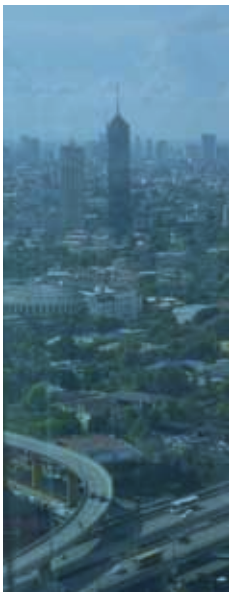


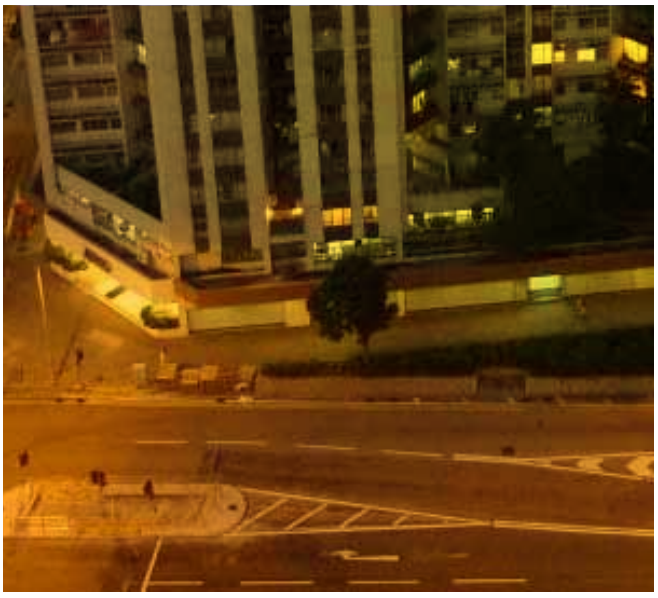





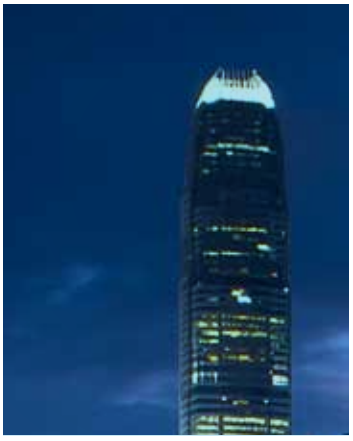


CLIMATE CHANGE PLANS AND INFRASTRUCTURE IN ASIAN CITIES

A Survey of Plans and Priorities

CLEAN AIR INITIATIVE for Asian Cities

Cities Development Initiative for Asia

CAI-Asia and CDIA June 2012.
"Climate Change and Infrastructure in Asian Cities".
Pasig City, Philippines.

Disclaimer

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Acknowledgements

This study was a partnership between CAI-Asia and CDIA and with financial support from CDIA and GIZ.

About CAI-Asia www.cleanairinitiative.org

CAI-Asia promotes better air quality and livable cities by translating knowledge to policies and actions that reduce air pollution and greenhouse gas emissions from transport, energy and other sectors.

CAI-Asia was established as the premier air quality network for Asia by the Asian Development Bank, World Bank and USAID in 2001, and operates since 2007 as an independent non-profit organization. CAI-Asia has offices in Manila, Beijing and Delhi, networks in eight Asian countries (China, India, Indonesia, Nepal, Pakistan, Philippines, Sri Lanka, and Vietnam) and is a UN recognized partnership of 230 organizations in Asia and worldwide.

CAI-Asia uses knowledge and partnerships to enable Asia's 2500 cities and national governments understand the problems, identify solutions and implement these effectively. Our four programs are: Air Quality & Climate Change, Low Emissions Urban Development, Clean Fuels and Vehicles, and Green Freight and Logistics. Our flagship event since 2002, the Better Air Quality conference, brings together more than 500 practitioners, policy makers and the private sector.

About CDIA www.cdia.asia

The Cities Development Initiative for Asia (CDIA) is a regional initiative established in 2007 by the Asian Development Bank and the Government of Germany, with additional core funding support of the governments of Sweden, Austria and the Shanghai Municipal Government. The Initiative provides assistance to medium-sized Asian cities to bridge the gap between their development plans and the implementation of their infrastructure investments. CDIA uses a demand driven approach to support the identification and development of urban investment projects in the framework of existing city development plans that emphasize environmental sustainability, pro-poor development, good governance and climate change.

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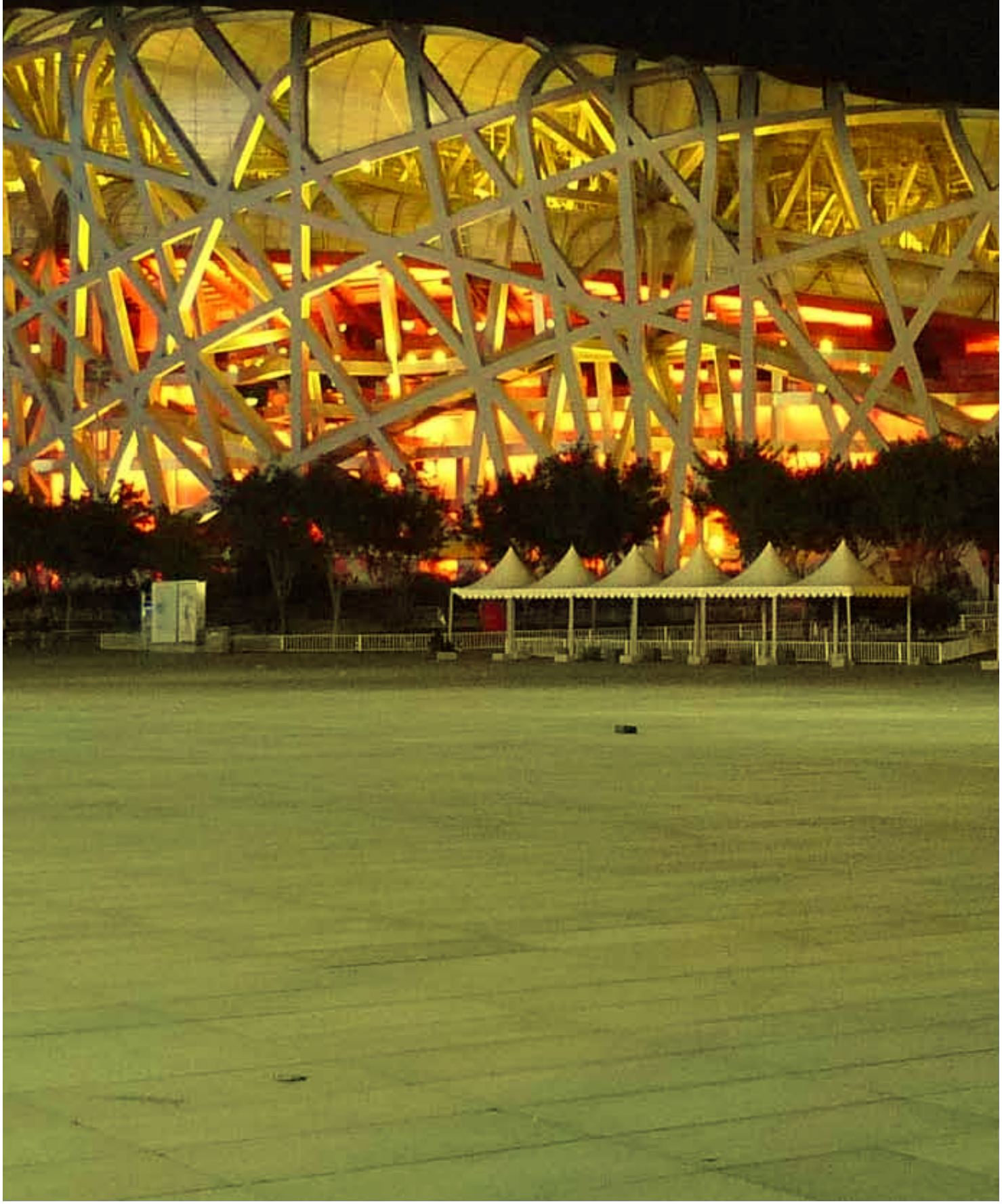
LIST OF ABBREVIATIONS

ACCCRN	Asian Cities Climate Change Resilience Network
ADB	Asian Development Bank
AFD	L'Agence Française de Développement
C40	Cities Climate Leadership Group
CDIA	Cities Development Initiative for Asia
CDM	Clean Development Mechanisms
CNG	Compressed natural gas
CO_2	Carbon dioxide
EGM	Expert Group Meeting
EMI	Earthquake and Megacities Initiative
EST	Environmentally Sustainable Transport
FAR	Floor Area Ratio
GCIF	Global City Indicators Facility
GEN	Global Energy Network for Sustainable Communities
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GRI	Global Reporting Initiative
HCMC	Ho Chi Minh City
HIDS	Ho Chi Minh City Institute for Development Studies
ICLEI	International Council for Local Environmental Initiatives
ICSC	Sustainable Cities International
IDFC	India Development Finance Corporation
IFIs	International Financial Institutions
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau
KOICA	Korea International Cooperation Agency
LAMAs	Locally Appropriate Mitigation Actions
NAMAs	Nationally Appropriate Mitigation Actions
NDRC	National Development and Reform Commission
NIES	National Institute for Environmental Studies
NMT	Non-motorized transport
PFS	Pre-Feasibility Study
RACE	Rapid Assessment of City Emissions
SIDA	Swedish International Development Cooperation Agency
TEEMP	Transport Emissions Evaluation Models for Projects
UN	United Nations
UNCRD	United Nations Centre for Regional Development
UNFCCC	United Nations Framework Convention on Climate Change

EXECUTIVE SUMMARY



The Clean Air Initiative for Asian Cities (CAI-Asia) supported by the Cities Development Initiative for Asia (CDIA) and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), conducted a survey focusing on the following three main questions:

- Is climate change given priority in policies, plans and investments of Asian cities?
- Where does the focus lie in relation to climate change mitigation and adaptation?
- Are there already infrastructure investments made or planned in relation to climate change?

The objectives of the survey of Asian cities are to determine:

- The status of climate change and other relevant plans for Asian cities and their focus on climate change adaptation versus mitigation
- Where demand for climate change related infrastructure projects exists based on these plans
- The role of development agencies and other development partners in prioritizing, planning and investing in urban infrastructure.

The study consisted of surveying the existence of climate change plans for 894 Asian cities and their countries, including a more detailed analysis of other relevant plans for 139 cities. To put these results in a broader perspective, this survey was supplemented with a review of selected other websites and publications and an analysis of priorities of international financial institutions (IFIs) and selected other development partners.

FINDINGS

This report presents the main findings of the study, which are as follows:

1. The development of city climate change plans is at an early stage in Asia. Only 29 of the 894 surveyed cites have climate change plans. Most are from India, P.R. China and Vietnam and were developed only in the past five years. City population size is not the reason for the low number of plans, as also only four Asian capital cities have climate change plans: Bangkok, Delhi, Singapore and Tokyo, while Seoul has made "low carbon" an explicit part of its urban master plan. Even at a global level, only 81 cities were found to have climate change plans, 29 of which are in Asia. However, as already 48% (19) of C40 Cities Climate Leadership Group (C40) cities have such plans, this is an indication that more cities will follow suit in coming years.

2. Of the 29 climate change plans analyzed, 36% focused on adaptation and mitigation, 36% on mitigation only and 28% on adaptation only. External assistance is a key factor of influence on the existence of plans and their scope. The Asian Cities Climate Change Resilience Network (ACCCRN) covers 9 of the surveyed cities and is adaptation focused, and the Low Carbon Pilot of P.R. China's National Development Reform Commission includes 8 of the surveyed plans and is mitigation focused.

3. The analysis of climate change plans by sectors relevant to infrastructure investments found that 79% include energy supply and distribution followed by buildings and water services (59%), planning and urban land use (48%), transport (48%), flood protection (41%), outdoor lighting (31%), and waste management (24%). All sectors except flood protection are relevant to mitigation and adaptation, and thus it can be expected that future plans will increasingly be covering both.

4. Notably none of the 29 city climate change plans analyzed gave data on financial investments needed to implement the plan or for the infrastructure investments.

5. Eighteen of the 21 Asian countries have National Climate Change Plans. Pakistan's and Myanmar's plans are still in development and North Korea's plan was not found. It is likely that cities use these plans as a starting point to develop their city climate change plans because (a) national climate change plans existed before city climate change plans, with the exception of Bangkok; (b) sector coverage in national plans is about 20% higher per sector than in city plans, except for buildings and outdoor lighting which are more relevant to cities; (c) national socio-economic and sectoral plans are often the basis for plans and policies at the provincial and city level, especially in P.R. China and Vietnam; and (d) national governments control most of the budget going to urban infrastructure thus it pays to align city plans with national plans.

6. Climate change has not yet been mainstreamed in the planning process of various city agencies and organizations responsible for the different sectors. Few other relevant plans for cities mentioned climate change, including socio economic plans, disaster risk management plans, urban development plans, transport master plans, environment,

health and clean air plans, and one energy plan. The most notable finding was that none of the 6 reviewed disaster risk management plans and 19 environment, health and clean air plans mentioned climate change despite an obvious overlap with climate change and potential co-benefits from addressing these issues through joint policies.

7. At the national level the situation is more hopeful. Of the 16 developing Asian countries included in the study, 15 have socio-economic plans and most of these refer to climate change. Half of the countries have disaster risk management plans and all include climate change elements. Only a few have dedicated urban development, transport, clean air and environment and energy plans at the national level, and climate change is covered by some of these plans. National bodies could therefore lead cities in mainstreaming climate change in sector plans and policies.

8. In comparing city and national plans, city climate change plans tend to be more focused on areas that are important to a city (e.g. municipal services, buildings), address broader local issues like traffic congestion and air pollution, and give more attention to visible projects such as energy efficient buildings. National climate change plans are on the other hand more broad sector based, focus more on climate change holistically but are less tailored to cities and thus can be harder to translate to local conditions.

9. International financial institutions (IFIs) and other development partners broadly cover the 16 developing Asian countries, although Bhutan and Myanmar are covered by fewer agencies. Transport and energy sectors are investment priorities of all IFIs but with insufficient detail to understand climate change related infrastructure investments. Interestingly, KfW has provided urban investments, with more than half going towards municipal services and explicit inclusion of planning and urban land use. Only JICA lists flood protection separately as an investment area. Other development partners work around development themes rather than economic sectors.

RECOMMENDATIONS FOR CITIES AND ITS PARTNERS

1. Define the scope of climate change related infrastructure investment

Cities should carefully determine the scope of its infrastructure investments related to climate change mitigation and adaptation because approaching this from a climate change perspective is complex. City and or national governments' long-term aim should take into account promoting sustainable and equitable urban development, leading to improved environmental and living conditions for all in Asian cities. This should cover types of infrastructure that stretch the boundaries of hard and soft infrastructure, mitigation scope, adaptation scope, and the broader city issues and co-benefits that frame the issue of climate change.

2. Consider city and national priorities for climate change related infrastructure based on the survey results in determining the focus of development assistance

The following infrastructure types were identified as priorities for Asian cities, based on the plans analyzed as part of this survey:

- General: capacity building and knowledge, data systems, climate change resilient infrastructure (coastline, housing, materials used), mainstreaming climate change across sectors (and infrastructure requirements for each sector)
- Transport: public transport improvements, non-motorized transport, electric vehicles, and alternative fuels
- Energy: renewable energy, efficient fossil fuel use, green buildings, and energy efficient technologies for e.g. outdoor lighting
- Municipal Services: waste management, sewerage systems, storm water drainage, waste water treatment plants, seasonal water supply, and water conservation
- Planning and Urban Land Use: green space, trees near roads, "eco-city," urban planning for climate resilience
- Flood protection: elevated walkways, coastal and river dikes/embankments and flood plains, and shelters for floods and typhoons.

What development agencies should also consider in combination with the priority infrastructure types is to

- Remove efforts from areas where existing consultancies can cover this
- Prioritize areas where development agencies can add the best value to cities
- Consider cities that have had to deal with a disaster, as they are more likely to want to change something in their cities
- Prioritize cities that have funding available or can access funds for infrastructure investments.

3. Consider the broader context of national policy and institutional frameworks relevant to cities and involve national governments

Having more direct relationships with and involvement of national governments in development partners' work is critical for its success in helping cities with improving climate change related infrastructures, for several reasons.

First of all, city governments have the greatest ability to reduce emissions and maximize climate change resilience from municipal services. Water services, waste management and flood protection were therefore frequently mentioned in city plans. However municipal services only account for a fraction of a city's GHG emissions. Of greater impact on long-term emissions and adaptation potential are urban planning and land use and transport systems, but these are often not within a city government's control alone.

Secondly, the vast majority of loans from IFIs are channeled through national government rather than given to city governments directly. Even climate change financing mechanisms, whether Clean Development Mechanisms (CDM) or the newly developed Nationally Appropriate Mitigation Actions (NAMAs), are under the control of national governments. Thus, it would be desirable to have local NAMAs or LAMAs to cater for city needs.

4. Seek to influence IFI focus on climate change infrastructure

It is recommended that cities and stakeholder organizations working with cities also engages with IFIs to

- Help IFIs expand their infrastructure portfolio related to climate change with those that are important to cities
- Support IFIs in maximizing mitigation and adaptation benefits of infrastructure projects by identifying and where possible quantifying these benefits as part of pre-feasibility analyses.
- Engage IFIs to how climate change is integrated in their feasibility analyses, financing/loan preparations, and monitoring and evaluation.

5. Broaden funding sources for urban infrastructure investments, including co-financing

These can include private sector institutions, especially private banks with a high public profile and an interest in green investment and carbon financing. Other sources of co-financing could also be considered, most notably funds with a climate change focus (e.g. Clean Technology Fund, Global Environment Facility), and UNFCCC mechanisms (CDM and NAMAs).

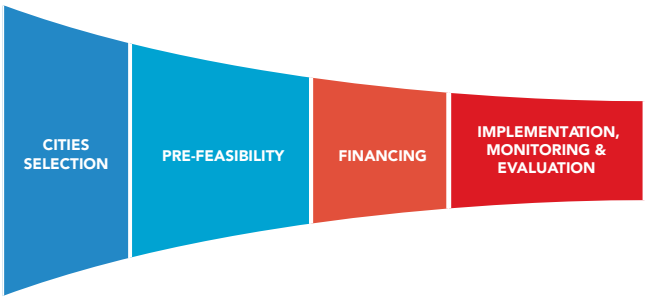
6. Foster stronger collaboration with development partners, city networks/initiatives, NGOs, research institutes, universities

Development partners operate within a broader context as illustrated.

It is recommended that development partners engage in a "Sequential Partnership" starting from the assessment of city plan/strategies, issues and priorities, via pre-feasibility and feasibility analyses of infrastructures, through to financing, implementation and monitoring and evaluation.

Under this framework, different development partners will take a lead to

- Assess the status of climate change and other relevant plans and policies, and infrastructure priorities
- Assess the potential for CO2 reduction through the application of tools. Several organizations will also have tools that can assess other city aspects relevant to climate change
- Inform where demand for pre-feasibility exists (= pre-selection of cities) and raise awareness of cities through partners' communication channels
- Work with local organizations and collect data relevant to pre-feasibility and feasibility analyses, plus facilitate cross-sectoral coordination
- Secure interest from IFIs and other financiers after pre-feasibility analyses



Proposed Sequential Partnership

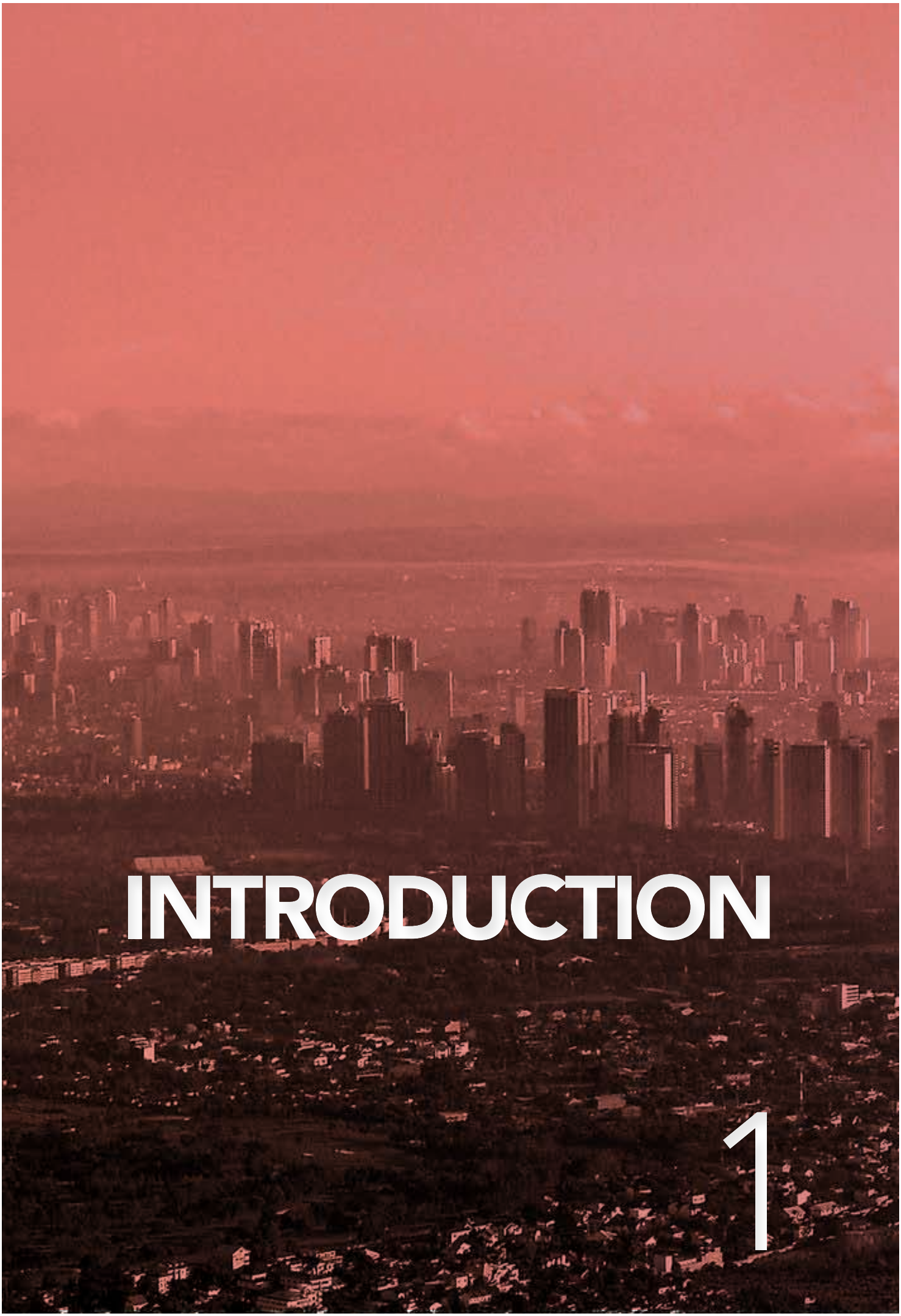
7. Establish a collaborative partnership to develop a climate change plan blue print

The key issues with the current state of climate change plans are that they are at a very early stage of development, plans are inconsistent among cities and have a different focus on adaptation and mitigation, and there is a lack of mainstreaming of climate change in other city and national plans.

This blue print would provide a:

- Common scope for mitigation and adaptation, consideration of co-benefits and city development issues
- Menu of contents, possibly with supplements for city types / climate change issues

This blueprint could be developed along the same lines as the Global Reporting Initiative (GRI) and also on the GHG Protocol Initiative, which seeks to make sustainability reporting by all organizations as routine as, and comparable to, financial reporting.



INTRODUCTION

1

The Clean Air Initiative for Asian Cities (CAI-Asia) supported by the Cities Development Initiative for Asia (CDIA) and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) conducted a survey focusing on the following three main questions:

- Is climate change given priority in policies, plans and investments of Asian cities?
- Where does the focus lie in relation to climate change mitigation and adaptation?
- Are there already infrastructure investments made or planned in relation to climate change?

The objectives of this baseline survey are to determine:

- The status of climate change and other relevant plans for Asian cities and their focus on climate change adaptation versus mitigation
- Where demand for climate change related infrastructure projects exists based on these plans
- The role of development agencies and other development partners in prioritizing, planning and investing in urban infrastructure.

The following activities were undertaken:

1. **Selection of cities.** A long list of 894 Asian cities was drafted for a baseline study based on (a) location in East Asia, South Asia and Southeast Asia (b) cities with populations from 250,000 to mega cities with over 10 million population size (c) high expected urban growth and vulnerability to climate change (d) priority cities for development partners and agencies e.g. ADB and World Bank and part of existing city networks and initiatives.

2. **Conduct baseline survey of climate change plans and other relevant plans** for 894 selected cities and their countries through a desktop research following a standard questionnaire template, and contacting selected government agencies and city networks and initiatives.

3. **Review of selected other websites and publications** to put this the baseline survey in a broader perspective, including a C40 baseline study on climate actions, the Global Carbon Project and the Urban and Regional Carbon Management Initiative, the World Bank Urban Development Series on Climate Change and Cities, and ADB's brochures on Green, Competitive, and Inclusive Cities.

4. **Analyzing priorities of international financial institutions (IFIs) and selected development partners,** including country presence, sector priorities, and sector investments. Websites and annual reports were analyzed for ADB, Agence Française de Développement (AFD), GIZ, Japan International Cooperation Agency (JICA), Korea International Cooperation Agency (KOICA), Kreditanstalt für Wiederaufbau (KfW), Swedish International Development Cooperation Agency (Sida), Rockefeller Foundation, UN Habitat, and World Bank.

5. **Report writing** including

- Chapter 2 provides an analysis of current climate change plans of Asian cities as well as other city plans that relate to climate change.
- Chapter 3 provides a similar analysis of national plans because these have an influence on cities.
- Chapter 4 gives a comparison of development partners' strategies.
- Chapter 5 presents main conclusions drawn out from the study.
- Chapter 6 lists recommendations for cities and its development partners.

Box 1. Baseline Survey

City Information:

- Country, population size, and location in a coastal area
- Membership or association with city networks or initiatives to anticipate potential partnerships between CDIA and the city networks and other city initiatives

City Plans:

- Existence of city plans including Climate Change, Socio Economic, Disaster Risk Management, Urban Development, Transport, Environment/ Health/ Clean Air, and Energy
- Reference of each plan to climate change was assessed: general, mitigation and adaptation
- Title, time period, issuing/implementing authority and source

Climate Change Plans were analyzed in more detail on areas covered and whether infrastructure investments were explicitly identified for each. The categorization of infrastructure was based mainly on the C40 Cities' baseline of climate actions (see Annex C for details), supplemented with flood protection which was not covered by the C40 study but important from an adaptation perspective :[1]

- Transport: personal transport (pedestrian/walking, cycling, motorized vehicles), public transport (buses, rails, ferries) and transport to/from city (freight, rails, ports, ferries, airports)
- Energy
  - Buildings: Public and private residential, municipally owned buildings, commercial and new buildings. For buildings different infrastructure investments are Retrofit, Renewable heat generation, Switching to low carbon fuels, Renewable electricity generation, Green electricity
  - Energy Supply: energy inside and outside city, transmission and distribution
  - Outdoor Lighting: public and private streetlights, traffic lights
- Municipal Services
  - Waste Management: residential, non-residential and landfill
  - Water: supply and consumption, wastewater and storm water management
- Planning and Urban Land Use: urban planning, city greening and biodiversity, and new buildings
- Flood protection from seas (embankments/dikes, beach sand replenishment, mangroves plantation), rivers (embankments/levies/dikes, polders, canalization), storms (detention basins, retention ponds, infiltration infrastructure, reforesting) [2, 3]

The survey initially intended to also analyze (a) investment expenditure on new construction and extension of existing infrastructure, including reconstruction, renewal and major repairs of infrastructure (b) maintenance expenditure for keeping infrastructure in working order[4]. However, too little information was found in existing climate change and related plans, and a more in depth study would be required to attempt to obtain this data from other sources.

[1] C40 and Arup. 2011.
[2] Wikipedia. Last updated 2011
[3] Gomes Miguez, M. and Canedo de Magalhães, L.P. 2010.
[4] International Transport Forum. 2010

Box 2. Climate Change [5]

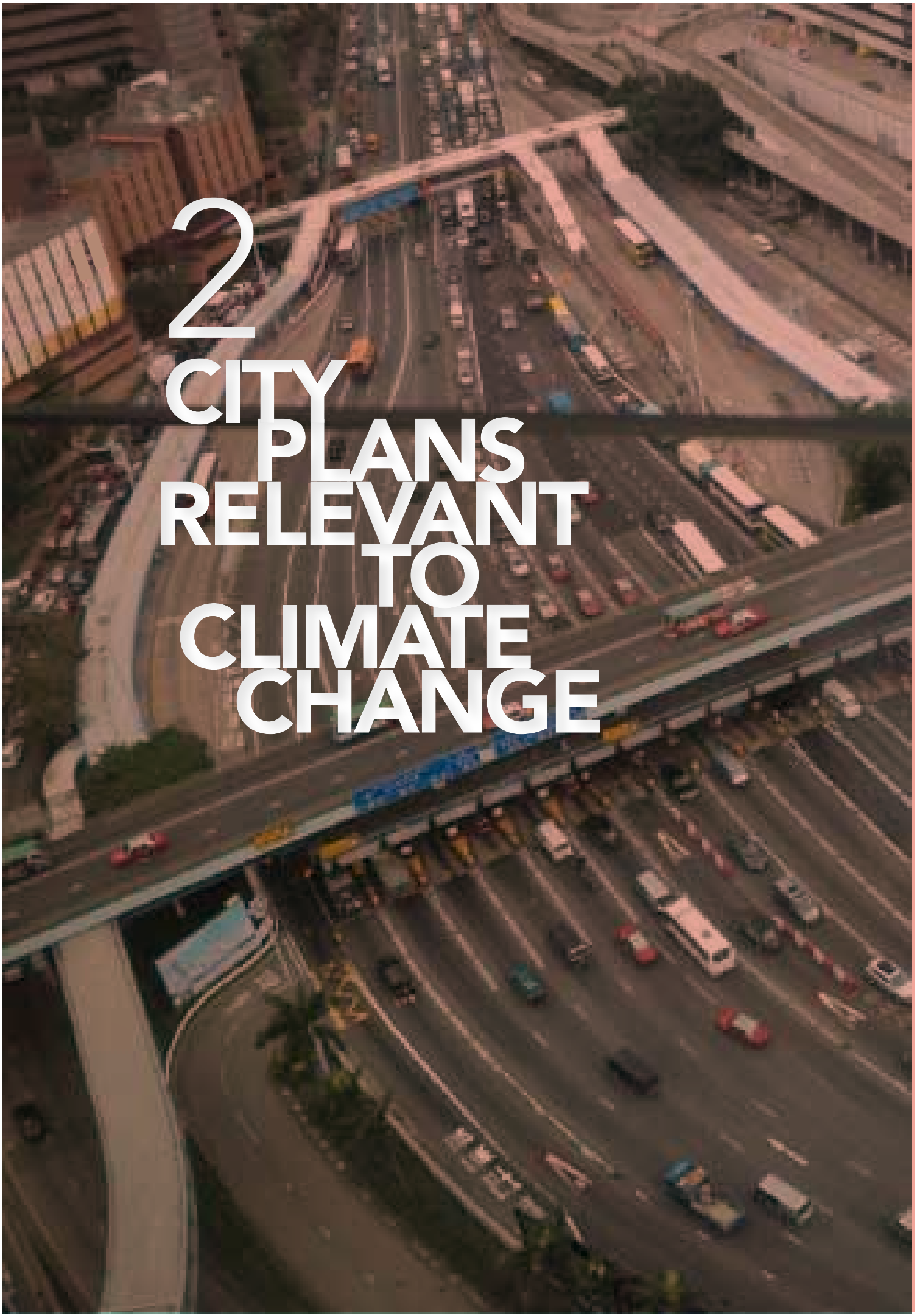
The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as the "change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."

Climate change has induced warmer global temperatures leading to sea level rise, increase of extreme weather events i.e. inland floods, storms, heat waves, and the spread of diseases. Thousands of people died and billions of dollars spent in relation to storm-related disasters in Asia. These events will only increase as climate variability amplifies.

Cities are especially vulnerable to climate change impacts. As stated in ADB's Cities and Climate Change: An Urgent Agenda, 15 of the world's 20 megacities susceptible to flooding and coastal surges. Traditionally, cities were built near the coasts or rivers. Their geographic location makes them vulnerable to flooding from sea and river level rises. The coastal cities of Kolkata, Shanghai, and Guangzhou and the riverside cities of Delhi, Tokyo, and Kuala Lumpur are extremely sensitive to sea and river level rise-related hazards respectively. Aside from geographic location, other factors such as large populations, immobile structures i.e. buildings, roads, and railways; and pressure to provide continual basic urban services i.e. transport and road infrastructure, housing, livelihoods and health services have compounded climate change vulnerability. If not climate change resilient, these structures will become enormous liabilities.

Fortunately, cities are financial, knowledge, technical, and institutional centers. They have influence and interest to advance climate protection. An integrated approach is essential in building city climate resilience against climate change. These include increasing the adaptability of key institutions, infrastructure, and urban services together with streamlining the efficiency of transport and energy systems for emission reduction. Urban development, mitigation, and adaption measures must go hand-in-hand for a comprehensive city climate change strategy.

[5] References: http://www.ipcc.ch/ipccreports/tar/wg1/518.htm, http://www.unhabitat.org/content.asp?d=10192&catid=550&typeid=24&subMenuId=0, http:www.unep.org/urban_environment/issues/climate_change.asp and ADB. Cities and Climate Change: An Urgent Agenda



2 CITY PLANS RELEVANT TO CLIMATE CHANGE

CITIES INCLUDED IN SURVEY

a. Location

The baseline survey was conducted for 894 cities from 21 Asian countries, of which 57 (41%) are coastal cities.

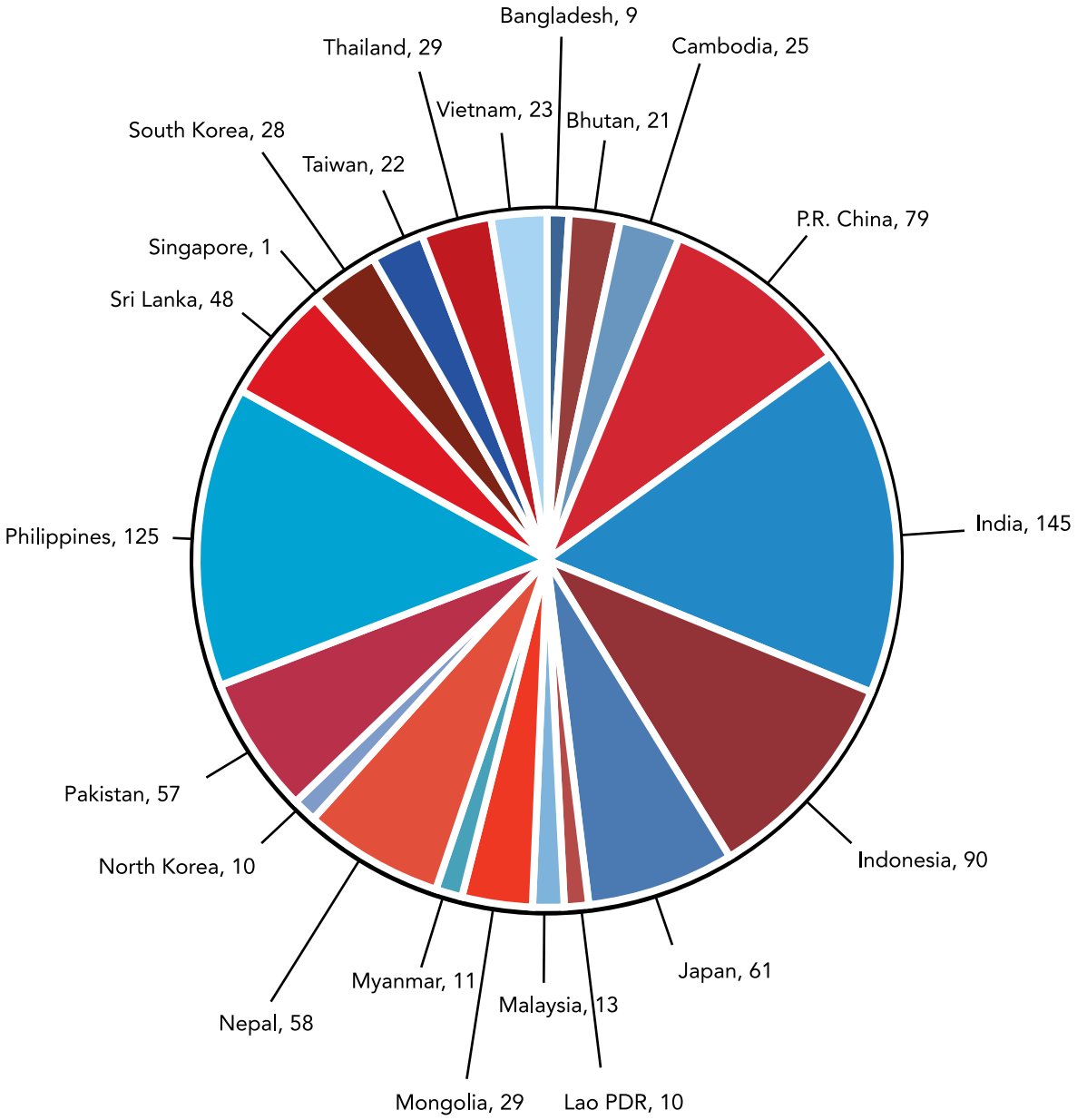


Figure 1. *Number of cities per country for the 894 cities*

b. Population

Out of the 894 cities, 684 (77%) fall within the population range of 250,000-1million.

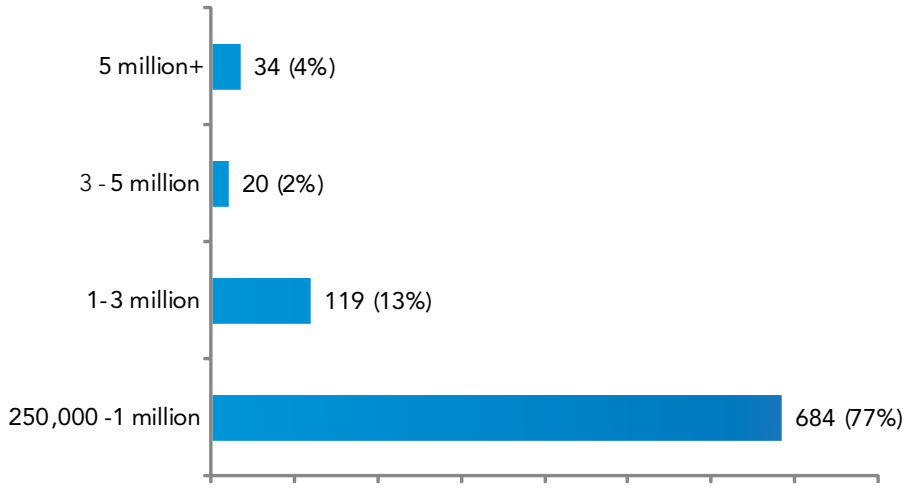


Figure 2. *Population size of 894 Asian cities*

c. City Networks and Initiatives

A total of 293 out of 894 surveyed cities are member of existing city networks and initiatives, which is important to know because several of these networks and initiatives focus on climate change and related areas. Moreover, if cities are already part of these then this may provide a good entry point for development agencies to raise awareness of cities about it's services. The highest number of cities participate in CDIA initiatives, followed by CityNet and United Nations Center for Regional Development (UNCRD). It is also noted that 52 cities are member of multiple city networks or initiatives.

Figure 4 shows that Philippines (46) and India (42) had the most number of cities which are members of city networks and initiatives.

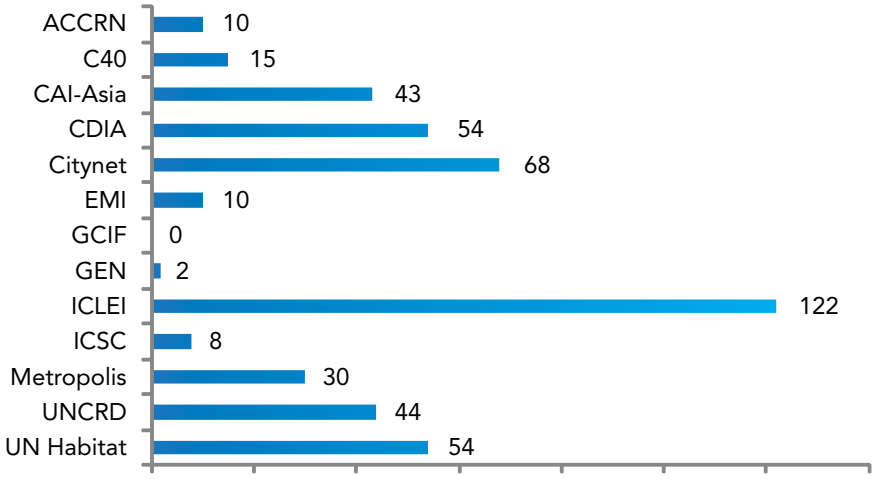


Figure 3. *Participation of 894 Asian cities in city networks and initiatives*

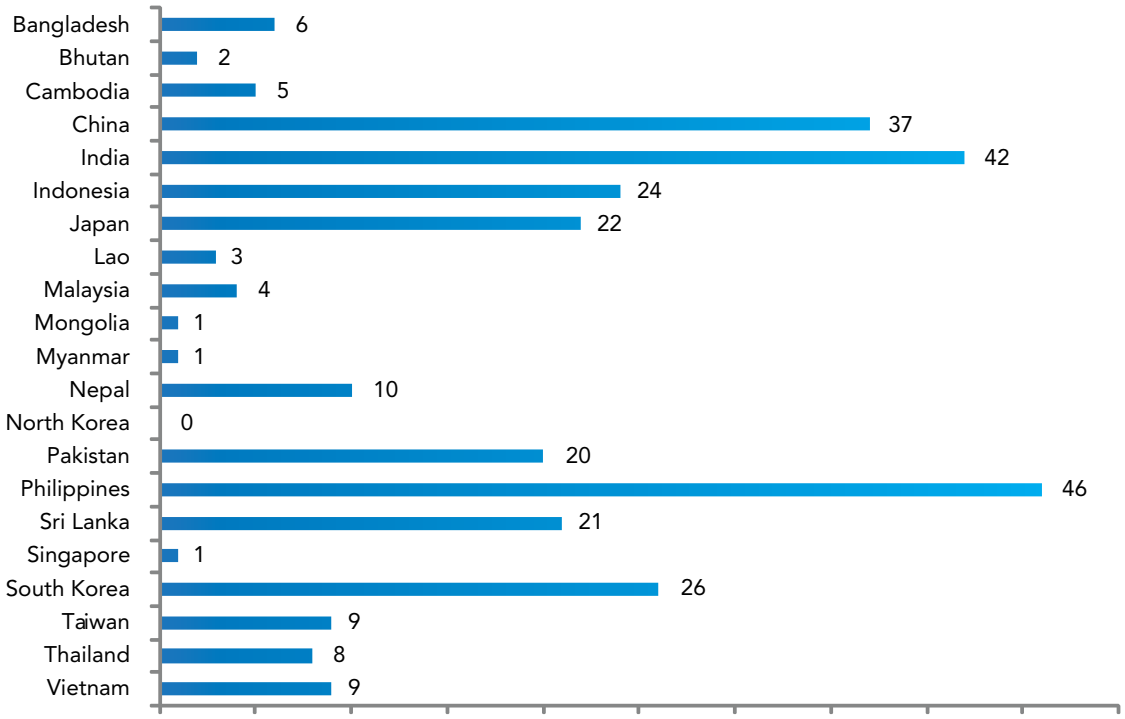


Figure 4. *Overview of country with city networks and initiatives from the 894 cities*

EXISTENCE OF CITY CLIMATE CHANGE PLANS

Climate change plans, although often referred to under different names, were found for only 3% (29) of the 894 cities surveyed. These include 8 cities in India (Ahmedabad, Assam, Chennai, Delhi, Gorakhpur, Indore, Orissa, Surat), 2 cities in Indonesia (Bandar Lampung, Semarang), 2 cities in Japan (Tokyo, Yokohama), 8 cities in P.R. China (Baoding, Chongqing, Guiyang, Hangzhou, Nanchang Shenzhen, Tianjin, Xiamen), Singapore, Seoul in South Korea, 3 cities in Thailand (Bangkok, Chiang Rai, Hat Yai), and 4 cities in Vietnam (Can Tho, Danang, Ho Chi Minh, Qui Nhon).

It is surprising that even most capital cities in Asia currently do not have dedicated climate change plans with the exception of Bangkok, Delhi, Singapore, and Tokyo, while Seoul has made "low carbon" an explicit part of its urban master plan.

To put this in a global perspective, 19 (48%) of the C40 Cities Climate Leadership Group (C40) have climate change plans. In total there appear to be at least 81 cities worldwide with climate change plans, of which 29 are in Asia.

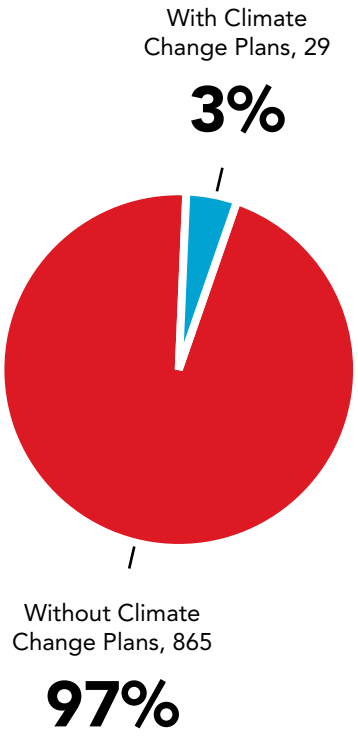


Figure 5. *Existence of Climate Change Plans in Asia*

ANALYSIS OF CITY CLIMATE CHANGE PLANS

The 29 plans of cities found were analyzed in further detail. An overview is given in Table 1.

Figure 7 shows that of the 29 cities with climate change plans, 36% focused on adaptation and mitigation, 36% on mitigation only and 28% on adaptation only. It is noted that this is similar to a World Bank study on climate change policies in 10 cities in developing countries that found a majority of plans with a mitigation focus only or with a larger focus on mitigation than adaptation [6]. Of the 17 coastal cities with climate change plans 5 focus on adaptation only.

However, the current influence of the nature of city climate change plans is more likely driven by climate initiatives that 9 (31%) of the 29 cities have joined. Nine cities developed their climate change plans with support from the City initiatives of the Asian Cities Climate Change Resilience Network (ACCCRN), which is funded by the Rockefeller Foundation and focuses on adaptation.[7] Eight Chinese cities are part of a Low Carbon Pilot of the National Development and Reform Commission, which includes the development of Low Carbon Development Plans and supporting policies, and is mitigation driven. [8] This indicates that the development of climate change plans is at an early stage in Asia and that the scope and content of these plans is to a large degree influenced by the nature of the supporting initiative. Based on a new World Bank Report, "Chinese cities are encouraged to embark on a low-carbon growth path to help reach the country's target for reducing the energy and carbon intensity of its economy, and become more livable, efficient, competitive, and ultimately sustainable."[9] It is noted that 7 cities of the 29 are also ICLEI members thus it can be assumed that developing a climate change plan was inspired partially through that membership.

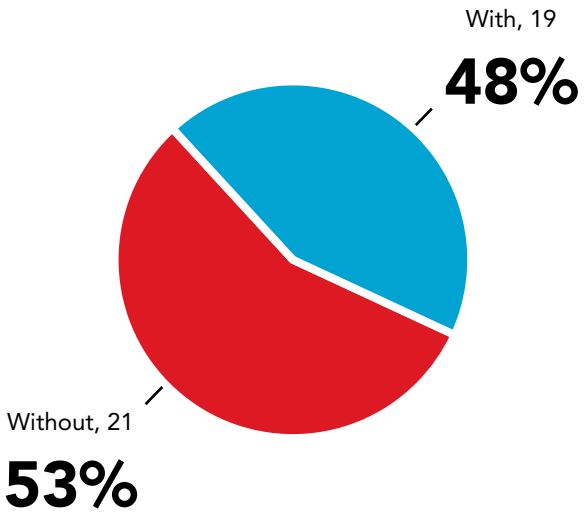


Figure 6. *Existence of Climate Change Plans among C40 cities*

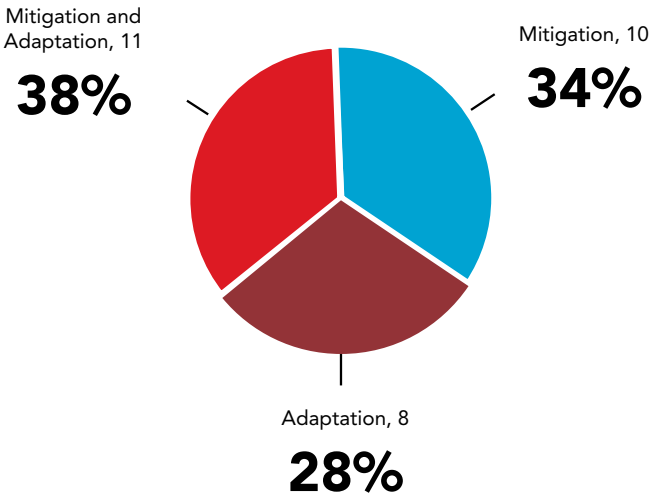


Figure 7. *Scope of Climate Change City Plans of 29 Asian Cities*

[6] Hoornweg, D., et al. 2010.
[7] Nine cities are part of the ACCRN, the two additional cities not included in this survey are Chiang Rai and Hat Yai in Thailand.
[8] Five provinces (Guangdong, Liaoning, Hubei, Shanxi and Yunnan) and eight cities (Tianjin, Chongqing, Shenzhen, Xiamen, Hangzhou, Nanchang, Guiyang and Baoding)
[9] http://documents.worldbank.org/curated/en/2012/02/15879709/sustainable-low-carbon-city-development-china

Table 1. *Details of Climate Change Plans of 29 Asian Cities*

No,	City/ Country	Population (million)	Coastal	Title of Plan	Year	Scope	Support for Plan	Sectors Covered
1	Ahmedabad, India	5.57	No	Low Carbon Society Vision 2035	2009	Mitigation and Adaptation	IIM, KU, NIES, MIRI*	• Transport • Energy (Supply and Distribution and Buildings) • Municipal Services (Waste Management and Water) • Planning and Urban Land Use
2	Assam, India**	31.17	No	Assam's Strategy and Action Plan on Climate Change	2011	Mitigation and Adaptation	Department of Science & Technology, Government of Assam	• Transport • Energy (Supply and Distribution, Buildings and Outdoor Lighting) • Municipal Services (Water) • Planning and Urban, Land Use • Flood Protection
3	Chennai, India	7.54	Yes	Chennai Climate Change Action Plan	2010	Mitigation and adaptation	Not known	• Energy (Supply and Distribution and Buildings) • Municipal Services (Water)
4	Delhi, India	21.59	No	Climate Change Agenda for Delhi 2009-2012	2009	Mitigation and Adaptation	Not known	• Transport, Energy (Supply and Distribution and Buildings), • Municipal Services (Waste Management), • Planning and Urban Land Use
5	Gorakhpur, India	3.77	No	Climate Change Resilience Strategy	2011	Adaptation	ACCCRN	• Transport • Energy (Supply and Distribution and Buildings) • Municipal Services (Water)
6	Indore, India	2.17	No	Climate Change Resilience Strategy	2011	Mitigation and Adaptation	ACCCRN	• Transport • Energy (Supply and Distribution) • Municipal Services (Water) • Planning and Urban Land Use • Flood Protection
7	Orissa, India**	41.95	Yes	Climate Change Action Plan 2010-2015	2010	Mitigation and Adaptation	Rural Research & Development Council	• Transport • Energy (Supply and Distribution) • Municipal Services (Water) • Planning and Urban Land Use • Flood Protection

No,	City/Country	Population (million)	Coastal	Title of Plan	Year	Scope	Support for Plan	Sectors Covered
8	Surat, India	4.16	Yes	Surat City Climate Change Action Plan 2025-2050	2010	Mitigation and Adaptation	ACCCRN	• Transport • Energy (Supply and Distribution and Buildings), • Municipal Services (Water) • Planning and Urban Land Use • Flood Protection
9	Bandar Lampung, Indonesia	0.79	Yes	Climate Change Resilience Strategy	2011	Adaptation	ACCCRN	• Municipal Services (Waste management)
10	Semarang, Indonesia	1.56	Yes	Climate Change Resilience Strategy	2011	Adaptation	ACCCRN	• Municipal Services (Water) • Flood Protection
11	Tokyo, Japan	13.18	Yes	Tokyo Climate Change Strategy – A Basic Policy for the 10-Year Project for a Carbon-Minus Tokyo	2007	Mitigation	Tokyo Metropolitan Government	• Transport, • Energy (Supply and Distribution and Buildings)
12	Yokohama, Japan	3.69	Yes	Yokohama Climate Change Prevention Measure Action Plan	2008	Mitigation	Not known	• Transport, • Energy (Supply and Distribution and Buildings)
13	Baoding, P.R. China	11.19	No	Baoding Low Carbon City Development Plan	2010	Mitigation	NDRC low carbon pilot	• Energy (Supply and Distribution, Buildings and Outdoor Lighting)
14	Chongqing, P.R. China	28.85	No	Chongqing Low Carbon City Development Plan	2010	Mitigation	NDRC low carbon pilot	• Energy (Supply and Distribution, Buildings and Outdoor Lighting)
15	Guiyang, P.R. China	2.15	No	Guiyang Low Carbon City Development Plan	2010	Mitigation	NDRC low carbon pilot	• Energy (Supply and Distribution, Buildings and Outdoor Lighting)
16	Hangzhou, P.R. China	8.7	Yes	Hangzhou Low Carbon City Development Plan	2010	Mitigation	NDRC low carbon pilot	• Energy (Supply and Distribution, Buildings and Outdoor Lighting)
17	Nanchang, P.R. China	2.70	No	Nanchang Low Carbon City Development Plan	2010	Mitigation	NDRC low carbon pilot	• Energy (Supply and Distribution, Buildings and Outdoor Lighting)

No,	City/Country	Population (million)	Coastal	Title of Plan	Year	Scope	Support for Plan	Sectors Covered
18	Shenzhen, P.R. China	8.62	Yes	Shenzhen Low Carbon City Development Plan	2010	Mitigation	NDRC low carbon pilot	• Energy (Supply and Distribution, Buildings and Outdoor Lighting)
19	Tianjin, P.R. China	10.43	Yes	Tianjin Low Carbon City Development Plan	2010	Mitigation	NDRC low carbon pilot	• Energy (Supply and Distribution, Buildings and Outdoor Lighting)
20	Xiamen, P.R. China	2.43	Yes	Xiamen Low Carbon City Development Plan	2010	Mitigation	NDRC low carbon pilot	• Energy (Supply and Distribution, Buildings and Outdoor Lighting)
21	Singapore	3.25	Yes	Singapore's National Climate Change Strategy	2008	Mitigation and Adaptation	Not known	• Transport • Energy (Supply and Distribution, Buildings), • Municipal Services (Waste Management, Water) • Planning and Urban Land Use • Flood Protection
22	Seoul, South Korea	10.46	No	Low Carbon Green Growth Master Plan	2009	Mitigation and Adaptation	Not known	• Transport • Energy (Supply and Distribution) • Municipal Services (Water) • Planning and Urban Land Use
23	Bangkok, Thailand	8.16	Yes	Bangkok 5-year Action Plan for Global Warming Alleviation 2007-2012	2007	Mitigation and Adaptation	Not known	• Transport, • Energy (Supply and Distribution, Buildings), • Municipal Services (Waste management, Water) • Planning and Urban Land Use
24	Chiang Rai, Thailand	0.22	No	Chiang Rai Climate Change Resilience Strategy	2011	Adaptation	ACCCRN	• Municipal Services (Waste management, Water) • Planning and Urban Land Use • Flood Protection
25	Hat Yai, Thailand	0.37	Yes	Hat Yai Climate Change Resilience Strategy	Not known	Adaptation	ACCCRN	• Municipal Services (Waste management, Water) • Planning and Urban Land Use • Flood Protection

No,	City/ Country	Population (million)	Coastal	Title of Plan	Year	Scope	Support for Plan	Sectors Covered
26	Can Thvo, Vietnam	1.19	No	Building Can Tho Climate Change Resilience Activities Plan	2010	Mitigation and Adaptation	Not known	• Municipal Services (Waste management, Water) • Planning and Urban Land Use • Flood Protection
27	Danang, Vietnam	0.89	Yes	Da Nang Climate Change Resilience Action Plan 2011-2020	2011	Adaptation	ACCCRN	• Energy (Supply and Distribution) • Municipal Services (Water) • Planning and Urban Land Use • Flood Protection
28	Ho Chi Minh, Vietnam	7.40	Yes	Action plan for climate change adaptation in 2011-2015	Not known	Adaptation	Not known	• Transport, • Energy (Supply and Distribution), • Municipal Services (Water), • Planning and Urban Land Use • Flood Protection
29	Qui Nhon, Vietnam	0.28	Yes	Climate Change Resilience Action Plan Quy Nhon City	2010	Adaptation	ACCCRN	• Municipal Services (Water), • Flood Protection

* Indian Institute of Management (IIM), Kyoto University, National Institute for Environmental Studies (NIES) and Mizuho Information & Research Institute (MIRI)

** State in India

While few cities have dedicated climate change plans, this does not mean that cities pay no attention to climate change. More cities are likely to have local policies related to climate change. An example is Shanghai, where the Shanghai Municipal Government released multiple climate change policies:

2010: Implementation Opinions for Carrying out State Council Announcement of Ensuring Realising the Carbon Reducing Goal in the 11th Five Years in Shanghai

2010: Key Work Arrangement for Energy-saving, Carbon Reducing, and Climate Change in Shanghai in 2010

2009: Key Work Arrangement for Energy-saving and Carbon Reducing in Shanghai in 2009

2008: Schemes and Methods for Energy Saving Calculation Monitoring and Evaluation

2007: The 11th Five Years Plan of Environmental Protection and Eco-construction of Shanghai

2006: The 11th Five Years Plan of Energy Saving of Shanghai

The analysis of climate change plans by sectors relevant to infrastructure investments (Figure 8) found that 79% include energy supply and distribution followed by buildings and water services (59%), planning and urban land use (48%), transport (48%), flood protection (41%), outdoor lighting (31%), and waste management (24%).

Table 1 shows that the split of sectors between adaptation and mitigation plans is not clear cut. As expected, flood protection and water services typically appears in adaptation or combined adaptation and mitigation plans, whereas plans that only focus on mitigation all include the energy sector. However, exceptions exist, such as Danang's adaptation plan that also covers transport and planning and urban land use. Although only 36% of plans are combined plans, all sectors except flood protection are relevant to both mitigation and adaptation, and thus it can be expected that future plans

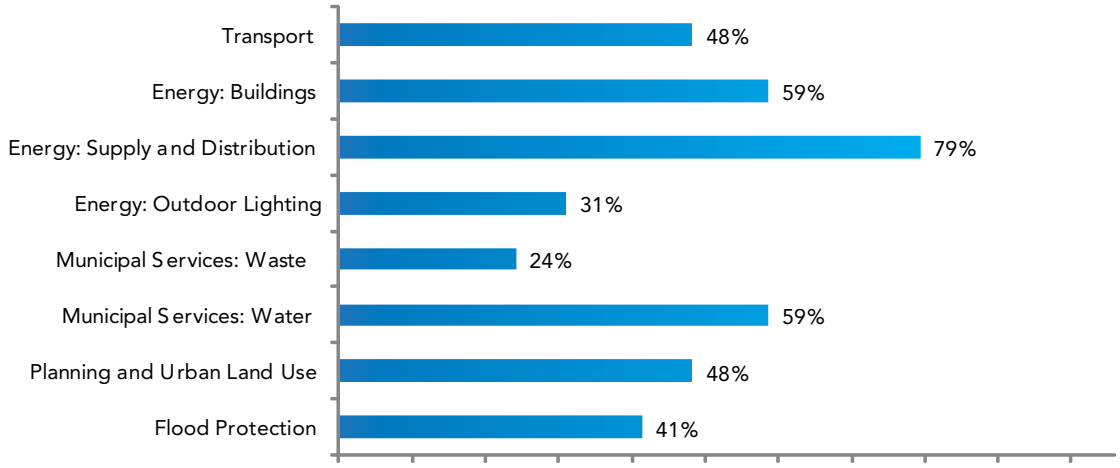


Figure 8. *Relevant Infrastructure Sectors covered by Climate Change Plans of 29 Asian Cities*

will increasingly be covering both. Cities' plans for climate change can also be determined by what motivates them or is urgent to them because of local priorities or political pressure, opportunities for financing, recent disasters or other external pressures.

Notably none of the 29 plans analyzed gave data on financial investments needed to implement the plan or for the infrastructure investments.

An overview of what was covered by the 29 analyzed plans is provided below.

a. General/Cross-cutting

The following initiatives are climate change actions but can be considered as cross-cutting across sectors:

- Capacity-building of government institutions, civil organizations, individuals for climate change management
- Knowledge and research objectives
  - Assessment of climate change impacts
  - Assessment of greenhouse gas (GHG) emissions by conducting a GHG inventory
  - Assessment of vulnerable groups and areas noting their key hazards with the subsequent priority actions and possible funding sources
  - Research on climate change resilient material and infrastructure
  - Online climate database
  - Carbon dioxide (CO_2) reduction targets
- Infrastructure development
  - Construction of climate change resilient infrastructure especially for structures near the coastline, in flood prone areas, and for housing developments.
  - Improve construction requirements and building codes to include climate resilient materials
- Mainstreaming climate change management in national plans, policies, and programs
- Conduct public awareness campaigns on climate change plus inclusion in educational programs
- Technical support for government institutions, civil organizations, and individuals on climate change management
  - Development of early warning systems
  - Development of climate modeling and forecasting

b. Transport

Indian cities and Bangkok's climate change plans covers both public transport and traffic management systems. Most of these focus on mass transit infrastructures and improving road infrastructures:

- Promotion of private and public electric vehicles
- Vehicular emissions management by anti-smoke blenching campaigns
- Encourage fuel switching e.g. conversion to compressed natural gas (CNG) and biofuels
- Establish and implement fuel quality standards
- Encourage non-motorized transport i.e. cycling (increasing bike lanes) and walking (elevating walkways)
- Improve public transport infrastructure by developing monorail/light railway system, electric vehicles, CNG bus

[10] http://www.planningforclimatechange.ca/wwwroot/Docs/Presentations/SE08%20-%20Sheng%20Ying.pdf

transport, and canal transport
- Improve road infrastructure by expanding roads and using climate change resilient material
- Improve traffic management
  - Park-and-ride system and car sharing
  - Creation of no-vehicles areas and/or time-zones

c. Energy

P.R. China's Low Carbon City Development Plans focuses on industrial energy consumption and efficiency. Most of the city plans in India covers renewable energy and electricity consumption. Common examples from other cities include:

- Increase the use of alternative and renewable energy especially solar energy, hydropower, geothermal power, biofuels, and waste
- Collect energy consumption data
- Energy efficiency and conservation especially for power generation and industries
- Reduce the use of coal and other fossil fuels
- Encourage green buildings and homes
  - Create green building guidelines
- Promote low-emitting and energy-efficient technology
  - Use of Light-emitting diodes (LED), compact fluorescent lamps and high pressured sodium lamps
  - Phase out of incandescent light bubs
- City energy management

d. Municipal Services

Water and waste management are common areas of concern included in Indian cities and Bangkok's climate change plan. Building or repairing of sewer systems, storm water and waste water treatment plants are standard infrastructure concerns under these plans:

- Improving natural and artificial water drainage systems
- Solid waste management e.g. increase recycling initiatives
- Climate change integrated water management
  - Increase water use efficiency and conservation
  - Efficient usage of seasonal water supply

e. Planning and Urban Land Use

Green buildings, expansion of park areas and growth of green covers are given the most importance under this sector for Indian cities and Bangkok city climate change plans:

- Increase the city's green areas by having more gardens, parks, mini-forests, and trees near roads
- Better urban land use planning with respect to climate change hazards
  - Create or revise and implement zoning controls
  - Envision an "eco-city" and "low-carbon development"

f. Flood Protection

Vietnam cities are more focused on this sector because most of their city climate change plans include disaster adaptation from typhoons, floods, droughts, and river bank and coastal erosion.

- Improve coastal management
  - Prevent coastal erosion
  - Sea wave protection
  - Tree planting along the coastline
  - Mangrove conservation and rehabilitation
- Flood prevention and protection
  - Assess impacts of flood on urban areas e.g. flood simulation models
  - Create and develop flood and storm shelters
  - Develop and implement flood plain zones
  - Create and develop polder systems e.g. rock-pile shoreline embankments
  - Develop flood control systems
    - Develop urban flooding management system
    - Locally specific flood protection programs
- Water river management by avoiding bank erosion and creating buffer zones

OTHER PLANS RELEVANT TO CLIMATE CHANGE

In addition to dedicated climate change plans, cities may also have included climate change mitigation and adaptation needs in other city plans. In several countries, cities are required to have certain city plans. For example, Indian cities have a Comprehensive Mobility Plan (transport) and City Development Plan (urban development). Likewise, Philippine cities have a Comprehensive Development Plan (socio-economic), and Pakistan cities a Three Year Rolling Plan (health and environment). Cities in P.R. China have a Five-Year-Plan which is essentially a socio-economic plan that is aligned with the national Five-Year-Plan, and supplemented with sectoral plans. In addition, almost all major Chinese cities have an urban development plan, and some have a transport plan, and a disaster risk management plan. Because Chinese cities have legally binding energy efficiency and emission reduction targets, most cities will have an energy plan and a clean air plan. Plans are at various levels of sophistication, and climate change will not be an explicit focus in most of these.

A selection of plans were collected from the cities of developing countries to get an indication as to whether these plans usually refer to climate change or not. Other plans collected were socio economic plans (4), disaster risk management plans (6), urban development plans (23), transport master plan (13), environment, health and clean air plans (19) and energy plan (1).

In general, very few plans mention climate change, which indicates that climate change has not yet been mainstreamed in the planning process of various agencies and organizations responsible for the different sectors.

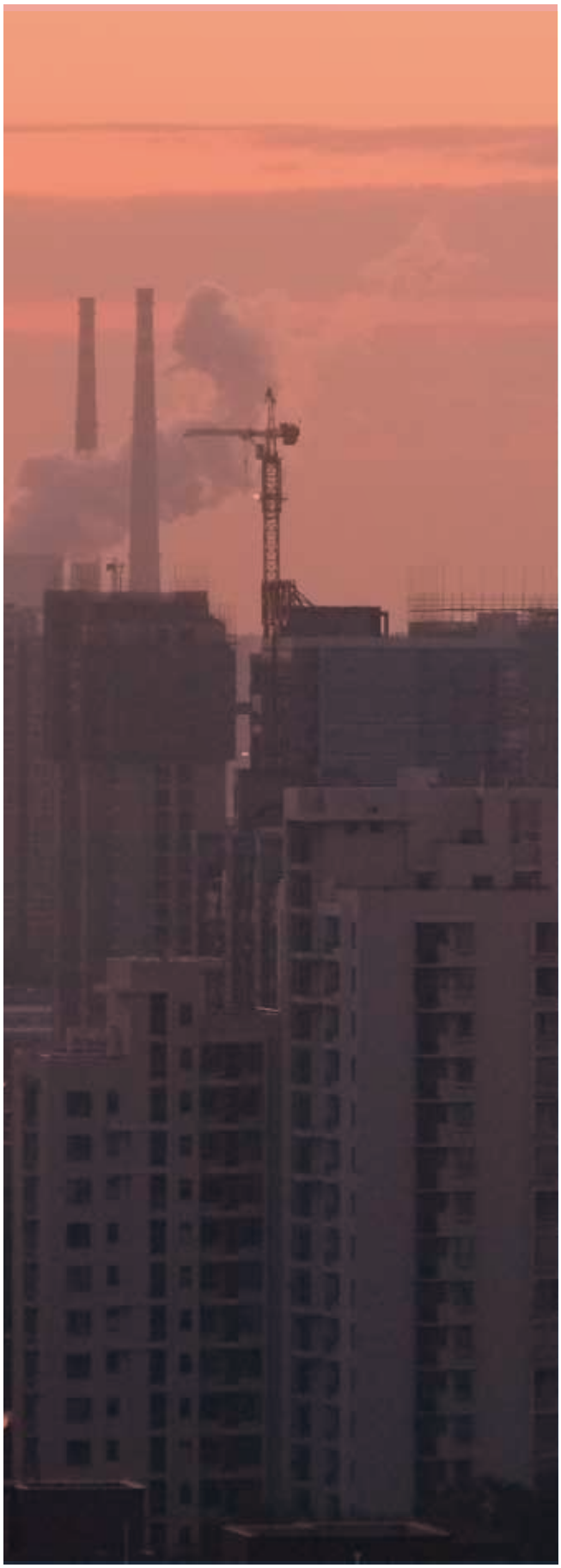


Table 2. *Overview of Other City Plans Found**

No,	City/ Country	Population (million)
Socio Economic	4	• Faisalabad, Pakistan (2006-2011) • General Santos (2005) and Naga (2011-2020), Philippines • Hanoi, Vietnam
Disaster Risk Management	6	• Jamalpur, Bangladesh • Thimpu, Bhutan • Delhi, India (2011) • Kathmandu, Nepal (2005-2006) • Marikina and Naga, Philippines
Urban Development	23	• Rajshahi, Khulna, Chittagong (2008), and Dhaka (2007), Bangladesh • Phnom Penh, Cambodia (2005-2015) • Ahmedabad, Bhubaneshwar, Delhi, Chennai, Gorakhpur, Guwahati (2006), Indore, Kochi (2005-2012), Kolkata, Pimpri (2006-2012), Rachi, Rajkot, Vijayawada, and Visakhapatnam, India • Vientianne, Lao PDR • Sialkot, Pakistan (2011) • Makati^ and San Fernando (2007-2011), Philippines
Transport	13	• Chittagong, Bangladesh • Ahmedabad, Chennai, Guwahati, Kochi, Kolkata (2001-2025), Pimpri, Rachi, Rajkot, Sangli, and Surat, India • Vientianne, Lao PDR • Sialkot, Pakistan (2010)
Environment, Health, Clean Air	19	• Thimpu, Bhutan • Ahmedabad, Delhi, Chennai, Kolkata, and Sangli (2010), India • Bahawalpur, Chiniot, Faisalabad, Gujrat, Islamabad, Jhang, Kasur, Rahim Yar Khan, Sahiwal, Sheikhupura, and Sialkot, Pakistan (2010-2013) • Makati, Philippines • Hanoi, Vietnam
Energy	1	• Delhi, India

* Year of development or timeframe of plan is indicated where available

a. Socio Economic Plans

None of the four plans assessed explicitly mentioned climate change.

b. Disaster Risk Management Plans

None of the six plans found referred to climate change, which is surprising given the expected surge in floods, and extreme weather events as a result of climate change.

c. Urban Development Plans

A total of 25 plans were found and only two cities mention climate change as part of their plans. Surat, India noted climate change as concern stating that "The location of Surat along with risks like floods due to river overflow, local high tide inundation, emergence of flood plain construction along Hazira corridor, vulnerability to further sea level rises, high number of vulnerable communities residing in the slums makes it one of the most vulnerable cities to climate change". While Dhaka, Bangladesh also sees effects of climate change will have a strong impact to its city. "Climate change effects are anticipated to add to such stress with possible adverse impacts on city's population, especially the economically disadvantaged sections of the society." Seoul has made "low carbon" an explicit part of its urban master plan.

d. Transport Master Plans

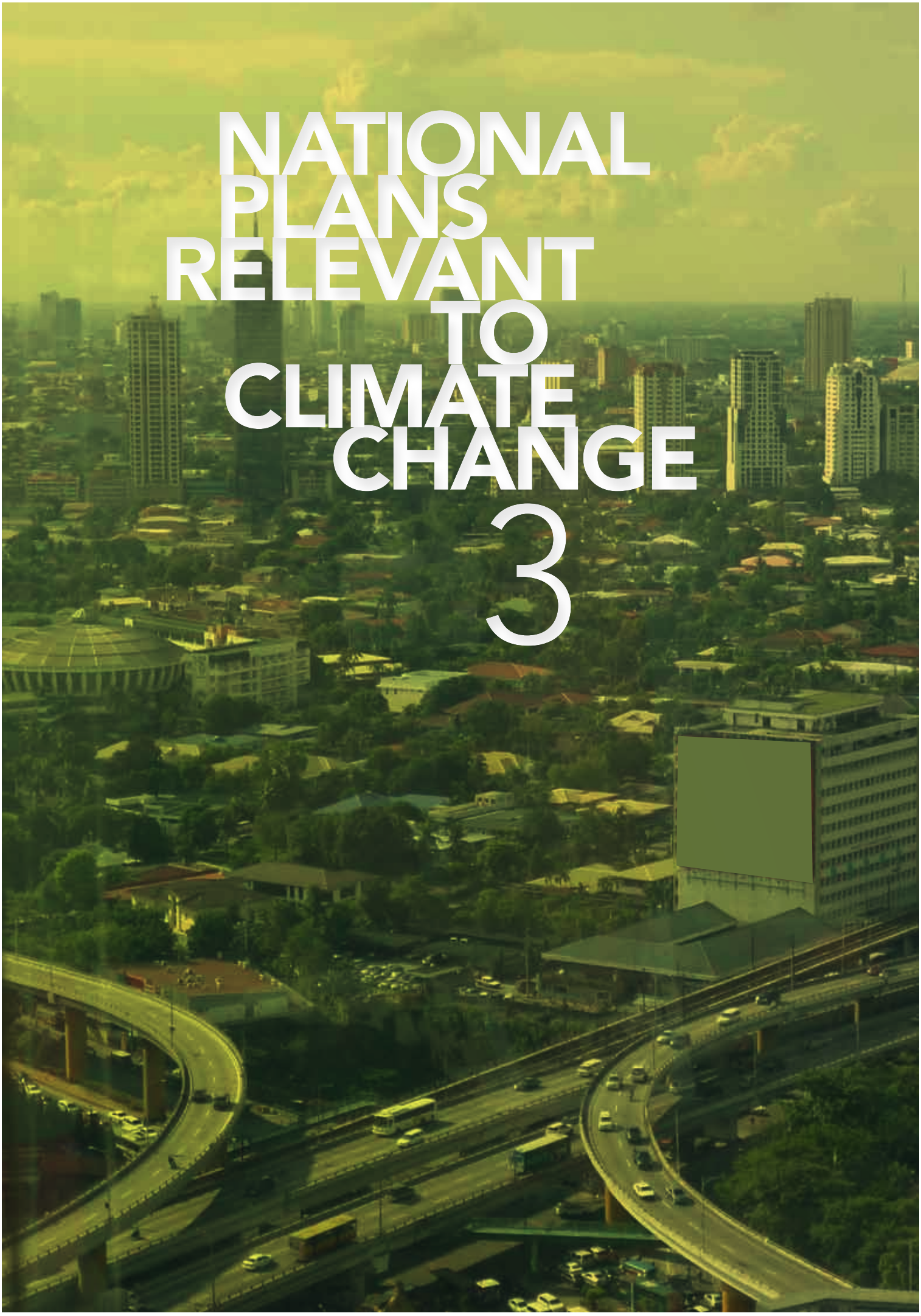
Ten out of the 13 plans mentioned climate change, mostly Indian cities' Comprehensive Mobility Plans under the framework of the National Action Plan for Climate Change for Urban Transport.

e. Environment, Health, and Clean Air Plans

None of the 19 plans specifically mentioned climate change. This is worrying because it is a sign of how climate change has been separated from other environmental issues in plans and related policies. In P.R. China, clean air plans cover emission of SO_2 and NO_2 but not of CO_2.

f. Energy Plans

The only city energy plan found for Delhi did not include climate change. Chinese cities usually have energy plans that cover energy consumption per GDP.



NATIONAL PLANS RELEVANT TO CLIMATE CHANGE

3

EXISTENCE OF NATIONAL PLANS

Eighteen of the 21 developing Asian countries surveyed have a National Climate Change plans, and Pakistan's and Myanmar's plans are still in development and North Korea's plan was not found. Because national climate change plans existed before city climate change plans, with the exception of Bangkok, it is plausible that cities used national plans as a basis. Notably, P.R. China recently issued the 12th Five Year Plan on controlling GHG emissions [11] and Vietnam's Ministry of Natural Resources and Environment (MONRE) has announced in March 2012 the National Climate Change Strategy and Climate Change and Sea Level Rise Scenario for Vietnam [12].

Table 3. *Summary of National Climate Change Plans per Country*

No	Country	Title	Issuing Authority	Year	Scope	Duration
1	Bangladesh	Bangladesh Climate Change Strategy and Action Plan	Ministry of Environment and Forests http://www.sdnbd.org/moef.pdf	2008	Mitigation and Adaptation	2009-2018
2	Bhutan	National Action Plan for Bio Diversity Persistence and Climate Change	Ministry of Agriculture and Forests http://www.moaf.gov.bt/moaf/?wpfb_dl=362	2011	Adaptation	2012-2021
3	Cambodia	National Adaptation Programme of Action to Climate Change	Ministry of Environment http://unfccc.int/resource/docs/napa/khm01.pdf	2006	Adaptation	Not specified
4	P.R. China	National Plan on Addressing Climate Change	National Development and Reform Commission http://www.ccchina.gov.cn/WebSite/CCChina/UpFile/File189.pdf	2007	Mitigation and Adaptation	2010-2020 in development
5	India	National Action Plan on Climate Change	Prime Minister's Council on Climate Change http://pmindia.nic.in/Pg01-52.pdf	2008	Mitigation and Adaptation	Not specified
6	Indonesia	National Action Plan Addressing Climate Change	Ministry of Environment http://www.uncsd2012.org/rio20/content/documents/Indonesia%20National%20Action%20Plan%20Addressing%20Climate%20Change.pdf	2007	Mitigation and Adaptation	2009-2012
7	Lao PDR	National Adaptation Programme of Action to Climate Change	Ministry of Natural Resource and Environment http://www.conference.tgo.or.th/download/2011/workshop/190811/PPT/04_ASEAN.pdf	2009	Adaptation	2010-2020

[11] http://zfs.mep.gov.cn/fg/gwyw/201201/t20120117_222661.htm
[12] http://www.monre.gov.vn/v35/default.aspx?tabid=675&CateID=59&ID=114681&Code=ELSM114681

No	Country	Title	Issuing Authority	Year	Scope	Duration
8	Malaysia	National Climate Change Policy	Ministry of Natural Resources and Environment http://www.scribd.com/doc/37003021/Malaysia-National-Climate-Change-Policy	2009	Mitigation and Adaptation	Not specified
9	Mongolia	National Action Programme on Climate Change	National Climate Change Committee	2000	Mitigation and Adaptation	2000-2015
10	Myanmar	National Adaptation Plan of Action on Climate Change	Not known	in development	Adaptation	Not known
11	Nepal	National Adaptation Programme of Action (NAPA) to Climate Change	Ministry of Environment http://www.napanepal.gov.np/pdf_reports/NAPA_Report.pdf	2010	Adaptation	2010-2012
12	Pakistan	National Climate Change Strategy and Action Plan	Pakistan Environmental Protection Agency, Ministry of National Disaster Management http://www.environment.gov.pk/	Not yet published	Mitigation and Adaptation	2011-2015
13	Philippines	National Climate Change Action Plan (NCCAP)	National climate change commission http://climate.gov.ph/index.php/en/nccap-executive-summary	2011	Mitigation and Adaptation	Not known
14	Sri Lanka	National Climate Change	Ministry of Environment	2010	Adaptation	2011-2016
15	Thailand	National Master Plan on Climate Change	Office of Natural Resources and Environmental Policy and Planning, Ministry of Natural Resources and Environment	2008	Mitigation and Adaptation	2011-2050
16	Vietnam	National Target Program to Respond to Climate Change	Ministry of Natural Resources and Environment	2007	Mitigation and Adaptation	2009-2015

ANALYSIS OF NATIONAL CLIMATE CHANGE PLANS

Fourteen of the 20 National Climate Change Plans cover both mitigation and adaptation measures. It is not surprising that the countries that have climate change adaptation plans only are among the smaller and less developed Asian countries such as Lao PDR and Sri Lanka.

The eighteen available national climate change plans were assessed. The analysis of climate change plans by sectors relevant to infrastructure investments (Figure 10) found that water services (89%) and energy supply and distribution (89%) were the most frequently covered followed by, transport (72%), flood protection(61%) and waste management (61%). Planning and land use (50%) and buildings (44%) were mentioned less,and outdoor lighting was absent, possibly because they are more relevant to cities than to countries as a whole.

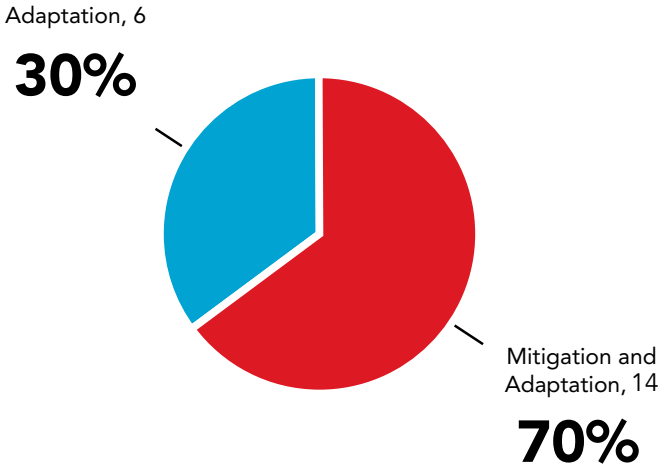


***Figure 9**. Type of Climate Change Plan at the National Level*

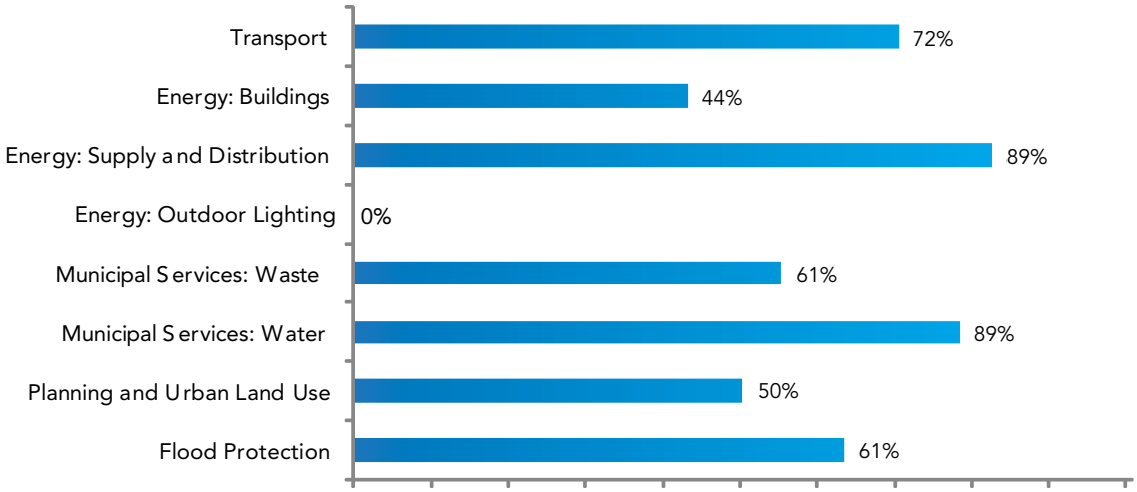


***Figure 10**. Overview of Climate Change Sectors at the National Level*

a. General/Cross-cutting

Several initiatives mentioned in climate change plans are cross-cutting for multiple sectors:

- Capacity-building of government institutions, civil organizations, individuals on climate change management
- Knowledge and research objectives
  - Assessment of climate change impacts
  - Assessment of greenhouse gas (GHG) emissions by conducting a GHG inventory
  - Assessment of vulnerable groups and areas noting their key hazards with the subsequent priority actions and possible funding sources
  - Research on climate change resilient material and infrastructure
  - Online climate database
  - Assessment of technology needs
  - Data-sharing
- Infrastructure development - Construction of climate change resilient infrastructure especially for structures near the coastline, in flood-prone areas, and for housing developments.
- Policy, plans, and programs
  - Create climate change plans e.g. roadmap on emission reduction
  - Community-based preparation
  - Mainstreaming climate change management in national plans, policies, and programs
  - Coordinate and strengthen current policies and regulations
  - Establish a climate change committee
  - Identify strategies for low carbon development
- Conduct public awareness campaigns on climate change which also include inclusion within educational programs
- Technical support for government institutions, civil organizations, individuals for climate change management
  - Development of early warning systems
  - Development of climate modeling and forecasting
- Climate change financing
  - Create national climate change fund
  - Create climate change finance group
  - Encourage private sector investments
  - Incentivize banks to fund climate change initiatives
  - Carbon credit trading

b. Transport

Most national climate change plans focus on mass or public transport and non-motorized transport, and specifically on expansion of rails and metros and improving pedestrian facilities.

- Promotion of electric vehicles
- Encourage fuel switching e.g. conversion to CNG
- Encourage non-motorized forms of transport e.g. biking and walking
- Improve public transport infrastructure
- Improve road infrastructure by expanding roads and using climate change resilient material
- Establish and implement fuel quality standards and fuel economy standards
- Improve traffic management
- Conduct low carbon transport planning
- Conduct vehicle inspection and maintenance
- Assess climate change risks on transport infrastructure

c. Energy

National climate change plans would generally look into renewable energy as well as electricity consumption and distribution both in urban and rural areas.

- Increase the use of alternative and renewable energy especially nuclear energy, solar energy, hydropower, geothermal power, biofuels, and waste
- Increase electricity access
- Improve cooking stove technology
- Energy efficiency and conservation especially for power generation and industries
- Reduce the use of coal and other fossil fuels
- Encourage green buildings
- Promote low-emitting and energy-efficient technology e.g. use of LED compact fluorescent lamps and high pressured sodium lamps
- Research institutes targeting energy efficiency and conservation
- Policy, plans, and programs
  - Emission reduction target scenarios
  - Emission standards
  - Tax incentives
  - Energy audits

d. Municipal Services

Priority sectors for most national climate change plans include water resources (conservation and distribution aspects), waste management, and public health relating to decrease in the spread of vector borne diseases. Notably, most national plans give the highest priority to agriculture and food security. Frequent topics covered are:

- Establish hydro-meteorological stations
- Conduct hydrology-based research
- Improving water drainage systems
- Solid waste management e.g. increase recycling initiatives and decrease outdoor waste burning
- Climate change integrated water management
  - Increase water use efficiency and conservation
  - Efficient usage of seasonal water supply
  - Control water pollution

e. Planning and Urban Land Use

Forest ecosystems and biodiversity are also prominent themes in national climate change plans. In addition, urban settlement, such as green buildings, is also a priority.

- Increase the city's green areas by having more gardens, parks, mini-forests, and trees near roads
- Better urban land use planning with respect to climate change hazards
- Envision an "eco-city" and "low-carbon development"
- Land reclamation guidelines

f. Flood Protection

Not all national plans would look only specifically to flood protection but more on a broader scale on how to reduce impacts of climate induced disasters. Most national governments direct their attention in developing advanced forecasting and warning systems and devices.

- Improve coastal management
  - Usage of coastal polders
  - Assess impacts coastal vulnerability
  - Mangrove conservation and rehabilitation
- Flood prevention and protection
  - Create and develop flood and storm shelters
  - Storm water management
  - Develop and implement flood plain zones
  - Create and develop polder systems e.g. storm water barriers, water gates, dikes, household flood protection areas
  - Develop flood control systems
- Water river management by avoiding bank erosion and creating buffer zones

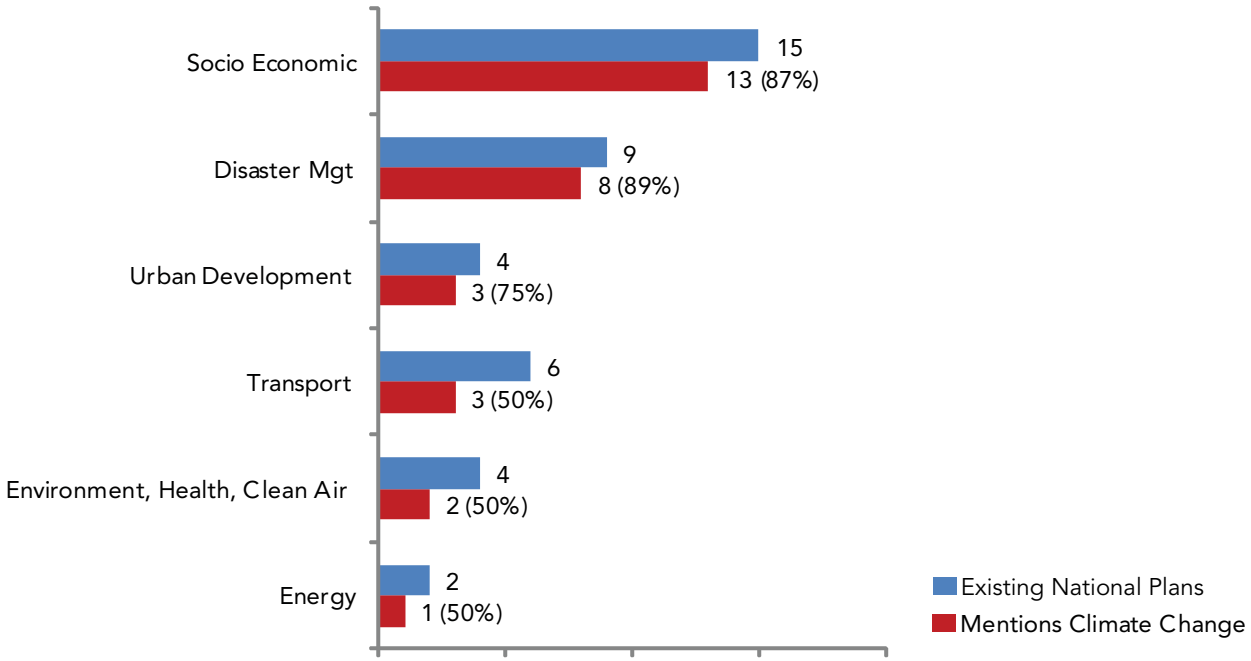


***Figure 11**. Overview of Existing National Plans that Mentions Climate Change*

ANALYSIS OF OTHER NATIONAL PLANS

Similar to cities, countries also have a range of other plans in which climate change could be incorporated. First it was determined which countries have socio economic, disaster risk management, urban development, transport, environment, health, clean air, and energy plans (see Table 4). Next, these plans were reviewed on whether they referred to climate change and what climate change information was provided. Of the 16 developing countries included in the study, 15 have socio-economic plans and most of these refer to climate change. Half of the countries have disaster risk management plans and only a few have dedicated urban development, transport, clean air and environment and energy plans at the national level.

***Table 4.** Overview of Other National Plans Found**

Plans	No.	Countries	General Focus
Socio Economic	15 (94%)	All except Bangladesh	Environmentally sustainable development - renewable energy, research, ecotourism, controlled urbanization, focus on agriculture, forests, and biodiversity
Disaster Risk Management	9 (56%)	Bangladesh, Bhutan, India, Lao PDR, Myanmar, Nepal, P.R. China, Pakistan, Vietnam	Flood protection, storm water management, monsoon protection
Urban Development	4 (25%)	India, Malaysia, Philippines, Sri Lanka	Land use, road improvement, industry, water management, storm water drainage, waste management, traffic management
Transport	6 (38%)	Bhutan, India, Lao PDR, P.R. China, Philippines, Sri Lanka	Public transport, fuel quality, road condition, NMT
Environment, Health, Clean Air	4 (25%)	Indonesia, P.R. China, Pakistan, Philippines	More focused on pollution control, Vector-borne diseases, health financing, No link between GHG and air pollution
Energy	2 (13%)	Philippines, P.R. China	Energy efficiency and conservation, renewable energy

Forty-one plans for 16 developing countries were assessed. Most national plans do not take into account the impacts of climate change nor note any climate change specific initiatives. A few (3) mentioned the gravity of climate change impacts and the need to address climate change. They take into account the negative impacts of climate change. It may even refer to already existing laws, policies, programs, and plans relating to climate change. However, the plans themselves do not state any climate change specific initiatives to be taken. A few (2) mentioned addressing the climate change with corresponding actions. They take into account the negative impacts of climate change. They also state climate change specific initiatives to be taken.

Most (18) mentioned addressing the climate change with corresponding actions. They take into account the negative impacts of climate change. They also state climate change specific initiatives to be taken. This was followed closely with those (15) which mentioned the gravity of climate change impacts and the need to address climate change. They take into account the negative impacts of climate change. They may even refer to already existing laws, policies, programs, and plans relating to climate change. However, the plans themselves do not state any climate change specific initiatives to be taken. With some (8), not mentioning climate change as part of their plan. They do not take into account the impacts of climate change nor note any climate change specific initiatives.

Despite not addressing climate change directly, many of the initiatives drafted in the plans have co-benefits with climate change. They also fall in line with climate change plans mentioned addressing the climate change with corresponding actions

The specific content of plans is briefly discussed below.

a. Socio Economic Plans

Fifteen out of the 16 developing countries in this study have national socio economic plans and 13 of these refer to climate change. Most plans deal with education, health, agriculture and food security, energy, and environment sectors. Some also include good governance and women and children as a major concern.

The socio economic plans called for a separate climate change action plans to be drafted or climate change action plans were referred to if already existing. It also wanted to conduct vulnerability assessments on vulnerable areas and groups. It also wanted more research and technology updates on energy and transport leading to emission reduction.

b. Disaster Risk Management Plans

Eight of the nine national disaster risk management plans mentions climate change in contrast to what was observed for disaster risk management plans of cities. The exception is the plan of P.R. China that focuses on earthquakes only. Disaster risk management plans predominantly cover the same sectors as the socio economic plans, except for water. It is noted that restoring water supply can be critical after a disaster has struck because of the risk for water-borne diseases and the need for drinking water for survival.

Plans often referred to the need for research on climate change impacts; an integrated approach to manage disasters with climate change hazards; mainstreaming climate change in policies, laws, and programs, plans; and updated meteorological technologies in support of early warning systems.

c. Urban Development Plans

Only four national urban development plans were found and three of these include climate change measures. The agricultural sector or food security for its nation is the top concern under these plans. Plans also aim to further incorporate the climate change agenda into existing policies, programs, and plans. Plans also call for more research on the impacts of climate change on urban areas and the provision of physical planning for climate change adaptation.

d. Transport Master Plans

Three out of the six national transport plans make reference to climate change. Most plans give priority to sub-sectors such as public transport, non-motorized transport, land use and travel demand management.

Sri Lanka's National Road Transport Plan noted climate change as concern stating that "The Master Plan has to contribute to addressing the pressing issues of energy efficiency, climate change, traffic congestion, and transport safety." The Philippines' National Environmentally Sustainable Transport (EST) Strategy noted the relationship of climate change and

transport and how climate change can be integrated further in transport planning. P.R. China's transport plan is a sectoral plan of the country's Five-Year-Plan with a strong emphasis on fuel efficiency and reduced carbon intensity.

e. Environment, Health, and Clean Air Plans

Clean air plans found in this study generally cover the transport, health and energy sectors. The environmental plans mentioned to devise and implement a national action plan for climate change, while the health plan wanted to research the effects of climate change on health. The one clean air plan found did not mention climate change. P.R. China's environment plan is a sectoral plan of the country's Five-Year-Plan and includes more measures on air pollution than on greenhouse gas reductions.

f. Energy Plans

Only the Philippines and P.R. China have a national energy plan. The Philippines' plan noted several initiatives i.e. incorporating climate change strategies as part of the energy sector, conduct impact and vulnerability assessment of energy systems i.e. power generation, transmission, distribution, fuel production, transport, integration of structural adaptations into energy infrastructure design which includes the modification of engineering design and practice. It also wanted to mainstream climate change adaptation to energy policies, laws, and programs, plans.

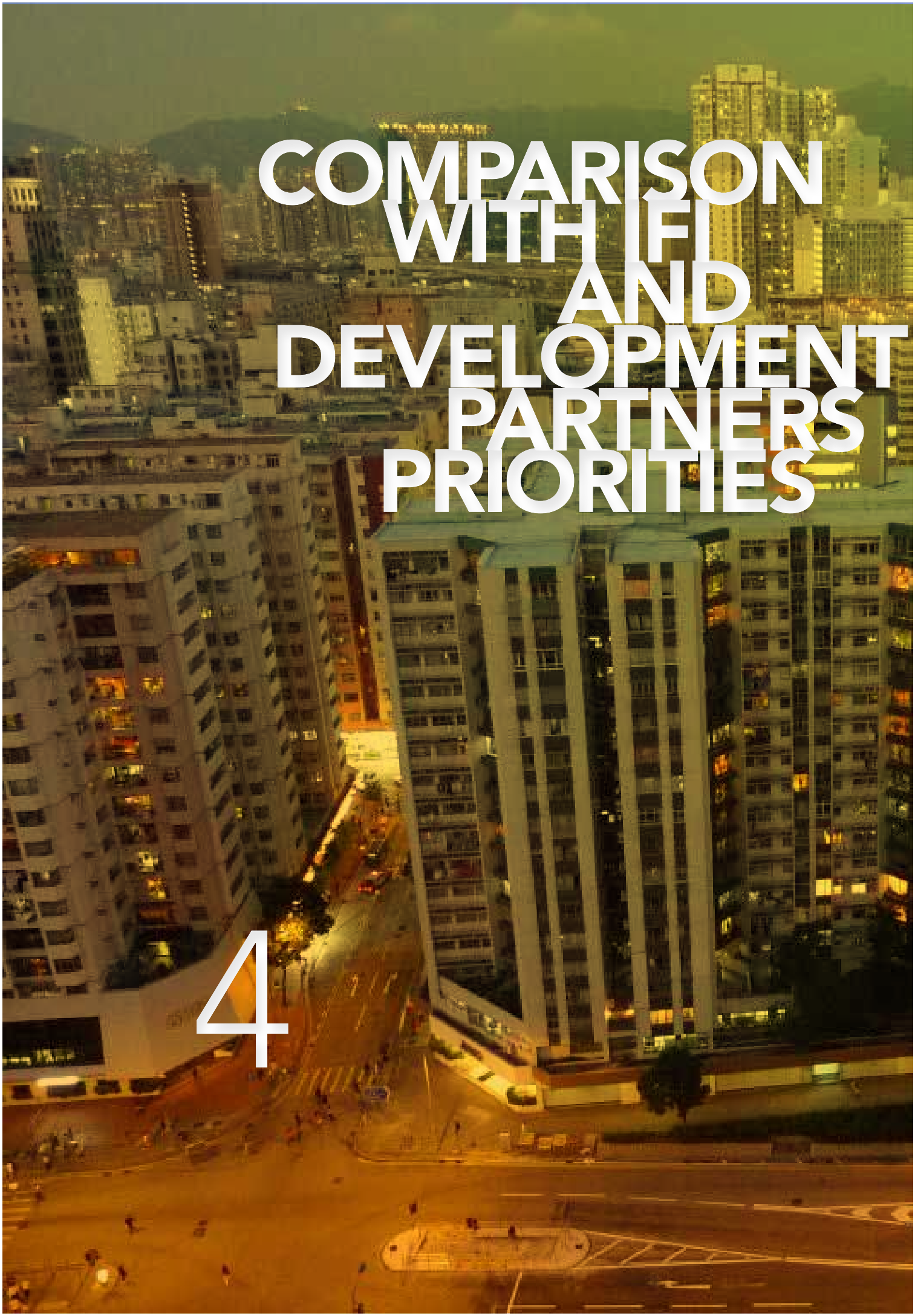
Sub-sectors such as geothermal, oil and natural gas, hydropower, electricity, coal, renewable energy and alternative fuel are common in most national energy plans.

COMPARISON BETWEEN CITY PLANS AND NATIONAL PLANS

Table 5 compares city and national climate change plans. City climate change plans tend to be more focused on areas that are important to a city, such as municipal services, buildings, flood protection, and aim to also address broader local issues like traffic congestion, road safety, air and water pollution and health. Furthermore they give more attention to projects that are visible such as energy efficient buildings and electric vehicles. National climate change plans are on the other hand more broad sector based, focus more on climate change holistically but are less tailored to cities and thus can be harder to translate to local conditions. With regards to climate change considerations on sectoral and other plans, national level plans more frequently noted the impacts of climate change and planned for climate change driven initiatives unlike the city level plans.

Table 5. *Comparison between City and National Climate Change Plans Based on Sectors*

Sectors	Both national and city climate change plans focus on the following:	Key differences
General/ Cross cutting	• Capacity-building of institutions, organizations, and individuals for climate change management • Assessing climate change vulnerable groups and areas, key hazards, priority actions, funding sources, emissions, and resilient materials • Climate change resilient infrastructure especially for housing developments and near coastal areas. • Mainstreaming climate change management in national plans, policies, and programs • Build on current and planned initiatives, synergy with other government institutions • Awareness and educational climate change campaigns • Technical support for institutions, organizations, and individuals for climate change management in the form of early warning systems and climate change modeling and forecasting	• National level plans called for technology-needs assessment, community-based preparation, climate change committee creation, road map on emission reductions, coordination of current policies, and climate change plan and low-emission strategies development. • Nationalplans called have more plans for financing climate change initiatives i.e. creating a climate change fund, incentivizing the private sector, carbon credit, and alike.
Transport	• Few mentioned encouraging electric vehicles • Few mentioned switching to cleaner forms of fuel i.e. CNG and biofuels • Few mentioned encouraging NMT • Few mentioned fuel quality and economy standards • Improvement of public transport especially expanding rail and bus mass transit • Improve road infrastructure in terms of climate change resiliency	• Few cities mentioned vehicle emission management • Few cities with areas and time zones with no vehicles • Nation level plans called for the assessment of climate change risks on transport and low carbon transport planning • National level plans called for vehicle inspection and maintenance • More cities wanted to address traffic management
Energy	• Increase the use of alternative and renewable energy especially solar energy, hydroelectric, and biomass • Improve energy efficiency and conversation • Energy self-sufficiency especially for industries • Reduce fossil fuel usage especially coal • Encourage green buildings • Energy technology	• National level plans called for the establishment of hydro-meteorological stations and more hydrology-based research
Municipal Services	• Improve natural and alternative drainage systems • Better water management in terms of efficiency and conservation • Few called for an integrated approach to water management • Better solid waste management – increasing recycling initiatives	• National level plans called for the establishment of hydro-meteorological stations and more hydrology-based research
Planning and Land Use	• Increase city green areas • Few mentioned better land use planning with respect to climate change hazards	• National level plans called for the establishment of hydro-meteorological stations and more hydrology-based research
Flood Protection	• Improve coastal management with include more coastal polders, mangrove conservation and rehabilitation , and tree planting along the coastline • Flood prevention and protection by implementing flood polders, research on impacts, and establishing shelters • River management • Storm protection by controlling drainage and establishing shelters	



4 COMPARISON WITH IFI AND DEVELOPMENT PARTNERS PRIORITIES

International Financial Institutions (IFIs) provide financial support through grants, loans, and technical assistance to governments as well as loans to private businesses for economic and social development activities in developing countries. Development agencies provide regional and international development aid or assistance primarily for economic development. They do not provide loans thus are not the source of investments into the infrastructure projects, but several are co-financing development partners' support to cities.

Table 6 shows IFIs and other development partners' presence in countries included in this study. It is noted that ADB, JICA and World Bank work with all Asian countries included in the study. All countries except for Malaysia and Myanmar are priority countries for most development partners which are also covered by most IFIs.

ADB has Country Partner Strategies for most countries, and sectoral priorities vary between countries based on what is given priority by national governments.

To understand what urban infrastructure IFIs would be interested in funding, an analysis was conducted of their 2010 annual reports to understand the loans approved for different sectors in 2010. These sectors were subsequently matched with the sectors used for this study (transport, energy, municipal services, planning/urban land use, flood protection). Table 7 shows that the transport and energy sectors are investment priorities of all IFIs. However, the breakdown of investments is not in sufficient level of detail to understand if investments into climate change related infrastructures rank high. Interestingly, KfW has provided urban investments, with more than half going towards municipal services and explicit inclusion of planning and urban land use. Only JICA lists flood protection separately as an investment area.

Other development partners typically provide development assistance that is not centered on economic sectors but rather focuses on development issues, such as environment, education and health. However, most of these development issues are relevant to the sectors covered by this study.

Table 6. *IFIs and Development Partners' Presence in Developing Asian Countries*

Country	ADB	AFD	GIZ	JICA	KfW	KOICA	Sida	UN Habitat	World Bank
Bangladesh	⦿		⦿	⦿		⦿	⦿	⦿	⦿
Bhutan	⦿			⦿					⦿
Cambodia	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿
India	⦿	⦿	⦿	⦿	⦿		⦿	⦿	⦿
Indonesia	⦿	⦿	⦿	⦿	⦿	⦿			⦿
Lao PDR	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿
Malaysia	⦿		⦿	⦿					⦿
Mongolia	⦿		⦿	⦿	⦿	⦿			⦿
Myanmar	⦿			⦿		⦿			⦿
Nepal	⦿		⦿	⦿	⦿	⦿		⦿	⦿
P.R. China	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿
Pakistan	⦿	⦿		⦿	⦿	⦿			⦿
Philippines	⦿	⦿	⦿	⦿	⦿	⦿		⦿	⦿
Sri Lanka	⦿	⦿	⦿	⦿		⦿	⦿		⦿
Thailand	⦿	⦿	⦿	⦿		⦿		⦿	⦿
Vietnam	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿

Table 7. *International Financial Institutions' Investment by Sector*

	ADB	%	World Bank	%	JICA	%	KfW – Urban Investments 2006-2010	%	KfW – Investments in 2010	%	AFD	%
Total investment	**11,462**		**58,747**		**10,461**		2,332		**4,612**		**5,268**	
Transport	**3,831**	**33%**	**9,002**	**15%**	**4,756**	**45%**	546	23%	2,487	54%	1,844	35%
Energy	**2,454**	**21%**	**9,925**	**17%**	**2,463**	**24%**	**171**	7%	785	17%		
Municipal Services	**607**	**5%**	**4,103**	**7%**			**1,231**	**53%**			**474**	**9%**
Planning/Urban land use							102	**4%**				
Flood protecion					**39**	**0.4%**						

Note: Amounts are in million US dollars.
The total percentages do not add up to 100% because not all investment sectors are included in this table

CONCLUSIONS

5

The main conclusions from the study are as follows:

1. The development of city climate change plans is at an early stage in Asia. Only 29 of the 894 surveyed cites have climate change plans. Most are from India, P.R. China and Vietnam and were developed only in the past five years. City population size is not the reason for the low number of plans, as also only four Asian capital cities have climate change plans: Bangkok, Delhi, Singapore and Tokyo, while Seoul has made "low carbon" an explicit part of its urban master plan. Even at a global level, only 81 cities were found to have climate change plans, 29 of which are in Asia. However, as already 48% (19) of C40 Cities Climate Leadership Group (C40) cities have such plans, this is an indication that more cities will follow suit in coming years.

2. Of the 29 climate change plans analyzed, 36% focused on adaptation and mitigation, 36% on mitigation only and 28% on adaptation only. External assistance is a key factor of influence on the existence of plans and their scope. The Asian Cities Climate Change Resilience Network (ACCCRN) covers 9 of the surveyed cities and is adaptation focused, and the Low Carbon Pilot of P.R. China's National Development Reform Commission includes 8 of the surveyed plans and is mitigation focused.

3. The analysis of climate change plans by sectors relevant to infrastructure investments found that 79% include energy supply and distribution followed by buildings and water services (59%), planning and urban land use (48%), transport (48%), flood protection (41%), outdoor lighting (31%), and waste management (24%). All sectors except flood protection are relevant to mitigation and adaptation, and thus it can be expected that future plans will increasingly be covering both.

4. Notably none of the 29 city climate change plans analyzed gave data on financial investments needed to implement the plan or for the infrastructure investments.

5. Eighteen of the 21 Asian countries have a National Climate Change Plans. Pakistan's and Myanmar's plans are still in development and North Korea's plan was not found. It is likely that cities use these plans as a starting point to develop their city climate change plans because (a) national climate change plans existed before city climate change plans, with the exception of Bangkok; (b) sector coverage in national plans is about 20% higher per sector than in city plans, except for buildings and outdoor lighting which are more relevant to cities; and (c) national socio-economic and sectoral plans are often the basis for plans and policies at the provincial and city level, especially in P.R. China and Vietnam (d) nationalgovernments control most of the budget going to urban infrastructure thus it pays to align city plans with national plans

6. Climate change has not yet been mainstreamed in the planning process of various city agencies and organizations responsible for the different sectors. Few other relevant plans for cities mentioned climate change, including socio economic plans, disaster risk management plans, urban development plans, transport master plans, environment, health and clean air plans, and one energy plan. The most notable finding was that none of the 6 reviewed disaster risk management plans and 19 environment, health and clean air plans mentioned climate change despite an obvious overlap with climate change and potential co-benefits from addressing these issues through joint policies.

7. At the national level the situation is more hopeful. Of the 16 developing Asian countries included in the study, 15 have socio-economic plans and most of these refer to climate change. Half of the countries have disaster risk management plans and all include climate change elements. Only a few have dedicated urban development, transport, clean air and environment and energy plans at the national level, and climate change is covered by some of these plans. National bodies could therefore lead cities in mainstreaming climate change in sector plans and policies.

8. In comparing city and national plans, city climate change plans tend to be more focused on areas that are important to a city (e.g. municipal services, buildings), address broader local issues like traffic congestion and air pollution, and give more attention to visible projects such as energy efficient buildings. National climate change plans are on the other hand more broad sector based, focus more on climate change holistically but are less tailored to cities and thus can be harder to translate to local conditions.

9. International financial institutions (IFIs) and other development partners broadly cover the 16 developing

Asian countries, although Bhutan and Myanmar are covered by fewer agencies. Transport and energy sectors are investment priorities of all IFIs but with insufficient detail to understand climate change related infrastructure investments. Interestingly, KfW has provided urban investments, with more than half going towards municipal services and explicit inclusion of planning and urban land use. Only JICA lists flood protection separately as an investment area. Other development partners work around development themes rather than economic sectors.

RECOMMENDATIONS FOR CITIES AND ITS PARTNERS

6

This chapter gives recommendations for cities and its development partners' direction in relation to climate change focus in Asian cities. Aside from the baseline survey, recommendations were also inspired by the World Bank Urban Development Series on Cities and Climate Change, and ADB's reports on inclusive, green and competitive cities, and by CAI-Asia and CDIA's experience in working with cities and government agencies on clean air plans and policies.

RECOMMENDATION 1
Define the scope of climate change related infrastructure investment

Cities should carefully determine the scope of infrastructure investments related to climate change mitigation and adaptation because approaching this from a climate change perspective is complex. City and national governments' long-term aim should be taking into account of promoting sustainable and equitable urban development, leading to improved environmental and living conditions for all in Asian cities.

Types of infrastructure. Defining the scope should first of all consider the type of infrastructures. The table in Annex C presents infrastructure types covered by the C40 baseline study and found in this study to give an indication of the wide range. Development partners could lead the way by stretching the boundaries for both hard and soft infrastructure investments that are critical from a climate change perspective but have not yet been mainstreamed by cities, IFIs and other investors. For this reason an "out-of-the-box" thinking is warranted. Both ADB's thinking on inclusive, competitive and green cities as well as World Banks urban development series are going beyond conventional infrastructure types. Examples are:

- Public transport infrastructures that expand beyond the actual bus or train systems but include transit modes, access routes for pedestrians and cyclist and to adjacent offices, residential and commercial buildings, parking at stations, intermodal connections, communication systems including mobile phone applications on timetables, and single ticketing systems for buses, trains, metros and taxis. According to the World Bank, mobility patters in cities are more determined by good public transport systems than by disincentives for car use.

- Infrastructures that support "smarter cities" that are underpinned by strong technology and communication systems. An example is the infrastructure to support road congestion pricing systems as exists in Singapore, which depends on sophisticated and expensive technologies and communication systems.

- Disaster management and response systems, including communication systems to raise public awareness on floods and extreme weather events and what to do during such events, telecommunication systems, and back-ups for electricity supply and drinking water and shelters for residents.

- Communication systems and shared databases for relevant agencies involved in mitigation efforts and post disaster response. This is particularly important because multiple agencies and a broader range of stakeholders are needed, as climate change cuts across sectors, while in reality there often is lack of coordination among municipal departments and with other relevant organizations, such as utility and telecommunications companies and charities and agencies (e.g. churches and the Red Cross) that provide post disaster support.

- Buildings and housing that make use of durable and resilient materials, have a layout and orientation to conserve energy, provide better protection against disasters (e.g. elevated houses), and are energy efficient. Aside from new housing it can also relate to housing upgrades. Development partners could for example help ensure that climate change considerations are included in slum upgrade projects.

- Greening cities and green spaces that could accelerate flood water to recede, create a cooling effect in cities, and absorb particulate matter pollution that contains black carbon and is known to contribute to local and global warming.

- Planning and land use development, which was mentioned several times in city and national plans (in contrast to a World Bank study of city climate change policies that found very few such mentions), suggesting there is a demand for support in these areas. An important factor is integrated spatial strategies that underpin the type and location of infrastructures, and includes land use regulation (to encourage/discourage certain land use developments), consumer demand (where people want to work and live), and a transport network (that connects the places where people live, work and socialize). Compact and mixed land

use, that co-locates offices, residences, and commercial, social and medical facilities, was found to be a key area for reducing emissions from transport in a study conducted for HCMC by CAI-Asia and Chreod Ltd. for ADB.

Second, the mitigation scope would need to consider

- To what extent the life cycle of infrastructure is considered. This relates to emissions generated during infrastructure construction, for example, construction emissions were estimated to be 28% and 20% of total emissions (construction + 20 year operation) of the metro in Bangalore and HCMC respectively 13. It also relates to the manufacturing of building materials, for example, aluminum is a lightweight material but a lot of energy is needed to make aluminum. Life cycle of e.g. building materials, transport system construction, electricity source of electric vehicles

- Whether a city aims to make a dent in the short-term or long-term emission reduction potential of infrastructure investments. Investments in public transport systems and energy efficient buildings lead to immediate GHG reductions. Urban form, however, may be the single largest determinant of long term GHG emissions of a city, and thus combining urban planning with investments in transport and buildings infrastructures would have a greater impact in the long run.

Third, the adaptation scope will need to consider that climate change erodes the assets of especially poor people, such as housing, sanitation, and water supply. Investments in infrastructures are thus needed to protect their assets, ensure a swift post disaster response, and rebuild these assets quickly after a disaster. Adaptation measures should be combined with mitigation measures. For example, a metro system can be designed to maximize emission reductions during operation and to be resilient to extreme weather events, for example through elevated entrances to prevent water from entering the metro during floods and which exist in Bangkok.

Fourth, it will be important for cities and development partners to frame the issue of climate change, by selecting infrastructure types in the context of broader city issues and co-benefits that are the local drivers behind change. Examples are air and water pollution and health impacts, traffic congestion, traffic safety, energy costs and security, and wider urban and economic development. All case studies of the World Bank on urban climate change actions found that air pollution and associated health impacts were an important reason for transport improvement measures. The study also gave the example of Delhi, where efforts on energy efficiency were driven by power shortages and not by climate change. For development partners this means that it should invest in understanding local issues and how climate change links with these (rather than the other way around!).

RECOMMENDATION 2
Consider city and national priorities for climate change related infrastructure based on the survey results in determining the focus of development assistance

The following infrastructure types were identified as priorities for Asian cities, based on the plans analyzed as part of this survey:

- General: capacity building and knowledge, data systems, climate change resilient infrastructure (coastline, housing, materials used), mainstreaming climate change across sectors (and infrastructure requirements for each sector)

- Transport: public transport improvements, non-motorized transport, electric vehicles, and alternative fuels

- Energy: renewable energy, efficient fossil fuel use, green buildings, and energy efficient technologies for e.g. outdoor lighting

- Municipal Services: waste management, sewerage systems, storm water drainage, waste water treatment plants, seasonal water supply, and water conservation

- Planning and Urban Land Use: green space, trees near roads, "eco-city," urban planning for climate resilience

- Flood protection: elevated walkways, coastal and river dikes/embankments and flood plains, and shelters for floods and typhoons.

What development agencies should also consider in combination with the priority infrastructure types is

- To remove efforts from areas where existing consultancies can cover this. Thus far, energy efficiency/ energy reduction has been given most attention in cities. There are ample consultancies that could carry out (pre-)feasibility analysis

[13] http://www.adb.org/documents/evaluation/knowledge-briefs/reg/EKB-REG-2010-16.pdf

of, for example, infrastructure to improve energy efficiency in buildings

- To prioritize areas where development agencies can add the best value to cities. This would apply to Infrastructures that are more complex because they cross multiple sectors, require multi agency cooperation, require specialist/technical input, or are related to broader urban issues such as land use

- Cities that have had to deal with a disaster are more likely to want to change something in their cities. Development agencies could help these cities by assessing how to restore infrastructure with climate change considerations in mind

- Cities that have funding available or can access funds for infrastructure investments, i.e. in addition to a demand / commitment

- See recommendations 3-7 for further ideas.

RECOMMENDATION 3
Consider the broader context of national policy and institutional frameworks relevant to cities and national governments

Having more direct relationships with and involvement of national governments in development partners' work is critical for its success in helping cities with improving climate change related infrastructures, for several reasons.

First of all, city governments have the greatest ability to reduce emissions and maximize climate change resilience from municipal services. Water services, waste management and flood protection were therefore frequently mentioned in city plans. However municipal services only account for a fraction of a city's GHG emissions. Of greater impact on long-term emissions and adaptation potential are urban planning and land use and transport systems, but these are often not within a city government's control alone. China and Vietnam are examples of countries with a centralized governance system whereby national plans set the scope, priorities, targets and budget allocations for different sectors which are subsequently cascaded down to provincial and city plans. It is thus not surprising that national government is critical in creating both political and financial space for city policies, infrastructure investments and other measures relevant to climate change. In other countries, such as Indonesia and the Philippines, more decentralized governance systems exist but many cities struggle to deal with unfunded mandates.

Secondly, the vast majority of loans from IFIs are channeled through national government rather than given to city governments directly. A point made by the World Bank study was that setting priorities for infrastructure is primarily a political process, and more complex for cities when financial resources come from national government or other external resources. Even climate change financing mechanisms, whether Clean Development Mechanisms (CDM) or the newly developed Nationally Appropriate Mitigation Actions (NAMAs), are under the control of national governments. Thus, it would be desirable to have local NAMAs or LAMAs to cater for city needs.

This has resulted in an infrastructure deficit in cities, including transport systems, municipal services and public housing, while especially now these require huge investments to deal with the pressure on urban infrastructure and services as a consequence of increasing urbanization and climate change. To make matters worse, the sole main avenue for most cities to raise revenue is through land sales and property taxes. This encourages cities to allocate land based on what generates most income, which often goes against proper urban planning and managed urban growth.

RECOMMENDATION 4
Seek to influence IFI focus on climate change infrastructure

As part of the decision of whether to support a city, the sector and infrastructure priorities of IFIs should be considered because IFIs are development agencies' main target for translating pre-feasibility studies into loans. At present these priorities are difficult to discern beyond general sectors (transport and energy are the priority sectors for IFIs generally) and certain general infrastructure types (e.g. public transport).

For this reason, it is recommended that cities and stakeholder organizations working with cities also engage with IFIs to

- Help IFIs expand their infrastructure portfolio related to climate change with those that are important to cities

- Support IFIs in maximizing mitigation and adaptation benefits of infrastructure projects by identifying and where possible quantifying these benefits as part of pre-

feasibility analyses. Several tools are available to conduct this analysis for projects and broader city systems, such as the Transport Emissions Evaluation Models for Projects (TEEMP) and the Rapid Assessment of City Emissions (RACE) tools that assesses emissions from energy use and transport linked with land use and determines the emission reduction potential of alternative land use and policy scenarios. It is noted that ADB and World Bank signed a memorandum of understanding to develop a common set of tools.[14]

- Engage IFIs to how climate change

RECOMMENDATION 5
Broaden funding sources for urban infrastructure investments, including co-financung

It is important to note that private sector investments in infrastructure are not driven by climate change but that many of their investments are relevant to climate change. By making them aware of the climate change relevance of their current investment portfolio this could help increase investments in such infrastructure projects. Private sector institutions can include private banks, especially those with a high public profile and an interest in green investments and carbon financing. Consideration should also be given to lenders that are closely related to government and fund many public infrastructure investments, such as the India Development Finance Corporation (IDFC).

Other sources of co-financing could also be considered, most notably funds with a climate change focus (e.g. Clean Technology Fund, Global Environment Facility), and UNFCCC mechanisms (CDM and NAMAs). If development agencies would carry out its pre-feasibility analyses with NAMAs in mind (countries have submitted NAMA priorities under the UNFCCC, many of which relate to the infrastructure types mentioned in this report) [15], then support of national governments, and subsequently national or international financing, will be easier to secure.

RECOMMENDATION 6
Foster stronger collaboration with development partners, city networks/ initiatives, NGOs, research institutes, universities

It is recommended that development partners engage in a "Sequential Partnership" starting from the assessment of city plan/strategies, issues and priorities, via pre-feasibility and feasibility analyses of infrastructures, through to financing, implementation and monitoring and evaluation.

Under this framework, different development partners will take a lead to

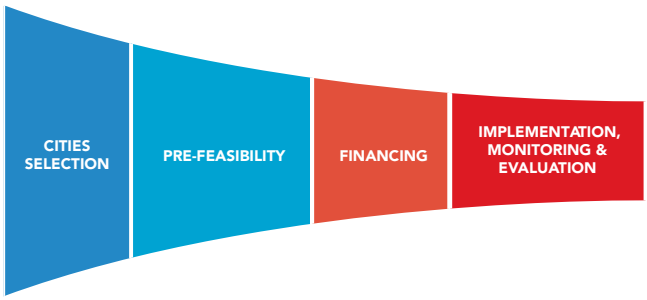


Figure 12. *Proposed Sequential Partnership*

- Assess the status of climate change and other relevant plans and policies, and infrastructure priorities
- Assess the potential for CO2 reduction through the application of tools. Several organizations will also have tools that can assess other city aspects relevant to climate change
- Inform where demand for pre-feasibility services exist (= pre-selection of cities) and raise awareness of cities of development partners' services through partners' communication channels
- Work with local organizations and collect data relevant to pre-feasibility and feasibility analyses, plus facilitate cross-sectoral coordination
- Secure interest from IFIs and other financiers after pre-feasibility analyses

Which would be development partners' strategic partners would depend on what are the most critical areas for information, contacts etc. Partnerships can cover upstream, pre-feasibility and downstream activities. Several existing partnerships, such as GIZ, CityNet, CDIA and CAI-Asia, should be explored to assess where these partners can supplement each other's work best.

[14] http://beta.adb.org/news/development-banks-agree-new-partnership-climate-action-cities
[15] http://unfccc.int/meetings/cop_15/copenhagen_accord/items/5265.php

An example of a local partner is the HCMC Institute for Development Studies (HIDS), a state agency under the HCMC People's Committee. It carries out scientific research, has the mandate to collect data from other agencies, consults and advises the HCMC Party Committee and the HCMC People's Committee on matters of social economics, urban environment and planning. By partnering with such an institution, a faster access to better data and decision makers can be achieved.

A related recommendation is for development partners to communicate its climate change scope of work with other institutions working on climate change which can be a starting point for further collaboration. The World Bank Urban Development Series on Cities and Climate Change, for example, list key climate change organizations.

Furthermore, development partners should assess what key events exist on climate change and cities (including relevant sectors) to participate in. It is important to note that key events or initiatives can trigger leadership and action. The C40 Cities Climate Leadership Group, including its global flagship event, is such an example.

RECOMMENDATION 7
Establish a collaborative partnership to develop a climate change plan blue print

The key issues with the current state of climate change plans are that they are at a very early stage of development, plans are inconsistent among cities and have a different focus on adaptation and mitigation, and there is a lack of mainstreaming of climate change in other city and national plans.

Climate change plans will be most effective if they are not developed as isolated plans to address climate change challenges, but are explicitly aimed at mainstreaming climate change across sectors and development issues. However, inclusion of climate change considerations in sectoral and other plans without an overarching separate climate change plan is not sufficient. In this context, climate change plans thus

- Explicitly aims to support and prioritize infrastructures already included in other city and national plans
- Identify gaps in climate change coverage of other plans and what needs to be done to fill these gaps
- Recommend cross-sectoral linkages as well as collaboration needed between different agencies and organizations. This in turn requires a climate change team and/or advisor, such as exists in several cities (e.g. Seoul) and countries (e.g. Philippines).

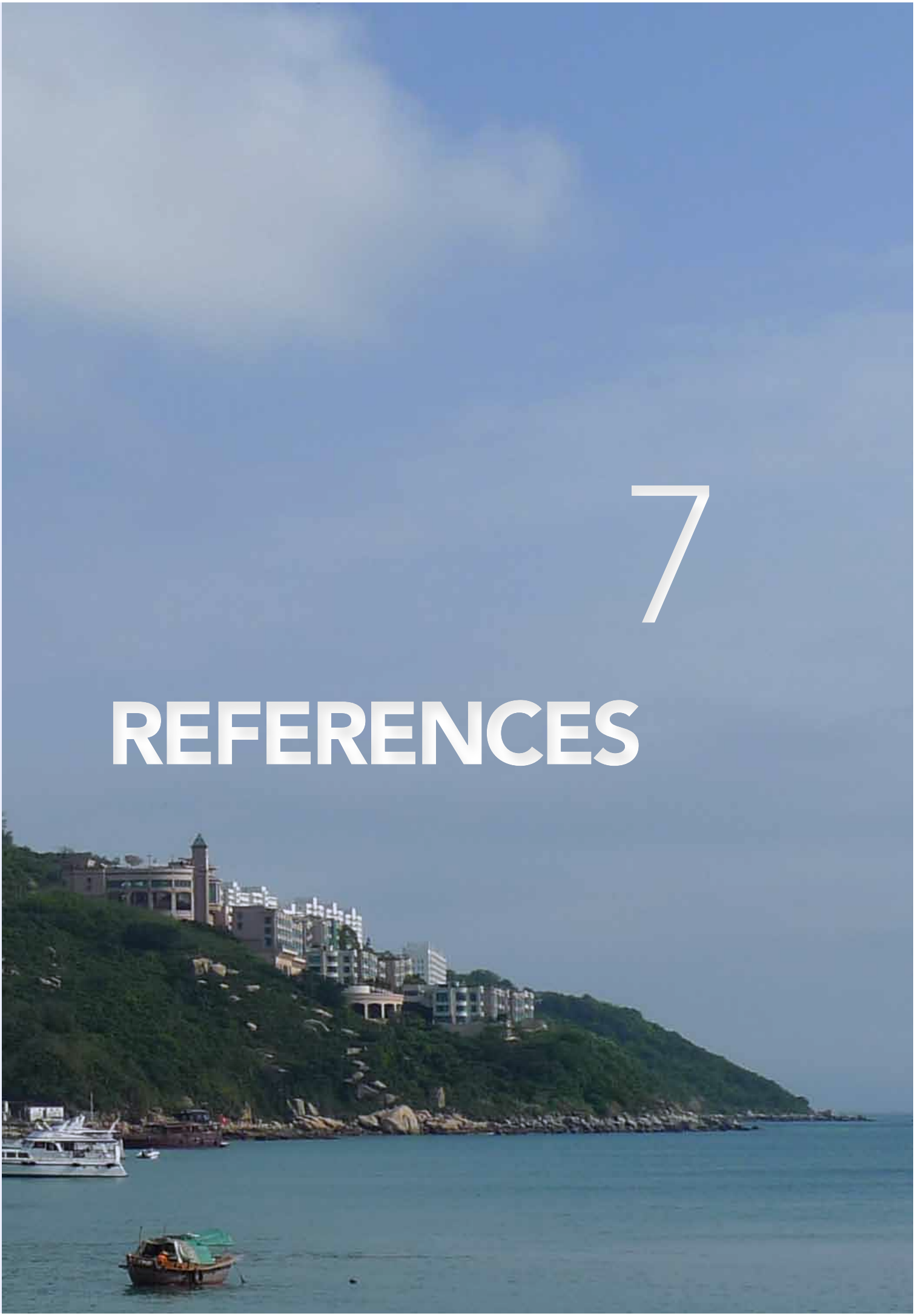
It is recommended that development partners establish a collaborative effort among each other to develop a blue print for climate change plans. This blue print would provide a:

- Common scope: mitigation and adaptation, consideration of co-benefits and city development issues
- Menu of contents, possibly with supplements for city types / climate change issues

This blueprint could be developed along the same lines as the Global Reporting Initiative (GRI), which seeks to make sustainability reporting by all organizations as routine as, and comparable to, financial reporting. The GRI develops and disseminates globally applicable "Sustainability Reporting Guidelines" for voluntary use by organisations reporting on economic, environmental, social and governance performance through (corporate) sustainability reports. Sector supplements are also developed, with input from sector stakeholders, to accommodate sector specific sustainability issues.

A link should also be made with reports by municipal governments, for which UN ICLEI developed similar guidelines. Ideally guidelines or menus for city reports and for city plans are aligned for climate change scope and information.

Lastly, the GHG Protocol Initiative, a decade-long partnership between the World Resources Institute and the World Business Council for Sustainable Development can be consulted for a credible and effective emissions accounting related to climate change. A module for cities will be released in 2012.



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