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Scientific Capacity Building & Enhancement for Sustainable Development in Developing Countries

Cities At Risk: Developing Adaptive Capacity for Climate Change in Asia's Coastal Mega Cities

Final Report for APN CAPaBLE Project:

CBA2008-06NSY-Fuchs

Cities at Risk:
Developing Adaptive Capacity for Climate Change in Asia's Coastal Mega Cities

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Final Report submitted to APN by
the International START Secretariat (www.start.org) and
the East West Center (www.eastwestcenter.org)

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Overview of project work and outcomes

Non-technical summary

Much of Asia's rapid population and economic growth is occurring in large coastal cities at high risk from sea level rise and climate change. The *Cities at Risk* workshop, held 26-28 February 2009 in Bangkok, brought together nearly 80 scientists, urban planners and officials, and representatives of disaster management and development agencies to review scientific findings and projections regarding climate-related risks (e.g., sea level rise, extreme climate events, intensification of storms and storm surges) for Asia's coastal megacities. Participants examined potential vulnerabilities and current coping mechanisms, including possible planning and governance mechanisms that better integrate science information, planning, development, and disaster management. Workshop participants also considered means for improving networking and communication among urban planners/officials and the scientific community in order to enhance urban resilience and adaptive capacities. By bringing together key stakeholders under a common umbrella, the workshop contributed to the sharing of critical knowledge and experiences among participants and helped lay a foundation for future communication and collaboration.

Workshop discussions generated the following take home messages:

1. *Recognize the urgent need to address the disconnect between the geographic and time scales at which the scientific and planning / policy communities are working*
2. *Encourage the urban planning community to take a comprehensive view of climate risks, including variability.*
3. *Recognize and promote the importance of identifying an "entrepreneur" in urban governments to help make climate change a priority.*
4. *Acknowledge knowledge gaps and invest in learning strategies.*
5. *Move from the traditional top-down impacts modelling approach to a critical threshold approach.*
6. *Communicate science, and vulnerability in particular, more effectively.*
7. *Urgently build capacity for individual and institutional participation in responding to climate change in Asia's coastal megacities.*
8. *Understand that effective governance at the systemic level is essential in mainstreaming adaptation strategies.*

At the conclusion of the February workshop, participants identified city-specific visioning / storyline activities as immediate, practical *Cities at Risk* follow-up activities that could be organized and implemented within the next several months. Several interested partners collaborated to facilitate "Training of Trainers" and adaptation visioning exercises in Bangkok, Thailand in June 2009, which engaged participants from the City of Bangkok and Governor's offices in activities aimed at mainstreaming climate change considerations into city development planning and policy. *Cities at Risk* participants also recommended facilitation of additional capacity building workshops and a *Cities at Risk II* as critical follow-on activities.

The *Cities at Risk* steering committee will meet in early 2010 to discuss development of future *Cities at Risk* activities. Recommendations from the February workshop as well as sustained interaction with *Cities at Risk* participants and their home institutions will inform future programming design and priorities. Just as effective governance at the systemic level is essential for mainstreaming adaptation strategies into urban planning and management, an effective, systematic approach to enhancing adaptive capacity will require sustained collaborative efforts between the research, science, education, policy and decision-making communities.

Objectives
The *Cities at Risk* workshop aimed to:

- Review the most recent science findings and projections of climate change impacts on Asian coastal cities
- Enhance awareness on the part of urban officials of the need to take early action
- Examine vulnerabilities and major threats in selected cities (e.g., infrastructure, economic assets and livelihoods, population and health)
- Consider adaptation and response measures and the integration of climate risk information with urban planning and disaster management
- Improve networking and communication between scientists, urban managers, and disaster agencies to enhance capacity in coastal megacities
- Consider future measures and activities to develop adaptive capacity in Asia's coastal cities, including scientific and technical capacity building, research, and new coalitions/alliances of individuals, scientists, practitioners, and governments.

Amount received and number years supported
The Grant awarded to this project was: US $56,055 for one year (Oct 2008-2009).

Work undertaken
The *Cities at Risk* workshop was held 26-28 February 2009 in Bangkok, Thailand. START and the EWC, in collaboration with Ibaraki University/IR3S and local workshop host SEA-START, organized and conducted the workshop in which nearly 80 scientists, researchers, urban planners and practitioners and representatives from disaster management and development agencies participated. The workshop was organized to target the following cities: Dhaka (Bangladesh), Shanghai and Hong Kong /Shenzhen/Guangzhou (China), Mumbai and Calcutta (India), Jakarta (Indonesia), Karachi (Pakistan), Manila (Philippines), Bangkok (Thailand) and Ho Chi Minh City (Vietnam). The three-day program was comprised of plenary presentations, panel discussions and breakout working group sessions. Results and lessons learned from recent major urban studies in Bangkok, Ho Chi Minh City and Manila were also discussed in a special session with representatives from the World Bank, the Asian Development Bank (ADB) and the Japan International Cooperation Agency (JICA).

Following the February 2009 workshop, major results and recommendations were summarized and shared with participants, who, in turn, shared the results and information about their workshop experiences with their home institutions. *Cities at Risk* recommendations were also shared by several participants at other relevant workshops and conferences, and a number of publications are being prepared to disseminate results to other audiences.

In response to post-workshop interest from the WBI, START partnered with SEA-START, WBI, Moxie Designs, LEAD International and the Victoria University to facilitate follow-on "Training of Trainers" and adaptation visioning exercises in Bangkok, Thailand in June 2009. Several *Cities at Risk* partners have also submitted a proposal to APN requesting funding to support a two-week training activity that will introduce, review, analyze and apply issues of and tools for risk and vulnerability assessment and mapping in targeted Asian coastal cities. The training will build on the *Cities at Risk* workshop and recent studies sponsored by ADB, the World Bank and JICA.

Results
Cities at Risk workshop interactions initiated a constructive dialogue among participants that increased awareness among urban planning and academic communities of the emerging risks, vulnerabilities and challenges faced by coastal megacities as a result of climate change and climate change impacts. The workshop

was an impetus for action on two fronts. Participants from urban planning and management institutions, enthused by the experience, returned to their home institutions to share information about workshop discussions and experiences and to incorporate new insights and an appreciation for the need for early action into ongoing discussions and city planning. Workshop participants, as a whole, also drafted a set of recommendations that were intended to inform priorities for and development of future *Cities at Risk* programming and initiatives. The workshop's major recommendations are summarized in the non-technical summary and discussed in greater detail in Section 3.1 of this report.

Participants of a series of training and adaptation visioning exercises held in Bangkok as a direct follow-on to the *Cities at Risk* workshop applauded the interactive and creative approach to problem-solving that the activities offered. The exercises facilitated experiences in which participants engaged in characterizing city communities and role-playing to determine options for coping strategies to deal with stresses including climate change hazards. Participants reported that the process forced them to think differently and created a common understanding among all stakeholders. They emphasized that the visioning exercise's focus on planning helped them to better understand that everyone has a role in the planning process, not only government. It was agreed that the storyline / visioning approach enabled participants to become more connected on a personal level to the questions at hand (by combining, e.g., role plays and future storylines) and thus develop scenarios focusing directly on the future communities and people of Bangkok.

Relevance to the APN CAPaBLE Programme and its Objectives

The *Cities at Risk* workshop and follow-on activities were aligned with the CAPaBLE Programme's objectives and preferred activities in that they facilitated capacity building, science-policy-practitioner interfacing, awareness raising, and information dissemination. The activities created arenas for interaction, discussion, and networking that encouraged sharing of knowledge, experience, and scientific information on climate change impacts, vulnerabilities, and adaptation strategies in Asia's coastal megacities.

Self evaluation

The *Cities at Risk* workshop was highly successful. Workshop objectives, sessions and charges to participants were well received. Participants exhibited enthusiasm in their interactions with each other and with the organizers, and communication between several participants and the organizers has continued following the workshop as they collaborate to plan and develop ideas for future programming and activities. The overwhelming interest in and urgent need for additional work that aims to build adaptive capacity for climate change in Asia's coastal megacities is illustrated by participants' calls for immediate, targeted follow-on activities to be followed by a *Cities at Risk II*.

While it was the original intent of project proponents that a team consisting of at least one scientist and one urban planner/policymaker represent each target city at the workshop, the steering committee faced many difficulties in securing direct participation from as many urban management and planning departments (other than Bangkok) as desired. *Cities at Risk* partners believe that these difficulties are a testament to the need to continue awareness raising for urban planning and development that emphasizes the importance of climate change impacts and adaptation and the need for early action.

Potential for further work

Cities at Risk partners intend to learn from the training and adaptation visioning exercises held in Bangkok in June 2009 and broaden the effort so that similar

exercises might be hosted in other major cities considered during the February workshop.

In their deliberations, *Cities at Risk* participants also recommended vulnerability mapping and assessments as a potentially useful tool and practice to inform urban development. In response, several *Cities at Risk* partners collaborated to submit a proposal to APN (through its Special Call for Proposals for a Focused Activity: Scientific Capacity Building for Climate Change Impact and Vulnerability Assessments program) requesting funding to support a two-week training activity that would build on the *Cities at Risk workshop* and recent studies sponsored by ADB, the World Bank and JICA. The follow-on training will introduce, review, analyze and apply issues of and tools for risk and vulnerability assessment and mapping in targeted Asian coastal cities. Additional support will also be sought for small research grants to enable training participants to carry out vulnerability assessments linked to urban and regional development plans for their own cities.

A meeting of the *Cities at Risk* steering committee is tentatively planned for March 2010 in Taipei, Taiwan. The committee, tasked with advancing outcomes of the February workshop, will discuss the follow-on activities described above as well as development of a longer-term, cohesive program of research and capacity building for the region and funding options. In its planning, the committee will also consider participants' call for a *Cities at Risk II* workshop to be held in 2010 or 2011.

Publications

Several publications are in preparation to disseminate *Cities at Risk* results:

- Prof. Roland Fuchs (EWC) is preparing an issues paper entitled, "Cities At Risk: Asian Coastal Cities in an Age of Climate Change", for submission to the EWC's widely circulated *Asia Pacific Issues.*
- Fuchs and others are also preparing a manuscript for submission to *Environment & Urbanization.* The working title of the manuscript is "Adapting to Climate Change in Asia's Coastal Cities: The Challenge for Urban Planners."
- A glossy publication that describes the *Cities at Risk* workshop, its major recommendations and proposed follow-on initiatives (including a brief summary of follow-on training and visioning exercises in Bangkok) is being prepared by START for dissemination at the UNFCCC Conference of Parties (COP) 15 in Copenhagen in December 2009.

Copies of all publications currently under development will be shared with APN when final.

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We would like to acknowledge our gratitude to all workshop collaborators, sponsors, and participants as well as our local workshop hosts at Chulalongkorn University.

Technical Report

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1. Introduction

The Fourth Assessment Report (AR4) of the IPCC underscores the vulnerability of South, Southeast, and East Asian coastal regions to the risks posed by climate change and sea level rise. These include "an accelerated rise in sea level (up to 6 meters or more by 2100), intensification of tropical and extra-tropical cyclones, extreme waves, and storm surges" (Nicholls et al., 2007b). The report also notes that the impact of climate change on coasts will be exacerbated by increasing human-induced pressures from the rapid growth of coastal populations and related infrastructures.

This is especially the case in Asia, which is undergoing unprecedented urban growth that will add substantially to the population residing in its coastal region. The scale of growth in some coastal urban regions has already been extraordinary. For example, the Pearl River Delta, largely agricultural twenty years ago, is now the richest area of China accounting for 33 per cent of the country's exports. Shenzhen, a city of only 300,000 people in 1978, reported a population of 8 million by 2006 (Niu 2009).

Asia's densely populated deltas and mega-deltas and other low-lying coastal urban areas are among those described in the AR4 as "key societal hotspots of coastal vulnerability". These "hotspots" are sites of some of the world's largest mega cities, significant not only from the standpoint of their large populations but also their economic infrastructure and dominant role in national and regional economies. A recent report from the Organisation for Economic Co-operation and Development (OECD) that examines the vulnerability to climate change and sea level rise of some 130 port cities worldwide (Nicholls et al., 2007a) found that approximately half of the total world population threatened by coastal flooding will be located in just ten mega cities, all but one of which is located in Asia.

Because of the built-in momentum of the climate system, the physical risks posed by climate change and sea level rise to Asia's coastal population will continue to grow, even if a dramatic reduction in greenhouse emissions were somehow to occur. Moreover, rather than slowing, climate change appears to be accelerating – recent modelling suggests warming by the end of the century that is more than double previous IPCC estimates. Increases in global temperature are also expected to lead to increasing frequency, intensity and extent of extreme weather events such as typhoons whose generation is closely linked to sea surface temperatures. In turn, risks posed by storms and storm surges will be compounded by increasingly accelerated rates of sea level rise.

With the increase in population in coastal areas, there is increased potential for loss of life and property. In recent years, there have been many incidences of severe flooding particularly when high tides were combined with storm surges and high river flows. Since 1994 half of the global loss of life from flood disasters and 98 percent of the 2 million people affected by floods were in Asia (McGranahan et al. 2007).

Physical risks and vulnerabilities in these regions are often accompanied by a deficit of adaptive capacity (i.e., the ability to cope with the risk and vulnerabilities posed by climate change) as the cities generally lack needed financial, human and institutional resources as well as access to relevant scientific information.

Despite urgent threats posed by the combination of sea level rise and climate change, local governments and the international development community have not as yet seriously considered the implications of climate change and sea level rise on rapidly growing coastal populations and infrastructure. This demands urgent attention to risk and vulnerability assessment, awareness raising and integration of science into planning and policy for the potentially affected areas.

In response, the global change SysTem for Analysis, Research and Training (START) and the East-West Center (EWC), together with other partners and supported, in part, by the present grant from the Asia-Pacific Network for Global Change Research (APN), collaborated to design and host a workshop entitled, "Cities at Risk: Developing Adaptive Capacity for Climate Change in Asia's Coastal Mega Cities". The *Cities at Risk* workshop brought together scientists, urban planners and officials and representatives of disaster management and development agencies in order to:

- Review the most recent science findings and projections of climate change impacts on Asian coastal cities
- Enhance awareness on the part of urban officials of the need to take early action
- Examine vulnerabilities and major threats in selected cities (e.g., infrastructure, economic assets and livelihoods, population and health)
- Consider adaptation and response measures and the integration of climate risk information with urban planning and disaster management
- Improve networking and communication between scientists, urban managers, and disaster agencies to enhance capacity in coastal megacities
- Consider future measures and activities to develop adaptive capacity in Asia's coastal cities, including scientific and technical capacity building, research, and new coalitions/alliances of individuals, scientists, practitioners, and governments.

Preparations for and facilitation of the *Cities at Risk* workshop are described is further detail in Section 2 of this report. Workshop results and recommendations, including a call for and recent implementation of city-specific workshop follow-on activities, are discussed in Section 3. Project conclusions are summarized in Section 4 of this report, and future directions are considered in Section 5.

2. Methodology

The *Cities at Risk* workshop was organized by START, the EWC and Ibaraki University/ Integrated Research System for Sustainability Science (IR3S) (Japan). Additional collaborators included the World Climate Research Program (WCRP), the ICSU Regional Office for Asia and the Pacific, the IHDP Urban Global Environmental Change (UGEC) project, the Monsoon Asia Integrated Regional Study (MAIRS) and the Asian Development Bank (ADB). Local workshop host was the Southeast Asia START Regional Research Center (SEA-START). A brief workshop prospectus, created by the organizers and circulated prior to the event, is available for download on the START website (visit http://start.org/programs/cities-at-risk) and from APN.

2.1 Development of the workshop program

Prior to the workshop, a *Cities at Risk* steering committee, comprised of representatives from START, the EWC, Ibaraki University/IR3S and SEA-START developed a detailed workshop program that included plenary presentations, panel discussions and breakout working group sessions. The workshop was organized to targeted the following cities: Dhaka (Bangladesh), Shanghai and Hong Kong /Shenzhen/Guangzhou (China), Mumbai and Calcutta (India), Jakarta (Indonesia), Karachi (Pakistan), Manila (Philippines), Bangkok (Thailand) and Ho Chi Minh City (Vietnam). A copy of the workshop program is included in Appendix 1 of this report.

As anchors of the workshop program, plenary sessions were intended to provide background for and to stimulate participant discussion. Plenary sessions were clustered according to following themes:

1. Cities at Risk: Increasing Population Exposure
2. Increasing Risks from Sea Level Rise and Climate Change
3. Analyzing, Mapping and Understanding Vulnerability: Knowledge Tools
4. Adaptation and Risk Management
5. Integrating climate risk adaptation and urban and development planning

When possible, presentations were expected to reflect case studies specific to low-lying deltas and urban areas in the Asia-Pacific region.

Four workshop panels, comprised of 5-6 discussants each, were designed to give the floor to representatives from municipal governments, planning agencies, research institutes and/or universities in the workshop's targeted cities. Panelists were provided with a list of "starter" questions prior to the workshop and were asked to offer brief comments that addressed one or more of the questions – from the perspective of their city and experiences therein – before discussion was opened to the plenary. Each panel targeted a different theme. Panel 1 was designed as an introductory roundtable discussion with representatives from several of the workshop's targeted cities about current climate-related risks, vulnerabilities and analytical capacities. Panel 2 would investigate information needs, opportunities and constraints, particularly from the perspective of practitioner communities. Panel 3 discussions would focus on options, strategies and constraints with respect to adapting to climate change in Asia's coastal megacities. Panel 4 would briefly considered financial challenges and opportunities with respect to adaptation and development.

Four working groups were created to provide the opportunity for focused discussions of key questions addressed at the workshop, while taking into account the points raised by presenters, panelists, and discussants. Each group was assigned a chair and rapporteur and was tasked with responding to one of the following questions:

1. *How can risks arising from the combined effects of sea level rise, climate change, and coastal settlement be best defined and characterized at the urban level in terms useful to planners and officials?*
2. *How can vulnerabilities (e.g., population, infrastructure, economic activity and livelihood, health, etc.) best be determined and portrayed, and what is the critical information required by planners and policy-makers? Additionally, how should required information be communicated?*
3. *How can appropriate adaptation measures best be identified, evaluated, and prioritized?*
4. *How can adaptation and climate risk management best be mainstreamed and implemented in urban development planning and governance?*

Each Working Group was expected to summarize its key recommendations in response to the questions posed as well as concrete recommendations for priority action in the form of future research, assessments, capacity building, and/or networking to enhance capacity building in Asia's coastal cities at risk. Working groups would report their recommendations during the final day of the workshop.

Major recommendations and outcomes of the workshop are discussed in Section 3.

2.2 Selection of workshop participants

As the workshop program was being developed, steering committee members, with input from collaborating organizations, regional and international scientists with expertise in targeted topics and partners in START regional centers in Asia, identified the most appropriate presenters, discussants and panelists for each workshop session. Nearly 80 scientists, researchers, urban planners and practitioners and representatives from disaster management and development

agencies participated in the three-day workshop. Participants represented institutions in Bangladesh, Thailand, Pakistan, Vietnam, Australia, Indonesia, Fiji, India, Japan Malaysia, Taiwan, Philippines, China, Germany, Canada and the USA. The workshop's participant list is included in Appendix 1 of this report. Approximately 30-40 additional representatives from interested national, regional and multi-lateral organizations in Bangkok also joined workshop sessions during an open forum on Day 1.

Participation in the entirety of the workshop was by invitation only so as to maintain manageable plenary and working group sizes that both permitted and encouraged discussion and interaction amongst all participants. Every participant played a role in workshop facilitation in some way (e.g., as a presenter, discussant, panel member, rapporteur, session chair), and all participants were expected to actively participate in one of the four working groups.

While it was the original intent of project proponents that a team consisting of at least one scientist and one urban planner/policymaker represent each target city at the workshop, the steering committee faced many difficulties in securing direct participation from as many urban management and planning departments (other than Bangkok) as desired. While several such representatives did attend, workshop organizers encouraged discussion of best strategies for communicating with and confirming involvement of other such colleagues in future programming and activities.

2.3 Organization and management of workshop logistics

SEA-START, as the local workshop host, collaborated with the International START Secretariat and EWC in managing workshop logistics. Workshop organizers at START and the EWC communicated with presenters and panelists to guide their preparations for workshop input. SEA-START interacted with Chulalongkorn University and the Montien Hotel, Bangkok to reserve, confirm and resolve conflicts with meeting venues and participant accommodations. Most participants' travel, DSA payments and other workshop-related reimbursements were managed by the International START Secretariat. Those individuals whose workshop participation was supported by Ibaraki University communicated directly with Ibaraki representatives in preparing and confirming their travel and related expenses. Organizers at the EWC and the International START Secretariat managed workshop follow-up with respect to synthesis of working group and rapporteur reporting.

Members of the workshop steering committee actively participated in workshop sessions, and at the conclusion of the workshop the committee was tasked with investigating, pursuing and expanding recommendations for future programming and activities.

2.4 Conduct of the Cities at Risk workshop

The *Cities at Risk* workshop was held 26-28 February 2009 in Bangkok, Thailand. Workshop sessions were hosted at the Chulalongkorn University and at the Montien Hotel, Bangkok. A Summary of Workshop Proceedings is included as Appendix 2 of this report.

2.5 Preparation and dissemination of workshop results

Following the February 2009 workshop, major results and recommendations were summarized and shared with participants, who, in turn, shared the results and information about their workshop experiences with their home institutions. Several participants contacted the workshop organizers after returning home, eager to share the good news that results were well received. Dr. Zhan Tian Zhan and Dr. Baode Chen, for example, workshop participants from the Shanghai Climate Center

and the Shanghai Typhoon Institute, respectively (both part of the Chinese Meteorological Administration - CMA), shared workshop experiences and recommendations with their home institution colleagues upon returning from Bangkok. Their insights directly informed a lecture given by the director of CMA to the Shanghai government on 26 May 2009; the lecture was entitled, "Attaching importance to challenges of global climate change and strengthening urban capacity building" (translated). In his lecture, the director explained the effects and trends of climate change within the world, China, the Yangtze Delta and Shanghai and analyzed progress of the international community in coping with climate change as well as challenges and opportunities for and within China. Drs. Tian Zhan and Chen informed workshop organizers that the lecture was well received by government officials and that there are now plans to organize related activities as part of the Shanghai 2010 Expo.

Workshop experiences and results were also shared by several participants at other relevant workshops and conferences. Insight from the *Cities at Risk* experience figured prominently in urban adaptation and resilience discussions at the IHDP Open Meeting 2009 in Bonn, Germany courtesy of *Cities at Risk* organizers from START (Hassan Virji and Clark Seipt) and representatives from IHDP UGEC (Karen Seto and Michail Fragkias). *Cities at Risk* Steering Committee members Anond Snidvongs (SEA-START) and Hassan Virji participated in the DRAGON Asia Summit held 22-25 June 2009 in Siem Reap, Cambodia. The purpose of the summit was to forge new global partnerships to develop the science needed to inform decision making in the Mekong, Mississippi, and other large river and delta systems around the globe. In a presentation to the summit's plenary, Dr. Snidvongs discussed global environmental changes in the Asian coastal-urban zone and emphasized an urgent call for action. Workshop recommendations were also discussed by participants of an adaptation visioning exercise hosted by START and several partners in June 2009 in Bangkok (see Section 2.6).

Created as a go-to point for others interested in learning more about the initiative, a *Cities at Risk* webpage was developed on the START website. The webpage provides a summary of the workshop and its major recommendations and will offer periodic updates as to follow-on activities and future opportunities. Workshop materials (e.g., the workshop program, presentations, participant list) are also available for download on the site.

Ms. Perlyn Pulhin, who represented APN at the workshop, summarized her experiences in an article in the May 2009 APN Newsletter. Workshop organizers were recently invited to submit a second newsletter article that summarizes major recommendations and follow-on activities; the article is in preparation and is expected to appear in the newsletter in late 2009 or early 2010.

Several publications are also in development to disseminate *Cities at Risk* results:

- Roland Fuchs (EWC) is preparing an issues paper entitled, "Cities At Risk: Asian Coastal Cities in an Age of Climate Change", for submission to the EWC's widely circulated *Asia Pacific Issues.*
- Fuchs and others are also preparing a manuscript for submission to *Environment & Urbanization.* The working title of the manuscript is "Adapting to Climate Change in Asia's Coastal Cities: The Challenge for Urban Planners."
- A glossy publication that describes the *Cities at Risk* workshop, its major recommendations and proposed follow-on initiatives (including a brief summary of follow-on training and visioning exercises in Bangkok) is being prepared by START for dissemination at the UNFCCC Conference of Parties (COP) 15 in Copenhagen in December 2009.

Copies of all publications currently under development will be shared with APN when final.

2.6 Identification of follow-on activities

One of the workshop's recommendations for action was that city-based scenario/storyline activities be an immediate follow-on to the February activities. In response, START partnered with SEA-START, the World Bank Institute (WBI), Moxie Designs, LEAD International and Victoria University to facilitate a "Training of Trainers" and adaptation visioning exercise in Bangkok, Thailand in June 2009. The training exercise introduced a group of eleven facilitators (most of whom were from institutions in Thailand, Philippines, Indonesia and Vietnam and were selected for participation based on their contributions to the February Cities at Risk workshop) to the concept of people-centered narratives/storylines. The storyline activities were designed to enable scenario building and visioning in cities affected by climate change. The training was followed by a storyline visioning exercise for the city of Bangkok, which engaged participants from the Bangkok City and Governor's offices in a participatory and dynamic visioning activity aimed at mainstreaming climate change considerations into city development planning and policy. More information about the training and visioning exercises in Bangkok is provided in Section 3 of this report. *Cities at Risk* partners intend to learn from the Bangkok experience and broaden the effort so that similar exercises might be hosted in other major cities considered during the February workshop.

Cities at Risk discussions also acknowledged a general lack of awareness, on the part of urban officials, of the magnitude of growing risks and vulnerabilities confronting Asian megacities. Where risks are recognized, there is believed to be a tendency of urban agencies to underrate such risks in light of other more pressing and immediate concerns. As such, participants recommended risk and vulnerability assessments as a potentially useful tool and practice to inform urban development. In response, several *Cities at Risk* partners collaborated to submit a proposal to APN (through its Special Call for Proposals for a Focused Activity: Scientific Capacity Building for Climate Change Impact and Vulnerability Assessments program) requesting funding to support a two-week training activity that would build on the *Cities at Risk* workshop and recent studies sponsored by ADB, the World Bank and JICA. The follow-on training will introduce, review, analyze and apply issues of and tools for risk and vulnerability assessment and mapping in targeted Asian coastal cities. Additional support will also be sought for small research grants to enable training participants to carry out vulnerability assessments linked to urban and regional development plans for their own cities.

A meeting of the *Cities at Risk* steering committee is tentatively planned for March 2010 in Taipei, Taiwan. The committee, tasked with advancing outcomes of the February workshop, will discuss the follow-on activities described above as well as development of a longer-term, cohesive program of research and capacity building for the region and funding options. In its planning, the committee will also consider participants' call for a *Cities at Risk II* workshop to be held within two years (i.e., in 2010 or 2011).

3. Results & Discussion

3.1 Workshop recommendations

Cities at Risk workshop interactions initiated a constructive dialogue among participants that increased awareness, on the part of both urban and academic communities, of the emerging risks, vulnerabilities and challenges faced by coastal megacities as a result of climate change and climate change impacts. The workshop was an impetus for action on two fronts. Participants from urban planning and

management institutions, enthused by the experience, returned to their home cities to share information about workshop discussions and experiences and to incorporate new insights and an appreciation for the need for early action into ongoing discussions and planning in their cities. Workshop participants, as a whole, also drafted a set of recommendations that were intended to inform priorities for and development of future *Cities at Risk* programming and initiatives. The workshop's major recommendations are summarized in the bullets below.

1. ***Recognize the urgent need to address the disconnect between the geographic and time scales at which the scientific and planning / policy communities are working.***

   The context in which climate change is understood by the science and urban planning communities must be understood and attempts made to reconcile differences. For example, some urban development and planning institutions see climate change as a rural issue that affects cities only via forced migration of rural residents to urban areas, thereby putting stress on cities. Awareness raising as to the multitude of direct and indirect impacts of climate change on urban landscapes and populations, and related vulnerabilities, must be prioritized. In addition, while adaptation often begins locally, it is imperative to remember that action and response in one place influence and are influenced by actions and response in another place (e.g., upstream / downstream interactions in Vietnam). As such, risk management and adaptation efforts must be scaled up to the national and regional levels.

   The disconnect between science and planning / policy communities is also fuelled by the different time scales at which information is provided and decisions are made. Immediate and pressing concerns require the attention of city managers on a day-to-day basis; longer-term concerns are recognized, but relatively shorter-term decisions often demand priority. The scientific community provides information and recommendations with respect to projected climate impacts that often are not suitable for the time horizons at which planning and development decision-making occurs. Workshop participants recommended that the scientific community work toward higher resolution and shorter time scales in the information and recommendations that they provide; at the same time, planners and policy-makers must try to lengthen their time horizons.

2. ***Encourage the urban planning community to take a comprehensive view of climate risks, including variability.***

   It is evident that within urban planning there is uncertainty in understanding climate change versus climate variability. This challenge is likely rooted, at least in part, in the disconnect between the time scales at which science and planning communities tend to operate, as described above. A comprehensive approach to risk management and adaptation that starts with consideration of practical experiences in addressing climate variability (of which there are a considerable number of examples, particularly for long-established cities) and then inputs relevant lessons learned into an approach towards addressing longer-term climate impacts and changes is recommended. Understanding the stresses that affect cities at the present and how resultant vulnerabilities can be reduced can be an entry point for longer-term planning and adaptation.

3. ***Recognize and promote the importance of identifying an "entrepreneur" in urban governments to help make climate change a priority.***

   Recognition of the importance of climate change and of the need to include considerations of climate variability and change impacts in all planning and development decisions is what is required to advance adaptation in cities. As evidenced in other fields such as emergency management, an important aspect of addressing climate change will be the presence of an "entrepreneur" or hero within the city management structure. Such a person will recognize the importance of climate change and climate change adaptation, will have a strong knowledge base to draw upon and will be positioned in the government (e.g., either as an elected or senior official) such that s/he has the influence and the time to make climate change a priority in planning and development. In places where governments have already begun to incorporate climate change into planning, there is often such an individual – someone who goes above and beyond to push the climate change agenda forward. Workshop participants emphasized that more of such climate change entrepreneurs should be encouraged, their skills and resources should be strengthened and opportunities that promote networking between the individuals as well as their institutions and governments should be organized.

4. ***Acknowledge knowledge gaps and invest in learning strategies.***

   There is need for new approaches to generate policy-relevant, integrative science that is suitable for input into appropriate scales of decision-making for urban planning and development. Both the science and urban planning communities need to examine and better understand how cities develop, how climate change will impact their development, critical thresholds for coastal flooding and potential response options and strategies. Consequently, analysis of the status of knowledge and needs in cities and of current progress in understanding and addressing adaptation can lead to identifying opportunities for addressing needs. Adaptation planning must also include review of existing development plans and strategies to consider how future climate might impact development options and recommendations for future policy options. Workshop participants identified knowledge about vulnerability interactions, research into resilience indicators and monitoring and evaluation of adaptation practices as gaps previously identified in their own work.

   A series of case studies that enable comprehensive assessment of the adaptive capacity of cities and changes in such through improvements upon existing development plans are recommended. Case studies could span a variety of cities and countries and explore the influence of different levels of economy, different governance structures and mechanisms, and so on. Examples of good governance for adaptation could be identified and lessons shared. Recommended case studies could be incorporated into a program of collaborative research, encored in national training and research institutes and with components that strengthen and encourage networking and linkages with regional and international institutions.

5. ***Move from the traditional top-down impacts modelling approach to a critical threshold approach.***

   There has traditionally been a "top down" approach to climate change impacts and vulnerability assessments where global models are downscaled to illustrate projected regional and smaller-scale changes. An alternative approach starts from present urban climate and an understanding of the

impacts of present climate and then investigates how changes or shifts in the climate will stress the city. This approach aids in identifying and assessing critical outcomes and thresholds of the city; factors that result in scenarios in which those thresholds are crossed can also be identified. Through examination of vulnerabilities, thresholds and sensitivities, dependence on detailed downscaled data can be obviated and actions can still be taken based on a risk management and precautionary principle approach.

6. ***Communicate science, and vulnerability in particular, more effectively.***

   There is a gap between the people who produce the scientific knowledge that informs adaptation and the people who need and/or apply that knowledge. While there is persistent need for data and information of high quality and consistency (and monitored by internationally set standards), better communication is also needed to promote more effective integration of climate change into the development agenda. Managing communications and presenting uncertainties in consistent ways are of particular importance.

   It is of utmost importance that there be stakeholder involvement in risk and vulnerability assessments so as to promote understanding of the dynamic processes that underlie and influence related decision-making. Workshop participants adamantly called for the facilitation of a series of visioning / storyline / scenario exercises to help cities better understand and make choices with respect to vulnerability pathways. Such activities are expected to engender communication and interaction for more effective integration of climate change into development. Workshop participants identified city-specific visioning / storyline activities as immediate, practical follow-up activities to the *Cities at Risk* workshop within the next several months.

7. ***Urgently build capacity for individual and institutional participation in responding to climate change in Asia's coastal megacities.***

   Innovative activities and initiatives are needed that encourage and enable the participation and contribution of a variety of stakeholders (individuals and institutions) in an informed urban planning and development process. Enhancing local expertise in cities for climate risk management should be a priority; future capacity building and training workshops to enhance such expertise (targeting e.g., risk and vulnerability assessment and mapping) are critical. Institutions should be strengthened to promote peer-to-peer learning. Networking and cooperation amongst megacities, particularly those most vulnerable to climate change impacts and risks, is recommended to strengthen access to knowledge and financial resources. Additionally, future *Cities at Risk* programming would be remiss to not share experiences and interact with existing networks and alliances concerned with urban development in the Asia-Pacific region.

8. ***Understand that effective governance at the <u>systemic level</u> is essential in mainstreaming adaptation strategies.***

   Institutions power the mechanisms of mainstreaming adaptation into urban development, and that power is concentrated heavily in the hands of governments. Governments at different levels (e.g., local, district, state / provincial, national) must act in an effective and timely fashion to address climate change issues and adaptation measures. And action must be proactive, not reactive. Roles and responsibilities at different levels should be streamlined to clarify who does what and how actions are to be harmonized. Implementation of adaptation measures as part of development

plans can be encouraged and/or ensured via incorporation of priorities in appropriate legislation. In turn, governments must ensure effective implementation of existing and new legislation.

Governments at various levels must also strive to enhance the capacity of the institutions that implement adaptation strategies. Targeted efforts might include convergence of public and private sector strengths and resources; enhancing the capacity of urban local governments to provide urban shelters and services to vulnerable groups and to protect the urban environment; expansion of democratization of governance processes and decentralization of responsibilities to urban local governments to improve implementation of national policy, planning and strategies; facilitation of civil society participation in local decision-making processes; strengthening government and civil society relations and including bottom-up approaches to risk and vulnerability assessments; and inclusion and prioritization of transparency and accountability mechanisms in urban planning and development.

3.2 Immediate workshop follow-on activity: Training and visioning exercises in Bangkok, Thailand

On 14-20 June 2009, following a post-workshop offer from WBI, START partnered with SEA-START, the WBI, Moxie Designs, LEAD International and Victoria University to facilitate a "Training of Trainers" and adaptation visioning exercises in Bangkok, Thailand. Unspent APN funds, originally intended to support the February workshop, were approved for use in co-funding the June exercises.

First, a two-day training exercise introduced a group of eleven facilitators (most of whom were from institutions in Thailand, Philippines, Indonesia and Vietnam and were selected for participation based on their contributions to the February Cities at Risk workshop) to the concept of people-centered narratives/storylines. The storyline activities were designed to enable scenario building and visioning in cities affected by climate change. Through role-playing and development of various scenarios for city communities, participants identified options for coping strategies to deal with stresses including climate change hazards. The training allowed the new facilitators to become not only knowledgeable about climate change specific issues affecting their cities but also to gain an appreciation for facilitating participatory engagement of city administration, private sector and civil society stakeholders in envisioning future challenges and possible outcomes of various coping strategy choices.

The training was followed by a three-day storyline visioning exercise, organized specifically for the city of Bangkok, which engaged participants from the Bangkok City Administration and Governor's offices in a participatory and dynamic visioning activity aimed at integrating climate change considerations into city development planning and policy by distilling out potential actions that might be appropriate under various conditions to sustain city operations and services. The participants were exposed to development approaches being taken elsewhere at both local levels and within the private sector and were engaged in role play and group exercises to highlight the need for attitudinal and behavioral changes and anticipatory actions needed to mainstream climate change considerations. The participants visualized various situations of climatic hazards and developed different options and actions to adapt or cope with the changes. The facilitators trained in the visioning approach earlier in the week helped to facilitate the Bangkok exercises.

Participants of the visioning exercises applauded the interactive and creative approach to problem solving that the workshop offered. Both trainers and facilitators unanimously reported that the process forced them to think differently and created a common understanding among all stakeholders. All participants were given an equal chance to participate, and particular encouragement was given to

the younger participants to speak up. Participants also emphasized that the visioning exercise's focus on planning helped them to better understand that everyone has a role in the planning process, not only government. It was agreed that the storyline / visioning approach enabled participants to become more connected on a personal level to the questions at hand (by combining role plays and future storylines) and thus develop scenarios focusing directly on the future communities and people of Bangkok.

Cities at Risk partners intend to learn from the Bangkok experience and to broaden the effort so that similar exercises might be hosted in other major cities considered during the February workshop. The enthusiastic response of the facilitators and the Bangkok participants lends confidence that modified events in other Southeast Asian cities would be most worthwhile.

A more detailed report about the June exercises, including participant lists, accompanies this report under separate cover.

3.3 Importance of workshop results and remaining knowledge gaps

Via discussion during its comprehensive and targeted series of plenary presentations, the Cities at Risk workshop succeeded in increasing the awareness and expanding the understanding of representatives from both science and urban planning and management communities of the emerging risks and vulnerabilities of coastal megacities to projected climate change. In considering strategies for increasing integration of climate risk information with urban planning, development and disaster management, workshop participants specifically emphasized communication challenges between the scientific, planning and practitioner communities – challenges that must be addressed to permit more targeted knowledge generation and exchange and more informed decision-making. Workshop calls for enhanced understanding of the different contexts in which scientists and decision-makers consider and apply information about climate change underscore this persistent need for increased interaction and improved communication between the communities. Workshop participants identified specific mechanisms and activities believed to foster improved knowledge exchange and greater adaptive capacity in Asia's coastal cities.

The Cities at Risk workshop and follow-on exercises in Bangkok provided opportunities for networking among scientists and urban officials and planners. By bringing together key stakeholders under a common umbrella, the activities contributed to the sharing of critical knowledge and experiences among participants and helped lay a foundation for future communication and exchange. In addition, the collaborative partnerships that were initiated and/or strengthened in the implementation and facilitation of the workshop and follow-on exercises served to bring increased visibility to the related activities and outputs of participating organizations, to strengthen and grow their networks and to enhance communication between the organizations themselves, all of whom are working on urbanization and related climate change risks in the Asia-Pacific. This initial *Cities at Risk* collaborative effort was platform on which to found future activities on climate-related risks and adaptation in the region.

In preparing for the *Cities at Risk* workshop, organizers had hoped for more tangible recommendations from participants as to practical steps forward, post-workshop, than were received. For those recommendations that were offered, even more detailed guidance from stakeholders as to best strategies for implementation will be solicited in the future. For example, needs assessments/analyses in cities were recommended as possible first steps in moving efforts to the city scale. More input would be needed – especially from different stakeholders in the cities – before such activities can be realized, however. Future questions to be asked include: How are such assessments best initiated and implemented? What are the resource

requirements? Who should be involved? How can such analyses be embedded in development agendas within cities?

With respect to identifying a specific plan for garnering increased interest, input and direct participation from urban planning and management agencies in these and future activities, workshop recommendations failed to include a comprehensive plan of action but did identify a number of activities that could be first steps towards increased participation (e.g., city-specific visioning exercises, case studies, additional capacity building and training workshops). The importance of such participation and input in future programming was acknowledged time and again, and participants did encourage consideration of incentives for participation as well as the need to be mindful of timing (e.g., not planning activities during monsoon season). Participants also emphasized the importance of continued awareness raising that encourages urban managers and planners to consider climate change and related risks as a present threat and a priority that merits early action.

During both the workshop and its follow-on exercises in Bangkok, there was much discussion about needs for future research and increased and improved communication between science and practitioners. *Cities at Risk* organizers acknowledge that there remains a tremendous research gap in the Asia-Pacific and that investment in research, particularly on urban vulnerabilities and adaptation, is needed. The organizers also acknowledge that effective, multi-directional communication between all relevant stakeholders is required.

Goals of advancing adaptive capacity for climate change in Asia's coastal cities cannot be achieved by targeting only one pathway, however. Just as effective governance at the systemic level is essential for mainstreaming adaptation strategies into urban planning and management, an effective, systematic approach to enhancing adaptive capacity will require sustained collaborative efforts between the research, science, education, policy and decision-making communities.

4. Conclusions

The *Cities at Risk* workshop brought together scientists, urban planners and officials, and representatives of disaster management and development agencies to review scientific findings and projections regarding climate-related risks (e.g., sea level rise, extreme climate events, intensification of storms and storm surges) for Asia's coastal megacities. Participants examined potential vulnerabilities and current coping mechanisms, including possible planning and governance mechanisms that better integrate science information, planning, development, and disaster management. Workshop participants also considered means for improving networking and communication among urban planners/officials and the scientific community in order to enhance urban resilience and adaptive capacities.

Workshop discussion generated the following major recommendations:

1. *Recognize the urgent need to address the disconnect between the geographic and time scales at which the scientific and planning / policy communities are working*
2. *Encourage the urban planning community to take a comprehensive view of climate risks, including variability.*
3. *Recognize and promote the importance of identifying an "entrepreneur" in urban governments to help make climate change a priority.*
4. *Acknowledge knowledge gaps and invest in learning strategies.*
5. *Move from the traditional top-down impacts modelling approach to a critical threshold approach.*
6. *Communicate science, and vulnerability in particular, more effectively.*
7. *Urgently build capacity for individual and institutional participation in*

responding to climate change in Asia's coastal megacities.

8. *Understand that effective governance at the systemic level is essential in mainstreaming adaptation strategies.*

Workshop follow-on activities are already underway and the *Cities at Risk* steering committee will meet in early 2010 to discuss development of future programming for developing urban adaptive capacities to integrate science and policy in managing climate risks in Asia's coastal megacities. Recommendations from the *Cities at Risk* workshop as well as sustained interaction with workshop participants and their home institutions will inform programming design and priorities.

5. Future Directions

The *Cities at Risk* workshop was an initial step in what is intended to be a longer-term set of activities for developing urban adaptive capacities and integrating science and policy in managing climate risks in Asia's coastal megacities. Future activities, as part of coordinated programming and networking, are expected to include additional city-specific exercises (e.g., visioning / storyline activities, needs assessments, training exercises), development of resource materials, hands-on thematic training courses for young scientists and practitioners, and advanced workshops and institutes (including a *Cities at Risk II* within two years time).

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Appendix 1: Workshop Materials

CITIES AT RISK:

BUILDING ADAPTIVE CAPACITY FOR MANAGING CLIMATE CHANGE IN ASIA'S COASTAL MEGACITIES

26-28 February 2008
Chulalongkorn University - Bangkok, Thailand
Montien Hotel – Bangkok, Thailand

Workshop Program

WEDNESDAY, 25 FEBRUARY 2009

Montien Hotel Bangkok

5:00 p.m. – 7:00 p.m.	*Registration of workshop participants*

THURSDAY, 26 FEBRUARY 2009

Room 105, Maha Chulalongkorn Building, Chulalongkorn University

8:15 a.m.	**Bus departs for Chulalongkorn University**
8:30 a.m. – 9:00 a.m.	*Registration of workshop participants (continued)*
9:00 a.m. – 10:15 a.m.	**Opening Session** **Chair: Dr. Nancy Lewis, East-West Center** **Rapporteur:** *Philip Estermann, East-West Center*
9:00 a.m. – 9:30 a.m.	**Welcome on behalf of sponsors and local hosts** *Dr. Hassan Virji, START* *Prof. Nobuo Mimura, Ibaraki University/IR3S* *Ms. Perlyn Pulhin, APN* *Prof. Nordin Hasan, ICSU ROAP* *Dr. Banasopit Mekvichai, Chulalongkorn University*
9:30 a.m. – 9:45 a.m.	**Workshop Objectives and Expectations** *Prof. Roland Fuchs, East-West Center*
9:45 a.m. – 10:15 a.m.	**Keynote Address:** *Towards Urban Adaptation Planning: The Challenges* *Ian Burton, Professor Emeritus, University of Toronto*

10:15 a.m. – 10:45 a.m.	*Tea and coffee break*
10:45 a.m. – 12:15 p.m.	**Helping to Meet the Challenge: An Introduction to the World Bank, ADB, and JICA Urban Adaptation Studies** *Dr. Warren Evans, The World Bank* *Dr. Jay Roop, Asian Development Bank* *Ms. Megumi Muto, Japan International Cooperation Agency*
12:15 p.m. – 1:30 p.m.	*Lunch*
1:30 p.m. – 2:20 p.m.	**Cities at Risk: Increasing Population Exposure** **Chair: Dr. Om Prakash Mathur, National Institute of Public Finance and Policy, India** **Rapporteur:** *Dr. Michail Fragkias, IHDP*
1:30 p.m. – 1:55 p.m.	**Current and projected populations at risk: Dynamics of Asian urban population growth in low elevation coastal zones** *Dr. Marc Levy, CIESIN*
1:55 p.m. – 2:20 p.m.	**Case Study: Dynamics of Growth in the Pearl River Delta** *Prof. Karen Seto, IHDP UGEC, Yale University*
2:20 p.m. – 3:35 p.m.	**Increasing Risks from Sea Level Rise and Climate Change** **Chair: Prof. Gordon McBean, Chair of the ICSU Program on Integrated Research on Disaster Risk (IRDR)** **Rapporteur:** *Mr. Norio Saito, ADB*
2:20 p.m. – 2:45 p.m.	**Sea Level Rise and Coastal Vulnerabilities** *Prof. Nobuo Mimura, Ibaraki University/IR3S*
2:45 p.m. – 3:10 p.m.	**Extreme Events** *Prof. Michael Manton, Monash University*
3:10 p.m. – 3:35 p.m.	**Estimating Risk Probabilities** *Dr. Roger Jones, Centre for Strategic Economic Studies, Victoria University*
3:35 p.m. – 4:00 p.m.	*Tea and Coffee Break*

4:00 p.m. – 4:45 p.m.	**Discussion: Increasing Population Exposure and Increasing Risks** *Brief comments (5-7 minutes) from Discussion Commentator followed by discussion from the floor.* *Commentator: Prof. Akimasa Sumi, University of Tokyo and Prof. Rusong Wang, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences*
4:45 p.m. – 5:45 p.m.	**Panel 1: Cities at Risk – Asia's Coastal Megacities** **Chair: Dr. Allen Clark, East-West Center** **Rapporteur:** *Nicole Milne, University of Hawaii* **Panel Members:** 1. Dr. Masahiro Sugiyama, *Univ. of Tokyo & Advisor, JICA Manila study* 2. Dr. Banasopit Mekvichai, *Chulalongkorn Univ. & formerly BMA, Bangkok* 3. Dr. Baode Chen, *Shanghai Typhoon Institute / CMA* 4. Dr. Do Minh Duc, *Hanoi University of Science, Vietnam* 5. Dr. M.C. Wong, *Hong Kong Observatory* *A roundtable discussion with representatives from several of the workshop's targeted cities about awareness and estimation of risks in their cities, perceived vulnerabilities, existing analytical capacities for modeling, risk estimation, and downscaling, and programming and/or projects in place to address the risks and vulnerabilities.*
5:45 p.m. – 6:00 p.m.	**Looking Ahead: Day 2**
6:00 p.m.	**Bus back to the hotel**
6:00 p.m. – 7:30 p.m. **7:00 p.m. – 7:30 p.m.**	*Break* **Meeting with Working Group Chairs and Rapporteurs** (*at hotel*)
7:30 p.m.	**Dinner Reception,** Montien Hotel Bangkok

FRIDAY, 27 FEBRUARY 2009

Montien Hotel Bangkok

8:00 a.m. – 8:10 a.m.	**Announcements and Review of Day 1**

8:10 a.m. – 11:45 a.m.	**Analyzing, Mapping and Understanding Vulnerability: Knowledge Tools** **Chair: Dr. Joern Birkmann, UNU/EHS** **Rapporteur:** *Dr. Upasna Sharma, TERI*
8:10 a.m. – 8:35 a.m.	**Overview: Improving the links between science and practice – Managing floods in urbanizing regions** *Dr. Louis Lebel, Chiang Mai University, Thailand*
8:35 a.m. – 9:35 a.m.	**Panel 2: Information Needs, Opportunities, and Constraints** **Chair: Dr. Dushmanta Dutta, Monash University** **Rapporteur:** *Dr. Geoffrey Blate, WWF* **Panel Members:** 1. Mr. Moshiuzziman Khan, *Khulna City Corporation, Bangladesh* 2. Dr. Tommy Firman, *Institute of Technology, Jakarta* 3. Dr. Dinh Tuan Nguyen, *HCMC Environmental Protection Agency* 4. Prof. Lin Feng-Tyan, *National Taiwan University, Taipei* 5. Prof. Emma Porio, *Ateneo de Manila Univ. and JICA Manila study* *A discussion with representatives from practitioner communities about the current status of information and data availability; perceived needs; and potential opportunities and constraints.*
9:35 a.m. – 10:00 a.m.	*Tea and Coffee Break*
10:00 a.m. – 10:25 a.m.	**Measuring and mapping livelihood and socio-economic vulnerabilities** *Dr. Susan Cutter, University of South Carolina*
10:25 a.m. – 10:50 a.m.	**Critical infrastructure and economic vulnerabilities analysis Case Study: Manila** *Ms. Megumi Muto, JICA and Project Leader of JICA Manila study*
10:50 a.m. – 11:15 a.m.	**Communicating Risk: Simulating and visualizing urban flooding - Ho Chi Minh City, Vietnam** *Dr. Anond Snidvongs, Chulalongkorn University and Advisor to the ADB Ho Chi Minh City study*
11:15 a.m. – 11:45 a.m.	**Discussion** *Brief comments (5-7 minutes) from Discussion Commentator followed by discussion from the floor.* *Commentator: Dr. Bach Tan Sinh, National Council for Science and Technology Policy, Vietnam*

11:45 a.m. – 12:45 p.m.	*Lunch*
12:45 p.m. – 2:20 p.m.	**Adaptation and Risk Management** **Chair: Dr. Kris Ebi, EES, LLC** **Rapporteur:** *Ms. Perlyn Pulhin, APN Secretariat*
12:45 p.m. – 1:05 p.m.	**Knowledge and capacity for climate risk management** *Dr. Habiba Gitay, The World Bank Institute*
1:05 p.m. – 1:30 p.m.	**Adaptation in Action:** **Options and strategies in Bangkok** *Mr. Chanchai Vitoolpanyakij, Director of the Department of Drainage and Sewerage, BMA and Leader of the WB Bangkok study* *Dr. S.M. Wahid, Asian Institute of Technology and Advisor to the WB Bangkok study*
1:30 p.m. – 2:20 p.m.	**Panel 3: Adapting to Climate Change in Asia's Coastal Megacities** **Chair: Dr. Anond Snidvongs, SEA-START Regional Center** **Rapporteur:** *Dr. David Dodman, IIED* **Panel Members:** 1. Prof. Huien Niu, *Shenzhen Urban Planning and Research Center* 2. Mr. Kishore Gajbhiya, *Municipal Cooperation of Greater Mumbai* 3. Dr. Md Nurul Islam, *Dhaka City Corporation* 4. Mr. Fei Yu Kuo, *Department of Urban and Housing, Taipei* 5. Dr. Noman Ahmed, *NED University, Karachi* 6. Ms. Antonia Yulo Loyzaga, *Manila Observatory* *A discussion with representatives from target cities about perceived adaptation options, strategies for implementation, and constraints.*
2:20 p.m. – 2:30 p.m.	**Review of Charges to the Working Groups** *Prof. Roland Fuchs, East-West Center*
2:30 p.m. – 2:45 p.m.	*Tea and Coffee Break*

2:45 p.m. – 5:00 p.m.	**Enhancing Adaptive Capacity: Working Groups**
2:45 p.m. – 5:00 p.m.	**Working Groups Convene (4)** **WG 1: Determining and Characterizing Risks at the Local Scale** *Chair: Prof. Gordon McBean* *Rapporteurs: Prof. Michael Manton and Ms. Antonia Yulo Loyzaga* **WG 2: Building a Knowledge Base: Determining and Portraying Vulnerabilities** *Chair: Dr. Habiba Gitay* *Rapporteurs: Prof. Emma Porio and Dr. Upasna Sharma* **WG 3: Identifying, Evaluating, and Prioritizing Urban Adaptation Measures** *Chair: Prof. Ian Burton* *Rapporteurs: Dr. Kai Kim Chiang and Dr. Quang Huy Luong* **WG 4: Urban Governance for Risk Reduction: Mainstreaming Adaptation into Urban Planning and Development** *Chair: Prof. Shabbir Cheema* *Rapporteurs: Dr. Kris Ebi and Dr. Dushmanta Dutta* ——— *A cross-cutting issue for all working groups to consider is the priorities for research, capacity building, and networking needed to enhance adaptive capacities in cities at risk.*
TBD	**Working Group Chairs and Rapporteurs meet for drinks, dinner, or breakfast? (Venue TBD)**

SATURDAY, 28 FEBRUARY 2009

Montien Hotel Bangkok

8:00 a.m. – 8:10 a.m.	**Announcements**

8:10 a.m. – 9:40 a.m.	**Integrating climate risk adaptation and urban and development planning** **Chair: Prof. Shu-Li Huang, National Taipei University, Taipei** ***Rapporteur**: Nicole Milne, University of Hawaii*
8:10 a.m. – 8:35 a.m.	**Governance Challenges and Opportunities** *Dr. David Dodman, IIED Human Settlements Group*
8:35 a.m. – 9:00 a.m.	**Integrating Public Health & Adaptation** *Dr. Kris Ebi, ESS, LLC*
9:00 a.m. – 9:40 a.m.	**Discussion** *Brief comments (5-7 minutes) from Discussion Commentator followed by discussion from the floor.* *Commentator: Ian Burton, Professor Emeritus, University of Toronto*
9:40 a.m. – 10:00 a.m.	*Tea and Coffee Break*
10:00 a.m. – 10:45 a.m.	**Panel 4: Funding Adaptation – Challenges and Opportunities** **Chair: Dr. Hassan Virji, START** **Rapporteur:** *Mr. Philip Estermann, East-West Center* **Panel Members:** 1. Dr. Poonam Pillai, *The World Bank* 2. Dr. Jay Roop, *ADB* 3. Ms. Megumi Muto, *JICA* 4. Mr. Orestes Anastasia, *USAID, Regional Development Mission-Asia* *A discussion with representatives from the donor, foundation, and private industry communities about perceived financial challenges and opportunities with respect to adaptation and development.*
10:45 a.m. – 2:00 p.m.	**Working Groups reconvene** *Lunch break to be taken at the discretion of Working Group Chairs.*

2:00 p.m. – 3:40 p.m.	**Working Group Reports to the Plenary** **Chair: Prof. Nordin Hasan, ICSU-ROAP** ***Rapporteurs:*** *Nicole Milne, University of Hawaii* *Clark Seipt, START*
	15 minute presentation followed by 5 minutes for questions
WG 1: 2:00 – 2:20 p.m.	**WG 1: Determining and Characterizing Risks at the Local Scale**
WG 2: 2:20 – 2:40 p.m.	**WG 2: Building a Knowledge Base: Determining and Portraying Vulnerabilities**
WG 3: 2:40 – 3:00 p.m.	**WG 3: Identifying, Evaluating, and Prioritizing Urban Adaptation Measures**
WG 4: 3:00 – 3:20 p.m.	**WG 4: Urban Governance for Risk Reduction: Mainstreaming Adaptation into Urban Planning and Development**
3:20 – 3:45 p.m.	***Overall Recommendations - Discussion***
3:45 p.m. – 4:15 p.m.	*Tea and Coffee Break*
4:15 p.m. – 5:00 p.m.	**Closing Plenary** **Chair: Prof. Nordin Hasan, ICSU-ROAP** ***Rapporteur:*** *Nicole Milne, University of Hawaii* *Clark Seipt, START*
4:15 p.m. – 5:00 p.m.	**Moving Forward: Next Steps** *Prof. Nobuo Mimura*
5:00 p.m.	**Workshop Adjournment**

CITIES AT RISK

26-28 February 2009 – Bangkok, Thailand

Workshop Participant List

1. Mr. Mafiz Uddin AHAMED
Executive Engineer (in Charge)
Khulna Water Supply and Sewerage Authority (WASA)
Khan-A-Sabur Road
Khulna, BANGLADESH
Tel: 880-041-722395, 880-041-725454
Fax: 880-041-720857
Email: N/A
BANGLADESH

2. Dr. Noman AHMED
Professor and Chairman
Dept. of Architecture and Planning
NED University of Engineering and Technology, City Campus
Maulana Din Mohammad Wafai Road,
Near Pakistan Chowk, Karachi-74200
PAKISTAN
Tel: 0092-21-9213058
Fax: 0092-21-9261255
Email: nahmed@neduet.edu.pk
PAKISTAN

3. Dr. Mozaharul ALAM
Research Fellow
Bangladesh Centre for Advanced Studies
House 10, Road 16 A, Gulshan-1
Dhaka-1212, BANGLADESH
Tel: +880-2-8851237, +880-2-8852217
Fax: +880-2-8851417
Email: mozaharul.alam@bcas.net
BANGLADESH

4. Mr. Orestes ANASTASIA
USAID - Regional Development Mission-Asia (RDMA)
GPF Witthayu, Tower A, 10th Floor
93/1 Wireless Road
Bangkok, THAILAND 10330
Tel: +66-2-263-7468
Fax: +66-2-263-7499
Email: oanastasia@usaid.gov
USA

5. Dr. Joern BIRKMANN
Head of Section, Vulnerability Assessment
United Nations University
Institute for Environment and Human Security, UN Campus
Hermann-Ehlers-Str. 10, 53113
Bonn, GERMANY
Tel: +49-228-815-0208
Fax: +49-228-815-0299
Email: birkmann@ehs.unu.edu
GERMANY

6. Dr. Geoffrey BLATE
Climate Change Coordinator
WWF – Greater Mekong Programme
Chulalongkorn University
Bangkok, THAILAND
Tel: +66-83-306-4411
Fax: +66-2-251-9416
Email: gblate@wwfgreatermekong.org
USA

7. Dr. Jariya BOONJAWAT
Associate Professor
Southeast Asia START Regional Center
5th floor, Chulawich 1 Bldg., Pathumwan,
Bangkok, 10330 THAILAND
Tel: +66 2218 9466
Fax: +66 2251 9416
Email: jariya@start.or.th
THAILAND

8. Prof. Ian BURTON
Professor Emeritus
University of Toronto
26 St. Anne's Rd.
Toronto, ON M6J 2C1 CANADA
Tel: 1 416 538 2034 (H)
1+416 739 4314 (O)
Fax: +1 416 739 4297
Email: Ian.Burton@ec.gc.ca
CANADA

9. Dr. Shabbir CHEEMA
Senior Fellow and Coordinator
Asia-Pacific Governance and Democracy Initiatives (AGDI)
East-West Center
1601 East-West Road
Honolulu, Hawaii, 96848 USA
Tel: +1 808 944-7427
Fax: +1 808 944-7399
Email: cheemas@eastwestcenter.org
USA

10. Dr. Baode CHEN
Professor
Shanghai Typhoon Institute
Chinese Meteorological Administration
166 Puxi Road, Shanghai 200030
P.R. CHINA
Tel: +86-21-54891935
Fax: +86-21-64391966
Email: Baode6405@gmail.com
USA

11. Dr. Kai Kim CHIANG
Stockholm Environment Institute - Asia
15th Floor, Witthyakit Building
254 Chulalongkorn University
Chalalongkorn Soi 64, Phyathai Road
Pathumwan, Bangkok, 10330 THAILAND
Tel: +66 (0) 2 251 4415-8 Ext. 104
Fax: +66 (0) 2 251 4419
Email: kaikim.chiang@sei.se
SINGAPORE

12. Dr. Allen CLARK
East-West Center
1601 East-West Road
Honolulu, Hawaii 96848 USA
Tel: +1 808-944-7509
Fax: +1 808-944-7399
Email: ClarkA@eastwestcenter.org
USA

13. Dr. Susan CUTTER
Director, Hazards Research Lab
Department of Geography
University of South Carolina
709 S. Bull Street
Columbia, SC 29208 USA
Tel: 01.803.777.1590
Fax: 01.803.777.4972
Email: scutter@sc.edu
USA

14. Dr. David DODMAN
Researcher
International Institute for Environment and Development (IIED)
3 Endsleigh Street, London, WC1H 0DD,
UNITED KINGDOM
Tel: +44 (0)20 7388 2117
Fax: +44 (0)20 7388 2826
Email: david.dodman@iied.org
UNITED KINGDOM; JAMAICA

15. Dr. Do Minh DUC
Department of Geotechnics,
Faculty of Geology
Hanoi University of Science
334 Nguyen Trai, Thanh Xuan
Hanoi, VIETNAM
Tel: +844-38585097
Fax: +844-38583061
E-mail: ducdm@vnu.edu.vn
VIETNAM

16. Dr. Dushmanta DUTTA
Senior Lecturer and Director of Research
School of Applied Sciences and Engineering, Monash University, Gippsland Campus
1 Northways Road
Churchill, VIC3842, AUSTRALIA
Tel: +61-3-5122-6407
Fax: +61-3-9902-6738
Email: dushmanta.dutta@sci.monash.edu.au
AUSTRALIA

17. Dr. Kristie EBI
President
ESS, LLC
5249 Tancreti Lane
Alexandria VA 22304 USA
Tel: +1 703 304 6126
Email: krisebi@essllc.org
USA

18. Mr. Philip ESTERMANN
Grants Officer
East-West Center
1601 East-West Road
Honolulu, HI 96848 USA
Tel: +1 808-944-7464
Fax: +1 808-944-7380
Email: estermap@eastwestcenter.org
USA

19. Mr. James Warren EVANS
Director - Sector Director
Environment Department
The World Bank
1818 H Street, NW
Washington, DC 20433 USA
Tel: +1 202-473-7095
Fax: +1 202-477-0565
Email: wevans@worldbank.org
USA

20. Prof. Tommy FIRMAN
Professor of Regional Planning
School of Architecture, Planning, and Policy Development
Institute of Technology
Jalan Ganesha 10
Bandung, 40132 INDONESIA
Tel: +62-22-2504735
Fax: +62-22-2501263
Email: tfirman@melsa.net.id
INDONESIA

21. Dr. Michail FRAGKIAS
Executive Officer
Urbanization and Global Environmental Change Project (UGEC)
Global Institute of Sustainability
PO Box 875402
Tempe, AZ 85287-5402 USA
Tel: +1 480-727-7833
Fax: +1 480-727-9680
Email: michail.fragkias@asu.edu
GREECE

22. Prof. Roland FUCHS
Senior Research Fellow
East-West Center
1601 East-West Road
Honolulu, HI 96848 USA
Tel: +1 808-944-7518
Fax: +1 808-944-7380
Email: FuchsR@eastwestcenter.org
USA

23. Mr. Kishore U. GAJBHIYE
Additional Municipal Commisioner (Western Suburbs)
Municipal Coproration of Greater Mumbai,
Mahapalika Marg, Fort, Mumbai-400 001,
INDIA
Tel: +91 22 2262 0433, +91 98331 84848
Fax: +91 22 2262 0639
Email: kishoregajbhiye@hotmail.com
INDIA

24. Mr. Dawood N. GHAZANAVI
Chief Operating Officer
Environment Operations Officer (EOC)
ADB TRM-EOC
23RD Floor, The Office at Central World
999/9 Rama I Road, Pathumwan
Bangkok 10330, THAILAND
Tel: 66-2-207-4444
Fax: 66-2-207-4400
Email: dghaznavi@gmail.com, dawood@gms-eoc.org
PAKISTAN

25. Dr. Habiba GITAY
The World Bank Institute
1818 H Street, NW
Washington, DC 20433 USA
Tel: +1 202-473-9896
Email: hgitay@worldbank.org
USA

26. Prof. Yuji HARA
Assistant Professor
Transdisciplinary Initiative for Global Sustainability
The University of Tokyo
7-3-1 Hongo, Bunkyo-ku
Tokyo 113-8654, JAPAN
Tel : +81-3-5841-1541
Fax : +81-3-5841-1549
Email: hara@ir3s.u-tokyo.ac.jp
JAPAN

27. Prof. Nordin Mohd HASAN
Professor/Director
ICSU Regional Office for Asia and the Pacific (ICSU ROAP)
902-4 JALAN TUN ISMAIL,
50480 Kuala Lumpur, MALAYSIA
Tel: +603-2694-9898
Fax: +603-2694-5858
Email: nordin.hasan@icsu-asia-pacific.org
MALAYSIA

28. Prof. Shu-Li HUANG
Graduate Institute of Urban Planning
National Taipei University
69 JianGuo North Rd., Sec. 2
Taipei, TAIWAN 10433

Tel: +886-2-2500-9713
Fax: +886-2-2505-4954
Email: shuli@mail.ntpu.edu.tw
TAIWAN

29. Dr. Md. Nurul ISLAM
Deputy Chief Health Officer
Dhaka City Corporation
Room 617,Nagar Bhaban
Fulbaria, Dhaka 1000, BANGLADESH
Tel: 88 02 9565360
Fax: 88 02 9557059
Email: mnurul@dhaka.net
BANGLADESH

30. Dr. Roger JONES
Professorial Fellow
Centre for Strategic Economic Studies
Victoria University
PO Box 14428
Melbourne, Victoria 8001 AUSTRALIA
Tel: +61 3 9919 1992
Fax: +61 3 9919 1350
Email: roger.jones@vu.edu.au
AUSTRALIA

31. Mr. Sam KERNAGHAN
Senior Consultant, International Development
Arup
13 Fitzroy St., London, W1T 4BQ UNITED KINGDOM
Tel: +44207 755 5799, +66-87-671-1588
Email: Sam.Kernaghan@arup.com
UNITED KINGDOM

32. Mr. Moshiuzzaman KHAN
Executive Engineer
Khulna City Corporation
Nagar Bhaban
Khulna, BANGLADESH
Tel: 88-041-725174, 731868
Fax: 880-041-721177
Email: xene_kee@yahoo.com
BANGLADESH

33. Fei-Yu KUO
Deputy Director
Department of Urban and Housing
Council for Economic Planning and Development, Executive Yuan
No. 3, Baocing Rd.
Taipei City 10020, TAIWAN
Tel: 886-2-22308736
Fax: 886-2-23700426
Email: fykuo@cepd.gov.tw
TAIWAN

34. Leader
Association of Thai City Planners Society
Room 2305, Faculty of Architecture
Kasetsart University
50 Phahon Yothin Rd
Chatuchak, Bangkok 10900 THAILAND
Tel: 02 940 7469
Fax: 02 940 5413
Email: admin@thaiplanners.or.th
THAILAND

35. Dr. Louis LEBEL
Southeast Asia Regional Committee for START (SARCS)
Faculty of Social Sciences
Chiang Mai University
Chiang Mai 50200 THAILAND
Tel: 66-53-854347
Fax: 66-53-854347
Email: llebel@loxinfo@co.th
AUSTRALIA

36. Dr. Marc LEVY
Center for International Earth Science Information Network (CIESIN)
Columbia University
61 Route 9W, PO Box 1000
Palisades, NY 10964 USA
Tel: +1 845-270-5762
Fax: +1 845-365-8922
Email: mlevy@ciesin.columbia.edu
USA

37. Dr. Nancy D. LEWIS
Director of Research
East-West Center
1601 East-West Road
Honolulu, HI 96848 USA
Tel: +1 808 944-7245
Fax: +1 808 944-7399
Email: LewisN@eastwestcenter.org
USA

38. Prof. Feng-Tyan LIN
Graduate Institute of Building and Architecture
National Taiwan University
1, Sec.4, Roosevelt Road
Taipei, TAIWAN
Tel: 886-2-33665964
Fax: 886-2-23659197
Email: ftlin@ntu.edu.tw
TAIWAN

39. Ms. Antonia Yulo LOYZAGA
Executive Director
Manila Observatory
Ateneo de Manila Campus, Loyola Heights
Quezon City, PHILIPPINES
Tel: +63-2-426-5921
Fax: +63-2-426-6141
Email: aloyzaga@observatory.ph
PHILIPPINES

40. Dr. Jia LU
Shenzhen Urban Planning & Research Center
Room 415, Municipal Planning Building
8009 Hongli Rd.
Shenzhen, P.R. CHINA
Tel: +86-755-82897767 (W)
13691643150 (M)
Fax: 0086 755 83949612
Email: lavendalu@gmail.com
CHINA

41. Dr. Quang Huy LUONG
Manager
IUCN
44/4 Van Bao
Hanoi, VIETNAM
Tel: +84(4) 3726-1575/6 ext. 127
Fax: +84(4) 3726-1561
Email: huy@iucn.org.vn
VIETNAM

42. Prof. Michael MANTON
Professor
School of Mathematics, Monash University
Monash University, VIC 3800
Melbourne, AUSTRALIA
Tel: +61-419-389 795
Email: michael.manton@sci.monash.edu.au
AUSTRALIA

43. Mr. Yosuke MARUYAMA
Urban and Civil Engineering
Graduate School of Science and Engineering
Ibaraki University
4-12-1, Nakanarusawa, Hitachi
Ibaraki, 316-0033, JAPAN
Tel: +81-294-38-5004
Fax: +81-294-38-5280
E-mail: 08nm821h@hcs.ibaraki.ac.jp
JAPAN

44. Prof. Om Prakash MATHUR
National Institute of Public Finance and Policy
18/2, Satsang Vihar Marg
Special Institutional Area, Near JNU
New Delhi, INDIA
Tel: 91-11-2656 9303, 2696 1829
Fax: 91-11-26852548
Email: opm@nipfp.org.in,
om_mathur@yahoo.com
INDIA

45. Prof. Gordon McBEAN
University of Western Ontario
London, Ontario, N6A 5C2 CANADA
Tel: +1-519-661-4274
Fax: +1-519-661-3750
Email: gmcbean@uwo.ca
CANADA

46. Dr. Banasopit MEKVICHAI
Assoc. Prof., Faculty of Architecture
Chulalongkorn University
254 Phyathai Road
Patumwan, Bangkok 10330, THAILAND
Tel: 66-2218-4428, 081-8320888 (M)
Fax: 66-2218-4429
Email: banasopit@merimekong.org.th
THAILAND

47. Ms. Nicole MILNE
Graduate Student
University of Hawaii at Manoa,
Dept. of Geography
1711 East-West Road, Box 602
Honolulu, Hawaii 96822, USA
Tel: +1 206 718 0078
Email: nmilne@hawaii.edu
USA

48. Prof. Nobuo MIMURA
Director
Inst. for Global Change Adaptation Science
Center for Water Environment Studies
Ibaraki University
4-12-1, Nakanarusawa, Hitachi,
Ibaraki, 316-8511 JAPAN
Tel: +81-294-38-5169
Fax: +81-294-38-5268
Email: mimura@mx.ibaraki.ac.jp
JAPAN

49. Ms. Megumi MUTO
Research Fellow, JICA Research Institute
Japan International Cooperation Agency
10-5, Ichigaya Honmura-cho, Shinjuku-ku
Tokyo 162-8433, JAPAN
Tel: +81-3-3269-2912
Fax: +81-3-3269-2054
Email: Muto.Megumi@jica.go.jp
JAPAN

50. Mr. Peter Elliott NEIL
Coordinator
Regional Forest Programme & Asia Focal Point for Climate Change
IUCN Asia
63 Sukhumvit Soi 39
10110 Bangkok, THAILAND
Tel: +662 662 4061 (ext. 152)
Fax: +662 662 4387
Email: neil@iucnt.org
UNITED KINGDOM

51. Dr. Dinh Tuan NGUYEN
Associate Professor
Ho Chi Minh City Natural Resources and Environment College
Ministry of Natural Resources and Environment
236B Le Van Sy Street, Ward 1
Tan Binh District
Ho Chi Minh City, VIETNAM
Tel: 84 08 8443006
Fax: 84 08 8449474
Email: dinhtuan1@gmail.com, hcmcepa@hcm.fpt.vn
VIETNAM

52. Dr. Somrudee NICRO
Thailand Environment Institute
16/151 Bond Street
Bangpood, Pakkred
Nonthaburi 11120, THAILAND
Tel: 66 2 503 3333 ext. 501
Fax: 66 2 504 4826 to 8
Email: somrudee@tei.or.th
THAILAND

53. Prof. Huien NIU
Professor
Shenzhen Urban Planning & Research Bureau
East Floor 4, Planning Building
8009 Hongli Rd., Shenzhen, P.R. CHINA
Tel: 0086 755 83949612 or 0086 13802218510
Fax: 0086 755 83949612
Email: niuhuien@tom.com
CHINA

54. Mr. Koji NODA
Senior Research Officer
Research Network Division
JICA Research Institute
Japan International Cooperation Agency
10-5, Ichigaya Honmura-cho, Shinjuku-ku
Tokyo 162-8433, JAPAN
Tel: +81-3-3269-2357
Fax: +81-3-3269-2054
Email: Noda.Koji@jica.go.jp
JAPAN

55. Prof. Eiji OHNO
Professor of Environmental Economics
Faculty of Urban Science
Meijo University
4-3-3 Nijigaoka
Kani, Gifu 509-0261, JAPAN
Tel: +81-574-69-0132
Fax: +81-574-69-0132
Email: ohno@urban.meijo-u.ac.jp
JAPAN

56. Ms. Poonam PILLAI
Sr. Environmental Specialist
The World Bank
1818 H Street, NW
Washington, DC 20433 USA
Tel: +1 202-458-9442
Fax: +1 202-522-0367
Email: ppillai@worldbank.org
USA

57. Prof. Emma PORIO
Professor of Sociology
Dept. of Sociology and Anthropology
Ateneo de Manila University
P.O. Box 154,
Manila, PHILIPPINES 1099
Tel: 63-2-4265990
Fax: 63-2-4265990
Email: eporio@ateneo.edu
PHILIPPINES

58. Ms. Perlyn PULHIN
Programme Manager, Communications & Institutional Development
APN Secretariat
5F, Wakinohama Kaigan Dori
Chuo-Ku, Kobe 651-0073, JAPAN
Tel: (+81) 078-230-8017
Fax: (+81) 078-230-8018
Email: ppulhin@apn-gcr.org
PHILIPPINES

59. Mr. Jay ROOP
Environment Specialist
Asian Development Bank
6 ADB Avenue
Mandaluyong City, PHILIPPINES
Tel: 632 632 5631
Fax: 632 636 2444
Email: jroop@adb.org
CANADA

60. Mr. Norio SAITO
Urban Development Specialist
Urban Development Division (SAUD)
South Asia Department (SARD)
Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, PHILIPPINES
Tel: 63-2-632-6258
Fax: 63-2-636-2293
Email: nsaito@adb.org
JAPAN

61. Ms. Clark SEIPT
Program Coordinator
International START Secretariat
2000 Florida Avenue NW, Suite 200
Washington, DC 20009 USA
Tel: +1-202-462-2213
Fax: +1-202-457-5859
Email: cseipt@start.org
USA

62. Prof. Karen SETO
Co-Chair, IHDP UGEC Program
School of Forestry and Environmental Studies
Yale University
380 Edwards Street
New Haven, CT 06511 USA
Tel: +1-203-432-9784
Fax: +1-203-432-5556
Email: karen.seto@yale.edu
USA

63. Dr. Upasna SHARMA
Associate Fellow
Center for Global Environmental Change
TERI
Darbari Seth Block, India Habitat Centre
Lodhi Road
New Delhi, INDIA Pin: 110003
Tel: +91-11-24682100, +919717001115 (Mobile)
Fax: +91-11-24682144
Email: upasna.sharma@gmail.com
INDIA

64. Ms. Priya SHYAMSUNDAR
Program Director
South Asian Network for Development and Environmental Economics
Bangkok, THAILAND
Tel: +66 846804519
Fax:
Email: priyas@sandeeonline.org
THAILAND

65. Dr. Bach Tan SINH
National Council for Science and Technology Policy
Director of Department of Human Resources Policy
and Organization
38 Ngo Quyen
Hanoi, VIETNAM
Tel: 84.4.39344102
Fax: 84.4.38252873
Email: sinhanh@hn.vnn.vn, sinhbt@gmail.com
VIETNAM

66. Prof. Anond SNIDVONGS
Director
Southeast Asia START Regional Center
(SEA-START)
Chulalongkorn University
Bangkok, THAILAND
Tel: +6622189464-7
Fax: +6622519416
Email: anond@start.or.th
THAILAND

67. Dr. Atch SRESHTHAPUTRA
Chairman of the Academic Committee
Building Technology and Environment
The Association of Siamese Architects
Under Royal Patronage
248/1 Soi Soonvijai 4 (Soi 17)
Rama IX Rd., Bangkapi, Huay Kwang,
Bangkok 10310 THAILAND
Tel: +662 319 6555
Fax: +662 319 6419
Email: atch.s@chula.ac.th,
atch111@yahoo.com
THAILAND

68. Dr. Masahiro SUGIYAMA
Project Researcher
Integrated Research System for
Sustainability Science
The University of Tokyo
7-3-1 Hongo, Bunkyo-ku
Tokyo, 113-8654, JAPAN
Tel: +81-3-5841-8576
Fax: +81-3-5841-1545
Email: sugiyama@ir3s.u-tokyo.ac.jp
JAPAN

69. Dr. Akimasa SUMI
Executive Director and Professor
Integrated Research System for
Sustainability Science
The University of Tokyo
7-3-1 Hongo, Bunkyo-ku
Tokyo 113-8654, JAPAN
Tel : +81-3-5841-1539
Fax : +81-3-5841-1545
Email: sumi@ir3s.u-tokyo.ac.jp
JAPAN

70. Ms. Rungthiwa TATICHARA
Southeast Asia START Regional Center
(SEA-START)
Chulalongkorn University
Bangkok, THAILAND
Tel: +6622189464-7
Fax: +6622519416
Email: rungthiwa@start.or.th
THAILAND

71. Dr. Zhan TIAN ZHAN
Director
Climate Change Department
Shanghai Climate Center / CMA
166, Puxi Road
Shanghai, CHINA
Tel: 86 21 54896481
Fax: 86 21 64272407
Email: tianz@climate.sh.cn
CHINA

72. Dr. Saksit TRIDECH
Permanent Secretary
Ministry of Natural Resources and
Environment, Thailand
92 Phahon Yothin 7 Phahon Yothin Rd.
Phayathai Bangkok 10400 THAILAND
Tel: 662 2788544
Fax: 662 2788545
Email: saksit@mnre.go.th
THAILAND

73. Dr. Hassan VIRJI
Director
International START Secretariat
2000 Florida Avenue NW, Suite 200
Washington, DC 20009 USA
Tel: +1-202-462-2213
Fax: +1-202-457-5859
Email: hvirji@start.org
USA

74. Dr. Ponn VIRULRAK
The Association of Siamese Architects
Under Royal Patronage
248/1 Soi Soonvijai 4 (Soi 17)
Rama IX Rd., Bangkapi, Huay Kwang,
Bangkok 10310 THAILAND
Tel: +662 319 6555
Fax: +662 319 6419
Email: virulrak@gmail.com
THAILAND

75. Mr. Chanchai VITOOLPANYAKIJ
Director
Department of Drainage and Sewerage
Bangkok Metropolitan Adminstration
Bangkok, 10330 THAILAND
Email: teethadan@hotmail.com
THAILAND

76. Dr. Shahriar WAHID
Sr. Research Engineer
Asian Institute of Technology, Thailand
WEM/SET, AIT, 4 Khlong Luang
Pathumthani 12120, THAILAND
Tel: +6625255561
Fax: +6625246425
Email: swahid@gmail.com
BANGLADESH

77. Prof. Jough-Tai WANG
Dept of Atmospheric Sciences
National Central University
300 Jun-Dar Road
Chung-Li, TAIWAN 32054
Tel: 886-3-426-9416
Fax: 886-3-425-6841 or 886-3-422-0064
Email: wangjt@atm.ncu.edu.tw
TAIWAN

78. Prof. Rusong WANG
Research Center for Eco-Environmental Sciences
Chinese Academy of Sciences
18 Shuangqing Road
Beijing, CHINA
Tel: 86-10-62943807
Fax: 86-10-62849110
Email: wangrs@mail.rcees.ac.cn, wangrusong@hotmail.com
CHINA

79. Dr. Eberhard WEBER
Head, School of Geography
Faculty of Islands and Oceans
University of the South Pacific
Division of Geography, Marine Campus
Suva, FIJI ISLANDS
Tel: +679-323-2222
Fax: +679-323-1509
Email: weber_e@usp.ac.fj
GERMANY

80. Dr. Ming Chung WONG
Assistant Director
Hong Kong Observatory
134A Nathan Road
Hong Kong, CHINA
Tel: +852 2926 8222
Fax: +852 2311 9448
Email: mcwong@hko.gov.hk
CHINA

Appendix 2: Summary of Workshop Proceedings

The *Cities at Risk* workshop was held 26-28 February 2009 in Bangkok, Thailand. Workshop sessions were hosted at the Chulalongkorn University and at the Montien Hotel, Bangkok.

1. Opening Session

Dr. Nancy Lewis, Director of Research at the EWC, opened the workshop by welcoming all participants. Welcome and opening remarks were also offered by co-organizers Dr. Hassan Virji of START and Prof. Nobuo Mimura of Ibaraki University/IR3S. Ms. Perlyn Pulhin of APN and Dr. Nordin Hasan of the ICSU Regional Office for Asia and the Pacific welcomed participants on behalf of the workshop's sponsors. Associate Prof. Dr. Banasopit Mekvichai of Chulalongkorn University welcomed participants to Bangkok and to the university.

Following a brief review of workshop objectives provided by Prof. Roland Fuchs (EWC), Dr. Lewis introduced the workshop's keynote speaker – Prof. Emeritus Dr. Ian Burton (University of Toronto). Renowned in the field of climate change adaptation, Prof. Burton addressed workshop participants in a presentation entitled, "The Adaptation Way: Strategies for Cities".

Prof. Burton began by emphasizing that to a certain extent, climate change is unavoidable. Even given the "best case" emissions scenario, global surface mean temperature will continue to rise up to and beyond the end of the century. As such, adaptation is required to manage unavoidable impacts and consequences. While mitigation benefits are delayed and realized in the long-term, adaptation benefits are short and medium term. Successful mitigation requires global agreement, but much successful adaptation can be achieved at the local level with adequate support. Adaptation is also global.

In discussing the exposure and vulnerability of cities to climate variability and change, Prof. Burton highlighted concerns with respect to sea level rise; storms, cyclones and floods; poverty and institutional capacity; sources of wealth, growth and innovation; migration; and displaced communities. He reflected that in the past, climate change has been viewed as a pollution problem. When attention was given to the topic, focus was concentrated on mitigation; adaptation issues were all but neglected. Adaptation is now on the agenda, however. Iconic issues receiving attention include coasts, endangered species, coral reefs, mountains, drylands, smaller poor rural communities and more. There tends to be less recognition of the necessity to address climate change in large cities, however, as other problems and other priorities demand attention.

Contributing to the lack of attention to adaptation may be the slow emergence of national planning and strategic programming for adaptation as most related work, to date, is project based. Stakeholders also report frustrations with the tendency for climate issues and response to be relegated and confined to environmental ministries and agencies. Funding problems may also fuel lack of attention, and from some perspectives, response to climate change is a developed country responsibility.

In response to the urgent need for adaptation, particularly in cities, Prof. Burton proposed the development of a Coastal Cities Alliance Agenda. Such an agenda would seek to understand what is happening with respect to adaptation elsewhere in the world, to use the "wheels" that have already been invented, to promote the emergence of collective and cooperation and to bolster a stronger voice for cities at

national and international levels. Prof. Burton guided the plenary through a review of existing and relevant alliances as well as material (e.g., literature, existing frameworks, etc.) that could be used to inform development of such an alliance for cities. Emphasizing that cities have choices with respect to adaptation, he offered recommendations as to a potential three-stage approach to collaborative and informed adaptation in cities.

First, climate change basics must be a priority. Initial efforts should seek to improve scientific and technical understanding of climate change risks and dissemination of relevant information for local urban areas. Improved understanding can inform mapping, risk assessments, and the like. Prof. Burton warned participants not to wait until expertise is built, however. Instead, application of existing knowledge in areas such as infrastructure design, land use planning, disaster risk reduction, public health protection, water resource management, ecosystems and biodiversity protection and/or vector borne disease control can inform adaptation planning and action at the present. Next, adaptation will require strategy. Prof. Burton recommended building support now and onward to prepare for climate change adaptation action at the public level. Cities must develop strategic plans for adaptation that integrate adaptation and mitigation, and there should be a role identified for cities in national strategies and plans. Strategic planning and action will also require (and be bolstered by) future research (e.g., IRDR) and capacity building efforts. Strategic adaptation implementation can then be put into action and will likely require innovative institutional arrangements and capacities as well as financial support and mechanisms.

In recommending how to move forward, Prof. Burton encouraged workshop participants to fully embrace the opportunities provided by the next three days of *Cities at Risk* sessions and discussions. He challenged participants to develop priorities and to do so searching for oft neglected ones. He stressed avoidance of maladaptation (i.e., ill-conceived measures that can increase exposure and vulnerability) and consideration of the adaptation deficit. At present, communities are under-adapting and in some instances, current adaptation is but a palliative response to major and long-lasting concerns. There is a need to act now in very strategic and purposeful ways. Acting together in cooperative alliances for common interests may be a way to promote effective and informed response.

The opening session of the workshop concluded with an introduction to a series of urban adaptation studies being implemented in Manila, Bangkok and Ho Chi Minh City by the Japan International Cooperation Agency (JICA), the World Bank and the Asian Development Bank (ADB). Dr. Warren Evans (World Bank), Dr. Jay Roop (ADB) and Ms. Megumi Muto (JICA) briefly discussed the effort. With the hope that lessons learned as part of the recent studies might inform and contribute to workshop discussion, the speakers shared a number of observations. First, partnerships that combine a mix of expertise and institutions are essential. Reaching out to and working with city planners to obtain specific recommendations for adaptation in cities is necessary. Second, there is a need for detailed analytical work in cities, the results of which should be translated into action in a timely fashion. In turn, the results and lessons learned from those actions should be considered in ongoing analyses. An important lesson learned from the studies is that cycles of information generation and research need be shortened.

2. Plenary Sessions

As anchors of the workshop program, plenary sessions were intended to provide background for and to stimulate participant discussion. When possible, presentations were expected to reflect case studies specific to low-lying deltas and

urban areas in the Asia-Pacific region. All plenary presentations are available in PDF format on the START website at: http://start.org/programs/cities-at-risk.

2.1 Cities at Risk: Increasing Population Exposure

The first plenary session included presentations from Dr. Marc Levy (CIESIN) and Prof. Karen Seto (IHDP UGEC, Yale University). Reflecting on the high rates and volume of urban growth, the session highlighted distinct aspects of the dynamic process of urbanization as well as challenges that are being faced. Together the presenters questioned how much is known about past, current and future urban dynamics and what the implications of such are for cities' preparations for and responses to the risks posed by climate change.

Dr. Levy engaged participants in what he called a "detective story". In particular he focused on the questions: How many people are exposed to sea level rise (SLR) risk? In what parts of the world is the exposure greatest? Where are settlements growing fastest? Globally, but especially in Asia, not only are urban populations more likely to be exposed to SLR in the low elevation coastal zone (LECZ) than rural populations, but larger urban settlements and megacities are more likely to exist within the LECZ than smaller urban settlements. Levy discussed several such examples in Bangladesh, Vietnam, India and China and highlighted previous work that emphasized significant variations in levels of exposure when different elevation thresholds (with respect to the LECZ) are examined.

Dr. Seto, in discussing a case study of the urbanization dynamics of the Pearl River Delta, focused on urban land, not population. Recommending that more attention be paid to the dynamics of urban land use, she reviewed changes in global urban land use in the last 30 years, discussed perceived drivers of that change and encouraged participants to contemplate future patterns of urban land use and their environmental impacts. Dr. Seto stressed that urbanization dynamics are moving targets and that both scientific and planning communities are often working with static and outdated urban land-use information. Adaptation and development planning must understand historical patterns of urban land-use and consider forecasts of future urban land-use change.

2.2 Increasing Risks from Sea Level Rise and Climate Change

The second plenary session included presentations from Prof. Nobuo Mimura (Ibaraki University/IR3S), Prof. Michael Manton (Monash University) and Dr. Roger Jones (Victoria University).

Prof. Mimura provided a global and regional picture with respect to impacts and risks of climate change and SLR, citing examples of mangrove retreat in Bangkok and related adaptation measures in Bangladesh, Maldives and Tokyo. He concluded that cities are increasingly at risk; that as such, risk management by city management is becoming more important and that future risks need to be taken into account in today's city management.

Prof. Manton reviewed historical and projected trends of extreme events. While extreme events are projected to increase – in intensity and frequency – in the future, the uncertainly associated with such projections grows at smaller scales (e.g., at the city level). Efforts have been made to reduce such uncertainties via regional studies but the need for improved and expanded monitoring and analysis of climate at the regional scale must be addressed.

Dr. Jones, in discussing the estimation of risk probabilities, explained that risk is obtained as a product of probability and consequences. He posited that climate change risks might be better understood by looking at the likelihood of exceedance of a certain event in a cumulative distribution function and that adaptation could be

framed by setting a goal, determining how to get to fulfill that goal and considering different pathways or options for doing so. Dr. Jones also discussed potentials of "hedging" under high uncertainty and consideration of potential benefits of appropriate adaptation versus potential penalties of inappropriate adaptation decisions, particularly in a context of variability and uncertainty.

2.3 Analyzing, Mapping and Understanding Vulnerability: Knowledge Tools

The workshop's third plenary session included presentations from Dr. Louis Lebel (Chiang Mai University), Dr. Susan Cutter (University of South Carolina), Ms. Megumi Muto (JICA) and Dr. Anond Snidvongs (Chulalongkorn University, SEA-START). Presentations were followed by a plenary discussion facilitated by Dr. Bach Tan Sinh (Nation Council for Science and Technology Policy, Vietnam)

Electing to use the context of flood management in urban regions as a platform for investigating needs to improve the interface between science and practice, Dr. Lebel explained that climate change alters historically experienced flood regimes and impacts different types of floods in different ways. There are also politics around disaster management that cannot be illustrated by models and maps and that should not be ignored when talking about vulnerability to climate change (e.g., fishermen and farmers find floods useful but real estate does not). As such, flood management is not a purely technical / engineering challenge; just as important are communication, consideration of institutional opportunities and constraints and issues of fragmentation, inclusion and exclusion amongst and between different communities (e.g., science, practice, policymaking). More often than not, knowledge needed for adapting to climate change is co-produced, negotiated and entangled with multiple priorities, decisions and actions. For example, the actions of powerful agencies and institutions and the way climate change is talked about in public affect the way science and policy talk. Responding to climate change in this context thus requires rethinking current flood management objectives, mechanisms and practices, which demands dialogue with practitioners.

Dr. Lebel stressed that adaptation will require effective knowledge networks that encourage exchange and collaboration. And such knowledge networks are not embodied by the expertise and recommendations that science delivers to planners and policymakers (via, e.g., models, maps and master plans). Instead, knowledge networks are arenas in which people come together and share knowledge. Examples of such arenas might include joint assessments, scenario-building opportunities, roundtable discussions and multi-stakeholder dialogues, places and opportunities facilitated by boundary organizations and study tours / exchanges.

Dr. Cutter addressed the multi-dimensional character of social vulnerability. As 'social vulnerability' emphasizes population characteristics that influence the distribution of risks and losses, it is often investigated via the intersection of risk, poverty and gender. Proposing a way to construct and scale such social metrics, Dr. Cutter introduced a tool developed by she and her colleagues at the University of South Carolina (USA) – the Social Vulnerability Index (SoVI), available online at www.sovius.org - that can be used to map social vulnerability. Because the tool's mapping outputs are based on a comparative metric, they can be useful in providing rationale for differential allocation of resources for preparedness. Furthermore, mapping the intersection of social and physical processes (e.g., population characteristics and biophysical risks) within a particular geospatial framework can be useful for understanding impacts. Enhanced understanding of this kind can inform improvements to the built environment, which will be important for reducing vulnerability, but there is also great need for additional work that aims to improve social resilience and adaptive capacity.

Ms. Muto presented two case studies from the joint ADB-JICA-WB study in Manila, Philippines. The studies aimed to analyze the infrastructural and economic

vulnerabilities in two areas in metro Manila (West Mangahan area and Kamanva). Flood maps, produced on the basis of different climate scenarios, informed socio-economic impact assessments in each of the areas. Both direct and indirect damages across different sectors were identified and then estimated. Estimates of damage costs under different flood scenarios were also made for different sectors (e.g., road networks, power, water, rail transport system, etc.). Adaptation options, their expected costs and potential investment mixes were then identified. Institutions and poor urban households in Manila were also surveyed to better understand their vulnerabilities and to analyze health impacts from flooding.

Dr. Snidvongs presented urban flooding scenarios developed for Ho Chi Minh City (HCMC), Vietnam as part of the recent ADB-sponsored study. A total of 27 scenarios (for 2050) were generated under the study and, accompanied by city land use plans, were shared with HCMC policymakers and planners. Dr. Snidvongs reported that participating stakeholders focused on a variety of aspects in the scenarios – some considered the effectiveness of dykes; others were more interested in salt water intrusion. City planners and engineers were especially interested in extreme rainfall events. With respect to adaptation options, participating planners concluded that while the dyke may be somewhat effective at present, this is no guarantee that it will be able to protect the city in the case of an extreme event, particularly as extreme events are expected to be more severe in the future.

Dr. Snidvongs also shared an important lesson learned from the study's experience in communicating projected climate risks through simulation and visualization – some policy planners tend to take modeling results and visualization outputs (maps) too seriously. He emphasized the need to help decision-makers to understand the uncertainty associated with projections. In addition, the study found that immediate and short-term city concerns take priority in the agendas of urban officials; longer-term issues like future climate risks are not usually considered. As such, there is a need to build the capacity of city administrations for strategic future planning that takes into consideration projected climate risks and impacts. That said, Dr. Snidvongs stressed that the focus of science in developing more and more accurate models as a capacity building response often misses the point. "It is like trying to develop a Rolls Royce and give it to people who use bicycles and don't know how to drive it."

Following the presentations, Dr. Bach Tan Sinh initiated plenary discussion by offering the following summary observations:

- We need to change our assumptions with respect to the linear model of knowledge exchange. The approach should be one of more mutual learning.
- Scientific research often tends to be supply driven rather then demand driven. People who need to be served by and apply scientific knowledge have very little say in the current science-policy-practice "dialogue".
- Furthermore, how scientists communicate information they generate to the user must consider the capacity of the user to absorb and use that information.
- Risk is very much socially constructed. And investigations of social vulnerabilities, inequalities and risk reduction must also include consideration of risk re-division. For example, if there is a flood in Hanoi, the question is not *whether* the floodgates should be opened but rather *what is the best approach* to opening the floodgates and to managing the ensuing floods.
- Any intervention has two sides; although an action may offer a solution to one problem, it could lead to another problem. Therefore, consideration of the interconnectedness of places, problems and responses is necessary.

Follow-on discussion recognized the need for increased and more effective communication between not just science and policymakers but also the people for whom policies are being made. It was agreed, in reflecting on Dr. Lebel's

presentation, that improved communication will require identifying and/or creating arenas where such interaction can occur. In addition, many assessments of vulnerability include vulnerable groups as passive entities instead of active agents. Vulnerable groups must also be included in dialogue about adaptation and response; they must be involved in the process of change for the change to be sustainable.

Workshop participants also raised several somewhat rhetorical questions as to the kind of changes and the scale of changes for which cities should be preparing. Many argued that the tendency to focus on flooding when discussing climate variability and change (in cities) indicates that there isn't much knowledge to offer on SLR and/or other hazards. Communities (science and practice) are driven by historic events and don't yet know how to deal with non-experienced ones. As a result, the relationship between current adaptation (i.e., coping) and adaptation for the future are not yet clear. One innovative participant recommended that input from sections of society not often involved in science-policy dialogues, such as writers and novelists, may help both science and practice imagine what future societies might look like and what kind of adaptation might be needed. Lessons might also be learned in considering commonalities amongst Asia's coastal megacities.

2.4 Adaptation and Risk Management

The workshop's fourth plenary session included presentations from Dr. Habiba Gitay (World Bank Institute), Mr. Chanchai Vitoolpanyakij (Department of Drainage, Bangkok Metropolitan Administration – BMA) and Dr. S.M. Wahid (Asian Institute of Technology).

Dr. Gitay's presentation stressed that proper knowledge management is crucial in any adaptation and risk management endeavor and that effective climate risk management in cities requires holistic integration of relevant climate risk knowledge into the development agenda. Consideration of the knowledge cycle – knowledge generation, knowledge sharing and knowledge application – reveals several challenges and opportunities in this respect. For instance, a great deal of climate risk management information has been generated (e.g., research and development results and reports, synthesis reports, IPCC assessments, climate scenarios and modeling, community-based work (though mostly rural)) but print language is often English-dominated and the information may be difficult for city managers to comprehend. Awareness raising, skill development, consensus building and network fostering are recognized as common platforms for knowledge sharing; participants also recommended mechanisms such as simulation/scenario building, demonstrations, project- and/or case-based learning, discussion forums and expert panels and brainstorming. Use of climate portals, wikis, blogs and other computer-based platforms can also be helpful, but user-oriented development of such platforms is critical. Dr. Gitay noted that more often than not, the knowledge being shared in many platforms is too broad for application to the specific needs of decision-making. There is also a need to move from passive to more active modes of knowledge sharing.

Challenges for knowledge application, with respect to adaptation and risk management in urban areas, include fragmented responsibilities (coordination and decision-making), information overload, a general focus on infrastructure improvement as a risk management solution rather than consideration of suites of options and financing for local governments. An entry point for action in many cities is the link between climate risk management and disaster risk management. There is a need for action to be proactive, rather than reactive, with response that is founded on a greater understanding of the problem and development of appropriate and long-term response at the right spatial scale. Longer-term, strategic response can be informed by cities' own experiences in managing climate variability and extremes. Planning and response should not be externally-driven but externally-

facilitated as it is beneficial to draw strengths from partners and to participate in peer-to-peer learning, networks and communities of practice. Sustainable efforts at the city level, collaboration with other cities and experiential learning are also needed to come up with not just technological innovation but social innovation as well.

Mr. Vitoolpanyakij, leader of the WB-sponsored Bangkok study, provided a brief description of the city with respect to its experienced climate variability and projected change and measures in place to contribute to managing current and projected risks. He explained that there is a robust linear relationship between local (Bangkok) temperature increases and global mean temperature increases. SLR is causing increased coastal erosion, inundation of coastal wetlands, increased risk of flooding and storm damage. The upper gulf of Thailand, which includes Bangkok, is the most vulnerable region of the country with respect to SLR. The country is also exposed to storm surges and typhoons and is facing flood risks due to altered extreme precipitation upstream from and in the Bangkok metro area. Since 1995, structural measures have been established to adapt to experienced changes. These include construction and expansion of dikes and improvement of a pumping system. It is recognized, however, that existing and planned protection systems will not have enough capacity to cope with projected climate change of the A1F1 scenario at the return period higher than 10 years. New proposals have been developed to address this concern with specifications on dikes, pumps and drainage canal improvement. With the newly proposed structural adaptation measures, the inundated area is expected to be reduced by 51.35% (from 744.34 to 362.14 km2). As proposed by the Bangkok Metropolitan Administration (BMA), shoreline protection of the western area of the Chao Pharaya River will also be pursued.

Dr. Wahid, an advisor to the WB-sponsored Bangkok study, followed Mr. Vitoolpanyakij's presentation with a review of the study's assessment of direct and indirect damages expected to be the result of climate change impacts for the city. Direct damage is that which is considered measurable and often relates to the replacement value of destroyed immovable assets and stocks. Indirect damage is 'not physical' but can have negative impacts on the economy and can occur over an extended period of time following a disaster event (e.g., income loss due to temporary suspension of business). Projections of maximum inundation for a 30-year flood in Bangkok showed that the eastern part of the city would be mostly protected by current dykes; in the western part of the city, on the other hand, crest elevations of current dykes would not be high enough to protect certain areas from projected flooding and accompanying SLR. The study's impact assessment indicates that more than a half million additional people may be living in flooded areas in the near future due to climate change. About 1.16 million buildings will be vulnerable (inundated at more than 10cm for varying number of days) and of this, 0.9 million are residential buildings. Some clinics will be affected and a solid waste transfer station will be flooded with depth of 50-100cm at the worst-case scenario. Overall impact cost is estimated at 35,302 million baht, which might rise to 148,434 million baht in the future worst-case scenario.

Additional (non-structural) adaptation options considered include reservoir operation during flood times; pursuing groundwater extraction control regulations; improving accuracy of flood forecasts and making dissemination of such more frequent; developing consistent guidelines for flood warning; developing a framework and institutional arrangements for flood insurance; raising public awareness and education; participating in International Disaster Management Networks; applying Community-Centered Approach with highlight on Preventive Approach; and developing city and land use control and guidelines to mainstream climate change. Conducting flood fighting activities that involve periodic training of inhabitants expected to join the flood fighting works; promulgation of a law on flood fighting to clarify the administration structure and job responsibilities of all concerned agencies; and assurance of funds for operation of a suitable flood

fighting system with enough equipment, materials, and manpower is also expected to be beneficial. Recognizing the importance of ensuring institutional support, the Thailand Climate Change Impact and Adaptation Council was created under the Office of Prime Minister and is chaired by a Deputy Prime Minister. The Council is represented by the main department and ministries are responsible for: establishing sub-committees and/or working groups to carry on the proposed adaptation measures; conducting scientific studies and maintaining a relevant knowledge-base; setting up a climate strategy; raising public awareness on climate change; and coordinating all climate change related activities.

2.5 Integrating climate risk adaptation and urban and development planning

The workshop's fifth plenary session included presentations from Dr. David Dodman (IIED Human Settlements Group) and Dr. Kris Ebi (ESS, LLC).

Dr. Dodman discussed challenges and opportunities with respect to urban governance for effective climate change adaptation. He highlighted the risks and projected impacts of climate change and the distribution of related vulnerabilities in urban areas, noting that people most at risk from climate change are those who are least able to avoid the direct or indirect impacts, are likely to be most affected and are least able to cope with the illness, injury, premature death or loss of income, livelihood or assets caused by climate change impacts. He argued that the quality of government influences levels of climate change risk for the urban poor. This can be witnessed, for example, in the quality of a government's provision for infrastructure; the quality of provision for disaster-preparedness; the quality of disaster preparedness and disaster response; the extent to which poorer groups can buy, build or rent 'safe' housing in 'safe' sites; and/or the degree to which local government creates an enabling environment for local civil-society action. Dr. Dodman emphasized two key messages for urban authorities. First, there are large overlaps between most of the measures needed now for local development and those required for adaptation. Second, there are large overlaps between climate-change adaptation and building resilience to extreme weather and disasters. Strategic actions for urban adaptation include identification of current conditions and vulnerability; adjusting existing, conventional city development plans and strategies; adjusting the planning and regulatory framework to support adaptation by households, community organizations, NGOs and the private sector; and responding to bottom-up pressures and supporting community capacities. Supporting effective urban governance requires multi-party attention and collaboration. Local authorities that must manage physical and demographic pressures must be supported by funding from donors, by financial and legal frameworks from national governments, and by urban citizens who provide pressure for action and demand accountability.

Dr. Ebi addressed issues related to integrating public health and adaptation. She described approaches to public health adaptation that include reducing exposures via legislative policies, alterations in the built environment, and/or alterations in the natural environment; preventing the onset of adverse outcomes via early warning systems, surveillance and monitoring, vector control programs, and/or public education and outreach; and/or responding to health concerns via medical training and awareness, treatment, and/or emergency response. Additionally, adaptation can occur via different modes (e.g., biological, behavioral, social), at different levels of society (e.g., individual, groups, communities, national, global) and at different stages (e.g., early via vaccination, later via early warning, even later via treatment). Dr. Ebi provided several examples of potential actions with respect to adaptation to reduce vector-borne disease (e.g., malaria) and adaptation measures to reduce health outcomes from flooding.

3. Panel Sessions

Four workshop panels, comprised of 5-6 discussants each, were designed to give the floor to representatives from municipal governments, planning agencies, research institutes and/or universities in the workshop's targeted cities. Panelists were provided with a list of "starter" questions prior to the workshop and were asked to offer brief comments that addressed one or more of the questions – from the perspective of their city and experiences therein – before discussion was opened to the plenary. Each panel targeted a different theme.

3.1 Panel 1: Cities at Risk – Asia's Coastal Megacities

Panel 1 was a roundtable discussion with representatives from several of the workshop's targeted cities about awareness and estimation of risks in their cities; perceived vulnerabilities; existing analytical capacities for modeling, risk estimation, and downscaling; and programming and/or projects in place to address the risks and vulnerabilities. Panelists were Dr. Masahiro Sugiyama (University of Tokyo), Dr. Banasopit Mekvichai (Chulalongkorn University and formerly BMA, Bangkok), Dr. Baode Chen (Shanghai Typhoon Institute / CMA), Dr. Do Minh Duc (Hanoi University of Science, Vietnam) and Dr. M.C. Wong (Hong Kong Observatory). Panelists were provided with the following starter questions:

1. *What is the level of awareness, on the part of government and planners, of the risks posed by the combination of growth of your city, sea level rise, and climate change?*
2. *Is there an agency / department responsible for estimating / projecting climate change risks?*
3. *Are historical data available for past disasters (e.g., hydrological, meteorological, flood extent, etc.)?*
4. *Are risk maps available?*
5. *Is there analytic capacity in the responsible government agency for climate modeling, downscaling, etc.?*
6. *Does urban planning take into account the increased risks associated with climate change?*

Dr. Sugiyama emphasized that the output of global climate models is not ideal for use at the city level. Downscaling from the global to city and regional levels adds additional uncertainties to model projections. To illustrate his point, Dr. Sugiyama discussed climate information for target cities in the Philippines and Thailand.

Dr. Mekvichai introduced her remarks by describing her former position as Deputy Governor of Bangkok and her responsibilities with respect city planning and flood control. She stressed that planners have many responsibilities and it is difficult to balance the maintenance of day-to-day services (i.e. garbage) with long term planning. She acknowledged that the city receives complaints that they aren't focusing enough on planning for climate change but admitted that she doesn't feel they have enough information to plan for it adequately. Residents approach the city concerned, wondering where it is safe to build, and the city doesn't have adequate information to present to them.

Dr. Chen discussed his current responsibilities at the Shanghai Typhoon Institute. He emphasized that one of the biggest challenges is understanding how climate change will impact places locally. He welcomed the networking and collaboration that he felt would stem from workshop interactions.

Dr. Duc explained that Vietnam is one of the top five countries vulnerable to climate change. In December 2008, the national government approved a program to respond to climate change, but program progress is currently stymied by conflict between the Ministry of Agriculture and Ministry of Environment as to who is in

charge of responding to risks. Addressing the conflict has proven very difficult. Dr. Duc confirmed that there is evidence of climate change impacts in Ho Chi Minh City and the Mekong Delta, particularly with respect to flooding. Vietnam currently has several projects on climate change, one with the World Bank and ADB and one sponsored by Norway. He noted that urban planning is behind economic development in Ho Chi Minh City and Hanoi; no master plans currently exist but the cities are working to create them.

Dr Wong's institution, the Hong Kong Observatory, has been following weather patterns since 1983 and is currently making their data and findings available to decision-makers in Hong Kong. A city of 7 million people, Hong Kong commonly experiences floods and typhoons. Dr. Wong emphasized that a major task at hand is to raise awareness about climate change because there is a severe disconnect between the public and the scientists and engineers. The Observatory is currently developing educational information for schools with the aim of helping to bridge the disconnect. Teams of meteorologists also give talks at schools and universities; the team gave 120 talks in the last year. The Observatory organizes workshops and exhibitions to reach out to the public and help explain climate change, focusing on how humans impact the environment and influence climate change and ways to combat it. Dr. Wong recently joined a group working with the Hong Kong government that is concerned with climate change.

Following the panelists' remarks, Panel Chair Dr. Allen Clark (EWC) welcomed questions and discussion from the floor.

Several questions concerned definitions of risk, distribution of risk within a city and populations at risk. Participants highlighted that populations are changing in different places in different ways. Even within a single city, people are not all at risk to the same extent. Participants were eager to discuss what constitutes risk, different ways to cope with risk and ways in which the capacity to cope varies. Some participants questioned if climate change planning excludes the poorest segments of the population.

Dr. Duc confirmed that in Ho Chi Minh City and the Mekong Delta there are many disasters; populations must "live in harmony with floods" because flood periods are very long. Vulnerability to the floods depends on the population's proximity to neighboring rivers. As large concentrations of poor people live close to the river, there is typically a larger impact on the poor.

Dr. Mekvichai noted that in Bangkok there is a floodwall in place (2m and 50 cm above sea level) to protect the city. As flooding occurs, the city can observe who is impacted and work to remedy the problem, including consideration of relocation where necessary. She stressed, however, that the causes of flooding must be examined first and foremost. In Bangkok, floods are caused by three causes – rain, stream flow, and SLR. The city needs to determine what extreme SLR will mean for the city so that it can adapt. Storm surges are also expected to threaten Bangkok, so the city is currently meeting with organizations to identify the effects of surges at various locations and to strategize with respect to relocating vulnerable populations.

Dr. Wong agreed that poor communities are often those most in need of climate change adaptation measures. He recommended that in addition to investigating and electing best response options, critical groups must also be identified and prioritized with respect to assistance.

Discussion also considered how to approach and solve issues between agencies with respect to management of and response to climate risks. Dr. Duc confirmed that, in Vietnam, the Prime Minister is the leader. The biggest issue is a conflict over who will control information. Ongoing work attempts to establish a way to exchange

data between ministries and institutions. Dr. Chen added that, in China, there a government agency that is in charge of planning and budget; they are the agency making an action plan for climate change.

Dr. Joern Birkmann (UNU) asked Dr, Mekvichai how Bangkok ensured that varied interests are balanced amongst its different approaches to urban planning. Dr. Birkmann also asked if there was a lead agency and if and how agencies coordinated in their planning. Dr. Mekvichai explained that the government and administration are responsible for flooding, and District Officers represent the government. A new department has been set up to help with flooding events. The Department of Irrigation (under Agriculture) and several Ministries come together to share information. If a problem arises, people cooperate. Dr. Mekvichai expressed her belief that when a disaster happens, people will respond and work together.

3.2 Panel 2: Information Needs, Opportunities and Constraints

Panel 2 investigated the current status of information and data availability in different cities; perceived needs for information; and potential opportunities and constraints. Panelists were Dr. Emma Porio (Ateneo de Manila University, Philippines), Dr. Dinh Tuan Nguyen (Ho Chi Minh City Environment Protection Agency, Vietnam), Dr. Tommy Firman (Institute of Technology, Indonesia), Mr. Moshiuzziman Khan (Khulna City Cooperation, Bangladesh) and Prof. Feng-Tyan Lin (National Taiwan University). Questions posed to the panelists prior to the session included:

1. *What is the current status of information and data availability for vulnerability assessment in your city?*
2. *Have systematic studies been done in regards to vulnerability by sectors (e.g., housing, economic base, water, land use, health care facilities, transport, etc.)?*
3. *Is there a GIS (Geographic Information System) in place for displaying information such as population and other social and demographic information, land use, infrastructure, etc.?*
4. *Have vulnerability maps already been prepared? Is there a government agency assigned to this task?*
5. *Is information on climate related risks and vulnerabilities made available to the public? If so, in what manner? And what are the constraints on preparing such information (E.g., technical, institutional, etc.)?*
6. *Are local universities enlisted to help in this task? Consultants (national or international)?*

Dr. Porio noted that most of the discussion and data presented in the workshop so far had focused on research data (i.e., from 'above'). She explained that she instead works from the ground up, with local institutions and the urban poor. In her work, she is trying to understand vulnerability in the context of urban poor populations, specifically via the development of profiles of urban poor populations and investigations as to who uses data about the urban poor and for what purpose. She compared flood and population maps for metro Manila to illustrate considerable overlaps with respect to current and projected flood zones and large urban poor populations. Dr. Porio emphasized that the comparison lacks but demands an information base that provides more detail with respect to needs of vulnerable people, including where exactly they are, who they are, etc. She expressed concerns, however, over what will happen if such maps and data were to be made freely and widely available. She explained that much such information is currently suppressed over fear of what will be done with it (e.g., fear of residents being evicted, buildings being demolished, general panic). Often, it is those with vested interests (e.g., realtors) and even some government agencies that don't want data published for these reasons. As such, the information is not available to decision-

makers. Experts are producing data, but it's not making it into the hands of those that need it.

In sharing perspectives from Vietnam, Dr. Nguyen confirmed that the National Target Program (NTP) had been approved in Vietnam and that climate change is now a priority issue. Indeed, just one week before the *Cities at Risk* workshop, there were three climate change related workshops in Vietnam. Nevertheless, although climate change is a priority in the country, focus is currently concentrated at the national level; it is unclear how much attention the issues are receiving at lower levels. In Ho Chi Minh City, work on climate change is just beginning, namely via two large projects, one of which is the ADB-sponsored study presented by Jay Roop on Day 1 of the workshop (to which Dr. Nguyen was an advisor). The second project is German-funded work on environmental planning. It's core objectives include development of a city strategy for adapting land and structures to climate change based on an analysis of the urban environment; developing a better understanding of specific aspects of relevant policy at different levels, including housing typology; and improving the ability of decision-makers and city managers to apply information and evaluate options for urban adaptation.

The next panelist, Dr. Firman introduced his comments by noting that he is an urban planner, not a climate change expert, but is interested in climate change because he recognizes its importance and urgency and the need to incorporate it into plans for mitigation and adaptation. Dr. Firman confirmed that in Jakarta, data relevant to climate change risks, project impacts, etc. are available from a variety of sources. Available data includes GIS data that is currently used for planning, monitoring, and developing the city. In fact, Jakarta is recognized to have the best GIS in Indonesia; coverage includes the Jakarta metro area and small cities nearby. Studies have been conducted with respect to vulnerability in Jakarta but most have been led by non-Indonesian scientists and seldom have planners been involved. As such, he admitted that the fields of climate change and adaptation are "new" for he and his colleagues. To some extent, risk information is available to the public. After the 2004 tsunami, an early warning system was established and is connected to public radio stations. Areas at risk of being flooded have been identified and the information is shared, but in many areas, poor people living in at-risk areas don't want to leave because they don't have anywhere else to live. Although Jakarta believes it is prepared for floods, there are financial, technical and coordination problems that constrain the government, as well as other obstacles including power struggles.

Mr. Khan provided workshop participants with basic facts and figures related to climate change for Khulna, Bangladesh's second largest city with a population of 1.2 million people. The Bay of Bengal is only 45 km from the city and three rivers surround it. No vulnerability assessment has been done for Khulna nor have any systematic studies been done by sector. No vulnerability or risk maps have been produced as of yet, and no agency is assigned to this task currently. Overall, there is low public awareness about climate change in Bangladesh. Some awareness of risks does exist, especially in parts of the country where disasters are common, but this awareness is mostly about disasters, not climate change, per se. Mr. Khan reported that there are plans currently within ADB to facilitate a study of the vulnerability of Khulna City's water sector to climate change.

Prof. Lin provided an overview of the evolution of disaster management in Taiwan over the past 40+ years. Before 1964, Taiwan had no official laws or regulations pertaining to disaster management. New response regulations were promulgated from 1964-1994. Then during the period 1994-2000, the National Science Council (like the USA's NSF) launched a program for disaster risk reduction in response to a large earthquake that occurred in 2003. The program produced a disaster prevention / response action plan. As part of Taiwan's current operation framework for disaster preparedness, the central government conducts research with 25 local

governments. Shared frameworks, technologies and communication support coordination and consistency in approach. There are also tight connections between the governments and national universities. Taiwan has continuous GIS projects from which data are shared using web GIS technology that is based on international data standards. Many maps, including risk maps, have also been developed based on the data. For example, Taipei has produced three risk maps (at a 1/1000 km scale) that anyone can download online. The Taiwanese government is eager to collect and produce more information so as to provide higher resolution maps.

The panel chair, Dr. Dushmanta Dutta, then opened the floor to discussion and questions from workshop participants. Dr. Marc Levy (CIESIN) offered the hypothesis that climate change may not be the best entry point for effective policy change because climate change is far from the most important issue for many actors in the urban planning/adaptation discussion. Climate change might work well as an entry point in, say, New York City or Taipei but less well in places like Khulna. This obstacle calls for different options for adaptation in different settings and a seeking out of alternative entry points. With respect to the local level, he encouraged participants to consider potential "entry points" as places where people are implementing what they agree on and then see if, how and where climate change fits in. Dr. Lebel argued that although 'arenas' are indeed diverse, climate change *is* a good entry point and may also facilitate opportunities to discuss of other pressing issues. For example, it may be impossible to talk about Chinese dams but consideration of climate change can lead to a discussion of flooding and indirectly, issues of infrastructure. Dr. Firman stressed that no matter what approach is taken, strengthening the capacity of local officials to cope with climate change is a priority. Dr. Porio added that there are people that want to improve governance but they need data to be available for informed decision-making.

Prof. Roland Fuchs (EWC) asked Prof. Lin if any vulnerability and risk maps had been developed beyond physical risks for Taipei. Prof. Lin gave examples of different analyses that can be based on physical risk maps and the types of information that be generated and conveyed to decision-makers as a result. She acknowledged that in Taipei, governments are still trying to link physical risks with social/economic factors, however. Prof. Fuchs also asked Prof. Lin's perspective as to the usefulness of and need for training in GIS as a basic tool for informing adaptation and planning processes. Since Taiwan is advanced in this respect, he asked if there would be any interest to develop a coordinated set of activities for related capacity building and research. Prof. Lin mentioned several GIS training courses available in Taiwan (e.g., run by the government, by universities) and encouraged Prof. Fuchs to talk with her directly.

3.3 Panel 3: Adapting to Climate Change in Asia's Coastal Megacities

Panel 3 focused on options, strategies and constraints with respect to adapting to climate change in Asia's coastal megacities. Panelists were Prof. Huien Niu (Shenzhen Urban Planning and Research Center, China), Mr. Kishore Gajbhiya (Municipal Cooperation of Greater Mumbai, India), Dr. Md. Nurul Islam (Dhaka City Corporation, Bangladesh), Mr. Fei Yu Kuo (Department of Urban Housing, Taipei, Taiwan), Dr. Noman Ahmed (NED University, Karachi, Pakistan) and Ms. Antonia Loyzaga (Manila Observatory, Philippines). Questions posed to panelists included:

1. *Does your city have an adaptation plan or strategy?*
2. *Is there a governmental agency / group charged with overall responsibility (e.g., environmental, public works, planning agency)? How is coordination achieved between responsible agencies?*
3. *What elements of adaptation exist (e.g., building codes, land use plan, urban development master plan, flood protection / engineering works, disaster plan)?*
4. *What are the barriers, if any, to the development of adaptation plans or strategies (e.g., institutional, financial, technical)?*

5. *Are there elements of existing development plans that are maladaptive from the standpoint of climate risk (i.e., elements that work against adaptation)?*

Prof. Niu began the session with thoughts rooted in her experiences as a planner in Shenzhen, a neighboring area to Hong Kong. Shenzhen, as the youngest megacity in the world, is less than 30 years old but boasts a population of more than 10 million people. In general, the city has not paid much attention to climate change, but three plans are nearly completed that will have some relevance to the issue. The upcoming Flood Protection Plan is the responsibility of the Shenzhen Water Management Bureau and is very technologically detailed. A new version of the Shenzhen Master Plan is recently completed but has not yet been issued by the central government. A comprehensive plan for the city that requires coordination of many efforts, Prof. Niu reported that the new Master Plan incorporates some disaster reduction in that the central government has asked cities to plan for disasters, including planning for relocation in some instances. A new Shoreline Plan that will detail how to properly utilize shoreline areas will also influence planning in Shenzhen. The plan does not currently mention climate change.

Mr. Gajbhiya offered an "at-a-glance" description of his city as a context in which to consider adaptation options and strategies. He noted that Mumbai was initially made up of seven islands and has approximately 18 million residents (2009), of which 60% live in informal settlements. The city operates a storm water drainage network that is more than 150 years old and is home to rapid urbanization that exacerbates certain problems. Several factors contribute to vulnerability in Mumbai. These include high population density (particularly in day-time), intensity of the monsoon (very high rainfall in July and August; more rainfall in one month than London receives in one year), heightened risks when high tide coincides with the monsoon, sea-level rise (documented as 0.78mm/year since 1878) and the urban heat-island effect (which is thought to interact with urban-induced convection to produce down-wind rainfall). Mr. Gajbhiya reported that Mumbai has an adaptation strategy in the sense that response mechanisms exist within a regulatory framework at a variety of scales (national, state, city). He believes that, in general, there is excellent and effective coordination among all the agencies that have different responsibilities. Recommended responses to identified vulnerabilities include infrastructural development of drains and pumping stations (at an approximate cost of $1.6 million USD), recommended changes in storm-water drainage capacity (from 25 mm/hr to 50mm/hr), controls on development in coastal regulatory zone and additional regulatory mechanisms at the national government level, the state level (Maharashtra State) and the local level (Mumbai Municipal Corporation). Adaptation strategies also include awareness raising of citizens, continued coordination between different agencies and consistent upgrading of disaster management plans.

Dr. Islam reflected on adaptation responses in Dhaka, a city of nearly 12 million people that is surrounded by rivers on all sides and has a history of serious flooding. Dhaka City has a Master Plan and a recently updated detailed area plan. Different ministries have responsibilities within the plan, and Dr. Islam reported good coordination between Ministries. Additionally, there is a 13-member national disaster management council chaired by the Prime Minister. For Dhaka, specifically, there is also a disaster management committee that is chaired by the Mayor. Adaptation responses in Dhaka currently include a new national building code adopted in 2007 to instruct proper land use in the city and updates to the Metropolitan Master Plan 1995-2005, which include some adaptive measures. The city's Detailed Area Plan has also been recently updated and additional regulations have been drafted for wetland protection and via local government ordinances. Recent construction of an embankment around Dhaka is nearly complete and the structure is expected to produce very good results in protecting the city from floods. The city has added pumping stations to pump out water, and improvements have been made to the drainage system. Heights of roads are also being raised. Major

financial constraints persist with respect to adaptation in Dhaka, but this is being managed in association with national and international supporters. A major conference on climate change was held in Dhaka in February 2009, and the government has announced that it will consider the recommendations.

Mr. Kuo reported that there is currently no comprehensive climate change adaptation plan for Taipei. Several relevant activities and programmes do exist, however, and influence decision-making and growth. For instance, the Programme of Flood Management in Frequently Inundated Areas is a multi-year programme to improve agricultural drainage systems and includes plans to construct an urban drainage system. The 'Green Building Promotion Program' addresses mitigation issues. Adherence to program guidelines has been mandatory for all new central government buildings since 2002 and for all new local government buildings since 2003. The National Territory Recovery Program and Act (currently in draft form) was developed in response to severe mudflows and floods in July 2004. The program addresses land-use change and industrial adjustment, bans new roads in mountainous areas (to prevent development) and promotes relocation of people living in potentially hazardous areas. The program is facing many difficulties as it was originally conceived without consultation with local government or citizens but is now being revised. At the national level in Taiwan, the National Council for Sustainable Development, chaired by Prime Minister; has formed the 'Climate Change and Kyoto Protocol Response Working Group', which was initially focused on mitigation but efforts are now underway for adaptation as well. In addition, the 'National Climate Change Impact Assessment and Adaptation Strategy in Taiwan' (draft completed in January 2009) addresses both individual sectors and cross-sectoral activities.

Dr. Ahmed explained that in his city of Karachi, home to 16 million people, there is no adaptive strategy for climate change but the topic is beginning to attract attention in intellectual and professional circles. A national disaster management authority exists but maintains a very small staff and operates only in response to a disaster. It is the city government that is tasked with routine tasks of disaster planning and management. Dr. Ahmed explained that the city's current disaster plan is "frozen" and does not take emerging issues into account. The city is attractive to real estate developers and development is booming along the coastline, some areas of which are ecologically sensitive (e.g., mangrove forests). Vulnerable fishing communities are affected by torrential rains and other localized disasters. Where flood control mechanisms have been put in place, they fall short of needs that will arise from climate change. In addition, monsoon patterns are changing, making planning even more difficult. Because multiple agencies are responsible for urban and coastal-zone management, a chaotic situation develops when disasters occur. In the past, the military has often had to intervene on such occasions. Dr. Ahmed emphasized that the mindset of policy-makers needs to be changed: currently, climate change is seen as a 'luxury' with more pressing issues to be addressed.

Ms. Loyzaga discussed climate change as a priority in the Philippines, particularly in metro Manila. She confirmed that climate change is a popular topic in the Philippines – there is a Presidential Taskforce and a Presidential Advisory Council for such. Metro Manila itself, however, does not currently have a climate change adaptation plan. Although a Metro Manila Development Authority exists, it is comprised of seventeen local government units. As can be expected, difficulties exist in managing infrastructure that crosses unit boundaries. National scale risk maps have been produced but were drafted according to political rather than ecosystem boundaries. Some of the maps can be scaled down to the "barangay" or smallest administrative level, but not all. In considering future priorities for adaptation planning and action in Manila, Ms. Loyzaga called for recognition of the poverty-hazard nexus. Mapping of informal settlements in metro Manila suggest

that 70% of the city's economy is informal, with slums agglomerating around particular economic activities, many of which are at risk from climate-related impacts.

Following the panelists' remarks, Session Chair Dr. Anond Snidvongs closed the session without questions from the floor due to time restrictions. Workshop participants were encouraged to approach panelists individually to continue discussion.

3.4 Panel 4: Funding Adaptation – Challenges and Opportunities

Panel 4 briefly considered financial challenges and opportunities with respect to adaptation and development. The panel was discussion-based and offered interested agencies and institutions the opportunity to describe relevant ongoing and/or future initiatives in the region and perspectives on potential support mechanisms for technical and other assistance, particularly given the ideas, discussions, and recommendations that grow from the workshop.

Ms. Megumi Muto (JICA) described recent and major re-organization of Japanese foreign assistance. The changes emphasize long-term funding for infrastructure, capacity building, etc., to pursue country development goals and address longer term CC needs. In addition, she discussed a new financial mechanism for both mitigation and adaptation activities called the "Cool Earth Partnership" – global set asides include $8 billion USD for mitigation and $2 billion USD for adaptation. A concern in allocating the funds is how to set targets and measure impacts.

Mr. Orestes Anastasia (USAID Regional Development Mission for Asia) offered thoughts on adaptation funding from the perspective of USAID work in Asia. He affirmed that the US has a strong commitment to addressing energy and climate change challenges via a new level of international engagement, particularly given new policy developments under the Obama administration. In briefly describing USAID's work related to climate change, Mr. Anastasia acknowledged that climate change has implications for all areas of the agency's Foreign Assistance Framework (e.g., Democracy and Governance, Peace and Security, Investing in People, Economic Growth, Humanitarian Assistance). USAID is currently spending approximately $185 million USD per year in forestry, energy, and other global climate change activities, and budget increases are being considered starting in 2010. With respect to adaptation, the current emphasis is integrating adaptation objectives into existing programs.

Mr. Anastasia then summarized the Regional Development Mission for Asia's (RDMA's) "road map" for addressing climate change in Asia. During the period 2008 to 2012, RDMA plans to implement a targeted and expanded program of work to lead and support USAID actions to address climate change in Asia's economic development, in cooperation with current and new partners. Objectives for climate change and development include reduction and/or sequestration of GHG emissions as a result of US government assistance; increased adaptive capacity to cope with impacts of climate variability and change as a result of US government assistance; and increased economic welfare, especially in poor populations. Priority focus areas of the RDMA, in this respect, include clean and sustainable energy, forests and land use change, coastal resilience and coral reefs and regional crosscutting technical assistance. Describing RDMA work in coastal resilience in more detail, Mr. Anastasia highlighted adaptation and resilience components of the Coral Triangle Initiative and indicated that adaptation might also be a future focus of the agency's Mekong Climate Initiative. Relevant thrusts are also expected to be part of future technical assistance missions and work in the region related to water resources and services.

In highlighting a number of opportunities for adaptation financing, Prof. Ian Burton first noted that funds for adaptation are generally not available for research, but are

available for technical assistance, capacity building and similar efforts. He reflected on a growing multiplicity of funding agencies and opportunities that countries and cities can access for adaptation activities but warned that there are often substantial transaction costs in dealing with the agencies that administer such funds, so a great deal of patience is required. Under the Global Environmental Facility (GEF), for instance, there are two major funds supported by voluntary contributions: the Special Climate Change Fund (SCCF) and the Least Developed Countries Fund (LDCF). Since 2002, the LDCF has dispersed only a fraction of the funds available; this is likely because current guidelines require that a country apply through another agency (e.g., World Bank). The World Bank has the Global Program for Climate Change Resilience (GPCCR) that hopes to develop a programmatic approach to adaptation. About $600 million USD is initially available for a small number of countries. In Asia funds are available for Cambodia, Bangladesh and Nepal because they have completed action plans under the LDCF. When asked about entry points for cities, Prof. Burton explained that each agency has a regional representative and each country has a focal point. He recommended that a city interested in pursuing funding go through its country focal point or approach the WB agency directly. He also posed a question for thought: Are coastal cities in Asia interested in and/or capable of doing something collectively to help ensure that the described funds respond specifically to the needs of cities?

Ms. Poonam Pillai (World Bank) stressed that climate change should be addressed as a development issue as some of the poorest countries will be most affected. She offered three questions for consideration with respect to funding. First, how can funds be raised for climate change separate from general development assistance funds? Second, how should funds be managed and how should accountability be ensured? Third, how should the funds be allocated and applied? Fragmentation of funding is a major concern, and discussion as to how to address the issue is ongoing. There are concerns not just about financing, but also about the capacity of country agencies to use the funds. The World Bank is currently developing a new grant program for cities that will support both mitigation and adaptation activities.

Panel 4 concluded with brief discussion of problems that can be caused by donor presence in developing countries. Ms. Muto argued that donors need to work on harmonizing their activities and reducing the burdens on recipients. Ms. Pillai agreed and noted that it is important for donors to be very well coordinated in their country-level efforts. Donors also have their own different funding cycles, and often a funding cycle does not match the long-term nature of the problem being addressed. It is important for donors to use funds wisely and to monitor and measure impacts. Monitoring and evaluation of projects in the short term whose impacts are longer term in nature may require fundamental rethinking of evaluation strategies.

4. Working Groups

Working Groups provided the opportunity for more focused discussions of key questions addressed at the workshop, while taking into account the points raised by presenters, panelists, and discussants. Every workshop participant was expected to actively participate in one of four groups.

Working Group 1 was tasked with investigating ways to determine and characterize risks at the urban level in terms useful to planners and officials. The group was asked to particularly consider risks with respect to the combined effects of SLR, climate change and coastal settlement. Working Group 2 focused on issues surrounding the need to build a knowledge base for urban planning and development with respect to climate change and climate change adaptation. The group was tasked with considering 1) effective ways to determine and portray

vulnerabilities (e.g., population, infrastructure, economic activity and livelihoods, health, etc.) and 2) the critical information required by planners and policymakers in this respect. Workshop organizers also encouraged the group to discuss communication issues, particularly in terms of knowledge delivery and exchange. Working Group 3 discussed best practices for identifying, evaluating and prioritizing appropriate adaptation measures in cities. Working Group 4 considered issues related to healthy and effective urban governance for risk reduction with a focus on how to best mainstream and implement adaptation and climate risk management in urban development planning.

At the conclusion of the Cities at Risk workshop, each Working Group described its key recommendations in response to its tasks. Working Group reports also included recommendations as to priority action in the short and longer term. Major recommendations from the Working Groups are the workshop take-home messages as described in the body of this report.

5. Closing Session

Prof. Nobuo Mimura (Ibaraki University/IR3S) used the closing plenary to summarize key follow-on activities recommended during workshop sessions. He reported that immediate follow-up to the *Cities at Risk* workshop was expected to include a conference report, in the form of a summary of proceedings and major recommendations, accompanied by access to all plenary presentations. A policy brief would also be developed, in the near term, for distribution to a wide audience, most likely via EWC outlets. Opportunities for compiling a special journal issue with contributions from workshop presenters would be investigated. With respect to future capacity building and research activities, Prof. Mimura committed the *Cities at Risk* team to seeking funding sources for an Advanced Institute / training workshop that targeted adaptation planning in cities, with particular emphasis on training for risk and vulnerability assessment and mapping. Representatives from the EWC confirmed that it might be possible to hold the workshop on their campus, if not in Asia. Results of such training and any other follow-on activities could be reported and discussed at *Cities at Risk II,* to be held within two years at a location to be determined. Development and/or use of a web-based platform for communication and region-based data compilation would also be considered. The *Cities at Risk* steering committee was tasked with managing follow-on activities, including seeking funding sources.

Prof. Mimura's summary was met with strong recommendations from the plenary that the organizers also consider facilitation of city-specific scenario/storyline activities as immediate follow-on to the workshop. In addition, participants encouraged the *Cities at Risk* steering committee to consider and incorporate additional specifics of the Working Group recommendations into future brainstorming and programming. The plenary agreed that many of the workshop's recommended activities are doable and emphasized the importance of prioritizing the participation of young scientists and practitioners in follow-on activities in order to strengthen the potential for forming a network of invested individuals and institutions that will grow and be enhanced as time passes.

In closing, Prof. Roland Fuchs (EWC) expressed his gratitude, on behalf of all workshop organizers, to participants for their time and input. He encouraged additional recommendations to the steering committee with respect to ideas for concrete follow-on activities and reported that the committee may meet as soon as September 2009 to consider development of longer-term programming and activities. Prof. Fuchs described his hopes that through the workshop and in follow-on collaborations and discussions new partners would find the motivation to mobilize and meet the challenges at hand.

Appendix 3: Summary of Funding Sources Outside of APN

Estimated *Cities at Risk* workshop contributions	
1. Co-Funding from ICSU	**$39,048**
Grant awarded to support additional workshop participation & costs	$39,048
2. Contributions from the East-West Center	**$37,500**
Staff Time (in-kind)	$30,000
Output Publication and Editing Expenses	$2,000
Workshop participation	$5,500
3. Contributions from START	**$30,000**
Staff Time (in-kind)	$30,000
4. Contributions from Ibaraki University/IR3S	**$20,000**
Staff Time (in-kind)	$5,000
Workshop participation	$15,000
5. Contributions from SEA-START	**$5,000**
Staff Time (in-kind)	$5,000
6. Contributions from ADB	**$5,000**
Workshop participation	$5,000
7. Contributions from the World Bank	**$5,000**
Workshop participation	$5,000
8. Contributions from JICA	**$5,000**
Workshop participation	$5,000
Total Estimated Contributions from Other Sources	**$146,548**
Total Contribution from APN	**$56,055**
TOTAL Support	**$202,603**

Appendix 4: Glossary of terms

ADB:	Asian Development Bank
APN:	Asia-Pacific Network for Global Change Research
AR4:	Fourth Assessment Report (of the IPCC)
BMA:	Bangkok Metropolitan Administration
CAPaBLE:	Scientific Capacity Building/Enhancement for Sustainable Development in Developing Countries programme (APN)
CMA:	Chinese Meteorological Administration
COP:	Conference of Parties (of the UNFCCC)
DRAGON:	Delta Research and Global Observation Network
EWC:	East West Center
ICSU:	International Council for Science
IHDP:	International Human Dimensions Programme
IPCC:	Intergovernmental Panel on Climate Change
IR3S:	Integrated Research System for Sustainability Science
JICA:	Japan International Cooperation Agency
MAIRS:	Monsoon Asia Integrated Regional Study
OECD:	Organisation for Economic Co-operation and Development
SEA-START:	Southeast Asia START Regional Research Center
SLR:	Sea level rise
START:	global change SysTem for Analysis, Research and Training
UGEC:	Urban Global Environmental Change project
UNFCCC:	United Nations Framework Convention on Climate Change
WBI:	World Bank Institute
WCRP:	World Climate Research Programme