At the Water's Edge: Mainstreaming Climate Change Resilience into Urban Policy in Dhaka and Ho Chi Minh City

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Abstract

Asian cities of the Ganges-Brahmaputra Basin and the Mekong Delta are particularly vulnerable to climate change. Recent studies confirm that the impacts of climate change are already being seen and felt in major Asian cities. Large populations and the influx of migrants from vulnerable regions have increased the risk of potential climate impacts in these cities. To combat the impacts of climate change, Asian city governance needs to mainstream climate change resilient policies into urban planning. This paper explores the preparedness of city governance of two major Asian cities – Dhaka (Bangladesh) and Ho Chi Minh City (Vietnam), to deal with climate change related vulnerabilities. This paper evaluates the urban policies of these cities and compares to what extent the city governments are committed to climate friendly policies and practices.

Key words: climate change, forced migration, urban planning, Bangladesh, Vietnam
1. Introduction

There is now a growing recognition that cities will play a crucial role in adapting to climate change (McGranahan et al., 2007; Satterthwaite et al., 2007; Bulkeley and Betsill, 2013; Revi et al., 2014; Johnson et al., 2015; WWF, 2015). The IPCC’s Fifth Assessment Report (Revi et al., 2014: 541) highlights “the importance of city and municipal governments acting now to incorporate climate change adaptation into their development plans and policies and infrastructure investments.” The report argues that such an undertaking involves the building of the institutional, governance and financial underpinning of resilience, the mobilization of new resources, the adjustment of building and land-use regulations, as well as the continual development of the capacity for locals to respond (Revi et al, 2014: 541). Provided global urbanization trends indicate that low elevation coastal zones are experiencing higher rates of urban land expansion, the focus on cities and municipalities are paramount. Such growth will put an increasing number of people at risk to the impacts of climate change (Seto et al., 2011). Furthermore, the IPCC recognizes coastal deltas to be highly vulnerable to the impacts of climate change (soil erosion, storm surges, land loss, etc.) (Nicholls et al., 2007). Of the world’s mega-deltas, Ericson et al. (2006: 78) suggests that the Ganges-Brahmaputra delta in Bangladesh and the Mekong delta in Vietnam are the top two deltas to be the most severely affected. At current sea-level trends, modeling suggest that by 2050 the Ganges-Brahmaputra delta could potentially impact up to 3.4 million people while the Mekong delta could place over 1.9 million people at risk (Ericson et al., 2006: 78). Given the high numbers of population at risk in these regions, the exploration of effective policies and adaptation measures that are inclusive to vulnerable populations is imperative.

This paper explores the factors affecting the governance capacity of two major Asian cities, Dhaka (Bangladesh) and Ho Chi Minh City (Vietnam), to deal with climate change related vulnerabilities, with a special focus on highlighting the challenges of crafting multi-level policies and solutions to the combined impacts of rapid and unplanned urbanization and climate change. This paper evaluates the policies and governance structures of these cities, comparing the extent to which national and municipal governments have been able to implement measures aimed at building resilience to climate change.

The paper proceeds as follows. Section two lays out a conceptual framework useful for evaluating the preparedness of city governance to deal with climate change. Section three then presents the cases of Dhaka and Ho Chi Minh City, focusing on climate change and migration, the vulnerability of migrants, city planning and climate resilience, and legislative frameworks on climate change. Lastly, section four reflects on the ability of these cities to adequately plan and prepare for climate change, highlighting the importance of multi-level policies and solutions in addressing the combined impacts of urbanization and climate change.

2. Building urban resilience to climate change
Adaptation is defined by the IPCC (2007) as a wide range of “initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects.” Vulnerability in turn, can be usefully defined as exposure to hazards that undermine the ability to adapt (Smit and Wandel, 2006; Adger, 2006; Fussel, 2007). Adger (2006: 268), for instance, defines vulnerability as “a state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt.” Exposure in turn implies the existence of social and biophysical pathways that connect climatic/environmental stressors with affected populations (Eakin and Luers, 2006; Smit and Wandel, 2006; Adger, 2006; Fussel, 2007). Finally, adaptive capacity implies the assets, public services, infrastructure and institutions (including formal services and informal coping mechanisms) that affected populations have at their disposal.

Recent work on the vulnerability of urban systems to climate change has emphasized the exposure of populations, private assets (e.g. housing and property) and public services and infrastructure to a variety of climate stressors (Atkins, 2012; Romero-Lankao and Qin, 2011; Romero-Lankao and Dodman, 2011). The “Atkins Report” on “Future Proofing Cities” (Atkins, 2012), for instance, conceptualizes vulnerability in relation to levels of poverty and inequality, the strength of basic services (in transportation, communication, sanitation, drinking water, healthcare) and urban form. Romero-Lankao and Qin (2011: 143-4) further distinguish between what they call “vulnerability as impact” studies, in which a primary focus is placed on “exposure to climate hazards, sensitivity of urban infrastructures, populations or activities, and the resulting or potential impacts” and “inherent urban vulnerability” approaches, which explore “how and why particular cities or populations are more vulnerable – or more able to cope or adapt than others.” A critical distinction concerns the ways in which and extent to which vulnerability is conceptualized as “an end point of a linear process” or a “dynamic process based on the decreasing ability of a city or its populations to cope with a set of environmental hazards and stresses,” (Romero-Lankao and Qin, 2011: 145). Focusing on process highlights important questions about the structural-historical forces (including ones affecting policy decisions) that exacerbate urban vulnerability to climate change. Political ecology approaches (e.g. Blaikie and Brookfield, 1987; Adger, 2001; Oliver-Smith, 2004; Wisner et al., 2004), for instance, highlight the structural-historical patterns of trade and investment that induce unsustainable patterns of land-use and settlement, by creating large numbers of people whose livelihoods are dependent on economic activities that are by their very nature vulnerable to economic and ecological disruption. Whether people “choose” to live and work in unsafe urban areas is therefore a function of historical policy decisions (regulating land use, environmental protection, etc.) as well as the historical/structural forces affecting livelihoods, poverty, wage rates, and migration (Blaikie and Brookfield, 1987; Adger, 2001; Oliver-Smith, 2004; Wisner et al., 2004; Eakin and Luers, 2006; Satterthwaite et al., 2007; 2010).

A final and related concept concerns the nature of urban resilience. In contrast to vulnerability, resilience is often defined in terms of a population’s ability to withstand, absorb and “bounce back” from environmental shocks and stressors. The IPCC (2007), for instance, defines resilience as
The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change.

Leichenko (2011) identifies four different approaches to the study of urban resilience. One, which draws upon concepts used in the study of ecosystem resilience (cf. Holling, 2001; and below), highlights “the ability of a city to absorb disturbance while retaining identity, structure and key processes,” (Leichenko, 2011: 164). Drawing upon theories of uncertainty, non-linearity and surprise, such approaches emphasize the self-organizing capacity of urban populations and institutions to learn and adapt in a changing ecological environment (a point on which we expand below). A second approach concerns the study of urban hazards and disasters, highlighting specifically “the capacity of cities, infrastructure systems, and urban populations and communities to quickly and effectively recover from both natural and human-made hazards,” (Leichenko, 2011: 165). A third examines the governance and institutional dimensions of urban resilience, highlighting the ways in which “resilient thinking can influence the development of improved governance mechanisms for promoting adaptation to climate change,” (Leichenko, 2011: 165).

By and large, the vast majority of policy writing about urban resilience and climate change has been about vulnerability to impacts and hazards, as well as disaster risk reduction (cf. Leichenko, 2011). The UNISDR report (2012: 11) on “resilient cities,” for instance, states that:

A resilient city is characterized by its capacity to withstand or absorb the impact of a hazard through resistance or adaptation, which enable it to maintain certain basic functions and structures during a crisis, and bounce back or recover from an event . . . What makes a city resilient to natural and human-induced hazards can be seen as a combination of resilience accumulated through the process of urbanisation and planning, on one-hand, and the result of specific actions to reduce disaster risk on the other. Sound development practice with good regulations, well-maintained infrastructure, capable emergency management and solid institutions, which develop participatory urban plans, provide building permits, and manage water resources and solid waste, help to build up cities’ resilience over time. A city also builds resilience through the engagement of its government, citizens and other stakeholders in the process of disaster risk reduction, where specific actions are taken to identify, manage and lessen the impacts of natural and human-induced hazards.

In theory, disaster risk reduction (or DRR) strategies can reduce vulnerability to climate change by (1) identifying the risk factors that would lead to an unacceptable loss of life, livelihood, health and property; and (2) developing strategies that would reduce exposure and vulnerability to these and related natural hazards, including, conceivably laws that prohibit the construction of homes and buildings in high risk areas (e.g. low lying coastal zones, floodplains), the construction of cyclone shelters, improvements in the availability and delivery of drugs, water purification, and other medical supplies, and strategies for
evacuation and communication during times of crisis (Wisner et al., 2004; UNISDR, 2012).

In practice, however, DRR policies often face multiple challenges that make it difficult to address the long term factors that expose human populations to the risk of extreme climate events, such as windstorms, flooding and drought (Wisner et al., 2004; Moench, 2007 [2009]; O’Brien et al., 2008). For one, public policies (such as public insurance, subsidies, compensation and reconstruction) often create very strong incentives to relocate and to re-engage in geographical areas and in economic activities whose exposure to natural disasters is chronically high (Wisner et al., 2004; Moench, 2007 [2009]; O’Brien et al., 2008). Second, they tend to counteract the aforementioned factors (including perceptions of what constitutes acceptable vulnerability and risk) that induce poor people to live and work in vulnerable areas in the first place (Wisner et al., 2004; Moench, 2007 [2009]; Johnson, 2012).

On this basis, useful distinctions can be made between economic migration, in which the decision to migrate is largely the result of strategic planning on the part of the household and distress migration, in which the decision to relocate (either permanently or temporarily) is influenced and often greatly constrained by the speed, scale and intensity of external environmental events (cf. de Haan, 1998; Deshingkar, 2005; de Sherbinin et al., 2008; Johnson and Krishnamurthy, 2010). Where economic migration has been shown to create new opportunities and income sources, distress migration often entails new risks and vulnerabilities, including, for instance:

- The loss or devaluation of property, assets, incomes and employment;
- The loss or devaluation of social security and status, creating new risks associated with social discrimination, social exclusion and violence; and
- Emotional and psychological stress arising as a result of lost cultures and connections to local livelihoods, communities and sense of place.

When it is planned and supported through public policy, migration can provide an important means of diversifying livelihoods and reducing vulnerability to environmental shocks and stresses (cf. de Haan, 1999; Deshingkar, 2005; McLeman and Smit, 2006; Perch-Nielsen et al., 2008; de Sherbinin et al., 2008; Bogardi and Warner, 2009; Johnson, 2012; 2013). However, urbanization processes are often uneven, reflecting the dynamic nature of rural-urban mobility, the temporality and insecurity of informal sector employment and the paucity of urban services in health, sanitation and public infrastructure. Although urbanization trends in the region can certainly be linked with improvements in literacy, livelihood and life expectancy, positive interpretations such as these need to be tempered by the fact that urban working and living conditions in Vietnam and Bangladesh are notoriously unsafe, that urban expansion has happened at the expense of some of the region’s most sensitive ecological areas and that the liberalization policies fuelling the rapid growth of the region’s largest urban centres have created vast numbers of poor people living in urban slums (Lewis, 2011: 162-5).

With these observations in mind, we now turn to the cases of Dhaka and Ho Chi Minh City.
3.0 Case studies

3.1 Dhaka, Bangladesh

Bangladesh is one of the most vulnerable countries to both short-term climate shocks, e.g.; cyclones, floods, prolonged droughts etc.), and long-term risk of climate change in the form of sea level rise (Mirza, 2002; IPCC, 2007; Karim and Mimura, 2008). According to the Global Climate Risk Index-2014, Bangladesh is ranked among the top five most affected countries by environmental hazards. Between 1993 and 2013, each year, on an average, 813 people died in Bangladesh (16,260 people in total) and damage costs reaching US$ 1832.70 million PPP per year occurred due to extreme weather events (Krefts and Eckstein, 2013). Coastal districts of Bangladesh are particularly vulnerable to climate change related hazards as they are already experiencing increased frequency of cyclones, storm surges and saline water intrusion.

Livelihoods and food security of the population of the affected regions are extremely vulnerable to climate related hazards. The most frequent coping strategy taken by the people of the affected regions is temporary or permanent migration. World Bank (2010) reports that about 37 per cent households of the surveyed areas depend on temporal migration as a strategy to adapt with the natural hazards. Average duration of seasonal migration also increased from six months to nine month since availability of work further decreased due to climate change events in rural areas of affected regions (Siddiqui, 2013).

This section of the paper first discusses climate change and recent pattern of migration in Bangladesh based on the analysis of the Population Census-2011 (BBS, 2013) and Household Income and Expenditure Survey-2010 (BBS, 2012); then it highlights climate risk of Dhaka city and the poor living condition of migrants in the city, and finally it discusses social protection policies and Dhaka’s urbanization policies in the light of climate risks faced by the city.

3.1.2 Climate change and migration in Bangladesh

The International Office of Migration (IOM) identifies major events of disasters that cause environmental migration in Bangladesh. They found that floods, cyclones and riverbank erosion are three of the most important environmental hazards that affect migration patterns (IOM, 2010).

Periodic severe floods are some of the most important contributing factors of migration decisions in Bangladesh. The IOM (2010) reports that the floods of 2007 affected 16 million people in Bangladesh, causing heavy damage to housing, crops and livestock. However, this type of severe floods usually displace people temporarily while evidence suggests that migration work as a safety net for affected families during floods in flood prone areas.

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1 PPP stands for Purchasing Power Parity.
Coastal districts are highly vulnerable to cyclones and associated storm surges. On average, a severe tropical cyclone accompanied by high winds over 150 km/h and storm surges hits Bangladesh every three years. These cyclones cause extensive damage to housing, agriculture, and loss of life to human and livestock in coastal communities of southern districts (GoB, 2009). Climate scenarios predict that future tropical cyclones will become stronger, with larger peak wind speeds and more heavy rainfall associated with ongoing increases of tropical sea surface temperatures (World Bank, 2010). It was observed that migration was an immediate response by many of the affected households after the last two major cyclones, *SIDR* in 2007 and *Aila* in 2009. As a result of the damaged embankments in the cyclone-affected areas, many households remain displaced for months or even years (IOM, 2010).

Saline water intrusion is already a major problem in the South-Western coastal districts of Bangladesh even before the projected sea level rise due to climate change. Flawed design of embankments, reduced flow of water in Ganges due to *Farakka* barrage in India and diminished rainfall in dry season enable saline water to infiltrate far inland through the river system (Adams et al., 2013). Excessive salinity largely limit soil fertility and reduce productivity of crop. Areas under crop cultivation dramatically reduced in last two decades in South-Western coastal districts. As a result, a large number of farmers and agricultural wage labourers of the region became jobless. Moreover, the availability of fresh water also decreased in this region (Adams et al., 2013). All these factors pose enormous challenges to the livelihoods of agro-based households.

Tens of thousands of people in North-Western districts of Bangladesh are displaced each year due to river bank erosion. A study by Refugee and Migratory Movements Research Unit (RMMRU) reports that about one million people are affected by river bank erosion each year (Abrar and Azad, 2004). Migration is the most common survival strategy to cope with this disaster.

Map 1 shows the proportion of total out-migrants from each district of Bangladesh. This map is based on the Household Income and Expenditure Survey-2010 (HIES-2010 hereafter), which are conducted by the Bangladesh Bureau of Statistics with the technical assistance from the World Bank (BBS, 2012). This survey is the major source of socio-economic data in Bangladesh, and it is widely used in policy analysis. First, for each district we calculated the total number of households who reported that at least one member of their household migrated to cities for their livelihood. The total number of households reported the case of migration is 726. Then the number of migrants of each district was divided by total number of migrants in the country. The map distinctly identifies two regions that are major sources of migrants. One of the regions is the Northern districts, e.g.; Rangpur, Kurigram, Gaibandha, Bogra and Naogaon; who are mainly affected by river bank erosion and seasonal poverty. However, the other region, the South-Western coastal belt, appears to be the highest source of internal migrants. This region is mainly affected by frequent cyclones, tidal surge, sea-level rise and saline water intrusion. The agro-ecology of this region is heavily affected by climatic shocks.

Using the same data source, HIES-2010, Table 1 reports the major destination of internal migrants in Bangladesh. This table shows the top five destinations of internal migrants.
From the table, it can be seen that Dhaka, is the destination with disproportionately higher numbers of migrants (55.65 per cent) than others. A recent study estimated that more than 3 million people live in Dhaka’s slums and almost half a million of people migrate to Dhaka from coastal and rural areas (Cities Alliance, 2010). According to an estimate of the International Organization for Migration, almost 70 per cent migrants migrate to Dhaka after facing environmental hazards (IOM, 2010).

Map 1: Proportion of internal migrants from each district
Source: Authors’ calculation from Household Income and Expenditure Survey-2010 of Bangladesh
Table 1: Major destinations of migrants (Total number of migrants=726)

<table>
<thead>
<tr>
<th>Destination Districts</th>
<th>Proportion of migrants (%)</th>
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<tbody>
<tr>
<td>Dhaka</td>
<td>55.65</td>
</tr>
<tr>
<td>Chittagong</td>
<td>12.53</td>
</tr>
<tr>
<td>Comilla</td>
<td>2.20</td>
</tr>
<tr>
<td>Mymensingh</td>
<td>1.93</td>
</tr>
<tr>
<td>Gazipur</td>
<td>1.79</td>
</tr>
</tbody>
</table>

Source: Household Income and Expenditure Survey-2010 of Bangladesh

3.1.3 Dhaka’s climate change risk and poor living condition of migrants

Although Dhaka is the most popular destination for internal migrants from all other districts, the city itself is one of the most vulnerable cities to climatic shocks and other environmental disasters. As of 2011, Hanson et al. (2011) identified 844,000 people living in Dhaka that were directly exposed to coastal flooding; however, this number is projected to increase to 11.1 million by 2070 (p. 100). A recent study by the World Wildlife Fund (WWF) ranked Dhaka as the most vulnerable cities to climate change impacts among eleven other vulnerable cities of Asia (WWF, 2015). Dhaka, a megacity with a large number of poor people sitting just meters above current sea levels, is often impacted by tropical cyclones and flooding, and has very limited adaptive capacity. The study estimates that Dhaka has a relatively higher exposure to environmental disasters (8 in the scale of 10) and higher socio-economic sensitivity (8 out of 10) with lowest adaptive capacity (10 out of 10 in inverse adaptive capacity) among major cities of Asia (WWF, 2015).

UNHABITAT (2009) reports that even a slight rise in sea level will affect large parts of the city as the elevation in Dhaka ranges between 2 and 13 meters above sea level. Dhaka is already facing the problem of waterlogging due to its poor drainage system. Frequent erratic rainfall submerges a large part of the city during the monsoon. The poor drainage system of the city is the outcome of unplanned growth of the city. A major part of Dhaka’s canals and ponds were filled for the construction of apartments and offices (Ahmed, 2014; UNHABITAT, 2009). Slum dwellers are the most affected group in Dhaka by the waterlogging. The most recent census of slums in Dhaka, conducted in 2006 by the Center of Urban Studies (CUS), reports that 60 per cent of the slums in the city have poor or no drainage and are vulnerable to frequent flooding. The census also found that housing materials of more than one-third of Dhaka’s population were too vulnerable to survive large-scale environmental disasters. Very high density of population in Dhaka’s slum, between 500 and 1,500 persons per acre, increases the degree of potential damage due to disasters (CUS, 2006).
The combination of high population density and rapid growth make it challenging for the service providers to provide basic services to Dhaka’s slum population. The World Bank (2007) reports severe deficiencies in both access to and quality of basic services, particularly for the poor. Dhaka’s slums are especially excluded from a range of service provision since many service providers do not work in the slum areas. Dhaka’s slum dwellers have limited access to basic services like healthcare, education, power, water supply, sanitation and waste disposal (World Bank, 2007; CUS, 2006). One of the main reasons behind poor service delivery in Dhaka’s slums is the lack property rights of the dwellers. Eviction from slums is common in Dhaka. This insecurity of tenure system in slums is the main barrier to service delivery for the slum dwellers (World Bank, 2006). The lack of rights and access to basic services make slum dwellers vulnerable and less capable of preparing and adapting to consequences of climate change.

3.1.4 Policies for supporting livelihoods of urban poor

Poverty reduction has been the central to policy making in Bangladesh since independence. However, the main focus of tackling poverty has focused more heavily on rural areas, while urban poverty has been overlooked. Banks et al. (2011) report that the Poverty Reduction Strategy Paper-2005 completely ignored urban poverty in its initial draft. Although incorporated into the final draft, it remained a relatively small area of focus. The Sixth Five Year Plan (2011-2015) is the first policy document which recognised urban poverty as a major problem and aims to ‘promote equal access to and fair and equitable provision of services in urban areas; and emphasize on urban policies that ensure equal access to and maintenance of basic services, including those related to education, employment and livelihood’ (GoB, 2011). However, it also fails to provide specific policy suggestions to create jobs, design social protection for the urban poor and reduce urban vulnerabilities to environmental hazards in Bangladesh. Similar bias was found in climate change related policy documents as well (Banks et al., 2011).

The majority of existing social protection programs in Bangladesh are designed to support the livelihoods of rural poor. Figure 1 compares the ratio of rural to urban poor in numbers with ratio of rural to urban social protection recipients in six districts of Bangladesh where major cities of Bangladesh are situated. The figure clearly shows that distribution of social protection programs largely ignore the urban poor in four out of six districts. For example, in Dhaka district, although the number of rural poor is one-third of the urban poor, number of social protection program recipients in rural areas is three times higher that of urban areas. This mismatch of distribution of social protection programs reflects the rural biased poverty and vulnerability targeting in Bangladesh by largely ignoring the urban poor.

Figure 1: Rural-Urban disparity in social protection programs
3.1.5 City planning and climate resilience

RAJUK\(^2\), an autonomous agency, is solely responsible for planning Dhaka’s growth. RAJUK was established in 1956 as ‘Dhaka Improvement Trust’ (DIT) under the provision of the *Town Improvement Act* -1953 (TI Act 1953). The act provides RAJUK the supreme planning and development control power within its jurisdiction. In last six decades RAJUK itself acquired land and developed townships in Dhaka and it also controls development of private township projects.

The first master plan for Dhaka was prepared by RAJUK (then DIT) in the 1950s for an area of 320 square miles (820 sq. km) considering plan period of 20 years. However, after Bangladesh became independent in 1971, most of the earlier assumptions of the plan became invalid and the city started to grow spontaneously. It took RAJUK almost 35 years to prepare a comprehensive development plan for Dhaka, known as the Dhaka Metropolitan Development Plan (DMDP hereafter). The DMDP, prepared in 1995, emphasizes the importance of green belts, water bodies, flood flow zones wetlands and agricultural land in and around the city, and earmarked a number of retention ponds around the city limits for retaining rainwater and maintaining an ecological balance (RAJUK, 1997). Although RAJUK was supposed to prepare the Detailed Area Plan (DAP hereafter) for Dhaka immediately after preparing DMDP, it took RAJUK 15 years to prepare and approve the DAP in 2010 (RAJUK, 2010).

\(^2\) RAJUK is the abbreviation of Rajdhani Unnayan Corporation in Bengali, which could be translated as Capital Development Authority.
After the preparation of the DAP, it was found that RAJUK, the planner of the DMDP, itself largely violated its own plan by developing and planning mega township projects in the wetland and flood flow zones around Dhaka ((RAJUK, 2010; Johnson and Haque, 2012). RAJUK acquired 6,150 acres of land in Dhaka’s Eastern fringe to develop the country’s largest township project, Purbachal New Town. This project is shown as urban overlay in the DAP since it is developed mostly by filling wetland and flood flow zone. Developing such projects filling wetlands and flood flow zone directly affects Dhaka’s drainage system while the city already suffers from waterlogging during the monsoon.

While RAJUK violated its own plan by developing housing projects in the wetland areas of Dhaka’s urban fringe, private real estate companies played an even larger role in filling wetlands for housing projects. Islam (2007) estimates that only 55 private real estate companies filled more than 25,426 acres of wetland in Dhaka’s fringe areas for housing projects. Only 35 of these companies received approval from RAJUK for their projects and they cover only 836 acres. That is, more than 24,000 acres of land area were illegally developed by 20 large companies. This is just a fraction of the larger scenario as numerous other small real estate developers are converting wetlands into housing projects.

Figure 2 shows how Dhaka’s land cover changed from 1989 to 2009 (Ahmed et al., 2013). It clearly shows that built-up area expanded very fast between 1989 and 1999 by trading-off with agricultural land. At the same time, water bodies around Dhaka were decreasing rapidly in this period. Between 1999 and 2009, the majority of the remaining wetlands were filled up. A megacity with existing waterlogging problem and risks of erratic rainfall faces higher risk of climate change related hazards due to non-resilient development planning.
Figure 2: Land cover change in Dhaka between 1989 and 2009

Source: Bayes et al. (2013)

3.2 Ho Chi Minh City, Vietnam
Low-lying topography, vulnerable coastal and deltaic communities, combined with rapid urban expansion makes Vietnam one of the most affected countries in the world to climate change. This section provides insight into the extent of climate change impacts on Vietnam’s largest urban centre, Ho Chi Minh City (HCMC) and affected surrounding regions, namely the Mekong Delta. This section then explores what policies are in place both at the national and provincial (HCMC) levels to address the impacts of climate change. We then conclude with an analysis of Vietnam’s existing climate change related legislation and strategies, identifying remaining policy gaps.

With the exception of Ho Chi Minh City, nine of the ten provinces most affected by sea level rise in Vietnam are located in the Mekong Delta (Carew-Reid, 2008: 2). Located in the south of Vietnam, the Mekong Delta is recognized as one of the three most vulnerable deltas to sea level rises in the world, expected to displace over 1 million people by 2050 (Asia Development Bank, 2013; Ericson et al., 2006). An area of significant importance to Vietnam’s economy, the Mekong Delta produces 90 per cent of the country’s rice exports and is home to approximately 22 per cent of the country’s population (Warner, et al., 2009: 15). Outside the Mekong Delta region, the vast majority of people reside in Low Elevation Coastal Zones and in cities often lacking the necessary flood protection (Zetter, 2011: 26). As a result, Vietnam is predicted to be a ‘hotspot’ for population displacement related to rising sea levels (Zetter, 2011: 27).

Located in the delta area created between the Dong Nai river and Saigon river, HCMC is a low lying urban area that can expect to see severe impacts from climate change. Recognized as one of the world’s most vulnerable port cities, HCMC will continue to be exposed to storm surges and flooding this century (Nicholls et al., 2008). The largest and fastest growing city in Vietnam, HCMC has a population of 7.8 million, with population densities ranging from 100 people/km² to as high as 45,428 people/km² in some urban districts (GSO, 2013). However, official data on population often excludes the high levels of temporary workers or unregistered migrants living and working in the city, with the ‘floating population’ estimated to be an additional 2 million people (Jones, 2008: 44).

The central impacts of climate change on HCMC include changing precipitation patterns, rising sea levels and salt water intrusion, warmer urban temperatures (heat island effect), and greater incidence of storms (Webster and McElwee, 2009: 3; VCAPS, 2013: 11). Precipitation levels are increasing during the wet season, with larger quantities of rainfall occurring over shorter periods of time (Webster and McElwee, 2009: 3). Further, according to Vietnam’s International Centre for Environmental Management, sea levels in southern Vietnam are expected to rise by 16 cm in 2030 and up to 100 cm by 2,100 (Dinh, et al., 2012: 104).

Such changes have resulted in an increase in urban flooding, with 478 flood events in HCMC during 2006, compared to only 356 in 2003 (Webster and McElwee, 2009: 3). Flooding in HCMC is primarily a result of excess storm water, river discharge, and high tide levels. Provided the low-lying nature of HCMC, roughly 60% of city land is exposed to tidal effects (Jha et al., 2012: 484). Rising sea levels will increase tidal flooding, putting further pressure on the city’s existing dyke system (Webster and McElwee, 2009: 3). In October 2014, tidal flooding in HCMC reached a new record with a tide of 1.7 meters, submerging many streets throughout the city (Vong and Huu, 2014). As of 2011,
1.9 million people living in HCMC were directly exposed to coastal flooding. This number is expected to rise to 9.2 million by 2070 (Hanson et al., 2011: 100). Based on a 1 meter rise in sea levels, it is predicted that 43 per cent of HCMC’s total land area will be inundated (Carew-Reid; 2008: 2).

The increase in urban flooding can also be associated with the rapid increase in urban development and decline in natural flood plains, combined with out-dated and inadequate urban infrastructure. Agricultural land in HCMC fell from 130,729 ha in 2000 to 117,625 ha in 2012 (Tan, 2012; GSO, 2013), with much of this loss occurring on the urban periphery. The extensive greenfield development occurring in the city is illustrated by two of HCMC’s flagship urban land development projects, Thu Thiem New Urban Area (657 ha) and Saigon South New Urban Area (2,975 ha), both of which are built on low lying wetlands on the urban periphery.

Increasing population and rapid urban development across the city are putting a strain on existing urban infrastructure. The infrastructure deficit in HCMC, specifically related to water management, is highlighted in a recent World Bank report (2011), which states, “only 7% of wastewater in HCMC is treated” and “only about 15% of sewer drains have been upgraded to meet current demands” (p.259). Further, an evaluation of the Spatial Master Plan to 2025 suggests the Plan does not adequately deal with the implications of climate change on the existing water management system; “the sewage system has to be reconsidered […] changes in extreme precipitation compounded by sea level rise require revised construction standards and an adjustment of the dimensions of the existing and new urban drainage systems” (VCAPS, 2013: 49).

3.2.1 Climate change and migration in Vietnam

Migration has historically been used as a form of adaptation to environmental change but climate change adds a new complexity to this nexus (IOM, 2009, IOM, 2012). As climate change reinforces existing migration patterns, rather than creating new ones, it can seen that increased rural to urban migration will increase under new climatic stresses (Asian Development Bank, 2011; UN Viet Nam, 2012).

There are several important economic push and pull factors motivating rural and urban migration in Vietnam. Push factors include lack of steady employment, low income and the commercialization and mechanization of agriculture in rural areas leading to a loss of livelihood opportunities (Chun and Sang, 2012; Noi, 2014). Pull factors in urban economic centers like HCMC, are employment opportunities in growing industry, service and technology sectors and better standard of living (Noi, 2014; Anh, 2006; Chun and Sang, 2012). As a result of these push and pull factors, rural to urban migration in Vietnam has grown significantly over the past few decades, with the urban population increasing by 78.2 per cent from 1990 to 2007 (GSO, 2009; UN Viet Nam, 2012). As of June 2010, the total population of all urban areas was 33.12 million, accounting for 38.6 per cent of Vietnam’s population (GSO, 2009; UN Viet Nam, 2012).

Rural to urban migration places a heavy burden on the physical and social infrastructure of urban cities (Luong, 2009). These burdens are exacerbated by the current and future
impacts of environmental degradation and climate change. As it stands, Vietnam currently ranks 6th among countries with the highest proportion of its urban population living in Low Elevation Coastal Zones (McGranahan et al., 2007). A study by Dasgupta et al. (2007: 28) found that a one meter mean sea level rise could affect up to 10.8 per cent of the Vietnamese population. As such, rapidly expanding urban settlements such as HCMC will continue to face severe climatic risks due to their location, high population densities, informal settlements and concentration of liquid waste (Tanner et al., 2008).

3.2.2 Migration from climate change affected areas to cities

Climate change has already begun to change the nature and scale of migration in Vietnam as rapid-and slow-onset shocks, environmental degradation, and the different combinations of climatic hazards are exacerbated by climate change (Noi, 2014: 4). A study by Chun and Sang (2012) in Long An and Dong Thap provinces found that environmental stress on livelihoods is high and two of the three top reasons for migration are poor livelihoods and income in sending areas. Another study in Dong Thap province found that important triggers for migration to industrial areas such as HCMC were flooding and lack of farming land (Thao, 2012). In addition, households ranked migration as the 5th coping strategy (Thao, 2012). Similarly, research in Quang Tri Province found that climate change had indirect impacts on migration decisions in the form of impacts on livelihood security (Hai, 2012).

Already in HCMC, there are observations of influxes of people migrating to the city after the regular flooding season in the Mekong Delta. As noted in Dun’s (2011: e214) study, a coordinator of several child shelters in HCMC confirmed “they always expect an influx of children a few months after each annual flooding season”. Sometimes the children come alone and sometimes they come with their families and are placed in children’s shelters for protection. The influx often occurs a few months after the flooding season as families remain in the affected areas in the delta to receive any disaster relief that is provided. Once the relief period is over, the families move to the cities to find work and protection. Thus, Dun (2011: e214) argues that the availability of disaster relief to affected areas in the delta play an important role in influencing when people migrate to the cities. As a result, this timeline can inform urban centers as to when to prepare for an influx of migrants from disaster affected areas.

3.2.3 Poor living condition and challenges of livelihoods of current migrants in HCMC

A very large number of unofficial and illegal migrants live in HCMC and it has been estimated that they constitute approximately 30 per cent of the population (Pincus and Sender, 2008: 4). However, due to the precarious legal position of migrants in Vietnam, officials often do not implement sampling methods that require them to acknowledge the existence of illegal immigrants, so the numbers can be much higher (Pincus and Sender, 2008: 117; Noi, 2014: 2). Like China, Vietnam has long maintained a household registration system to restrict migration. As such, many households live in HCMC illegally, without the proper paperwork to live in the city, to buy land or build a house, register children in school or access public services (Pincus and Sender, 2008: 117). As a result of the registration system, illegal migrants are present in all the districts of the city.
In particular, migrants tend to live at higher densities in some districts such as Go Vap, Tan Binh, Binh Thanh and District 12, where the proportion of the inhabitants without license of permanent residence is relatively high (Le, 2002 as cited in Webster and McElwee, 2009: 4). In some sub-districts such as Binh Hung Hao, the proportion is as high as 75 per cent of the population (52,141 inhabitants without license of permanent residence out of 69,397 inhabitants) (Le, 2002: 8). Such high densities of illegal migrants make these districts sites of environmental and social vulnerability.

Without proper papers, migrants are unable to buy land or build a house. As a result many migrants end up in poor living situations. While the average living area per person in HCMC is 17.7 square meters/person, migrants often occupy a space that is approximately only one third of that area (Haugton et al., 2010: 16). Approximately 61.7 per cent of migrants occupy an average living space under 6 square meters/person and 31.7 per cent are living in space that is less than 4 square meters/person (Haugton et al., 2010: 128). With only 8.7 per cent of migrants owning their own dwellings, over 90 per cent of migrants are living in rented housing, temporary shelters or other forms of shelter (Haugton et al., 2010: 127). In addition, migrants often do not connect directly to the electricity grid and end up paying more to use electricity through other households. Many migrants also face job insecurity because they are often employed without contracts, particularly of temporary and unregistered migrants, which means that the labour code and regulations are easily violated (UN Viet Nam, 2010). Their lack of contracted employment also means migrants often do not have access to any benefits such as health insurance, unemployment benefits or social insurance. In HCMC, approximately 60 per cent of migrants are working without a written job contract (Haugton et al., 2010: 58). The precarious legal position of migrants in HCMC along with their poor living situations mean they are exposed to many social and environmental vulnerabilities. Migrants, and in particular, illegal migrants have less capacity to withstand, move away or rebuild in times of disaster. Their houses are often poorly built which make them vulnerable to climate events (Webster and McElwee, 2009: 5). As such, these populations are already highly vulnerable and unprepared for increased influxes of migrants due to climate-induced mobility. Indeed as Costa et al. (2013) argues climate-induced mobility might become one of the major issues that governments have to consider in their adaptation policies.

3.2.4 Vietnam’s legislative framework on climate change

Migration and displacement are highly sensitive political issues in Vietnam. Zetter’s (2011) study on policies for environmentally displaced peoples in Vietnam found that “the concept of displacement and that one might have rights-based claims arising from displacement, is non-existent in current policy discussions and frameworks. This leaves a protection vacuum for people who are or may potentially be displaced due to environmental conditions” (p. 32). Indeed, an examination of the National Strategy on Climate change issued by Prime Minister Nguyen Tan Dung on December 5th, 2011, demonstrates that the strategy does not contain the words “migration”, “displacement” or “resettlement”. While the strategy contains a focus on planning residential areas and developing infrastructure in response to climate change, it is uncertain how migrants and
future climate migrants will be considered or incorporated into the master-planning scheme. Vietnam also has a National Target Program to Respond to Climate Change (NTP-RCC) implemented in 2008, and a National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 (NS-NDPRM) was put in place in 2007. The NTP-RCC outlines government strategies and responses to climate change from 2009-2015, while the NS-NDRM is Vietnam’s national policy framework for disaster management. Both policy documents focused on sea-level rise as a result of climate change as the dominant element (Zetter, 2011: 38).

Zetter (2011: 38) argued that while ‘migration’ and ‘relocation’ are rarely mentioned in both documents, the government strategies to adapt to climate change and mitigate the effects of natural disasters would inevitably bring about the relocation or displacement of people living in affected areas. Zetter (2011) also finds a possible explanation for the absence of the concept of displacement in current policy agendas and normative frameworks in Vietnam. Zetter (2011: 52) argues that the explanation “perhaps lies in the interpretation of the political vocabulary: displacement is perceived as a reactive and uncontrolled process in comparison to proactive government settlement strategies and regulated migration policies”. As such, government documents describe the concept of displacement more as “relocation, arrangement and stabilization of life for people in disaster prone areas” (Zetter, 2011: 52). However, the outcomes of state-driven relocation programs are mixed. Vietnam has a long history of government-managed resettlement and the programs are diverse and include resettlement of people in disaster-affected areas, among several other groups. While it has been reported that living conditions and access to public services are better in resettlement areas, vulnerability and resilience depend on socio-economic conditions, in particular access to livelihoods (Noi, 2014: 21). Other programs have suffered from lack of proper planning, lack of transparency and accountability and limited community participation. In addition, some resettled people have faced issues with lack of services, lack of employment and general lack of support (Noi, 2014: 21). Despite these few programs, migration and resettlement still only has minor presence in the development debate and agenda in the context of climate change. As a result, Noi (2014: 25) argues, “there is an urgent need to promote the mainstreaming of climate change, migration and resettlement issues in relevant development policies and strategies”.

Catastrophic floods in the Mekong Delta during the late 1990s and early 2000s led the government to introduce the Living with Floods Program (LFP). LFP addresses the impacts of climate change and increased flooding, focusing on adaptation over prevention (IRIN, 2011). Today, this program is Vietnam’s central government resettlement program related to climate change. Since implementation in 1996, efforts of the LFP have focused primarily on the relocation of populations in flood inundated areas of the Mekong Delta. Building resettlement clusters with basic public infrastructure (roads, schools, electricity, etc.) and dyke systems within the flooded areas, a primary aim of LWP is “to normalize living conditions for people in the flooded areas” (Danh and Mushtaq, 2011: 190). As of 2011, 1000 resettlement clusters have been built (Danh and Mushtaq, 2011: 151), and based on the National Strategy for Natural Disaster Prevention, Response and Mitigation, “by 2015 another 130,000 households should be relocated, of which around 70% from flooded areas in the Mekong River Delta” (Noi, 2014: 3).
The effectiveness of this program and its ability to address the needs of those vulnerable to floods are criticized in the academic literature (Warner, et al., 2009; Danh and Mushtaq, 2011; Tien, 2004 as cited in Danh and Mushtaq, 2011). According to Danh and Mushtaq (2011), progress in the resettlement clusters have been slow and often lack essential infrastructure such as clean water supply, electricity or roads. Other public infrastructure such as schools and clinics has also not developed as expected. Although, their findings do suggest that on average those resettled had greater access to public services than prior to resettlement. The central challenge with LFP is access to livelihoods, with studies suggesting (Tien, 2004 as cited in Danh and Mushtaq, 2011; Danh and Mushtaq, 2011; Noi, 2014) resettled residents have had difficulty in finding gainful employment, receiving less income than prior to resettlement. Lastly, as Noi (2014) indicates existing legislation intended to provide public participation in planning processes, the Grassroots Democracy Decree, could prove useful in resettlement processes, but has not been implemented in reality (p.3-4).

3.2.5 City planning in climate affected areas

At a national level, Vietnam has multiple strategies and layers of legislation related to climate change. Comparatively, however, less is addressed at the provincial (HCMC) or city level. Reflecting on the spatial master plan for HCMC and current development trends, it is clear challenges remain in creating a climate resilient city.

The Vietnam Climate Adaptation Partnership (VCAPS) Consortium, a joint bilateral initiative between Vietnam and the Netherlands, has noted the inadequacies of the HCMC Master Plan to deal with effects of climate change. Specifically VCAPS (2013) finds, “the master plan does not specifically deal with flood protection. It is unclear which zones are protected to what level and what is expected of developers when building in specific zones. It does not explicitly state which measures can be taken to prevent flooding, and in which sequence these measures should be implemented” (p.49). Conversations with state urban planning officials as well as private companies illustrate the tensions between climate change planning and the pressures of market-driven urban development. Successful greenfield land development projects (e.g. Saigon South New Urban Area), soaring land prices in the south end of the city, and plans to develop a new sea port have led to adjustments to HCMC’s master plan and overall direction of development. Despite previous recommendations from the HCMC Urban Planning Institute (UPI), a city planning agency, to develop in a northwest direction, on higher elevated land, the government’s current goal is to expand the city in the southern direction “towards the East Sea”.

Further exacerbating existing urban planning efforts is the inaccuracy of government data used for planning projections. For instance, the 1999 government census reportedly excluded two million people who did not have permanent registration or residential permits (Jones, 2008: 44). Discussions with urban planners further highlight the difficulty in planning for growing populations without adequate data.

4. Concluding remarks
As noted in the introduction, the IPCC’s Fifth Assessment Report highlights the importance of national and municipal governments incorporating climate change adaptation into their “development plans and policies and infrastructure investments” (Revi et al., 2014: 541). However, the two cases being considered in this paper highlight the challenges of crafting multi-level policies and solutions that can be used to address the combined impacts of rapid and unplanned urbanization and climate change. Principal among these are the challenges of understanding and ideally addressing the socio-economic determinants of climatic vulnerability at the urban scale.

By way of conclusion, this section now highlights the factors affecting climatic vulnerability, outlining a number of insights about the challenge of reducing urban vulnerability to climate change. One of the principal themes that emerge from the comparison is the multi-dimensional nature of socio-economic and ecological vulnerability in low elevation urban centres. Underlying the vulnerability being documented in Dhaka and Ho Chi Minh City are complex processes of urban-rural migration, unregulated settlement and inadequate access to basic urban services. By far, the most vulnerable populations in the two cases are the temporary and unregistered migrants whose lack of basic rights and entitlements has made them particularly vulnerable to climate change. Here the task of documenting and supporting the rights of itinerant populations presents its own set of challenges. As does the task of building resilience through the provision of urban services in health, sanitation and disaster risk reduction.

A related theme concerns the governance capacity of urban institutions. Recent empirical work on the factors affecting effective urban climate governance has shown that cities can incorporate climate change vulnerability into their operational planning and practices, but this depends on cooperation from multi-level institutions (Johnson et al., 2015). Here the comparison of Dhaka and Ho Chi Minh City suggests that the national government played a more prominent role in Vietnam than has been the case in Bangladesh, highlighting (potentially) the historical legacy of central state planning in Vietnam. At the same time, national and municipal authorities in both countries were clearly constrained by a lack of capacity and authority to act beyond the urban scale, reflecting the multi-scalar dimensions of globalization, rural-urban migration and climate change.

A third and related theme concerns the ability of cities to govern and adapt to a rapidly changing global and regional economic environment. Here the impacts of liberalization and global economic restructuring loom large, suggesting that the incorporation of Dhaka and HCMC into global economic production systems has created new vulnerabilities to climate change. In both cases, national and municipal authorities have used land as a means of attracting and restructuring foreign and domestic capital, but here it is clear that such processes have come at the expense of ecologically sensitive forests and wetlands, displacing tens of thousands of resource dependent communities. Here it is worth emphasizing too that liberalization in both of these contexts has been dependent upon the use of temporary labour working in unsafe conditions, further exacerbating the vulnerability of poor and itinerant populations to climate related shocks and stressors.
Whether national and municipal authorities can build the resilience of urban populations, assets and infrastructure to future climatic changes is therefore an open question, reflecting the complexity of urbanization, the capacity of government (at multiple levels) and the impact of global and regional production systems on urban social and ecological systems.

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