Climate Resilience in Concept and Practice:
ISET Working Paper 3

Planning for Urban Climate Resilience:

Framework and Examples from the Asian Cities Climate Change Resilience Network

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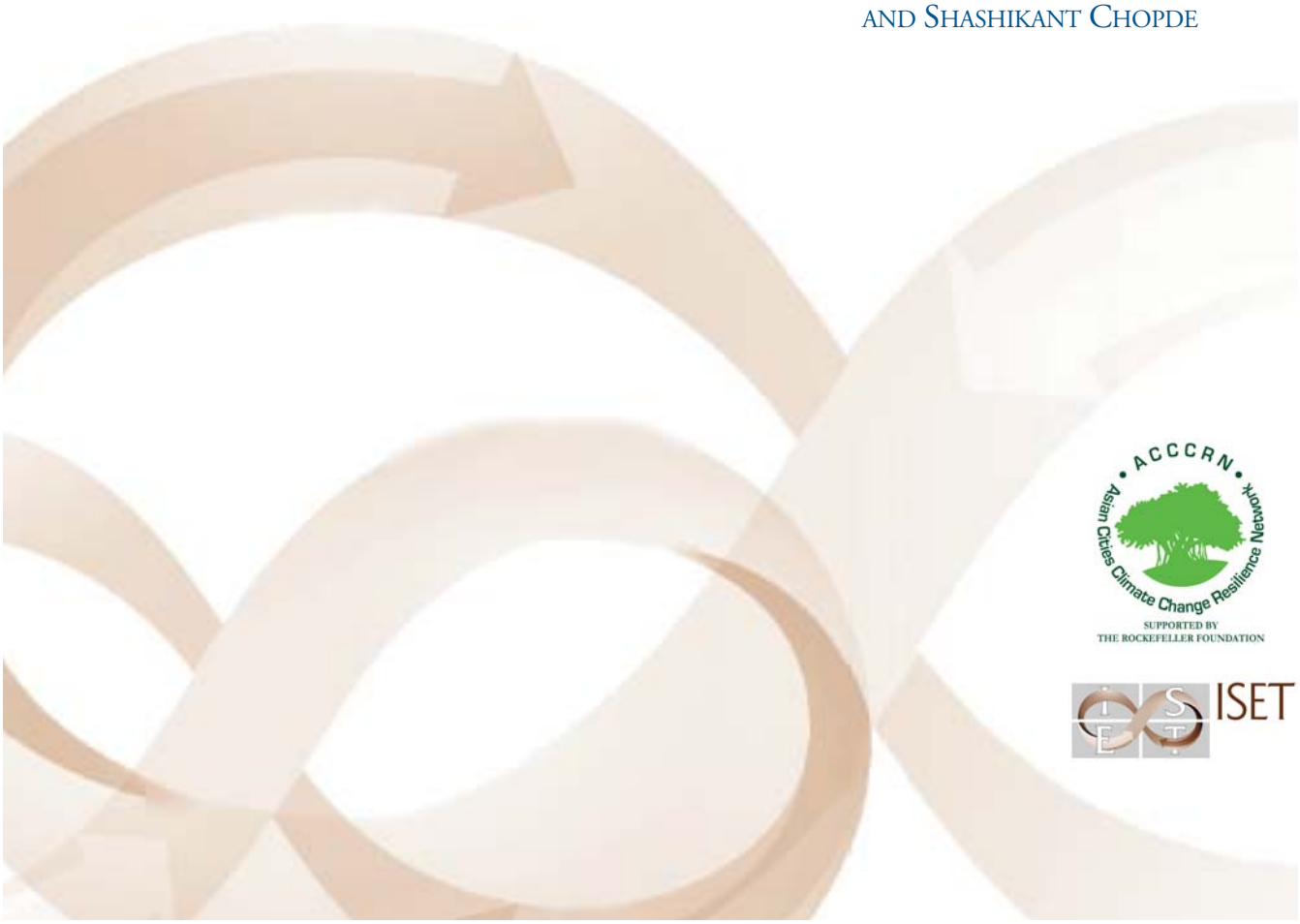

ACCCRN Asian Cities Climate Change Resilience Network
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This publication is made possible by the support of the Rockefeller Foundation as part of the Asian Cities Climate Change Resilience Network (ACCCRN). ACCCRN aims to catalyze attention, funding, and action on building climate change resilience for poor and vulnerable people in cities by creating robust models and methodologies for assessing and addressing risk through active engagement and analysis of 10 cities in Asia. The ACCCRN program engages local level and national organizations in India, Indonesia, Thailand and Vietnam, and was conceived and launched by the Rockefeller Foundation in 2008.

As part of ISET, the authors have been involved in shaping the overarching conceptual frameworks, activities, and results described here. Likewise, our interpretation of the ACCCRN experience is shaped by our deep involvement with it. Views and opinions expressed within do not necessarily reflect the position of all ACCCRN partners nor of the Rockefeller Foundation. While we gratefully acknowledge the contributions by many colleagues, responsibility for any errors or misinterpretations lies with the authors alone.

Any comments or questions on this paper can be directed to info@i-s-e-t.org.

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Acknowledgments

This paper summarizes and synthesizes an enormous volume of work undertaken by organizations and individuals in 8 of the 10 ACCCRN cities over the period February 2009 – October 2010. We could not have prepared this paper without the efforts of skilled and enthusiastic partners in TARU Leading Edge and Gorakhpur Environmental Action Group in India; Mercy Corps Indonesia; the Thailand Environment Institute; and in Vietnam, the National Institute for Science and Technology Policy and Strategy Studies (NISTPASS) and Challenge to Change. In addition, ISET and all these country partners relied on the active engagement of city-level participants, from local government and other organizations, to shape key contributions and provide guidance to resilience planning. It was these local participants who did the heavy lifting for this project: puzzling through new concepts, searching for data, interpreting and helping ISET to communicate difficult and fuzzy new concepts, and then applying new ideas and tools in their own work. This paper would have been impossible to produce without their diligent efforts, data contributions, explanation, review and support. We also acknowledge helpful review comments by Dr. Sarah Opitz-Stapleton of ISET.

Acronyms List

ACCCRN	Asian Cities Climate Change Resilience Network
BAPPEDA	Badan Perencana Pembangunan Daerah (Regional Planning and Development Agency - Indonesia)
CAC	City Advisory Committees
CCROM	Centre for Climate Risk and Opportunity Management (Indonesia)
CRS	City Resilience Strategy
CSAG	Climate Systems Analysis Group (Univ of Cape Town)
CSC	City Steering Committee (Gorakhpur)
CtC	Challenge to Change
DARD	Department of Agriculture and Rural Development
DfID	Department for International Development (U.K.)
DoC	Department of Construction
DoNRE	Department of Natural Resources and Environment
DRAGON	Delta Research and Global Observation Network Institute (Can Tho University)
GEAG	Gorakhpur Environmental Action Group
HCVA	Hazard, Capacity and Vulnerability Assessment
IDA	Indore Development Authority
IITM	Indian Institute of Tropical Meteorology
IMHEN	Institute for Meteorology, Hydrology and Environment Ministry of Natural Resources and Environment (Vietnam)
ISDA	Infrastructure Services Deficiency Analysis
ISET	Institute for Social and Environmental Transition
NGO	Non-Government Organization
NISTPASS	National Institute for Science and Technology Policy and Strategy Studies (Ministry of Science and Technology – Vietnam)
NTP	National Target Program to Respond to Climate Change (Vietnam)
PPC	Provincial People's Committee (Vietnam)
SEA START	South East Asia – (Global Change) System for Analysis Research and Training
SECs	Socio-Economic Clusters (India)
SEDP	Socio-Economic Development Plan (Vietnam)
SGCCI	South Gujarat Chamber of Commerce and Industry
SIWRR	Southern Institute of Water Resources Research (Vietnam)
SLD	Shared Learning Dialogue
SLR	Sea Level Rise
TCPO	Town and Country Planning Office (India)
TEI	Thailand Environment Institute
ULB	Urban Local Body (India)
UNFCCC	United Nations Framework Convention on Climate Change
VA	Vulnerability Assessment

Executive Summary

This paper summarizes and draws lessons from a great deal of interaction, analysis (including over 70 studies), and planning processes conducted in cities in Vietnam, India, and Indonesia as part of the Asian Cities Climate Change Resilience Network (ACCCRN). The ACCCRN program was conceived and initiated by the Rockefeller Foundation in 2008 and aims to catalyze attention, funding, and action for building climate change resilience for poor and vulnerable people in developing cities. Local partners from ten cities have engaged actively in this experimental process. In this paper, we draw key lessons about approaches, methods, and the practice of "urban resilience and "resilience planning" from their experiences. The cities discussed in this paper are Indore, Surat, and Gorakpur (India), Can Tho, Quy Nhon, and Da Nang (Vietnam), and Semarang and Bandar Lampung (Indonesia).

We open our discussion by outlining the Urban Resilience Framework (URF). The URF is a conceptual framework for urban resilience that underlies the methodology introduced through the ACCCRN program. It emphasizes the role of *systems* and *social agents* (both internal and external) for building resilience in cities. Strengthening resilience, as described in the URF, includes building the capacity of agents to visualize and act, organize and reorganize, and learn; and the performance of systems with enhanced flexibility and diversity, redundancy and modularity; and that fail safely rather than catastrophically. To strengthen urban resilience, iterative processes of diagnosing vulnerability, planning, and implementation are required.

ACCCRN demonstrates one model for how this framework can be operationalized. We discuss in detail this process, which we have termed "resilience planning." Through ACCCRN, ISET introduced a practical sequence of activities that utilizes inputs from climate projections, impact assessments, vulnerability assessments, detailed planning and sectoral studies, and pilot projects. Driving this approach were Shared Learning Dialogues (SLDs), a series of iterative multi-stakeholder workshops and discussions to generate interest and ownership, validate results of studies, and build a platform for collaborative action across diverse groups. In each instance, the ACCCRN process engaged a wide body of actors including government departments, academic institutions, communities, NGOs, private sector representatives, and citizen groups.

Although the processes of diagnosis, learning, and planning are highly iterative in the URF, a key milestone in ACCCRN was the production of a "City Resilience Strategy." Resilience strategies are a novel tool, similar to climate adaptation action plans that are being developed in cities such as New York, Chicago, Durban, Cape Town, and Quito. As presented in the ACCCRN program, resilience strategies are a *living* document intended to provide context, evidence and analysis to justify actions for strengthening urban resilience, set priorities for action by local government, and provide background information to support greater awareness and autonomous adaptation by community and private organizations. ACCCRN cities were encouraged to recognize that resilience could be supported through a number of different approaches of varying cost and complexity, depending on the range of local conditions and priorities. The initial strategies generated a set of actions for building resilience, and then *evaluated* and *prioritized* them using locally-appropriate criteria and methods. In addition, the strategies show linkages and seek to influence existing development policies, procedures and plans, and create a platform for funding priority actions through local resources, senior governments, and external donors.

In this paper, we review the processes of resilience planning as actually implemented in 8 cities. This includes understanding how resilience planning can occur in a number of local and national contexts, the strengths and weaknesses of the methods introduced through ACCCRN, and key constraints and obstacles. We also draw lessons from the resilience strategies, which are the first documents of their kind to be developed locally in this type of process.

The early strategies provide a glimpse into how "resilience" is being interpreted and practiced on a city level. Key observations and preliminary conclusions include:

1. Process:

Shared learning is a useful and innovative approach to resilience planning: Resilience planning varied in each country and each city, depending on a variety of factors such as local partner capacities, city governance and institutions, approach of the facilitating country partner, and city planning and bureaucratic processes. Across cities however, the system of shared learning introduced was deemed by local partners to be largely effective for its main objectives of initiating, validating, and driving the process, and innovative in producing new relationships and avenues for coordination. For instance, opportunities for convening scientific and local knowledge through open and structured deliberation was new to most Vietnamese participants and led to significant gains in understanding and consensus on local actions. Likewise, SLDs provided the first occasion for local government in Indonesia to work directly with local NGOs and helped create opportunities for their ongoing engagement in local planning processes.

Resilience planning is a long-term process and requires a flexible timeline: The ACCCRN process was originally designed for a relatively short period of engagement. At the beginning, ISET and other regional partners underestimated the time required to fulfill key aspects and objectives: for local partners to absorb new and challenging concepts; for translation of complicated technical materials into local language (and capacity building of translators to undertake this work); for rigorous data collection, climate, and vulnerability assessments; and for resolution of conflicting perspectives among stakeholders on key issues. Because the processes were locally driven local timelines and had to deal with local political priorities, which can change. Overall, the time allocated for the engagement and resilience planning processes was insufficient and flexibility was essential, particularly in Indonesia where the process began later. In the Indonesian cities, deadlines prevented the logical sequence of activities and analysis from occurring, resulting in weaker analysis, less opportunity for review and absorption of concepts by partners, and reduced local control and ownership by forcing partners to rely more on external support.

City leadership is important but sometimes fleeting: Securing the support of city leadership (such as mayor, municipal commissioner, chairmen or department heads, etc.) can help to ensure participation of other key players or sectors, and increase the likelihood that results will be integrated into decision making. Ultimately, it is necessary for local government to become a key stakeholder that is willing and able to integrate climate change priorities into their activities. However, experience also indicates the risk of relying on few key figures who may leave office or change positions, and that gaining a wider base of knowledge and support reduces the risks of inconsistent leadership.

Resilience planning is more effective with a core group of dedicated planners who represent key stakeholders and city decision makers: While the ACCCRN processes aimed to engage a broad base of city stakeholders, driving a local process relied on a smaller *core group* that served as a repository of information and capacities, led and/or coordinated integration across sectors, and acted as ambassadors of climate resilience to build demand for resilience planning in their own departments or organizations. In all cities, the process of drafting the resilience strategies engaged key decision makers and representatives of multiple agencies. In this way, those who drafted or contributed to the resilience strategies were also the owners / users and part of the intended audience. This was a central aspect of ensuring the strategies' influence and effectiveness; even the most carefully crafted resilience strategy will have little impact if key stakeholders are not involved in the *process of creating it*. The time commitments necessary for consistent participation of members requires institutional arrangements to secure local staff time and may require monetary arrangements to compensate for loss of time on other work.

2. Resilience Strategy Content and Structure:

The documents must be "strategic," which will have different meanings in different contexts: The ACCCRN resilience strategies are all *strategic* in nature, seeking to optimize limited resources, build an actionable roadmap, and link climate change issues to the actions of local and higher levels of government. Resilience strategies reflect the reality of each particular city context. In Vietnam, local governments are highly organized but strategic economic and social decision making is dominated by national policies and targets. Fortunately, national policy has already mandated the development of local climate action planning. It was clear, therefore, that incorporating climate considerations into planning could be accomplished through the creation of a small local government office responsible for climate adaptation planning, a role that would be required in any event. In contexts with weaker local government, the strategies put a heavier emphasis on the role of NGOs, academic institutions, private sector, and citizens' groups.

Structures are useful for understanding vulnerability and generating actions, but they can be limiting, as well: Most of the ACCCRN cities choose a single frame of analysis through which to interpret vulnerabilities—for instance, through specific hazards, geographical locations, or urban sectors. Imposing such a frame of analysis helps ensure that proposed actions respond to the relevant vulnerabilities in the respective framework and should make transparent any gaps in the proposed plan of action. Using a single frame of analysis also brings limitations, however. For example, cities that focus on geographical vulnerabilities may be more likely to miss an important intervention related to a citywide sectoral issue such as water management or energy systems. And all of the frameworks need to be sensitive to socially differentiated vulnerabilities (e.g. women, children, migrants). In ongoing planning efforts, it will be important for the cities to revisit their vulnerabilities using alternative vulnerability frameworks.

Dealing with uncertainty in climate information for planning: A key issue in climate adaptation practice is how planners can make effective use of available climate information despite large uncertainties and unfamiliar or unhelpful data formats. In early stages of the program, many partners expressed frustration at the lack of probabilistic data regarding future climate impacts, which they had hoped to use to design infrastructure standards. All of the cities struggled with how to apply climate data to the design of their resilience strategies and convey the nature of climate projections and models (see also *ISET Climate Resilience in Concept and Practice Working Paper 2*). They ultimately met these challenges in a number of ways:

- **Focus on existing vulnerabilities:** All of the strategies have a strong focus on *current challenges and vulnerabilities that are very likely to be exacerbated by climate change.* These issues included waterlogging, water scarcity, flood protection, ecosystem degradation and solid waste management.
- **"No-regrets" planning:** No-regrets strategies are actions that yield positive outcomes regardless of climate conditions and across a wide range of futures. Examples of no regrets strategies include awareness building, early warning systems, improved service delivery, drainage systems, wastewater management, etc. In many cases, no regrets strategies respond to current problems, guaranteeing benefits that can be felt immediately but will also strengthen resilience to future climate hazards.
- **Further studies on potential interaction of climate and key urban systems:** All cities identified the need for better local data and detailed scientific studies of plausible local climate impacts that would allow them to plan with more sophistication in the future. A common interest across most cities was learning more about impacts on key hydrological parameters and water management systems in relation to planned urban development.
- **Avoiding maladaptation:** Strategies recognize the increasing risks of further development in exposed sites, of overexploitation of key resources (e.g. groundwater), and/or the vulnerability of particular sectors (e.g.

fishing, agriculture). They propose approaches that would redirect "business as usual" away from these sensitive sectors or areas.

- **Awareness:** Several cities have prioritized awareness raising among different groups, from the general public to private businesses and elected officials, in order to generate broad support for resilience actions, and to build capacities for behavioral change and autonomous adaptation. In the case of Gorakhpur in particular, public education campaigns are intended to generate grassroots political pressure and improve the responsiveness of local government.

Scenario development can be a powerful tool for planning for urban and climatic uncertainty: Several of the cities developed future scenarios related to climate change and urbanization as part of their resilience strategies. In each case, the scenarios were developed collaboratively as part of a stakeholder workshop, providing an opportunity to evoke discussion and group visioning. The types of scenarios varied between cities. In Surat and India, scenarios focused primarily on urban growth trajectories, with climate change considered subsequently as a factor that would exacerbate urban development challenges. Semarang partners employed scenarios to consider how climate would affect specific environmental challenges when paired with city growth – for instance, water service coverage, flood days per year, and loss of aquaculture industry.

3. Key Thematic Areas:

All of the strategies include actions that touch on awareness raising, capacity building, infrastructure, ecosystems, and development of knowledge and institutions. A number of thematic areas appear across the strategies, as described below:

Major infrastructure: Although all cities identify major challenges related to flooding, water supply, or both, none prioritize major infrastructure investments in their resilience strategies. We believe that this reflects the planners' recognition of the uncertainty of climate data, the expense and complexity of large infrastructure projects, and the presence of existing infrastructure projects in most of the cities funded through either multilateral development banks and/or through large national government programs. For these reasons, it may generally be unfeasible for urban resilience planners to emphasize infrastructure issues in the early stages of their work. An important question in urban adaptation in the future will be how to plan robust infrastructural solutions in the face of uncertainty. It is likely that major infrastructure issues will return to the resilience planning agenda in future once some of the more detailed hydrological studies are completed, for example.

Disaster Risk Reduction (DRR): A number of the cities present suggestions for DRR planning, including development of or improvements to early warning systems, greater community involvement in DRR plans, flood depth markers, and improved floodplain identification and evacuation procedures. This reflects the attention to extreme events and climate hazards, as well the predominance of existing problems (rather than new and unfamiliar climate challenges) in the minds of city partners. Disaster risk reduction can be considered a "no-regrets" strategy.

Coordination: Most of the cities have identified the need for a centralized office or resource center for local coordination and/or information to improve the quality and usefulness of climate data. These include a Climate Watch Group in Surat, City Climate Change Coordination Offices in the Vietnamese cities, a Resource Center in Gorakhpur, and a Center for Cities and Climate Change in Semarang. The specific proposals vary between cities, but include mechanisms to assemble data and undertake analyses that lead to policy advocacy, enhance decision making and/or capacity building, make climate information available to the general public, and lead ongoing planning and coordination of climate adaptation actions throughout the city.

Identifiable vulnerable social groups: Each city context will have different needs for incorporating marginalized groups into resilience planning. In Gorakhpur, Da Nang and Quy Nhon, vulnerable groups are a central focus of the resilience strategies, which are explicit about the links between the geographic and social nature of vulnerability. In the Vietnamese cities, these vulnerable groups were most often considered to be the poor farmers and fishers (especially women-headed households) on the outskirts of the city, whose housing and livelihoods are already quite susceptible to climate hazards. Interestingly, all three Vietnamese cities point to resettlement of vulnerable groups as a resilience planning issue – both as a positive solution and as a negative impact on those displaced – but this issue is not raised in any of the Indian cities.

Remaining areas of concern: There are a number issues that cities see as critical and linked to climate change – yet partners are struggling with how to respond to them. These include **migration to cities**, which is expected to increase as a result of dynamic urbanization and economic processes exacerbated by climate change impacts in rural areas. **Public health** also generated widespread concern, yet the specific effect of climate change on health as opposed to other factors is not very clear. Health related interventions called for further study or focused on improving current sanitation, drainage, solid waste management, and existing primary health care operations. **Water supply** has emerged as a key concern as well. In Surat, Can Tho, Da Nang and Semarang water supply systems will need to be relocated, augmented or redesigned as current intakes become more saline or simply inadequate in the face of longer droughts and higher demand.

Introduction

The rapidly growing cities of the developing world house a significant and expanding share of the world's population. However, many of these people still live in poverty, and their demands for basic urban services and infrastructure cannot be met by most of these cities. In the coming decades, climate change will add a further strain to the lives of poor urban residents, and to the already frayed infrastructure and administrative systems of hard-pressed cities.

The Asian Cities Climate Change Resilience Network (ACCCRN) is an innovative program that supports medium-size Asian cities to adapt to climate change. The program has taken an action research approach that has catalyzed city level actors to assess key climate stresses and potential vulnerabilities, and propose measures to respond to these, rather than commissioning external experts or national agencies to prepare such plans. The cities participating in the current phase of ACCCRN are Gorakhpur, Surat, and Indore (India), Da Nang, Can Tho, and Quy Nhon (Vietnam), Bandar Lampung and Semarang (Indonesia), and Chiang Rai and Hat Yai in Thailand. This paper describes the process of building city Resilience Strategies in Vietnam, India, and part of the work in Indonesia as a mechanism for planning interventions to strengthen urban climate resilience in each city.[1]

ACCCRN worked with national partners TARU Leading Edge and Gorakhpur Environmental Action Group (GEAG) in India, the National Institute for Science and Technology Policy and Strategy Studies (NISTPASS) and Challenge to Change (CtC) in Vietnam, Mercy Corps in Indonesia, and the Thailand Environment Institute (TEI). Phase 2 of the process has been organized around a "shared learning dialogue process" (see *ISET Climate Resilience in Concept and Practice Working Paper 1*) through which local partners have increased their understanding of climate change, situated climate risks within their own contexts, and begun to devise and pilot resilience actions. The preparation of "City Resilience Strategies" emerged as the key milestone and objective of this process. Strategies provided a mechanism for consolidating earlier learning, proposing a set of complementary future actions based on the analysis, identifying specific proposals for funding and disseminating these results to key decision makers and/or a larger city audience.

The paper will first summarize the Urban Resilience Framework that underlies this work, and then briefly describe the flexible common guidelines for resilience planning that were presented to city and country level partners in the program and which formed the basis for the city level work. The paper will explain the process and the key conclusions of the strategies in each of the cities that have so far completed this work, and will then compare and synthesize the experiences, both within and between countries, with reference to the Urban Resilience Framework.

The purpose of the paper is primarily to describe and analyze the **practice of resilience planning** as it has emerged in these cities, drawing on a large amount of discussion, analysis, and related activities, including a total of over 70 studies of climate futures, impacts, local vulnerabilities of different groups and sectors, and planning issues. This review should be of widespread interest in demonstrating the processes of resilience planning as they have been implemented in a number of cases, which provide replicable models for other cities. In addition, this analysis will help identify the need for refinement and strengthening of processes in the next phase of the ACCCRN program. It also provides comparative insights to share between ACCCRN cities about the approaches adopted by their peers, in order for them to improve their own strategies iteratively in future rounds of planning.

1 Having joined ACCCRN later than the other cities, the Thai cities have not yet initiated the process of drafting Resilience Strategies and thus are not included in this paper. Indonesian cities had not completed their strategies at the time of writing, so while we can describe the preparations and processes applied in Indonesia, we cannot compare their strategies with others.

Urban Climate Resilience

There is a rapidly expanding body of literature addressing the implications of climate change for urban areas, particularly in developing countries, where cities are growing rapidly and a high proportion of urban populations are poor or otherwise particularly vulnerable to climate-related disruptions (Wilbanks et al. 2007; Satterthwaite et al. 2007; Balk et al. 2009). With few exceptions, this literature focuses on the likely impacts of climate change and points to the need for local measures to adapt to these projected impacts. There are also an increasing number of city governments, particularly in developed countries, undertaking climate impact and vulnerability assessments of various kinds and developing strategies that respond to current or potential vulnerabilities (Durban, Quito, Cape Town, Seattle/King County, New York City, Chicago, London, etc). In addition, many guidebooks and manuals are now available to provide advice to local governments on how to undertake assessments of climate change and other hazards, and to develop responses to these.

In relation to Asian cities, a number of recent studies have focused on these issues in the largest metropolitan areas, where a large share of national populations and economic infrastructure are concentrated (World Wildlife Federation 2009; Asian Development Bank 2010, among others). There are a number of challenges in these analyses. First, they have generally relied on methodologies that invest heavily in downscaled climate modeling approaches to derive projections of future local climate conditions, and then propose recommendations that respond to these projected conditions. For most cities in Asia, and particularly rapidly-growing medium size cities that lack the knowledge or resources needed to undertake modeling or easily use modeling outputs, this method is not yet accessible. This issue is discussed at length in *ISET Climate Resilience in Concept and Practice Series Working Paper 2*.

More importantly however, even with access to the latest modeling options, estimates of future climate impacts on rapidly growing cities are highly uncertain.[2] Given the uncertainties and long time frames involved, there are risks of maladaptive investments, such as hardening of coastal or riverbank defenses, which can create conditions for catastrophic failure in future. A related concern is that much of the existing approach to urban climate impact reduction and adaptation addresses specific technical responses to particular climate hazards, such as infrastructure hardening or design standards. This analytical approach is an important initial step, but generally does not identify indirect or cumulative impacts, issues tied to institutional failure, and feedbacks between urban systems and agents, or do enough to account for uncertainty (Klein et al 2007; Schipper 2007).

Many climate impacts arise not specifically from climate hazards alone, but from a combination of factors. For example, in the case of New Orleans, the damage caused by Hurricane Katrina was not caused only by the storm, but to lapses in maintenance of the dike system, destruction of wetlands, the expansion of urban housing into low-lying districts that should never have been developed, the lack of communications and public transportation systems to evacuate a sizeable low-income, elderly and marginalized population in these districts, and the absence of an effective emergency preparedness plan at any level of government. The occurrence of a Category 4 storm was not unexpected, and all these other factors had been clearly identified. What was missing was a framework for multiple agencies and jurisdictions to respond to the combined hazards that were all predictable (Bourne 2004; Fischetti 2001).

2 We explore in *Working Paper 1* in this series the challenges of applying climate data and current modeling methods to the projection of future climates in any particular locality.

Climatic uncertainties and dynamic urbanization trends present developing cities with new and unfamiliar planning challenges. Developing countries need to invest in urban infrastructure at a more rapid pace to meet the needs of an exploding urban poor population so as to enable private investment that will create economic opportunities for an expanding national labor force. Investments in urban development and infrastructure are extremely costly and largely irreversible. With costs mounting and social, economic and climate uncertainties, city decision-makers face a dilemma: how to guide investment to meet the diverse needs of residents and the urban economy, even under unforeseen climate conditions and unexpected indirect impacts.

The forthcoming Urban Resilience Framework developed by Arup and ISET for this program (da Silva et. al. 2010) places an emphasis on resilience rather than adaptation to suggest more explicit analytical attention to interacting urban systems, where direct climate impacts are linked through spatial, physical and economic connections to effects on urban populations. It also encourages attention to the autonomous actions of social agents, both individuals and organizations, who are able to prepare and respond to climate effects independently.

As described in the urban resilience framework, climate vulnerabilities can be assessed by considering how fragile systems or marginalized groups are exposed to direct or indirect climate impacts. Resilience-building means identifying and ameliorating fragile systems through strengthening those characteristics that reduce their vulnerability to given impacts. Building resilience also means strengthening capacities of social agents to access urban systems and to develop adaptive responses. A resilience approach not only encourages adaptation to specific projected climate conditions (e.g. more frequent heat waves, more intense rainfall), it also builds the ability of cities to respond to surprise and to unexpected outcomes.

The key elements of the urban resilience framework are **urban systems** and **social agents**. Systems include ecosystems, infrastructure systems, institutions and knowledge. When managed well, these urban systems interact to enable a wide range of private activities that lead to improved human wellbeing. One or more of these systems, or the linkages between them, may have critical weaknesses or fragilities with respect to climate impacts. For example, urban food supplies may depend on both vulnerable local floodplain agriculture as well as multiple forms of transportation infrastructure, and energy supplies for refrigeration and transport, each of which could be subject to climate impacts. Even after severe climate disasters, people have marketable goods to exchange, but urban markets run on cash, and one of the key enabling linkages may be functional automatic banking machines (Moench and Dixit 2004). The point is that analysis of direct climate impacts alone is insufficient to understand the vulnerability of urban systems.

But understanding urban resilience also means analysis of the capacities of social agents in an urban context. "Agents" are actors in urban systems, including individuals (e.g. farmers, consumers), households (as units for consumption, social reproduction, education and capital accumulation), and private and public sector organizations (government departments or bureaus, private firms, civil society organizations). Human agency differs from system function in that outcomes arise not merely from cause-effect relationships. Agents are capable of deliberation, independent analysis, voluntary interaction and strategic choice in the face of new information. They have identifiable but differentiated interests and are able to change behavior based on experience and learning. This means that even if system function is stable and predictable over time, agents will respond differently to new information. Agency is constrained by access to the services provided by urban systems (ecosystems, infrastructure, institutions, knowledge). Those individuals and groups who are socially or economically marginalized – due to income, gender, age, class, caste, religion or ethnicity for example – have less access to the ameliorating services provided by urban systems and are likely to be more vulnerable to similar climate impacts.

Resilient systems are able to maintain their functions and linkages in the face of stresses and change. From the study of many different kinds of systems (but particularly complex ecological systems), the generic characteristics that help systems to become more resilient include the following (see da Silva et. al. 2010 for more detail).

1. **Flexibility and diversity:** the ability to perform essential tasks under a wide range of conditions, and to convert assets or modify structures to introduce new ways of achieving essential goals. A resilient system has key assets and functions distributed so that they are not all affected by a given event at any one time (locational diversity) and multiple ways of meeting a given need (functional diversity).
2. **Redundancy, modularity:** capacity for contingency situations, to accommodate increasing or extreme/surge pressures/demand; multiple pathways and a variety of options for service delivery, or interacting components composed of similar parts that can replace each other if one, or even many, fail.
3. **Safe failure:** ability to absorb shocks and the cumulative effects of slow-onset challenges in ways that avoid catastrophic failure[3]. Safe failure also refers to the 'soft interdependence' of a system, where, if network structures interlink in ways that support each other, failures in one structure or linkage are unlikely to result in cascading impacts across other systems.

Resilient agents have the capacity to anticipate and to take action in order to adjust to external changes and stresses. Their ability to act is constrained by resources, and by access to supporting systems, including the ability to access resources provided by other agents. Agents develop this adaptive capacity through experience, gradually acquiring a repertoire of responses to stresses and shocks. The awareness of hazards, the ability to learn new responses and to acquire information needed to assess hazards and outcomes, are all therefore important elements in strengthening the capacity of agents. The key capacities of resilient agents can be summarized as:

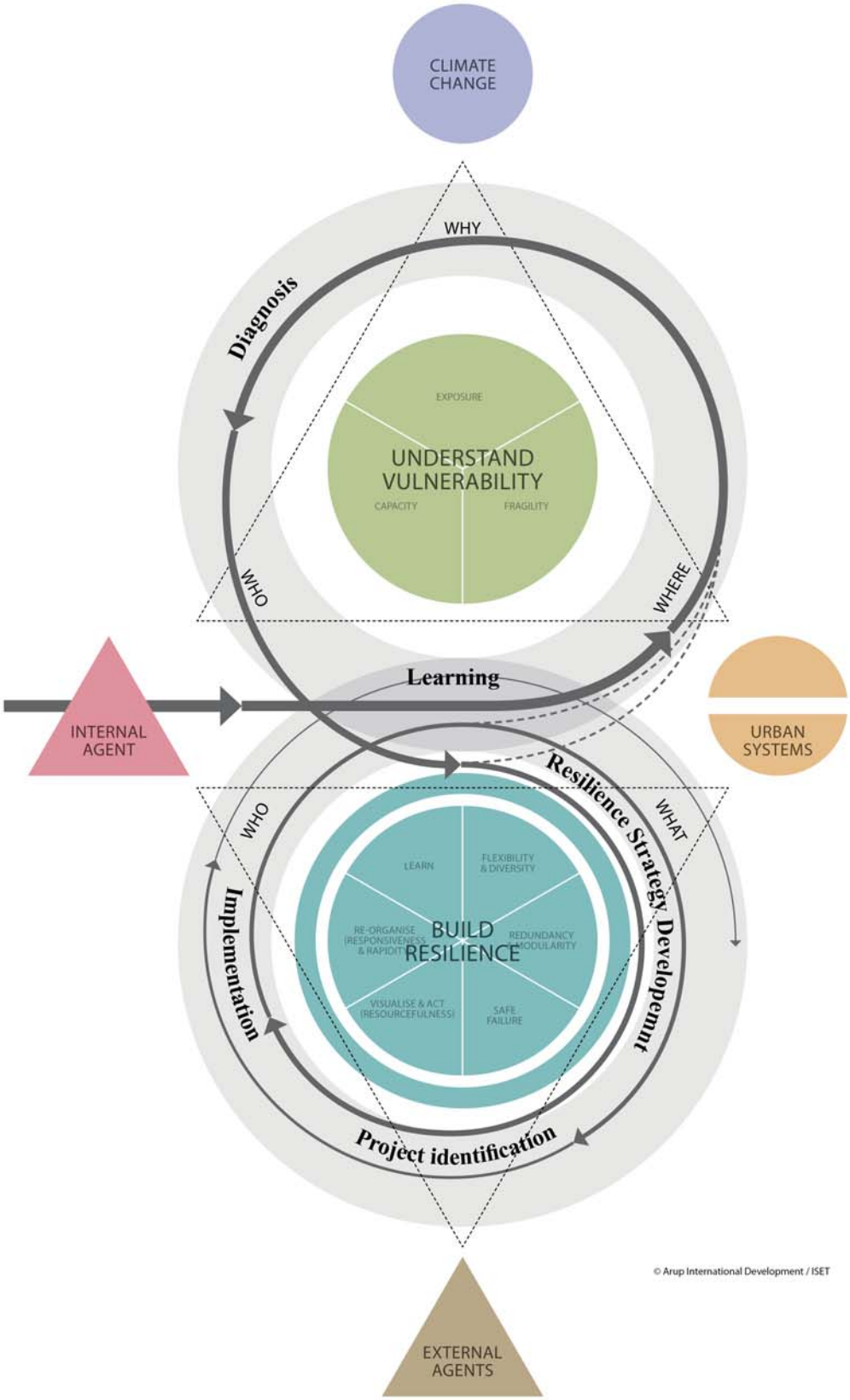
1. **Capacity to visualize and act (resourcefulness):** capacity to identify and anticipate problems, establish priorities and mobilize resources for action[4].
2. **Capacity to organize and re-organize (responsiveness and rapidity):** ability to establish function, structure and basic order in a timely manner both in advance of and immediately following a disruptive event or organizational failure.
3. **Capacity to learn:** ability to internalize past experiences, avoid repeated failures and innovate to improve performance.

We can use the concepts of systems and agents to conceptualize the process of taking action to strengthen urban climate resilience (see Fig 1 below). The key processes must engage agents in *learning* about climate change impacts and the vulnerability of urban systems and local agents, *planning and prioritizing* interventions to build resilient characteristics of systems and capacities of agents and then *monitoring* the results of these interventions in order to improve them. The first of these processes may be conceived as the **diagnostic phase,** involving key agents in the assessment of vulnerability of urban systems and of agents to climate change. The diagnostic involves both an assessment of climate impacts, but also a matching assessment of the characteristics of system elements and linkages that might render them more or less vulnerable to direct and linked indirect impacts. Similarly, the vulnerabilities of agents are assessed by linking climate impacts to their capacities for learning, action, and re-organization. This process is indicated in the rightward arrow and the upper loop on the diagram.

3 Also defined as the ability to avoid catastrophic failure if thresholds are crossed.

4 Resourcefulness is also related to the capacity to recognize and devise strategies that relate to the agency (incentives and operational models) of different actor groups.

Fig. 1. Urban Resilience Framework (Arup International Development-ISET)



The next step is the process of **developing Resilience Strategies** to respond to the vulnerabilities identified. Finally, the process of **implementation** of resilience building actions generates new knowledge and leads to a better understanding of vulnerabilities, as well as system characteristics and agent capacities, in order to iteratively improve the strategies. *This paper describes and compares the initial Resilience Strategies undertaken by city level partners in the ACCCRN program, in relation to this framework.*

The success of these processes of diagnosis, strategizing and implementation, in a context of complex urban systems and multiple agents at different levels and scales, relies on cumulative and iterative shared learning. Technical and scientific resources must be applied not only at the outset, in the diagnostic phase, but also to monitoring implementation of the work, in order to build confidence in the knowledge generated. Learning also needs to reflect the experience and knowledge of local actors, and particularly those who are most vulnerable to climate impacts, in order to integrate lessons and improve practice.

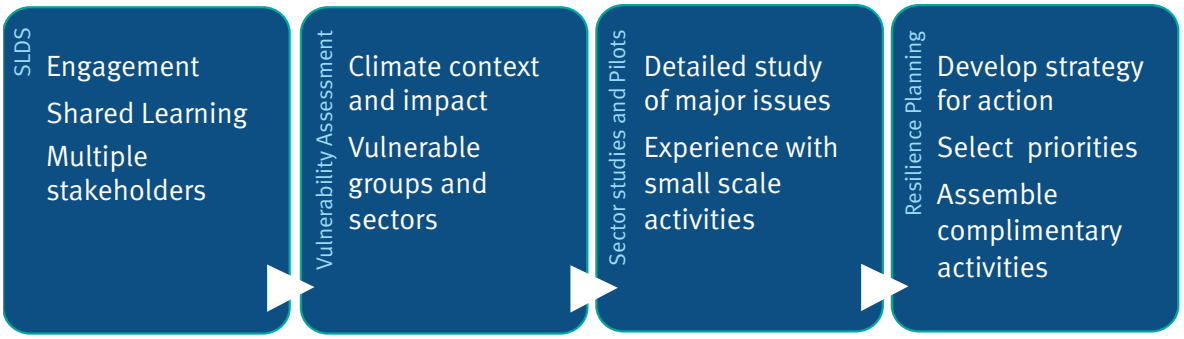
An important tool to support urban resilience planning is a mechanism and process for shared learning (see *ISET Climate Resilience in Concept and Practice Working Paper 1*). This mechanism should engage local agents and external experts in to producing knowledge about vulnerabilities and build local understanding and ownership of proposed actions to address these. In ACCCRN, shared learning dialogues (SLDs) engage scientific experts, local government officials, civil society, private sector and community representatives in deliberation on the available data and future scenarios, local implications and potential responses. They provide a unique platform for building shared knowledge and commitment to action that meets multiple interests. This platform also provides the mechanism for linking all the inputs to the resilience planning process: diagnostic studies, vulnerability assessments, local knowledge, community feedback, technical agency inputs, and prioritization of proposed actions.

Guidelines for Resilience Planning

The concepts of urban climate resilience were applied through a resilience planning process in each of the ACCCRN cities. This process used inputs from climate projections, impact assessment, vulnerability assessment, SLDs, and detailed planning studies, in order to prepare a City Resilience Strategy. An idealized process for resilience planning would use inputs from iterative SLD workshops or meetings that each reviewed incremental knowledge inputs from climate experts, local vulnerability assessments, and in-depth studies of key issues. In principle, these studies would start with an overall introductory review of climate change issues and projections, then move on in turn to vulnerability assessments, in-depth sector studies, development of interventions and assessing priorities. Small-scale pilot projects in each city were intended to build experience and collaboration between partners, as well as to introduce new local organizational approaches. Each of these studies and pilots provide new knowledge from various sources (science, analysis, experience), while the SLD approach ensures the engagement of local knowledge and key implementing partners (local government officials, NGOs, vulnerable groups, private sector representatives, and scientific experts). Comparison and analysis of alternative proposed actions then serves to justify funding of priority activities.

However, idealized processes are seldom possible in the real world, and so while some ACCCRN cities approximated this procedural model, others faced delays and deadline pressures that compelled them to undertake activities simultaneously rather than sequentially, and limited the number of SLD iterations. In some cases, planning was concluded before sector studies were complete, and SLD discussions had to rely only on fragmentary inputs. In each city, a technical working group helped lead the planning process in order to integrate climate resilience planning with other local planning processes. These inputs and processes are summarized in Figure 3 below.

Fig. 2: Inputs to Resilience Planning at the City Level (Idealized sequence)



In providing guidelines for city resilience strategies, ISET sought to emphasize the concepts and relationships between key factors, rather than reduce the process to a checklist or a step-by-step procedure. Each city's conditions and capacities are different, and the leadership of the process varied considerably between different cities, so the process needed to be flexible to respond to the interests and approach each chose to pursue.

Commonalities between the processes in various ACCCRN cities include: the proposed inputs to the planning process, suggested structural and content aspects of the Resilience Strategy, and suggested tools for comparing proposed activities in order to identify priorities for donor funding and implementation. These elements were designed to encourage city level project partners to work through the issues themselves, obliging them to struggle with new concepts and information in order to generate a practical plan with high local commitment, rather than a more technically sophisticated analysis by expert consultants, with limited local comprehension or buy-in.

What is a City Climate Resilience Strategy?

A City Climate Resilience Strategy is a broad local level guidance document prepared by local government or by a specialized public or private organization. It should provide the context, evidence and analysis justifying actions to strengthen urban resilience to climate change. While city resilience strategies will be different depending on the local conditions, climate vulnerabilities and capacity for response, they should respond to existing development policies, procedures and plans (recognizing that in many cases these are not internally consistent), and should be linked to the budgets and work plans of existing agencies so that they can be applied fairly readily. The strategy should identify high priority resilience actions that can be linked and coordinated with other local initiatives, and funded through available local resources or external sources. This is not only a matter of identifying "projects" but could also include changes to existing practices, the need for new practices, or discrete new activities to respond to specific issues.

City Climate Resilience Strategy should:

- Provide context, evidence and analysis to justify actions for strengthening urban resilience.
- Set priorities for action by local government
- Provide background information to support greater awareness and autonomous adaptation measures by community and private organizations
- Link to existing development policies, procedures and plans
- Identify actions that could be funded from various sources including local resources, senior governments and external donors

A climate resilience strategy document was described to ACCCRN city partners as being structured in 3 sections: the first dealing with future climate, impacts and vulnerability; the second presenting potential actions in terms of their contributions to resilience of urban systems or to the capacities of agents, and their linkages to other city plans and priorities; and the third section establishing priority areas for city intervention and for seeking external support.

Producing a climate resilience strategy requires technically credible information—not only with regard to climate, but about urban systems, interactions among agents and existing development plans. It requires the engagement of vulnerable groups and communities in diagnosing problems and designing actions to respond to these. The planning process requires mechanisms for coordination and for learning across multiple local government departments and non-government actors. The crucial innovation introduced by ISET to simultaneously build engagement, consultation, coordination and shared learning for urban resilience through resilience planning is the Shared Learning Dialogue (see ISET *Climate Resilience in Concept and Practice Working Paper 1*). The SLD approach provides a mechanism to link vulnerability assessments, studies, expert and local knowledge through iterative, face-to-face multi-stakeholder dialogues that build shared understanding and commitment for resilience planning. However SLDs, as well as other coordination and analysis processes at the local level, require strong local leadership. If the planning process is to be led by local government, this requires executive level commitment in order to assure collaboration and support across the jurisdiction of several departments and agencies. If it is led outside the government, then it needs to tie in explicitly with community and private sector support, in order to build credibility for implementation measures.

Resilience planning follows a familiar strategic planning cycle in which planning objectives are formulated, data collected and analyzed, proposed interventions prioritized, and implementation measures monitored for effectiveness in addressing the original objectives (see Figure 3 below).

Figure 3: Resilience Planning Cycle

The generic approach to resilience planning described above was a novel undertaking for ACCCRN cities in several ways. Of course, this was their first systematic effort to assess and respond to potential climate change impacts. Because it was a completely new area of technical analysis and of integration, there was very limited local expertise in the subject matter. In addition to unfamiliarity with the subject matter, this process of planning was also new. It integrated expert and local knowledge, and provided for both top-down technical direction and bottom-up local needs articulation. To facilitate collaboration and practical integration, the planning was directed by a technical working group composed of multiple agencies within or outside local government. Except for Surat and Indore, the plans were prepared by local personnel. The processes of analyzing options and of prioritization were often new to those involved. And the plans did not always fit neatly into existing mandates, procedures and government requirements. For all these reasons, capacity building was an essential part of the process. This took the form of providing documentary support (translated into local languages) and shared trainings on methods and tools. Importantly, in each city there was extensive technical support for the process from national program partners and ISET.

We are conscious of the fact that ISET is reporting here on processes and outcomes that were strongly influenced by our own interventions – the way ISET framed urban resilience concepts, tools and methods with partners, the practical advice ISET provided over the course of the process to various partners, the examples and models that ISET shared, and the feedback ISET provided on draft products. ISET worked mostly with country level partners, but also had supportive interaction with cities in Vietnam and India especially. We want to be clear about this role, and to emphasize that this document is therefore not an **independent** appraisal of the process. Readers should be aware that our primary purpose is to **document** and **compare** the processes that actually took place, and to demonstrate the variety of ways in which ISET technical support was interpreted and integrated into actual city level practices. The Rockefeller Foundation has engaged an independent organization to provide it with monitoring and evaluation data on the ACCCRN program. This document does not attempt to serve the function of independent evaluation.

The details of the process are described below for each country.

Describing Experience and Practice

In the following sections of this paper, we describe the experience of resilience planning for ACCCRN cities in Vietnam, India and Indonesia. At the time of writing, the 6 cities in India and Vietnam had completed their draft resilience strategies, and an early draft strategy was available for Semarang. The information presented here is based on the experience of the authors in key elements of the resilience planning process in the cities, on numerous interactions and discussion with city and country partners, and on the results of interviews conducted with city level partners in Vietnam between Sept 23 and Oct 1, 2010.

The city experiences are presented first by describing the *process* of resilience planning as implemented in each of the countries. We focus on the participants and structure of the planning process in each city, and how interventions were generated and assessed. We then compare the planning processes in the different cities. Next, we describe and compare the main products – *the resilience strategies*. We conclude the paper with a discussion of comparative lessons and conclusions from resilience planning as implemented so far in ACCCRN.

Resilience Planning Process – Vietnam, India, Indonesia

Vietnam

Context

City governments in Vietnam play a leading role in land use and development decision-making, both because they control land tenure and zoning, and because an extensive formal planning system directs not only public expenditures but also private investment toward sectoral and regional economic development targets. Local governments (city, district, and / or ward level) are also responsible for providing most services.

However, planning in Vietnam is commonly understood as the prerogative of senior levels of government. While local authorities can propose and recommend local planning policies, master urban development plans and public expenditure plans are all reviewed by the responsible national ministries before central approval. Planning and implementation of plans is largely a top-down process, with approvals and directions from higher-level agencies sent "down the line" to be implemented and enforced locally. For example, all urban master plans are either prepared or guided by the national Ministry of Construction and approved by the Prime Minister. Similarly, disaster response mechanisms such as local Committees for Flood and Storm Control follow national guidelines and models. Resolution of complex development problems is mostly understood as the result of properly defining and measuring the problem, and then providing expert direction for the implementation of "solutions", often based on idealized models that are applied uniformly under diverse conditions. This approach is quite different from the principles of resilience planning (see above).

The executive level of local government (the Provincial People's Committee, or PPC) is the key local political decision-making body, and has independent authority to enter agreements with foreign investors or donors to implement projects with a value of up to $US 1 million (for international donor projects). In the case of ACCCRN, the local project holder (formal partner) was the People's Committee, but in all cases the PPC created a formal Steering Committee to manage the ACCCRN project activities for the city.[5]

City administrative boundaries in Vietnam normally include large areas of surrounding agricultural land. Under the Vietnamese constitution, all land is owned by the State, and is leased under long term transferable tenures. On the fringes of cities, the local government (acting as an arm of the State) can expropriate land from farmers for over-riding public benefit. It is obliged to pay the fair value of agricultural land to the farmers. However, the government can then re-zone the land and then lease it to developers for industrial or other purposes. There are obvious financial incentives to the city in this kind of urban expansion and peri-urban land conversion, which often gives little attention to site specific climate hazards.

The government of Vietnam adopted a National Target Program to Respond to Climate Change (NTP) in late 2008. This policy framework specifically recognizes the need for adaptation to climate change at all levels, and in all agencies of government. It requires all provinces (and provincial-level cities) and all state ministries to prepare Climate Action Plans to address both adaptation and mitigation objectives. To date, there has been little consistency or consensus in how these plans should be prepared. But Can Tho and Da Nang cities have to prepare and submit such plans, as does Binh Dinh province (within which Quy Nhon is situated).

5 Terminology varied slightly: in Da Nang the Steering Committee is called a Project Management Board.

In Vietnam, the products of resilience planning were referred to by cities as "Resilience Action Plans" rather than strategies. The concept of strategic planning is not widely understood or practiced in public sector planning in Vietnam, and local partners generally agreed that the Vietnamese term for "strategy" meant a much larger and more important national or regional level policy, so they were uncomfortable with using that term for their work. This terminology also provided them with a direct link to the Climate Action Plans required under the NTP.

The main players engaged in development of the City Resilience Plans in Vietnam were the local governments, ISET, the National Institute of Science and Technology Policy and Strategy Studies (NISTPASS – an agency within the Ministry of Science and Technology), and Challenge to Change, an independent international NGO based in the UK. In addition, Dr. Michael Di Gregorio, an ISET consultant, worked with Quy Nhon on urban analysis, scenario building and proposal development. At the city level, the Resilience Planning work was headed by a Steering Committee composed of senior members of various city/provincial departments, including Department of Natural Resources and Environment (DoNRE), Department of Agriculture and Rural Development (DARD), Department of Planning and Investment (DPI), Department of Construction (DoC), and others. The Steering Committee was in all cases chaired by a Vice-Chairman of the PPC but effectively managed by a Standing Deputy Chair, who was the functional local project leader, from one of the relevant technical departments. As the process evolved from preliminary information to vulnerability assessments and to locally-led resilience planning, each city also set up a Climate Working Group composed of operating level technical officials from several key departments. This was the group that actually met to undertake the development of the resilience plan, under the leadership of the Deputy Chair of the Steering Committee (local project leader).

Who was involved in the planning process?

At the city level the key players in the resilience planning process generally included: Department of Natural Resources and Environment (DoNRE), Department of Foreign Affairs, Department of Planning and Investment, Department of Construction, Committee for Flood and Storm Control, and the People's Committee. Additional players involved via the Working Group, attendance at SLDs, and providing information for the pilot projects, etc., included: provincial technical departments, city agencies, mass organizations (Women's Union), non-government organizations (Red Cross), local community, community leaders (particularly for the pilot projects), local research organizations, local universities (e.g. Quy Nhon University, Da Nang Technical University, DRAGON Institute).

The setup in Quy Nhon was a bit different because this city does not have the same direct administrative relationship with the central government as do the larger cities of Da Nang and Can Tho. Both of those latter cities have the equivalent of provincial administrative status, while Quy Nhon is under the authority of Binh Dinh province. So in Quy Nhon, the leadership and coordination came from the *provincial* departments, but the Steering Committee and Working Group both included senior officials from the City of Quy Nhon (an administrative district within Binh Dinh province).

In each of the three cities, however, there was at least one agency not well represented in the process. In Quy Nhon, the private sector was not involved at all and the Department of Construction was only peripherally involved. In Da Nang there was early participation by a solid waste company, but they did not stay engaged; a local INGO that expressed interest in participation was dissuaded from joining the SLD for Phase 2 to allow the city government players to build solid working relationships first. And in Can Tho, it proved difficult to engage departments outside DoNRE in a consistent and substantive manner throughout the planning process. With a few exceptions, the representatives of other departments changed frequently until near the end of the planning process, leaving DoNRE to carry most of the work.

Vulnerable groups in the cities were involved mainly through interview and consultation during the Hazard, Capacity and Vulnerability Assessment, the participation of representatives at SLDs and as targeted sectors during the pilot programs and sector studies. Consultation with these groups was a new approach for Vietnamese planning departments, and most of the key working group members found the information obtained from these interactions useful.

NISTPASS provided direct technical support for planning, including: help in applying methodology and tools; review and editing of most of the related city documents; help connecting with different sources of information, particularly national data sources; and good feedback, informed by a full understanding of the whole adaptation planning process. Support was provided via frequent email contact with the Working Group, regular in-person visits to the city, attendance at Working Group meetings, and attendance at SLDs.

The primary role of Challenge to Change was in conducting and communicating the results from the Household Capacity Vulnerability Assessments (HCVA) in all three cities, capacity building for local facilitators and communities, and providing project development and implementation support for the pilot projects. In Can Tho, CtC worked with the World Bank to organize training on participatory adaptation planning. CtC staff also provided ongoing support and facilitation at working group meetings and SLDs.

ISET's role in the resilience planning process in Vietnam was to provide the methodology and approach for adaptation planning, including training and transfer of tools and methods. Climate change and resilience planning is a new, uncertain, and consequently confusing topic for Vietnam. The idea of Working Groups and strong inter-departmental cooperation is also unusual. Technical assistance via workshops, training in methods and tools, active engagement with the city throughout the process (e.g. via attendance at SLDs and Working Group meetings) and feedback on city progress provided by ISET and by NISTPASS were crucial to building the cities' knowledge, capacity and understanding of climate change, resilience, and the resilience planning process.

Inputs

The city level resilience planning process in Vietnam started with an initial SLD workshop in each of Da Nang, Can Tho and Quy Nhon in February 2009 (see *ISET Climate Resilience in Concept and Practice Working Paper 1* for a description of the SLD process in Vietnam). This session introduced concepts of climate change and generalized projections of climate factors and impacts for the country. It also discussed areas and social groups in the city with high vulnerability. For most participants in each city, this was their first formal exposure to climate science and to questions of local vulnerability. These discussions were used to establish terms of reference for local climate impact and vulnerability studies at the city level, and detailed Hazard, Capacity and Vulnerability Assessment (HCVA) studies at the community level in 2 wards (or communes) in each city. The climate impact studies relied on local climate projections from the Institute for Meteorology, Hydrology and Environment (IMHEN), a technical division of the Ministry of Natural Resources and Environment in Hanoi responsible for generating national climate scenarios. Future climate impacts were based on an assessment of current hazards and vulnerability, and by extension, the likely vulnerability to future conditions. The draft vulnerability studies were subsequently reviewed by local stakeholders through the SLD process, and through other small group consultations and meetings. The SLDs provided recommendations for in-depth studies to enable action on specific priority sectors or issues. While in each city a single technical department hosted and led the project, there was recognition that the planning work required engagement from multiple departments. So in each city, a technical Working Group was established to ensure the climate change planning agenda moved forward. This group reviewed the results of studies and SLD recommendations, and generally applied the guidelines suggested by ISET in preparing Resilience Plans in each city.

In all three Vietnamese cities, the vulnerability assessments formed the basis for the analyses and conclusions in the Resilience Plans. The vulnerability assessments were comprised of three components: community level HCVA; climate and sea level rise (SLR) scenarios; and climate impact and vulnerability assessment. These components aimed to evaluate both current and future climate vulnerability. The community level HCVA work was led by Challenge to Change, in close collaboration with the local government and community leaders, and in Can Tho also assisted by the DRAGON Institute. IMHEN generated future climate and SLR scenarios for all three cities; in Can Tho this analysis was supplemented by data from SEA START. The Institute for Water and Environment prepared a climate vulnerability assessment summarizing overall results for Da Nang and Quy Nhon, and Can Tho University prepared a similar document for Can Tho. ISET provided support and guidance to IWE in its fieldwork for the climate impact and vulnerability assessment.

The SLR analysis evaluated the influence of SLR in general and extreme flood events in particular. IMHEN researchers adjusted existing dynamic hydrological models calibrated to the (well-documented) 1-in-50-year flood events in each of the cities, and scaled the model results for SLR of 30 cm, 50cm, and 100 cm. The resulting inundation maps were overlaid with current land-use maps for agriculture, aquaculture, and infrastructure and compared generally with city plans for 2020. IMHEN provided projections under the UNFCCC – SRES emissions scenarios A1F1, A2, and B2 to derive temperature, rainfall and SLR for 2020, 2050, 2070 and 2100, using selected climate models. Can Tho also obtained climate projections from SEA START. The Climate Change Impacts and Vulnerability Assessment used these climate and SLR results to evaluate potential effects of changing temperature, rainfall variation, and SLR on land-use and future city development, including agriculture, aquaculture, and infrastructure.

Concurrently, Challenge to Change prepared the city HCVAs assessing the climate threats posed to groups, communities, and households. This assessment was carried out in two highly vulnerable districts or wards in each city: Son Tra and Lien Chieu districts in Da Nang; Vinh Thanh and Binh Thuy districts in Can Tho; and Nhon Binh and Nhon Ly wards in Quy Nhon. Local hazards were ranked and mapped by district, ward and section, based on consultations and historical experience. The assessment also evaluated the effectiveness of city planning and disaster management, and how these interlinked with climate. Finally, researchers analyzed information collected on social issues crosscutting with climate change, such as gender, socioeconomic class (e.g. unregistered migrants), education, health, and livelihoods. In each case, the HCVA compiled data on existing coping methods and their limitations, and sought recommendations on improvements from local authorities and community members.

Though the vulnerability assessments undertaken as part of the ACCCRN work formed the basis for the Resilience Plans in all three cities, the cities also drew on existing studies and reports, particularly Can Tho where the World Bank was developing a Local Resilience Action Plan for the city (World Bank and the People's Committee of Can Tho City 2009).

Ideas for sector studies and pilot projects were solicited and discussed during the second SLD in August 2009, following presentation and discussion of the vulnerability assessments. Sector studies included: in Can Tho, a study conducted by the DRAGON (Delta Research and Global Observation Network) Research Institute for Climate Change on innovative resettlement options for Bo Bao hamlet; in Quy Nhon, a study conducted by the Southern Institute of Water Resources Research (SIWRR) on flood modeling of Tuy Phuoc district; and in Da Nang a focused study on vulnerability in parts of Cam Le district subject to flooding and rapid urbanization.

Pilot projects for the three cities provided a way to fund local initiatives considered high priority by the local government in order to experiment with innovative approaches to climate resilience. These consisted of: in Da Nang,

construction of a boat winch system in Tho Quang, Son Tra District to rapidly move boats onto the beach when storm warnings are announced, provision of simple radio equipment for fisherfolk in coastal areas coupled with raising community awareness on natural disaster prevention and climate change adaptation together, and planting trees along beach areas to help prevent erosion; in Can Tho, installing a user-managed piped, treated drinking-water system and solar electricity to 85 households on Con Son Islet; and in Quy Nhon, wetland reforestation in Thi Nai Lagoon, promotion of traditional fish sauce processing as a model for livelihood diversification and value added in Nhon Ly commune; and a program to raise awareness, generate knowledge, and develop skills in storm resistant house construction techniques.

How were interventions generated and prioritized?

The cities obtained intervention ideas from the SLD discussions, working group interactions, vulnerability assessments, and studies. Ideas were further developed using the tools provided by ISET, taking into account the Rockefeller criteria[6], priorities of local government, discussions of the Working Group, and socio-economic conditions of each area of the city where interventions were proposed. In Da Nang, they also considered the lifestyle and customs of local people to determine whether the proposed actions would be suitable for them. A subset of interventions to move forward with were selected based on: discussion with the working group; review of existing and future programs, city plans, and department feedback; and consideration of opinions and comments of local communities and local technical departments.

Once a subset of interventions was selected by the cities for inclusion in the Resilience Plans, the interventions were prioritized to provide an action plan. Interventions were ranked using the tools and techniques provided by ISET at the March 2010 Resilience Training Workshop, particularly the qualitative Cost-Benefit Analysis and multi-criteria analysis tools.

City Working Groups met weekly, in most cases, with support from NISTPASS. For the qualitative cost-benefit analysis, the most significant costs and benefits, including indirect costs, in the economic, social and environmental sectors were assigned a rank related to their *estimated relative* magnitude to provide comparison between options and ratios of the rankings derived. Higher ratios indicated more effective actions for initial prioritization. Regarding the multi-criteria analysis tool, the criteria used for action assessment included: builds diversity, flexibility, reorganization capacity and learning capacity. Ranking was accomplished by assigning a rating of 1 to 5 and comparing the ratings.

Final prioritizing took the resulting CBA and multi-criteria rankings, and incorporated additional criteria such as local capacity, local priorities, local development policies, and the linkage between those actions with other programs and projects. In particular, Quy Nhon working group members explained that they had explicitly given higher ranking to activities that would improve adaptive capacity of more than one group/area/sector and activities that were consistent with policy priorities for the city government.

For all three cities, interventions proposed based on these analyses were generally focused on capacity building and awareness raising for city staff and local communities, on additional studies to further understand potential climate change impacts in discrete sectors, and incorporation of climate change issues and impacts into ward, district and

6 Rockefeller Foundation's main criteria for reviewing proposals included: builds urban climate resilience; impact on lives of poor and vulnerable populations; high prospects for replication; ability to achieve scale; potential to integrate with other resilience-building measures at city level; scale of impact; technical, operational and financial feasibility; prospects for timely implementation; local ownership and ability to leverage other resources.

city planning including the Socio-Economic Development Plan (SEDP)[7]. The proposed interventions arising from this first round of resilience planning are discussed later in this paper.

Assessing the process: Vietnam

SLDs functioned as the mechanism to launch the process and engage scientists, communities, and technical departments in climate resilience planning. Working Paper 1 in this series describes the SLDs, which contrasted with conventional workshops in Vietnam by integrating participants from diverse levels of government and communities, varying expertise and technical departments. According to city partner interviews, the SLD process and information accumulated throughout the process led to much deeper and broader understanding of the key issues and potential impacts of climate change, and recognition that traditional top down approaches would not be effective in responding to local climate vulnerabilities. In addition, the forum raised local awareness and increased participation in subsequent iterations of the process.

Partners felt that this new technique for sharing information from different technical departments and different social groups would continue locally, due to the positive experience in ACCCRN. Several players felt the SLD process should be replicated in other provinces in Vietnam.

Working Group members from the cities provided the following feedback on the process:

Support and training for core team: Local participants felt there was insufficient detail provided at the beginning of the process about the objectives, end products, methods and procedures to be followed. This led to initial confusion[8]. WG members also felt they needed more support from the city and department heads to allow team members to devote time and attention to the work.

Integrating planning processes: Many WG members did not fully understand the complete planning process at the city level (e.g. for urban master plans or for SEDP). This was felt to be a good starting point for resilience planning because it could assist the participants to start from common understanding before applying new methodologies to existing practices, raise the confidence level of professional staff working on climate issues and submitting climate plans to senior officials, and allow better integration of climate issues into key planning documents submitted to the PPC. A key problem for cities was that drafts of their resilience plan did not adequately refer to existing planning documents and citywide policies.

Integration of existing research Existing research should be reviewed to identify useful inputs to the process. This should be done in collaboration with local people to avoid duplication of existing studies or knowledge.

Local collaboration on vulnerability assessments and sector studies: There was concern that national experts doing studies should work more collaboratively with local department, review progress regularly and share interim results. Where possible, local technical experts should be used.

Community consultations and outreach: More attention needs to be given to community consultation. It is difficult for communities to provide useful knowledge if they don't understand the topic or what is being requested. Awareness raising for communities, city officials, the private sector, etc. about climate change, potential impacts, and approaches to building resilience to those impacts should be increased.

7 In Vietnam, the SEDP is the government's official public expenditure planning document, which is aggregated across multiple levels from the district to province and national scale, based on central approval of local submissions.

8 Editorial note: however, it also obliged the local working groups to figure more of these issues out for themselves. The consistency of approaches eventually adopted suggests they were able to do so.

Nature of planning document: There is no formal mandate for a local resilience plan, so it has no official status. In order for other departments to pay attention to this document, there must be a formal policy mandate created, and the document should follow normal approval requirements and be approved by senior local government officials. That way, it will be treated more seriously across the entire city. One way to accommodate this in the short term is to incorporate Resilience Plan conclusions into the city's Climate Action Plan which must be approved and submitted to MoNRE.

Unanimously, the cities agreed that their biggest challenge in this work was a short timeframe, the lack of full-time staff to devote to the work, and a lack of knowledge and experience with climate change, potential climate change impacts, and ways to build resilience to those.

Beyond this, however, challenges varied by city. In Can Tho, the greatest challenges were limited absorption of the technical information, methods and tools, and continually changing players. Only two members of the Can Tho Working Group attended the Resilience Training Workshop, but there were several opportunities for training and technical workshops delivered by NISTPASS and CtC for WG members. Still, ongoing involvement of departments outside the core Working Group members (DoNRE, DARD, and later on, Public Health) was very limited and they failed to assign permanent staff.

In Quy Nhon, there were challenges around getting buy-in from senior staff with extensive planning experience; they initially couldn't see the utility in the process proposed for the ACCCRN work. Fortunately, over time, many realized there was much they could learn and several became avid supporters of the work. In Da Nang, the same issues left most of the work to junior staff with little experience in planning. Additionally, Da Nang had shifts in project leadership that slowed the process. It proved difficult to identify a single agency in Da Nang that combined both the technical capacity in this field and the political clout to mobilize and coordinate resources from other agencies. The problem has been resolved by having two city departments share leadership of the program (one a high level staff organization, the other a technical line agency).

In Vietnam, there are distinct challenges associated with local planning in a central planning system. Because they require central approvals, key local plans are difficult to change, and for this reason resilience actions that recognize maladaptation and seek to alter master plans are perceived as unfeasible. However, in Quy Nhon working group members believed that destructive floods a year earlier had increased the likelihood that high ranking officials would reconsider a plan to develop one low-lying sub-district.

One product of the central planning system in Vietnam is a lack of clarity about what cities will do with their Resilience Plans. These documents, while *related* to Climate Change Action Plans now required from all provinces and provincial-level cities, are *different* from the mandated content and structure of the national requirements. The cities have each proposed support to deepen engagement, institutionalize climate resilience planning, and continue holding SLDs through Climate Change Coordination Offices, which would also be responsible for the formal Climate Change Action Plans. Demand for these offices emerged strongly from the working groups and city networks. This would provide a mechanism for institutionalizing the resilience plans into formal documents that would go through the normal approvals process and thereby gain legitimacy at the local government level.

India: Gorakhpur, Surat, and Indore

Context

In India, ACCCRN partners with the cities of Gorakhpur, Indore, and Surat. The context of planning and governance is quite different from that of Vietnam. Typically in India, the State-level Town and Country Planning Office (TCPO) prepares development plans that are further disaggregated to zonal level plans. These plans focus on socio-economic development. Zonal plans are then prepared by Municipal Corporations in each city. In principle, the 74th Constitutional Amendment provides for devolution of, inter alia, planning functions to Municipal Corporations by devolving funds, functions and functionaries (including technical expertise of various departments) to municipal corporations. Yet the progress on devolution, decentralization, and implementation of the74th constitutional amendment has been slow. Even in one of the most progressive states on this front—Madhya Pradesh, which houses Indore city—the TCPO still continues to perform the function of preparing and revising development plans, with assistance from the Indore Development Authority (IDA), a parastatal body. Only recently has the Indore Municipal Corporation taken over preparation of two zonal plans (with assistance from the U.K. Department for International Development - DfID). At the same time, the implementation of the development plan is regulated by the Indore Development Authority (IDA).

TCPO with support from IDA is responsible for coordinating public and private investments as per the development plans (in development areas beyond jurisdiction of municipal corporations). For public investments the respective departments, such as the Industrial Development department, are required to inform IDA/ TCPO before making investments in the planning area. The same is true for private investments. The 74th Constitutional Amendment aims for municipal corporations to perform all the above functions, but major institutional restructuring will be required before this is possible.

In areas within the jurisdiction of municipal corporations, the flagship urban programs of Government of India (such as JNNURM[9]) provide large funding to municipal corporations for development of city infrastructure (water supply, drainage, solid waste management etc.). However, the lack of capacity among municipal corporations to even develop project proposals (much less manage the resulting infrastructure), along with lagging prerequisite state-level institutional reforms (including the 74th Constitutional Amendment) have slowed access to funds. In relation to ACCCRN, this underlines the need to engage stakeholders at both state and municipal level, while remaining aware that institutional changes may affect the development planning process in coming years. In addition, while nominal authority for planning may technically exist within municipal corporations, in practice, devolution of power and capacities to implement may not.

In India, the ACCCRN process has been led by two separate organizations: TARU Leading Edge, a consulting firm, in Surat and Indore, and the NGO Gorakhpur Environmental Action Group in Gorakhpur (GEAG). A Delhi-based firm, TARU has offices in both Indore and Surat, although key ACCCRN consultants commuted to the cities for project activities with city partners. GEAG is based and operates solely within Gorakhpur.

From the beginning of the process, partners were aware of large functional divergences in the three cities. Surat is a high capacity city with a strong economy driven primarily by the diamond polishing and textile industries, and the

9 Jawaharlal Nehru National Urban Renewal Mission: a 7 year national government plan for upgrading urban infrastructure across India, valued at over $20 billion, and implemented largely through state level agencies who provide grants or soft loans for cost-sharing projects with cities.

highest per capita income of any city in India. Business leaders and the South Gujarat Chamber of Commerce and Industry (SGCCI) are thus key players in planning and city development and had an existing relationship with the municipal corporation. In contrast, local government administrative and management functions are relatively weak both in Gorakhpur and Indore.

The ACCCRN process in India was initiated in early 2009, with a series of consultations between stakeholders and TARU, GEAG, and ISET. These initial engagements promoted knowledge sharing about existing challenges, climate impacts, and key potential vulnerabilities between the nodal facilitators, members of various local government agencies and departments or Urban Local Bodies[10] (ULBs), private sector actors, civil society representatives, and members of academic and research institutions. From these initial engagements, TARU, GEAG and ISET identified interested individuals/ representatives from key organizations to join the newly-created City Advisory Committees (CAC – Surat and Indore) or City Steering Committee (CSC – Gorakhpur). SLD consultations and intensive interactions with the CAC / CSC helped inform work by TARU and GEAG on inputs, including vulnerability assessments, sector studies, and pilot projects. The resilience planning process in India integrated priority issues of urbanization, poverty and climate change, rather than focusing solely on the latter.

Indian partners relied on a series of one-to-one meetings, focus group discussions, and smaller group SLDs rather than large multi-stakeholder SLDs (See *ISET Climate Resilience in Concept and Practice Working Paper 1* for a more detailed description the early stages of the shared learning process in Indian cities). During the pre-planning phases of the ACCCRN program (June 2009 – January 2010), the advisory committees met more or less regularly. Meetings were less regular from January – May 2010, during which travel including the ACCCRN Cities' Resilience Planning Workshop in March dominated partners' schedules.

Who was involved in Resilience Planning?

The composition of the advisory committees varies between cities, but in each case TARU, ISET and GEAG encouraged the involvement of members from agencies with strong decision making powers from among the various Urban Local Bodies. CAC and CSC members included municipal corporation representatives from relevant departments, business leaders and private sector representatives (particularly in Surat), and members of academic institutes, representatives from city society organizations, and individual and institutional experts.

The strength and predominance of the business and commerce community in Surat was reflected in the composition of the Surat CAC. Along with the local chamber of commerce and other industry representatives, the Surat Municipal Corporation and the Municipal Commissioner (the administrative head of the municipal corporation) herself were heavily involved and helped to drive the process in a strong local direction. In Indore, TARU similarly sought the involvement of ULB/ Municipal Corporation members, but they struggled to secure a similar level of buy-in and interest until more recently in the planning and implementation stage. In contrast, due partly to the weak governance in Gorakhpur, GEAG strongly encouraged and secured the participation of citizens groups and academia in the CSC and in resilience planning, rather than relying on the municipal corporation.

The CAC membership did not include members of poor or slum communities identified as vulnerable. GEAG in particular has worked closely with these groups through SLDs to understand their conditions and concerns, and in Surat and Indore CAC members had awareness of poor people's needs though they were not directly represented.

10 Under recent constitutional amendments, Urban Local Bodies are mandated with delivering all basic infrastructure and services in urban areas. They are essentially under the control of Municipal Corporations, which consist of an elected political council and a separate administration.

There was resistance to involving representatives of poor communities directly in the advisory groups on the grounds that it would not improve communications. Although the CAC members were selected based on their involvement with key organizations, partners observed that they largely participate as individuals and based on their personal capacities without necessarily reporting back to their agencies or being able to assure corporate follow-up.

Inputs

GEAG prepared the Resilience Strategy documents for Gorakhpur with inputs and review from the CSC. As described by GEAG, the strategy developed from a dynamic process with inputs from all actors at all stages contributing to an evolving strategy. ISET provided technical assistance and guidance for preparation, assisting in conducting planning workshops and drafting. TARU led the consultations and drafted the resilience strategy documents in Indore and Surat. Their process focused on generating and feeding the required information/ knowledge that often involved extensive analytical and quantitative assessments. GEAG, in contrast, relied more on qualitative assessments and participatory techniques.

Climate projections: TARU accessed climate projections for Indore and Surat produced by the Climate Systems Analysis Group (CSAG) of the University of Cape Town and the Indian Institute of Tropical Meteorology (IITM) - Pune. ISET assisted TARU in the analysis and interpretation of historical climate information and the climate projections. Working Paper 2 of this series outlines how climate information was generated and used in each ACCCRN city.

Vulnerability Assessments: Vulnerability assessments were conducted in-house by GEAG and TARU in their respective cities. In Indore and Surat, after the initial round of rapid appraisals of vulnerability issues in slums, TARU employed a GIS enabled sampling and aggregation method that identified homogeneous socio-economic clusters (SECs) through visual observation of satellite imagery and verified with rapid ground surveys. City maps were overlaid with homogeneous SEC polygons, which were then used in selecting sample locations for community/household surveys and Infrastructure Services Deficiency Analysis (ISDA) for 1200 households in 120 communities in Surat and 750 households in 75 communities in Indore. By aggregating survey results to homogenous SEC polygons and integrating existing tax database information, TARU created Ward Level SEC and Vulnerability Maps. A rapid (hydro-meteorological) risk analysis was carried out in parallel, using drainage and contour maps, records of historical events, hydro-metrological, tidal, and other relevant data sets. In this way, risk maps complemented the SEC and Vulnerability Maps.

In Gorakhpur, the VA used consultations with the City Steering Committee and a Citizen's Forum to pinpoint, prioritize, and rank according to intensity, the physical risks in the city. Sections of the city were concurrently mapped into socioeconomic units of lower, middle, and higher incomes. Fourteen wards (out of 70 total) in Gorakhpur were selected for further study and community level SLDs with GEAG facilitation. Combining these results with secondary data, the VA analyzed four main categories: vulnerability of infrastructure and services (including calculation of current demand and demand deficiencies for different socioeconomic groups); social issues of health and education; institutional challenges of addressing vulnerabilities; and economic consideration of losses associated with hazards (with particular attention to differential impacts on income groups).

Sector studies: The CAC and CSC selected a number of sector studies for the cities, which were all completed in early 2010 and whose results informed the Resilience Strategies. In Indore, studies included urban health and environment, the transport sector, water security, energy security, and green buildings. The objective of these studies was to capture the systemic vulnerabilities of these sectors in the city and to highlight cross-sectoral linkages amongst

the various sectors in the city. In Gorakhpur, sector studies included Geo-hydrology of Gorakhpur City, the Role of Plastics Use and Disposal in Enhancing Climate Vulnerability, and Ramgarh Lake Ecosystem. Surat sector studies examined energy security, water security, health impacts, environmental impacts and flood risk management.

Pilot Projects: Based on the results of VA and sector studies, pilots were identified with the primary objective of catalyzing buy-in and trust of city stakeholders in the program. The pilots were also used to test and at the same time, demonstrate their effectiveness towards building resilience. Hence, in Surat three pilots were identified and are being implemented: a) National-level Architectural and Urban Design Competition to generate innovative solutions for hazard resistant construction and planning in flood prone areas; b) the Volunteer-based Basic Services Monitoring and MIS for normal and emergency period, which uses text SMS to strengthen the existing early warning system; and c) building a spatially explicit database of vulnerable persons requiring special care during emergencies in one neighborhood. Simultaneously in Indore, given its reliance on high-cost water supply sourced from long distances, partners are implementing a pilot on urban user groups for conjunctive water management of local and distant water resources. Gorakhpur conducted four pilot projects including "Polythene-No More!" campaign on reducing the use of plastics in the city, the Ramgarh Lake Conservation Campaign, review of Gorakhpur City Master Plan, and a ward-level Solid Waste Management Program.

Resilience Strategy Preparation

From May-July 2010, partners held three planning workshops in each city with CAC members and some external stakeholder participants. The first workshop focused on developing scenarios for future city growth trajectories, led by TARU and GEAG (see Box below). The latter two workshops discussed and prioritized actions to respond to the identified challenges. Key decision makers, including the Municipal Commissioners in Surat and Indore, attended the latter workshops and participated in discussions regarding resilience actions.

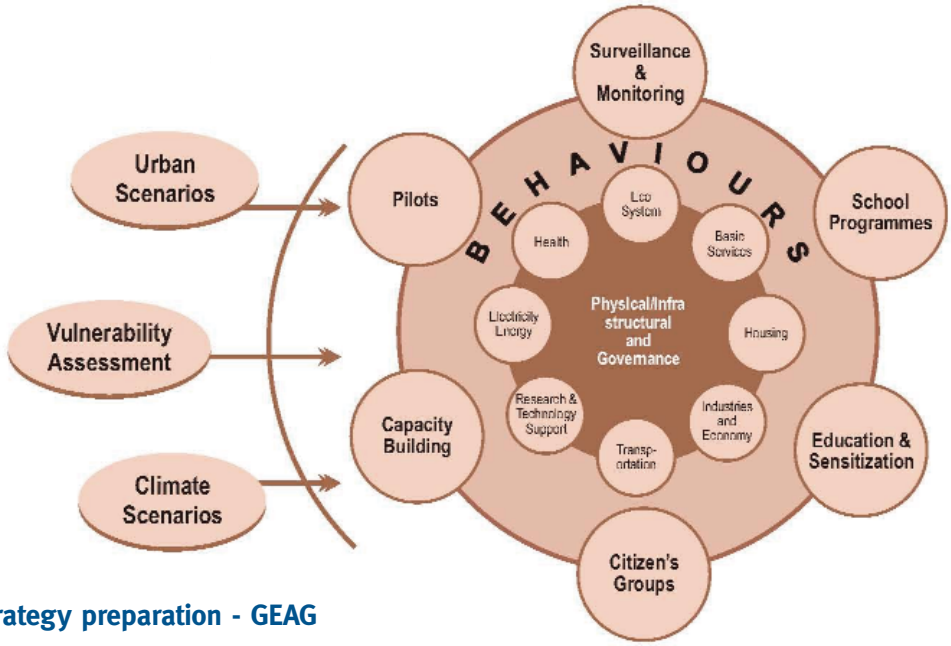


Fig. 4 Resilience Strategy preparation - GEAG

In Surat and Indore, TARU conducted individual and small group meetings to collect and validate data (for example, information on salient aspects of Master Plan and City Development Plans) needed for the next CAC consultation. The results of analysis were documented and circulated in advance of each consultation, and presented for

comments and ratification. The consultations used various participatory techniques such as card methods, group work, etc. In contrast, GEAG relied less heavily on meetings between CSC workshops, rather holding longer workshops with larger groups, involving CSC members and vulnerable communities. Such larger group meetings spanned the whole day and did not entail prepared documentary inputs from GEAG. The meetings touched upon most of the issues and challenges related to city's growth, including governance system, city infrastructure, urban services, population growth, migration, tourism etc.

Scenario Development for Resilience Planning in India

Indian cities used scenarios to address the uncertainties of both urban development and climate. In terms of climate, TARU relied on scenarios developed by other agencies for both Surat and Indore, while Gorakhpur mainly used data from ISET modeling work in a related project, and from historical flood events.

The uncertainties of future urban development led each city's CAC / CSC to frame its own urban scenarios based on the issues that were felt to be most critical locally. In Surat and Indore, 4 alternative scenarios were defined based on the interaction of 2 determinant but highly uncertain variables. In Surat, these were economic growth (low or high) and social cohesion (conflicts or harmony), while for Indore the two critical uncertainties were type of migration (whether "push" from impoverished rural areas or "pull" from increased demand for skilled labour and services) and efficiency of infrastructure management (poor or efficient). In both cities, these 2 variables were arranged on 2 axes, from low to high, generating 4 different quadrants that characterized the 4 alternative urban future typologies that could result. In the case of Gorakhpur, economic growth (high or low) and political support (poor or good) were the two key uncertainties identified. Future vulnerability scenarios were developed by overlaying future climate scenarios against these urban development scenarios. CAC discussed the interactions of the climate and urban development scenarios to identify "issue matrices" in consultations in both Surat and Indore. Subsequently, these issue matrices were used for identifying and prioritizing resilience building options.

The scenarios served as tools for the advisory committees and local experts to consider alternative futures in consultations. This enabled the the CAC's to identify how they could shape deliberate choices of governance and investment in order to avoid the most damaging climate impacts and foster positive socio-economic development.

In all the Indian cities there was thus an extensive period of discussion, interaction and deliberation among a number of stakeholders, especially the CAC / CSC, that bridged between the vulnerability assessments and formal sector studies, the scenarios, and the emerging resilience strategies being drafted by TARU and GEAG.

How were interventions generated and prioritized?

Intervention ideas were generated primarily by TARU and through sector studies in Surat and Indore, with workshop participants providing inputs for prioritization. In Gorakhpur, partners describe that intervention ideas emerged over the course of the process, in consultation and interaction with multiple groups. GEAG used a "risk frame" to characterize causal factors, system fragility, and identify needed actions (see Fig 5 below). For prioritizing these actions, GEAG employed additional tools such as qualitative cost-benefit analysis, multi-criteria matrices, capacity assessment and technical feasibility assessments.

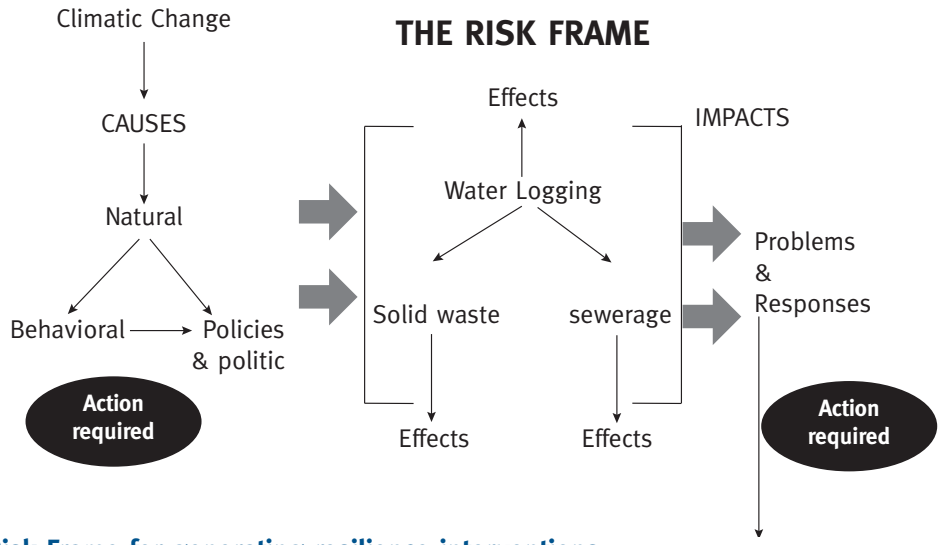


Fig. 5 GEAG Risk Frame for generating resilience interventions

TARU and GEAG drafted the strategies based on recommendations and discussion, while the CACs provided reviews. The Resilience Strategies were directly mainly toward the CAC's as interested and powerful city decision makers. Though all three strategies recommend actions to be taken by urban local bodies and municipal agencies, they have encouraged other players to be involved as well. For this reason, the strategies also encourage actions for NGOs, particularly in Indore and Gorakhpur. In Surat, the strategy is likely to influence local government due to official involvement through the process.

Assessing the process: India

Overall, partners observed that the ACCCRN process varied considerably between the cities, reflecting the disparate contexts of governance and local interest in the process. Surat benefitted from a highly engaged and proactive business community and Municipal Commissioner, which promoted regular meetings driven and facilitated by the CAC itself, rather than by TARU. The involvement of Municipal Corporation representatives has also led to higher confidence among partners that the Surat Resilience Strategy will have heavy influence and be internalized by the city.

The processes in Indore and Gorakhpur have not had the same level of commitment or recognition from local government, especially at a senior level. Gorakhpur's Municipal Commissioner in 2009 had shown interest and support for the ACCCRN program and its goals as well, but a new commissioner was appointed in February of 2010. Though initially disengaged in the process, the Municipal Commission of Indore joined the effort starting in early 2010.

The credibility of the facilitating agency at city level (TARU/ GEAG) plays an important role. Despite challenges associated with weaker governance, GEAG's deep roots in Gorakhpur as an NGO has enabled the organization to reach across the city through its wide networks, and engage influential partners in a variety of sectors. This similar advantage allowed GEAG to more thoroughly engage communities, civil society, and citizens groups throughout the process. However, TARU's prior experience and technical skills helped garner state-level support for their process from agencies such as the Gujarat State Disaster Management Authority. GEAG partners noted, however, that their process was not very successful in engaging the state governments or Municipal Governments, which is a

shortcoming due to the important role of the state of Uttar Pradesh in city planning and governance.

Pilot projects lend tangibility and seem to have good potential in influencing policies. For example, the pilot on housing design for flood prone areas in Surat has generated designs that the Municipal Corporation is keen to integrate in its housing schemes. At the same time, due to the encouraging outcomes of the pilot on Solid Waste Management in Gorakhpur, the Mayor has expressed interest in adoption by the Gorakhpur Municipal Corporation. In both cases, the pilot experiences have provided practical examples and evidence for success that has stirred broader local interest and may lead to continued action by local government.
Securing buy-in of key stakeholders is a time consuming process. Even once mobilized, it is difficult to secure the continuing engagement of government agencies and departments in South Asia. The level of engagement is often drastically reduced with transfers of senior staff—indicating that it is primarily a function of personalities. The engagement process also needs to link up with second-line leadership of key organizations to reduce this risk. For example, with the transfer of Municipal Commissioner of Gorakhpur, it is taking considerable time for GEAG to re-engage at the desired level.

The planning process becomes richer when some of the key stakeholders are actually involved in preparing studies and sharing results at various levels. The level of participation of stakeholders, in terms of interest, consultation attendance and contributions, in the project grew richer after some of the key stakeholders were engaged in sector studies and implementation of pilots. Specifically, the pilot projects have high potential to effectively engage vulnerable and marginalized populations. For example, the SWM pilot in Gorakhpur did initially increase the level of participation of the specific population where the pilot is being implemented and now has received the proactive support of communities from other wards as well.

The strong engagement of various local groups in Gorakhpur helped to foster and build the greater levels of citizen awareness that the resilience strategy itself recommended. GEAG used the waterlogging and flooding problems as "entry points" to mobilize popular interest and concern, and to generate new experience and examples that can build capacity. This process in Gorakhpur undoubtedly contributed to the focus of that strategy on small-scale, community-level actions that would serve as models and motivators to demonstrate the possibilities both for other local organizations and for the Municipal Corporation. This contrasts with the recommendations put forward in Indore, which while also favoring local awareness building, mostly relied on actions led by local government and other large organizations (despite the limited confidence in these organizations).

Overall, the process of resilience planning as implemented in India has led to significant gains in awareness and commitment in all three cities. The iterative engagement of local stakeholders in learning, planning and validating new information, as well as their engagement in pilots and studies, has helped to build local interest and buy-in for the strategies.

Indonesia: Bandar Lampung and Semarang

ACCCRN works in the two coastal cities of Bandar Lampung (Lampung Province, Sumatra) and Semarang (Central Java). Mercy Corps Indonesia, the Indonesian branch of the international NGO Mercy Corps, leads the ACCCRN project as the national partner. Mercy Corps senior staff visit the cities regularly, provide guidance and agenda for the SLDs, assist in coordinating with research organizations, NGOs, and universities for planning inputs (vulnerability assessment, pilot projects, and sector studies), and support the city work group for resilience planning. One local Mercy Corps staff member is based in each city and participates in all meetings with the city team and

city working group, which are led by representatives of city government departments, NGOs, and members of local universities.

A key objective of both city networks has been to integrate climate resilience concerns and initiatives into Longterm City Development Plans (10-year) and Midterm Development Plans (5-year). Midterm development plans are being finalized by BAPPEDA (City Planning and Development Board) and heads of city government agencies at the end of October and November 2010 respectively, for Semarang and Bandar Lampung.

The ACCCRN shared learning process commenced in Indonesia in July of 2009, with city scoping, initial City Mobilization Workshops, and SLD 1 in August. These early engagements facilitated the formation of an official city network of stakeholders and working group. The Indonesian timeline was compressed relative to India and Vietnam, as partners began the process 6 months later. Though originally scheduled to complete the City Resilience Strategies at the same time as the Indian and Vietnamese cities, this proved unfeasible. In addition, partners identified an advantage to producing their strategies concurrently with midterm development planning occurring in the cities during Fall 2010. City resilience strategies were still being drafted in both cities, and only an early draft of Semarang's strategy was available at the time of writing this paper.

Who was involved in Resilience Planning?

City teams in both Bandar Lampung and Semarang were formed and officially approved by city mayors following the first SLDs. The teams include representatives of government agencies (i.e. city planning, transportation, disaster management, environmental board, health, public works, etc.), local NGOs, universities, and leaders from *kelurahans* (an administrative unit similar to a sub-district). There was also some limited involvement from the private sector in Semarang, with representatives two private companies (producing cigarettes and wood pulp respectively) engaging as city team members as part of corporate responsibility programs. In both cities, the local Chambers of Commerce have not shown great interest in the process, although partners note that the National Chamber of Commerce has demonstrated support, which may encourage greater business involvement in the future.

During the SLD 2, city working groups were formed, each composed of three to four volunteer members. Bandar Lampung working group has been led by a member of the Development Planning Board (BAPPEDA), whereas an NGO representative and university faculty member head the Working Group in Semarang. The leadership structures demonstrate tradeoffs, according to Mercy Corps: while the Bandar Lampung team has easier access to development planning and government processes, the Semarang team has been more inclusive and dynamic, integrating non-government stakeholders and initiatives more deeply into their processes. The dynamics in Semarang have proven an advantage in overcoming challenges associated with integrating vulnerability assessment results, as described below, into the City Resilience Strategy.

The working groups in each city normally met once a week and have been involved in most decision making processes, including pilot project selection, intervention concept note preparation, and resilience strategy development. Through ACCCRN, Mercy Corps is able to compensate NGO and university working team members for both their time and expenses (meals and transportation), but is not legally able to provide compensation for time of government department representatives. This is seen as a minor obstacle, putting a heavier burden on the latter working group members. In each city, Mercy Corps has local staff who work closely with the Working Group.

Inputs

Vulnerability Assessment: Partners conducted vulnerability assessments for Bandar Lampung and Semarang in three stages. CCROM undertook a citywide assessment, characterizing *kelurahans* by levels of current and future risk by overlaying exposure to climate hazards (based on a "composite climate hazard index") with coping capacity (based on vulnerability and adaptive capacity indices using a number of indicators). Meanwhile, Mercy Corps contributed a community-based vulnerability assessment in *kelurahans* identified as vulnerable by the City Team during SLD 1. The Urban and Regional Development Institute (URDI) produced an assessment of governance in relation to climate change adaptation. Integrating and synthesizing conclusions from these papers proved challenging due to the divergent methods used, and city partners have not fully supported results particularly from the citywide assessment. Challenges associated with the VA are discussed further below.

Pilot Projects: NGOs and Universities have designed and implemented pilot projects in both cities, with each pilot targeting areas of *kelurahans* determined to be vulnerable. Pilot projects include:

Semarang:

- **Community-Based Revolving Fund** to engage female-headed houses in the vulnerable district of Kelurahan to improve their sanitation system through a revolving loan fund and to raise awareness among participants of climate issues.
- **Landslide and Cyclone Resilience** to aid communities in establishing an early warning system and the formation of a local disaster preparedness committee, local action plan, and model for vegetation of landslide prone areas.
- **Community-Based Coastal Adaptation** including promotion of the development of a breakwater using the community-inspired technology of used tires; conducting community-based mangrove conservation; strengthening organizations of fish pond owners and fisherfolk that have an interest in conserving the coastal areas; and implementing a stakeholder platform for the management of coastal conservations.
- **Land Arrangement Models** to pilot a range of land conservation techniques to combat soil degradation. Approaches include crop conservation, terracing, water conservation through catchment wells and bio pore, and tree planting, as well as community education on conservation activities.

Bandar Lampung:

- **Participatory Design of Disaster Mitigation and Climate Adaptation Activities:** In two sub-districts, partners have sought to increase understanding, awareness, and participatory involvement of the community to build adaptive capacity and identify specific areas of need through focus groups and surveys. Intervention activities will moreover include: installation of and training on brackish water filter systems; a waste management program including waste recycling training, organic fertilizer training, and a trash painting contest; a media campaign; and a documentary film for project replication.
- **Capacity Building of Panjang Selatan:** The project will benefit three wards where there are a high number of fishermen families, poor families, and female-headed households. Project leaders have intervened through waste management training, natural resources management education, eco-feminism education, and installation of drinking water sanitary training. The goal of this work is to increase community capacity through active involvement, and in the long-term to encourage the formation of adaptation-focused community groups and build collective support for adaptation in the sub-district.

Sector Studies: Sector studies in both of the Indonesian cities have only recently concluded and been presented in SLDs. For this reason, the influence of these studies on the emerging resilience plans may be limited. Due to short periods allotted for study, they are by necessity focused on district level analysis rather than citywide.

Timeline pressures in Indonesia have resulted in the loss of the intended sequential ordering of inputs, described earlier in this paper. Pilot projects for instance, were selected and implementation commenced before researchers released conclusions of the VA. Similarly, the ACCCRN program demanded concepts for intervention proposals well in advance of resilience strategy completion. Sector studies are feeding into the process at a late stage of strategy development, and they are limited in scope due to timeline pressures.

Resilience Strategy Preparation

Cities have extended the period of resilience strategy preparation in order to ensure they can provide inputs to the midterm development planning process, which finishes in October and November 2010 in Semarang and Bandar Lampung respectively. As indicated above, a significant obstacle in the Indonesian planning process has been concerns and confusion surrounding the vulnerability assessment. A number of criticisms arose from City Teams in both cities with regard to:

- The results presented were highly technical and inaccessible, and the indicators and data used are not transparent to partners.
- Researchers used incorrect or misleading data to characterize kelurahans as vulnerable, such that some sectors and sub-districts appear to be more vulnerable according to the assessment than they are in reality. Hazard assessment, precipitation data and socio-economic data sets used for analysis are disputed by the cities as inaccurate.

In response to these challenges, the working group in Bandar Lampung has decided to revisit the original data sources to assess the root of the problem. This process may lead to revisions in the VA given sufficient resources. In contrast, the Semarang team is attempting to integrate data from the VA such as trends and impacts into its emerging city resilience strategy, while for the time being working around the more controversial spatial analyses.

The draft Semarang City Resilience Strategy describes its process as occurring in four stages over several months:

1. Preparation: Partners held a workshop for comprehensive review of the SLDs, VA sector studies, and pilot projects. The workshop introduced the resilience planning process and discussions of urban development trends. This stage also initiated coordination and synchronization with city's development planning team through a series of informal workshops.
2. Brainstorming: An initial scenario development workshop, followed by a workshop to generate action ideas based on scenarios.
3. Consultation and prioritization: City team and Working Group meetings were used to verify strategies, prioritize using qualitative CBA, and gain credibility from target groups and expert input for each action selected.
4. Finalization: In the final stages, the Working Group focused on integrating the resilience strategy with midterm development planning documents (RPJMD), as well as examining the resilience strategy for consistency with other relevant plans and documents. Partners also initiated the drafting of concept proposals for prioritized actions.

The Semarang working group has taken advantage of the concurrent mid-term development planning process to ensure that the two documents are linked and co-formulated. Starting in August 2010, members of the development planning board joined the working group to consider ways in which climate change issues identified through the ACCCRN process should be integrated into the midterm development plan. Bandar Lampung will follow a similar process following clarifications of the VA, with the Bandar Lampung deadline for midterm planning at the end of November rather than October 2010.

The resilience strategy preparation process contrasts with the conventional planning process in Indonesian cities, according to partners. In most circumstances, government agencies contract special city planning projects to external consultants, who consult city agency leaders but draft the plan independently. The ACCCRN process, in contrast, has demanded that the cities themselves devise actions and priorities based on analytical inputs. This has produced some anxiety for partners, especially in the wake of concept note feedback that partners found confusing and interpreted as unsuccessful. City partners are themselves concerned about what they see as a "lack of innovation" with regard to formulating resilience activities, and hope to gain ideas from external projects and documentation (for instance, UNFCCC reports) and other ACCCRN city resilience activities.

In response to partner requests, ISET provided additional guidance to Semarang and Bandar Lampung working groups for resilience planning, including process recommendations and case study examples.

Process Assessment: Indonesia

Because resilience planning was ongoing at the time of writing, analysis of the process and strategies is minimal in this paper. A number of lessons do, however, emerge from the Indonesian case. Cities have overcome significant obstacles of limited time and unconvincing vulnerability assessments.

As in the other countries, process delays occurred for a number of reasons, including scheduling, study and pilot extensions, bureaucratic approvals, etc. Just as the resilience strategy was getting underway in Bandar Lampung, for example, local elections led to a change in local government leadership, and subsequent staffing changes among key team members. Their planning process was set back by several months. It proved to be impossible to meet the original project timelines. The compressed timeline and parallel, as opposed to sequential, work streams pushed city partners beyond comfort levels in tackling a complex planning task that was completely new to them.

Challenges surrounding the vulnerability assessment results, as described above, have also contributed to confusion in the process. This was again exacerbated by artificial deadlines, as the city team and working group lacked initially the time necessary to thoroughly assess results and identify gaps. The follow-up to this confusion demonstrates a high level of engagement and ownership among the city team and especially the working groups, who were able to challenge the results and willing to delay the process to ensure they were using reliable analysis.
As in other countries, the involvement and support of key local leadership has proved crucial—and conversely, the loss or change in this leadership, challenging. New mayors have recently taken office in both cities, with the new mayor for Semarang exhibiting helpful support and interest in the ACCCRN program. The transition has been rockier in Bandar Lampung where the new mayor is not yet engaged in the process, and some key city staff have been reassigned from this project as a result of administrative changes.

Process Conclusions: India, Vietnam, Indonesia

The approaches and processes required in each context will vary greatly across countries, in part because the authority of local governments is different in each. In Vietnam, for example, governments are responsible for providing most services, but local governments can act only to implement authorities granted or specified by the national government (e.g. national programs, legislative mandates, public works projects). In India, ULBs have achieved greater autonomy and authority under recent constitutional amendments but there is a still a need a to engage state governments, which oversee many aspects of urban planning. On the other hand, India demonstrates the degree of variation within one country, with Surat relying heavily on its municipal corporation for implementation, whereas Gorakhpur and Indore look for more dispersed strategies of enhancing resilience due to weaker local governance.

We observe a number of commonalities in the resilience planning process across the cities and countries:

- **Process:** the SLD process proved innovative and helpful as a platform for planning. In India, the role of the advisory committees was vital to grounding the process, testing and validating lessons from studies, and providing local data inputs. The CSC in Gorakhpur in particular, with a broad diversity of representation and drawing on a series of separate local participatory consultations, appeared to develop a strong sense of commitment and leadership to the process. In Vietnam, the experience of convening scientific and local knowledge in the same forum, creating opportunities for open and structured deliberation, was a new one for most participants and led to significant gains in understanding and consensus on actions. In Indonesia, the SLDs provided the first occasion for local government to work directly with local NGOs, and helped create opportunities for their ongoing engagement in local planning processes.
- **Core group:** The ability to seed a locally driven process depends on the constitution of a "core group" that acts as a repository of information and capacity, and leads or coordinates integration across sectors. The core group members can in turn act as ambassadors of climate resilience for other processes or to build demand for resilience planning in their own organizations—for instance as in Semarang, where working group members have joined the development planning board as it drafts mid-term development plans. In Indonesia and Vietnam, the working groups have functioned as the lead planners themselves. Local government planners are still bound by the existing processes and requirements of mandated planning authority in relation to land use, public investment, service delivery and so on. The time commitments necessary for consistent participant of members require institutional arrangements to secure local staff time and may require monetary arrangements to compensate for loss of time for other work.
- **Timeframe:** The ACCCRN program allotted 10-18 months from the introduction of climate change information to a largely uninformed local audience, to the production of local resilience plans, using an iterative multi-stakeholder SLD platform and designing and implementing multiple technical studies and pilots along the way. Conceptual and methodological resource material needed to be translated into multiple languages, when local terminology often did not exist for many of the technical distinctions. In all countries, this created a tight timeline, with a variety of unexpected delays creating additional pressure. In particular, all partners involved (including ISET) expected that climate data would be more readily available and interpretable than turned out to be the case (see *ISET Climate Resilience in Concept and Practice Working Paper 2*). ISET work plans in collaborating with partners turned out to be consistently optimistic. In certain respects, time pressures prevented the process from dragging or losing momentum. However, the SLD and resilience planning process requires flexibility for partners to absorb new information and feedback; to build trust and collaboration; for studies to be rigorously completed and examined by partners; and for partners to gain familiarity with an unorthodox method of planning. In addition, one should not underes-

timate the time needed for translation of materials. It takes time to develop the capacity of translators for this technical work.

The condensed timeframes in ACCCRN created considerable tension and confusion, particularly in Indonesia where haste contributed to early analytical errors in the vulnerability assessment that had to be reworked. The logical sequencing of analysis in the planning process could not be maintained there and sequential steps had to be undertaken in parallel. This resulted in weaker analysis, less opportunity for review and absorption of concepts by partners, and reduced local control and ownership by forcing partners to rely more on external support. In a new field such as this one, external support cannot always be mobilized in sufficient depth or on short notice as local conditions change, leading to further frustration and delay.

- **City leadership:** Securing the support of city leadership, such as mayor or municipal commissioner, or the PPC Vice-Chairman and department head in Vietnam, can help to ensure participation of other key players or sectors, and increase the likelihood that results will be integrated into decision making. Ultimately, in most cities it will be necessary for local government to become a key stakeholder that is willing and able to integrate climate change priorities into their activities. However, experience also indicates the risk of relying on few key figures who may leave office or change positions, and that gaining a wider base of knowledge and support reduces the risks of inconsistent leadership.
- **Audience, Ownership and Authorship:** Resilience strategies are developed by the City Steering Committees in Vietnam. The working groups in these cities are responsible for analysis, drafts and revision, with their members most intimately familiar with the informational inputs and analysis. In India, the City Advisory Committee (Indore and Surat) and City Steering Committee (Gorakhpur) have contributed to generation of insights from sector studies and approved the strategies, with TARU and GEAG responsible for drafting, analysis and revisions. In all cities, the process of drafting the resilience strategies engaged key decision makers and representatives of multiple agencies not only in understanding city vulnerabilities, but in helping define and prioritize activities for implementation. *In this way, those who drafted or contributed to the resilience strategies were also the owners / users and part of the intended audience.*

Resilience Strategy Comparison

This section of the paper compares the various strategy documents produced as a result of the process described above. As expected, resilience strategies took different forms and reflected different priorities across cities and countries. While this partly reflects the divergent city contexts, including vulnerabilities, governance systems, and planning processes, it is important to acknowledge that individual capacities and preferences, political realities and other factors play a role in any planning process.

The City Resilience Strategies and Action Plans produced in India and Vietnam are the first documents of this type generated from the ACCCRN program, which is one of the first donor-led initiatives to target urban climate resilience planning and implementation in developing countries. In this way, both the process and the strategies themselves can provide useful insight for other cities. We discuss the following aspects of the strategies:

- Linkages between identified vulnerabilities and proposed actions: This is fundamental to ensure that indeed actions respond clearly to identified system fragility or to weak capacity of agents, and that any gaps are transparent and recognized by the authors;
- Types of actions identified and prioritized, in relation to the resilience framework;
- Responsibility for implementation of the top priority actions.

Vietnam

Links between Vulnerabilities and Proposed Interventions

Each of the Vietnamese resilience plans is structured roughly consistent with the suggestions and guidelines prepared by ISET. The documents are organized into 3 parts. The first part covers city background including economy, geography, and climate; climate projections; identification of key vulnerabilities, institutional challenges and opportunities, and objectives of the plan. In Part 2, the document identifies climate impacts and potential actions to address these; and the final part presents a prioritized list of actions to 2020, indicating a timeline and, for Da Nang and Can Tho, the agencies responsible for implementation.

The strategies all rely on experiences of recent extreme events as the basis of climate vulnerability assessment, proposing that exposure and associated risks to vulnerable sectors will increase under future climate change scenarios. The analyses also draw upon inundation maps based on sea level rise scenarios. In particular, the report conducted for Can Tho by the researchers at the University of Can Tho DRAGON Institute provides assessments of potential future inundation due to combined influence of seasonal floods and SLR, and saline intrusion impacts on agriculture, aquaculture and infrastructure, which stakeholders had identified early in the process as key issues.

Quy Nhon and Da Nang deploy similar vulnerability approaches, by framing all of their vulnerabilities, impacts, and corresponding actions around specific climate hazards. Interventions are in turn devised to respond to the specific hazard, providing a set of potential actions for storms, a set of potential interventions for floods, etc. These are subsequently ranked, using the methods and criteria described above, to provide a top priority intervention, second priority intervention and so on for each hazard. In this way, the proposed resilience-building actions are derived directly from assessment of vulnerable groups and future climate hazards.

For both Da Nang and Quy Nhon, all proposed actions are subsequently distributed out of the hazard categories into *prioritized* type-of-action groups. In Quy Nhon, for instance, these ranked categories are: 1) Awareness and capacity building; 2) Risk assessment of socioeconomic planning; 3) Support for sustainable livelihoods in the face of climate threats; 4) Research and assessment on key sectors or groups defined in the plan; 5) Reforestation; 6) Infrastructure planning and construction; and 7) Disaster response and early warning. Each of these groups consists of a number of actions responding to different hazards. Both cities' lists are long and comprehensive.

In contrast, Can Tho proposes a set of 22 interventions, grouped into the five (unranked) categories of climate change awareness, planning, infrastructure, natural resources, environmental and health, and livelihoods. From this list, interventions are then prioritized into 11 discrete priority actions. In this way, Can Tho provides a clear and arguably more manageable set of actions until 2020. The list is less comprehensive than those of Da Nang and Quy Nhon. But it also explicitly outlines the gaps in the proposed work plan, specifying which of the identified vulnerabilities or hazards are not targeted.

Types of Actions

Annex 1 lists the proposed interventions in each of the 7 cities. Overall, the plans reflect a preference for "soft" interventions, rather than infrastructural strategies to respond to specific hazards. The priority action groups in both Quy Nhon and Da Nang involve awareness and training / capacity building at all levels, which in both cases encompass community disaster preparedness. They also advocate more research, livelihood projects, and efforts to integrate climate issues into development plans and other department programs. The Quy Nhon strategy additionally contains a strong ecosystem conservation and restoration focus. In Can Tho, actions include awareness oriented measures, additional research and impact assessments, integration of climate change issues into existing plans and programs, and projects on health and continuing pilots and sector studies.

Each of the cities proposes and has strongly advocated for the creation of city government offices charged with coordinating climate change across city agencies. However, this does not appear explicitly in the Quy Nhon action plan, as the plan focuses more heavily on actions than institutional mechanisms for enacting them.

As described above, the Quy Nhon strategy and proposed actions suggest a greater willingness to propose revisions to the city urban development master plan. In the case of Quy Nhon, unlike Da Nang and Can Tho, the city is facing a series of major land annexation measures in the coming decade to greatly expand its area, as it addresses anticipated growth and industrial development. This is likely to be accompanied by "promotion" to a centrally-administered city (i.e. provincial level status, like Da Nang and Can Tho already). The resilience strategy contains a thorough analysis of historical and future development trajectories in the context of potential inundation and damages based on recent experience. The city's second action group priority is detailed risk assessment of hazards for socioeconomic development and urbanization in peri-urban areas, suggesting a recognition of the potential risks in its current master plan. The assessment will focus initially on plans for residential and industrial development in Nhon Binh district, specifically through the use of hydrological and hydraulic modeling to create an impact assessment of flood events under alternative climate and development scenarios.

Direct infrastructure investment is close to the bottom of the ranked lists for all 3 Vietnamese cities (if it appears at all). Most infrastructure-related interventions relate to storm resistant housing and improvement of basic services rather than flood protection or drainage. However, a number of more detailed studies that could lead to infrastructure planning and investment do show up on the priority lists. This is discussed further below in the cross-country comparison.

Implementation Responsibility

In Vietnam, the whole approach to resilience planning and the strategy itself are experimental. The process and resulting document lack formal senior government mandate or authority. This is important because local governments have limited authority to take actions that are not explicitly mandated by senior government directives. However, these local resilience plans are closely related to the Climate Action Plan that each province and provincial-level city must prepare under the National Target Program to Respond to Climate Change (see discussion above). In each of the ACCCRN cities, there will be a Steering Committee to oversee implementation of the NTP, under the direct oversight of the People's Committee. This body then becomes the overall implementing authority for Climate Action mandated by MoNRE in each city. Specific tasks for the priority actions recommended in each city will be assigned to the relevant city technical departments. In each city, the Steering Committees originally established for purposes of ACCCRN project management now appear to have become the designated provincial Climate Change Steering Committees. This therefore gives the resilience planning process a direct link to the preparation of the more formal Climate Action Plans required for each province, and makes it much more likely that priority activities will be implemented by the responsible agencies.

The Da Nang and Can Tho action plans transparently identify which actors will implement the proposed actions according to their timeline. The Quy Nhon plan has a lower level of institutional analysis and does not explicitly designate implementation authorities in the document. In each city, the Climate Change Steering Commmittee would provide authority to climate resilience activities through the Climate Change Coordination Office, which will be responsible for coordinating between government agencies. The Office would also house and update climate related information; engage government departments in climate change planning and encourage the integration of results into city programs and plans controlled by other agencies; integrate the needs of vulnerable communities into planning; lead capacity building, training and awareness programs at various levels within the city; and provide liaison with national government and related programs. The DoNRE will be responsible for ensuring the organization and staffing of these offices.

In Quy Nhon, the DoNRE will also be responsible for overseeing the hydrological modeling study for Nhon Binh ward and coordinating the technical inputs of consultants (mainly SIWRR). In Da Nang the hydrological modeling work will be overseen by the Dept of Construction, together with DoNRE, and with technical inputs from Da Nang University and SIWRR. The feasibility study for storm-resistant housing and livelihoods will be implemented by the Da Nang Women's Union, a local non-government mass membership organization.

India

The Resilience Strategies for Indore, Surat, and Gorakhpur were completed in August 2010 by TARU and GEAG respectively with input and review from the CAC and CSC as described above. The Surat and Indore strategies "provide an overarching framework with a clear vision and direction for improved delivery of services by the stakeholders and action to be undertaken by the communities, thereby promoting economic development." The Gorakhpur strategy reflects an emphasis on "developing institutions and governance mechanisms required for implementation and strengthening critical systems" through the promotion of active and conscientious citizenry. The differences between these strategic perspectives is significant: in Surat and Indore the resilience strategy is framed mainly as a platform for strengthening economic development, while in Gorakhpur it is framed mainly as a platform for strengthening governance.

All of the strategies for India focus heavily on existing hazards and development challenges as the points of entry into building climate resilience. Foremost in the analyses for Indore and Surat are urban trends, such as growing population and migration, resource scarcity and public sector management weakness, and economic trends. Potential impacts of climate change are considered as an additional, and highly uncertain, pressure exacerbating the impacts of other trends. In Surat, this included a focus on flooding due to upstream dam operation on the Tapi River and smaller but more frequent flooding on streams; and in Indore, chronic water scarcity and short-duration flooding. Flooding and water related problems also represent the main point of entry for the Gorakhpur strategy, due to water logging problems in the city that are expected to get worse in the future.

Links between Vulnerabilities and Proposed Interventions

In contrast to the Vietnamese strategies, those in Indian cities categorized proposed actions by sector rather than by hazard. In Surat, sectors of interest include: water resources, natural disasters/ urban health, urban services, population (ie. vulnerability and capacity of certain populations); environment, economy, social equity, and technology. In addition to these, the Indore strategy considers energy and urban services. The sectors considered for Gorakhpur are: housing, industry and commerce, basic services, transportation, energy/electricity, health, household based livelihoods, ecosystems, and urban planning. The sectoral analysis is readily tied to existing sectoral conditions, but less clearly related to the climate vulnerabilities analyzed in each city.

The strategies prepared by TARU for Indore and Surat are similar in structure. A "Risk Assessment" section describes hazards facing the city and vulnerabilities based on a set of quantitative social and service access indices produced from surveys undertaken as part of the vulnerability assessments. The strategy summarizes results of various sector studies undertaken as part of the ACCCRN project and describes the climate risks identified in the studies. Next, urban growth scenarios depicting key alternative future trends are described in detail (see process description in previous section). The scenarios themselves do not explicitly evaluate climate change issues.

The final section of each strategy focuses on proposed resilience actions. A series of interventions, both short term (3-5 years) and medium-term (5-20 years) are categorized by sector, with each intervention attached to one ore more "potential partners/ stakeholders." Each of the actions responds to an "issue" identified as a result of CAC discussions of the scenarios. Priority action areas are described in greater detail below the comprehensive chart of actions, and the strategies conclude with a list of linkages to national and state programs.

In the strategies for Indore and Surat, the urban growth scenarios function as a central framework for translating vulnerability analysis into actions. The scenario development assembles a series of potential challenges or positive outcomes that may result from potential urban growth trajectories, which are then overlaid against future climate scenarios. Actions suggested in the latter part of the document respond to the challenges or outcomes from this interaction of climate and urban scenarios. The suggested resilience actions arise from the consultation and shared learning dialogue within the CAC, as they compared the previously identified climate vulnerabilities with urban development and climate scenarios. In the case of Indore and Surat, the proposed climate resilience actions arose not from the itemization of specific future impacts, but more from a pro-active effort to address short-term risks that arise from existing infrastructure and planning shortcomings. While addressing these issues would improve climate resilience, the main motivation at the local level was a focus on how to support the most desirable urbanization and poverty reduction scenarios.

The strategy prepared for Gorakhpur outlines historical and future climate vulnerabilities, with special attention to potential impacts on waterlogging. The other main risks highlighted in the strategy are sewerage and sanitation

challenges and solid waste management. Vulnerable groups and sectors are identified and associated vulnerabilities highlighted. The strategy also reviews climate and urban development scenarios. Actions are categorized by sector, area for action, and specific actionable interventions. These in turn are grouped into six larger "Final Action Items."

More than other strategies, the Gorakhpur strategy describes the participatory process through which partners assessed vulnerabilities and identified pathways for action and specific interventions. Results of these discussions (such as the "Resilience Strategy Framework" and "Risk Frame" presented above as Fig 4 and 5 respectively) appear in the strategy document. As in Surat and Indore, partners utilized scenario development as a platform to formulate actions responding to key concerns, although the flow of ideas from these discussions is less apparent in the document. The actions generated from these discussions target most of the sectors and groups identified earlier in the strategy as vulnerable, demonstrating that the strategy has clear roots in earlier vulnerability analysis. In Gorakhpur it is particularly clear how the participation of a broad cross-section of the community and the leadership of the CSC throughout the process contributed to this continuity.

Types of Actions

Each of the strategies provides a framework for the types of actions deemed strategically useful for building resilience. The Surat strategy aims to:

- Build on *current and planned initiatives*
- *Demonstrate* resilience building projects to leverage further action at the local level
- Generate multi-sectoral *information* and develop a portfolio of *potential projects* (ie. identification of diverse potential actions that could be supported by donors or state or national governments)
- *Build synergies* with state and national level urban initiatives that are already underway.

The same set of action principles are used for Indore, with the additional goal to "Create awareness about climate risks and generate demand (for resilience actions) using a bottom-up approach." This additional guiding principle for resilience actions in Indore was intended to address that city's greater need to motivate political and administrative action in an environment of weak governance – in this case by encouraging greater citizen awareness of the weak infrastructure services and attendant climate risks. This approach compares with that in Gorakhpur, where the overall focus of the resilience strategy was on demonstrating small-scale resilience actions and building local awareness to motivate advocacy and strengthen political accountability.

For Gorakhpur, action principles are as follows:

- Build a community of practice including government, NGOs, academic, private sector institutions familiar with climate, to create a sustainable mechanism for climate resilience planning and implementation activities;
- Develop targeted local actions for drainage, housing, health and communication systems to demonstrate how these actions address problems and build capacities;
- Establish an information base for long-term planning, emergency response and social advocacy, especially communications systems and climate scenarios;
- Activities to raise public and political awareness and encourage policy change.

Common among these approaches is the strategy of *demonstrating* activities that provide examples of resilience and leverage further action from local and state government agencies. In Indore and Gorakhpur, the generation of public awareness is viewed as high priority in order to change behavior and to build political commitment. The Gorakhpur strategy in particular describes the development of climate change awareness in explicitly political as well as behavioral terms – as intended to improve governance through public advocacy and fostering more environmentally conscious behavior (i.e. reducing use of polythene bags which contribute to solid waste and drainage problems). Due to the presence of a more effective municipal corporation that already recognizes climate problems, the Surat plan relies more heavily on technocratic action rather than advancing public awareness.

From the individual actions itemized in the strategies, TARU and GEAG provide a set of composite interventions for each city that are judged as high priorities. These are highlighted in Annex 1, which provides a list of all interventions suggested by the cities.

Implementation Responsibility

The CAC or CSC in each Indian city has approved their respective resilience strategies, but it is not clear from the strategy documents whether these bodies, formed mainly for purposes of the ACCCRN project, will develop ongoing advisory or oversight responsibilities in the cities. Neither is responsibility for reviewing and revising the strategies made clear in the documents. The lead organizations in each case (TARU and GEAG) have provided much of the initiative for the process, and there are mixed signals on whether, if they were to disappear, other local stakeholders would be able to take this initiative. Certainly this appears to be more likely in Surat, where there is a high degree of local interest and a strong public administration.

With regard to implementation, the Surat and Indore strategies indicate, for each proposed action, one or more "potential partners / stakeholders" who would be involved. For Indore and Surat, the Municipal Corporations evidently emerge as key players on which successful implementation of the strategy would depend. In Surat, the South Gujarat Chamber of Commerce and Industry is also foreseen in the strategy as playing a major implementation role on various potential projects. Many of the organizations listed as potential implementers are represented on the CACs. The Gorakhpur strategy does not specify which actors would be responsible for each action, rendering difficult a comparison with the Indore and Surat approaches.

Semarang, Indonesia

The Semarang Resilience Strategy was still in draft stages at the time of writing. The document does however provide a useful third example of structure, analysis, and priority actions for urban resilience. The strategy begins with an introduction clearly outlining the background and purpose of the document, before moving into vulnerability analysis, a discussion of relevant national policies and city planning processes, and presentation and prioritization of proposed resilience actions. The Semarang City Resilience Strategy is clearly linked to the statutory mid-term planning process currently underway in the city that ties land use and public expenditure planning.

Links Between Vulnerability and Proposed Interventions

In contrast to the Indian or Vietnamese strategies, the Semarang analysis takes a broad geographical approach to vulnerability by defining areas exposed to hazards (lowlands, riverbeds, hilly areas exposed to winds, landslide prone areas) or distant from crucial service (in this case, watersheds). Within these, the document considers key sectors that would suffer as a result of their geographical exposure. The strategy also identifies critical locations vulnerable to climate hazards, where impacts would hamper key city systems. These include transportation hubs, the business

district of Semarang, and historical and cultural assets in the old city. As a result of the geographical focus, the Semarang draft document relies more heavily on mapping analyses than the Vietnamese or Indian strategies. Key vulnerable groups in the city are also noted.

Like the Indian strategies, the analysis depends heavily on scenario development to understand potential vulnerabilities. In contrast to the Indian scenarios however, in Semarang the scenarios refer to very specific, technical issues related to future climate, development trends, and city infrastructure planning. Three areas of concern –dry season (drought), rainy season (inundation), and sea level rise—are introduced, and within these scenarios are used to examine how city development plans, infrastructure projects, or general trends will affect issues such as water scarcity, flooding, water contamination, saline intrusion, aquaculture, etc. The results of these scenarios are interesting in that they indicate large gaps between climate, population, and development trends and the solutions currently proposed by the city. Despite the early geographical framing of vulnerability, the document formulates its actions based on key sectors (similar to the Indian strategies). The selected sectors follow clearly from both the geographical and scenario analysis, however. They are: water sector resilience, infrastructure, environment, marine and fisheries sector, and human resources capacity development.

Types of Actions

See Annex 1 for a listing of actions proposed in Semarang's draft strategy, and note that the action and priorization are still subject to change given the ongoing drafting process. The strategy contains 16 initial actions categorized by the five key sectors. An early glance at these actions suggests an approach with greater focus on infrastructure than that of the Indian or Vietnamese strategies. Of the 16 actions, seven are categorized by ISET as infrastructure, including centralized systems (sea wall, sea water desalination, construction of channel belt for rainwater distribution, construction of flood shelter) and decentralized (water harvesting, purification of public wells, neighborhood drainage networks). This stronger emphasis on infrastructure interventions in Semarang is probably due to the close relations (overlapping membership) of the climate Working Group and the city's Development Planning Board (working on the mid-term development plan). Both processes proceeded in parallel. This provided a clear advantage to those formulating the resilience strategy to think in terms of infrastructure priorities that could be tied to land use and public expenditure planning.

Following the use of resilience characteristic matrices and qualitative cost-benefit analysis, however, Working Group members have designated the centralized strategies as lower priorities, with the exception of the flood shelter. Of the decentralized strategies, rainwater harvesting was identified as the highest priority, purification of public wells as middle priority, and neighborhood drainage networks as lower.

As in all three Vietnamese cities, Gorakhpur, and Surat, Semarang partners advocate a central institutional mechanism for climate resilience capacity building, planning, coordination and knowledge development. In Semarang, this organizing mechanism would be known as the Center for Cities and Climate Change (C4).

The strategy proposes four adaptation priorities for short term action, that are outlined in terms of budget, partners, and timeline. These are:

1. Rainwater harvesting
2. Construction of flood shelter
3. Center for Cities and Climate Change
4. Domestic wastewater management to protect water resources

Implementation Responsibility

The strategy states that "all actions and financing will be coordinated by BAPPEDA [Development Planning Board] of Semarang City, assisted by the City Working Group and Technical Team on Climate Change Adaptation of Semarang." For the four prioritized actions above, local partners for financing and implementation are indicated. These include BAPPEDA, other relevant city departments, NGOs, universities and research institutes.
The strategy stresses the importance of carrying out actions using a community based, participatory approach – especially for the decentralized infrastructure oriented interventions.

Comparing Strategies Across Countries

Annex 1 presents a summary of the various actions proposed by each city in order to strengthen climate resilience. The actions are categorized in relation to the urban resilience framework as applying primarily to building capacity of agents or to strengthening urban systems. Actions directed mainly at institutional often are intended to strengthen linkages between agents and systems. In some cases the actions fit in more than one category. The list of proposed actions covers a broad range of potential resilience building activities in each city, and a number of interesting comparative observations can be made from this list.

All the cities have obviously identified actions that address both the capacities of agents and the resilience of key urban systems. In particular, there is a strong emphasis on both awareness raising and on building knowledge in order to engage the public and official decision makers, and to provide evidence to better assess future actions.

Below, we outline a number of the common types of interventions that the cities believe will enhance their resilience against an uncertain climate future. Because of the different planning approaches in Vietnam, India, and Indonesia, partners came to similar conclusions in different ways. TARU and GEAG adopted a scenario approach to help local partners consider strategic issues in the future development of the city. Climate projections did not greatly alter the outcome of these discussions but rather served to highlight current fragilities of various urban systems. Overall, this approach helped to demonstrate to local stakeholders how a focus on avoiding climate-induced failures of key urban systems could also support their strategic goals for urban social and economic development.

In Vietnamese cities, future urban development is already framed in draft master plans for the period to 2020. This reduced urban planning uncertainties for the team charged with resilience planning, and allowed them to focus on how climate change might affect this city development. Climate uncertainties were addressed by considering how current climate vulnerabilities were likely to get worse both because of increased climate variability and because of urban development trends that would expose more people to climate hazards. This introduced a complication, as the assessments conducted revealed some aspects of the master plans to be maladaptive. Thus whereas the Indian cities could choose a desirable future vision and how they might achieve it, Vietnamese cities were obliged to consider how they might alter approved development trajectories (a politically difficult process). In contrast, the Indonesian cities benefitted from working closely with the development planning board on the upcoming Mid-Term Development plans.

The cities sorted their proposed actions in different ways. Da Nang and Quy Nhon sorted their resilience actions by climate hazard. The Indian cities sorted their resilience actions initially by sector, but then grouped them into thematic or related initiatives. Semarang has thus far also employed a sectoral approach to grouping their actions. It is not immediately clear which of these approaches might most easily connect to the organizations that will ultimately be responsible for implementation. Can Tho's list of resilience actions may in some ways be most easily adopted by implementing organizations because it is discrete and sectorally focused at the same time.

Common Themes Across Strategies

Despite the differences in framing urban development and climate change futures, the cities came up with many similar approaches in their resilience strategies.

Climate information: All of the cities struggled with how to apply climate data to the design of their resilience strategies (see also *ISET Climate Resilience in Concept and Practice Working Paper 2*). It was difficult to convey the nature of climate data and the inherent uncertainties of projections and models. Alternate climate scenarios were explicitly used in Semarang as part of the analysis. Most cities focus on current climate vulnerabilities and climate changes that seem likely to exacerbate these as the locus for priority actions. In addition, they suggest exploratory work to build knowledge and capacity around some of the other issues where climate impacts and vulnerabilities seem more uncertain.

Major infrastructure: None of the cities prioritize major infrastructure investments in their resilience plans. This is interesting considering that all identify major challenges related to flooding, water supply or both. We believe that this reflects the planners' recognition of the uncertainty of climate data. Large infrastructures investments are very costly and require detailed assessments of design standards, risks and alternatives. Initially, many partners expressed frustration at the lack of probabilistic data regarding future climate impacts, which they had hoped to use to design infrastructure standards. Some of the technical planning groups still have to come to terms with the inability of climate models to supply this kind of information. Hence almost all the cities prioritize more detailed studies of climate impacts on key hydrological parameters and water management systems, e.g. Surat studies of storm water drainage and sewerage design parameters in light of new climate conditions.

Another reason for the lack of emphasis on infrastructure in these resilience strategies is that all of the cities except Gorakhpur currently have major infrastructure investment programs underway, funded through either multilateral development banks or through large national government programs (or both). These infrastructure projects are large and complicated, with many funding restrictions, requirements and prerequisites. The projects are typically controlled by different agencies than those leading the climate resilience strategies. For all these reasons, it might be difficult for resilience planners to emphasize infrastructure issues in the early stages of their resilience work.

Disaster Risk Reduction: A number of the cities present suggestions for Disaster Risk Reduction (DRR). Surat probably had the most comprehensive DRR approach, from an improved early warning system to greater community involvement in decentralized DRR plans. Other cities also saw the need for early warning systems for floods and severe storms, and several suggested posting flood depth markers in publicly visible spots in low-lying districts (TARU suggested colour-coding these markers to match flood warning levels e.g. Blue, Orange, Red). Better floodplain identification and evacuation procedures were also suggested.

Awareness: The various awareness level actions proposed are not only intended to change the behavior of the general public in order to improve broader urban resilience (e.g. through elimination of polythene waste in Gorakhpur), but also to change the behavior of decision-makers. So in Gorakhpur and in Indore, awareness programs are partly intended to strengthen user knowledge of service improvement potential, in order to bring pressure to bear on local elected officials to upgrade services. In Vietnam, the resilience planners in the city understood the need to build support for climate adaptation efforts, in part through building awareness among both the public and among local government officials.

Coordination: Most of the cities also recognize the need for some kind of local coordination or information repository to improve the quality and usefulness of climate data. While the city strategies apply climate data in different

ways, they all conclude that climate projections are highly uncertain as a basis for action planning. They would all like to find better ways to manage and use climate data. This suggestion takes different forms: Surat proposes a voluntary Climate Watch Group to assemble data and undertake analyses that lead to policy advocacy. Gorakhpur proposes a community-oriented public information centre that would interpret local climate information and make it more widely available. The early Semarang strategy identifies the need for a center to coordinate climate information for enhanced decision making and capacity building. In Vietnam, where local governments have broad authority over planning and delivery of public services, and where governments are already obliged to prepare Climate Action Plans to meet national policy requirements, all three cities strongly felt the need to create a dedicated Climate Change Coordination Office to take responsibility for ongoing planning, data management and coordination of climate adaptation actions throughout the city.

This emphasis in Vietnam on a small, permanent government bureau responsible for coordination and planning at the local level is also reflected in the more explicit identification by Vietnamese cities of which agencies would have responsibility for actual implementation of the proposed resilience actions. While TARU identifies in its strategy documents for Indore and Surat the potential partners involved in various proposed resilience actions, it does not specifically identify responsibilities for leadership and implementation.

Maladaptation: All the cities recognized that a major contributing factor to higher future climate risk is urban development in sites exposed to climate hazards (such as former river channels or low-lying areas), or inappropriate infrastructure design (e.g. new roads that lack drains or block surface flows, creating flood impoundments). These appear to be common problems in Gorakhpur, Indore, Da Nang and Quy Nhon, especially in peri-urban areas. Semarang identified risks associated with deforestation and development of sloping land in watershed areas. Cities recognized the need to avoid further maladaptation by identifying these risks and preventing them in future urban development. One of the ways they proposed to avoid future maladaptation was to undertake detailed hydrological modeling and flood risk mapping in areas of the city that were potentially vulnerable (Da Nang, Quy Nhon, Can Tho and Surat all proposed this kind of study).

Identifiable vulnerable social groups: In Gorakhpur, Da Nang and Quy Nhon there is a strong focus of the strategy on vulnerable groups. These strategies are more explicit about the links between the geographic and social nature of vulnerability (i.e. that poor people live in exposed and vulnerable places). In the Vietnamese cities, these vulnerable groups were most often considered to be the poor farmers and fishers on the outskirts of the city, whose housing and livelihoods are already quite susceptible to climate hazards. Interestingly, all three Vietnamese cities point to resettlement of vulnerable groups as a resilience planning issue – both as a positive solution and as a negative impact on those displaced – but this issue is not raised in any of the Indian cities.

Action oriented: While the strategies adopt different formats, tools and processes, they are all *strategic* in nature: they develop priorities to identify a limited range of realistic measures in the short term, and link these to existing plans and policies at the city level, as well as to the actions of senior levels of government. This strategic nature, including the ability to identify priorities, is important in order for the plans to be actionable. The strategies are well grounded in local realities: compare for example the strong role of local (provincial or city) government in Vietnam with the relatively weak and limited role of municipal corporations in India. This leads in the latter case to the need for stronger citizen engagement to prompt political action, and the role of a broader range of state-level organizations, quasi-independent service providers and parastatal organizations.

The strategies are also explicitly tied to the development of proposals for project funding, not only to Rockefeller Foundation but also to senior levels of government. In most cases, the authors of the strategies point out the link-

ages to potential government funding opportunities. For Surat and Indore, for example, TARU has highlighted multiple sectors and opportunities for funding under various national and state level schemes. In Vietnam, all three cities make explicit the linkages between their local actions and the National Target Program on Climate Change. In these ways, the strategies largely succeed in creating an initial road map for resilience actions at the local level.

Conclusions: Results of Resilience Planning

The results of the process in each country reflect the fact that these were novel and unusual procedures everywhere. Approaches varied somewhat, and responded to differences in local leadership, organization, professional and political strengths. The organizations who worked on the plans had few precedents in their own experience to work from, and indeed almost no useful examples of similar work undertaken anywhere else. All the local partners involved were still trying to understand the basic concepts and tools while applying them rapidly over a very brief project timeframe, so the products have technical flaws and weaknesses. These can be remedied in future iterations of the process. The most important results were that local engagement in the development of these plans gave a much greater understanding of the climate change issues and resilience processes among local and national partners, so that future iterations of resilience planning in each city under local leadership are not only possible, but likely. This section of the paper documents outcomes from Vietnam and India and reviews some of the conclusions and lessons from the resilience planning effort so far.

ACCCRN Program Outcomes

Before the resilience planning process got underway, ACCCRN's sponsor (The Rockefeller Foundation) established a series of results areas where they hoped to see measurable signs of achievement over the 5-year life of the program from 2008 - 2013. While resilience planning was only part of the program's second phase, this activity was crucial to the engagement of the cities with concepts and practical issues of climate resilience. It was also crucial to the process of identifying interventions and developing proposals for donor funding in subsequent phases of the program. The resilience planning process succeeded in identifying proposals from each city that have been received favorably by Rockefeller for funding in the next phase.[11] Annex 2 presents the proposals submitted to Rockefeller by each city in India and Vietnam, and Annex 3 summarizes outcomes from these 2 countries in relation to Rockefeller's pre-defined results areas.

The results summary covers the second phase of the ACCCRN program, starting in early 2009 and lasting about 18 months. In terms of city level coordination mechanisms for adaptation planning, it is clear that an on-going planning mechanism has been developed and put in place in Vietnam. The CAC in Surat is also likely to continue its operations and has functioned well in coordinating local planning efforts. In Gorakhpur the process has been led and coordinated by GEAG, with inconsistent participation from the local government, while in Indore local coordination mechanisms have been weak.

The expectation of raising broader awareness among diverse audiences and generating initiatives that benefit vulnerable groups has been clearly met in Gorakhpur, where vulnerability assessment, broad community engagement and resilience initiatives focus directly on the issues of poverty and vulnerability. These issues have been addressed in most other cities as well to varying degrees in the vulnerability assessment process. The process ensured that these study results (e.g. in Surat and Indore, or the HCVAs in Vietnam, or social vulnerability studies in Indonesia), were brought to the attention of the relevant working groups. The development of specific resilience initiatives is in its early stages, and all of the cities will be considering additional initiatives over the coming months. However it seems clear that most of the cities have the concerns of vulnerable groups in the front of their minds as they consider alternative resilience initiatives going forward.

11 Funding had not been formally approved for any of these interventions at the time of writing.

The process of resilience planning has clearly demonstrated how local organizations (city governments and other partners) have used new climate information and new information about urban development and urban problems to help identify vulnerabilities and develop resilience plans. Most of the cities explicitly prioritize the value of new information in helping them to assess risks and to select effective resilience interventions.

While there is little evidence of new relationships with local government emerging from the process so far in India, existing relationships with private sector or civil society groups have in most cases been strengthened through the iterative consultations in the process. By contrast, in Vietnam, the climate and impact studies introduced new sources of expertise to local government planners, and engagement in planning has led to the development of a variety of new relationships at the local government level.

The cities have only recently completed their resilience planning work, and the timelines for producing strategies and action proposals offered limited time for them to explore the experiences of others. However, there has already been some interaction among the cities (within their own country mainly), and there seems to be interest in learning from each other's experiences. While the Vietnamese cities have undertaken some deliberate efforts at sharing lessons (a joint meeting in Quy Nhon), there have been few opportunities so far in the program for direct city-to-city interaction and exchange of lessons.

Ultimately, Rockefeller hopes that cities will leverage their knowledge and experience in ACCCRN to generate additional funding from other sources for resilience investments at the local level. There is already evidence of this happening in Vietnam, where a number of government and donor funded activities overlap with ACCCRN in these three cities. The cities themselves are actively coordinating and facilitating these activities.

National government support for extending and replicating ACCCRN approaches has not yet been evidenced in either country, but this result was not expected until later in the program. Similarly, program results are too recent to expect much evidence of donor support and adoption of ACCCRN methods. In both countries government and donor support is being actively courted, and as the program moves forward and cities can demonstrate more experience with implementation of resilience actions, all the cities are well positioned to build additional external support.

There is thus evidence for achievement, or progress in achievement, of results across a wide range of both initial and longer-term ACCCRN program objectives.

Urban Climate Resilience Results

In relation to the urban resilience framework summarized at the beginning of this paper, the resilience planning process in each city has included several iterative rounds of diagnosis, integrating climate information with analysis of the vulnerability of urban systems and agents. This represents the top half of the diagram in Fig 1 above. The process of urban resilience planning has emphasized shared learning (the central axis of the diagram) by engaging a broad range of local stakeholders and decision-makers in most of the cities. The results of the process have included strategic plans for each of the cities – the focus of comparative analysis in this paper – but they have also included significant learning by the stakeholders in each of the cities. This learning provides the foundation for implementation of resilience actions in the next phase of the ACCCRN program (i.e., the bottom part of the diagram).
In all of the cities, a broad set of potential actions was proposed to address the climate vulnerabilities identified. These actions included measures to address fragility in infrastructure, ecosystems, as well as inadequate institutions and gaps in knowledge. They included awareness raising and capacity development aimed at individuals, households, private organizations and government bodies throughout the city in order to build their capabilities to antici-

pate and respond to climate threats and opportunities. The table in Annex 1 demonstrates how proposed interventions in each city would address elements of urban climate resilience, strengthening urban systems, building the capacity of agents to take effective actions, and reducing exposure to climate hazards.

Many of the proposed actions in Annex 1 are unlikely to be implemented. Local needs will evolve and analysis of priorities will improve as information grows and understanding and incentives for action become more widely shared among key decision makers in both public and private sectors. As a first cut, this process has been successful in introducing the concepts and demonstrating the breadth of potential local actions for future consideration.

A much smaller set of these proposed actions has already been more carefully prioritized and designed for subsequent submission to the Rockefeller Foundation as funding proposals (see Annex 2). This shorter list basically represents the highest priorities and best cases for externally fundable interventions in the short term. In addition to these interventions proposed for funding to Rockefeller, each city is also engaged in ongoing work related to climate resilience and supported either with its own budget or by national government programs and other donors. In India, for example, Surat and Indore already have a variety of urban infrastructure, livelihood diversification and capacity building, and public health programs that are directly linked to the vulnerabilities identified in climate change studies. In Vietnam, all three cities have drainage and wastewater collection systems undergoing upgrades, and they have coastal or riverbank protection systems underway. Through a national program on Disaster Risk Reduction, they are already engaged in improving disaster preparedness and response, and the National Target Program on Climate Change is providing funds for climate change demonstration projects. The ACCCRN resilience strategies are initial efforts, but they provide a platform on which to refine and integrate these other local resilience-building activities.

The resilience planning process itself, as introduced in ACCCRN cities, also builds resilience by helping to institutionalize mechanisms for iterative shared learning. Implementation of resilience interventions, together with monitoring of results and re-assessment of vulnerabilities, can now be built on a continued and familiar process of shared learning engaging diverse local stakeholders. Each of the Vietnamese cities, in its strategy document, proposes to continue the use of SLDs. This is an important tool for strengthening the diagnostic, planning and implementation processes shown in the urban resilience framework diagram (Fig 1, above).

One of the challenges that city partners faced in resilience planning was working with climate data. While all of the cities used climate information based on regional downscaling of global models, this information proved to be of limited value in planning (see also the discussion in *Working Paper 2*). The projected mean values or changes that are employed by climate scientists to characterize future climate regimes were not as helpful as they might have been to planners because they did not convey a clear sense of the underlying uncertainties in projections, nor did they address extreme and threshold values of temperature, precipitation or storms that are crucial to designing urban systems. Instead of being paralyzed by these uncertainties, all the cities overcame their initial frustrations and developed resilience strategies that addressed climate uncertainties in several common ways:

- The planners focused on *existing* climate vulnerabilities. All of the cities face climate-related challenges already, and future climate change and greater climate variability are only expected to exacerbate these conditions. By focusing on current vulnerabilities and extrapolating trends, all the cities could point to crucial problem areas that need urgent attention (e.g. waterlogging, water scarcity, flood protection, ecosystem degradation, solid waste management).
- Planners adopted "no-regrets" intervention strategies. These are likely to yield positive outcomes across a wide range of potential future climate conditions (e.g. awareness building, improved coordination, early warning systems, wastewater management).

- City partners focused on the need for better local data, and for more detailed scientific evidence of local climate impacts under a range of plausible future conditions. These needs were expressed in terms of both improved data collection and management, but also in terms of specific research studies. They were able to define a small number of crucial areas on which to focus these research needs (drainage / sewage system design; hydrologic / hydraulic modeling of peri-urban flooding; water management).
- Planners looked for ways to avoid maladaptation. They could recognize the potential increasing risks of further development in exposed sites, or overexploitation of key resources (groundwater) or the vulnerability of particular sectors (e.g. fishing, agriculture) and sought approaches that would redirect "business as usual".
- In all the cities, there was recognition of the need for building the awareness of different groups, from the general public to private businesses and elected officials, in order to generate broad support for resilience actions, and to build capacities for behavioral change and autonomous adaptation.

These approaches to managing uncertainty demonstrate a strong appreciation of the central challenges of urban climate resilience, and put the cities clearly on an iterative path of generating and interpreting new knowledge, shared learning, carefully defined action, monitoring outcomes and integration of lessons in further rounds of shared learning and action. This appears to be close to the path envisioned in the urban resilience framework.

The resilience strategies identified some issues on which the planning groups obviously felt uneasy, without necessarily being able to name the required actions. One of these is migration. Some of the strategies pointed out the likelihood of indirect climate impacts on the city through higher levels of rural-urban migration as climate stresses increase risk and reduce returns to marginal agricultural production in surrounding areas. The resulting population pressures would exacerbate urban development issues. Both Indore (Deccan Plateau) and Can Tho (Mekong Delta) are at high risk of these kinds of impacts. Surat also identified the need for building social cohesion and social capital among poor migrants, most of whom were young and male, in order to improve their resilience to local floods and climate related disasters. While the likely stress on already-burdened urban systems is clear, solutions are less obvious.

The public health sector generated widespread concern. But beyond current sanitation, drainage, solid waste and vector-borne disease issues, it was not obvious what the particular effects of future climate would likely be in this sector. It was clear that while diseases could be linked to climatic factors, they were obviously also affected by many other factors (such as surveillance and reporting, migration, and infrastructure investments). Different kinds of health effects (sanitation, infectious diseases, vector borne diseases, heat stroke) require different kinds of management intervention. This was therefore not necessarily a high priority for immediate investment, but rather one that merited attention and further study.

Another issue of this type identified in several cities was water supply. In Surat, Can Tho, Da Nang and Semarang water supply systems will need to be relocated, augmented or redesigned as current intakes become more saline, or simply inadequate in the face of longer droughts and higher demand. Indore already suffers from acute water scarcity. Indore has proposed some measures to address this issue, but in other cities it is less clear what needs to be done or when.

One of the issues that was dealt with quite differently between the cities was how resilience planning becomes institutionalized in local decision-making. In Vietnam, where local governments are highly organized and still dominate strategic economic and social decision making, and where national policy already has created a requirement for local

climate action planning, it was fairly obvious that the way to incorporate climate resilience into decision making was to create a coordination and planning group within government to take responsibility. In Indonesia, local governments are also highly structured and have existing formalized planning responsibilities. However, while Semarang has proposed a similar coordinating office at the local level, the initiative for resilience planning in Indonesia has come mainly from civil society, and non-government organizations are likely to continue to play a strong role in the processes of both planning and implementing resilience actions, while supporting their integration into formal local planning processes. In India, despite constitutional decentralization measures, many city governments remain weak and disorganized. Leadership of resilience planning will depend on local conditions and could come from civil society, from the private sector, from academic organizations or from local government.

The main result has been that in all three countries, local governments, technical consultants, and non-government organizations undertook a series of planning studies with external support, and that local facilitators then anchored these studies and built local understanding and ownership over a relatively short period of time, demonstrating the practicality of the resilience planning process. The results have generated substantial local interest and in each country can serve as an easily explainable model for replication in other cities.

While they face very different contexts, the city strategies demonstrate diverse strengths in technical analysis, in participatory planning, and in coherent inter-departmental processes. The local partners in ACCCRN may have much to learn from each other. But they also have a clear need for ongoing documentation and assessment of progress as early resilience initiatives are implemented.

In conclusion, the strategies illustrate very well how the urban resilience framework can be applied to guide local adaptation planning. The ACCCRN city level partners systematically considered the nature of current and future climate hazards, the capacities of vulnerable groups and of local government agencies, civil society and technical support organizations in developing their plans. They reviewed the ability of urban infrastructure, key institutions and surrounding ecosystems to absorb stresses and shocks, and they identified key knowledge gaps that required further study. Each city implemented a multi-stakeholder SLD process to share knowledge about climate and local conditions and to validate inputs to the planning process. Strategies suggested a broad range of potential actions but prioritized those that could be most clearly justified in the face of high uncertainty and limited experience.

We expect that the cities will build on these initial strategies, implementing their high priority interventions and revising their plans on the basis of improved information, stronger capacity and growing experience.

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Annex 1:
Categorizing Types of Proposed Resilience Actions

The following table outlines a list of all proposed actions from each city (Nov 2010), categorized according to whether they are aimed primarily to build the capacities of agents (awareness, capacity building) to strengthen fragile urban systems, or to support institutions to better link systems and agents. The proposed actions themselves range from general concepts, to studies, new policies or planning procedures, and specific discrete interventions. Priority actions are shown in **bold**. Many of the actions listed below are closely linked to others under a larger strategic umbrella, but we have shown them as discrete components to demonstrate how partners draw on multiple types of actions to achieve one objective—for example, water management planning in Indore, which is proposed to combine awareness interventions with infrastructure and institutional investments.

In many instances, actions fall into more than one category. For instance, most infrastructure, institutional, knowledge and disaster risk reduction initiatives will by nature build capacity and awareness. Similarly, many institutional actions often are designed to plan or coordinate one or more other types of action, whereas knowledge generation generally seeks information to improve the quality of action in other areas.

In a separate annex we list the priority interventions submitted to Rockefeller Foundation for funding.

Table 1: Categorizing types of proposed resilience actions in relation to the Urban Resilience Framework

Types of Actions	Da Nang	Quy Nhon	Can Tho	Surat	Indore	Gorakhpur	Semarang
Increasing Capacity of Agents - Awareness	Public training and awareness raising on climate change, adaptation options, flooding, natural resource use and protection, water use and conservation, public health	Public awareness and capacity building around storm adaptation, minimizing flooding impacts, forest and water resource management and use	**Establish flood depth markers in residential areas** Enhance community awareness of climate adaptation	Information, education and communciations on climate change and health risks Awareness generation, forming issue-based groups for community action on managing local assets	**Citizen engagement and reporting system (water)** Establishment of Theme Park to create public awareness and introduce solutions (longer term) **Energy efficiency programme / Promotion of energy efficiency products (research for technology innovation and testing)**	**Sensitizing citizens groups, architects, and builders** Sensitizing various citizen groups on delivery and maintenance of service delivery Citizen and school education program	Mainstreaming **climate** change into formal education curricula
Increasing Capacity of Agents – training, responsiveness, livelihood options	**Extension for resilient agricultural and aquaculture techniques** Training on storm resistant house construction Training and diversification of rural livelihoods Agricultural extension for farmers whose cultivated land has been reduced due to urbanization Improve government staff facilities and training for early warning Support livelihoods training for residents in resettled areas	**Improve facilities and training for DRM** **Public training around avoiding construction in high erosion areas, suitable construction for drifting sand areas** Diversification of rural livelihoods Extension for resilient agricultural and aquaculture techniques Train communities to plant vegetative cover and windbreaks in drifting sand areas	**Improve facilities and training for DRM** Identify climate change related health risks and take action on these for vulnerable groups Extension for resilient agricultural and aquaculture techniques	**Improvements in disaster response plans, training and involvement of citizen groups in response action, to improve warning response time.** Informal skill building courses on technologies, improved services, management Monitoring program on migration and demand focused skill buildling	Increasing liveihood options through vocational training in technologies, improved services and management with close linkages with information industry Climate leadership training programmes Establishment of Training and Learning Center to impart skill development (longer term) Create environment (branding, marketing) for encouraging pull migration of high quality human resources (longer term) Community based flood preparedness programs (longer term) Empowering poor communities for resource management	**Building responsible citizenry for Climate Resilience of GKP city** (encompasses other actions) Orientation/ sensitization of industries and commercial establishments to energy efficiency, waste management, and organized housing for workers Microfinance	Diversification of marine and fishery businesses and products

Types of Actions	Da Nang	Quy Nhon	Can Tho	Surat	Indore	Gorakhpur	Semarang
Strengthening Fragile Systems - Infrastructure	**Hardening of infrastructure in low-lying areas, especially road systems and construction of multiple flood shelters** Upgrade of irrigation systems and existing pumping stations Construction of early warning and flood control systems Improvement of public health care at the commune level Strategic plan for water exploitation and usage of underground water resources in the most effective way. Construction works for river bank erosion and sea rise protection	**Develop storm and sand resistant housing, and infrastructure** Improve/expand water supply infrastructure Build local resettlement areas for highest-risk households Consolidate and upgrade early warning and flood control systems Build/consolidate dike and barrage systems to prevent saline intrusion	Study and implement rainwater harvesting Build multi-functional schools in communes Plan and construct water supply and wastewater treatment plants	**Basin level real time flood warning systems to provide 4 day warning** **Mapping of current and future risk from sea level rise, floods** **Minimize flood losses by preventative measures (asset banks, vehicle parks outside flood zones)** **Evaluation of maladaptation risks for city expansion plans and coastal infrastructure planning** Plan for increasing share of public transport, create no-vehicle areas and time zones in over crowded core Affordable, thermally comfortable, flood resistant houses for poor Expansion focused on clean and sunrise industry/ service sector	**Demand side water management incluidng leak detection and retrofitting, water reuse options at various scales, rain water harvesting plan and strategy.** Revive old water tanks and wells as emergency supply source Developing and implementing drainage improvement strategy 100% Sewerage coverage, Sewage treatment plants and water recycling Codes and guidelines for sustainable residential and industrial buildings design, construction and operation Technology upgrading for electricity co-generation and distribution Harden city infrastructure to withstand climate risks (longer term) Hotline maintenance in monitoring of lines and transformers (longer term) Transport Master Plan based on new technologies (longer term)	**Making the proposed drainage system more effective and energy efficient (encompasses other actions)** Pilot testing effective, energy efficient micro level (identified ward) drainage system Design for a green and resilient transport system for the city Alternative energy efficient drainage system	Rainwater Harvesting **Domestic waste water mgmt to protect water resources** **Construction of flood shelter** Seawater desalination Purification of public wells/ contaminated water sources Construction of sea wall Construction of channel belt (for rainwater distribution) Neighborhood drainage networks

Types of Actions	Da Nang	Quy Nhon	Can Tho	Surat	Indore	Gorakhpur	Semarang
Strengthening Fragile Systems – Building Knowledge to enable other system actions	Study potential future hydrologic and urban development interactions, including updating digital flood maps Study conjunctive use of surface and groundwater Feasibility study for underground services in central city Model potential future drought and saline intrusion impacts on water supply	Study changing hydrology of Ha Thanh river floodplain and potential conflicts with urban development in Nhon Binh ward. Research flooding, saline intrusion, and drought impacts on Thi Nai lagoon biodiversity Study how to manage multi-objective water reservoirs to mitigate flooding, provide alternative water supply during periods of high saline intrusion and drought in Ha Thanh and Kon river floodplains Assess storm and coastal erosion impacts on tourism and tourism development	Establish a climate change database Further research on innovative resettlement options Identify climate impacts on various city groups and sectors Research on clean production processes in the industrial sector Develop forecasting models, disaster warnings, disease information and interventions and distribute to affected communities Study river bank erosion to identify high risk areas and explore mitigation options	Formation of Climate Watch group to collect and manage data on various fast and slow changing parameters, provide support decision makers Studies of drainage and swereage system design parameters in light of climate change Improving disease surveillance epidemiological research support to track diseases Health GIS with data on vulnerable people and their needs Collation of and modeling, analysis and sharing of real time weather information to improve reservoir managementDemand growth under various urban scenarios for water and energy	Assessment of existing and potential water resources and climate impacts Urban user groups for conjunctive water management (longer term) Study on renewable energy options at various scales and end uses Disease surveillance system with Epidemiological research support to track diseases & Health GIS Benchmarking vulnerability of critical lifeline services and infrastructure to climate risks Develop framework for online/continuous monitoring of gaps/deficiencies in urban services Push migration and launch of suitable programs and safety net	Public health surveillance and management system (encompasses other actions) Establishing multiple channels of data collection and reporting water quality (public water analysis lab and quality monitoring mapping weekly) Strengthening data collection for urban service Promoting preventive health measures and practices for water and vector borne diseases Water quality monitoring and maintenance Data base management Area specific studies for Resilience Master Plan	

Types of Actions	Da Nang	Quy Nhon	Can Tho	Surat	Indore	Gorakhpur	Semarang
Strengthening Fragile Systems: Building Institutions to better link systems and agents (planning and management)	Establish a climate change coordination office Develop construction regulations for erosion areas Incorporation of climate change into sector development plans and socio-economic development	Establish a climate change coordination office Integrate climate hazard assessments into socioeconomic planning and urban development Improve management of sand and titanium extraction	Establish a climate change coordination office Integrate climate change resilience into approved city programs	Water Management planning for quality and quantity, including: technology options for water management including reuse and desalinisation; demand side water management Identify and promote synergies with State and National level initiatives Flood, surge and tidal area zonation and appropriate buildling zonation rules Support agency for energy efficiency improvement Developing multi-scalar and multi-sectoral disaster response plans including support to citizens during emergencies Emergency water and energy supply management Emergency and business continuity management plants for disasters	Development of multi-scale conjunctive water management options (encompasses other actions) Water auditing system (zero tolerance) Flood zoning and advance warning warning system Improving disaster response plans including evacuation of citizens from flood risk zones Identify and promote synergies with State and National level initiatives Monitoring programme on migration, identification of social safety nets/schemes Constituting City level group for monitoring and advisory to the ULB Regional economic growth strategy and plan Ward level / micro resilience planning initiatives Designing and testing an asset insurance product Water audit software development – monitoring system (longer term) IT enabled Transport system / Comprehensive Transport Masterplan Business Continuity Plan for Industries	Resource Center for Gorakhpur City Climate Resilience established (encompasses other actions) Ward level micro Resilience Plan developed and institutionalized (encompasses other actions) Review of master plan (encompasses other actions) Designing a city wide community based SWM system based on pilot (PPCP model) Enforcement of Master Plan for city planning	Establishment of Center for Cities and Climate Change

Types of Actions	Da Nang	Quy Nhon	Can Tho	Surat	Indore	Gorakhpur	Semarang
Ecosystem (systems)	Improvement of natural resource management and reduction of exploitation in the riverside and coastal areas. Coastal and hillside reforestation Plant urban trees	Mangrove restoration Explore climate impacts to and potential to restore coral reef ecosystems for coastal protection Hillside reforestation	Develop city "green zones"		Increase in Green Cover (Urban forestry) City's environment management plan	Mapping, Demarcation and Conservation Promoting public land plantation	Watershed management above dams Vegetative treatment for settlements vulnerable to landslide Development of green belt along beach surrounding aquaculture zone.

Annex 2: Proposals Submitted to Rockefeller Foundation for Funding as a Result of Resilience Planning

In May 2010, Vietnamese, Indian and Indonesian cities were given the opportunity to submit concept notes to the Rockefeller Foundation. However, Indonesian cities had not yet undertaken their resilience strategies, so initial concepts did not have the benefit of detailed analysis and planning frameworks and are not listed here. Concepts endorsed by the Rockefeller Foundation were subsequently developed into full proposals and submitted for review in August. Approval of these proposals, described below, is pending at the time of writing (Nov 2010).

Vietnam

- **Climate Change Coordination Offices:** All three cities in Vietnam have requested supplemental funding for Climate Change Coordination Offices (funding from the National Government to support development of plans to address the National NTP is available to all three cities and will be used as the financial base for the offices). The offices will coordinate all climate change activities in the city, including those funded by other donors, will receive and provide on-going capacity building and technical training around climate change, urbanization, and resilience issues, and will sponsor targeted technical studies, undertaken jointly with other agencies, departments, and institutes to further knowledge and understanding of city-specific climate change issues.
- **Hydrological modeling studies** have been proposed in both Da Nang and Quy Nhon to better understand the combined affects of urbanization and sea level rise. In both proposals, a linked hydrologic-hydraulic model (H-H model) and supporting database will be constructed that take into consideration potential impacts of climate change and urban development, to simulate urban planning and development options under future climate conditions (change in river flow and currents, intensified river flooding exacerbated by sea level rise, change in water quality caused by saline intrusion, accumulation of pollutants, etc.) for urban development planning purposes.
- **Feasibility study in Da Nang for storm resistant housing and livelihood support for poor female-headed households**. Support will take the form of a credit scheme and vocational training for selected households to repair, reinforce and rebuild houses and sites that are vulnerable to storms and floods to increase their resistance to high winds, heavy rain, flooding, and other extreme conditions. These actions will serve as a platform for training and transfer of relevant livelihood skills, technologies and building techniques to those households, and assist them to develop entrepreneurial trade-related skills. It will also disseminate information on climate adaptation, storm resistant housing, and disaster risk mitigation practices to other vulnerable communities and to relevant public and private sector actors.

India

- **Conjunctive Water Management –Indore:** Partners in Indore propose a project to address acute water scarcity in Indore through a number of experimental measures aimed at demand side management, which contrasts with the supply augmentation approach that has dominated water management planning for the city. The project would assess available resources and technology options including rainwater harvesting, decentralized groundwater recharge systems and waste water treatment, and innovative storage systems. It

would evaluate the potential for these techniques to be adopted in the community through active participatory research and seek to raise awareness and demand for the strategies within communities and the city administration.

- **End-to-End Early Warning System—Surat:** This project would aim to address flood risk facing the city from both Tapi floods (caused by release of water from the upstream Ukai dam) and Khadi (local small river) floods, though two main avenues: improving reservoir operation to minimize flood peaks, and preparing institutions and social systems for flood emergency situations through advanced warning. The project would engage stakeholders and assist in the formation of a Flood Management Advisory Committee similar to the existing CAC, and undertake modeling efforts to improve understanding of reservoir dynamics and flood impacts. Modeling efforts have the objective of improving early warning in the city to provide warning four days in advance, thus enchancing additional innovative techniques for improving disaster management in the city through radio, TV, and SMS communications, flood risk color coding, systematic vehicle evacuation, asset banks, and a number of focused efforts to serve poor and vulnerable people living in high risk areas.
- **Urban Community Based Micro Resilience Model – Gorakhpur:** Partners propose to use Gorakhpur's Mehewa Ward, a low income ward suffering from drainage, water quality, sanitation and public health deficiencies, as a "laboratory for testing an urban micro-resilience model." Micro-resilience planning would experiment with small-scale interventions at household and neighborhood levels. Household resilience interventions may include education and communication (especially for women and children), techniques for integrated farming, waste management, water, health, and sanitation, and enhanced access to services. On a neighborhood level, the program will seek to build institutions and capacity for resilience planning, promote planning and the use of climate information, and launch demonstration projects, awareness campaigns, and health surveillance through a ward level resource center.

Annex 3: Achieving ACCCRN Intended Results

The following table describes the progress in achieving desired outcomes, as outlined by the Rockefeller Foundation in its initial Results Framework.

Table 2: Achieving ACCCRN Intended Results

ACCCRN Outcomes (from initial RF Results Framework)	India	Vietnam
Cities develop internal coordination mechanisms for adaptation planning	A CAC/ CSC has been established in each city. The local government is represented in this core body in all three cities. Surat has developed the most robust and formal advisory committee mechanism for adaptation planning due to strong local buy-in from the municipal corporation and business representatives. Gorakhpur has also developed a coordination mechanism, which is less formal but likely to be sustained due to do the long-term presence of GEAG as a local stakeholder and leader. Coordination in Indore is weakest, due to the absence of a local leader such as GEAG and lower degree of local buy-in.	All three local governments have developed internal CC Steering Committees and CC Working Groups and intend to continue these structures into Phase 3 through the proposed CC Coordination Offices. Local governments, supported by the CC Steering Committees, understand need for internal coordination both in terms of generating and using relevant data, and in planning and coordinating actions of different agencies. Community groups have increased capacity and awareness and have played a role in developing pilot projects to increase resilience in their communities (e.g. boat winch, Con Son solar power and water, tree planting)
Diverse groups demonstrate awareness and initiative on interventions for vulnerable groups	Gorakhpur: high level of community level interaction through participatory consultations during the vulnerability assessment. This led to active participation of diverse groups (community leaders, academics, civil society groups, private sector) in generating ideas and proposals. Less evidence of community awareness and initiative in other cities. However, business and municipal corporation representatives have demonstrated higher personal awareness and interest in proposals for resilience actions.	Government department staff have increased their knowledge of CC impacts on vulnerable communities in their cities and developed pilot projects to address some of these. Da Nang local government and Women's Union jointly proposed a project to address the vulnerability of poor women.
Local governments and other actors are able to use new information to develop resilience plans	The Surat CAC has developed high capacity for using information to develop resilience plan. This capacity was demonstrated to a lesser extent in Indore. In Gorakhpur, GEAG has supported this strongly in its leadership role. Information from vulnerability assessment and sector studies and pilot project results have been shared with the municipal corporations and other stakeholders, and is publicly available to people in the city. The Municipal Corporation is beginning to use this information in their planning, ie. solid waste management.	All three cities used climate scenarios and vulnerability assessments to develop action plans and proposals. They also all recognize the need for better local data and detailed studies to provide analysis for decision-making by different public and private sector agents. Nonetheless, there is still limited appreciation for evidence-based planning and programming. These systems will change only slowly.

Table 2: Achieving ACCCRN Intended Results (continued)

ACCCRN Outcomes (from initial RF Results Framework)	India	Vietnam
Local governments establish new relationships with other actors to generate, share and apply new knowledge	In Surat, the existing relationship between the Surat Municipal Corporation, Southern Gujarat Chamber of Commerce and Industry, Surat Citizen's Council Trust, and local architects was further strengthened. In Indore, the ACCCRN program activities have brought together the municipal corporation and other local bodies in the private sector (architects, business associations), academic institutions (Daly College, IPS Academy, SGSITS) and city based NGOs (Sahayata, CEPRD, AAS, UHRC) on to the same platform. In Gorakhpur, relationships between GEAG, private sector partners, communities, and other stakeholders were strengthened.	In Can Tho, new relationship between the university and the city / Steering Committee. This has led to incorporation of CTU in the WG and recognition of their advisory role. In Quy Nhon, increased engagement between the city and Quy Nhon University. Stronger linkages between DoNRE and DRR community (Red Cross) in all cities. CtC taught all three cities how to engage and involve local community and how to use information from grass roots level in planning. In some cities, new relationships with other organizations e.g. ADF, Env Defense Fund, Climate Change NGO network, and JICA for climate change activities.
Cities learn from each others' experiences and apply lessons to their own context	Workshops in Vietnam, Thailand and National workshops in India have facilitated sharing between the Indian cities and other ACCCRN cities. For example, Gorakhpur used GIS as a tool based on the TARU applications in Indore and Surat.	Quy Nhon learned about public health issues when this was raised by Can Tho, and problems with filling floodplain areas for urban development from Da Nang. Both of these issues are now incorporated in their planning. Can Tho rearranged their working group based on Quy Nhon's structure of their WG with key, dedicated members. CCCO proposals put forth by all three cities drew heavily on one another, from the idea of needing a CCCO office to the role of the NTP Steering Committee and data management. All three cities are actively seeking venues to present their work and results as a way of influencing other Vietnamese cities to replicate their approach.
City level partners and other actors leverage ACCCRN resources to advance their priorities and plans (e.g. proposals and projects with other donors).	All three cities have definite plans (and project ideas) to pursue with other donors. A specific roundtable discussion with donors in India has been planned for this purpose in the month of October 2010.	Da Nang district administrations have contributed additional funding to both the boat winch and fish sauce pilot projects. Can Tho has obtained NTP funding for climate modeling work and data base development. Da Nang and Can Tho are both positioning their Climate Change Coordination Offices to interface with international donor projects; in Da Nang this has already resulted in interactions with ADB and ADF. In Quy Nhon: DoNRE has submitted proposals under the NTP for Danish funding based on their resilience plan priority actions; are collaborating with SEI on a climate impacts and data project.

Table 2: Achieving ACCCRN Intended Results (continued)

ACCCRN Outcomes (from initial RF Results Framework)	India	Vietnam
National government agencies recognize the value of this experience and the need to support it	ACCCRN project has been recognized by the national government of India. A policy roundtable in November of 2010 will present policy recommendations to national government agencies.	MoNRE NTP funds will support the formation of the CCCO in Quy Nhon and Can Tho.
Donors and international organizations recognize and learn from this experience	DFID, GTZ, and USAID have all expressed interest in the ACCCRN experience.	ISET – USAID project will explicitly build on ACCCRN experience in VN and TH. AusAid pilot project in Tuy Phuoc used ACCCRN assessment methods and mangrove reforestation tools. UNDP has expressed interest in collaboration in Quy Nhon. UNCDF is exploring add-on financing in Quy Nhon.