POLICY BRIEF

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Tracking Climate Actions for Climate Compatible Development in Cities

Shobhakar Dhakal, Ashish Shrestha, Shaleen Singhal, Susie Moloney, Philip Vaughter, Rotchanatch Darnsawasdi, Sohee Minsun Kim, Chanathip Pharino, Eko Haryono

Highlights

- Asia-Pacific cities are embarking on climate actions with various policies and plans in recent years, however, in many cases these policies and plans are without clear quantifiable city wide targets.
- Climate actions in Asia-Pacific cities are generally happening on a piecemeal basis and are fragmented at the project level across sectors. The overall achievements made by cities are thus difficult to quantify and to ascertain.
- Barriers for implementation of cities' actions within the region are multiple. Cities must evaluate their own resources, institutional capacity, linkages with provincial, regional and national levels of government, and must develop and implement trackable indicators and frameworks for climate action.

Climate Compatible Development in Cities

In recent years, the onus of climate action(s) have shifted towards cities, and the roles of climate actions at the city level are increasingly recognised. Following the Paris Agreement coming into force on 4 November 2016, bottom-up initiatives, such as those at the city level, are expected to receive further attention. Climate change mitigation can attenuate future climate risks, however climate change

adaptation is widely recognised as a vital component to reduce vulnerabilities in cities. A balanced approach to mitigate greenhouse gas (GHG) emissions from cities, as well as implementing effective adaptation plans will help to ensure low emission and resilient futures. The concept of Climate Compatible Development of Cities is defined here as an urban development pattern which (a) emits less GHGs/mitigates more emissions, (b) enhances carbon sinks, (c) builds resilience by reducing vulnerability and adapting to the impacts of climate change, and (d) reduces mitigation and adaptation burdens outside of the city boundaries. Climate compatible development in cities can only be realised if mitigation and adaptation strategies are far-reaching and are successfully implemented and measured.

Different city sectors are often viewed as silos, however, a comprehensive understanding of feedbacks between mitigation, adaptation, and resilience is necessary for true climate compatible development. Tools to track such development pathways are essential moving forward. From a technical perspective, tracking climate change mitigation in cities is straightforward and commitments, targets, as well as progress in sectoral mitigation are steadily being documented in scientific publications. Fewer cities[1] in the world have engaged with assessing adaptation policies and practices through an indicator-based approach. Climate adaptation policies and practices in cities are often reactive to immediate climate threats but prudent and contextualized approaches are needed for planning, implementing, and assessing these climate actions (Brooks et al., 2011). The UNFCCC (2010) identifies indicators to monitor and evaluate projects and programs, as well as policies, strategies, and plans. Developing and using indicators is relatively easier for projects, as opposed to programs and policies, which require multi-sectoral coordination. Although, there has been some progress in monitoring and evaluating adaptation projects using indicators, progress has been lacking in monitoring and evaluating adaptation policies and programs. A lack of measurable targets or clearly defined expected outcomes to evaluate effectiveness of policies and programs is the major reason behind this (UNFCCC, 2010). Different cities have different sector-wise priorities for climate actions based on the cities' vulnerability to different climate risks and nature of mitigation opportunities. Cities in many of the developing countries in the Asia-Pacific region are more vulnerable to impacts from climate change due to inadequate infrastructure, extensive poverty, comparative lack of urban planning, as well as inadequate adaptation planning and implementation at the city-level. On the one hand, mitigation strategies are not the principal priorities in these cities while on the other hand the global urbanisation trend shows that Asia and Africa are the rapidly urbanising regions and there are greater risks of irreversible carbon lock-in with business as usual urban development in these regions (Unruh, 2002; Unruh and Carrillo-Hermosilla, 2006). Cities will also need long term mitigation policies embedded within their urban development plans, as well as adequate adaptation policies and practices, as maladaptation is still predominant in a developing cities context.

Climate Actions in Selected Cities in the Asia-Pacific Region

In 2017, 2.1 billion urban residents or 60% of the world's urban population were in the Asia- Pacific region. It is expected that the Asia-Pacific region will become predominantly urban from 2018 with two thirds of the region's population expected to live in cities by 2050 (UN-ESCAP, 2017). In 2014, 17 out of 28 global megacities (cities with a population of 10 million or more) were in the Asia-Pacific region. Although growth rates of megacities, which accommodate only 10% of the region's total population, is declining; there is rapid growth of small and medium sized cities where much of the urban transformation is unfolding. Most of the urban residents (54.4 %) live in smaller cities with a population of less than

[1] Refer to examples of German Strategy for the Adaptation to Climate Change (DAS) (Umweltbundesamt, 2015, 2010) and adaptation-related indicators in the UK (Miller et al., 2012)

500,000 inhabitants. (UN-ESCAP, 2017). As there are new emerging cities and existing cities are undergoing redevelopment, renewal and retrofitting in Asia-Pacific, there is great opportunity to introduce and integrate the latest climate compatible development approaches and techniques across several sectors such as infrastructure and services; as newer built environment is being created or upgraded.

Apart from being the hub of economic growth for these societies, cities are also a predominant source of environmental problems for the region, including issues related to clean water and sanitation, poor health, inadequate transport, and energy access. Under business as usual (BAU) scenarios, the Asia-Pacific region's emissions from energy are projected to double from 2007 to 2030, making the region liable for 45 % of global energy-related emissions by 2030, compared to 31% in 2007 (ADB, 2011). Incentivising energy efficiency in cities' GHG mitigation policies can greatly contribute in reducing this number.

Adaptation strategies in different Asia-Pacific countries are often planned at the national level with overall strategies to mainstream climate change policies in development sectors such as forest resources, agriculture, water resources, coastal and fisheries resources, infrastructure, and health sectors. These adaptation strategies are formulated on their Second National Communications and National Adaptation Program for Action[2]. However, much of the implementation for climate change policies will occur at the city level, and city level adaptation plans have been developed only in a few cities in the region. This research examines such policies and plans in several Asia-Pacific cities namely: Melbourne (Australia), Bangkok (Thailand), Hatyai (Thailand), Delhi (India), and Yogyakarta (Indonesia) and compares the status of climate actions in the following section.

[2] Refer to "Submitted National Communications from Non-Annex I Parties", http://unfccc.int/national_reports/non-annex_i_natcom/items/10124.php

Table 1: Synthesis of progress in climate actions in selected cities

Cities[3]	Climate Concern	Emission Reduction Target	Climate Actions
Melbourne	• Victoria's average temperature has risen by 0.8°C since the 1950s, resulting in a higher frequency of severe heat waves. • Melbourne's 2013 GHG emission was 5,994kt CO_2 eq. • It is projected that by 2030 warming in Victoria is likely to range from a 0.6°C to 1.2°C increase from 1990 temperatures and by 2070 a 0.9°C to 3.8°C increase from 1990 temperatures. • Experienced a record-breaking 13-year drought and the annual inflow to Melbourne's dams dropped by almost 40%. • Runoff into waterways is projected to decrease between 5 to 45% by 2030 and between 5 to 50% by 2070. • Experienced its highest summer rainfall on record in 2010/2011, leading to major flooding that affected a third of the state. • The risk of forest fires is high, and fires have released 70 million tonnes of CO_2 eq. (around 6% of the state's total emissions) over a period between 2000 and 2009. • Also by 2070, drought frequency is projected to increase between 10 and 80%. • More frequent extreme weather events are predicted; a current one-in-100-year extreme storm surge could occur every five years by 2070.	• National target to reduce emissions by 26-28% of 2005 levels by 2030. • Victorian state target of 15-20% (from 2005 levels) by 2020.	• National level includes - the National Climate Resilience and Adaptation Strategy 2015, which aims to provide national support for local government adaptation by providing scientific data, technical information and guidance. • State of Victoria implementing the Climate Change Framework, Climate Change Act 2017 and Climate Change Adaptation Plan 2017-2020. Includes GHG reduction target; 25% renewables by 2020 and 40% by 2025; energy efficiency measures and mainstreaming climate change into government policy. • The City of Melbourne (CBD/inner municipality) has an ambitious target to become a carbon neutral city by 2020[4]. • The metropolitan area's urban strategies include Plan Melbourne Metropolitan Strategy 2016, 100 Resilient Cities 2016, and the 30 year infrastructure review 2016. Most of the metropolitan councils (32) have climate action plans to reduce emissions, but few councils have adaptation policies. • Case study of local government monitoring and evaluating initiative: The Western Alliance for Greenhouse Action (WAGA), a partnership of eight councils across Melbourne's Western Region has developed a framework to monitor and evaluate progress on their regional adaptation strategy (Climate Change Adaptation Strategy: 2013-2020) and action plans, following their Climate Change Adaptation Risk Assessment in 2011. Actions focus on seven areas: business and continuity and service delivery; infrastructure and assets; water management; governance and regulation of planning and building;

[3] Data is based on synthesis of information from project workshop on "Framework and Indicators for Climate Compatible Urban Development", ProSPER.Net Inter-University Collaborative workshop, 6-7 June 2016, Bangkok, Thailand.

[4] Refer to, "Zero Net Emissions by 2020": http://www.melbourne.vic.gov.au/SiteCollectionDocuments/zero-net-emissions-update-2014.pdf

			emergency management; regional mobility and regional economy all of which relate to identified priority risks facing councils. WAGA has also developed the 'Low Carbon West Strategy for a Transition to a Low Carbon Economy' with 20 priority actions focusing on four areas: urban growth and development; communities; transporting people and freight; and business and industry. Actions include creating bulk buy schemes for solar PV; facilitate energy efficiency in commercial and industry sectors; advocate for large scale renewable energy generation; establish formal car share scheme; implement organic waste scheme, establish a waste to energy facility.
Bangkok	• Being a regionally important coastal city, Bangkok is facing challenges with environmental pollution and management, flood risks, and heat waves. Flooding is a major concern in Bangkok. During the 2011 flood, the mean annual rainfall peaked at a 24% increase over average rainfall. • Over recent decades, temperatures have increased relative to long-term averages. From 1991 to 2000, maximum average temperatures of Bangkok in the summer months were found to be significantly higher than the long-term average, and lowest temperatures in the winter months were also warmer than the long-term average for these months. • The relative sea level rise in Bangkok is 1-2cm per year. The Chao Phraya River basin, the major water supply source of Bangkok, has been affected by climate change with increased flooding and sea water intrusion[5] (Ligaray et al., 2015; Wongsa, 2015) . • An urban heat island effect is also common in Bangkok resulting in increasing usage of air conditioning for buildings, adding to energy consumption, and in turn, GHG emissions.	• The total GHG emissions for the city in 2007 was around 42.65 million t CO_2 eq. and was projected to reach 48.69 million t CO_2 eq. by 2012 under a BAU scenario. The total targeted reduction of CO_2 for 2012 was 9.75 million t CO_2 eq., and of this, 72% was achieved (BMA, 2012).	• Bangkok Metropolitan Administration (BMA) and Japan International Cooperation Agency (JICA) initiated a study in 2012 to prepare the Bangkok Master Plan on Climate Change 2013 – 2023, to develop Bangkok as a sustainable low carbon and climate resilient metropolis. • Engaged in a number of activities, including capacity development for the implementation of the master plan, The Low Carbon Bangkok City Project in 2013 is targeting locations such as office buildings, schools, universities to improve building energy efficiency (Dhakal and Shrestha, 2016). • New Bangkok master plan aims to expand the scope of BMA activities to focus on adaptation and mitigation plans by partnering with different governance levels, as well as other public and private sectors, and establishing monitoring, evaluation, measurement, report and verification mechanisms.

[5] Refer to: https://www.reuters.com/article/us-thailand-drought-water/hit-by-drought-and-seawater-bangkok-tap-water-may-run-out-in-a-month-idUSKCN0PH00920150707

Hatyai	• As an important commercial hub in southern Thailand, Hatyai is also vulnerable to floods. The great floods in 2011 and 2010 and a devastating flood in 2000 badly affected the city. Especially in 2010, 80% of the city was inundated and flood water reached up to 3.5 metres high. It caused more than $320 million USD worth of damage.[6] • City faced frequent flashfloods, and more severe flood events due to climate change, exacerbated by modern farming and the city's unplanned urbanisation. Hatyai continues to remain vulnerable to future flood disaster (Tanavud et al., 2004). • City administration realised that flood prevention was not enough. As 80% of the city is potentially flooded during extreme rains, in addition to preventive measures its focus has shifted to learning how to live with floods by minimising flood damage[6] (IMT-GT, 2015).	• No comprehensive city wide targets.	• Hatyai municipality has been promoting renewable biodiesel production from used oil from food producers, initiatives to reduce energy consumption and provide bonuses for energy savings, and waste to energy projects to generate electricity of 6MW from 250 tonnes of water per day. • Large investments in flood prevention: floodwalls, levees, drainage systems, and six large water diversion canals. • City established Floods Working Group with representatives from the city administration, local communities, the business sector, academia, and NGOs. City also established the Climate Change Resilience Learning Centre for coordination and education, working with capacity building of local communities, government agencies, and other stakeholders.[6] • City has adopted various disaster preparedness programmes for flood risk reduction, including an early warning system, which includes installation of surveillance cameras to primarily monitor traffic but also floods, and local programmes to cope with flooding in Utaphao River Basin. • Hat Yai has become a model for flood resilience in Thailand as one of ten core cities in the Asian Cities Climate Change Resilience Network (ACCCRN). • Few other campaigns include promotion of energy-efficiency in buildings, sustainable consumption and increase in coverage of public transportation (IMT-GT, 2015).
Delhi	• Delhi has been observing a warming trend since the 1990s, as well as an urban heat island effect, urban flooding, and water security issues, all of which are major concerns. • The most vulnerable sectors are public health, energy, water, transport, agriculture, forestry, and biodiversity.	• No comprehensive city wide targets.	• Government of India had issued the National Action Plan on Climate Change (NAPCC) with the aim to facilitate India's commitment to reduce the national energy intensity by 25% by 2020 compared to 2005 levels (Singhal et al., 2009), which was followed by the Indian states preparing State Action Plans on Climate Change (SAPCCs) in 2009. The NAPCC defines eight

[6] Refer to: http://wwf.panda.org/wwf_news/?256130/Hat-Yai-resilience

	• Total GHG emissions of Delhi in 2009-2010 was 25.82MT CO_2 eq., while per capita emissions were 1.44T CO_2 eq.		critical areas called *National Missions*: Solar, Enhanced Energy Efficiency, Sustainable Habitat, Water, Sustaining the Himalayan Ecosystem, Green India, Sustainable Agriculture, and Strategic Knowledge for Climate Change. • Delhi prepared a State Action Plan on Climate Change (SAPCC) in 2009. The Climate Change Agenda for Delhi 2009-12 by the Government of the NCT of Delhi put forth 65 action items identified across all sectors with specific targets that the Government intended to undertake. The key sectors identified are water, forests, buildings, waste, energy, lighting, transportation and renewables. The SAPCC is yet to be fully implemented [7].
Yogyakarta	• Yogyakarta has experienced rising temperatures, changing rainfall patterns, and flooding, together with natural disasters such as volcanic eruptions. • The total GHG emissions of the city in 2012 was 666,361.87T CO_2 eq., with per capita emissions of 1.26t CO_2 eq. Control of Dengue fever is also one of the city's major challenges[8].	• No comprehensive city wide targets.	• Mitigation activities are mainly focused on agriculture and forestry (as 26% of the city is forest land), energy, and waste. Initiatives such as use of livestock waste for biogas and compost, forest planning, development of urban forests, and the promotion of LED lamps and solar panels for households is in practice. • The city has also adopted many initiatives in the transport sector such as monitoring air quality and vehicular emissions (including monitoring air quality in indoor parking spaces in shopping malls and hotels), prioritising the use of bike transit, smart driving training, and the use of LEDs for street lights[9]. Similarly, waste management and the replacement of plastic bags are prioritised.

[7] Refer to: http://envfor.nic.in/ccd-sapcc
[8] Refer to: http://www.paklim.org/index.php/about/climate-change-strategies-in-cities/strategy-in-yogyakarta.html
[9] Refer to: http://www.paklim.org/index.php/about/climate-change-strategies-in-cities.html

What is Needed?

Asia-Pacific cities, in different climates, geographies, economies, and stages of development are in different stages of implementing climate actions. Evidence shows that actions are not always comprehensive and well-coordinated across sectors and time, nor do they equally address mitigation and adaptation strategies. A more holistic vision for climate compatible development is necessary across the region. First, cities need an overarching framework on how climate change can be streamlined into development planning. Based on the above, mentioned in *Table 1*, when it comes to the tracking of progress in adaptation strategies, most of the cities are not proactive, while adaptation plans are relatively new in most of the other cities of the Asia-Pacific region. Mitigation tracking is relatively easier with GHG reductions, yet city wide tracking is weak and tracking of out-boundary GHG implications largely does not exist. One key limitation is also a lack of measurable indicators to quantify adaptation and a lack of a common framework defining the data requirements to create comparable benchmarks. The nature of adaptation makes it particularly challenging for monitoring and evaluation using standard approaches (e.g. via individual, quantitative, outcome-based indicators).

Mitigation and adaptation are the key elements of building climate compatible cities which can be enhanced through building local, regional, national, and institutional commitment, as well as technical and scientific capacity. Cities also need to evaluate their own institutional capacity, from local government and municipalities at the city level to central government at the national level as it is essential to develop and implement trackable indicators and frameworks for climate action. In most of the cities where adaptation plans are being implemented and where new plans are being developed, tracking adaptation together with mitigation can help keep track of the city's progress towards a resilient and low carbon future.

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