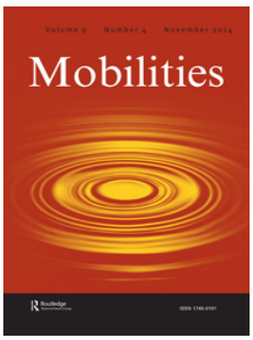

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Veins of Concrete, Cities of Flow: Reasserting the Centrality of Circulation in Foucault's Analytics of Government

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ABSTRACT *The 'governmentality' lectures that Michel Foucault gave at the Collège de France considered the question of urban circulation and how its fluxes and flows have been problematised in different historico-political contexts. To establish the critical parameters of this question, Foucault's understanding of the 'urban problem' will first be addressed and how this relates to governmentality. Subsequently, his analytics of government will be outlined in respect to the wider literature on urban circulation and applied to the flow of water in Singapore, examining how water has shifted from being primarily a locus of sovereignty, discipline and more recently, security. It will be argued that the urban problem and the concomitant question of circulation have been disassociated from more general renderings of governmentality.*

KEY WORDS: Circulation, Governmentality, Foucault, Water governance, Urban planning, Political ecology, Singapore

Introduction

According to Braudel (1981), 'the essential problem, at the beginning and throughout the life of towns in Europe and elsewhere, remains the same: the division of labour between countryside and urban centres' (484). At the very heart of this antagonism, between city and nature, government and anarchy, is the notion and management of circulation. Fundamentally, this concerns how people, resources, commodities, money and information are given passage across the physical and metaphysical boundary of the city or state, how 'inside' and 'outside' supply, accommodate and constitute the other and the lengths that government can and should go to in order to manage these various, reticulated circulations. Braudel insists that the city can only endure and expand through its relation with its hinterland and other urban centres, through its capacity for attracting, distributing and indeed,

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commanding the resources upon which it relies. A Braudelian interlocutor, Michel Foucault would find himself contemplating within a genealogical framework the same theoretical–historical problematic of urban circulation. This concerns how the city does not terminally undermine what we think of as 'nature' but normatively inflects what are considered to be natural processes, optimised for the benefit of effective forms of government. Therefore, whereas Foucault's philosophical project had previously been focused on the methods through which human behaviour is naturalised and controlled within institutional settings, it would be scaled up during the second half of the 1970s when applied to the town, and ultimately, to the general population; society per se rather than society's 'others'. In this way, Foucault was not so much concerned with the 'urbanization of nature' (Swyngedouw and Kaika 2000) but the naturalisation of the urban, of circulation and the art of government itself.

This paper will foreground Foucault's thinking through of the urban problematic and the concomitant question of circulation, which I contend has been disassociated from more general renderings of his concept of governmentality. However, there have of course been notable exceptions to this tendency (see Rabinow 1989; Osborne 1996; Osborne and Rose 1999; Joyce 2003; Legg 2007; Bennett and Joyce 2010; Collier 2011; Darling 2011). The literature on calculable territory also develops these ideas in a sustained fashion (Hannah 2009; Elden 2010, 2013), but the specific question of circulation is left analytically and empirically unpacked.

After establishing the critical parameters of the 'urban problem' (Foucault 2003, 245), I will consider how the birth of circulation, both urban and anatomical, was intimately intertwined with the consolidation of sovereign power, and continues to be intervolved with the workings of the modern state. I will then consider the government of circulation under the remaining two technologies of power identified by Foucault, discipline and security, completing his analytical triad. I will draw upon wider, more contemporary commentary on urban circulation and adding to what is a largely theoretical affair, an empirical basis will be provided by applying Foucault's analytics to water circulation in Singapore. Empirical data were collected through semi-structured interviews with 25 participants from government, industry, non-governmental organisations and independent professionals, whilst an extensive archival analysis was performed on government publications and communiques, parliamentary records, newspapers, scientific and engineering reports, industry and third sector outputs.

This case study strongly resonates with the problematic being considered here, both empirically and analytically. Empirically, given its small but always expanding land size of 710 km² and severe lack of natural resources, Singapore has frequently been referred to as an island city-state uniquely dependent on cross-border circulation (Olds and Yeung 2004; Oswin and Yeoh 2010). Separated from its nearest national neighbour, Malaysia, by the Straits of Johor, it can be considered a city without a hinterland, or as it has been more romantically re-imagined by former Prime Minister Lee Kuan Yew, 'a heart without a body' (Lee 2000, 3). To increase self-sufficiency, Singapore has undergone a massive programme of industrialisation and urbanisation during the last 50 years, upgrading its former status as an entrepôt with accompanying rural economy. This geographical and historical profile makes it a particularly productive case study to explore Foucault's arguments on government, which were essentially concerned with urban concentration and the associated problems of labour control and sanitary reform in West Europe.

This brings us to the analytical relevance of the case study, which is provided by its focus on water. Not only is water a conveniently tangible and exemplary marker of urban flow but, as will be demonstrated, was absolutely central to Foucault's investigations into government, specifically issues of supply, sewerage and sanitation. An intriguing aside to these rather mundane, managerial exigencies, Foucault (2006, 11) also asserted on different occasions that the 'link between water and madness is deeply rooted in the dream of the Western man'. For the terrestrial offers concreteness, restraint and reason; the aquatic can but afford transience, transgression and ambiguity. Indeed, water and madness have overlapping histories of division and incarceration, parallel experiences of partitioning practices. Whether permeating, pouring or pooling, water has proven to be an intrinsically 'uncooperative commodity' to govern over, perpetually evading physical and conceptual containment (Bakker 2003). Developing arguments from political ecological research on urban water (Gandy 2002; Swyngedouw 2004; Kaika 2005; Karvonen 2011), this paper will consider how water flows constitute the urban and configure its politics, specifically in terms of Foucault's analytics of government.

Escaping the institution: Foucault, circulation and government of the urban

At the beginning of his *Society Must Be Defended* lecture series in 1975, Foucault expressed dissatisfaction with the claustrophobic, repetitive and fragmented character of his research. Since 1970, Foucault had concerned himself with the 'disciplines' and the microphysics of power, which involved critiquing power at its most manifest, elementary level. However, partly through boredom and partly through a desire for some sense of overall continuity, Foucault would thereupon attempt to scale-up his analysis from the human body to the social body, towards political economy, military strategy and the state (Foucault 2003). After some initial rather hesitant attempts, Foucault would finally be liberated from his analytical straitjacket when a third technology of power, security, was introduced at the end of these lectures, where discipline is downgraded and reconfigured accordingly within the broader framework of biopower. Whilst his work on sexuality provided a crucial axis between the scale of the body and the population, it was in fact through the problematic of the town and the concomitant question of circulation that governmentality begins to emerge as a central concern.

However, Foucault had not suddenly happened upon the problem of the town during his lectures. Since the early 1970s, he had been collaboratively contemplating the role of engineers, urban infrastructure and city parks alongside Deleuze, Guattari and others (Elden 2007). During interviews as well, Foucault would ponder the ways in which architecture and infrastructure, 'bridges, roads, viaducts, railways' (Foucault 2000, 354), have strategically distributed people and things, and allowed for the '*canalization* of their circulation' (361). However, similar to the heuristic role that the institution played for the explication of discipline, the town would come to serve an essential analytical function for the study of governmentality. Foucault is quite unequivocal about the centrality of circulation to processes of government; indeed, governmentality was originally directed towards circulation and the 'material instruments' through which it flowed, from the widening of roads to the navigability of canals, constructed to provision the town and strengthen the power of the state (Foucault 2007, 325).

Around the turn of the eighteenth century towns were still largely isolated entities, detached from surrounding countryside by protective walls. According to Foucault (2007), the critical question therefore was how to permanently open up the enclosed town to trade, people and resources, thereby 'resituating the town in a space of circulation … the problem of the town was essentially and fundamentally a problem of circulation' (13). The urban problem was not necessarily democratically conceived but in respect to state aggrandisement: How was the town to be brought into an alternative economy of power to that of feudalism under a modern form of political sovereignty? Taking specific examples of urban circulation as entry points into the problem of government; street planning, grain regulation and contagion control; Foucault considers how they were administered under three different technologies of power: sovereignty, discipline and security. The analytical horizon for Foucault was now, under these three modes of power: 'How should things circulate or not circulate?' (64).

It would be during Foucault's investigation into the techno-urban mechanisms of security that the political–ethical problem of government materialises, which would occupy much of Foucault's intellectual and political energy up until his death. Whilst the technical concept of 'population' is the key correlate to government in terms of how the state should act on and through its apparent but penetrable naturalness as a living, semi-autonomous phenomenon (i.e. biopolitics), this should not be disassociated from the wider urban question. With the subsequent drift within Foucauldian scholarship towards population control and technologies of the self, I would argue that a disconnection has occurred between governmentality studies and the urban problem. I will therefore attempt to reorient the question of government around the notion of urban circulation, drawing upon empirical material from a case study of water circulation in Singapore. As noted previously, the decision to focus on water is neither arbitrary nor coincidental. Of all the circulations that constitute the urban milieu, Foucault (2007) would regularly refer back to water as a 'natural given' (21) requiring especial attention from town planners, including rivers, swamps, marshes, floods, stagnant water, potable supply and sewage. Government is to intervene in the urban setting and act as the essential arbiter between its human inhabitants and their biological, climatic, physical and indeed, 'hydrographic environment' (2003, 245), and thereby mediate and naturalise complex coexistences of citizens and circulation. Of specific significance here, this is a matter of:

> controlling circulation. Not the circulation of individuals but of things and elements, mainly water and air … The problem of the respective position of the fountains and sewers, the pumps and river washhouses … How to prevent the infiltration of dirty water into the drinking water fountains … How to keep the population's clean water supply from being mixed with the waste water. (2000, 148)

Before turning to the specific example of water, I will consider how circulatory flow is conceptualised and governed under the three technologies of power.

Sovereignty and the birth of circulation

Under sovereignty, the interests of the state and its territory come first; to ensure through violent means if necessary the 'state's salvation' (Foucault 2007, 262). Since

the emergence of medieval monarchies, the imperative to expand sovereign influence and augment royal riches has prompted a raft of urban measures that connect towns and stake claim to vast territories. This can be seen in a utopian text by Alexandre Le Maître, markedly dedicated to the king of Sweden, which Foucault (2007) argues is exemplary of sovereign circulation. The whole territory was to be organised concentrically around the capital city where the royal court is located, with peasants confined to the surrounding countryside and artisans residing in smaller towns. The purpose of this would be to literally centre the sovereign at the heart of society, to territorialise sovereign interests through conquest of other lands and situate the capital in 'an intensity of circulations: circulation of ideas, of wills, and of orders, and also commercial circulation' (15).

It became a matter of urgency to expose towns to trade and position them expediently and sometimes violently within the sovereign territory, and subsequently, the world (Braudel 1981; Taylor 2004). Throughout Europe, self-contained towns with their walls, tolls and local allegiances were reconstituted within a 'larger networked territorial formation', where state bureaucracies centrally coordinated 'intercity mobilities' (Sassen 2006, 73). Foucault was clear; 'sovereignty capitalizes a territory, raising the major problem of the seat of government' (2007, 20). And indeed, the growth of capital cities between the sixteenth and eighteenth centuries was not incidental to the formation of the modern states but absolutely integral, whilst at the same time London, Paris, Madrid, Vienna, Munich or Copenhagen would be inconceivable without the executive power of the sovereign (Braudel 1981). As Friedrich (1952) asserts, capitals constituted 'the 'heart' of the emergent modern state' (4).

Certainly, seeing urban circulation like a planner is not entirely dissimilar to seeing vascular circulation like a physician, and it is worth considering how understandings of both developed symbiotically. For the modern conceptualisation of circulation occurred at a time when ways of conceiving the human body and social body was undergoing huge scientific, paradigmatic change. This tumultuous period of scientific discoveries was preceded by the Copernican Revolution in the mid-sixteenth century, which was itself concerned with the decentred circulation of the earth around the sun (Kuhn 1957). The physical and conceptual architecture of western civilisation was undergoing a process of widespread secularisation, where conjecture on circulation was increasingly attuned to more worldly, profane forms of movement that did not necessarily revolve around Christianity, and the church, at the supposed centre of the universe.

William Harvey was a central figure in this revolution by heretically overturning the erstwhile theory of blood movement that had hitherto enjoyed approximately 1400 years of unchallenged intellectual hegemony (Chauvois 1957). Previously, blood had been thought to flow back and forth from the heart to the rest of the body through vascular channels transporting heat and vitality to extremities, analogous to the ebb and flow of the tides in the Euboic Sea, or as Hippocrates preferred, like rivers returning to their sources (Keynes 1978). Whilst this had been called into question by other sixteenth century physicians, Harvey was the first to consolidate an overarching theory of perpetual, unidirectional circulation (Franklin 1961). Winding his way through the streets of London to St. Bartholomew's Hospital would have him deep in thought about blood flow, though occasionally distracted by strident stall sellers and innocuous collisions with passers-by, Harvey's day of scientific speculation would begin, as it were, in transit.

The urban and intellectual milieu in which this journey would ensue had been undergoing dramatic transformation throughout the sixteenth and seventeenth centuries, as cities increasingly came under the influence of the baroque sensibility. Here, the artist abandoned a former preoccupation with 'closed forms … in favour of movement, chiaroscuro and depth … he [*sic*] is not concerned with the limitations of objects, but with their infinite possibilities in movement and function' (Franklin 1961, 24). For René Descartes, a tentative advocate and interlocutor of Harvey's new theory of circulation, transcendental truth was found in linearity and symmetry, opening up the analysis of movement in absolute space instead of the closed medieval mindset (Butterfield 1957; Lefebvre 1991). The baroque era would institutionalise mobility in urban planning, intellectual and social life; a transition explicitly symbolised by the replacement of medieval walls with open, tree-lined boulevards throughout Europe, beginning with Paris in 1670 along with the filling in of the city's moat (Kostof 1991). These grand, open streets which celebrated conspicuous circulation and unprecedented speed were the product of sovereign power, of centralised finance and military might, constituting a new political phenomenon in Europe that required vast territorial reach (Anderson 1974). Cities were conceived as 'rhythm in stone' (Friedrich 1952, 69) not for purely aesthetic purposes but to represent the omnipresence of the sovereign, where all roads literally led. From Versailles, to Washington, Delhi and St. Petersburg, radial avenues arbitrarily cut through the city to converge on the central palace, its sweeping plaza and royal monuments, which span out into the surrounding countryside, allowing unbroken communication, vision and mobility (Mumford 1961). This was the urban manifestation of the then prevailing doctrine of mercantilism, which was premised on sovereign control of circulations – bullion, money, trade, raw materials, labourers – to augment state wealth (Foucault 2007).

Harvey would regularly refer back to this sovereign city of circulation during lectures to exemplify anatomical processes. At one point, he complains about the lack of 'circulating air' in London and its pernicious effects on human health, rallying against the blockage of ventilation caused by refuse and urban disorder (cited in Franklin 1961, 75). On another occasion, Harvey compares a thoroughfare located near St. Paul's Cathedral to the alimentary tract in the human body (O' Malley, Poynter, and Russel 1961, 14), whilst the River Thames was imaginatively invoked to analogise the water cycle to blood circulation. Therefore, in light of these urban cues, it could be argued that in emphasising the subsequent impact that Harvey's theory had on urban planning (i.e. having people, goods and air circulate through the city) as opposed to vice versa, Sennett (1994) overstates the linear quality of a relationship that was much likelier, well, circulatory.

The domestic context would also have a catalytic effect on Harvey's theoretical inclination as he negotiated the twists and turns of London's political labyrinth. Being personal physician to Charles I, Harvey would find himself on the side of the Royalists during the turmoil and violence of the English Civil War (Keynes 1978). His masterpiece, *De Motu Cordis*, was indeed dedicated to the king, who he compared to the human heart (Harvey [1628] 1978). However, Harvey had begun to reassess his commitment to the king's cause after Charles was executed in 1649 by Parliamentarians. As Chauvois (1957) explains, the English doctor came to revise his perspective on public affairs and realised that 'it is the nation that labours and produces, whereas the king is not the originator of prosperity but the co-ordinator and distributor of what has been created by others' (151). Remarkably, Chauvois attributes a contemporaneous shift in Harvey's scientific understanding of circulation

to the evolution in his political thought, 'namely that the 'heart' must no longer be conceived as the source and origin of the well-being of the body, but that this must rather be sought in the organs that feed the heart and thus take precedence over it' (Ibid.). This change of heart, so to speak, encapsulates rather well the general emergence of biopower in Western Europe and its subsumption of sovereign rule.

Circumscribing circulation through technologies of discipline

Sovereign power was found to be qualitatively insufficient for responding to the historical developments of the seventeenth and eighteenth centuries, largely pertaining to urban, demographic expansion and the gradual shift from a feudal to capitalist economy (Foucault 2007). The rigid juridical framework offered by sovereignty effectively blocked the necessary transition to a more versatile, continuous and discreet form of government, which could penetrate society in detail and as a collective (Foucault 2003). Biopower emerged outside of the juridical domain as a result, with its bipolar attention to both the *anatomo-politics of the human body*, which became the object of the disciplines, and forming somewhat later *a biopolitics of the population* that relied on mechanisms of security (Foucault 1978). The ascent of biopower requires quite different tools of political analysis, which prompted Foucault's suggestion to cut-off the king's head in state theory – a scholarly, less bloody equivalent to Charles's demise – by which he meant going beyond the study of legislation and judicial punishment. First, we shall turn to the disciplines and their efficacy for governing circulation.

Discipline essentially functions through the organisation and analysis of space, therefore, the artificial, enclosed environment of prisons, hospitals, schools and factories present unrivalled opportunities to observe, catalogue and correct residents' behaviour through architectural interventions. Partitioning practices and the compartmentalisation of individuals into cellular, analytical space are fundamental techniques, allowing for 'efficiency of movements' (1977, 137). Be they patients, prisoners or pupils, Foucault contended that these institutions were primarily configured to exercise power in the bourgeois interests of the capitalist economy; to pacify and organise workers for life in industrial society rather than to edify or cure. However, these served as essential nodes in the wider programme of urban government, for what was always at stake with disciplinary power was the 'utopia of the perfectly governed city' (198). As Virilio (2006) rightly proposes, 'the poorhouse, the barracks, the prisons … solve a problem less of enclosure or exclusion than of traffic … acting as brakes against the acceleration of penetration' (33). Discipline was first and foremost a concerted attempt to circumscribe and control urban circulations through a generalised 'panopticism', to monitor and protect the means of industrial production (e.g. materials, tools, resources) from theft and tampering, whilst ensuring the social reproduction of labour through public health measures (Foucault 1977). Steps were taken in response to the increasing 'politico-sanitary anxiety' (Foucault 2000, 144) around issues of public hygiene and urbanisation, as more people moved from the countryside to the city in search of work.

From the seventeenth to the eighteenth century, this was the duty of the police, the first form of state governmentality in West Europe. The police were the sovereign's primary instrument for intervening in the burgeoning urban domain not only to maintain social order but to strengthen the internal capacity of the emerging modern state. The urban milieu presented novel challenges to government which the police

were deployed to address: to provision basic needs such as food and water, ensure the population's health through sanitary infrastructure, maintain housing and streets, encourage work and employment; essentially organise and optimise the process of urbanisation. According to Foucault (2007), this eclectic array of issues all come back to the familiar problem of urban circulation, which concerns both the 'material network' such as 'the condition and development of roads, and with the navigability of rivers and canals, etcetera', and 'also the circulation itself … the set of regulations, constraints, and limits, or the facilities and encouragements that will allow the circulation of men and things in the kingdom and possibly beyond its borders' (325).

These techniques could be seen at the French port town of Rochefort, 'a crossroads for dangerous mixtures, a meeting-place for forbidden circulations', where Foucault (1977) proposes that the hospital functioned as a spatial filter to categorise and isolate the 'whole mobile, swarming mass' (144) that was daily visited upon its borders. Later, and with greater skill and care, Foucault (2007) describes how the same methods were deployed in towns across Europe, in Kristiania (modern-day Oslo), Gothenburg and Richelieu, which took the geometrical formula of the Roman camp as their model. The rectilinear rigour of these towns built *ex nihilo* would not merely facilitate but regiment urban circulation, as '[d]iscipline works in an empty, artificial space that is to be completely constructed … reconstructed to arrive at a point of perfection' (2007, 19). As discontented workers began to resist the coercive methods of proletarian subordination and the insalubrious, hazardous conditions of the urban industrial environment, the necessity of police in its original sense became more pressing than ever (Pinder 2005).

In stark contrast to the despotically planned baroque city, urbanisation during the industrial interregnum was haphazardly shaped by the caprices of the capitalist economy and the private interests of the bourgeoisie. The exigencies of industrial production trumped those of population and urbanisation. Railways and canals were 'invited to plunge into the very heart of the town' (Mumford 1961, 525) to supply coal, water and raw materials to inner city factories, around which slums sprung up to house the workforce. A set of planning principles were proposed to halt this urban decline, premised on de-congestion of the city, spatial zoning and improved circulation, to open up the city to light and air. As Pinder (2005) affirms, 'modernists took further earlier arguments about movement and circulation as underpinning a healthy urban environment' (77), advocating the purification of urban flows and channelling of currents. This model was perfected by Le Corbusier in the twentieth century, who envisioned the city as a site of contained, homogeneous circulations. Disorder is that which is fluid and disregarding of geometry, 'the flow that bursts its banks and sweeps away everything before it' (Pinder 2005, 70). Disgusted by the urban condition in Western industrial cities, Le Corbusier ([1925] 1987) spoke of nature as something to be mastered by the 'water-tight formula' (164) offered by rational urban planning. Indeed, watery evocations were regularly summoned to represent the anarchic adversary of discipline and order, where 'a modern city lives by the straight line, inevitably; for the construction of buildings, sewers and tunnels, highways, pavements. The circulation of traffic demands the straight line; it is the proper thing for the heart of a city' (10).

From police to modernist architects, discipline is applied to urban circulations of people and natural resources centripetally, to establish rhythms and enclose flows in fixed, predetermined streams whilst foreclosing exchange between inside and outside

(Foucault 2007). Here, 'one must eliminate the effects of imprecise distributions … their diffuse circulation, their unusable and dangerous coagulation' (Foucault 1977, 143). For discipline is 'an anti-nomadic technique' (218); 'it arrests or regulates movements … it establishes calculated distributions' (219) to achieve 'as solid separations as possible' (220). 'It isolates, it concentrates, it encloses … Discipline allows nothing to escape' (45). As such, the naturalness of circulation does not register where instead the state 'carves out a new division' and brings to bear an 'absolute artificiality' (349) on what could be considered natural phenomena. Concentrated and completely contained, disciplined circulation should not flow but proceed in file.

Security and circulation unbound

Emerging shortly after discipline in the latter half of the eighteenth century, security soon became the predominant form of government. Power over human life becomes biological or biopolitical, in addition to anatomical, exercised over humans as a living species and their demographic characteristics. As with discipline, this readjustment was prompted by the urban problem and the contested issue of circulation under capitalism, but whereas discipline concentrates, contains and controls nature, security mechanisms adapt instead to the reality of natural processes, respects their autonomy and seeks to identify, optimise and work through nature's discernible laws rather than stifle them. Here, 'nature' re-enters the political field and so does 'civil society', as an overlapping sphere of spontaneous activity (Foucault 2007, 349). Foucault traces this form of government back to physiocratic economics, whose founding member Quesnay was influenced by scientific understandings of blood circulation. Physiocracy posited that population should be approached as a natural phenomenon with its own dynamics, desires and regular patterns of existence, not as something to simply subordinate under sovereign rule. The art of government is to reflectively and effectively calculate when and when not to intervene in this quasi-autonomous domain, to stimulate, steer and secure these natural processes to agreeable ends for state and society. Too much state intervention does not merely constitute infringement of individual rights, but, according to physiocracy and later strands of liberalism, this will invariably serve to undermine the very objectives of government (Foucault 2008).

Security is statistical, then, as nature is not brought in line with a predetermined norm or space a la discipline but managed in accordance to its own record of occurrence. Only after an average has been established can governmental intervention be effective, which only seeks to regularise natural phenomena deemed beneficial, minimising that which is considered pernicious. Essentially, discipline demarcates absolute boundaries whilst security calculates an acceptable range, which 'involves not so much establishing limits and frontiers, or fixing locations' but 'making possible, guaranteeing, and ensuring circulations' (Foucault 2007, 29). Discipline is centripetal but security is centrifugal and subsumptive; it promotes the continual expansion of existing systems, opens up processes to extraneous activities or things, thereby '[n]ew elements are constantly being integrated … allowing the development of ever-wider circuits' (Foucault 2007, 45). With discipline, 'it separates, it immobilizes, it partitions' (1977, 205), but security works through freedom of 'movement, exchange, contact' (2007, 64). This freedom of interaction creates complex networked assemblages that connect people, places and things across time and space, through which circulations of all varieties flow. Spaces of circulation are therefore

no longer homogeneously imagined as with discipline and its modernist disciples such as Le Corbusier, instead 'poly-functionality' (19) prevails and the intermingling of disparate mobilities.

Initially, urban governance was revolutionised under mechanisms of security, which operate on the premise of 'freedom of circulation' (Foucault 2007, 49). Foucault (2007) takes the example of Nantes, a city in West France, to illustrate this technology of power. He describes how consecutive planners attempted to open up Nantes to ventilation, trade and goods, to make it a 'perfect agent of circulation' (17). Whilst one particularly idiosyncratic architect proposed to literally construct the town in the shape of a heart, the final design rested on the strategic integration of quays, bridges and roads into the existing site, to facilitate smooth exchange between inside and outside: 'allowing circulations to take place, of controlling them, sifting the good and the bad, ensuring that things are always in movement, constantly moving around, continually going from one point to another' (65). Circulation was not a prerogative of sovereignty, neither was it to be fixed by discipline; urban space was instead opened up to a multitude of possibilities, to what Foucault called an 'indefinite series of mobile elements' (20). This would include the importation of grain, which up until the mid-eighteenth century was largely under disciplinary duress. To prevent scarcity, strict controls on cultivating, pricing, storing and exporting grain were imposed on harvesters and merchants; therefore, the whole production chain was totally planned and restricted.

Under security, however, scarcity was not an evil to be precluded from urban life but included as a naturally occurring reality. This will reflect upon prices, increasing when grain shortage beckons or decreasing in times of plenty, but circulation when freed from protectionist measures will flow where required through the self-interest of exporters and stabilise grain levels once again (Foucault 2007). This represented a completely novel way of governing under a new regime of truth, a political economy founded on and through nature; 'It is, if you like, its indispensable hypodermis' (Foucault 2008, 16). The reinsertion of nature does not only occur theoretically but physically, beginning with the anti-urbanism of the physiocrats who shifted the focus of governmentality from the town to the countryside, to the mundane materiality of land, forests and crops (Foucault 2007). These along with all other 'material givens … flows of water, islands, air, and so forth' (19) form a new horizon of governmental intervention; nature, both conceptually and materially, enters the social domain and becomes the essential medium through which political sovereignty is exercised.

Bauman (2000) pertinently referred to the acceleration of centrifugal forces in the contemporary period as the shift from 'solid' to 'liquid' modernity. Here, the former permanence provided by traditional institutions is supplanted by the transience of market trends, flexible employment and the increased motility of individuals and information. This markedly negative perception of expanded circulation and its infrastructure of mobility is certainly not unique (Sennett 1994; Virilio 2006). Augé (1995), well known for his portrayal of modern transport infrastructure as alienating, abstract spaces of permanent peripherality, noted that the proliferation of motorways, high-speed trains, out-of-town supermarkets, service stations, airports, overpasses and underpasses, physically circumvent and politically undermine the old sovereign centre with its monuments and palaces of great historical, symbolic significance. This may be considered the culmination of an alternative form of government, indeed, security writ large, constituting a new spatial logic of flow and connectivity (Castells 2000; Urry 2007).

Applying Foucault's analytics to water governance in Singapore

Whilst Singapore receives a high average rainfall of 2400 mm a year and is completely surrounded by water, its small size, urban density and lack of aquifers and lakes has made it extremely difficult to capture water for potable supply. Singapore has therefore been ranked 170th out of 193 countries in terms of water availability, positioning it amongst the most water scarce in the world (UNESCO-WWAP 2006). Until the turn of the millennium, Singapore relied upon two sources of water supply. From the 1970s onwards, local catchment has been gradually expanded into urban areas to augment protected reservoirs in the central conservation zone, with catchment now constituting two-thirds of Singapore's land surface. In addition, imported water from Malaysia has been essential to Singapore's supply, supported somewhat precariously by diplomatic accords agreed in the early 1960s. Therefore, since 2000, Singapore has increasingly leveraged on advanced water technologies to mitigate its physical and geopolitical limitations, with recycled wastewater facilities and desalination able to contribute 40% of supply, to supplement the 60% provided by local catchment and imported water (CLC-PUB 2012). Together, they are referred to as the 'Four National Taps' because they ultimately sustain Singapore as both island and nation, which explicitly illustrates the close, mutually constitutive connection between political sovereignty and urban circulation.

Although this politico-logistical connection is well established, I would argue that, once reoriented around the urban problem, Foucault's analytics can unpack this relationship further through its discerning differentiation between technologies of power. It is not necessarily a matter of purifying circulation in the disciplinary mode, thereby violently separating, standardising or speeding up flows as some scholars have emphasised (Deleuze and Guattari 1987; Scott 1998). Rather, statecraft may instead entail the exposure rather than enclosure of circulatory spaces to multiple and meaningful social interactions, to constantly calculate and imbricate complex coexistences of reticulated circulations, to facilitate more subtle forms of government aligned with that of security. In Singapore, as the state shifted from a colonial to post-colonial apparatus, and then from a centralised to more decentralised institution, its approach to managing water also shifted. Indeed, the government of nature and the nature of government are co-evolving processes, which are orchestrated through and made material in the urban milieu. Singapore's contained sovereignty within an urban island setting affords unique analytical opportunities for examining the interconnections identified by Foucault between circulation, government and the state. I will now consider how the circulation of water has, at different points in history, been primarily the locus of sovereignty, discipline and security.

Initially, it was sovereign power that situated Singapore within a wider network of circulation. Located at the meeting point of two monsoon systems, which have blown mariners to its shores for centuries, Singapore occupies an economically and militarily strategic position between the Pacific and Indian oceans, operating the second busiest port in the world. When British statesman Sir Stamford Raffles declared Singapore under the control of the East India Company in 1819, this small 539 km^2 island off the tip of Malaysian Peninsula was almost entirely covered with rainforest and was sparsely inhabited by approximately 150 people, confined to coastal areas (Corlett 1992). Completed in 1822, the first official town plan intended to open up the island to mercantile trade, subordinate the indigenous population and ensure the 'transfer of ideas, usually one way, from the colonial power to the colony' (Teo

1992, 165). The urban form encapsulated in architecture and avenues the 'priorities and prejudices' (164) of British sovereignty. Military and administrative facilities were built at the centre of the town along the banks of the Singapore River, which along with the European district displayed a penchant for geometric order and European Enlightenment principles. Street dimensions and the materials used for their construction were strictly regulated by the British administration, which had direction signs written in English that locals struggled to understand and generally ignored (Frost and Balasingamchow 2009).

The overriding objective was to establish Singapore as a secure port to challenge Dutch control over Southeast Asian trade and impose British sovereignty. This meant that until the twentieth century, there was little impetus to intervene in matters beyond this immediate priority, and this is reflected in the flow of water. During the first half of the nineteenth century, one after another, indignant colonists complained about constant flooding, marshy conditions and the associated difficulty of accessing the town (Little 1848). With the assistance of imported convict labour from India, and the unceremonious destruction of the oldest inscribed stone on the island, the meandering, tenuous banks of the river were reinforced to allow access for merchant boats. In addition, the native *Orang Laut* (Sea Gypsies) that lived upon the Singapore River in floating villages had to be cleared as they were a serious obstruction to trade traffic, eventually disappearing from the waterways by the 1840s (Gibson-Hill 1952).

In 1822, a small reservoir was built at the Fort Canning colonial base to provide sojourning ships with water. Commandant John Crawfurd was adamant that the reservoir be well maintained to prevent disruptions to trade, but as the President of the Municipal Commissioners admitted during the early 1900s, 'authorities did not appear to be so much concerned for the supply to the people as for the supply to the shipping' (Hallifax [1921] 1991, 326). In response to a growing population of over 50,000 relying on increasingly contaminated wells, local entrepreneur Tan Kim Seng offered S$13,000 to the Municipal Government to construct the first impounding reservoir in 1868 (Buckley [1902] 1984). This gesture was indicative of a fundamental shift that was beginning to take place, where an emerging bourgeoisie would become increasingly critical of a British administration that put the interests of trade ahead of the general population. The British would begin to construct more housing and other infrastructure as the 1900s progressed but urban problems became increasingly acute, particularly housing shortage and poor sanitation (Teo 1992).

It was not until national independence loomed and self-government began in 1959 that state priorities shifted and disciplinary capabilities became more necessary and permanent. The comprehensive development of domestic conditions would be pursued through a centrally coordinated programme of national economic growth, premised on rapid, state-orchestrated industrialisation (Huff 1995). As part of this programme, reservoirs would have to be expanded to supply enough water for incoming industries and workers, whilst persistent flooding needed to be contained given the urgent need for productive land. Where reservoir expansion was concerned, only 11% of the island was then acting as catchment area, and this was in the uninhabited central region. As catchment areas expanded outwards and increasingly penetrated into more urbanised areas, general anti-pollution measures became explicitly linked to water security, and thereby legitimised the stringency of the former. Then Prime Minister Lee Kuan Yew underlined the importance of curtailing water pollution in the first of his 1971 New Year Resolutions. Lee proposed that in

order to take advantage of Singapore's daily average rainfall of 700 million gallons, between 25 and 35% should be collected for potable supply, which would require 'stiff anti-pollution measures' so that 'the run-off rain water can be pumped into reservoirs' (NAS 2012, 407).

General surveillance was stepped up at existing reservoirs, with enforcement officers in boats and trucks deployed to provide 'constant vigilance' (PUB 1970, 1) and reprimand anyone caught littering, illegally fishing, swimming and breaking any other regulations. The 'Water Pollution Control and Drainage Act' would prove to be the main instrument for environmental enforcement, issuing 'powers for the control of land drainage; maintenance and restoration of the cleanliness of the watercourses; regulation and control over the collection, treatment and disposal of sewage; and more effective measures against water pollution' (ENV 1975, 4). Effectively, these new provisions vested the government with extraordinary and unprecedented leverage over the entire water cycle. Most significantly, the act stipulated that all wastewater was henceforth to be discarded into sewers, where continued inability to comply would result in removal. From 1971, Singapore's famous food vendors, or hawkers, were subject to a resettlement programme that was bolstered by stronger legislation, as their discarded food items and litter was clogging up Singapore's network of drains and waterways.

Initially, 28,854 hawkers were licensed to 'enable the Hawkers Branch to identify, control and contain the street hawkers' and allow for 'more effective planning of raids, better deployment of officers and closer surveillance' (ENV 1972, 32). Once the hawker population had been accounted for, they were resettled in large purpose-built centres with individually partitioned stalls, fitted with sewage connections, piped water, toilet and refuse services. Now compartmentalised in individual booths, hawkers' water consumption levels and hygiene practices could be monitored, ranked according to a grading system and modified by water conservation and sanitation campaigns. Other social groups would be resettled or phased out using analogous techniques, justified by the new direction in catchment management and vindicated by state rhetoric emphasising personal sacrifice for the public good (ENV 1990). Farmers, squatters, boat mechanics, fruit and vegetable sellers would all be cleared or relocated in clearly demarcated spaces, in industrial farms, public housing blocks, flatted factories and wholesale markets. By the early 1980s, the clearance of catchment areas had been so successful that aquatic life returned to inland waterways, with scientific tests showing that dissolved oxygen levels had doubled, its demand by organic matter had more than halved and nutrient levels had decreased by a factor of 10 in some tributaries.

Disciplinary measures would also be indispensable in terms of flood containment. A national canalisation programme was implemented to achieve this, of which Le Corbusier would have been enormously enamoured with its ruthless rectilinearity, standardised concrete components and utilitarian form and function (Figure 1(a) and (b)). Being a relatively low-lying country with 65% of its territory sitting less than 15 m above sea level, Singapore has historically suffered from watery inundations which used to be a normal aspect of everyday life. Whilst this would become less acceptable at the turn of the twentieth century with a greater epidemiological understanding of malaria, only 50 years later, Singapore was said to be suffering an 'enormous drainage problem' (*The Straits Times*, 18 May 1951). The intended solution was, as one government minister dramatically proposed, 'essentially one of scientific control of vast natural forces' (*Singapore Parliamentary Debates*, vol. 1, col. 793,

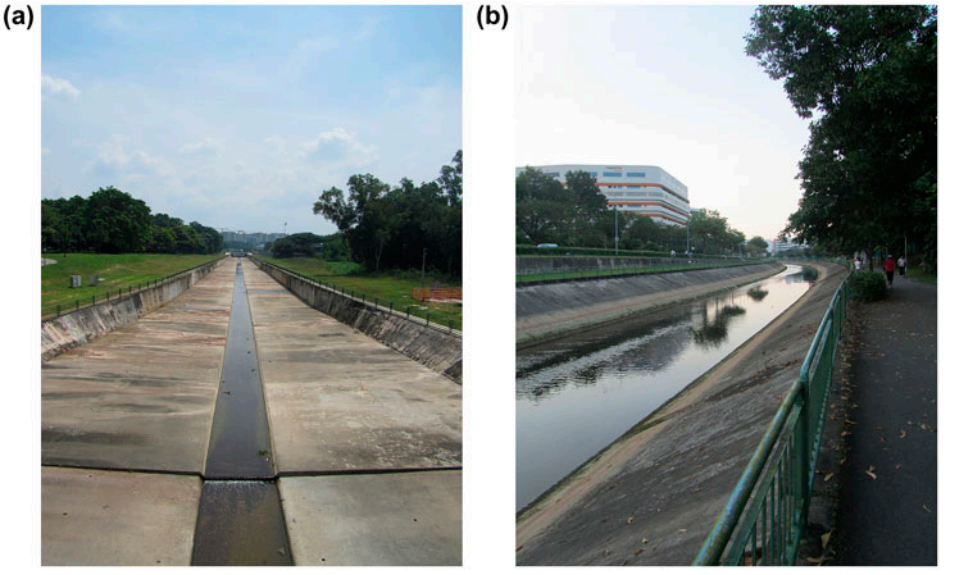

Figure 1. 'Disciplined Circulation': (a) Sungei Bedok, (b) Sungei Sembawang.
Source: Photos by the author (2012).

12 October 1955). This would serve as a rallying call for what he envisaged to be the strictly scientific development of drainage over the next three decades. The modernist predilection for functional segregation was enshrined in the 'capture and convey' method of flood control, which sought to increase discharge capacity of drains in order to enclose water and swiftly send it along a hydrological highway headed directly to sea. To manage the presence of urban water simply meant endeavouring to ensure its absence, constituting a 'double mode; that of binary division and branding (mad/sane; dangerous/harmless; normal/abnormal); that of coercive assignment, of differential distribution' (Foucault 1977, 199). Encapsulating this disciplinary ethos, Mr Barker, Minister for Law and National Development, boldly surmised that 'the real answer to the problem is to eradicate flooding completely' (*Singapore Parliamentary Debates*, vol. 26, col. 157, 7 September 1967).

The government's programme was one of hydrological incarceration, to build faster and tunnel deeper. From 1972, the canalisation programme was significantly accelerated under the new Ministry of the Environment. During its first annual term, 2540 drainage construction projects were undertaken constituting a 50% increase on the previous year (ENV 1972). This included the first partially closed drainage system in Singapore, adding to the largest ever subterranean tunnels then constructed at a previous flood alleviation project, seeing water descend underground and out of the national consciousness in ever greater volumes. During the 1980s, a subterranean canal large enough for a single-decker bus to drive through was constructed on Orchard Road, Singapore's famous shopping centre (ENV 1988), whilst a vast 8000-m network of closed pipe conduits and box culverts was planned for the Marina Centre (ENV 1980). Around the turn of the 1990s, a campaign to cover drains in Singapore's housing estates and litter prone areas was also announced. Certainly, disciplinary methods such as these have been effective in terms of flooding

alleviation. Flooding is now largely contained and limited to flashy, localised surges usually of no more than 300 mm and lasting little over an hour (PUB 2012). However, an unfortunate corollary of this is the physical and emotional detachment that has occurred between citizens and water, which has undermined Singapore's efforts at governing circulation. Consequently, security mechanisms would begin to reconfigure the 'calculation of openings, of filled and empty spaces' (Foucault 1977, 172), where water ceased to be something simply to fear and foreclose.

This shift of direction was partly out of the hands of the government as the mutable materiality and mobility of water, which makes it an especially capricious presence in the modern city, was continually evading infrastructural enclosure. Despite the national canalisation programme and optimistic government projections of complete eradication, flooding nevertheless continued throughout the 1970s and 1980s as the whole island experienced something of a decade-long deluge due to rampant urbanisation. Increased flooding was attracting much media attention and condemnation from a weary public, prompting reluctant disclosure from government figures that flooding may not improve before it gets worse. Adopting an unfamiliar brand of environmental realism, Head of the Drainage Department, Ling Teck Luke, announced that in some regions citizens 'must learn to live with floods' (*The Straits Times*, 9 September 1980). This change of tact can actually be traced back to the Drainage Master Plan of 1975, where for the first time movement towards loath acceptance that flooding would be an element of Singaporean life in the long term was perceptible. The same Mr Barker that had less than a decade earlier reckoned the complete eradication of flooding to be not only desirable but wholly realisable made a public statement announcing that it was not economical to enlarge drains to the extent that would be necessary to permanently prevent flooding:

> Despite all that is being done to alleviate flooding, we cannot eradicate floods completely. More rain is expected in the next month or so, and if the rain is heavy and coincides with a high tide, flooding will occur. But our floods do not last long and will not reach the proportions of a disaster. (*Singapore Parliamentary Debates*, vol. 35, col. 1092, 21 November 1976)

Evidently, disciplinary designs on flooding had unsurprisingly been found wanting, the necessarily exhaustive and expensive programme for gaining the complete control of water would have to be complemented by mechanisms of security that iteratively react and adapt to its slippery material reality. The binary divide between absence and presence, city and water, was defetishised, where storms, rainfall and floods were henceforth managed as naturally occurring phenomena. The shift to security is detectable in the statistical language that Mr Barker adopts in his public statement, where he calculated that existing infrastructure could indeed 'cope with *average* rainfall', however, it would likely fall short of containing floods during '*exceptional* storms that may occur *infrequently'* (*Singapore Parliamentary Debates*, vol. 35, col. 1092, 24 November 1976, emphasis added). By establishing a bandwidth rather than binary of the socially and economically acceptable, flooding at times of exceptional storm periods was consequently normalised. Even in the aftermath of Singapore's worst ever recorded storm when seven people lost their lives, Mr Barker resolutely reminded Parliament that 'drains and canals are not designed to cope with such rainfall. It is not practical nor economical, from the project cost and land use aspects, to build extra-large canals to meet exceptional or infrequent heavy

storms' (*Singapore Parliamentary Debates*, vol. 38, col. 68, 10 January 1979). Furthermore, whilst Singapore's circulation of water has now been competently circumscribed give or take the occasional transgression, there have also been adverse effects associated with this modern, disciplinary approach. Firstly, the policy of covering drainage channels was linked with a rise in mosquito numbers and outbreaks of dengue in Singapore. Secondly, citizens had become socially and emotionally alienated from water, an unfortunate upshot of concrete modernism, which undermined efforts to decrease the amount of litter entering Singapore's network of drains, canals and rivers.

Under security, the *government of nature* was transformed, where 30 years later, this acceptance of water's ambiguous presence continues, irrespective of the success of anti-flooding measures. However, in line with the international shift towards neoliberalism and subsequent phase of urban restructuring (Harvey 1989), the *nature of government* would also begin to shift as part of a broader and more profound transformation in state strategy that recognised not only the independent naturalness of water, but the quasi-autonomous existence and proclivities of civil society. From the 1990s onwards, governmental practice in Singapore would undergo a coordinated programme of liberalisation, which sought to selectively decentralise responsibility and decision-making authority to private companies, quangos, civil groups and individual citizens (Haque 2004). However, the state did not relinquish but reconfigure its governmental duties, in some instances, adopting a more proactive approach to policy objectives by encouraging entrepreneurialism, self-responsibility and international expansion of domestic companies (Yeung 2000). This also occurred within the water sector, exemplified by its financial, technical and institutional assistance of domestic and international water companies to profile Singapore as a 'global hydrohub' (PUB 2008), whilst activity in the embryonic third sector was promoted through similar incentives. The shift in emphasis from discipline to security was institutionalised under the leadership of Environment Minister Ahmad Mattar, who in markedly Baumanian terminology affirmed that the objective was to turn attention from the 'hardware' of environmental management – concrete, regulation and fines – to subtler types of 'software' that would engage the public through lifestyle and educational initiatives to make them 'feel for the environment' (ENV 1993, 2).

Henceforth, in response to these various exigencies, the re-entry of water into everyday life has not only been accepted but is increasingly celebrated. The response was to physically and conceptually open up waterways and reservoirs to people, to work through the re-entry of nature back into everyday life (Figure 2(a) and (b)). Launched in 2006 with the involvement of the public and private professionals in the planning process, the ABC Waters Programme landscaped selected waterfront sites to allow interaction with water, integrating streams and rivers into terrestrial areas whilst opening up waterbodies to sports and leisure pursuits (PUB 2009). The geography of governmentality has changed from concrete demarcation and centralised regulation to inspiring or tempting appropriate types of behaviour under an alternative, more subtle form of lifestyle – and market-based governance, which functions through the 'option of circulation' (Foucault 2007, 49) and people's involvement in water.

Figure 2. 'Circulation Unbound': (a) and (b), naturalised storm drain at Kallang River@Bishan – Ang Mo Kio Park ABC Waters Project.
Source: Photos by the author (2012).

Conclusion

Whilst not a mainstay throughout the whole of Foucault's oeuvre, the town did at least provide an enduring, if perhaps flickering, backdrop. We have the 'constant circulation of the insane' (2006, 10) across the boundary of the city, the policing of the plague and banishment of lepers to the countryside, and the role of infrastructure in channelling urban mobilities. Therefore, the question of circulation was a lingering one for Foucault, how it is conceived, calculated and distributed. However, this question would become particularly pertinent during the latter half of the 1970s when Foucault began to seriously consider the art of government. Here, without neglecting his sensitivity to the microphysics of power, Foucault would scale-up his analysis to the level of the population specifically through the problematic of the town and urban circulation. Whereas in his archaeological period, Foucault had seemingly imprisoned himself in language, his genealogical turn during the Collège de France years had instead seen him confined to the institution. After some initial experimentation, his escape route to more fertile analytical pastures would be via the bustling streets of the urban maelstrom.

Given the centrality of circulation to Foucault's analytics of government, there does appear to be a shortfall of studies in the governmentality literature that directly addresses questions of urban mobilities and the material infrastructures of circulation. I would argue that the analytical origins of governmentality are certainly worth reiterating and remembering, not least because they can provide a subtle, adaptable approach to the study of urban flows. Alongside Foucault's reflections on urban nature and natural urbanity, this has much to offer political ecological inquiry into environmental governance. In addition, governmentality can overcome the unproductive binary between mobility and immobility through its differentiation between

technologies of power and their impacts on circulation. This should provide the grounds for a more nuanced analysis of the state's role in governing flows, which I have sought to demonstrate, has been intimately interconnected with modern cognisance of circulation.

I have attempted to recentre the problem of circulation in Foucault's analytics of government by applying this framework to water governance in Singapore. The aim was to demonstrate both the efficacy of empirical investigation for illuminating the nature of government and the virtue of Foucauldian analysis for investigating the government of nature. Far from being a theoretical exercise in political science or philosophy, changing principles underlying state intervention can tangibly be discerned in the urban form, where in this case, the shift in governmental practice was reflected down at the water's edge. Whilst the social experiences that Foucault analysed were revealed to be historical constructs, it can be shown that something as elemental as water can have a history too. The same can be said for circulation more generally, which is to say along with Foucault that the conceptualisation of circulation, both urban and anatomical, is a product of its time, place and politics. An intriguing question would therefore be how our understanding of circulation, government and nature might continue to change going into the future, and what impacts this will have on the urban form and its sustainability. This question directly relates to current crises of governance in respect to various types of circulation, encompassing financial instruments, terrorists, carbon, drugs, potable water, avian influenza, cyber fugitives, communications surveillance and sabotage, social media networks and immigrants, all of which are just some of the politico-logistical questions of our time.

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