3.3.0

SERIES 3
Building Resilience

DEVELOPING RESILIENCE OPTIONS

CLIMATE RESILIENCE FRAMEWORK
ISET-INTERNATIONAL

In this set, you will begin to explore what steps and activities you can take to address potential climate impacts.

Though climate resilience planning may be a new concept for your city, there are probably many actions already underway within your city that you can leverage. Ongoing disaster risk reduction, urban or utility planning, and poverty alleviation work all have the potential to contribute to building resilience. By leveraging existing tools, institutional mechanisms, and engagement in those efforts, and by enlisting the stakeholders responsible for their implementation, you may have a strong start to your resilience work. In most cases, there will be no need to invent new technology or tools to address the future threats of climate change. However, building resilience will often require new ways of thinking and solving problems. The Climate Resilience Framework can help structure this new way of thinking and problem solving.

IN THIS SET YOU WILL:

- ✓ Learn how to use the Climate Resilience Framework and resilience characteristics to evaluate potential resilience actions; and
- ✓ Explore how existing city initiatives can be leveraged, within the Framework, to efficiently and effectively start your resilience building work.

Contents of Set

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Overview

Building urban resilience is a complicated and lengthy endeavor. It requires ongoing engagement with a wide group of stakeholders, and eventually may require addressing new threats or developing new approaches and methodologies. However, many of the most effective interventions start with existing activities and address existing vulnerabilities that are likely to get worse as a result of climate change. They are easy to implement, because they are already familiar to residents and planners, and they are easy to engage stakeholders around because they address current needs while also addressing likely future challenges. For example, many disaster risk reduction efforts involve extensive public awareness and education campaigns. A climate change component can be developed for these campaigns addressing growing flood risk, risk of increased incidence of extreme weather, increasing risk of storm surge, etc. By augmenting existing programs, resilience planners access a well-established and credible public engagement process with relatively little investment. Leveraging existing projects, programs, and municipal efforts like this will allow you to broaden the effect of your interventions and increase the likelihood that they will be sustained by a large and willing group of stakeholders.

Often, however, developing resilience to climate change does require a new way of thinking about urban vulnerability and new ways of focusing financial resources and human capacity. It is not enough to identify current, successful projects in your city and assume they will be effective for future challenges. The effects of climate change will be broad, impacting your city in complex and sometimes hard-to-predict ways. The Climate Resilience Framework (CRF) provides a basic structure for thinking about how to address these complex, inter-linked social and physical vulnerabilities and assists in identifying specific, sustainable, effective actions.

The basic structure of the CRF—systems, agents, institutions and exposure—is a good starting point for exploring options to build climate resilience. Your vulnerability assessment (Series 2):

- Identified systems and agents in your city that are currently vulnerable;
- Considered the role institutions play in creating or maintaining those vulnerabilities; and
- Explored how climate changes over the next few decades might increase exposure, exacerbating vulnerabilities.

You will want to identify potential actions that address deficiencies in each of these elements, although it is not necessary to treat them equally in terms of number or scale of activity. Not all urban systems and agents will be affected equally, and not all interventions will have the same impact. Ultimately you will want to select the MOST viable, cost-efficient, and timely actions possible. Use the priority list of vulnerable systems and agents you identified earlier to initially limit the scope of your efforts. However, in these early stages you want to focus first on engaging a broad range of stakeholders to leverage the experience and creativity of your entire community to identify as many potential solutions and activities as possible. Broad engagement with stakeholders will also serve to build a network of people with shared resilience goals. This will make the transition from the prioritized actions that are easiest to take now (based on existing mandates, resources and expertise) to broader resilience actions easier.

A climate resilient city or community will seek to reduce the vulnerability of systems and agents while simultaneously improving the ability of social/cultural institutions to enhance, rather than inhibit, social equity and opportunity. Below are the characteristics that make a system, agent, or institution resilient. These characteristics can be used in two ways: the first is to identify existing weaknesses and, at an initial level, target a more specific area where an intervention may help solve the problem. Later, once you've begun to develop resilience actions themselves, you can use this list as a basic assessment of the inherent resilience of the concept. For example, "does modifying the height of a dike increase the flexibility and diversity of the flood management system?" Within each category, it is important that each action meet several of these characteristics.

SYSTEMS

CHARACTERISTIC	FLEXIBILITY AND DIVERSITY	REDUNDANCY AND MODULARITY	SAFE FAILURE
Description	The ability to perform essential tasks under a wide range of conditions, and to convert assets or modify structures to introduce new ways of performing essential tasks.	Spare capacity for contingency situations or to accommodate increasing or extreme surge pressures or demand; multiple pathways and a variety of options for service delivery; and/or interacting components composed of similar parts that can replace each other if one, or even many, fail.	Designed to fail in predictable and/or planned ways that will minimize damage; ability to absorb or respond to sudden shocks or the cumulative effects of slow-onset stress in ways that avoid catastrophic failure.
Examples	• Food is imported into the city from numerous, diverse national and international locations, so if crops fail in one region food is still available. • Community flood shelters can be flexibly used during non-flood periods, doubling as clinics or meeting halls.	• There are multiple roads leading out of the city so that if one roadway is blocked, alternate routes are available. • Water tanker trucks provide modularity: if one truck fails the system is not seriously affected.	• Dikes and floodways that channel extreme floods into wetlands or retention zones where they cause minimal damage. • Fuses and breakers in home electrical systems that break or fail rather than letting a power surge melt wires or destroy electronics.

AGENTS

CHARACTERISTIC	RESPONSIVENESS & RE-ORGANIZATION	RESOURCEFULNESS	CAPACITY TO LEARN
Description	Able to organize and re-organize in an opportune fashion; ability to establish function, structure and basic order in a timely manner in response to a disruptive event or organizational failure.	Capacity to identify and anticipate problems; establish priorities, and mobilize resources for action. This includes the capacity to visualize and plan, which may require collaboration. It also includes the ability to access financial and other resources, including those of other agents and systems in order to take action.	Ability to learn new information, skills, techniques and behaviors, to internalize past experiences, to avoid repeated failures and innovate to improve performance.
Examples	• Releasing water from a water supply or power generation reservoir in advance of a forecasted typhoon to allow for floodwater storage and avoid catastrophic release. • Disaster Risk Reduction planning, training and re-structuring for community organizations. • Moving your furniture up to the second flood before a large storm or flood forecast.	• Ability to access credit or insurance to protect against and recover from shocks and to leverage opportunities. • Strong social networks that provide physical and emotional support and resources.	• Monitoring, through formal and informal reviews of performance of key systems, identification of opportunities for improvement. • The ability to understand and implement innovative changes, such as adopting a new housing design to address recurrent flooding.

INSTITUTIONS

CHARACTERISTIC	RIGHTS AND ENTITLEMENTS	DECISION MAKING	INFORMATION
Description	Rights and entitlements to use key resources or access urban systems are equitably distributed.	Decision-making processes, particularly in relation to urban development and urban systems management, follow widely accepted principles of good governance, chiefly: transparency, accountability and responsiveness (United Nations Development Program, 1997 #202).	Private households, businesses and other decision-making agents have ready access to accurate and meaningful information to enable judgments about risk and vulnerability and for assessing adaptation options.
Examples	• All city residents have access to water and water is priced to provide minimum basic needs at a rate that the poorest city inhabitants can afford.	• Diverse stakeholders have ways to provide meaningful input to decisions.	• Useful, clearly presented information regarding hazards and possible response options are available to the public through accessible media, such as in newspapers, on the radio or television, and on websites.

Using Resilience Characteristics

For each of the system or agent weaknesses you identify, you should attempt to look beyond the apparent obvious cause to more subtle, underlying issues. For example, in a seaside town, storms may be causing beach erosion. However, further exploration may reveal that erosion was not as great a problem before the offshore reef was damaged and a nearby mangrove forest was removed to allow for construction directly on the beach. By uncovering the root cause of the erosion, this town might decide that rather than build a heavily engineered and very expensive beachfront retaining wall, they would invest in a short-term retaining wall, in restoring the coral reef, and in mangrove planting. The latter two efforts could employ local residents in their implementation and maintenance, providing local jobs, and be accompanied by a community education program around climate change, sea level rise, and the protection provided by reefs and mangrove forests. Long-term planning for this community might begin exploring zoning and land use planning mechanisms that would support or drive a gradual retreat from the coast as sea-level rise results in higher storm surge.

Identifying and developing actions to influence or intervene with institutions may be particularly difficult. In some respects, the pervasive, socially constructed nature of institutions provides few opportunities for small, targeted actions to effect meaningful change. However, public education campaigns aimed at changing underlying social behavior could be considered "institutional change". In other instances, changing specific regulations (e.g. around school access) could bring meaningful social or planning change. However, it should be noted that advocating for changes in formal government laws can be fraught with political risk and create divisions rather than coalitions among stakeholders and therefore should be undertaken cautiously. The perspective that we advocate with this process is that the consideration of institutional restraints is important, even if they are not being acted upon. It can give insight into current limitations and opportunities for future partnerships, facilitated learning or other exchange with other organizations.

Resources, both human and financial, are limited for resilience activities so inevitably the range of options is somewhat limited. Experience with resilience planning in other cities around the world suggests that some interventions are repeatedly identified as likely to build resilience within the same general resource constraints. Although each city and community has a unique social, cultural, economic, and environmental context that will

lead to some specific, place-based solutions, the nature of climate change, its likely impacts on cities, and the persistent problems that plague almost all developing countries and cities mean that you can start identifying options by examining a list of strategies that have been successful elsewhere. Table 3.3.1 lists some of the activities that have been implemented in the ACCCRN cities and the problem they seek to address.

In the next activity, you will work in small groups to identify possible resilience options for your city. These options should take into account the findings of your Vulnerability Assessment, and the basic scenarios you outlined in Set 3.2. Your vulnerability assessment will help you identify fragile systems and weak agents, and the institutions that constrain current response to those fragilities and weakness. The scenario work you completed in Set 3.2 will help you envision how different combinations of conditions will highlight the importance of some risks and vulnerabilities relative to others, allowing you to narrow the possible range of activities to those that will have the greatest impact in areas most important to your community.

TABLE 3.3.1: ACCCRN INTERVENTIONS MAPPED AGAINST CRITICAL UCCR ACTION AREAS

Current ACCCRN City Interventions	Land use & urban planning	Drainage, flood & solid waste management	Water demand & conservation systems	Emergency management & early warning systems	Responsive health systems	Resilient housing & transport systems	Ecosystems service strengthening	Diversification & protection of climate affected livelihoods	Education & capacity building of citizens	Institutional coordination mechanisms & capacity support
INDONESIA										
Semarang: Pre-feasibility study for expanding rainwater harvesting systems			X							
Bandar Lampung: Integrated solid waste management master plan		X								
Semarang: Flood forecasting and warning system		X		X						X
Bandar Lampung: Ground Water Conservation (Biopores)	X	X	X							
Bandar Lampung: Building Teachers and Students Climate Change Resilience Capacity				X					X	
INDIA										
Surat: End-to-end early warning system		X		X						X
Indore: Testing and promoting decentralised systems for differential water sources and uses			X			X				
Indore: Strengthening vector-borne disease surveillance and response systems				X	X				X	

TABLE 3.3.1 (CONTINUED): ACCCRN INTERVENTIONS MAPPED AGAINST CRITICAL UCCR ACTION AREAS

Current ACCCRN City Interventions	Land use & urban planning	Drainage, flood & solid waste management	Water demand & conservation systems	Emergency management & early warning systems	Responsive health systems	Resilient housing & transport systems	Ecosystems service strengthening	Diversification & protection of climate affected livelihoods	Education & capacity building of citizens	Institutional coordination mechanisms & capacity support
INDIA										
Surat: End-to-end early warning system		X		X						X
Indore: Testing and promoting decentralised systems for differential water sources and uses			X			X				
Indore: Strengthening vector-borne disease surveillance and response systems				X	X				X	
Gorakhpur: Implementing and promoting ward-level micro resilience planning	X	X							X	X
Gorakhpur: Implementing and promoting adaptive peri urban agriculture	X	X					X	X		
Indore / Surat: Cool roof and passive ventilation promotion for low income housing						X				
Indore urban lake restoration for emergency water provision	X		X				X			

TABLE 3.3.1 (CONTINUED): ACCCRN INTERVENTIONS MAPPED AGAINST CRITICAL UCCR ACTION AREAS										
Current ACCCRN City Interventions	Land use & urban planning	Drainage, flood & solid waste management	Water demand & conservation systems	Emergency management & early warning systems	Responsive health systems	Resilient housing & transport systems	Ecosystems service strengthening	Diversification & protection of climate affected livelihoods	Education & capacity building of citizens	Institutional coordination mechanisms & capacity support
VIETNAM										
Can Tho, Da Nang, Quy Nhon: Climate Change Resilience Coordination Offices (CCCOs)	X									X
Quy Nhon: Hydrology and urban development modelling for flood-related land-use planning	X	X								
Da Nang: Hydrology, hydraulic and urban development simulation model	X	X								
Da Nang: Storm and flood resistent credit and housing scheme						X				
Da Nang: Developing, testing and promoting new education modules to increase youth awareness on UCCR									X	
Quy Nhon: Urban mangrove restoration for storm surge protection and resilient land-use practice	X	X		X			X	X		
Can Tho: Strengthening dengue fever surveillance and response system				X	X				X	
Can Tho: Developing and implementing real-time salinity monitoring, disemmination and response mechanisms					X			X	X	
Can Tho, Da Nang, Quy Nhon: Vietnam youth urban resilience competition									X	

TABLE 3.3.1 (CONTINUED): ACCCRN INTERVENTIONS MAPPED AGAINST CRITICAL UCCR ACTION AREAS

Current ACCCRN City Interventions	Land use & urban planning	Drainage, flood & solid waste management	Water demand & conservation systems	Emergency management & early warning systems	Responsive health systems	Resilient housing & transport systems	Ecosystems service strengthening	Diversification & protection of climate affected livelihoods	Education & capacity building of citizens	Institutional coordination mechanisms & capacity support
THAILAND										
Chiang Rai: Restoration of Kok River for urban flood management		X					X			
Hat Yai community based flood preparedness and institutional coordination systems		X		X					X	X

*Note: The critical UCCR action areas are derived from the base of specific interventions proposed by ACCCRN city and national partners in India, Indonesia, Thailand, and Vietnam as well as the ten city resilience strategies prepared by the multi-stakeholder Climate Working Groups of each ACCCRN city. These documents are available at www.acccrn.org.

Table excerpted from: Brown, A., A. Dayal and C.Rumbaitis Del Rio, 2012. From practice to theory: emerging lessons from Asia for building urban climate change resilience. Environment and Urbanization, October 2012, vol. 24, no. 2, 531-556.