



# Framework for Climate Vulnerability Assessment in Urbanizing Asia: a Guidebook for the Urban Climate Resilience in Southeast Asia (UCRSEA) Partnership

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## Introduction

This brief guidebook presents an overview of the Urban Climate Resilience in Southeast Asia (UCRSEA) partnership's approaches to assessing climate vulnerability in urban areas, as part of a situation analysis that can provide the context and framing questions for more thorough investigation.

The guide is based on the UCRSEA conceptual framework that aims to highlight the governance dimensions of urban climate vulnerability and resilience, combining complex Social-Ecological Systems (SES) approaches with actor-oriented approaches. This combination of frameworks is grounded in theory of resilience and assets, capabilities and freedoms, and our core research questions about improving understanding of urban poverty and vulnerability, and how to influence urban governance.

### **This is significant for a number of reasons:**

*i.* Our interest in urbanization is as a transformative process, rather than simply a location. Urbanization is unfolding rapidly in Southeast Asia and is fiercely contested – there are both winners and losers, and indeed, many people can win in some ways while losing in others.

*ii.* Climate Vulnerability Assessments need to move away from a **'predict and act'** approach towards assessing climate thresholds. This means that instead of taking (downscaled) climate projections as the starting point for vulnerability assessments, it is important to assess how patterns of urbanization (and other factors) are creating

vulnerabilities that will be exacerbated by future climate change. This leads us to thinking of climate vulnerability in terms of thresholds – the points at which a crisis will occur, and the social processes in which this crisis is identified.

*iii.* Building resilience is a necessary feature of future urbanization. However, in order to ensure broader goals of social justice, equity and sustainability, it is not an end in itself. Increasingly, academic literature talks of three capacities of resilience – Absorptive, Adaptive and Transformative. It is clear that current trajectories of urbanization will need to change along transformative lines in order to avoid local impacts and potentially exacerbating poverty and inequality. At a global level, it is also increasingly recognized that urbanization must follow a different path from current trajectories that are in line with principles of Green Growth.

*iv.* A critical feature of contemporary urbanization is the dependence on critical infrastructure and technology, which are dependent on viable ecosystems, and managed through complex institutional structures and processes.

*v.* Resilience theory informs our approach to understanding urban climate vulnerability. It reminds us that shocks and crises are not only determined by the location of a particular event, but by the ways in which systems are networked, and how the impacts of shocks and crises cascade through inter-linked, inter-locked systems across different locations, impacting different people in different ways.

*vi.* The ways in which actors (individuals, households, communities, organizations) access and control these systems are key determinants in wellbeing and welfare, and conversely in poverty and vulnerability. Our methodology aims to investigate the interface between these systems and actors as a key principle that is itself linked to our core research questions.

*vii.* Global and regional processes increasingly drive urbanization, and in turn shape how vulnerabilities are created and redistributed across different locations and people, beyond the site of a particular city. Patterns of regional integration are also informed by calculations of risk and investment logic to diversify financial risk across different locations.





## Theoretical Foundations

### The Climate Resilience Framework

The Climate Resilience Framework (CRF) provides an important reference point for our understanding of urban vulnerability, and the social process through which vulnerability can be assessed, as a means for strengthening resilience (Figure 1).

Focusing on the Left Hand –

- i) infrastructure and technology
- ii) ecosystems/natural resources
- iii) institutions
- iv) agents and actors

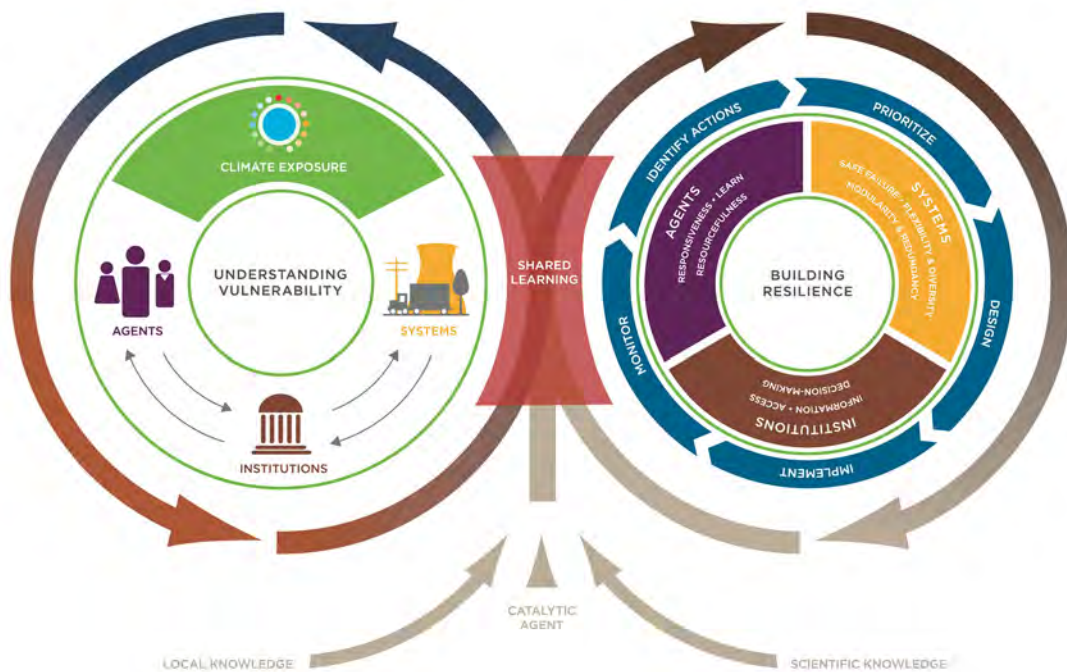


Figure 1 Climate Resilience Framework (CRF) developed by ISET-International

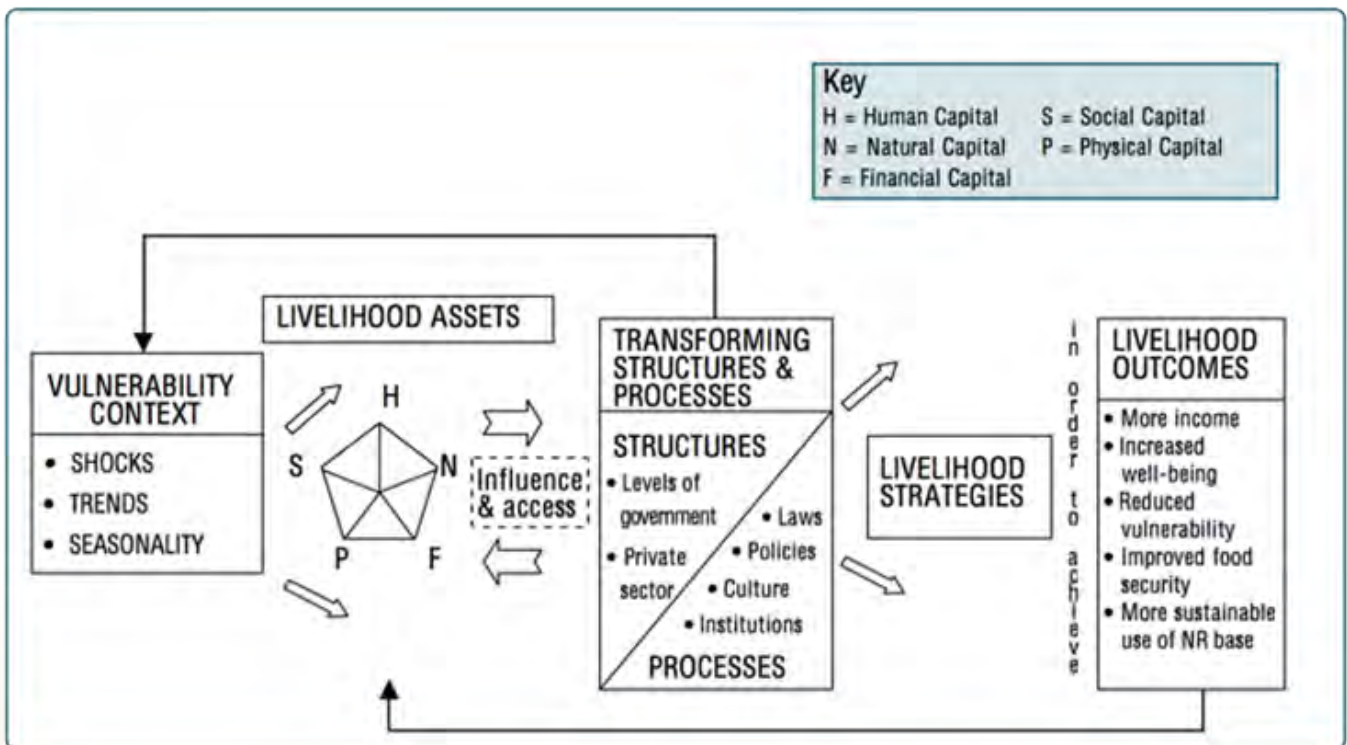
### Sustainable Livelihoods Analysis

There are two scales at which we aim to assess vulnerability – at the broad ‘**system**’ level of an urbanizing area, and also at the scale of individuals, households and communities.

Our approach is primarily focused on people and governance; how people are vulnerable, the ways in which people are poor, and how we can promote more accountable, transparent and transformative approaches to urbanization.

This approach draws on the concepts of assets, entitlements, capabilities and freedoms, and considers the interactions between them (Figure 2).

Sustainable Livelihoods Approaches are based on a long theoretical history that links how individuals manage vulnerability to achieve livelihood outcomes. The emphasis is on how individuals and households juggle a range of assets within their livelihood portfolios, confronting a range of stresses and shocks.



**Figure 2 Sustainable Livelihoods Framework**

We recognize that people and households are vulnerable to numerous shocks and crises, and thus juggle a wide resource portfolio (even with limited assets) in order to achieve some sense of wellbeing. The assets that people juggle can be divided into the following categories:

- Social
- Natural
- Economic
- Physical
- Human

The extent to which people are able to turn access and control these assets, and thereby turn them into benefits is shaped by broader structures and processes – related to issues of governance (power, markets, legal processes, corruption) and broader environmental factors (climate change, disasters). As we have said above, a critical factor also is the ways in which they access urban systems – and the extent to which these urban systems might be at risk of failure (Figure 3).

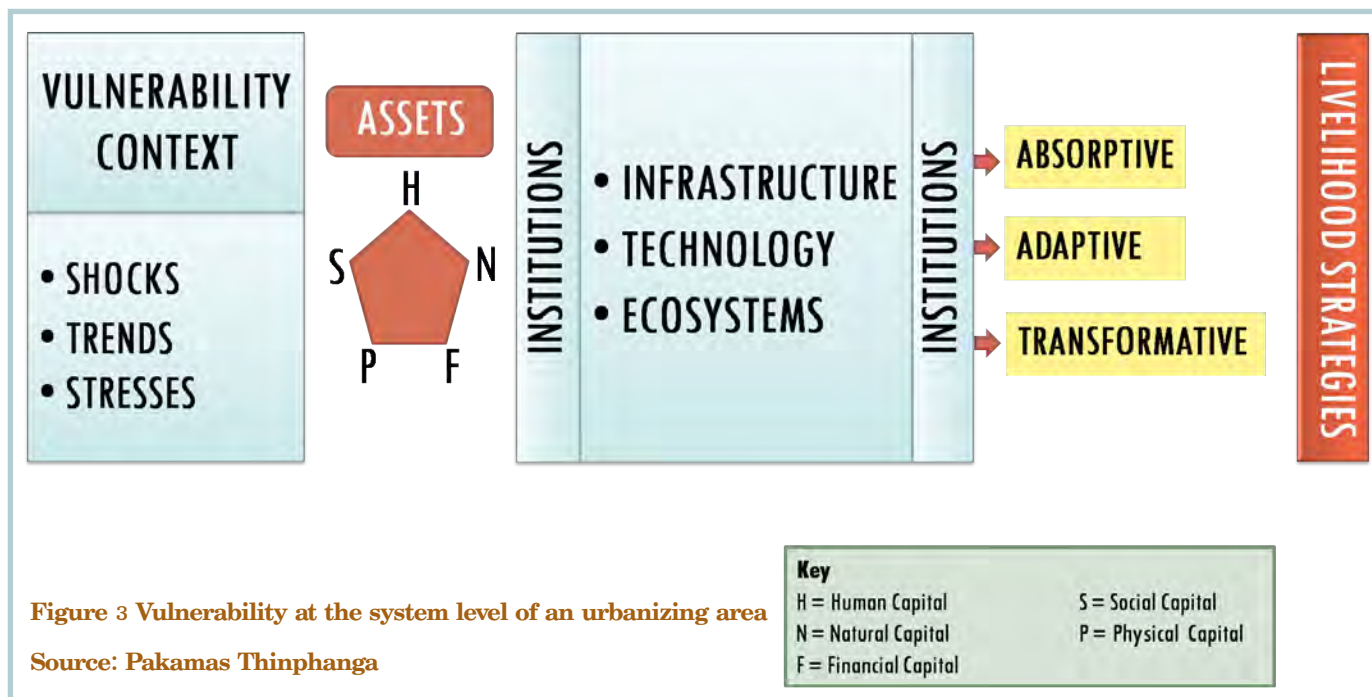


Figure 3 Vulnerability at the system level of an urbanizing area

Source: Pakamas Thinphanga

## Shared Learning Dialogues

At the heart of UCRSEA’s approach is the recognition that assessing vulnerability and building resilience are social processes that require different stakeholders coming together for informed public dialogue and deliberation. The core method for doing so is referred to as Shared Learning Dialogues (SLD).

Shared Learning Dialogues are the core activity underpinning UCRSEA – allowing public dialogue around understandings of vulnerability; reviewing research findings and recommendations; identifying monitoring and reviewing resilience building actions.

***All the steps and activities for assessing vulnerability that are laid out below can be implemented through an SLD approach.***

There are a number of reasons for this approach to SLD:

*i.* Poverty and vulnerability are increasingly seen not only in terms of material deprivations but also in terms of marginalization – that poor people do not have voice and influence in how decisions are made. SLDs are designed to open public space for the kind of dialogue that can overcome issues of marginalization.

*ii.* Building resilience rests on the concept that systems are able to reorganize and adapt in the face of changing circumstances, and shifting uncertainty and risk, while also learning from previous experience. In the urban context, this requires building processes for stakeholder consultation, deliberation and dialogue.

*iii.* A core principle of environmental governance is that multi-stakeholder dialogue, bringing together different knowledges (scientific and local) can help to

address complex environmental problems and generate innovation, while also ensuring that solutions are socially just. Principle 10 of the 1992 Rio Declaration affirms the importance of Access Rights – access to information, access to public participation in decision-making, and access to justice. Similarly the Convention on Biodiversity (CBD) also reaffirms the importance of bringing stakeholders together across ecosystem boundaries, and of bringing different knowledges together.

In practice Shared Learning Dialogues can exist in different forms and scales but according to similar principles – participatory, broad representation, providing space for consultation and dialogue.

This is easier said than done, but there are core approaches that can be applied to ensure principles are implemented effectively.

- Combination of presentations with task-based group activities
- Provide space for participants to discuss and present their own ideas and information, combining small group and larger plenary discussions
- Use of visual tools and Participatory Rural Appraisal (PRA) methods

## **Trends and Trajectories: Emerging Vulnerabilities**

The starting point for assessing urban vulnerability is the current trends and trajectories that urbanization brings, and how these create new patterns of vulnerability.

Urbanization is a moving target – the pace and intensity of urbanization is so great that the urban area’s scope and characteristics are constantly changing. These processes of change also can contribute to patterns of vulnerability.

At the same time, these processes of change are often difficult for local stakeholders to see when they are occurring on a day-by-day basis. Urban residents often forget how dramatic changes of the fairly recent past have been, and how influential some changes have been in creating vulnerabilities and risks.

A starting point for understanding vulnerability is to consider trends and trajectories of change, how these are unfolding and with what implications, and how they are likely to progress into the future.



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## Thresholds Analysis

Urban climate vulnerability is increasingly manifest through the fragility of urban systems, and more significantly, the institutional weaknesses for managing complex urban systems that are nested, interlinked and operating across ecological and administrative boundaries. Significantly, climate vulnerability in urbanizing areas is not only determined by location, but also by the nature of the complex systems on which contemporary urbanization depends, and in particular, the complex institutional mechanisms for their management. It is this institutional dimension to vulnerability – the critical gaps in institutional adaptive capacity – that requires assessment approaches that are grounded in participatory processes and multi-stakeholder dialogue.

### Thresholds Approach to Assessing Climate Vulnerability

A threshold is broadly defined as a ‘level or point at which something starts or ceases to happen or come into effect’ (Soanes and Stevenson, 2008, p. 1502). In defining climate thresholds, the Intergovernmental Panel on Climate Change suggests that they are the point where there is “a non-linear response to a given forcing” (Glossary of Terms 2012). A threshold that is long lasting and potentially irreversible is also termed as a ‘tipping point’ (Lenton et al., 2008) leading to a fundamental systemic collapse, or transformation. Within the context of urban climate change, thresholds are the levels or points within a city that urban systems begin to fail, and beyond which unacceptable impacts occur.

Climate thresholds approaches enable city stakeholders to contextualize the potential impacts of future climate change by better understanding the ways in which current trajectories of urbanization are creating vulnerabilities that will be further exacerbated by future climate change. In many cases, only slight variations in climatic conditions are likely to push already fragile urban systems into situations where they might fail, or to points of crisis. Current development trends alone suggest that many systems will be pushed past their crisis thresholds. Climate projections suggest that such variations are eminently possible.

Thresholds – and points of fragility or failure – can become manifest in different ways across the three constituent elements of urban systems:



**1. Infrastructure, Technology & Ecosystems:** Fragility or failure can become manifest in the way that physical infrastructure or technology experiences climatic events or sequences of events that exceed their design capacity. Moreover, since urban infrastructure systems are inter-linked, fragility or failure in one area of urban systems can have cascading effects, and often with unanticipated consequences.



**2. Institutions:** Urban systems depend on complex institutional arrangements that in many cases are overlapping, competing or poorly coordinated, with limited mandates, technical capacity or financial resources. The ways in which institutions deal with crises points to their own complexity and fragility. Urban systems increasingly depend on complex institutional arrangements often across different government agencies or tiers of government, and often cutting across state and non-state actors. Even where physical systems themselves do not fail, the institutions that are responsible for their management, operation and maintenance, or the distribution of benefits, can fail. The technical or managerial capacity of institutions also face thresholds: their ability to function with a wide range of changing and uncertain responsibilities, and the legal constraints of their mandate and remit, or of their financial and human resources.



**3. Agents:** In order to ensure just and equitable outcomes, it is essential to determine how vulnerabilities and impacts are distributed across different urban people. Approaching thresholds through the lens of agents allows for understanding how different people are impacted and how they respond, in some cases positively and negatively, during climate related shocks and crises.

Urbanization in the target cities across Cambodia, Myanmar, Thailand and Vietnam follows a similar pattern: it is happening at a rate at which formal planning processes are often weak – with critical governance gaps. Land use planning and zoning does not consider climate risks, and is rarely enforced.

- **Infrastructure, Technology & Ecosystems:** Much of the urban infrastructure that is already in place has been designed for different purposes and levels of demands in earlier historical climate regimes, with several events in the last decade in which climate-related events have gone beyond design capacity.
- **Institutions:** The pace of urbanization reaching across different administrative tiers together with the increasingly complex, inter-linked systems of infrastructure and technology, creates points of weakness in existing institutional processes. Existing institutional mechanisms struggle to deal with climate related events, and in some circumstances have failed. Institutional mandates and remits do not necessarily fit with the multi-scale demands of urbanization, and technical, administrative and financial capacities to deal with the pace and scale of urbanization, are often limited.
- **Agents:** The distribution of risks and impacts is uneven across different urbanizing territories, and across different urban and rural people. Dealing with climate related shocks and crises involves making choices, that inevitably creates winners and losers. At a household and individual level, a range of social, economic and political variables influence vulnerability to climate related shocks.



Underpinning this approach is recognition that thresholds are highly differentiated, and that determining any specific threshold is, first and foremost, a political and social process of negotiation. Urbanization is characterized by competing values and interests with access to and control over urban systems and services, as well as the distribution of climate-related vulnerabilities and impacts, differentiated according to factors of wealth, ethnicity and political power. What constitutes an unacceptable threshold is largely determined by values and interests, and not always shared across different urban stakeholders.



## Steps and Processes: Outlining Methods and Approaches

### Trends, Trajectories and Future Visions

A very successful and participatory approach to doing this is to take advantage of historical photographs and using these as prompts for participatory discussions (as activities under an SLD process).

Starting with photographs of 30 years participants worked in groups taking notes of key issues, pointing out the most significant aspects of urban life in the past. Working off flip charts with prompts – environment, transport, economics and employment, population – small groups were able to brainstorm some of the key issues as they remember the past. This also proved to be a good way to get people talking – and to get those who are younger or more recently settled, to engage with those who have a longer memory of the place.



**Figure 4 Past and present photographs**  
(top row Bangkok, bottom row Udon Thani)

This approach also lends itself to a shared visioning way of working that is based around identifying how people would like to see the future, and how they see the future unfolding according to current trajectories. The shared visioning approach is based around four simple questions that guide a series of participatory exercises, brainstorming, dialogue and prioritization. The core shared visioning questions are:

- Where were we?
- Where are we going?
- Where do we want to go?
- How do we get there?

Establishing a vision of the urban future allows assessment to link to long-term strategic planning, and to establish an agreed strategic framework that is in line with principles of Green Growth as well as climate resilience.

## **Urban Systems: Fragility, Failure and Criticality Analysis**

### **Critical Urban Systems Mapping**

Mapping urban critical systems is an effective mechanism for assessing points at which systems might be fragile and liable to failure, and significantly the implications of such failures for different urban actors.

This approach enables local stakeholders to think in terms of the core urban systems on which urban life depends: water, food, energy, waster, transport. It is always difficult to see the whole picture of these systems, and it is therefore important to facilitate a way of thinking about the urban that is not simply defined by territory and space.

This approach to assessing systems has been tried and tested in a variety of different contexts. For example it is widely used in the fields of engineering and security – mapping a complex system such as an aircraft carrier and identifying points at which the system might fail, and from this determining whether the consequences would be critical, and if so, for whom and what responses might be possible.

This general approach can be adapted and very much simplified. In its most straightforward format systems mapping can be done as a participatory exercise in an SLD context to help identify core questions that can be followed up in more detailed research activities.

The advantage of this approach is that it encourages local stakeholders to think of the urban as a combination of infrastructure and technology, ecosystems, institutions and actors.

#### ***Steps for such an exercise would be as follows:***

The mapping exercise should be simple. Starting with one critical urban system – for example, water (Figure 5) – the system can be mapped out from interface; ie the point

at which different users access water. For most urban residents this is the point of a tap in the house. For most farmers, it is the point at which the irrigation canal reaches their farm. For state agencies it might be the point at which they have the first area of responsibility.

Mapping out the whole system as a flow diagram allows for identification of how different uses of water are dependent on a complex system of pipes, pumps, canals and reservoirs, and ultimately the upper reaches of the watersheds.

The flow diagram of systems also allows identification of the different uses within the overall systems, how different institutional arrangement govern use and management of pieces of the system, and how different kinds of actors gain access and derive benefits from the system.

The assessment of fragility and failure should focus in on areas within this overall system where there might be weaknesses. These might be in the physical design of the infrastructure (drainage pipes that are not designed for the regular higher levels of precipitation) or in the institutional arrangements (for example, poor maintenance of flood drainage canals).

Once weaknesses in the overall system have been identified, the significance of a failure can be assessed – the extent to which a failure would be critical, who would be impacted and in what ways.

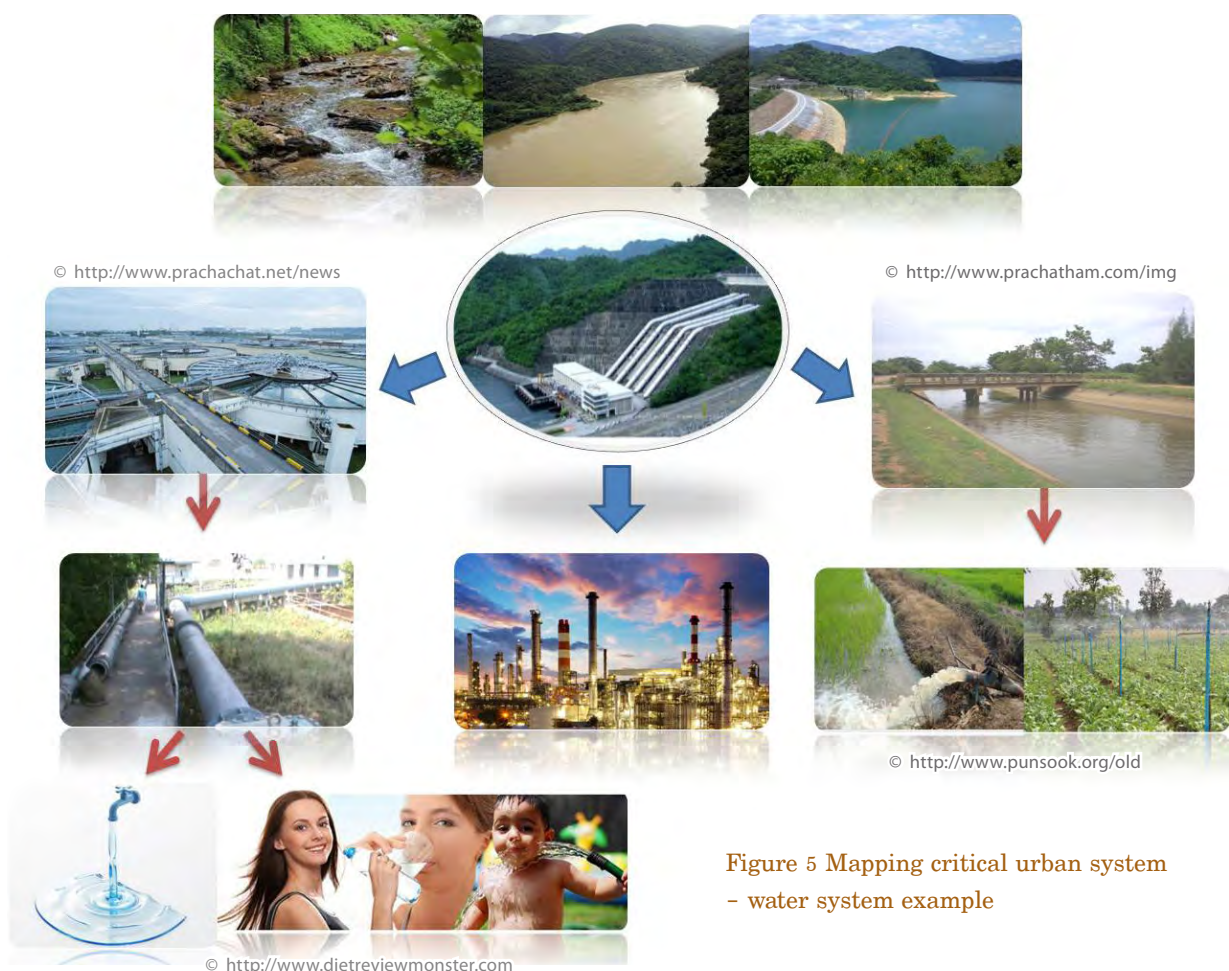


Figure 5 Mapping critical urban system  
- water system example

## **Politics and Institutions (in line with Transforming Structures and Processes in the Sustainable Livelihoods Framework)**

This section applies a political economy/political ecology approach to provide an analysis of the policy and investment framework that is influencing the case study city.

It is important to be able to assess the institutional and policy context that shapes vulnerability and actors capacity to deal with shocks and crises. In doing so, two important distinctions need to be made between the idealized world of policy (as outlined in documents, plans and legislation) and what occurs in practice.

Drawing on the mapping of systems (see above) it is possible to identify the institutional mechanisms and processes that govern systems at specific points in the flow chart, while also identifying the degree to which formal or informal rules and norms determine the way in which systems are governed.

Drawing on experience of specific events – or in many cases, more regular shocks, crises and stresses – through case studies (see below) is an effective means of illustrating what happens in practice, and how different actors navigate institutional complexity. Case study approaches applying qualitative methods are well-suited for revealing the influence of informality, and issues of power, influence and corruption.

### **People-centred/Actor Oriented Approaches**

Central to the UCRSEA conceptual framework and the core research questions, are issues of how different actors access and control urban systems, and how this shapes wellbeing as well as poverty and climate vulnerability.

UCRSEA is interested in the interface between actors (government agencies, private sector, urban citizens and poor/marginalized people) and urban systems in order to understand how actors operate within this broader context, how actors access, control and derive benefit from complex urban systems, and how they cope/adapt to shocks, crises and stresses.

As with the institutional and policy analysis above, this can be addressed through a combination of two approaches: i. mapping points of access to complex urban systems and ii. Case-study approaches can reveal how actors negotiate this broader urban arena. The case study approach is well established in sociological method, particularly by Norman Long.

### **Case Studies: Agency and Structure**

Assessments of vulnerability often rest on idealized notions of how people might respond to shocks and crises of the future, rather than drawing lessons of how people have responded to actual shocks and crises of the recent past – a participatory post mortem of a specific event.

**Focusing on case studies:** Qualitative assessments of how different types of actors have responded to events of the past allows us to consider the actions that people take, their understanding of events, and the constraints that they have faced. Additionally, investigating how people deal with crises allows us to consider the complex the cascading impacts of specific events, and the interactions between different drivers of vulnerability. For example, the impact of a flood might not simply be the inundation of property and disruption of normal life, but may lie in the ways in which people are unable to work, pushing them into debt, and constraining them from sending remittances that their families might depend on.

Even relatively small sample size case studies can reveal important insights. Participatory research in Hat Yai, (Le Meur, 2014) focused on two similarly flood-exposed urban communities, one Buddhist and the other Muslim, in order to assess differences in their adaptive capacity. This study revealed important insights – that the major determinant in their ability to recover was not the extent or intensity of inundation, or indeed the level of loss and damage; it was in fact related to the political and social capital that community leaders enjoyed with local administrations, and their ability to navigate a complicated system of emergency and welfare support.

**Livelihoods History Analysis:** Qualitative analysis of how actors respond, that is differentiated according to such factors as wealth, gender, age, location, employment –focuses on how and why people adapt to varying degrees of success over different timeframes (Ayeb-Karlsson, S., Geest, K., Ahmed, I., Huq, S. and Warner, K., (2016) A people-centred perspective on climate change, environmental stress, and livelihood resilience in Bangladesh. *Sustainability Science*, pp.1-16). These qualitative approaches grounded in what people actually do in times of stress and crisis, also reveal the extent to which their actions (and their agency) is shaped by institutional processes (power relations, rules, norms and regulations) and broader structural factors (including access to urban infrastructure).

The focus of case studies can also be at the level of organizations, for example, looking at how local governments deal with specific shocks and crises. Similar work in Udon Thani has revealed how local government only has an ad hoc mechanism for negotiating water shortages, meaning that sudden crises have to be dealt with via a sudden response. This has meant that rice farmers have had their irrigation water supply cut off in order to protect other users' needs. Investigation of local communities also revealed a complex set of reasons behind the lack of investment and maintenance of natural water bodies that had previously supplied domestic supply. Case studies of Royal Irrigation Department (RID) reservoir managers also illustrated the ways in which their ability to manage the storage system is constrained by the hierarchical reporting system to the central level in Bangkok, and by the pressure from different local administrative authorities to meet certain supply needs.

## Self Assessments

Supporting the capacity to learn and reorganize in the face of changing circumstances, and greater climate uncertainty and risk is at the heart of resilience. As such, self-assessment frameworks provide an important mechanism for assessing performance against established indicators and criteria, and for promoting multi-stakeholder dialogue and shared learning.

The Local Government Self Assessment Tool (LGSAT) has been developed by the United Nations Office for Disaster Risk Reduction (UNISDR) as part of the global campaign Make My City Resilient. It is structured around the Ten Essentials of the Hyogo Framework for Action (HFA), an international agreement on how to build resilience in the face of climate change and disasters. Tested as part of the Mekong-Building Climate Resilient Asian Cities (M-BRACE) program in partnership with UNISDR, the LGSAT also proved to be a useful mechanism for promoting multi-stakeholder dialogue, and for stakeholders to identify key areas of vulnerability using international criteria for disaster risk reduction (DRR).

The LGSAT generated important lessons, pointing to areas of vulnerability and opening up discussion on how these could be addressed. Key findings include:

- Weak enforcement of land use planning and building codes
- Lack of assessment of hazards and risk. Where data is available, it is not publicly accessible.
- Lack of budget assigned to local organizations and limited remit to address DRR and climate change
- Poor coordination between different government agencies and between state and non-state actors

The main weakness of the LGSAT is that the focus remains clearly on DRR, rather than climate change. In order to strengthen the urban climate focus we are now preparing a brief self-assessment tool that focuses on urban systems, and assesses characteristics of resilience.



## Flowchart for Vulnerability Assessment

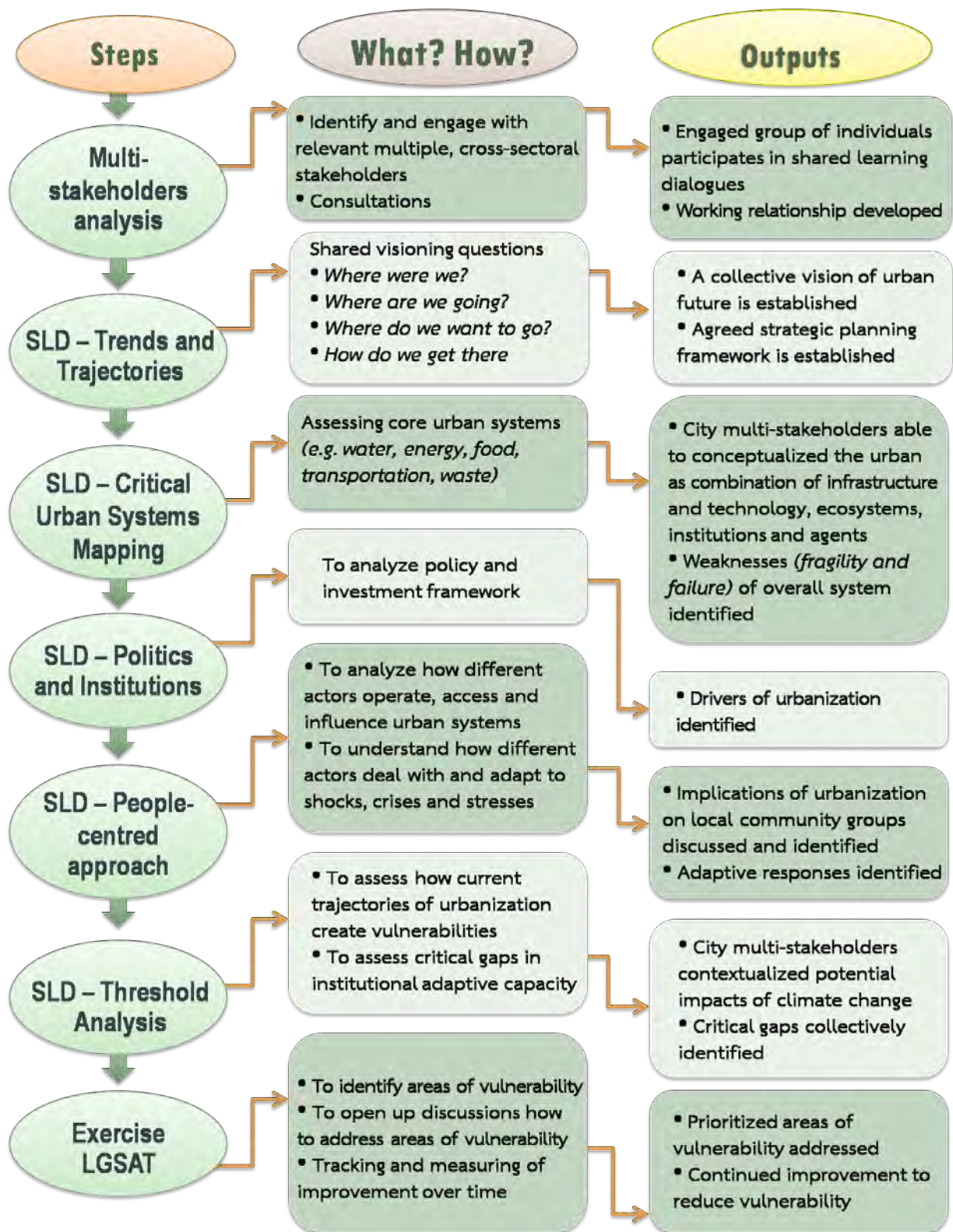


Figure 6 A flowchart outlining key steps for vulnerability

Source: Pakamas Thinphanga



## Conclusion

The guidelines presented in this document set out a number of approaches that can be applied to provide an overview of changing circumstances of vulnerability in target cities. These approaches are designed to be consistent with the core research questions and conceptual framework that underpins the UCRSEA partnership. This is not an exhaustive suite of approaches; there are a number of tools and methods, in addition to those presented here, that could also contribute.

*The main elements of our overall approach can be summarized as follows:*

- Historical perspective – addressing processes of change by considering recent past, historical trends and emerging trajectories of urbanization
- Focusing on the interaction of systems and actors, while being careful not to privilege one over the other
- Case studies – examining specific events, or series of events, that reveal how different actors understand and interpret shocks, crises and stresses, and how they are able to act (or not)
- Applying approaches that encourage participation and create space for public dialogue, including self-assessments and Shared Learning Dialogues

In conclusion it is important to re-state that these guidelines should help in developing an understanding of the broader context of vulnerability in target cities – a situation analysis – that provides the basis for the more detailed studies to follow.



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