting a publication by Abeyasekere (1989, cited in Caljouw et al., 2005, p. 467), which indicates that despite a high and regular frequency of inundation during the 19th century, the government failed to take action, only responding after extreme events caused widespread damage. Gunawan (2010) explains that no public or stakeholder engagement was undertaken, except following major flood events, indicating a lack of appreciation for the need to involve local people and organisations necessary

to understand the issues and how to respond to them collectively. In 1910, a major flood event forced all normal activities to cease, while severely disrupting mobility and damaging transport infrastructure (Gunawan, 2010). It was only following this major inundation that water pumps were installed in high-risk areas and the construction of new canals commenced, according to Chandramidi (2013), who argues this illustrates a deficiency of learning from experience. Gunawan (2010) puts the lack of sufficient flood management during the colonial era down to a lack of adequate funding, which resulted in numerous unimplemented plans, where the cost of such projects would have been equal to that of the entire city budget at the time. The canals that were built served areas inhabited by the colonial elite, who were also the primary beneficiaries of protective measures implemented following a major flood in 1918 (Gunawan, 2010). Chandramidi notes that this prioritisation of elite areas hampered efforts to build relationships between the government and local stakeholders, leading to a distrust of the colonial government (2013).

Formal flood planning began in 1910, with the development of a comprehensive plan (Salim & Firman, 2011), followed by another in 1930, which followed the earlier 1910 framework, though Steinberg (2008) regards both plans as ineffective because Batavia did not have wealthy sponsors to fund those efforts. Chandramidi (2013) explains that the individuals concerned were architects rather than business elite, indicating an exclusion of relevant actors required for implementing such plans. The final plan developed by the colonial regime was one drawn up in 1948 for Kebayoran Baru by Professor Ir. V.R. van Romondt at the Institute of Technology in Bandung, which designated high ground between two rivers. The rivers and adjacent lands were planned as green spaces to act as flood zones. However, these areas were developed informally, which resulted in regular flooding during the rainy season (Chandramidi, 2013). This indicates that while expert advice was sourced to advise on planning, it went unheeded by the planning authorities who failed to stop the unregulated development.

Post-independence planning during the 1950s was politically driven, characterised by government-driven initiatives under a strong central state, led by the first president, Soekarno (Salim and Firman, 2011; Hudalah and Woltjer, 2007). Soekarno's efforts to rebuild Jakarta on a grand scale were intended to physically represent the struggle against imperialist regimes [18]. In the building of his new, monumental national monuments and facilities, Soekarno symbolically homogenised the various areas of Jakarta, utilising unifying symbolic layers, enormous statues and buildings to further his nation-building effort (Salim and Kombaitan, 2009). During this era, the Concept Plan of 1952 was developed, which redesigned the city to be surrounded by rings of highways and a green belt to act as a separation between the surrounding towns of Bogor, Tangerang and Bekasi (Chandramidi, 2013). The Outline Plan of 1957 designated these cities for further future development outside the city (Silver, 2008), which indicated an understanding by the planning authorities of the need to use planning as a tool for protecting vulnerable open spaces, a form of resiliency planning according to Chandramidi (2013).

The Master Plan of Jakarta for 1965-1985 was set out in 1966 by the Special Capital Region (DKI) of Jakarta government, which designated a metropolitan region with Tangerang, Serpong, Depok and Bekasi functioning as satellite cities (Steinberg, 2007). The plan set out strategies for responding to flooding, one of five important challenges at the time. It included measures for comprehensive flood control at the regional level, which included infrastructure investment, drainage regulations for new settlements and set the outer limits of the region at the Cikarang River to the east, at the Cisadane River to the west and the Puncak mountain range to the south of Bogor as the southern boundary, which as a comprehensive approach indicates the application of expert knowledge applied in a complex manner (Chandramidi, 2013). Chandramidi further

notes that since the masterplan's flood mitigation measures were not based on administrative boundaries but utilised a river basin approach incorporating Jakarta as well as areas outside of the city, it is an approach that illustrates the need to include cross-border cooperation between governments at the municipal and provincial level to achieve resilient planning in the metropolitan region (2013). The spatial plan of Jakarta also mapped areas with potential for flooding in order for planning authorities to understand where to limit development (Gunawan, 2010).

The government's awareness of flood management and its importance to planning began in 1965 with Presidential Degree 183/1965, which proscribed as vital all works related to flood mitigation, demonstrating the seriousness with which the authorities regarded flooding. This meant that any subsequent flood management not carried out properly could be punished with legal action (Gunawan, 2010). This is supported by Hudalah and Woltjer (2007), who argue that the constitution requires the government to effectively manage all land, water, spaces and natural resources to the greatest benefit of the country's citizens. The Basic Agrarian Law of 1960 regulated the authority to utilise and develop land while also regulating the relationship between people and land, indicating a top-down approach from government, where it exercised control over the public and stakeholders (Chandramidi, 2013).

Technocratic planning has been utilised in Indonesia since independence in 1949, through Presidential Decree 3/1947 on the committee for scientific strategy, which signifies a strong emphasis on expert knowledge, which led to the technocratic planning tradition still in place today (Chandramidi, 2013). These strong, state-driven initiatives continued into the regime of Suharto's New Order (which ousted Soekarno in 1967), where large-scale, prestigious projects were continued. However, planning during the New Order, while also technocratic, was focused on economic development utilizing neo-liberal policies and free-market mechanisms, based on an economy with a high degree of external foreign financing (Chandramidi, 2013). Soeharto moved the economy away from state-directed approaches to economic liberalisation (Cowherd, 2005). The neo-liberal ideologies promoting free markets as the sole effective economic system led to the removal of government roles from numerous policy areas under Soeharto, where the government would be seen to guide investment and promote development rather than direct or influence the realisation of plans (Hudalah and Woltjer, 2007). The development of new industrial zones at Tanjung Priok and Pulo Gadung, aimed at attracting foreign investment to the new international airport at Soekarno-Hatta are examples of this (Cybriwsky and Ford, 2001). This demonstrates a move away from government-driven initiatives of the previous regime and the inclusion of new actors – in particular the private sector – in the development of the city (Chandramidi, 2013).

A body was established in the 1970s to manage flooding in city, the *Proyek Pengendalian Banjir Jakarta*, or PBJR (Jakarta Flood Management Project), which succeeded in developing the Master Plan of 1973 in cooperation with a Dutch flood consultant, Nedeco (Chandramidi, 2013). This flood plan utilised a horse-shoe system where upstream water would be captured by a half-circle canal placed outside of the city (Gunawan, 2010). This was the first time since independence where the government took the opportunity to engage with international specialist consultants, showing a high degree of expert knowledge engaged in the planning and flood management system. However, plans took time to be realised, as evidenced by the construction of the East Flood Canal, originally planned in 1973 but only initiated in 2006 (Chandramidi, 2013).

During the 1970s and 1980s, flooding increased significantly, linked to encroachment of informal developments on water bodies, which is a positive development, as it indicates an increased awareness of flood causes. Additionally, the expansion of informal settlements illustrates the

rural-to-urban migration where new developments under construction and economic activity attract people seeking improved living conditions (Chandramidi, 2013). In 1983, another major flood event occurred, causing inundation of Kebon Nanas, a location of important government facilities in Central Jakarta (Gunawan, 2010). This prompted the government to implement more flood management projects, this time funded with aid money from the Japanese government. The projects included flood management, river clean-up and dredging, land acquisition and improvement of the drainage system, which indicates an effort to access international research best placed to implement the necessary infrastructure to respond to flooding (Chandramidi, 2013).

Also adding to the build-up of flood events was the increase in development in Jakarta, specifically of new towns built by private developers on the periphery of the city and aimed primarily at the middle and upper income groups of society. Pondok Indah, the first project of this typology, was constructed in 1970 in South Jakarta, despite the fact that this area was earmarked by the Spatial Development Plan as a green buffer for satellite cities and for water catchment areas (Chandramidi, 2013). Many new housing developments followed, often built along toll roads leading out to Bogor, Tangerang or Bekasi. These communities, initially planned as self-sufficient developments, ended up merely as dormitory communities that created an ever-growing stream of commuters in and out of the city (Cybriwsky and Ford, 2001). These communities serve as an example of the conflict of interest between the government and private developers, where new development was built on unsuitable land or in the wrong locations, which ultimately compromised the resilience of the city to flooding (Chandramidi, 2013). Moreover, visual research utilising historic satellite imagery clearly indicates water retention ponds that have disappeared due to development over the past decade (preliminary visual mapping research undertaken by the author, 2016).

Cybrinski and Ford (2001) note another policy shift that has impacted the spatial development of the city: the DKI government has prioritised increased specialisation in finance and service industries while manufacturing and industrial functions have been transferred to surrounding towns and cities. Since the 1980s, large areas of *kampungs* in the city have been demolished and replaced with high-rise developments and shopping malls, where former residents were forced into relocation to apartments built by the government. This is a clear indication of how the physical development of Jakarta is driven by market forces (Chandramidi, 2013), where the needs of local residents are not protected or prioritised by the government.

Chandramidi (2013) argues that the most important development plan for Jakarta during Soeharto's tenure was the Master Plan for the Special Capital Region (DKI) of Jakarta (RUTR 1985-2005), which aimed to integrate regional and city strategies while addressing the imbalance between economic and physical solutions, aiming at stronger community participation in the implementation of the Kampong Improvement Programme, itself designed to reduce the chaotic development of informal settlements at the city's periphery. This illustrates what could be a first attempt to include local communities in the planning of their neighbourhoods. However, in practice, as Steinberg (2007) notes, market forces have overtaken the aims of the document. Rahmawati (2015) suggests that while spatial plans for Jakarta are aimed at primary guidance for managing land-use change, in practice these documents are not implemented or enforced well by local governments due to power dispersal at the decentralised level of governance, which suggests a failure of decentralisation practices undertaken in recent years. Additionally, another problem with the spatial plans is that the land allocated to water catchment was reduced from 37 percent to less than 26 percent and this land was further reduced in the subsequent Spatial Plan 2000-2010 to less than 14 percent (*Tempo*, 2007).

The post-Soeharto era in Jakarta is characterised as institutionally decentralised with a focus on metropolitan coordination or cross-boundary cooperation at the local level. This increasing localisation of urban and regional development involves the central cities (*kota*) and their surrounding districts (*kabupaten*) of DKI. The urgency around flooding has also intensified the need for governance arrangements at the regional level due to the need for coordination of efforts along rivers and canals, both upstream (where causes of flooding often emerge) and downstream (where consequences of flooding are readily apparent). Therefore the implication is that decentralised authority can be supplemented by provincial coordination and control.

Summary of Initial Findings

Table 1 summarises the key preliminary findings of urban morphology in Jakarta in conjunction with historical institutional periods. Though preliminary, this table helps to understand what correlation there is between historic institutional forms and related policy decisions and the spatial development of the city, in particular with regard to specific urban morphological patterns or typologies. This already indicates a clear influence of policy on the development of urban form in Jakarta.

Table 1. Some key preliminary findings. Source: Mathewson, D.W. (2018).

Historical institutional era	Characteristics	Specific or related policies	Time frame	Urban morphological era, typology or description	Characteristics
Sunda Kelapa	Indigenous Javanese kingdom		5 th century CE -1617	Pre-European coastal city (Ford, 1993)	Javanese pre-colonial coastal city; Hindu-Buddhist cosmological cities or palace cities (largely retained by Islamic states post 16 th century), (Ford, 1993)
	Segregation of ethnic groups (Ford, 1993) and (Chandramidi, 2013); first technocratic planning through demolition of Sunda Kelapa by Dutch Governor in 1619 (Steinberg, 2007), (Cybriwsky and Ford, 2001); no stakeholder engagement (Chandramidi, 2013); lack of acknowledgement of flooding problems and severe flood problems already at this early stage (Steinberg, 2007), (Cybriwsky and Ford, 2001)	Governor Jan Pieterszoon Coen plan for Batavia (1617-19)	1617/1619 - 1808	Batavia (Dutch port city), (Ford, 1993) and (Chandramidi, 2013)	Cities with a Dutch-style port or European style core adjacent to a Chinatown for Chinese and other Asian merchants or traders (both segregated) with indigenous Javanese <i>desas</i> beyond the city fortifications in <i>kampungs</i> and <i>desas</i> , which developed spontaneously without formal planning (Ford, 1993) and (Chandramidi, 2013); Dutch-style canals and rivers were sluggish and malaria-infested and flood-prone with tall, narrow Dutch houses and dense, tightly packed Chinese shophouses (Ford, 1993)
Early Colonial Period					

Historical institutional era	Characteristics	Specific or related policies	Time frame	Urban morphological era, typology or description	Characteristics
Middle Colonial Period	Further segregation of Europeans who moved six kilometres south of Old Batavia (Kota Tua) to Weltevreden; Chinese allowed to fully occupy old Batavia (Kota Tua) (Ford, 1993)	Plan for Koningsplein and surrounding Weltevreden (1808-11)	1808/1811 – Mid 19 th century	Weltevreden (European monumental city with linear pattern) (Ford, 1993) and (Chandramidi, 2013)	Spacious, airy, classical-style, monumental cityscapes set within open parklands and gardens, set upon higher ground less susceptible to flooding with linear development along trunk road connecting Weltevreden with Old Batavia (Ford, 1993); abandonment of coastal city identity (Kusno, 2011)
Late Colonial / Pre-Independence Period	Fatalist approach to flood problems by government and inhabitants (Caljouw, et al., 2005);	Publication by De Haan on causes of flooding in Batavia (Caljouw, et al., 2005)	Mid 19 th century – mid 20 th century	Linear Dumbbell Pattern (19 th century expansion era) (Ford, 1993)	Linear Dumbbell Pattern where a main trunk road (today's Jl. Gajah Mada) flanked by linear development linked Kota Tua (Old Batavia) with Weltevreden to the south (Ford, 1993)
Post-Independence Sukarno Era	Highly centralised state apparatus, government-driven initiatives at the behest of political leaders; prestigious projects to promote the power of the regime and distance itself from the colonial era (Ford, 1993); first awareness or acknowledgement of flooding as a problem and the need for experts to advise the government on planning and mitigation measures (Chandramidi, 2013)	Concept Plan of 1952 which laid out the first highways and a green belt, the Outline Plan of 1957, which set out the development of satellite cities, 1965-85 Master Plan of Jakarta established in 1966, Presidential Decree 183/1965, the first flood mapping and land allocation for water retention (Chandramidi, 2013)	1949 - 1967	Fill-out of the Linear Dumbbell Pattern (Post-war International and Modernist style planning), (Ford, 1993)	New layers of ideology added to the city in the form of monumental developments like the Monas (at Medan Merdeka) and National Stadium (for the Asian Games of 1962), as well as new town (suburban) style developments such as Kebayoran Baru, six kilometres south of Medan Merdeka (Ford, 1993)
Suharto Era	Suharto moved the economy away from state-directed system in favour of free market liberalisation (Cowherd, 2005); planning during this period was more technocratic in nature (Chandramidi, 2013); governing bodies largely seen as rubber stamp decision-takers	Master Plan for the Special Capital Region (DKI) of Jakarta (RUTR 1985-2005)	1967 - 1997	Expansion beyond the filled-out Dumbbell Pattern (International Postmodernism) (Ford, 1993)	Development of the city with large mega developments continued during this period, including luxurious hotels, industrial estates, large malls, high-rise towers lining major roads in the 1970s and 1980s, Western-style corporate architecture, wide avenues and

Historical institutional era	Characteristics	Specific or related policies	Time frame	Urban morphological era, typology or description	Characteristics
Post-Suharto / Decentralisation / Neoliberal Era	with almost total power vested in the presidency (Holzhacker et al., 2016)				electric railways linking the city with far-flung areas of the metropolitan region; South Jakarta designated for flood retention – however, subsequently the location of significant new suburban residential development (Chandramidi, 2013) and (Ford, 1993)
	Characterised by so-called good governance: political transparency, the rule of law, governmental effectiveness, transparency and civil society promoted by intergovernmental bodies such as the world Bank and IMF (Holzhacker, et al., 2016); decentralisation efforts from central/national government to more localised power and responsibility: e.g. at the provincial, city, district, sub-district and village levels achieved through constitutional change (Holzhacker et al., 2016); fiscal arrangements between national and local levels of government reformed with implementation of single block grant system (Silver, et al., 2001)	Law No. 22/1999, Law No. 32/2004, Dana Alokasi Umum or DAU (General Purpose Fund), Spatial Plan of Jakarta 2000-2010	1998 - Present	Mega city with linear, high-rise and mega developments (Dahiya, 2012)	<i>Kampungs</i> replaced by malls and high-rise residential and office developments, further development of large highways and associated linear development along their length (Chandramidi, 2013) and (Ford, 1993)

Current Responses to Flooding: Interim Solutions

Residents of *kampungs* and informal settlements have historically occupied river banks and other undesirable, flood-prone land in Jakarta (due to a lack of affordable housing in the city). These spaces often filled the role of informal rubbish dumps for the city. These factors have resulted in the narrowing and silting of waterways, culminating in flooding during the rainy season on top of silting and clogging of water basins by water hyacinth (Priatmodjo, 2016). Added to these factors

is the long history of flooding in Jakarta, coupled with a lack of investment in flood defence (Abeyasekere, 1989) and a fatalistic acceptance to flooding and its inevitability (Caljouw et al., 2005), which has only exacerbated the challenges to the city's flood and drainage systems (see Figures 12-13).



Figure 12. Waduk Pluit before transformation. Source: Google Earth (2018).



Figure 13. Waduk Pluit after works carried out. Source: Google Earth (2018).

In 2012, this long-term historic trend of institutional non-interference appeared to change when the government decided to tackle the flood issue by focussing efforts on cleaning up parts of the city's river and canal networks. The governor of Jakarta chose two water retention basins (*waduk*) in the city for redevelopment: one at Waduk Pluit in the north of Jakarta, the other in the east, at Waduk Ria Rio, to serve as water restoration and green open space pilot projects (see Figures 14-15). Each *waduk* was chosen in part due to the narrowing of their banks, silting, infestation by water hyacinth, excessive annual flooding, as well as their strategic locations in the city (Priatmodjo, 2016). These projects were undertaken within the current context of metropolitan

cooperation at the local level as well as national decentralisation of planning and development powers at the national level (Holzhacker et al., 2016) and (Silver et al., 2001).



Figure 14. Waduk Ria Rio before transformation. Source: Google Earth (2018).



Figure 15. Waduk Ria Rio after works carried out. Source: Google Earth (2018).

Waduk Pluit is the largest reservoir in Jakarta and was built from 1960-1980. Not long after this, it began to be occupied by informal settlements due to the unoccupied and undeveloped land surrounding the water basin. Originally 80 hectares, by 2012, the capacity of the water basin had been reduced by 25 percent, while its original depth of 10 metres had been reduced by 70 percent (Priatmodjo, 2016). The project for restoring the *waduk* necessitated a phased removal of surrounding informal settlement residents to alternative housing elsewhere. Due to a lack of available accommodation in the vicinity, 2,000 families who had occupied the wet section were decanted to a site 20 km distant and their houses demolished to preclude their return (Priatmodjo, 2016). Not long after the land on the west bank was unoccupied, a 6 hectares park was built on the site, called Taman Kota Waduk Pluit, and opened in August 2013. It includes jogging and

cycle paths, as well as recreation facilities. Machinery was brought in to dredge and restore the reservoir, work which still continues, along with the decanting of 5,000 further residents on the east bank to nearby social housing estates (Priatmodjo, 2016).

The other water basin, at Waduk Ria Rio, covers 26 hectares and was constructed from 1960-1967 and was similarly occupied with informal settlements. 230 families were decanted to a site 8 km away, while a park situated on the western side of the water basin was built (Priatmodjo, 2016). The new 1.6 hectares park, called Taman Kota Ria Rio, was not equipped with the same type of recreational facilities as the park at Waduk Pluit, however, free wifi was provided as well as attractive and rare foliage (Priatmodjo, 2016) to attract visitors and create a local amenity space. Restoration of the water basin is ongoing.

Conclusion

This paper focusses on a gap in contemporary concepts between the west and global south around flooding and urban development with implications for other cities in the region facing rapid development and environmental challenges. It sets out to describe the role of government responses to flooding historically, which has influenced the spatial development of Jakarta over time in terms of policies, strategies and flood mitigation responses. This research illustrates the long history of top-down, centralised approaches to these issues, highlighting alien urban morphological, water drainage and flood protection systems imposed onto the Javanese context and the failures of those approaches to mitigate flooding. It also highlights more recent trends of decentralisation and power sharing at the local level of governance, which has resulted in some initial project examples indicating an integral movement towards flood resiliency.

A dual approach of historical institutional and urban morphological analysis has been utilised as a new methodology to understand the link between decisions of government with respect to flooding and the subsequent pattern of development in Jakarta over time. This paper demonstrates that applying a combination of historic institutionalism and urban morphological analysis can reveal dependencies between the dynamics of political decision-making and the development and evolution of urban form.

The research details, firstly, the distinct eras of institutional policy and secondly the resulting spatial typological periods that can be distinguished in Jakarta over four successive centuries. These preliminary findings indicate a link between institutional era and spatial development typology, though this is somewhat blurred from the era of Soeharto's New Order to the one that followed, which appears to be a continuation in terms of high-rise developments and mega-shopping malls. However, the shift of manufacturing and services to satellite cities and the replacement of *kampung*s by more formalised development was particularly evident in the post-Soeharto era, as was the increase in these new development typologies, which owed less to Western typologies than those already prolific in other Southeast Asian countries or in the wider East Asian region, for example in cities such as Kuala Lumpur, Bangkok, Ho Chi Minh City, Hanoi and even Hong Kong, where high-rise, mega mall and linear development abound. These preliminary findings can be further developed in future research.

Acknowledgements

An earlier draft of this article was presented at "The 4th Planocosmo International Conference", Bandung, 2-4 April 2018.

References

- Abeyasekera, S. (1989). *Jakarta: A History, Revised Edition*. Singapore: Oxford University Press.
- Caljouw, M., P.J.M. Nas, and Pratiwo (2005) Flooding in Jakarta: Towards a blue city with improved water management. *Bijdragen tot de Taal-, Land- en Volkenkunde [Contributions to Language, Land and Ethnology]*, 161-4, 454-484.
- Chandramidi, A.N. (2013) *Urban Flood Resilience in Jakarta: an Historic Analysis of Institutions*. Unpublished Masters Thesis. University of Groningen.
- Cowherd, R. (2005) Does Planning Culture Matter? Dutch and American Models in Indonesian urban transformations. In B. Sanyal, (Ed.). *Comparative Planning Cultures*. London: Routledge.
- Cybriwsky, R. and L.R. Ford (2001) City profile: Jakarta. *Cities* 18(3), 199-210.
- Dahiya, B. (2012). Cities in Asia 2012: Demographics, Economics, Poverty, Environment and Governance. *Cities* 29, S44-S61. Accessed from: <https://doi.org/10.1016/j.cities.2012.06.013> on 30 December 2014
- Fiisabiilillah, D.F. and A. Maulana (2016) Feeding the Megacity: Challenges to Achieve Food Security in Jakarta. *Journal Perencanaan Wilayah dan Kota [Journal of Regional and City Planning]* 27(3), 208-218.
- Ford, L.R. (1993) A Model of Indonesian City Structure. *Geographical Review* 83(4): 374-396.
- Gagalnya Sistem Kanal: Pengendalian Banjir dari Masa ke Masa [Failure of the Canal System: Flood Control from Time to Time]. *Kompas*, 2010.
- Holzhacker, R.L., R. Wittek, and J. Woltjer (2016) Decentralisation and Governance for Sustainable Society in Indonesia. In Holzhacker, R.L., R. Wittek, and J. Woltjer (Eds.) *Decentralisation and Governance in Indonesia* (pp. 3-29). London: Springer.
- Hudalah, D., J. Woltjer (2007) Spatial Planning System in Transitional Indonesia. *International Planning Studies* 12(3), 291-303.
- Temukan Data Seluruh Unit Kerja Pemerintah Provinsi DKI Jakarta. Jakarta Open Data – Berbagi Data untuk Transparansi. *Jakarta Open Data*, 2017. Accessed from http://data.jakarta.go.id/user/login?came_from=http://data.jakarta.go.id/dataset/data-jumlah-penduduk-dki-jakarta on 27 December 2017.
- Quickscan of Masterplans executive summary: Jakarta Coastal Defence Strategy Bridging Phase (JCDS-BP). *The Hague: Netherlands Enterprise Agency*, 2012. Accessed from <http://www.partnersvoorwater.nl> on 29 December 2014.
- Kusno, A. (2011) Runaway city: Jakarta Bay, the Pioneer and the Last Frontier. *Inter-Asia Cultural Studies* 12(4): 513-531. Accessed from: <http://www.tandfonline.com> on 9 January 2014.
- Marzot, N. (2002) The Study of Urban Form in Italy. *Urban Morphology* 6(2), 59-73.
- McCarthy, P. (2003) *Part IV: Summary of City Case Studies*. In *UN-Habitat. Global Report on Human Settlements 2003: The Challenge of Slums*. London: Earthscan.
- Priatmodjo, D. (2016) Winning Back City's Blue-Green Elements: Cases of Waduk Pluit and Waduk Ria Rio, Jakarta. Paper presented at the 53rd *International Making Cities Livable Conference on Caring for Our Common Home: Sustainable Cities and Settlements*. Pontifical Urban University, Vatican City: Pontifical Urban University, 13-17 June.
- Rahmawati, Y.D. (2015) Self-Organisation, Urban Transformation, and Spatial Planning in Greater Jakarta, Indonesia. *Jurnal Perencanaan Wilayah dan Kota (Journal of Regional and City Planning)* 26(30), 147-165.
- Rustiadi, E., D.O. Pribadi, A.E. Pravitasari, G.S. Indraprahasta, and L.S. Iman (2015) Jabodetabek Megacity: From City Development Toward Urban Complex Management System. In Singh, R. (Eds.) *Urban Development Challenges, Risk and Resilience in Asian Mega Cities*. Tokyo: Springer.

- Salim, W. and B. Kombaitan (2009). Jakarta. *City* 13(1), 120-128.
- Salim, W. and T. Firman (2011) Governing the Jakarta City-Region: History, Challenges, Risks and Strategies. In Hamnett, S. and D. Forbes (Eds.). *Planning Asian Cities: Risks and Resilience*. Abigdon: Routledge.
- Sanders, P. and D. Baker (2016). Applying Urban Morphology Theory to Design Practice. *Journal of Urban Design*, 21(2), 213-233. Accessed from <https://doi.org/10.1080/13574809.2015.1133228> on 27 December 2017.
- Silver, C., J. Iwan, A. Schroeder, and L. Schroeder (2001) Intergovernmental Transfers and Decentralisation in Indonesia. *Bulletin of Indonesian Economic Studies* 37(3), 345-362.
- Silver, C., (2008) *Planning the Megacity: Jakarta in The Twentieth Century*. London, Routledge.
- Steinberg, F., (2007) Jakarta: Environmental Problems and Sustainability. *Habitat International* 31, 354-365.
- Steinberg, F., (2008) *Revitalisation of Historic Inner-City Areas in Asia: Potential for Urban Renewal in Ha Noi, Jakarta and Manila*. Mandaluyong City: Asian Development Bank.
- Steinmo, S., (2008) Historical Institutionalism. In: Della Porta, D. and Keating, M. (Eds.) *Approaches and Methodologies in the Social Sciences*. Cambridge: Cambridge University Press.
- Di Balik Banjir Jakarta. *Tempo*, 12-18 February 2007.
- Whitehand, J.W.R. (2007) Conzenian Urban Morphology and Urban Landscapes. Paper presented at the *Proceedings, 6th International Space Syntax Symposium, Istanbul*, Istanbul Technical University, 12-15 June 2007.