The Urban Resilience Framework (URF)

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1 Introduction

Globally more than half the world's population live in cities and towns, many of which are located in areas most susceptible to the impacts of climate change. Further urbanization is taking place in emerging economies where massive rural to urban population shifts are underway leading to both formal and informal development of areas already exposed to landslides, in flood plains or with poor access to water. Within cities, increases in urban population and demand for services, combined with lack of funding, poor planning and pre-existing patterns of social marginalization, has resulted in highly differentiated access to services. In many cases, large sections of the urban population lack both economic power and political voice and increasing numbers are living in slums. At the same time, urban areas are plagued by inadequately developed, poorly maintained and often failing infrastructure. Where systems are fragile and large portions of the population are socially or economically marginalized, urban areas are highly susceptible to external shocks and stresses.

The additional shocks and stresses arising from both anticipated and unexpected climate change impacts compound the challenges urban areas already face. It is widely accepted that climate change will most adversely affect the poor and those who are for other reasons socially marginalized. Although these are not the only ones who will be affected by climate change, such groups lack many of the capacities that wealthier groups with wider social connections can access when under stress.

At an urban scale the resilience of cities will be determined both by their ability to maintain essential assets, and ensure access to services and functions that support the wellbeing of citizens, in response to dynamic change. The systems and the basic services they supply support and enhance individual households, communities', and businesses ability to adapt. Where fragile systems and low-capacity/socially marginalized populations are exposed to the impacts of climate change, vulnerability is high. Yet, little work has been done to identify vulnerability specifically to climate change in cities and the measures that need to be taken to address these vulnerabilities beyond what might be deemed 'disaster risk reduction', 'poverty alleviation' or 'development'.

The Urban Resilience Framework (URF) has been developed by Arup and ISET based on research, academic reference and their experiences as practitioners; including their collaboration on the Rockefeller Foundations' Asian Cities Climate Change Resilience Network. Its intent is to provide an over-arching framework in which to understand vulnerability in an urban context, so as to be able to identify courses of action that build resilience.

More specifically, the purpose of the URF as part of global responses to climate change is to provide:

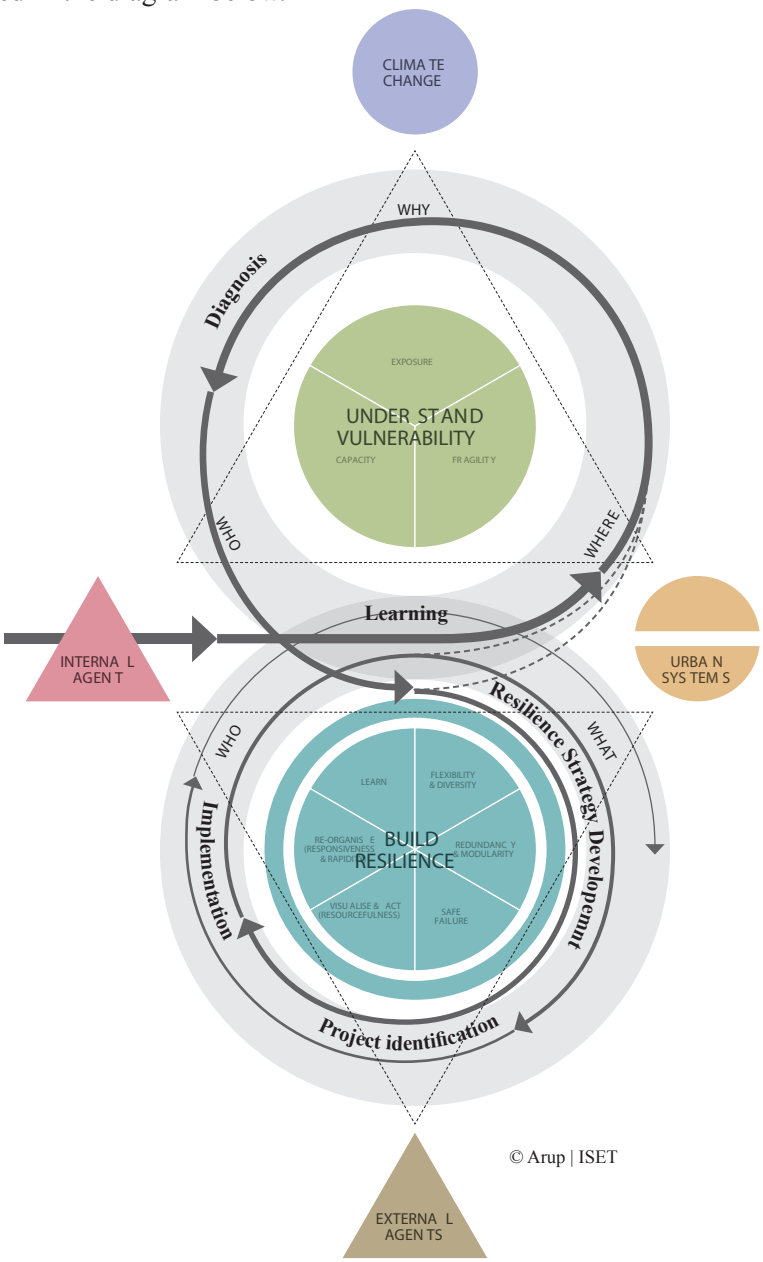
- Value to key actors within cities for developing strategic resilience plans: As a robust and practical guideline (or roadmap) to help cities to think about, plan for, and design interventions to strengthen climate change resilience that reflect their specific characteristics and context.
- Value to donors and national governments as an analytical filter for both reviewing and providing technical assistance to climate-response interventions proposed by cities and others working in urban areas: As awareness of and funding for activities to build climate resilience in urban areas increase from multiple sources, the URF can also be used to develop a common reference point and analytical filter against which specific intervention proposals can be evaluated. It can also be used to guide the identification of potential activities and the provision of external technical or other assistance.
- Value to the wider debate on adaptation strategies and funding: The URF provides a rigorous link between conceptual and theoretical approaches to climate resilience, and practical needs for local planning and prioritization, as a contribution to the global discussion over strategic approaches to adaptation and the funding or other resources they require.

2 Urban Resilience Framework

Unlike most approaches to urban climate change adaptation, which limit their focus to identifying and predicting impacts of climate change spatially, sectoraly or on pre-identifi ed communities in order to match these to specifi c intervention responses, the Urban Resilience Framework (URF) is grounded in an understanding of the city's interdependencies, agencies, vulnerabilities and capacities through a systems approach. In addition, the URF recognizes that climate impacts and potential adaptation strategies will evolve over time. As a result, it recognizes the iterative nature of interactions that need to occur between successive cycles of analysis, planning and response implementation.

This approach recognises that urban populations (as distinct from rural populations) exceed the carrying capacity of local ecosystems. They therefore depend on socio-technical systems that extend from the local to the global for both survival and well-being. Consequently, the URF focuses on the characteristics and dynamics of the interlinked physical and institutional elements of the urban system and how these are affected by shocks and stresses. Equally on the behaviour and socio-economic position of internal agents (governmental organizations, private businesses, identity groups, households and individuals) of which urban populations are composed, their ability to access urban systems and services, and the strategic responses they make as stresses accumulate.

The URF is summarised in the diagram below.



Understanding vulnerability

The top half of the framework focuses on the relationship between urban systems, internal agents and climate change in producing vulnerability. The diagram recognises climate change as a global concern and the ultimate driver for adaptation (*why*), but that vulnerability is determined by a much more localized set of factors that shape climate change impacts. Vulnerability is considered as a compound consequence of the fragility of the urban systems, the capacity of internal agents - including how that capacity is constrained by poverty, social marginalization and other factors - and exposure to the impacts of climate change.

Iterative shared learning and engagement processes that combine investigation, data collection and analysis are used to diagnose the complexity of the urban system (*what/where*), the multiplicity of agents (*who*) and how both are affected by changes in climate (*why*) as well as what determines or constrains their ability to act. Thus, the URF provides a robust analytical foundation for understanding vulnerability to climate change which then informs the lower half of the framework – the identifi cation and implementation of actions aimed at building resilience.

It should be noted that the URF does not assume a comprehensive and complete analysis of vulnerability is either necessary or achievable. The approach is based on iterative analytical integration of the three components, where the type and complexity of data refl ects available resources and timescales. In practice, this might start as a scoping exercise in order to identify key aspects or immediate priorities where further iterations should focus.

External Influences

The URF also explicitly recognizes the role of external actors in catalyzing and enabling responses, working with and through internal agents, and infl uencing where investment in changes to urban systems are required. In the case of the ACCCRN program, these external actors include the Rockefeller Foundation and the program partners. In other cases such actors include national governments, international donor agencies or even a municipal planning department.

Although in this case the URF is focused on specific impacts of climate change, the framework could be equally applied to other external factors that result in dynamic change (such as earthquake, economic collapse, demographic change).

Building Resilience

The lower half of the framework recognises that individual activities to build resilience need to be identified within the context of a resilience strategy that addresses the specific vulnerabilities to climate change identifi ed in the top half of the diagram. Particular activities, for instance, might focus on improving the capacity of internal agents and/or reducing the fragility of the urban system and/or changing the way in which agents and systems interact so as to reduce exposure to climate change impacts. Courses of action might also involve working through internal agents to improve systems or reduce exposure.

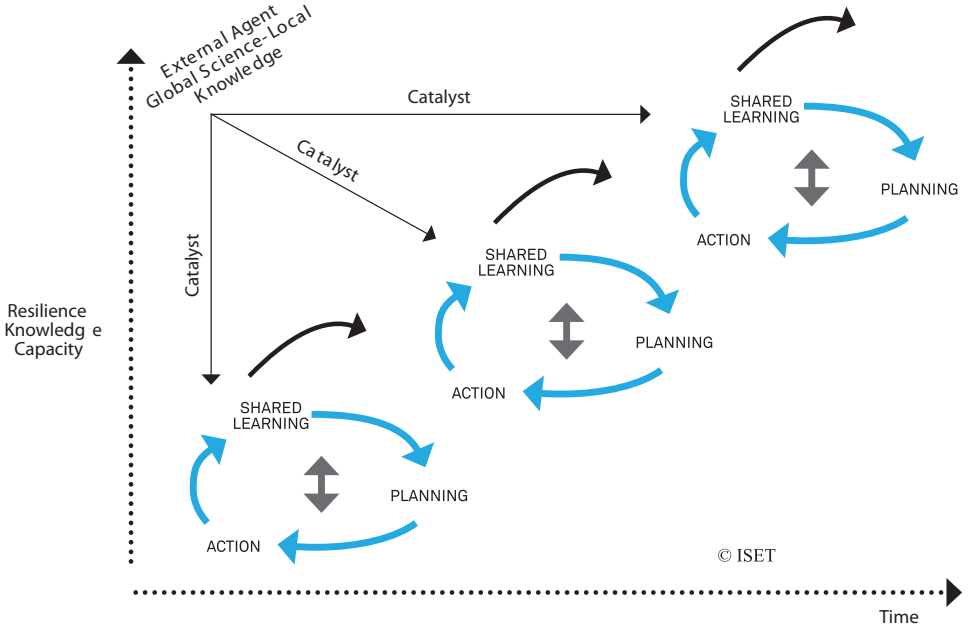
On a practical level the URF approach allows external actors to:

1. Identify ***who*** (which agent) or ***what*** (which system) is going to be affected by ***which*** aspect of climate change;
2. Identify the ***specific sources of vulnerability*** and ***specific capacities*** associated with ***specific groups of agents*** and ***specific systems*** in relation to specific change processes; and
3. Identify who (which agent) might do what to address the impacts of climate change.

An iterative approach

Overall the framework refl ects the fact that building urban resilience to climate change cannot be achieved through 'one time' activity or 'one-off' projects. Integration of multiple interventions at different scales and across different sectors is needed over time. Equally, adaptive processes for building understanding, planning and implementing activities are required that can incorporate new information, respond to changing conditions and build on the experience of prior interventions.

As the URF diagram illustrates, cyclic approaches that iterate between planning, implementation and learning are a fundamental component of building resilience. In this the framework draws on the growing body of experience with adaptive management for environmental services – a similar challenge of managing the ecosystems themselves and the agents (species) active within them. Management of any dynamic system requires approaches that build knowledge, learn and enable adjustments in strategy as implementation proceeds. This is particularly true in the case of climate change where the specific impacts cities will face are often highly uncertain and will be compounded by equally dynamic patterns of urbanization.



Application

Notably, the framework avoids polarization towards either top-down or bottom-up approaches (which reflect the one-dimensional nature of many decision-making institutions) by combining analytical and participatory approaches. Any society has diverse sources of knowledge, and values and interests always diverge. Interventions are unlikely to succeed if they neglect this diversity and adopt a single analytical or value perspective. Instead robust interventions require the support of multiple agents (including beneficiaries), who generally have differing interests and values but may all play a role in successful implementation.

Innovative mechanisms are therefore needed to capture multiple perspectives and interests in analysis and design of actions so as to assure interventions are effective. The URF provides a practical mechanism to consider the knowledge, views, motivations and capabilities of internal agents involved in identifying and delivering resilience interventions, in order to better design and guide these towards successful outcomes.

Finally, this framework provides a consistent and holistic framework based on which more detailed tools (vulnerability assessment, urban systems analysis, climate information analysis, project evaluation) to guide adaptation efforts targeted at specific audiences (city government, community groups, donors) can be developed. Such tools can be used to inform practical courses of action for minimizing the impacts of climate change on urban areas and, equally importantly, for returning to a functional state following anticipated or unanticipated shocks.

The full paper on the Urban Resilience Framework by Arup and ISET will be published later this year with the support of the Rockefeller Foundation.

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