

This is a repository copy of *Fixing a swamp of cobras : the clash between capital and water in shaping urban vulnerabilities*.

White Rose Research Online URL for this paper:
<https://eprints.whiterose.ac.uk/165104/>

Version: Published Version

Article:

Friend, Richard Morris orcid.org/0000-0001-5861-1523 and Hutanuwatr, Khanin (2020)
Fixing a swamp of cobras : the clash between capital and water in shaping urban vulnerabilities. ANTIPODE. ISSN 0066-4812

<https://doi.org/10.1111/anti.12682>

Reuse

This article is distributed under the terms of the Creative Commons Attribution (CC BY) licence. This licence allows you to distribute, remix, tweak, and build upon the work, even commercially, as long as you credit the authors for the original work. More information and the full terms of the licence here:
<https://creativecommons.org/licenses/>

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.



Fixing a Swamp of Cobras: The Clash between Capital and Water in Shaping Urban Vulnerabilities

Richard Friend 

*Department of Environment and Geography, University of York, York, UK;
richard.friend@york.ac.uk*

Khanin Hutanuwatr 

*Department of Architecture and Planning, King Mongkut's Institute of Technology Ladkrabang,
Bangkok, Thailand;
khutanuw@gmail.com*

Abstract: This paper addresses how capital can refashion landscapes and patterns of risk and vulnerability. Drawing on the emblematic case of the conversion of Thailand's Cobra Swamp into Suvarnabhumi International Airport we argue that there is a fundamental clash between the internal logic of capital accumulation and the ecology of water that occurs in places in which land is under water for much of the year. Counter-intuitively investment in public infrastructure such as airports targets locations that are exposed to flood risks. While the literature on capital fixes tends to treat "land" writ large, this paper adds a dimension that has been overlooked in the theoretical work, by highlighting the significance of the ecology of the land in which such fixes occur as a means of understanding patterns of investment, land use change and vulnerability. Our analysis draws on three separate but related concepts of capital "fixes"—spatial, technological and high/low road fixes. We argue the importance of recognising the specific ecological characteristics of land that capital "fixes". This perspective has global significance in providing critical insight into the ways in which capital creates and accommodates the kinds of vulnerabilities and risks associated with climate change.

Keywords: capital fixes, water, Thailand, land, floods, urban vulnerability

Introduction—Context and Purpose of the Paper

Flying in to Thailand one is confronted with a concrete representation of how landscapes can be refashioned. For Nong Ngu Hao (Cobra Swamp), now Suvarnabhumi International Airport (SIA), is itself a remarkable case of how the coming together of capital and associated political influence converts waterscapes into landscapes, creating opportunities for capital accumulation but also new vulnerabilities. Despite its natural propensity to flooding as indicated in its original name, the Cobra Swamp has become the site of one of Asia's largest international airports, and thus the location of enormous financial investment. The hydrological significance of Cobra Swamp within the broader landscape of Greater Bangkok and the Chao Praya Basin was revealed graphically in 2011, with frantic efforts to

protect the symbolic, economic and communications value of Suvarnabhumi against the natural flow of the floodwaters that drained from the North of the country destined for the airport. While Suvarnabhumi escaped the flood on this occasion, the protection of the airport had implications for other areas in the flood-scape beyond administrative borders, as floodwaters were diverted elsewhere to save the airport.

This paper addresses the core question of investment in physical infrastructure that targets flood-prone land. A common feature of urbanisation and industrialisation in Thailand and the global South is that often the most sought after land for expansion is marginal land; and in many cases, land that is not always “land” but water for much of the year, and thus by its ecological characteristics, especially prone to flooding. Hazardous space is generally seen as being the domain of poor and marginalised people (McGranahan et al. 2007; Watts 1983), yet counter-intuitively such spaces are also sites of high levels of investment and critical infrastructure. Significantly in the context of global environmental change, these floodplains, wetlands and deltas are especially exposed to the impacts of flooding associated with climate change.

Focusing on the emblematic case of Suvarnabhumi International Airport/Cobra Swamp, this paper fills theoretical gaps regarding the relationship between capital, land and flood risk. This paper responds to recent calls to address issues of governance, power and politics in addressing urbanisation and flood risks (Gillespie 2020; Shatkin 2019; Weinstein et al. 2019) alongside arguments for urban theory to be better grounded in the experience of the South and emerging economies (Parnell and Robinson 2012; Watson 2013). We focus on how the internal logic of capital accumulation can create, redistribute and absorb risks associated with flooding and climate vulnerability, thereby making hazardous space all the more attractive for investment. The focus of attention is on the specifics of the encounter of capital with the wetlands and waterscapes that are so characteristic of land in monsoonal Asia. We address the ways in which processes of capital accumulation create flood risks through targeting and reconfiguring landscapes, and how emergent vulnerabilities are accommodated in ways that allow for further capital accumulation. We draw on three separate but related concepts of capital “fixes”—spatial, technological and high/low road fixes (Glassman 2007; Harvey 2001)—that partly explain how capital encounters land as a basis for accumulation. While the literature on capital fixes tends to treat “land” writ large, this paper adds a dimension that has been overlooked in the theoretical work, by highlighting the significance of the ecology of the land in which such fixes occur as a means of understanding patterns of investment, land use change, risk and vulnerability. As such, the paper provides important contributions to a range of current theory on urban political ecology (Gillespie 2020; Shatkin 2019; Weinstein et al. 2019) but also to scholarship grounded in the social construction of hazards, vulnerability and disasters (Adger 2006; Hewitt 1983; Mustafa 2005; Taylor 2014; Wisner et al. 2004).

We argue that the nature of land and water matters in shaping the encounter of capital and land (Bakker and Bridge 2006; Castree 2003). The “land

reclaimed from lakes, rivers, canals and marshes" (Shatkin 2019:214) and coastal belts (Sengupta et al. 2020) have been targeted for urban development in cities of the global South. In addition to the political influence of alliances of state and private developers (Shatkin 2008) and prioritisation of economic development (Sengupta et al. 2020), there is a deeper layer to such an alliance, and the targeting of ecologically sensitive land. Underpinning this encounter is a fundamental clash between the internal logic of capital accumulation and that of water, hydrology and ecology. In recognising the inherently political dimensions of land use change that drive urbanisation and industrialisation (Gillespie 2020; Shatkin 2019; Weinstein et al. 2019), and the social construction of hazards, risks and vulnerabilities (Hewitt 1983; Mustafa 2005; Wisner et al. 2004), this theoretical perspective illuminates how patterns of urbanisation and land use change in specific social-ecological contexts operate in ways that exacerbate risk and vulnerability, while also creating opportunities for fresh rounds of capital accumulation. These landscapes of the urbanising global South that are so closely associated with climate vulnerability are likely to be a new frontier of capital expansion (cf. Gillespie 2020), and arenas of political conflict regarding the causes of and responsibilities for flood risk, and appropriate responses.

Urbanisation, Hazardous Space, and Fixes

Urban political ecology has addressed urbanisation as arenas of contesting interests and values, with physical infrastructure reshaping landscapes and reinforcing social and political structures and relations (Pelling 2003; Swyngedouw and Heynen 2003). Recent scholarship has directed attention to issues of governance and power and alliances of political interests that shape patterns of urbanisation and flood risk (Shatkin 2019; Weinstein et al. 2019). From this perspective, urban planning is seen as supporting specific political and economic interests at the expense of others. Scholarship on vulnerability acknowledges to varying degrees the biophysical and social dimensions of hazards becoming disasters, the severity of such events, and the ways in which impacts become manifest and are distributed (Adger 2006; Cutter et al. 2008). Critically, vulnerability is not only a function of exposure and sensitivity but also of adaptive capacity in responding to potential impacts (Adger 2006). Yet, the literature grounded in social production of nature has struggled to accommodate the specifics of ecological and biophysical processes (Bakker and Bridge 2006; Castree 2003), while the urban political ecology focus on flood has not considered the significance of the ecological characteristics of land that is targeted for urbanisation beyond recognition of its ecological sensitivity (Sengupta et al. 2020). Our interest is in addressing the specifics of the encounter between capital and water-based landscapes in which the inherent risk of flooding might be expected to act as a disincentive for capital. Such a focus is of greater significance given the context of rapid and contested urbanisation across the global South, and the heightened risks of climate change.

Land Use Change, Urbanisation, and Emerging Patterns of Vulnerability

As the world urbanises there is growing recognition that the most rapid and intense growth in urbanisation is occurring in particular landscapes—the coasts, floodplains and deltas of the South, especially those of Asia (McGranahan et al. 2007; Sengupta et al. 2020). This trend of urbanisation means that the majority of the world's population and economic assets are increasingly being located in some of the most hazardous space on the planet, exposed to the impacts of flooding, storms and sea level rise that are most associated with climate change (Pelling 2003; UN 2016). Moreover, the ways in which urbanisation is occurring, and the refashioning of landscapes that it requires, are intensifying patterns of flood risk and vulnerability.

Critical analysis of hazards, disasters and climate change has increasingly pointed to the social construction of vulnerability (Wisner et al. 2004), how certain interests prevail or are denied, to the differential impacts of stresses, shocks and crises that are distributed across locations and among people determined by assets, capabilities and entitlements (Adger 2006; Watts 1983). Drawing on concepts of political ecology has allowed for understanding of the mechanisms by which vulnerability is socially constructed through the refashioning of landscapes and creation of physical infrastructure, that both reshapes ecological processes and the impacts of shocks (Graham and Marvin 2001). Mustafa (2005) employs the concept of hazardscapes as refashionings of social and physical landscapes that create hazards across locations, and how such processes are themselves shaped by social and political structures, material and discursive relations, serving particular political interests at the expense of others.

Similarly, work grounded in urban political ecology draws attention to the city and processes of urbanisation as transformations of society and nature that can both reproduce existing power relations, while also providing space for further contestation (Swyngedouw and Heynen 2003). Vulnerabilities to shocks and crises are further mediated through the physical infrastructure and institutional arrangements that shape much contemporary urban life (Graham and Marvin 2001). While the responses to such vulnerabilities favour managerial and technical pathways (Bassett and Fogelman 2013; Hewitt 1983; Wisner et al. 2004) with a strong engineering bias (Mustafa 2005), there are also political contestations to the ways in which risks such as urban flooding are projected and managed (Shatkin 2019). Such responses represent a degree of path dependency of further investment in the land use changes and infrastructure investments that have contributed to creating flood risks in the first place and that further constrain adaptive capacity, thereby intensifying vulnerabilities.

The role of capitalism in driving land use change and urbanisation is the focus of much academic literature. The global land grab that has targeted rural production space for food and biofuels, also has an urban dimension, with land acquisition and displacement features of urbanisation across the South (Zoomers et al. 2017). Current patterns of urbanisation in the global South are characterised as a failure of governance, with planning processes informal in ways that allow for political benefits (Roy 2009) that are increasingly dominated by the private sector and commercial interests (Shatkin 2008). Urbanisation in the global South

represents a real estate frontier for global capital, through the privatisation of state land, including the targeting of waterfronts (Gillespie 2020). Despite the centrality of land use planning to urban policy, it is an area that stands out for its evident failures to control land use change. Urban investments occur in the absence of land use plans. Where plans do exist, they are often out of date (often by design), and easily circumnavigated (Friend et al. 2014). An important dimension in the story of urbanisation is the enormous political influence enjoyed by real estate companies, and the role that investment and speculation in land, often closely tied to local planning processes, plays in creating political power and influence (Gillespie 2020; Shatkin 2008). The apparent informality of much urban planning provides a malleability of the planning and legal process that creates political and economic benefit (Roy 2009). Basic information is rarely in the public domain and is itself a commodity for local government to trade (Ribiero 2005). Failures of land use planning to act on greater understandings of flood risk are attributed to institutional conflict between competing government agencies (Weinstein et al. 2019). Local government itself plays contradictory roles of both the managerial and regulatory, but also the entrepreneurial role responsible for attracting investment (Harvey 2006). These tensions are difficult to reconcile and tend towards favouring entrepreneurial interests and outcomes.

Across this literature there are similar concerns for the political drivers of change, and the pivotal role of capitalism in reconfiguring nature, and in driving patterns of urbanisation and global environmental change. A growing literature presents climate change as a direct consequence of global capitalism, arguing for the need for a new radicalism and social transformation (Klein 2015; Pelling 2003). Capitalism's demand for resources and the ability to treat environmental costs as economic externalities puts it in conflict with the needs for addressing global environmental change. Shatkin (2019) argues the need for a "politics of impermeability" to address the ways in which urbanisation of coastal megacities in Asia has poured concrete on ecological landscapes, creating political tensions over water sources, flow and drainage, and infrastructure.

Such arguments raise the question of the role of the state in playing its regulatory role in addressing the fundamental market failures that allow for climate change (Giddens 2009) and that allow for commodification of land and real estate speculation (Gillespie 2020). Yet despite the recognition of the targeting of wetland areas, there is a continuing tendency to overlook the significance of the socio-ecological specifics of land where urbanisation occurs in the South, or the ecological and social consequences of changing patterns of climate vulnerability and risk. It is through capital's encounter with the specific ecologies of monsoonal Asia (and similar ecologies across the global South) that the tensions and deeper relations between capital and nature can be revealed.

Spatial, Technological, and High/Low Road Fixes: The Encounter between Capital, Land, and Water

The relationship between capital and land, and the reconfiguring of nature has been the focus of much debate within Marxian theory. The argument that

capitalism generates the destruction of the natural world through its demand for resources is well established. What Marx refers to as the nature of capital being to drive beyond spatial barriers, allowing for the geographical restructuring of capitalist activity, that create new forms of uneven development and the shift in the geographical scale at which capitalism is organised (Marx 1973). Increasingly the implications of capitalism's commodification and refashioning of nature is applied as a means of explaining the ecological crises that the globe now faces (Moore 2011).

Changing patterns of ownership and refashioning of land that allow for speculation and accumulation are central to the history of the emergence of capitalism and the decline of feudalism. Polanyi (2001) refers to the "commercialisation of the soil"—breaking humanity's relationship with the earth, thereby transforming social relations and through this contributing towards the end of feudalism. However, as central as land is in this debate, this is a discussion of land in a rather abstract sense; there is no reference to the specific ecological characteristics and functions of soil, or the significance of how they may differ across geographies.

The relationship between people and land goes beyond land as simply a factor of production. For Harvey (2001) the importance of land as physical space also appears as a way of dealing with the inevitable internal crises of capitalism, the phenomenon whereby surpluses of labour and capital are created but for which there are no opportunities to engage them in profitable use. Capital takes a range of responses to such crises of over-accumulation, including the devaluation of factors of production (labour and capital) and means of exchange (markets), or the destruction of stock or labour to reduce surpluses. But historically crises of over-accumulation have also been associated with the export of capital, identifying fresh locations for investment and opportunities for physically restructuring; a process that Harvey terms the "spatial fix", described as "capitalism's insatiable drive to resolve its inner crisis tendencies by geographical expansion and geographical restructuring" (Harvey 2001:24). When capital faces a crisis it needs to relocate, and at some stage, find a physical landing site.

Airports take a central role in Harvey's discussion, being a combination of both a fixed spatial asset (the airport itself) and the mobility of the aircraft. Harvey extends this concept of "fixity", as being the tension between having to be grounded and being mobile; being grounded in order to generate further cycles of accumulation, and being mobile in order to relocate as opportunities and crises emerge:

This leads to one of the central contradictions of capital: that it has to build a fixed space (or "landscape") necessary for its own functioning at a certain point in its history only to have to destroy that space (and devalue much of the capital invested therein) at a later point in order to make way for a new "spatial fix" (openings for fresh accumulation in new spaces and territories) at a later point in its history. (Harvey 2001:25)

The ability to profit from the destruction of space at future points in time depends on the ability to reshape values, and to relocate capital, if not the physical infrastructure itself. For Harvey, geographical expansion is fundamental to capitalism's

ability to endure and overcome crisis. Such expansion is itself related to technologies of transport and communication that stretch the reach, ease and pace of such expansion. Diversifying and spreading investments, whether they be focused on identifying new sources of labour, raw materials, or new markets, across spatial scales is thus a mechanism for expanding the reach of capital accumulation. The reach of capital, and its ability to relocate with agility and speed is a characteristic of contemporary globalisation.

Work grounded in political ecology addresses capital's role in transforming nature and social relations (Taylor 2014). Historically the expansion of capital has opened new ecological frontiers that generate opportunities for resource extraction of previously uncommodified nature (Moore 2015). Capitalism's expansion has now reached the limits of such frontiers requiring opening up new frontiers. Harvey's work on the spatial fix is increasingly given a more overtly socio-ecological dimension. Recent work on socio-ecological fixes considers how "entangled social and environmental crises" are fixed through production and transformation of landscapes, and also shifts in "the regulation of productions of space and nature" (Ekers and Prudham 2015:2438). This orientation draws attention to "the reconfigurations of socio-natural relationships, and more specifically, through the production of nature" (Ekers and Prudham 2015:2441). From this relational perspective, capital not only shapes nature, but is itself shaped by its encounter with nature. As Nugent (2015) argues in the case of investment in green energy in Canada, spatial fixes through investment in large-scale infrastructure also operate as mechanisms for dealing with environmental crises as well as crises of capital.

A familiar pattern emerges of initial speculative investments generating significant financial returns, that then lead to cycles of refashioning the land, with further cycles of construction that allow for economic activities that create further opportunities for accumulation. Glassman (2007) refines this theory of spatial fix further in a discussion of Thailand, differentiating between what he terms "low road" and "high road fixes", drawing a distinction between the first round of speculation and investment in land with the further rounds of re-investment and refashioning of land. In the case of Thailand, there are historical differences in the political coalitions of these fixes, with the low road fixes of the 1970s and 1980s centred on an alliance of military leaders, bankers, and exporters, and post-1997 crash political and economic alliances of domestic and foreign capital.

For Glassman, the high road fix is most associated with further transformation of existing urban space:

While the high-road fix is not inevitably tied to particular locations, it is a fix that frequently features further investment in already well-established sites of capital accumulation. Existing urban populations and production capacities serve as the basis for new investments that further transform urban space into the means for expanded reproduction and the longer-term restoration of profitability. (Glassman 2007:353)

What is increasingly in evidence in Thailand is the spatial fix of capital investing in land that occurs as both a combination of the low and high road fixes. These are not separated historically, but colliding in the same space and at the same time. In the areas of the country where urbanisation is occurring most rapidly it is both

associated with “low road” patterns of targeting marginal lands, as well as “high road” transformation of existing urban spaces and investments.

Current patterns of urbanisation appear somewhat counter-intuitive. There is a conventional wisdom in the climate vulnerability literature that poorer people tend to settle and reside in marginal and hazardous locations (McGranahan et al. 2007). Indeed, there are numerous examples from around the world of poor urban people living in spaces that are hazardous, by their very “nature” or the ways in which the urban landscape has been constructed (Douglas et al. 2008). Yet the situation is not quite so straightforward for what we now witness is that flood prone lands are not solely the location of the poor. How and why this occurs, alongside the long-term implications of such a trend, can be revealed through a critical review of Cobra Swamp as part of a broader analysis of urbanisation in Thailand.

The Case of the Cobra Swamp Becoming Suvarnabhumi International Airport

Suvarnabhumi International Airport is an emblematic case study with global resonance. The conversion of Cobra Swamp into one of Asia’s major airport hubs has a long history involving a cast of planners, politicians, consultants and international advisors, and a series of planning and strategy documents.

This research is based on a combination of historical analysis and qualitative actor-oriented approaches, drawing on a critical analysis of a range of archive material, including planning documents, as well as a series of interviews with key actors involved in the history of planning and approval for the airport, and more recently, in its management.

Such a critical archival analysis of planning documents has never been undertaken previously in Thailand. Our research focuses on two broad streams of planning processes; those directly related to city land use planning for the expanding area of Bangkok, and those that are focused on the development of air transport infrastructure in Thailand. These are planning processes that date back to the 1950s, and that involve international consultancy firms as well as domestic advisers. The planning documents can be divided into the following categories and areas summarised below:

1. Land use planning for Bangkok and Greater Bangkok;
2. Development plans for SIA itself; and
3. Strategy documents for development of aviation and transport infrastructure, and the Eastern Seaboard.

It is important to note that many of these planning documents are not easily available to the public, and as such have not previously been subject to critical public scrutiny. The planning documents that have been reviewed for this paper are summarised in Table 1.

Our analysis of these planning documents focuses on the tension between maintenance of green space for flood protection of the wider landscape of Greater Bangkok, and various shifts in planning around the optimal location for

Table 1: Planning documents reviewed in this paper

Document type	Content
Land use planning for Bangkok and Greater Bangkok	<ul style="list-style-type: none"> • Hearing documents on urban land use of Eastern Bangkok • Documents related to Bangkok General Plan which includes but is not limited to land use plan, open-space plan, infrastructure and canal networks plan • Water management plans for Greater Bangkok • Documents related to National Land Use Plans
Development plans for SIA	<ul style="list-style-type: none"> • Materials from Suvarnabhumi Airport Museum and website • International financial loans in SIA • News articles on recent investment in SIA expansions and commercial areas in SIA
Strategy documents for development of aviation and transport infrastructure, and the Eastern Seaboard	<ul style="list-style-type: none"> • Documents related to Eastern Economic Corridors • Materials on Laem Chabang and Eastern Seaboard

an international airport. In analysing this series of planning documents our focus has been on the ways in which flood risks associated with the Cobra Swamp have been identified, both for the airport itself and for the wider landscape, as well as the mitigation strategies identified. This initial line of enquiry has led to an analysis of competing arguments regarding the development of the airport and associated potential flood risks.

This documentary analysis is complemented by a series of interviews with key informants conducted in 2017–2018 to not only understand the internal workings of the politics that underpin this contested planning process, but also how those responsible for protecting the airport from flooding during 2011 present their own explanations of land use and flood risk. Key informants include senior officials within state planning agencies, as well as those with a responsibility for management of the airport itself. Such an approach draws on more case-study, qualitative methods within political sociology, shifting from quantitative analysis towards attempts to understand the lived reality of actors involved in the “nitty gritty” of everyday politics and planning (Auyero 2006), corresponding with a similar focus within the anthropology of policy and the workings of organisations and bureaucracies (for example, see Lipsky 2010). These interviewees represent three main groups of state and non-state actors; government urban planners, SIA staff, and citizens in flood-affected areas.

Historical Context

Airports across Asia, such as Jakarta and Bangkok, are located in areas that are identified in the vernacular as swamps (Jarvie and Friend 2016; Sengupta et al. 2020). Even within this broader context, Suvarnabhumi International Airport (SIA)

stands out as a special case given its central importance in the national economy and its contribution to the growth of Greater Bangkok, and its history of planning and construction.

The airport has a long history going back almost 60 years. The airport is constructed on 32 km² of land on the south-eastern edge of Bangkok in Samut Prakan Province. The planning and construction of the airport has gone through many governments and types of administration, beginning with the military dictatorship of Field Marshal Sarit Thanarat in 1960 to the reformist government of Anand Panyarachun in the mid-1990s. The plans for the airport then accelerated after the 1997 crash, and the political upheaval that brought a new government under Thaksin Shinawatra to power in 2001. This administration oversaw the bulk of construction with the airport finally opened in 2006 (Airports of Thailand 2011).

The history of the airport is mired in allegations of corruption, that themselves are inter-twined with the intense contestation of Thai politics (Fullbrook 2007). It is a political history related to wider ambitions for industrial development. The initial case for the airport was to accommodate anticipated increase in demand that could not be met by the existing airport at Don Muang, and to strengthen the linkages with regional industrial development along the Eastern Sea Board (ESB) that included the deep-sea port of Laem Chabang, and the petrochemical industrial estate at Map Tha Phut (NESDB 2017). The Eastern Sea Board has come to be the cornerstone of industrial development in Thailand.

The role of military governments and political-economic influence has dominated the history of the airport's planning, approval and construction. The initial identification of the airport project under Field Marshall Sarit launched a period of speculative land purchasing; buying low value, flood prone land at low cost with the anticipated financial returns once the project was to be approved. After the violent political crisis of 14 October 1973 that led to a brief period of democratic government, the allegations of corruption scandals between international corporation and the ousted government were revealed and later led to the cancellation of the project. Despite this cancellation of the project, the land expropriation in Samut Prakan Province continued (Kanparit 2008).

Between 1976 and 1983 there were further attempts to re-propose the second airport. In 1976, the Ministry of Transportation hired the consultancy firm Tippetts-Abbett-McCarthy-Stratton (TAMS) to study the master plan for the new airport. TAMS studied 15 areas around Bangkok to assess their suitability for the new airport, finally deciding on Nong Ngu Hao as the most suitable location.

Their assessment indicates the significance of prior land speculation in shaping this planning decision. TAMS argued that the major reason for proposing Nong Ngu Hao was that a large plot of land had already been accumulated. Even though the construction would be costly due to soil conditions, it would still be preferable to purchasing new land of similar area (Kanparit 2008). Despite this assessment, Nong Ngu Hao was rejected by two cabinets, both led by military-background prime ministers, with both cabinets suggesting renovation of Don Muang to increase its carrying capacity (Kanparit 2008). Ultimately it was

governments with strong links to the business elite rather than the military that provided the green light to the approval and later construction of the airport.

Investment in SIA involved a range of sources and actors. Early in the development of the project, the limitations of Thai finance were readily identified. In 1963 the National Economic and Social Development Board (NESDB)—the main agency charged with national strategic planning—warned the cabinet that the national treasure reserve would not be enough for the project as the project budget can reach 1200 million, considered a huge burden to the country compared to its economic size (Kanparit 2008). Japan played an important role in furthering investment during the critical phase between 1976 and 2005. JBIC (Japan Bank for International Cooperation) provided seven loans for Thailand for the Second Bangkok International Airport Development Project, implemented by the New Bangkok International Airport Company Limited. In May 2005 JBIC provided the final loan, for the seventh phase of the project, for the amount of 35.453 billion yen (JICA 2005). The press release of this time referred to this project as being in line with JBIC's mission of "improving the urban environment".

Fixing the Cobra Swamp: Thailand's International Airport

Addressing the ecological characteristics of land is essential for understanding how capital accumulation occurs in specific contexts, and its broader political implications. The potential for such expansion of capital is constrained when the land in question is largely, or at least partly, water. The landscapes that predominate in monsoonal Asia present constraints for land speculation and investment. Landscapes that are dominated by water for at least a part of the year have limited potential for capital accumulation in their natural state. Water cannot be reshaped easily in ways that would allow for further construction and investment. Land needs to be reclaimed from water, with wetlands, coasts, floodplains and deltas drained or filled, requiring cycles of technological fixes.

Accommodating Flood Vulnerability and Risk: Planning and Management of SIA

The implications of urban development for flood risk have been widely articulated in public in Thailand.

Since its earliest inception, the vulnerability to flooding of the location of the airport was never in any doubt, and this concern has featured in much of the public debate. The original name of the site of the airport and its elevation at between 0.5 and 1.0 metres above sea level clearly indicates its propensity to flooding, making the area a significant site for rice production. In contrast, Thailand's first international airport—Don Muang—was constructed on higher ground (as its Thai name indicates).¹ Suvarnabhumi is in one of the lowest lying locations in Greater Bangkok (Nasongkhla and Sintusingha 2011); an area that is described as essentially a lake (Jumsai 2006, quoted in Nasongkhla and Sintusingha 2011).

The flood risks associated with the airport go beyond the site itself to the wider hazardscape (cf. Mustafa 2005). The location of the airport in the natural floodplain of Greater Bangkok has created tension between the flood protection needs of the capital city, and the imperative to protect the airport itself from flooding. As one of the lowest lying areas in the east of the Chao Praya Basin, Cobra Swamp receives run-off from the wider basin, and thus from Bangkok itself. Indeed, such flood risks underpinned arguments that were made in the press at the time of the approaching final approval of the project. Presciently Sutiprapa et al. (2008) argue that the reduction of the flood retention area to the east of Bangkok as a result of the airport's construction increased the risk of a flood disaster for greater Bangkok. These concerns were to be realised in the 2011 floods that affected the whole of the lower Chao Praya Basin.

Interviews with planning officials suggest that these conflicting interests are shaped by the relative institutional power imbalance between urban planning agencies and those charged with investment and economic development. As one informant explained, from a planning perspective:

It is necessary to respect the geographical context ... At the very least, areas such as flood-prone lowlands should be screened out from development, but they weren't ... It's just claimed that it's government development policy ... we were forced to follow the government policy. (Personal communication, 21 August 2018)

These tensions are clearly represented in our analysis of the history of planning documents for the airport (Airports of Thailand 2011; Kanparit 2008) and the history of Bangkok urban/regional plans² (CUURP 2010; Ronghanam 2015; Tapananont 2015).

Greater Bangkok has sought to establish the eastern areas of Bangkok as flood protection zones even during the same time in which SIA was going through the approval process. These conflicting objectives even appeared within the same consultancy firm with Litchfield, Whiting, Browne, and Associates responsible for both the feasibility study of the new airport (Kanparit 2008) while also working on the Greater Bangkok Comprehensive Plan; a plan that ultimately was to be considered a model of comprehensive urban planning in Thailand (CUURP 2010). Although this city plan included 30-year plans for transportation, infrastructure, and land use for Bangkok Metropolitan Authority (BMA) and neighbouring Provinces including Samut Prakan where SIA is located (Ronghanam 2015) Cobra Swamp was not identified as a site for an airport site (Kanparit 2008). However, only a few years later in 1961 the Ministry of Transportation selected the Cobra Swamp as the site for the new airport (Airports of Thailand 2011).

At the same time that the government approved the construction of SIA in 1998, the reserved areas were still identified as floodways in the 1999 Bangkok Comprehensive Plan. In 2005, the first plane touched down on the runway and in 2006 SIA was fully operational, however the designation of floodways in the area was also included in the 2006 Bangkok Comprehensive Plan, and survived through to the 2013 Bangkok Comprehensive Plan (Figure 1). Indeed this later plan identified SIA and the area to the north perimeter of the airport as "open space to preserve natural drainage condition ... Any landfill, constructions, or activities that will reduce the

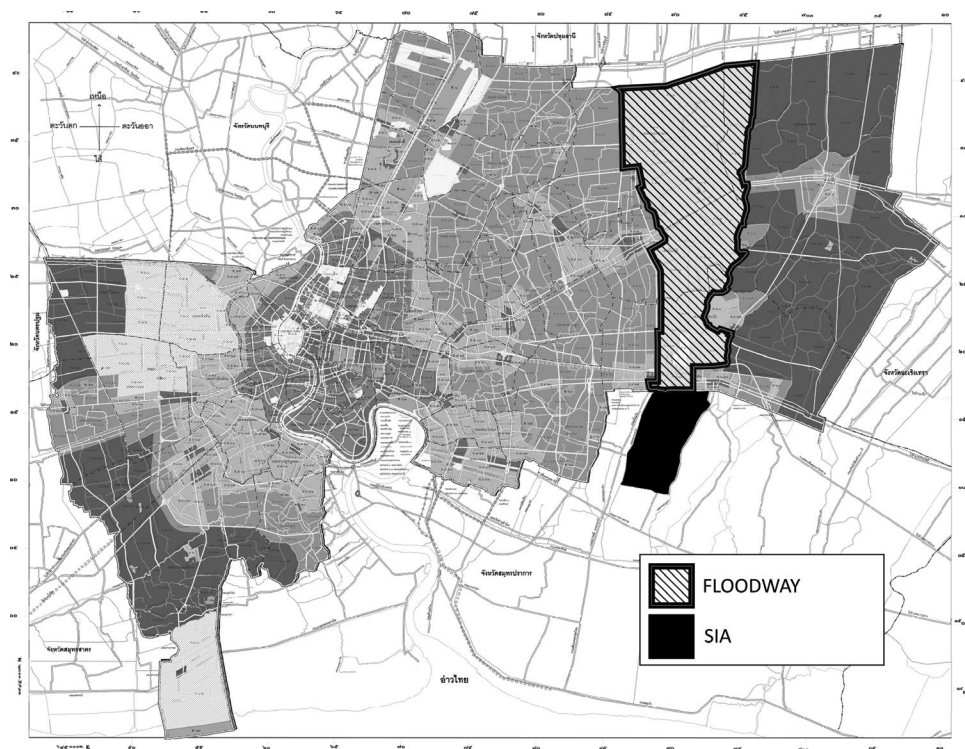


Figure 1: Areas designated as floodways in the 2013 Bangkok Comprehensive Plan (source: authors' modification of "2013 Bangkok Comprehensive Plan", Department of City Planning, Bangkok Metropolitan Administration; http://cpd.bangkok.go.th:90/web2/NEWCPD2556_2/guide.html [last accessed 7 September 2017])

efficiency of natural drainage condition are prohibited".³ Despite its recognised role in blocking such floodways, plans for the construction of Suvarnabhumi have proceeded alongside plans to protect Bangkok's floodways.

Such tensions are further reflected in the operations of water management, especially in times of crisis. During the 2011 floods SIA refused a request from BMA to divert water from canals into the airport's retention ponds, arguing the need to maintain water quality. Despite its location in what BMA has identified as protected areas for floodways, SIA has not incorporated underground tunnels, which typically would allow flood waters to drain underneath the area, arguing concerns for maintenance (Personal communication, SIA staff, 2017). As a result, flood water outside the perimeter of SIA cannot pass through the airport. SIA's approach to dealing with these challenges has rested on technological approaches to moving water against its natural flow.

Technological Fixes

SIA provides a case study of managerial, technical and engineering solutions for dealing with flood vulnerability (Hewitt 1983; Mustafa 2005; Wisner et al. 2004).

The location of Suvarnabhumi International Airport in Cobra Swamp, described as a “lake ... and the worst subsoil conditions” (Jumsai 2006, quoted in Nasongkhla and Sintusingha 2011) depends on the technological and administrative ability to manage drainage of water against its natural flow.

The technological challenges of locating such critical national infrastructure on flood-prone land were identified early. In a special edition of *Geotechnology* devoted to the engineering challenges confronting the airport’s construction, Moh and Lin (2006) focus their attention on the engineering requirements of “soil improvement and pile foundation” to protect the site on which the airport itself is located. The relatively new technology used in Suvarnabhumi construction, a technique known as Preloading Vertical Drainage, allowed for 80% of water to be extracted from the soil within 11 months and helped expedite the process that previously would have taken 30 years (Kanparit 2008). This was achieved by dumping a considerable amount of sand and rock pebbles to squeeze water out of the soil, later to be used for construction of the airport’s runways and building facilities. However, shortly after opening, the airport was caught up in allegations of corruption as serious cracks appeared in the runways (Fullbrook 2007).

Protecting the airport has also required construction of dykes around its perimeter, as well as retention ponds and pumping stations working as part of a network of canals designed to divert flood waters away from the airport, and towards the natural drainage of the Gulf of Thailand. In the aftermath of the 2011 floods the need for additional flood protection infrastructure also began to be considered (Keokhumcheng et al. 2012), leading to the height of the airport’s dykes being raised from 3.5 to 4 m during Yingluck Shinawatra’s administration.

The response to these patterns of investment, and transformations of landscapes is again a technological fix of flood protection infrastructure. Recent plans from the Royal Irrigation Department aim to divert flood waters even further east through Nakhon Nayok River and Phra Ong Chaiyanuchid Canal toward Bang Pakong River rather than allowing flood water to pass through Bangkok and SIA (Department of City Planning et al. 2017). Doing so again requires diverting water against gravity and the topography of the landscape. This will be achieved through further canal modification and dyke construction, but also through pumping; another energy consuming technological fix, founded on managerial, technical and engineering approaches (Bassett and Fogelman 2013; Hewitt 1983; Mustafa 2005; Wisner et al. 2004). While redistributing vulnerabilities elsewhere in the hazardscape (cf. Mustafa 2005) such technological fixes also open up new territories for real estate speculation, thereby continuing the cycle of the spatial fix.

During the 2011 Bangkok floods, water was diverted from the greater metropolitan area and SIA east towards Chachoengsao Province. Interviews with Chachoengsao farmers revealed that this led to inundation of their fruit orchards, and that it took five years until the trees could produce fruit again, leaving them without their main source of income. As a result many farmers were compelled to sell their land to real estate developers with their own ambitions to convert farmland, with its own implications for the impermeability of the wider hazardscape.

Technologically fixing one locale can intensify the vulnerability of others, whilst also opening up opportunity for land accumulation and further investment in the manner similar to the concept of disaster capitalism (Klein 2007). The cycles of capital accumulation can thus continue.

High Road Fixes

SIA is emblematic of the clash of rationalities between capital accumulation and natural hydrology, it is also part of a pattern of wider investment, and in many ways, a driver of such change, as was originally anticipated. SIA is one of a series of large developments in flood-prone locations in the wider floodplain.

Ambitions for Suvarnabhumi have at times gone beyond those solely for an airport. The airport also created investment potential in the surrounding areas, with powerful elites influencing the amendment of land use regulations to allow for urban expansion in the area of the airport (Roachanakanan 2014). During Thaksin's government from 2001 to 2006 plans for a Suvarnabhumi Metropolis were announced prior to the formal opening of the airport. Building on the airport's increased global linkages, this would have created a new urban centre around SIA incorporating two nearby districts of Bangkok, Prawet and Lad Krabang, and two districts from Samut Prakan Province, Bang Phli and Bang Sao Thong (Institute of Public Policy Studies 2006). The new metropolis would have had the same administrative status as a province and an anticipated population of over 400,000 people. However, the proposal did not materialise, being abandoned by the military regime that removed the Thaksin government in a coup in 2006. But it was a plan that was also mired in allegations of corruption, including claims of speculative land purchases by influential political and business elites.

Urbanisation and associated communications and transport infrastructure continue to play a central role in this drama of economic development. The approval and then construction of the airport at Suvarnabhumi spurred a growth in development of factories and warehouses, as well as residential properties and recently tourism servicing facilities such as large-scale souvenir malls, duty-free department stores, spa arcades, and even hubs for growing numbers of Chinese tourists. In early 2017, it was reported that Alibaba had shown interest in using a portion of SIA's vacant land in its eastern part for establishing an e-commerce park; a new investment that would also include a free trade zone, with warehouses, and packaging facilities, and distribution networks through air, land, and rail (Thansettakij 2017). This project was warmly welcomed by the Airport of Thailand's executive (Matichon Online 2017/2017). If approved, this new Chinese investment will intensify urbanisation on the Cobra Swamp, echoing the previous ambition of Suvarnabhumi Metropolis in terms of investments moving beyond the airport itself.

Recent concerns for the stalling of economic growth since 2008 and the apparent middle income plateau in its national development have reinvigorated the interest in accelerating and expanding urbanisation as a critical driver of growth. Urbanisation, particularly outside of Bangkok where it has formerly been concentrated, is increasingly recognised as a means of shifting Thailand from its apparent

middle income plateau as can also be seen in the plan for new cities development in the Eastern Economic Corridor (EEC) programme (NESDB 2017). For the influential Siam Commercial Bank, spreading urbanisation outside of Bangkok is by the bank's own terminology a means of "fixing" the problem of the capital city—"getting urbanisation going will require both 'fixing' Bangkok, and developing a portfolio of places" (Siam Commercial Bank 2011:1). Urbanisation is presented as the future pathway, providing economic opportunities that are underpinned by the real estate and construction (and associated) industries through the creation of the physical space and architecture of the urban. This is very much a cycle that creates more demand and more consumption, furthering cycles of further accumulation. Indeed, the Siam Commercial Bank (2011) appears to endorse Glassman's analysis, highlighting the importance of investment in urban land and infrastructure while also creating new markets for high value consumer goods as keys to urban-led economic growth.

Suvarnabhumi International Airport is emblematic of the targeting of wetlands for large-scale investment, and the ways in which flood risks are internalised. However, it is by no means unique. In secondary cities across Thailand similar trends can be found. In Udon Thani in Northeast Thailand a large public wetland area has come under pressure with government plans to be converted into an international conference and sports centre, all part of the ambitions for the province to have a role as a regional hub for business, education and health service provision (Siriwattanaphaiboon 2015). Similarly, in Khon Kaen Province, the floodplains surrounding the city are increasingly targeted for housing estates and factories, altering the natural hydrology and contributing to increasing flood risk for the city (Inmuong et al. 2015).

Similar patterns are in evidence beyond Thailand. For example, Phnom Penh's Boeung Khak Lake has been a site of fierce conflict between local residents and an alliance of state and private sector investors intent on converting the 90 hectare lake into prime real estate, now grandly named "Phnom Penh City Centre, the Pearl of Cambodia" (Baliga and Chakrya 2017). Eventually this conflict was settled in favour of the investment, with the area now identified as witnessing the most rapid rises in land prices, as the full area of the lake is completely filled, and the eviction and resettlement of 4000 families (ibid.). Filling the lake was necessary to overcome legal constraints on construction over waterways with a coalition of investors and government colluding to transform waterways "into land that is physically and legally suitable for construction" (Doyle 2012:148).

This pattern begs the question as to why and how such hazardous spaces are also the locus of such investment, why such high-value investments should be made on these sites, and how such investments accommodate the inevitable risks associated with flooding.

Reshaping Urban Landscapes and Vulnerabilities: The Clash between Capital and Water

The urban political ecology literature highlights the political processes by which urban landscapes, infrastructure and services are shaped, and how these create

and distribute benefits and risks. That hazards and vulnerabilities are produced and recreated through social, economic and political processes that reshape landscapes and social relations, also has a well established literature (Adger 2006; Hewitt 1983, Mustafa 2005).

Our focus in this paper is firmly on how the internal logic of capital drives patterns of contemporary urbanisation that target specific ecological landscapes, and lends itself to specific outcomes in its encounter with the flood-prone ecologies that characterise Thailand and much of monsoonal Asia. This perspective has additional significance given the pace of urbanisation in this part of the world, with much of this urbanisation occurring in locations that are exposed to flood risks that are themselves projected to intensify with climate change.

The restructuring of space that underpins urbanisation, and the pivotal role of capital has been central to the argument of the spatial fix and the emergence of capitalism (Harvey 2001). However, this type of analysis has been less concerned with the specific ecological characteristics of the natural world that has been encountered, and how such characteristics influence the encounter with capital. Nature—and land and soil—have been seen writ large (Castree 2003), even within discussions of the socio-ecological fix (Ekers and Prudham 2015). There has been less attention on how capitalism's encounter with different ecologies, located in different histories and social realities, not only creates cycles of destruction and dispossession, but also reshapes vulnerabilities to shocks and crises that in turn fuel further opportunities for capital accumulation.

This discussion begs the question of how the risks associated with investing in, and refashioning hazardous space can be accommodated. In some ways, it would seem reasonable to assume that the harsh realities of floods and other shocks and disasters would lead to patterns of investment that are more sensitive to environmental risk, and more in tune with ecological processes. This is an enduring argument that suggests a certain rationality to the ways in which capital encounters environmental risks, whereby ultimately such risks will be avoided and that capital will shift towards operating in line with ecological imperatives.

The case of SIA suggests a different trajectory. Underpinning the spatial and socio-ecological fix, is an overtly technological fix. The initial risk associated with flooding of locating high levels of capital and physical investment can be offset both by the added cycles of investment in technological mitigation of risk that are fixed in the space of the investment, as well as the physical spread of investments across different locations and the ability to relocate. As evidenced in the case of SIA, one pathway that emerges when capital encounters wetland ecologies is of a greater reliance on the spatial and technological fixes that evades the more fundamental questions of maintaining natural hydrological functions.

A further dimension of changing patterns of ownership of resources can be seen in the commodification of soil itself as a resource to be utilised in the investment and transformation of land (cf. Gillespie 2020). In the face of flood risks, current patterns of urbanisation have created a market in soil, with the sale of soil to be used in the filling of land for construction so that it is protected from flood (cf. Phuttharak and Dhiravisit 2014); or at least, that there is an added value in the perception that this type of construction provides flood protection. The

commodification of soil also contributes to a relocation of flood risk, as one part of the landscape is raised above the floodwaters through the filling of soil, so another location is firmly below the flood line, with the earth of the land removed.

The way in which such risk might be managed can be revealed in situations in times of crisis, for example in significant flooding events. There is a widespread propensity for infrastructure solutions to addressing flood vulnerability (Basset and Fogelman 2013; Lebel et al. 2011; Mustafa 2005). This is often presented as tendency associated with the influence of engineering perspectives rather than those informed by ecology and conservation, shaped by the disciplinary backgrounds of state actors (Basset and Fogelman 2013). Our analysis does not contradict this argument but suggests deeper factors at play. There is a degree of path dependence in evidence that again provides its own pathways of opportunity. Once large infrastructure investments are already established they are not easily replaced, leading to technological fixes of protective measures, such as flood defence walls, that essentially replicate the type of flood risk created by the investment in the first place. Significantly investment in protective infrastructure is invariably underwritten by public funding, thereby reducing the direct financial liability and creating additional opportunities to profit from the large-scale public schemes. Large infrastructure projects are means of increasing the scale and pace of capital accumulation, and increasingly mechanisms for fixing socio-ecological crisis as well as financial crisis (Nugent 2015). A whole new industry of what Klein (2007) terms “disaster capitalism” emerges around technological solutions to the protection of physical investments that are by their nature high risk in the first place. Building upon Glassman’s (2007) concept of low-road/high-road fixes, such disaster capitalism can arguably be the “higher”-road fix that seizes catastrophic opportunities for the “third” cycle of investments on disaster-related projects mostly tending toward structural measures such as concrete embankments, flood tunnels, and ever-larger pumping stations. In doing so, the capacity to respond to hazards is constrained, thereby intensifying vulnerabilities across locations and people.

Relocation of investment provides other opportunities for dealing with shocks and crises, all-the-more so when accumulated profits surpass the costs associated with the initial investment. Investments in physical infrastructure are time-bound. They contain within them a degree of mobility. Increasingly the need for being able to relocate, where the spatial fix is not committed to a specific point in space, is driven by a range of forces from the price of labour to pressure of environmental legislation, and now, the risks of climate-related shocks. What is common across these relocation strategies is the need to offset localised pressures by relocating both capital and physical investments. The risks associated with the location of the initial investment and the impacts of specific events can be “fixed” by moving again, continuing Harvey’s cycle of opening spaces for fresh accumulation in new territories.

While relocating SIA is clearly enormously challenging, the airport is itself partly a product of capital flows emerging from crises in other locations. The flow of capital into Thailand was a response to shocks and crises in one particular

geography. The opportunities for the spatial fix in Thailand (and similar countries) were themselves products of the globalised spatial fixes, and incorporation of Thailand into global capital alliances. Thailand benefited greatly as the investment location of choice during the era of US military intervention in the region, and the early 1980s—and the desperate need for capital expansion in Japan and the US in the face of sustained economic crisis. The large-scale investment in Thailand is thus a product of Japanese and US, and increasingly Chinese and global capital relocating as a response to crises of over-accumulation. Thailand itself has been the locus of a spatial fix that came from a crisis elsewhere, but which is now able to relocate even further afield.

Part of this is the ability for capital to shape what Ekers and Prudham (2015:2438) refer to as “the social regulation of space and nature”; to move beyond the forces that might constrain its actions, be they external forces through strengthened environmental governance, or the location of risk associated with specific investments. The growing ability of capital to move across locations, and to spread investment portfolios around the region and ultimately the globe allows for a restructuring of risk. Indeed, the viability of a local scale investment is partly shaped by the global reach of diversification of the initial risk.

Conclusion: Addressing the Clash of Rationalities

Cobra Swamp/SIA is an important case study in its own right, but significantly speaks to wider debates of theory and policy, illuminating some of the specifics of how capital fixes materialise in the types of ecological landscapes that dominate much of Thailand and monsoonal Asia. Understanding both the internal mechanics of capital and the socio-ecological specifics of such an encounter is critical (Castree 2003) in order to reveal the politics of urban flood vulnerability, and whether the public concern for flood risk will create new space for reconfiguring state-society relations.

We argue that there is a fundamental clash between capital and water whereby capital seeks to fix water in ways that go against its ecological character. In doing so capital is able to internalise risks through a series of fixes, but at the same time contribute to a refashioning of a wider hazardscape that displaces risks to other locations and people, and creates new vulnerabilities.

Importantly the case of Cobra Swamp/SIA provides a counter-balance to assumptions that hazardous space is predominantly the location of poor people. In contrast, hazardous space can be actively targeted for urbanisation and large-scale infrastructure investment, with the inherent risks of such space actively attracting capital by providing opportunity for accumulation through a series of fixes. This is an important perspective as arguments about culpability and vulnerability increasingly influence debates about urban futures (Shatkin 2019).

Bringing the theory of the spatial fix to the specific socio-ecology of tropical Asia draws attention to how the reconfiguring of nature allows a continual cycle of destruction and creation that is characterised by the way in which opportunities for accumulation are offset against the creation of specific impacts, and how capital deals with risks that its own investments and creations might be

responsible for creating. This analytical perspective on spatial and socio-ecological fixes is of added significance as we encounter environmental challenges that are closely associated with global climate change. In contrast to arguments that capital will somehow restrain itself when confronted with the constraints of climate change, our analysis suggests that capital can internalise and redistribute such risks. Policy is drawn towards technological and high road fixes rather than addressing the political factors underpinning investment and land use changes that have contributed so significantly to the creation of flood risks in the first place. The propensity towards such fixes represents a degree of path dependency and limiting of options that further constrains adaptive capacity, thereby intensifying vulnerability.

It seems that we are confronted with two possible responses to climate risks that emerge from investing in hazardous space—to refashion again in ways that are more in tune with climate change concerns and notions of adaptation, or to embark on a pathway of disaster capitalism (cf. Klein 2007), where the risks of future disasters create a whole new set of opportunities for capital accumulation irrespective of environmental risks. Focusing on this tension between capital and water raises critical questions for how capital is to be constrained, regulated and redirected.

Endnotes

¹ The Thai term “*don*” refers to higher ground.

² “1999 Bangkok Comprehensive Plan”, Department of City Planning, Bangkok Metropolitan Administration; <http://cpd.bangkok.go.th/thai-map2.html> (last accessed 7 September 2017); “Progress in Bangkok Comprehensive Plan: Challenges and Solutions”, Department of City Planning, Bangkok Metropolitan Administration; <http://tiwrm.haii.or.th/download/SUTAT/100RC-BKK/20160706-meeting2-2559/all-PPT/bangkok-plan.pdf> (last accessed 7 September 2015).

³ “2013 Bangkok Comprehensive Plan”, Department of City Planning, Bangkok Metropolitan Administration; http://cpd.bangkok.go.th:90/web2/NEWCPD2556_2/guide.html (last accessed 7 September 2017).

References

- Adger W N (2006) Vulnerability. *Global Environmental Change* 16(3):268–281
- Airports of Thailand (2011) “Chronicle of Construction [in Thai].” <http://www.suvarnabhumiairport.com/th/180-chronicle-of-construction> (last accessed 15 September 2017)
- Auyero J (2006) Introductory note to “Politics under the microscope: Special issue on political ethnography I”. *Qualitative Sociology* 29(3):257–259
- Baliga A and Chakrya K S (2017) Boeung Kak: A disastrous decade. *Phnom Phen Post* 3 February <http://www.phnompenhpost.com/post-weekend/boeung-kak-disastrous-decade> (last accessed 2 September 2020)
- Bakker K and Bridge G (2006) Material worlds? Resource geographies and the matter of nature. *Progress in Human Geography* 30(1):5–27
- Bassett T J and Fogelman C (2013) Déjà vu or something new? The adaptation concept in the climate change literature. *Geoforum* 48:42–53
- Castree N (2003) Commodifying what nature? *Progress in Human Geography* 27(3):273–297
- Cutter S L, Barnes L, Berry M, Burton C, Evans E, Tate E and Webb J (2008) A place-based model for understanding community resilience to natural disasters. *Global Environmental Change* 18(4):598–606

- CUURP (2010) "Thai Urban Planning: Problems and Solutions." Department of Urban and Regional Planning, Chulalongkorn University http://www.cuurp.org/B_resource/B_data/articles/2553_01-URP_NT140410%20x.pdf (last accessed 7 September 2017)
- Department of City Planning (Bangkok Metropolitan Administration), Floodway Co. Ltd and H2O Consult Co. Ltd (2017) "Identifying Urban Measures for Protected Areas for Rural and Agriculture in Bangkok." Paper presented to a hearing on 4 July at Sport and Spa Convention Hall, Minburi District, Bangkok, Thailand
- Douglas I, Alam K, Maghenda M, McDonnell Y, McLean L and Campbell J (2008) Unjust waters: Climate change, flooding, and the urban poor in Africa. *Environment and Urbanization* 20(1):187–205
- Doyle S E (2012) City of water: Architecture, urbanism, and the floods of Phnom Penh. *Nakhara: Journal of Environmental Design and Planning* 12:135–154
- Ekers M and Prudham S (2015) Towards the socio-ecological fix. *Environment and Planning A* 47(12):2438–2445
- Friend R, Jarvie J, Reed S O, Sutarto R, Thinphanga P and Toan V C (2014) Mainstreaming urban climate resilience into policy and planning: Reflections from Asia. *Urban Climate* 7:6–19
- Fullbrook D (2007) Cracks appear in Thai aviation-hub hopes. http://www.atimes.com/atimes/Southeast_Asia/IB07Ae01.html (last accessed 7 September 2017)
- Giddens A (2009) *The Politics of Climate Change*. Cambridge: Polity
- Gillespie T (2020) The real estate frontier. *International Journal of Urban and Regional Research* 44(4):599–616
- Glassman J (2007) Recovering from crisis: The case of Thailand's spatial fix. *Economic Geography* 83(4):349–370
- Graham S and Marvin S (2001) *Splintering Urbanism: Networked Infrastructures, Technological Mobilities, and the Urban Condition*. New York: Routledge
- Harvey D (2001) Globalisation and the spatial fix. *Geographische Revue* 2(3):23–31
- Harvey D (2006) From managerialism to entrepreneurialism: The transformation in urban governance in late capitalism. *Geografiska Annaler: Series B, Human Geography* 71(1):3–17
- Hewitt K (ed) (1983) *Interpretations of Calamity: From the Viewpoint of Human Ecology*. London: Allen and Unwin
- Inmuong Y, Phothaworn P and Phongsiri M (2015) "Climate Vulnerability of Urban Communities in Khon Kaen City [in Thai]". TEI Working Paper 5
- Institute of Public Policy Studies (2006) "Suvarnabhumi Metropolis." <http://www.fpps.or.th/news.php?detail=n1153847445.news> (last accessed 7 September 2017)
- Jarvie J and Friend R (2016) Urbanisation, inclusion, and social justice. In Worldwatch Institute (ed) *State of the World: Can a City Be Sustainable?* (pp 343–353). London: Island Press
- JICA (2005) "JBIC Signs ODA Loan Agreement with Thailand: Supporting Economic Growth through the Construction of International Airport." Japan International Cooperation Agency, 17 May https://www.jica.go.jp/english/news/jbic_archive/autocontents/english/news/2005/000044/index.html (last accessed 15 September 2017)
- Jumsai S (2006) "A Planner's Take on Suvarnabhumi". http://www.nationmultimedia.com/2006/08/28/opinion/opinion_30012103.php (last accessed 15 September 2017)
- Kanparit S (2008) "The Special Documentary: Chronicle of Suvarnabhumi from Nong Ngu Hao to the Airport of the East [in Thai]." <http://www.bloggang.com/mainblog.php?id=kheyesarn&month=17-12-2008&group=5&gblog=27> (last accessed 15 September 2017)
- Keokhumcheng Y, Tingsanchali T and Clemente R S (2012) Flood risk assessment in the region surrounding the Bangkok Suvarnabhumi Airport. *Water International* 37(3):201–217
- Klein N (2007) *The Shock Doctrine: The Rise of Disaster Capitalism*. New York: Macmillan
- Klein N (2015) *This Changes Everything: Capitalism vs. the Climate*. New York: Simon and Schuster
- Lebel L, Manuta J B and Garden P (2011) Institutional traps and vulnerability to changes in climate and flood regimes in Thailand. *Regional Environmental Change* 11(1):45–58

- Lipsky M (2010) *Street-Level Bureaucracy: Dilemmas of the Individual in Public Services*. New York: Russell Sage Foundation
- Marx K (1973) *Grundrisse: Foundations of the Critique of Political Economy* (trans M Nicolaus). London: Penguin
- Matichon Online (2017) AOT in troubles: Alibaba invests in Suvarnabhumi [in Thai]. 13 April <https://www.matichon.co.th/news/528573> (last accessed 15 September 2017)
- McGranahan G, Balk D and Anderson B (2007) The rising tide: Assessing the risks of climate change and human settlements in low elevation coastal zones. *Environment and Urbanization* 19(1):17–37
- Moh Z C and Lin P C (2006) Geotechnical history of the development of the Suvarnabhumi International Airport. *Geotechnical Engineering Journal of the Southeast Asian Geotechnical Society* 37(3):143–156
- Moore J W (2011) Transcending the metabolic rift: A theory of crises in the capitalist world-ecology. *Journal of Peasant Studies* 38(1):1–46
- Moore J W (2015) *Capitalism in the Web of Life: Ecology and the Accumulation of Capital*. New York: Verso
- Mustafa D (2005) The production of an urban hazardscape in Pakistan: Modernity, vulnerability, and the range of choice. *Annals of the Association of American Geographers* 95 (3):566–586
- Nasongkhla S and Sintusingha S (2011) Global aerotropolis versus local aqua-community: Conflicting landscapes in the extended Bangkok Metropolitan Region, Thailand. In C A Brebbia (ed) *The Sustainable World* (pp 205–216). Southampton: WIT Press
- NESDB (2017) “Eastern Seaboard and Eastern Economic Corridor Development Programs.” National Economic and Social Development Board http://www.nesdb.go.th/ewt_dl_link.php?nid=6677&filename=esdps (last accessed 6 September 2017)
- Nugent J P (2015) Ontario’s infrastructure boom: A socioecological fix for air pollution, congestion, jobs, and profits. *Environment and Planning A* 47(12):2465–2484
- Parnell S and Robinson J (2012) (Re)theorising cities from the global South: Looking beyond neoliberalism. *Urban Geography* 33(4):593–617
- Pelling M (2003) *The Vulnerability of Cities: Natural Disasters and Social Resilience*. London: Earthscan
- Phuttharak T and Dhiravit A (2014) Rapid urbanisation—its impact on sustainable development: A case Study of Udon Thani, Thailand. *Asian Social Science* 10(22):70–79
- Polanyi K (2001 [1944]) *The Great Transformation: The Political and Economic Origins of Our Time*. Boston: Beacon
- Ribiero G (2005) Research into urban development and cognitive capital in Thailand. *Thailand Journal of Transdisciplinary Environmental Studies* 4(1) https://journal-tes.dk/vol%204%20no%201/no_4_L.pdf?id=00028 (last accessed 2 September 2020)
- Roachanakanan T (2014 [2007]) Bangkok Metropolis: Changing patterns of uneven development”. In T Roachanakanan (ed) *Articles in Planning: Review of Town and Country Planning in Thailand*. Bangkok: Department of Town and Country Planning
- Ronghanam P (2015) Evolution of urban planning of Thailand [in Thai]. *Na Jua* 12:250–271
- Roy A (2009) Why India cannot plan its cities: Informality, insurgency, and the idiom of urbanisation. *Planning Theory* 8(1):76–87
- Sengupta D, Chen R, Meadows M E and Banerjee A (2020) Gaining or losing ground? Tracking Asia’s hunger for “new” coastal land in the era of sea level rise. *Science of the Total Environment* <https://doi.org/10.1016/j.scitotenv.2020.139290>
- Shatkin G (2008) The city and the bottom line: Urban megaprojects and the privatisation of planning in Southeast Asia. *Environment and Planning A* 40(2):383–401
- Shatkin G (2019) Futures of crisis, futures of urban political theory: Flooding in Asian coastal megacities. *International Journal of Urban and Regional Research* 43(2):208–226
- Siam Commercial Bank (2011) “Looking Beyond Bangkok: The Urban Consumer and Urbanisation in Thailand.” www.scb.co.th/eic/doc/en/insight/SCB%20Insight%20Dec%202010%20Eng.pdf (last accessed 15 September 2017)
- Siriwattanaphai boon S (2015) “Climate Impacts and Adaptation of Udon Thani City [in Thai]”. TEI Working Paper 9

- Sutiprapa J, Mithranon P, Watana P and Taesrikul C (2008) Bangkok: Globalising the city of angels. In G W Jones and M Douglass (eds) *Mega-Urban Regions in Pacific Asia: Urban Dynamics in a Global Era* (pp 62–108). Singapore: National University of Singapore Press
- Swyngedouw E and Heynen N (2003) Urban political ecology, justice, and the politics of scale. *Antipode* 35(5):898–918
- Tapananont N (2015) “Bangkok and Vicinities Comprehensive Plan [in Thai].” Department of Urban and Regional Planning, Chulalongkorn University http://www.cuurp.org/D_publicP/D_data/bf_58/10-nopanant.pdf (last accessed 6 September 2017)
- Taylor M (2014) *The Political Ecology of Climate Change Adaptation: Livelihoods, Agrarian Change, and the Conflicts of Development*. New York: Routledge
- Thansettakij (2017) Alibaba seizes Suvarnabhumi [in Thai]. 29 March <http://www.thansettakij.com/content/137604> (last accessed 15 September 2017)
- UN (2016) “The World’s Cities in 2016.” Population Division, Department of Economic and Social Affairs, United Nations
- Watson V (2013) Planning and the “stubborn realities” of global South-East cities: Some emerging ideas. *Planning Theory* 12(1):81–100
- Watts M (1983) On the poverty of theory: Natural hazards research in context. In K Hewitt (ed) *Interpretation of Calamity: From the Viewpoint of Human Ecology* (pp 231–262). London: Allen and Unwin
- Weinstein L, Rumbach A and Sinha S (2019) Resilient growth: Fantasy plans and unplanned developments in India’s flood-prone coastal cities. *International Journal of Urban and Regional Research* 43(2):273–291
- Wisner B, Blaikie P, Cannon T & Davis I (2004) *At Risk: Natural Hazards, People’s Vulnerability, and Disasters*. New York: Routledge
- Zoomers A, van Noorloos F, Otsuki K, Steel G and van Westen G (2017) The rush for land in an urbanizing world: From land grabbing toward developing safe, resilient, and sustainable cities and landscapes. *World Development* 92:242–252