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Governing sustainability in secondary cities of the Global South

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Abstract

Innovation is a defining characteristic of current trends in urban development, and in governing experiments in urban sustainability that aim to build inclusive, resilient and sustainable cities, as per Sustainable Development Goal 11 and the New Urban Agenda. This paper contributes to the literature on governing urban environmental sustainability transitions, with a focus on emerging cities in the Global South. Secondary cities in Asia, Africa and Latin America are adopting a number of innovative governance models to drive adaptive futures in the face of resource or political constraints – be it through donor initiatives, coordinated national policies, public-private partnerships, business experiments, local government action, transnational municipal networks, community-based adaptation measures, practices in self-governance or hybrid forms of the above. Our paper employs a multi-level governance framework to chart out the actors, drivers, financial conditions, barriers and the inclusivity and sustainability outcomes in eight different governance models. Six of the cases are drawn extensively from literature, while two case studies reflect on our primary, multi-method engagement in the cities of Nakuru (Kenya) and Udon Thani (Thailand). We then delineate the critical issues and key lessons from these cases to trace elements of "good urban governance" that are relevant to planning urban transformations in the South.

1. Introduction

The Sustainable Development Goal 11 calls for "inclusive, resilient, safe, and sustainable" cities and human settlements. Inclusive urban governance is an explicit element of achieving this goal, through the involvement of civil society in urban planning and management decisions. The impacts of environmental degradation and climate change have highlighted that the most vulnerable and exposed are usually marginalized, low-income populations with the least opportunity to participate in the urban development decisions which affect their livelihoods, health and happiness. However, these new and growing environmental threats have created opportunities for innovations in urban governance which could enable the previously marginalized to participate in decision-making that aims to ensure a sustainable urban future.

SDG 11 and the New Urban Agenda have put the spotlight on urban areas as sites of action for sustainability and resilience goals. The role of cities in reaching net-zero emissions is recognized, as is the vital role of national governments in supporting them to achieve this (Coalition for Urban Transitions 2019). Recent large-scale disasters in urban centres such as Tacloban, or the plan for Jakarta's relocation, have highlighted that cities concentrate risk. However, they also present a huge opportunity for action: half of all potential urban emissions reductions lies in cities with fewer than 750,000 people (Coalition for Urban Transitions 2019).

Intermediary are cities with a population in the range of 50,000 to 1 million, but this range can vary, given that such cities have different forms and functions in different countries. They often overlap with secondary cities, which are the fastest growing urban areas in terms of population: the number of cities with between 300,000 to 500,000 inhabitants has increased from 87 in 1970 to 275 in 2018, with Asian countries accounting for a large proportion of these, as 45% of Asian urban dwellers live in cities with less than 500,000 inhabitants (United Nations, Department of Economic and Social Affairs, Population Division 2019). Meanwhile, the number of cities with fewer than 300,000 inhabitants climbed from 730 to 1,750 in the same period (United Nations, Department of Economic and Social Affairs, Population Division 2019).

New and growing environmental threats have created opportunities for innovations in urban governance.

Intermediary cities are sub-national centres of "administration, manufacturing, agriculture, trade or social and cultural services" (United Cities and Local Governments 2016, p.134) that connect urban areas with their hinterlands. They can also be industrial districts, corridor cities or greenfield developments in the peripheries of large metropolises. These "ordinary" cities (Robinson 2013) tend not to play a central role in global or national politics of sustainable urban development, but their unique pathways and barriers to achieving this goal merit attention. The issue of governing sustainability transitions becomes especially acute when a city lacks the financial and human resources to address its developmental needs (Véron 2010). Indeed, many intermediary cities lack the resources of larger cities required for effective action, especially in lower- and middle-income countries. For example, a local government in Denmark has almost USD 18,000 per capita to spend (2016 figures), compared to less than USD 1,000 for a Thai local government (OECD / UCLG 2019, p.52) – and smaller cities will usually be less well resourced. Consequently, the actions of intermediary cities may often be reactive, rather than forward-looking, preventative measures.

The demands for localization of the SDGs place a lot of pressure on local governments to deliver the various goals and targets, not least SDG11. However, the capacities of cities to meet these visions – agreed upon by national governments in international platforms – is determined to a large extent by financial, human and technical resources they have available, which in turn is often a factor of the municipalities' size and administrative status. Yet in some cities, "smallness" has helped in spreading new environmental norms, knowledge sharing and sustaining institutional co-ordination (Pasquini et al. 2015).

In this paper we explore approaches to urban environmental governance in secondary cities, recognizing cities to be complex spaces with multiple actors prioritizing different interests which need to be balanced. In each case, we examine the drivers, key features, and challenges of these actions for urban sustainability and inclusivity, focusing particularly on emerging cities in the Global South. We seek to answer the following research questions, in considering how these emerging cities are responding to environmental and sustainability challenges:

1. How are actors, financial conditions, and different drivers and barriers, influencing inclusivity outcomes of sustainable transitions in some emerging cities of the Global South?

2. What are the entry points for secondary cities to adopt more inclusive urban environmental governance to achieve sustainability goals?

This paper is structured as follows. In Section 2, we review the literature on urban governance and set out a framework for assessing multi-level urban governance. Section 3 outlines our methodology, including the terms of the case studies we have chosen and our approach to assessing them. In Section 4, we review each case study in more detail, while in Section 5 we draw out the commonalities, differences and lessons learned across the cases. Finally, in Section 6 we return to our framework to offer further reflections on urban governance.

2. Governing sustainability transitions in secondary cities

In this section we set out a framework for conceptualizing governance within secondary cities.

2.1 Environmental governance in secondary cities

Environmental governance in secondary cities is understood to be markedly different compared with that in primary cities (Véron 2010; Fuhr et al. 2018; McCann and Ward 2012; Geldin 2019). In rapidly urbanizing contexts, investing in reducing climate risks can be seen by city governments as both an opportunity and impediment to growth – though city governments may have lesser financial and human resources (Véron 2010) and greater trade-offs for taking climate action (Fitzgibbons and Mitchell 2019; Tuhkanen et al. 2018). The growth trajectories of secondary cities could be shaped more by regional and local politics, and to a lesser extent by market influence and global politics than primary cities (Geldin 2019; Véron 2010). Land availability and lax land regulations may make emerging cities ideal for unchecked project expansions (Watson 2014). Policy networks assume that increasing the adaptive capacities of global cities will trickle down to the responses of intermediary cities (Geldin 2019). Research has focussed on studying pioneering cities and global networks, and there is a knowledge gap on governing sustainable urban transitions in emerging cities of Asia, Africa and Latin America (McQuaid et al. 2018; Castán Broto and Bulkeley 2013; Gouldson et al. 2016), apart from the focus on adaptation and resilience of the urban poor in these regions.

We adopt a definition of governance that extends beyond "formal" governance institutions and processes. Governance can be defined as the pathways and mechanisms through which diverse forms of state and non-state action are co-ordinated (Rosenau 2000). Simplistic dichotomies in delineating "formal" versus "informal" mechanisms of governance do not recognize the complex relationships between state and non-state actors, where the latter may adopt a mix of strategies such as contention, subversion, and collaboration to secure well-being outcomes (Mitlin 2018). Shadow systems and informal spaces of knowledge-sharing in formal systems can play a crucial role for governing climate change (Leck and Roberts, 2015; Munene et al., 2018). These reflections are especially useful in understanding governance of the "urban" – where the value of nature is ascribed and power is exercised, contested, negotiated and enforced constantly at different sites by different actors (Bulkeley et al. 2018; Cho 2010).

Leck and Simon (2013) argue that no single body or institution can tackle environmental change effectively, but rather, multi-level governance approaches are necessary, bringing together a number of actions, actors, sectors and governance levels. This entails not only horizontal networks of action but also vertical networks, where power relationships and governance structures will shape actions. As Bulkeley and Betsill argue, "…a multi-level governance perspective entails engaging with multiple tiers of government and spheres of governance through which urban sustainability is being constructed and contested" (2005, p.48). This should include a range of governance structures, from the community level to legally codified systems of governance where possible, to ensure representation of the widest range of actors and recognize the mix of strategies and approaches these adopt. This requires that formal governance structures are accepting of and open to participation and engagement from other stakeholders through decentralization of decision-making.

However, as Agarwal et al. (2012, p.571) point out, "… the real question in the effective decentralisation of decision-making powers may be not so much whether it is elected or administrative bodies that partner with central bodies but whether decentralisation reforms allow newly empowered local actors to exercise these new powers." This includes the extent to which local actors are fiscally empowered and given freedom to raise funds independently of central bodies, and whether they have the institutional structures and

capacities that enable them to implement more collaborative and participatory approaches (Borie et al. 2019).

2.2 Inclusive multi-level governance

In this paper we use a multi-actor and multi-scalar approach, referred to as the "multi-level governance" framework, as a lens for comparing different case studies of initiatives designed to address urban environmental and sustainability issues. As cities are complex spaces with multiple competing spheres of interest, we draw on the concept of multi-level governance as a possible pathway for reconciling these interests through participatory and inclusive approaches to decision-making. At the same time, it is clear that "a different combination of external and internal factors can result in cities following different pathways" (Bai et al. 2010, p.3) and therefore it is worth considering the drivers and actors pushing towards more sustainable outcomes.

Drawing on the "triggers, actors, linkages, barriers, pathways" framework used by Bai et al. (2010) in their analysis of 30 innovative urban practices in Asia, we adapt and extend it to consider also the overarching policy context framing our case study initiatives. We consider the drivers for action, the key actors initiating the action, the model of the action applied, the financing for it and the policy framing it, as well as the barriers faced and the resulting outcomes. For each of the elements, we consider the stakeholders involved, and the interlinkages between them, to understand the scope for inclusion of different types of actors and of which type.

In line with the recent literature on global climate governance, this paper recognizes the role played by a multiplicity of actors and networks that contribute to governing a low-carbon and adaptive urban future (Okereke et al. 2009; Castán Broto 2017; Munene et al. 2018; Matin et al. 2018; Joubert and Martindale 2013; Grandin et al. 2018; Leck and Roberts 2015; McCann and

Figure 1. Multi-level governance framework
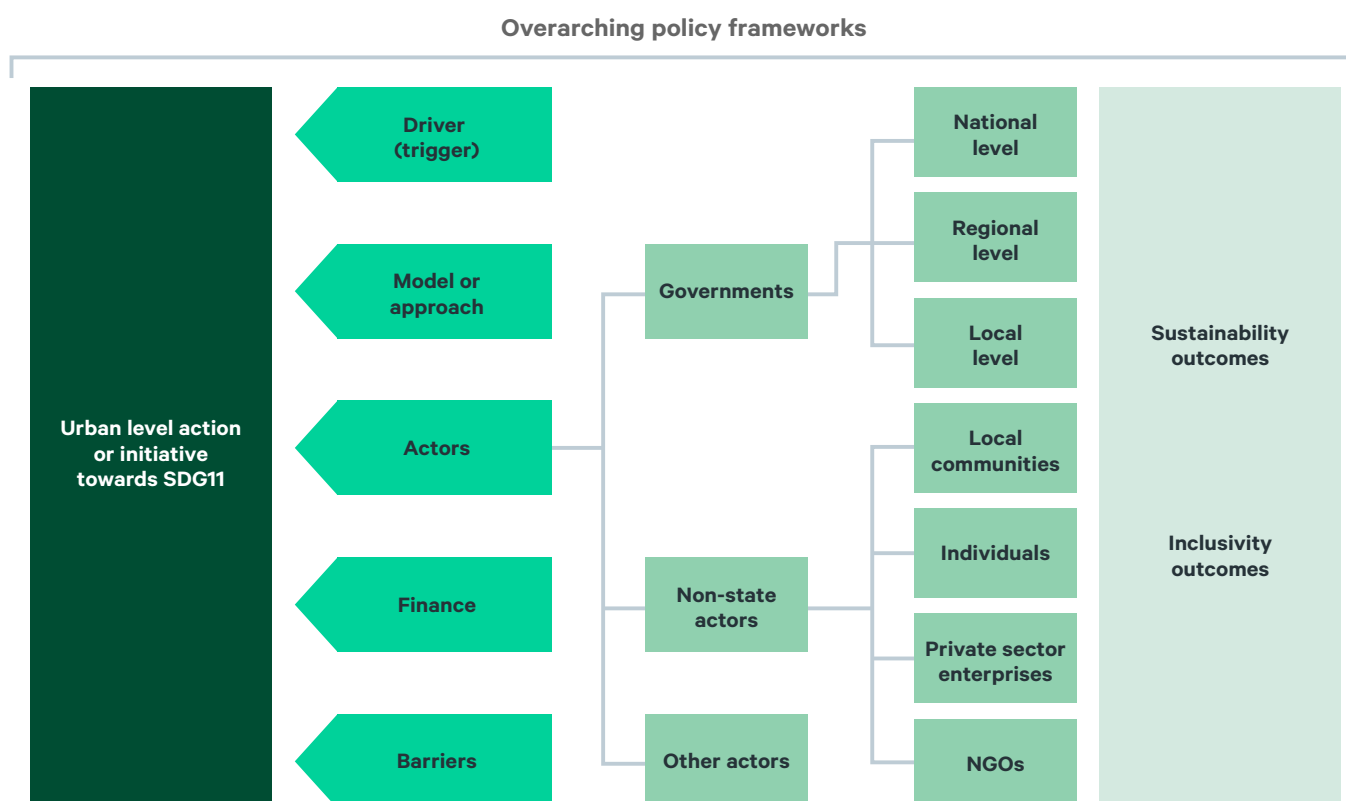
Source: Author's own, adapted from Bai et al. (2010)

Ward 2012). The role of new players in climate action such as green enterprises in the energy and infrastructure sectors (Affolderbach and Schulz 2016), boundary organizations (Corfee-Morlot et al. 2011), emergent groups and volunteers following disasters (Twigg and Mosel 2017) and accidental low-carbon protagonists (Cohen 2016) are receiving due recognition in environmental governance research, irrespective of the intentionality of action. In addition, there are complex inter-dependencies between urban regions and the surrounding peri-urban and rural ecosystems that call for an understanding of actors that govern beyond cities' administrative boundaries (McCann and Ward 2012; Félix et al. 2013; Castán Broto 2017).

> Governance structures which embed participation of different stakeholders, and recognise the institutions and technologies involved, will lead to more transformative outcomes.

The involvement of so many different actors also requires different forms of engagement. Participatory governance stresses the involvement of actors who are not normally charged with decision making, while collaborative governance emphasizes the process of working together (Gaventa 2006). Participatory governance requires that citizens play more direct roles in public decision-making, or at least engage more deeply with political issues. Government officials should also be responsive to this kind of engagement. Collaborative governance brings multiple stakeholders together in common forums with public agencies to engage in consensus-oriented decision making (Ansell and Gash 2008) and community visioning, where members of a community build consensus on descriptions of a community's desired future and on actions to help make goals a reality (Bradley 2012). Also termed as "co-production", these approaches aim at building social capital, integrating human service delivery, and interconnected strategies for relationship building, learning processes, and measurement and modelling among the participants (Bradley 2012). Effective collaborative governance enables a better and shared understanding of complex problems involving many stakeholders, allowing them to work together and agree on solutions. It helps policymakers identify and target problems and deliver action more effectively (Newig et al. 2018).

Because public participation is complex and time-consuming, and involves challenges in reaching a consensus, the relevant government agencies may fail to implement the agreed solution. These structural issues are known to affect long-term agenda setting and outcomes. Where an effort is made to integrate participatory approaches in governance, the challenge remains to ensure that participatory governance moves beyond "instrumental use" towards "deliberative approaches that recognize both the multiple capacities of urban actors and their right to participate in the making of sustainable urban futures" (Castán Broto 2017, p.7) rather than being mere exercises in consultation or education (Shi et al. 2016), which may also ignore power and social relations. This may require, for example, more qualitative data and stories which allow multiple interpretations and a plurality of experiences to co-exist, and institutional processes which are not overly technocratic or reliant on technical knowledge (Borie et al. 2019). Governance structures which embed participation of different stakeholders, and recognize the institutions and technologies involved, will lead to more transformative outcomes (Borie et al. 2019).

Actors in an urban context

The heightened emphasis on city-level action and co-production has paradoxically led to a range of global actors influencing local agendas. Cities are increasing turned into test beds or "living labs" as projects and policies test the outcomes of experimentation in real time with a drive to demonstrate sustainable best practices. There is a policy drift towards experimentation with the involvement of multiple actors while governing "wicked" problems such as climate change (Harman et al. 2015; Bai et al. 2010; Grandin et al. 2018; Castán Broto 2017; Halpern et al. 2013; Castán Broto and Bulkeley 2013; Geldin 2019). Co-operative networks in experimentation may overcome traditional institutional barriers that actors might face individually, by tapping into the common interests and capacities of the state, the market and the civil society.

Newer transnational municipal networks (hereafter TMNs) and global actors such as international donor agencies are mostly framed around the delivery of a Sustainable Development Goal, enjoy a broader range of partnerships from private businesses and community networks, and are

driven by primate cities in the US and Europe as an assertion of their importance and influence in global climate politics, although with increasing participation from cities in the Global South. These national or international relationships are becoming more and more institutionalized and formalized (Corfee-Morlot et al. 2011; Geldin 2019). TMNs such as ICLEI focus on building adaptation and resilience in local communities, compared to their earlier emphasis on mitigation (Bulkeley and Betsill 2013). Based on an analysis of experimentation in 100 cities, Castán Broto and Bulkeley (2013) conclude that more experiments take place in cities that are members of transnational municipal networks. These global networks are touted as an important non-linear, bottom-up approach for cities to occupy the centre-stage in global environmental politics. Despite the appeal of this mode of operationalizing sustainable urban governance, we do not know the long-term impacts of experiments. Additionally, although Castán Broto and Bulkeley (2013) find that urban experimentation does not depend on the size of cities, we find that their data of 100 experiments does not include any secondary city.

TMNs give cities the access to resources, policy learning, profile-building and political leadership that drive local change (Bulkeley and Betsill, 2013; Castán Broto, 2017; Fuhr et al., 2018). The engagement of locally elected leaders in the global climate change policy arena compels for better government action and has led to some strategic policy support. In the case of Durban, these TMNs provided networking opportunities to influence change, on the face of inertia in formal institutions (Bulkeley and Betsill 2013). Therefore, the importance of TMNs in promoting certain cities as sites of experimentation needs to be emphasized – although there are experiments in cities that evolve outside of the international policy arena.

In the age of global experimentation and networks, one might expect the role of governments to shrink. Contrarily, in a study of sustainable urban experiments in Asia, Bai et. al. (2010) find that the governments played the "leading actor role" in most experiments, with strong roles in legal and public responsibility, project design and formulation, and that change in public policy is a main trigger for sustainable urban development projects in Asia. Replication of local experiments requires support from national and regional policy (Bai et al. 2010; Fuhr et al. 2018; Johannessen et al. 2019; Shand 2018). When considering the role of government actors and their interactions with other stakeholders, it is also important to recognize that in certain cases, "the use of state resources in many poorly performing states is driven by informal relations and private incentives (including patronage, clientelism and ethnicity), rather than formal state institutions that are underpinned by equity and the rule of law" (Cammack 2007, p.1). In such cases, global actors such as international funding bodies also can drive change: for example, a project aimed at upgrading slums in Harare, involving the Bill and Melinda Gates Foundation, addressed the institutionalized power imbalances between the local community and the government (Leck and Roberts, 2015).

In this paper we identify three levels of government; national, provincial and local. While these can be referred to in different ways (e.g. provincial can also be referred to as regional or state or county governments in different contexts, and local governments are interchangeably used with the terms municipalities or municipal or city governments), for clarity we will use the terms national, provincial and local governments.

National governments are key players in sustainable urban development because they set strategic priorities and policy guidance for climate and urban governance. They stipulate statutory objectives and standards for different areas of service provision and management but also adopt differential responses to contentious politics (Mitlin, 2018). National governments can provide impetus to local governments to act on certain policy areas (Fuhr et al. 2018; Corfee-Morlot et al. 2011). The role of regional and national governments is key in sustaining co-ordinated climate action in urban areas. For example, Anguelovski et al. (2014, p.156) find that, for climate adaptation, "sustained political leadership from the top, departmental engagement and continued involvement from a variety of stakeholders are integral to effective decision-making and institutionalisation of programmes in the long run."

We identify a literature gap on the role of provincial governments (also referred to as state, regional or county governments) in shaping sustainable urban governance in cities of the Global South. Nevertheless, regional governments could inform regulation and encourage innovations (Castán Broto 2017) in urban areas. For example, in India urban governance is a provincial (state) subject, entailing that all matters of planning and integration of national plans with regional goals rests with the provincial government (Sami 2016). The city governments are chiefly the implementing agencies and are not involved in the planning process.

Cities contain both opportunities for climate action and political struggles over it, as actors with competing interests on real estate development, land-use and finance determine the trajectory of urban development (Castán Broto 2017; Grandin et al. 2018; Cho 2010; Coelho and Raman 2010). Local governments are well-positioned to create liveable communities and they may do so by promoting carbon-neutral transport, introducing advanced waste or water management systems and pushing for energy-efficiency in building standards and city planning (Fuhr et al. 2018). Cities in the North are accordingly leading sustainability transitions when national governments are reluctant or unambitious (Affolderbach and Schulz 2016; Bulkeley and Betsill 2005; Bulkeley and Betsill 2013). Not all local governments possess a similar capacity or will and face a great deal of barriers to action, including a lack of knowledge, resources, political will, or autonomy (Pasquini et al. 2015; Sami 2016; Tuhkanen et al. 2018). Cities lack control over industrial policy or large-scale infrastructure (Wachsmuth et al. 2016). Political interests may hamper adaptation actions at the local level (Brockhaus et al. 2012). In many emerging cities, there might not be a responsible agency for dealing with climate risks at the city level (Sami 2016) or the ward level (Ruszczyk 2019), creating a dependency on the upper levels of the government for incentives and resources (Fuhr et al. 2018).

In many cases of exceptional local environmental action, change was brought about by environmental champions in politically influential positions (Pasquini et al. 2015). The presence of a local leader is a key driver for changing norms and pushing for action (Fuhr et al. 2018). For example, in Durban, local champions have built their climate change knowledge and skills personally, using these alongside their institutional influence to guide the Municipal Climate Protection Programme, as well as to capacitate others (Roberts and O'Donoghue 2013).

Households and individuals in urban communities may be regarded as the most important players in environmental governance.

Initiatives by local governments are operated and managed in partnerships with community organizations or private actors (Bai et al., 2010; Castán Broto and Bulkeley, 2013). Private sector actors have a prominent role in several local partnerships on urban sustainability experiments and are taking on roles that are typically regarded as public dominion (Castán Broto and Bulkeley 2013). Many critical urban infrastructure projects are handled and financed by private sector players – especially in the sectors of waste management, public transport, road and water (Harman et al. 2015). The role and interests of insurance companies in determining post-disaster loss and damage are also frequently noted (Bahinipati et al. 2017; Tuhkanen et al. 2018). States also outsource the planning process to private consultants (Sami 2016). Under a supportive policy environment, such boundary organizations have been found to build and maintain local partnerships (Corfee-Morlot et al. 2011).

Households and individuals in urban communities may be regarded as the most important players in environmental governance, because people "self-govern" (Joubert and Martindale 2013) and cope with disasters individually or at the household level (Corfee-Morlot et al. 2011). Subjectivity rooted in individuals' cultural and social identities (e.g. class, ethnicity, gender and occupation) and in societal norms and values (e.g. attachment to place) can inform perceptions of and responses to risk (Félix et al. 2013; Matin et al. 2018; Tuhkanen et al. 2018). Intergenerational knowledge and interventions also aid environmental conservation in communities (McQuaid et al. 2018). While households in informal settlements develop coping mechanisms as a direct response to crises, long-term adaptation strategies may be adopted to a lesser extent (Archer et al. 2019). Households also engage at the community level, for

instance by building shared resilient infrastructure or by negotiating and political bargaining with the support of local leaders and area councillors (Bulkeley et al. 2018; Joubert and Martindale 2013).

Involvement of communities in participatory deliberations and consensus building are increasingly the norm in environmental and urban planning (Collier et al. 2013). Archer et al. (2019) note that there are constraints to community action related to levels of asset ownership, differential priorities, social networks, and policy support, such as service provision. However, civil society actors, including grassroots networks such as Slum/Shack Dwellers International (SDI) and Asian Coalition for Housing Rights (ACHR), have demonstrated the potential of community-led development to address infrastructure and housing needs – with technical support from NGOs and professionals where necessary – increasingly through co-production with the state, fostering new partnerships at the urban scale (Mitlin 2018; Mitlin 2008; Mitlin and Bartlett 2018). Therefore, urban communities are a crucial link in urban environmental governance. In addition to providing standard infrastructural and policy arrangements, there is a need for governments to strengthen local information systems and improve climate awareness (Corfee-Morlot et al. 2011, Archer et al. 2019).

Towards a multi-level approach

The previous section has highlighted the multiplicity of actors implicated in urban development decisions, and the challenges and opportunities faced by each stakeholder. This multiplicity can sometimes be a limitation, because citizens may find themselves not knowing where to turn when faced with a problem. At the same time, there are great opportunities to develop useful connections between different types of actors to ensure more joined-up and scaled-up action. Such action can enable more inclusive and sustainable development processes such as collaborative governance, if there are effective mechanisms in place to mediate the process and define common aims and outcomes.

The way in which an outcome is defined can also depend on the driver for action, for example on whether the city-level action is a response to a sudden shock or stress, or a longer-term pressure of development, or a desire to meet goals such as SDGs or other targets. Disasters are the main drivers for local governments to take climate adaptation measures in emerging cities, even in low-resource environments. For example, the high cost of repetitive disasters forced action in Hessequa, a small municipality in South Africa (Pasquini et al., 2015) and in Surat in India (Sami, 2016). Disasters may also compel households, communities and small businesses to take action to reduce their exposure to such hazards.

A joined-up approach can help to ensure that measures taken by one actor do not have negative impacts on others through displacement effects – and here local government involvement as a key planning actor is essential, to provide the necessary oversight and overall vision. The larger policy environment will also frame the potential for multi-level action and collaboration across stakeholders. Fuhr et. al (2018) identify key sets of drivers and enablers for local climate action, including high capacities and pressure to showcase performance, local democracy, an enabling policy framework, a conducive socio-economic environment and local leadership. Financial barriers remain a big sticking point for action for all actors. Unless emerging cities can adequately raise their own revenue, for example through local taxes and charges, they remain reliant on central government funds, which may be inadequate. Institutional capacity may also be another constraint: for cities struggling to deliver basic services and infrastructure for their citizens, the additional targets of global initiatives such as the SDGs and climate action may be an additional burden.

A joined-up approach can help to ensure that measures taken by one actor do not have negative impacts on others through displacement effects – and here local government involvement as a key planning actor is essential, to provide the necessary oversight and overall vision.

3. Methodology

This paper explores, through a series of eight case studies, how urban environmental governance in secondary cities in the Global South is shaped. The cases are all initiatives aimed at addressing environmental and sustainability concerns. In each one we examine who the key actors were, the drivers for action, the policy environment, what barriers were faced, and how any challenges were overcome. On this basis we can therefore consider the opportunities for inclusive and multi-level urban environmental governance that emerge.

These case studies in emerging cities in the Global South illustrate different types of action taken to address challenges relating to climate, the environment and sustainability. Cases were selected to highlight diversity in terms of the actors leading the process or initiative, based on a scoping of existing literature on environmental initiatives in secondary cities in the Global South. In selecting the cases, we focused on secondary cities across Asia, Latin America and Africa, and on activities or approaches which had been initiated by different types of actors in each case, as outlined in Table 1. Although the cases are not representative of all secondary cities in the three continents, the eight different mechanisms of governing urban sustainability transitions analysed in the paper are expected to resonate with the complex governance issues faced by many cities. With this in mind, we reflect on the different governance models and drivers for action as a starting point for exploring opportunities for inclusive urban governance which emerge.

Table 1. Case studies

Activity/issue area	City	Population	Governance model
Building resilience to flood and heat risks	Surat, India	4,467,000	Locally adapted donor initiative
Smart eco-city development	Songdo, South Korea	>100,000	Public-private partnership
Building flood resilience	Đông Hà, Vietnam	160,000	Donor-government initiative
Regional water and waste management	Nakuru, Kenya	286,411	Regional infrastructure planning
Making a greener city	Udon Thani, Thailand	135,000	Local planning and development
Adaptation to climate risks	Manizales, Colombia	431,760	Local planning and community-based adaptation
Post-landslide support and recovery	Saint Bernard, Philippines	28,395	NGO-led community action
Adaptation to flooding	Khulna, Bangladesh	664,728	Community-based adaptation

We selected our case studies through a desk review, where we identified examples across the three continents to supplement the two case studies under the SEI Initiative on City Health and Well-being: Udon Thani in Thailand and Nakuru in Kenya. In these two cities we have engaged with relevant actors through a series of data gathering and engagement activities focused on urban environments. In Nakuru, interviews and workshops on fluoride contamination with stakeholders such as Nakuru Water and Sanitation Services Company Limited (NAWASCO), the Catholic Diocese of Nakuru, Egerton University, public health officers, neighbourhood water vendors, and community champions representing the four target neighbourhoods. The aim was to share experiences and determine levels of awareness of fluoride content in cooking and drinking water and the effect this has on citizens' health. We also had informal interactions with the mayor of Udon Thani, discussions with key stakeholders and a feedback session on our research with local community leaders and the municipality.

Our six other case studies were drawn from secondary sources in urban and environmental journals, including cases on which the authors had pre-existing knowledge. However, we recognize that literature on secondary cities, especially those in Africa, is limited, which constrains the extent to which we can explore certain aspects of the cases, and that our understanding of the Udon Thani and Nakuru cases will be deeper.

For all eight cases, we applied the modified Bai et al. (2010) framework to draw out details drivers of action, actors involved, finance, barriers, policy frameworks and outcomes, focusing specifically on inclusivity and sustainability outcomes. In each case, we explored which types of actors were involved and to what extent, and sought to understand the opportunities to make connections between different types of, and to increase levels of inclusion. While this was a subjective exercise based on the available secondary sources, it enabled us to gain understanding of the types of actors who initiate action and the extent to which various stakeholders are involved in the case studies. We also note that the literature is particularly limited on the drivers and long-term outcomes of these experiments. For six of the cases, therefore, the analysis hinges on our interpretation of existing literature, unlike the cases of Udon Thani and Nakuru, where our ongoing engagement helped to fill in knowledge gaps.

4. Results

In this section we provide an overview of the eight case study locations and initiatives, before analysing the role and involvement of different types of actors in each and discussing them in relation to the analytical components. Longer case study descriptions can be found in Box 1.

4.1 Resilience building in Surat, India

Surat city joined the Asian Cities Climate Change Resilience Network (ACCCRN), a transnational initiative funded by the Rockefeller Foundation, to improve disaster preparedness and resilience to floods. The cities were selected to join ACCCRN based on criteria such as extent of climate-related hazards, capacity and resources of local government, and the geographical location and profile of cities. With an objective to prepare a City Resilience Strategy (CRS), ACCCRN, through its local implementing partner TARU, supported, for example, stakeholder workshops, vulnerability assessments, and detailed sectoral studies (Sharma et al. 2013). The industry association, Southern Gujarat Chamber of Commerce and Industries (SGCCI), had a major interest in the project, due to previous experience of local industries losing capital and infrastructure during floods.

The Surat Climate Change Trust (SCCT) was set up because key government and private stakeholders were seeking more institutionalized and sustained action beyond ACCCRN's project timeline (Chu 2016). The SCCT consists of various inter-sectoral organizations such as Gujarat State Disaster Management Authority, Narmada, Water Resources and Water Supply Department, SGCCI, and academic institutions (Sharma et al. 2013). In addition, an Urban Health and Climate Resilience Centre was established, which is a "first of a kind" institution in the country (Sharma et al. 2013). The Centre aims to address public health issues related to climate change impacts and disasters.

4.2 Smart eco-city development in Songdo, South Korea

Songdo was built on reclaimed wetland to boost economic growth while maintaining environmental standards. With a strong push from the private developer Gale International and an infrastructure provider, Cisco, the greenfield city under the governance of the Incheon Free Economic Zone (IFEZ) was built in an area of 53.4 km^2. The IFEZ is formed of the Incheon Metropolitan City, the Incheon Free Economic Zone Authority (IFEZA), the Incheon Urban Development Corporation, and other relevant public agencies. The IFEZA is a parastatal body that organized deals with the private sector, and these projects are then to be approved by the local government (city of Incheon) and the Free Economic Zone (FEZ) committee. The FEZ committee had extensive control in designing spatial plans and tax incentives for the development. The IFEZ aims to be one of the smartest urban regions in the world and is designed to be a replicable model of a greenfield "ubiquitous" smart city using data-driven, smart technologies and high-end infrastructure. Meanwhile, the private consultants have formed a syndicate company, the New Songdo International City Development LLC, that leads the development of Songdo international business district.

4.3 Nature-based solutions for building resilience in Đông Hà, Vietnam

The Asian Development Bank (ADB) identified Đông Hà as one of the Greater Mekong Sub-region towns in which a technical assistance project that strengthens the flood resilience of the city through green infrastructure would be undertaken (ADB 2015). A core group including technical experts from the International Centre for Environmental Management (ICEM), provincial and local government and local construction companies pinpointed flood risks in the city based on past patterns and identified two main areas for building resilience. The group revised the town

vision to include aims of "green and sustainable" development in addition to being a regional centre of growth.

The city's major drainage channel, constituting a box canal, was found to be inadequate for flood events. The solution proposed included a complete redesign of a 285-hectare basin. A core green zone was set up to help improve drainage and water retention, as well as to improve the landscape and air and water regulation. The group also worked on improving the resilience of the market-to-port commercial zone, which is the main economic centre of the city. Le Duan Park, which could provide natural drainage, is also located in the area. This prominent central site near the Hieu River was selected because it was located in a "highly visible demonstration site" (ADB 2016, p.148). This area is envisaged as a green space with footpaths and recreational facilities, and with functions ranging from increased permeable surfaces, public space for recreation and tourism, and to facilitate stormwater drainage and waste management.

4.4 Regional water and sanitation improvement in Nakuru, Kenya

Nakuru has problems with water contamination and inadequate infrastructure for waste collection, but the county leads Kenya in prioritizing improved sanitation: it was the first county to pass a sanitation bill and strategy. County-level policies addressing water and sanitation management have included the Water Bill of 2014, which aims at the provision of water services and sanitation and the creation of water services providers; the Solid Waste Management Bill of 2014, for the establishment of the County Solid Waste Management Fund, and its institutional and regulatory mechanisms; the Nakuru Countywide Inclusive Sanitation Strategy of 2019, which provides a framework for improving sanitation infrastructure and faecal sludge management regulations; and the Nakuru County Sanitation Programme, an EU-funded public-private partnership, which applies a behavioural change and market-based model of accelerating sanitation improvements.

The Nakuru County Sanitation Programme is implemented by the Nakuru Water and Sanitation Company (NAWASCO) in partnership with Vitens Evides International, and receives technical support from SNV Netherlands Development Organisation and Umande Trust. In addition, the Annual Development Plan (ADP) is a one-year extract from the County Integrated Development Plan (CIDP) (Nakuru County Government 2013; Nakuru County Government 2018), allowing for reviews that respond to emerging issues in the economy. It sets out strategic initiatives that address the County Government's priorities and plans for each financial year.

4.5 Udon Thani – a greener, MICE city in Thailand

Through the Udon Charter for 2029, a multi-stakeholder vision for the city, the city is committed to achieving six policy points, driven by the objective of becoming a green city focused on MICE (Meetings, Incentives, Conventions and Exhibitions). It seeks to increase gross provincial product, become an employment hub for MICE and green jobs, narrow the inequality gap, have a walkable urban core, and minimize the impact on global climate change. These policy objectives include action points for investing in green transport, green energy, green industry and green infrastructure, as well as parks and public spaces, affordable housing, safe food, health, and becoming a MICE city with a green economy. The city is also invested in becoming a "sport city". Clear targets have been set for these objectives. While the city has engaged in international projects to build capacity in water management and climate resilience, the Udon 2029 process is a home-grown collaboration of city stakeholders, drawn from local government, academia, local businesses and local communities.

4.6 Local integrated climate planning in Manizales, Colombia

In Manizales, Colombia, the model of disaster risk management and governance is led by the local government. The Municipal Office for Disaster Prevention and Response (OMPAD) oversees local DRR initiatives and the formation of emergency committees. Manizales' mayor and the municipality's independent control entities, along with the civil-society-nominated Territorial Planning Council, constitute the local body responsible for planning and monitoring. Their local plans focused on reducing risk and building resilience, namely the Biomanizales of 1993, the Bioplan of 1995 and the local disaster risk plan, have all been updated and integrated with the municipal development plans. The creation of an Environmental Secretariat with an allocated budget shows the importance placed on integrating environmental initiatives at the local level.

4.7 Post-landslide support and recovery in Saint Bernard, the Philippines

The Homeless People's Federation Philippines, Inc. (HPFPI) is a community-based organization that stepped in to mobilize communities to build temporary houses after a landslide destroyed dwellings in the municipality. HPFPI located suitable land and offered the requisite technical support to build 103 terraced housing units. The shift to more spacious housing units resulted in improvements in public health. By building trust and partnerships amongst local groups, the community associations that worked with HPFPI have organized as home-owner associations at the municipal level, and shifted to a mode of self-governance, with the HPFPI only playing a support role. The NGO is now scaling up its initiatives and advocating for policy changes that are suitable for low-income dwellers.

4.8 Community-based and household adaptation to flooding in Khulna, Bangladesh

In Khulna, Bangladesh, community-based adaption (CBA) measures are used in low-income settlements to cope with climate risks, specifically high rainfall and flooding. Households and individuals have limited resources in Khulna, yet respond autonomously to risks and disasters despite receiving minimal structural support for climate adaptation. Residents engage in a wide range of in-situ adaptation strategies, such as changes to the built environment and livelihood strategies (Haque et al. 2014). For example, roofs of homes are lined with polythene bags or cement bags to prevent leakage during heavy rainfall, and floors are raised in height by using elevated plinths or constructing on stilts. Other coping strategies include use of wood and ash sediments on slippery mud floors, raising up furniture, and using top shelves for storage. Social networks play an important role in communally responses.

Table 2. Summary of actors, finance, drivers, barriers, sustainability and inclusivity outcomes in each case study

Case	Actors	Finance	Drivers	Barriers	Outcomes	Inclusivity
Resilience building in Surat, India	TARU was the private sector partner for conducting risk assessments. The City Advisory Committee (CAC) consisting of the local government (the Surat Municipal Corporation – SMC), the regional business association Southern Gujarat Chamber of Commerce and Industries SGCCI, other business groups, academics and individual experts drafted the CRS.	The ACCCRN project was funded by the Rockefeller Foundation. Both the SCCT and the UHCRC was established with seed funding from the Foundation and received support from the SMC. The SCCT can receive funding for projects from external sources.	Previous experience of disaster including improved the awareness of city stakeholders and led to active participation. The SGCCI had an important say in city planning and an interest to prevent future capital losses. They hosted consultation meetings and lead pilot projects after the end of the project.	Lack of institutional co-ordination at the municipal level was identified as a major challenge. The SCCT aims to act as an independent funnel for funding (Karanth and Archer, 2014) but it is still reported to be battling constraints regarding institutional co-operation (Chu, 2016). There are no mechanisms at state or national level for resilience planning and funding.	The CRS was only adopted partially. An early warning system for disasters and a cool roof and passive ventilation program was set up (Sharma et al., 2013). SCCT's objectives include building long-term capacity to address climate change adaptation and GHG stabilization (Karanth and Archer, 2014).	The visioning process lacked the involvement of communities (Sharma et al., 2013). The consultations of the CAC only mention increasing the awareness of the laborers. Traditional divisions on the lines of religion and caste have not been overcome in this case of adaptation planning (Chu, 2016; Chu and Michael, 2019). The role of civil society has been neglected (Karanth and Archer, 2014).
Smart eco-city development in Song Do, South Korea	The initial push for land development was provided by FEZ. Gale International, a Boston-based real estate company and Posco, a Korean conglomerate construction company along with the Incheon Municipal government and IFEZ were key players. Kohn Pederson Fox architects shaped the master plan and Cisco designed the informational infrastructure required.	Cisco brought about 47 million dollars of funding into the city project (Strickland, 2011).The IFEZ was set up as a special economic zone in 2003 to attract a number of foreign investments for the development of the region and growth of the country, through tax incentives and subsidies provided by the government.	A vision to build the 'greenest, most wired city in the world' (Strickland, 2011) appear to have driven the project. In its early stages, the project tapped into local aspirations that helped election campaigns (Shwayri, 2013). Players such as the Mayor of Incheon city, Mr. Sang-soo Ahn brokered many private deals and secured local regulation to give impetus to city-building (Shwayri, 2013).	The project was hindered by a series of political and financial battles. Due to failure in attracting foreign capital and an increasing local deficit (Shwayri, 2013), the private developers and consultants had to find other avenues of monetization such as direct user fees or developer subsidies (Halpern et al., 2013).	Songdo was LEED – certified, with incorporated building and design features such as an urban oasis, open and green spaces and sustainable transport design, LED traffic lights, bicycle lanes, etc. The city also won the 2008 Sustainability City Award. However, the city is built on wetland that is home to rare species. This was a sustained source of conflict with local fishermen and environmental groups which led to downsizing of the project (Shwayri, 2013).	Local fisherman protested the land reclamation due to its impact on their livelihoods. After a series of negotiation, they received land compensation for starting new businesses. The city was mainly designed for foreigners in the IBD, incentivizing them to invest in the region. However, it failed to attract foreign interest and Korean locals are reshaping the city (Shwayri, 2013).

Case	Actors	Finance	Drivers	Barriers	Outcomes	Inclusivity
Nature-Based Solutions for Building Resilience in Dong Ha, Vietnam	The technical expertise was provided by a thinktank, ICEM. Key players from the local government, technical experts and civil society actors formed the core group constituted by ADB.	The project is funded by the ADB with a 4 million euros grant from the Nordic Development Fund. The redevelopment of a modern, green urban zone is expected to increase the development value of the basin, that could be utilized to fund further green infrastructure.	The vision of ADB was to redevelop the basin and the economic centre areas into resilient zones that could also thrive financially for trade, tourism and commercial activity. They accordingly revised the city vision and chose a 'highly visible demonstration site' (ADB, 2016, p.148). The project is a part of GMS Corridor Towns Development Project (ADB, 2016).	Poorly planned or unplanned developments has exerted pressure on the city's natural ecosystems and resources. The program preferred 'hard engineering solutions because they are standardized and relatively easy to deliver' (ADB, 2016, p.149).	The project is expected to increase the micro-climates of the two sites and the flood resilience of the city. There could be limits and drawbacks to technical solutions, and a greater need for simpler bio-engineered or political transformations. The focus of the project was also linear and focused on water management.	Although a participatory mapping exercise was conducted, the core committee did not consist of any local community members or associations. The connectivity plan hinged on displacing the small shop holders in the region. ADB identified that it could play more a role of a mediator in community participation processes in the future (ADB, 2016).
Regional water and sanitation improvement in Nakuru, Kenya	The county government is working with the national government and other key stakeholders such as UN Habitat and private sector in implementing water and sanitation programs. Private providers such as NAWASCO are a part of service provider associations that contribute to delivering the county mandate.	Most funds are provided by the state, unless implemented in partnership mode. As per mandate, no funds should be appropriated in the budget unless planned for and the ADP is prepared accordingly.	The anticipated upgrading of the town to city status in 2020 is pushing county-level action in Nakuru city. The need to deal with the poor water supply quality and sanitation conditions as the population of the city increases is also a major driver.	The major challenge is lack of political goodwill and inadequate budgetary allocations. Although there is a working group bringing water, sanitation, solid waste and drainage management sectors, there is no policy guiding their operations and integration purely relies on trust and goodwill.	Nakuru county is planning to incorporate an integrated solid waste management system that will involve collection, sorting, treatment, recovery recycling and composting to protect the environment and human health through public education. The county has partnered with local organizations and private individual to handle solid waste in Nakuru.	Public participation is required during the review of the budget and projects listed in the ADP. The constitution of Kenya, County government Act and Urban Areas and Cities Act has well-defined conditions on public participation for any development project which is funded by public finances.

Case	Actors	Finance	Drivers	Barriers	Outcomes	Inclusivity
Udon Thani – A Greener, MICE City in Thailand	The local government has played a key role in driving city-wide initiatives. It has regular monthly meetings with community leaders of all 105 communities in the city to update leaders on municipal activities. The Udon Thani 2029 team consisted of volunteers from academia, local businesses, communities and a local coordinator, who have driven the Charter process. The Udon City Development Company (CDC) also plays an important role.	The city receives a centrally allocated budget, as well as locally raised funds (e.g. taxes on advertising billboards) to fund infrastructure and services. There is also investment through private-public partnership (PPP), such as for the Smart Bus. There have been externally funded research projects focusing on urban climate resilience.	The Thai government, through the Digital Economy Promotion Agency, is urging cities to collaborate with the private sector to form a City Development Corporation (CDC) to secure funding for development projects. There is also a national drive for a National Charter for Urban and Local Economic Improvement, which promotes the development of charters for provinces and urban areas. Experience of flooding and water shortages is driving its investment in green infrastructure.	The city faces a shrinking and ageing population within the municipality, but rapid urbanization on the outskirts of the city, which are areas with important wetlands. A new high-speed rail route is also encouraging development in the area. Community leaders feel that there could be better arrangements for water and waste management and need for improving citizen awareness on these issues.	The city is carrying out the important step of collecting data to use as a baseline for monitoring progress. With regards achieving green transportation, the city has piloted a multiway pedestrian crossing to improve walkability (contributing to the healthy, sporty city objective) and launched the Udon Smart Bus. There has been a public discussion on haze and air quality from crop burning, to increase access to public spaces and green spaces and led to arborist training and tree-planting activities.	In the monthly community meeting held by the municipality, there are opportunities for information sharing and dialogue between the city representatives and community representatives. The municipality shares budget plans and asks for the approval of the community leaders. The process of developing the Charter was volunteer-led with representatives of different stakeholder groups taking a lead on different sections according to their interest.
Local integrated climate planning in Manizales, Columbia	Strong institutions at the national and local level are driving the action. Civil societies and local universities are designing and monitoring a city-level risk management index and data on river behaviour. The Chamber of Commerce supported an environmental education program and the growth of eco-friendly business. 'Slope guardians' program has trained women in high risk slopes to mitigate risks at the slopes through management of vegetation, drainage channels, stabilization projects, registration of households and land-use.	The central transfer of funds to municipalities are earmarked to be spent on sectors such as health and education. The capacity of the local bodies to raise funds for other services such as environmental planning is varying. The 1.2% tax revenue from urban properties went to finance environmental conservation projects of Manizales.	The willingness of local actors to work on risk management has enabled the integrated approach. The municipality's autonomy as envisaged by the national constitution has been instrumental, and the co-ordination required with other levels of the government for financial and policy support have been smooth (Hardoy and Velásquez Barrero, 2014).	Persisting issues of sewage treatment services and wavering local participation in meetings indicate lessening interest on disaster risk reduction are key issues. Many initiatives such as the slope guardian project were not expanded due to lack of funding. There is lesser autonomy of municipalities for revenue spending on climate risks adaptation and DRR initiatives. The National Disaster Fund is also shrinking.	Some of the outcomes of the integrated planning approach include eco-park networks, reforestation of river basin, environmental observatory, indicators for environmental management, the Environmental Plan for the Biocomuna Olivares, the Integrated Risk Management Programme for Manizales and the integration of environmental studies into school curricula.	100 women participated in the Slope Guardians initiative. The process of planning had strong participative mechanisms in place, both embedded in the constitution and in institutional practice (Hardoy and Velásquez Barrero, 2014). A portion of insurance premium that is paid along with the property tax is shared with poor groups voluntarily by upper income segments. Whereas displaced or migrant population living in steep slopes have been re-settled, licenses are issued for middle income housing projects on risk zones.

Case	Actors	Finance	Drivers	Barriers	Outcomes	Inclusivity
Post landslide support and recovery in St. Bernard, the Philippines	The HPFPI was the main actor in post-disaster governance. Municipal health office, local NGOs, religious groups and faith-based organizations such as the Parish Social Action Centre (PSAC) and the Vincentian Missionaries Social Development Foundation also provided basic necessities, medical support and relief assistance. The HPFPI also garnered support from the local and national level agencies from the Department of Social Welfare ad Development and the Department of Education (Co, 2010).	The project used community funding and relied on the community's regular savings to invest in development. The Federation provides an institutionalized network at the local, regional and national level to organize these efforts. The Federation is funded by international donors, NGOs and faith-based groups such as the CordAid, IIED, ADB.	Disaster played a key role in the organization and coming together of multiple stakeholders. Established participative and negotiation mechanisms and the well-defined objective of the NGO streamlined the process.	Due to lack of data, targeting relief to the families in need was difficult. The federation overcame most of the barriers through continued persuasion towards long-term strategic solutions. Involvement of the community helped in identification of worst-affected families.	The building of temporary homes used available, low-cost materials and reused landfill materials that were used to raise the height of the housing.	HPFPI coordinated with local government units such as the Municipal Disaster Coordinating Council and the community members and organizations. The process was inclusive and participatory in data collection, selection of beneficiaries, design, construction and maintenance, resulting in community ownership. The federation also prioritized providing support to elderly couples and families with children (Co, 2010).
Community-based and household adaptation to flooding in Khulna, Bangladesh	The urban poor have limited capacity and resources for adaptation, but individuals, households and communities come up with low-cost, spontaneous measures to reduce their exposure to risks. Local NGOs work on concerns of the community and together with the Khulna City Corporation (KCC) mediate to reducing vulnerability of the households (Haque et al., 2014).	The actors finance these low-cost initiatives through incremental communal efforts and re-using existing infrastructural elements. While older members in the community dedicate their time in mobilizing funds and people, the younger members volunteer with physical effort.	Disasters and their adverse impacts on livelihoods and health forces vulnerable communities to develop coping mechanisms and resilience.	Most of the residents do not hold tenure security and have fewer incentives to invest in future-proofing their houses. The KCC does not provide them with drinking water, roads, drains and sanitary facilities. The existing efforts of the individuals and communities do not address the structural issues and policy gaps that exacerbates the vulnerabilities of these populations (Haque et al., 2014; Roy et al., 2012).	Residents use low-cost, soft-engineering measures. Households increase their food access by growing food on their roofs. Available containers are used to store water. Bamboo sticks are used to clear blocked drainage systems and they use bricks and stones to build lanes. Communities reduce risk together by fishing for food, taking shelter together, and setting up community kitchens. They also build common goods such as elevated pathways, toilets and drains.	The community receives risk information late due to lack of communication devices. Most members of community in question live in extreme poverty and possess very limited physical assets. The senior members in the community negotiate with ward commission for better support (Haque et al., 2014).

5. Discussion

In this section we discuss key elements and entry points for secondary cities to improve the inclusion of their environmental governance initiatives. We analyse the data presented in Table 2 and frame the discussion around elements of good governance from the case studies. The section is organized around the modified Bai et al. (2010) typology, and analyses the actors, drivers, financial conditions, barriers and outcomes of the eight case study experiments.

5.1 Actors

This section highlights the roles and responsibilities of key actors in the case studies, their partnerships and interactions, and the limitations and gaps in knowledge of their roles in shaping sustainability transitions. Table 3 is adapted from Provè et al. (2016), and summarizes the actors involved in the eight case study projects. We analysed qualitative data from the literature sources to subjectively assess the level of engagement of different actors in each case. The signs indicate the involvement" of different stakeholder groups in each case: with "–" meaning not represented; "+/–" weakly represented; "+", actively represented and "++", very actively represented. If there were gaps in the literature in relation to the role of a given actor, the cell is left empty. The table is used both to identify the most prominent players and to identity the interactions between actors (section 5.1.3).

Table 3. Actors steering city-level initiatives and their level of involvement

Cities	Global	Government			Private sector	Civil society			
	Global/donor funded projects	National government	Provincial government	Municipal government	Consultants, architects, real-estate developers, other private sector actors. Service providers	Social and cultural institutions, NGOs	Environmental champions, mayors, political leaders, volunteers	Academic community	Local communities
Surat, India	++	+/-		+	++	-		+/-	-
Song Do, Korea		++	+	+/-	++	-	+		-
Đông Hà, Vietnam	++		+	+	++	-	-		-
Udon Thani, Thailand		+		++	+	+		+	
Manizales, Colombia		++	+	++	+	++		+	+
Khulna, Bangladesh		-		+		++			++
Saint Bernard, the Philippines		+		++		++			++
Nakuru, Kenya	+	+	++		++	+	+	+	++

The role of governments

In this section, we highlight the role of governments in 1) providing the requisite planning and policy framework for cities to achieve sustainability goals, 2) aligning environmental goals from the global up to the local level, 3) scaling successful pilots horizontally based on the eight cases and 4) building partnerships to tap into external expertise, finance or local interests.

The case studies highlight the importance of integrated policy planning at the national, provincial and local levels for catalysing urban sustainability transitions. The policy directions of the national governments of Kenya, India, Colombia, Bangladesh, South Korea, Thailand and Philippines translate to the economic and environmental politics played out in the eight cases. A strong institutional constitution for environmental management at the urban level is key for driving favourable sustainability outcomes, as in the Colombia case, or for carrying out a proactive disaster risk response, as in the Philippines case. Coordination between the national, provincial and local governments in Udon Thani catalysed action, as did having the same ruling party in the national and local scale in Manizales.

Provincial governments can be key in framing the role of different cities and policy decisions.

There is little research on the role played by provincial governments in SDG 11, or indeed implementation of other SDGs. However, provincial governments can be key in framing the role of different cities and policy decisions, for example in the cases in India and Vietnam. In the case of Manizales, provincial governments are implementing disaster risk reduction initiatives in partnerships with industry actors and CSOs. Initiatives such as the Nakuru County Sanitation Programme are working towards positive outcomes, and the privatization of solid waste management is also bringing improvements, according to our discussions with country officers at our citizen science workshop in Nakuru. These are good indicators of improved services, but these efforts need to be scaled up and buttressed with integrated policies. Horizontal scaling up might be more successful in regional contexts due to alignment of political, cultural and ecological factors, but in practice these intra-regional partnerships are rare. This calls for strengthening of provincial governments in fostering regional city partnerships and knowledge sharing.

In developed countries there are regional partnerships between neighbouring local governments that support context-specific knowledge sharing on urban climate risks and adaptation (Harman et al., 2015). This type of horizontal scaling up of experiments and partnerships is largely missing in emerging cities in Asia and Africa but could offer financial as well as environmental benefits. For example, local government units in the Philippines are taking a clustering approach to deal with transboundary issues, particularly watershed management, whereby one large municipality and smaller surrounding municipalities come together, or where there is a strong relationship between a municipality and its hinterland (Archer et al, 2017). In agreement with the literature, we found that local governments are the most prominent actor, being either "actively involved" or "involved" in most case studies (Table 3). Local governments are achieving their environmental goals by partnering with social institutions or businesses to tap into external resources or technical expertise, as can be seen in the case of Udon Thani. As in the case of Manizales, local governments can also take a lead in collaborative governance by steering public awareness and motivating volunteer efforts in environmental management.

The role of global actors and global networks

Global networks and global actors in city governance play an important role in governing sustainability transitions. They often (1) take the lead in implementation of SDG 11, (2) reshape governance modalities in emerging cities and (3) adapt to the interests and expertise of local partners. We also found that their inclusivity outcomes could be improved through design – for instance, in the selection of cities or implementation partners.

ACCCRN and ADB had different visions in their resilience building projects. While ACCCRN was focused on building resilience to climate change in Surat, ADB, as a bank, had also wanted

to boost the visibility and the investment value of the Đông Hà region. This shaped the focus of their project solutions from softer solutions to hard engineering solutions that are more standardized. Whereas ACCCRN evolved to play a sustained role in adaptation planning in the Surat, the long-term impacts of the multilateral financial actor's involvement in resilience building in Đông Hà is not known. In the economic realm, however, ADB has transformed medium-sized cities in Asia by attracting large-scale foreign investment and growth through the GMS project (Friend et al. 2014).

Global networks play an uncertain role in shaping policies at local, regional or national levels. The literature may overstate profile-building of cities and the potential of transnational municipal networks (TMNs) to help build political partnerships, because TMNs fund projects in cities that show a benchmark of political will and capacity, such as Surat. Global cities occur repeatedly in different experiments and sectors as leaders and educators, and other cities are pressured to emulate their governance models and best practices (McCann and Ward 2012). In this way, TMNs could reproduce existing inequalities between cities in accessing adaptation resources, which calls for greater inclusion of cities that lack political, financial and technical resources (Fitzgibbons and Mitchell 2019; Geldin 2019). Geldin (2019) points to a number of limitations of TMNs, such as a disproportionate focus on megacities, risk-averse selection criteria that reproduces spatial divides, and duplication of existing institutional efforts and partnerships. This was noted to be the case even for partnerships like ACCCRN, which included intermediary cities that are usually given lesser consideration in policy circles.

While the main efforts of TMNs are shaped by global discourses on sustainability, which results in funding, it is the designated country or local partner that shape the project discourse based on their expertise and networks. For instance, within ACCCRN projects in Indian cities, Gorakhpur had a stronger community participation component than Surat due to the strong role played by the local implementing partner in supporting community processes. The case studies show that the business sector is "very actively" involved in projects that focus on real estate development or building physical or informational infrastructure. Thus, the choice of local implementation partner might have substantial impacts on inclusivity and sustainability outcomes.

The role of the private sector

There is growing attention on the role played by the private sector in urban environmental governance, operating under wide-ranging national policy regimes. Businesses play a strong role in providing technical inputs, expertise and technological infrastructure or funding. Business associations can become key stakeholders, as in Surat where their experience of capital loss during previous disasters has been drawn on. Business stakeholders also invest in green infrastructure, for example in Udon Thani's Smart City Bus, funded through a private-public partnership, and have engaged in rebranding the city (e.g. as a "MICE" city) to gain financial returns on infrastructure or real-estate investments. Achieving equitable conditions might not be the key objective of private-sector led projects, as in Songdo, which could lead to conflict between actors (Table 2). The involvement of NGOs is missing in projects with the "active involvement" of business groups, as in the cases of Surat and Songdo (Table 3). The role of local communities and environmental champions and volunteers is limited in the cases studied.

The role of civil society, communities and individuals

Socio-cultural institutions and NGOs play a key role in building local partnerships, mobilizing communities, negotiating better infrastructure and policies from the government and driving low-cost adaptation projects. In Nakuru, the Nakuru Town Residents Association, together with CSOs such as People's Power Watch Group, pushed the County Government of Nakuru to move toward a cleaner and safer environment. For example, they have argued for relocation of the Gioto dumpsite, currently only 3km from the city centre. In Udon Thani, the Udon Thani Charter group is led by volunteers from various sectors, from academia to local communities and the private sector.

Academic communities and thinktanks play an important "boundary" role, having "active" involvement in many projects (Table 3), mostly to provide technical support, but they are not "very actively" involved or the primary drivers of action. Community-based organizations thrive with greater national and international support, as in the cases of Columbia or India, although they often step up when the climate responses, sustainability agendas or service provisions from government institutions are weak, as is the case in Khulna. NGO-based projects are self-sustainable if they play more of a mediator role in enabling communities to fund and plan their own development, like in the case of HPFPI in Saint Bernard.

5.2 Finance

Analysis of the financial conditions in the eight case studies emphasizes how 1) government commitment and funding is required to scale-up solutions from the pilot stage, and to ensure that basic infrastructure is provided, 2) substantial involvement of the private sector in projects can exclude other important stakeholders, and 3) global networks can effectively fund community networks and development in the face of policy slowdown.

Because TMN or global funding is typically used for implementing pilot projects in specific zones of cities, there is a need to pool local resources to help scale-up solutions across the city. In Asia, there is only weak evidence that international development sector has led the scale-up of initiatives (Bai et al. 2010). Similarly, while ACCCRN and ADB have conducted risk assessments and adaptation planning in sections of cities, these efforts have not been replicated on a larger scale, which perhaps points to a lack of regional and national support and commitment. A willingness in local government to contribute funds for innovative institutions or solutions will support long-term solutions, as in Surat. However, smaller cities with fewer resources or autonomy, like Manizales, find it difficult to mobilize taxes and use funds for sustainable projects. In response, national governments need to earmark dedicated funds for environmental management, as well as provide a flexible institutional framework that enables city governments to make independent decisions on how to allocate resources, based on local risks and priorities.

A new model of governance emerged as a result of urban development in Songdo, which has important implications for finance. Provision of services is now managed by a public-private cooperation company (PPCC). It is hoped that the PPCC, consisting of Cisco, Korean Telecom, and other private players, along with IFEZ, will help Songdo generate more revenue (Halpern et al. 2013). The PPCC will take over the delivery of several basic services like electricity from the local government, for which citizens will pay a fee to the PPCC. City Development Companies are also appearing in several Thai cities, largely in response to a national strategy to develop "smart" cities and catalyse the involvement of the private sector. Although the private sector provides technical expertise and improves infrastructural services in the Songdo, there needs to be due consideration of how monetizing service provision could drive up the costs of services and undermine Songdo's aim to be a city "for all".

The presence of a support NGO, like the HPFPI in Saint Bernard, allowed the city some leeway to access external funds and a develop a networked structure that will enable poor communities to channel funds into long-term community adaptation. However, in Saint Bernard and Khulna poor and informal communities still get too little support for building long-term resilience. Self-governance cannot substitute for service provision, especially of infrastructure like drainage and sewerage. Governments in developing countries should give utmost priority to universal provision of services, given their crucial links to resilience and adaptation. For instance, ensuring security of tenure can considerably increase people's capacities to respond to risk, and be an incentive to invest in climate-proofing of poor communities.

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5.3 Drivers

While global commitments such as the SDGs and the NUA require implementation at the local level, it is national governments that have signed up them, with little involvement of local governments and other local actors, who will ultimately have to meet these commitments. Therefore, lived realities, such as exposure to disasters, economic incentives and local and global visions for city development, may be the key drivers for governing sustainability transitions in secondary cities of the Global South.

Previous experience of disasters is often the main driver of local community action. In Surat and Manizales, for example, motivated strong participation in the project from business and academic institutions. Disasters may also be an important factor in selecting city sites for global network projects. For instance, in Surat and Đông Hà previous experience with floods shaped the resilience building projects. On top of this, local communities and individuals develop coping mechanisms as a response to disaster, as in Khulna and Saint Bernard.

Economic incentives can also be a key driver in environmental governance. Real estate speculation and visions of building a world-class city from scratch might encourage entrepreneurism. While this connection is explicit in projects that focus on landscaping for real estate development, such as in the Hieu River basin in Đông Hà, other implicit links to growth may not be straightforward. For example, Surat is an important business centre, and is a hub for manufacturing, particularly diamonds and textiles. Most of the cities recent flood losses occurred in the areas that housed the weaving industry (Bahinipati et al. 2017). Provincial policymakers need to develop inclusive strategies to strengthen the resilience of "worse-off" secondary cities and other smaller settlements.

"City visions" shape the pathways of urban development. Local governments and national leaders frame visions for cities and face political pressure to demonstrate delivery of inclusivity or sustainability goals, under pressure from the electorate or the international community. Song Do's vision of becoming a world-class eco-city, Udon Thani's drive to become a MICE city, and Nakuru's aspiration to gain city status are also backed by local aspirations and different visions of urban development. All ACCCRN cities implement a common methodology, but solutions are always adapted to local visions and interests (Sharma et al. 2013). Our findings in Surat echo those of Chu (2016), in that local embeddedness and existing coalitions between the political and entrepreneurial classes played a key role in fostering partnerships.

5.4 Barriers

This section sets out the political and financial constraints faced by emerging cities, based on our case study data. The multiplicity of actors in the urban arena and their competing interests and discursive struggles can hinder political action. Political conflicts and institutional inertia were found to be significant barriers to climate experiments (Bai et al. 2010). We found that insufficient institutional coordination and political will in governments were the main barriers in all eight case studies, which reflects the emphasis in the literature on the need to overcome political barriers to achieve successful multi-level governance. Lack of institutional co-ordination and integration impedes holistic action in the case of Surat and Nakuru. In Nakuru, citizen participation in decision-making and service delivery is hindered by a lack of integration between multiple actors. Participants in our workshop indicated that they were unaware of where to report certain issues, coupled with the fact that the response level of duty bearers is minimal. The community members also felt that there was minimal effort from the duty bearers to improve the current situation.

A lack of financial autonomy and resources in secondary cities also hinders action. Many of the cities under consideration in our case studies have not attained universal provision of basic services, which should remain a key priority, as this is an essential element of resilience and equitable development. In the cases of Đông Hà and Udon Thani, a low capacity for planning

Previous experience of disasters is often the main driver of local community action.

urban expansion compounds these political barriers. Conflict over land is also key to the political struggles in Songdo, Saint Bernard and Khulna.

Another barrier to local action in urban areas in many developing country regions is a lack of an integrated policy framework and funds for addressing climate risks and adaptation. Scaling-up small pilot projects requires resources and political support from the national and international community, which is currently lacking in most of the eight case study cities. Even for Manizales, where there is national-level policy support, funds are decreasing due to shifting national priorities.

5.5 Outcomes

Inclusion

We note that the inclusivity outcomes of urban sustainability experiments could be improved by 1) moving towards a collaborative rather than a participative mode of governance and 2) building on local innovation and interests to achieving SDG11.

In case studies where global organizations and enterprises are leading projects, the municipal government is actively involved, and private players are very actively involved, but local communities are not actively involved (see Table 3). Studies have similarly shown that public participation might not fully achieve its purpose in interventions, even though it retains its importance in the rhetorical realm (Harman et al. 2015; Matin et al. 2018; Tuhkanen et al. 2018). Local communities might therefore mistrust the international organizations and suspect TMNs to be a mechanism for framing regional and national policy agendas (Ruszczyk 2019). Therefore, it is of utmost importance that multilateral donors, institutions and TMNs ensure that inclusivity outcomes are improved.

Even in local initiatives, piecemeal approaches to participation might be adopted. Although residents of Nakuru are aware of their role in shaping the development of their community, opportunities to participate in public participation forums are rather limited. Taking account of their views tends to be done as a formality as part of the approval process of the Area Development Plan, especially at the budget approval phase. Participation is largely cosmetic because the outcomes of the consultative processes are not always binding. While Article 37 of Kenya's Constitution and Section 88 of the County Government Act empowers any aggrieved citizen to petition the County Government on any matter under its responsibility, citizens seldom do so either because of a lack of knowledge or mistrust of the system and procedures required to submit petitions.

In Udon Thani, on the other hand, the monthly meeting of the municipality involving all 105 community leaders ensures transparency and direct communication with the city government, and provides opportunities for community leaders to vote on budget allocations and learn of municipal plans and activities, which they can then report to residents in their communities. The meetings also create opportunities for strong networks between communities, on a horizontal scale. Although it can be argued that the meetings are largely consultation exercise on behalf of the municipality, the Udon Thani Charter process is a collaborative exercise amongst a diverse set of stakeholder volunteers.

Despite political constraints, gaps in service provision and limited resources, the local governments of Manizales and Udon Thani have driven collaborative partnerships to gather local innovation and momentum by building a common and holistic goal around sustainable urban development. By tapping into local expertise and the efforts of universities, think tanks, business groups and volunteers, these emerging cities could be the new leaders in driving SDG11 in the South by ensuring poor communities' involvement and provisioning marginalized groups.

Sustainability

As noted earlier, the literature is limited on the long-term environmental impacts of the case studies in question. However, in this section, we chart out a couple of entry-points to help understand the sustainability outcomes of the cases. Urban sustainability experiments have been criticized for a piecemeal approach to sustainability transition, and for not transforming the underlying planning, policy or other systemic issues that need to be transformed (Harman et al. 2015). The resilience strategy for Surat was not fully implemented but they achieved setting up few interventions such as early warning systems. The vision of local actors in Surat led to the creation of institutions that have overcome political inertia. Development of multi-functional, inclusive, and open public spaces, as has happened in Udon Thani and Đông Hà, may have long-term effects in regulating micro-climates, air quality and water retention. Low-cost innovations and adaptations, as seen in Khulna and Saint Bernard, are often sustainable because they involved re-use of available materials and components, for example in designing housing. Operationalizing systematic water and waste treatment management, as has occurred in Nakuru, is an essential component of building self-sufficient and sustainable cities.

In the case of Songdo, the sustainability outcomes of projects are contradictory and unclear. This is supported by the literature: smart, green developments are found to lack a clearly defined framework and indicators for monitoring sustainability (Castán Broto 2017; Colding et al. 2018). While mainstreaming information and communications technology solutions for the management of urban service provisions, careful planning is required to minimize the increasing energy needs of these very solutions (Colding et al. 2018; Kaika 2017; Watson 2014). The solutions should also be grounded in local realities (Collier et al. 2013), taking account of, for example, the long-term impacts of land reclamation and impact on local livelihoods.

6. Conclusions

Our case studies encompassed a range of sustainability and environmental challenges, from climate change to provision of water and sanitation. In those cities where action was led by local government actors or other "top-level" stakeholders, a strategy document or vision for the city had been developed, for example Surat's City Resilience Strategy or Udon Thani's Charter, serving to frame the issue at hand and provide indicators for monitoring. However, such documents are less likely to exist when the driving actors are local households or community groups. Having a common vision for a city is a prerequisite for a sustainable transition (Corfee-Morlot et al. 2011). This raises the question of the extent to which environmental governance in cities can be scaled up and sustained when it is driven from the bottom up.

Some of the cases are very recent, and their long-term impacts are not yet documented in the literature. It is clear that urban experiments are transforming the role and nature of urban governance in emerging cities of the Global South. They alter the capacities, access and power of different actors (Halpern et al. 2013; Watson 2014; Datta 2015; Harman et al. 2015), while defining a whole new set of modalities for governing the urban. Newer forms of governance emerge in these types of partnerships, like the PPCC in Songdo, the SCCT in Surat, or City Development Company in Udon Thani, for efficient delivery and cost recovery. Greater intervention is required to balance the sustainability and inclusivity outcomes of these new governance arrangements.

1. **How are actors, financial conditions, drivers, barriers influencing sustainability and inclusivity outcomes of sustainable transitions in some emerging cities of the Global South?**

By considering the various actors involved in each case, the drivers for action, the barriers faced and the outcomes in terms of sustainability and inclusivity, we demonstrate a way of thinking

Urban experiments are transforming the role and nature of urban governance in emerging cities of the Global South.

about urban environmental governance, recognizing that cities are nodes within a national network with certain freedoms but also operating with constraints. Inclusive approaches to urban governance are needed to achieve the aims of SDG11, let alone other sustainability goals, but how these approaches work and how they are operationalized will depend on local contexts.

We found that different types of urban vision can be driven by similar sets of actors: for example, smart cities are typically seen as involving many private sector actors, as in the case of Songdo, however, the case of Surat also demonstrates that achieving a climate resilient city can also be driven and sustained by private sector stakeholders. But in Surat and Songdo, there are limited opportunities for residents to get involved in decision-making, to the extent that residents in Songdo are becoming consumers in a privatized city. In Manizales, involvement of local civil society, local universities, and low-income women as "slope guardians", enables an integrated approach, as envisaged by the city. The level of participation from different types of stakeholders will also determine what sort of sustainability outcomes are achieved.

The cases and the literature review show that cities and national policy frameworks can lack coherence and co-ordination. For example, national emission targets are not broken down to the urban level to activate decentralized goals and responsibilities (Fuhr et al. 2018). Even provincial governments do not take into account the capacities and resources required to deal with climate change at the city level (Sami 2016). Countries may not incentivize effective action at the local level or acknowledge the importance of cities' role in addressing climate risks (Corfee-Morlot et al. 2011). In the same vein, there can also be differences between provincial and local governments over budgetary allocations or other responsibilities (Tuhkanen et al. 2018). Different political parties controlling the provincial and local level can impede development projects (Sami 2016). Finally, there needs to be co-ordination among the relevant government departments, because institutional silos significantly undermine action (Aylett 2015; Pasquini et al. 2015; Matin et al. 2018; Sami 2016). Without integrating relevant sectors, the single-handed efforts of the local environmental departments, which are often poorly resourced, might be inadequate (Gouldson et al. 2016). The power asymmetries and institutionalized hierarchies between different organizations – especially when involving local communities and informal actors – can lead to one-sided outcomes (Castán Broto 2017; Shand 2018) and therefore needs to be addressed at the project design stage. When multiple actors are involved in climate experimentation, devolving tasks can help to avoid conflict. Bai et al. (2010) argue that clearly delineated roles and responsibilities among actors was a key reason for the success of sustainability projects. Similarly, Fuhr et al. (2018) call for "a synergetic division of labour across governmental levels which is also supported by international climate financiers". And the same case could be made when funding sustainability and environmental transitions.

2.   **What are the entry points for secondary cities seeking to adopt more inclusive urban governance to achieve sustainability goals?**

TMNs and global actors could propose context-specific, systemic changes, steering projects away from short-term, standardized, easy-to-get outcomes. They can also help to select partners and consultants with values that align with a defined set of inclusive and sustainable outcomes and with a track record in the local area. They can also ensure that sites are selected fairly, and fund sustainability projects in worse-off secondary cities and other settlements, and that worst-affected populations are consulted at every stage of the process.

National, provincial and local governments should focus on 1) understanding the sustainability interactions of policies and programmes and emphasize interventions with co-benefits, 2) integration of different departments that have an impact on or are responsible for urban environmental issues that significantly interact, for example through regular coordination meetings, 3) mandating public participation in city planning and developing processes for participation, and ensuring this goes beyond consultation on pre-determined

plans, (4) supporting plans, policies, programmes and projects that have positive environmental outcomes alongside promoting economic growth, (5) financing the scaling-up of successful project interventions and bottom-up efforts of communities and households, recognizing the latter as legitimate initiatives in their own right and providing an enabling policy environment to facilitate investments, such as by granting land rights, 6) prioritizing universal service provision and infrastructure management that improves the resilience of the urban poor (which improves both sustainability and inclusivity outcomes). Community members, along with boundary organizations in academia, civil society and the private sector, can lead the way in co-creating their visions of a sustainable, inclusive city and back initiatives that increase local capacity and resilience.

We use a multi-level governance framework in our research, but in doing so several issues should be considered. Multi-level frameworks are mostly framed in a normative manner, based on cases from the North. City governments from Asia, Africa and Latin America may lack the financial resources to activate mechanisms for cooperation (Castán Broto, 2017). The power asymmetries between different organizational actions across and within the formal-informal spectrum might impede action. Policymakers must take active steps to understand and address these imbalances and improve the transparency of their governance mechanisms. There may also be conflicts across different levels and departments of government, when resources are scarce and goals conflict. There may be competition for resources across cities, pitting them against each other for capital investments and infrastructure (Wachsmuth et al., 2016), and how national governments allocate resources may sometimes be determined by how far the political positions of city governments and national governments are aligned.

The self-organization of non-state actors in cities of Asia and Africa should not be treated as a substitute for coordinated government action. The focus of global actors to increase the resilience of communities could potentially incentivize lack of co-ordinated support from the national and regional governments, and global agencies need to rethink the sustainability of their initiatives after they exit. Future research could examine how provincial governments might provide frameworks to support local action and encourage coordination across cities, especially those facing common challenges.

Our paper has provided entry points and considerations for more inclusive approaches to urban environmental governance in secondary cities. It is not a comprehensive review of all such approaches but highlights the need for sustainability and inclusivity goals to be addressed together. It also highlights different governance models in secondary cities can achieve these goals, and the challenges they face. There is a need for more in-depth study of specific cities to better understand their potential to achieve environmental sustainability, and the challenges they face in doing so.

Appendix 1. Vulnerability to climate risks of case-study cities and their policy context

Surat

Surat is a major industrial city that specializes in producing textiles and diamonds, and which houses many business groups and migrant workers. Located on the west coast of India on the banks of the Tapi River and the Arabian Sea, the city is vulnerable to floods, storms, increasing sea level and precipitation. Most of the settlements occupied by labourers are located on riverbeds and creeks (Chu, 2016). A destructive flood in 2006 resulted in a high proportion of labour migrating out of the city, in addition to overall health risks, economic losses and damage. The plague epidemic of 1994 (Chu, 2016) and the 2006 flood (Bahinipati et al. 2017) increased the awareness of the city on environmental and public health issues. Local experience and informal adaptation strategies have made the people of Surat more resilient. Karanth and Archer (2014) estimate that sea level rise of one metre could submerge nearly 40% of the city's land. Despite these risks, an official integrated assessment of losses and damages is yet to be conducted in the city (Bahinipati et al., 2017). Surat is one of the 20 cities selected for the first round of implementation of the Smart City mission of the government of India. Although India launched the National Action Plan on Climate Change in 2008, political authority is decentralized and climate and urban planning rests with individual state governments.

Songdo

The city of Songdo was built on a landfill on the reclaimed wetlands of the Yellow Sea in the Incheon Province in the north-west of South Korea. The idea of building an international business district (IBD) specializing in international trade and commerce in Incheon was conceived as early as 1998 in a presidential campaign and strengthened in an era of co-operation between South Korea and China. The development of the city aligned with the President's vision for green growth that aims to reach a synergy between environmental and economic objectives (Shwayri, 2013).

Đông Hà

Đông Hà is the capital of the Quang Tri province. It is a riverside city also located along an economic corridor at an intersection of National Road 1 A and the Trans-Asian Road, an ideal location for international trade in the Mekong Region. The city is also susceptible to flooding. Increasing severity of flood and drought events are expected in the region as a result of climate change. The provincial and local government recognizes climate change as an issue, but the local master plan does not take into account climate considerations and lacks safeguards. Areas which were highly susceptible to flood risks have been allowed to be developed for real estate development. National policies do not focus on the development of Đông Hà, but the Quang Tri province defines its role in the overall settlement system and its socio-economic development plan (ADB, 2015).

Nakuru

Nakuru is Kenya's fourth largest town and the headquarters to the Nakuru County Government. It was also the only town in East Africa chosen for piloting of Localizing of Agenda 21, leading to preparation of the Nakuru Strategic Structure Plan in early 2000. The town has a functional municipal board in line with the Urban Areas and Cities Act (UACA). High population growth has not only compromised the living environment but also created demand for basic services such as housing, water and sanitation. The town is facing severe water, sanitation and solid waste management challenges, including blocking of drains by solid waste, which has led to flooding and health hazards. The national government has several pieces of legislation in place for environmental and waste management, such as the Environmental Sanitation and Hygiene Policy (KESHP) (2016–2030), Environmental Sanitation and Hygiene Strategic Framework (KESSF)

(2016–2030) and the Urban Sanitation Guidelines (draft) (2019). The national government enables devolved governance through the County Integrated Development Plan (CIDP), which is premised on Part XI of County Government Act of 2012.

Udon Thani

Udon Thani in Thailand is a small city of 130,000 residents undergoing rapid development in part because of its strategic location near the Lao border. Udon Thani is exposed to both flooding and drought. It is heavily reliant on one reservoir for its water supply. The city administration is fostering a "sports city" approach and aiming to achieve a vision to be a green city and a MICE city by 2029, as per the Udon Charter. This entails focusing on green transport, green energy, green industry and green infrastructure, as well as urban revitalization.

Manizales

This city in Colombia was an early adopter and leader of climate action among emerging cities of the Global South, starting as early as 1990s. The city was founded in 1849 on top of a mountain ridge and, in 1905, became the capital city of the Department of Caldas. The city expanded from a plateau region into steep slopes that were not zoned for development – now accounting for 507 km^2 and covering differentiated ecological zones, mostly in tropical rainforest regions. Due to its location, the city (and the country) is exposed to a high rate of disasters. Intense precipitation causing landslides, erosion, and sometimes flooding add to the risks of volcanic eruptions, earthquakes, and man-made pressures on ecosystems. Colombia has a strong awareness of climate risks and has integrated a National Adaptation Plan with its National Development Plan. It also has environmental legislation that supports disaster risk reduction systems and adaptation actions (Hardoy and Velásquez Barrero, 2014). The Ministry of Environment and Sustainable Development (MADS), the National Environmental System (SINA), and the Disaster Risk Management Unit at the federal level and the Corpocaldas at the regional level, are the government authorities responsible for natural resource management and managing climate change priorities.

Saint Bernard

Saint Bernard is in an eastern rural region of the Visayas in Philippines. Agriculture and fisheries are the main livelihoods in the city. Due to the frequency of disasters in the region the government had signaled a shift in priorities from disaster response to reduction through the Medium-Term Development Plan (2004–2010) and the Strategic National Action Plan for Disaster Risk Reduction (2009–2019). The National Disaster Coordinating Committee (NDCC) with an emphasis on local disaster mitigation, preparedness, rehabilitation and response, both pre- and post- disaster, showcases the presence of a strong leadership and increasingly proactive policy responses. At the time of the disaster, however, a comprehensive national framework for managing disaster risks was largely absent. Local governments had constrained capacity and resources to provide comprehensive relief. A landslide hit the Saint Bernard city on 2006, following an earthquake. Of 30 baranguays, eight were affected by this disaster. The landslide collapsed settlements and led to leaking of mud, water and volcanic rocks from the slope, affecting 18,862 residents. The case study focuses on the Guinsaungon settlement, which was one of the communities worst hit by the disaster (Co, 2010). The municipality provided evacuation centres housed in schools. Overcrowding at the centres led to deteriorating health conditions and shortage of drinking water, electricity, sanitation and drainage facilities in the schools.

Khulna

Bangladesh is known to be highly susceptible to climate risks such as flooding and cyclones. Khulna is a city in the southwestern coastal region of the country on the banks of the Rupsha and Bhairab rivers. It is prone to floods, storms, fresh-water shortages, salinity intrusion,

riverbank erosion and heatwaves. Industrial expansion, water pollution and lack of drainage facilities compound the climate-related risks. The vulnerability of informal settlements to disasters is worsened by poverty, lack of assets, loss of livelihoods, precarious living conditions in hazardous areas, risk of evictions, food and water insecurity and associated health problems. Waterlogging as a result of inadequate drainage is a regular occurrence in the study site. There is a lack of national policy response to respond to the needs of the increasing urban population in Bangladesh. The 1999 National Housing Policy, the National Adaptation Programme of Action (NAPA) (GoB, 2005) and the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) do not take into account the concerns of the urban poor (Roy et al. 2012). The Khulna City Corporation (KCC) largely focuses on providing post-disaster relief.

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