

# PLANNING FOR CLIMATE CHANGE

A STRATEGIC, VALUES-BASED APPROACH FOR URBAN PLANNERS



**VERSION 1: FOR FIELD TESTING AND PILOTING IN TRAINING**

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A Strategic, Values-based Approach for Urban Planners



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## Foreword

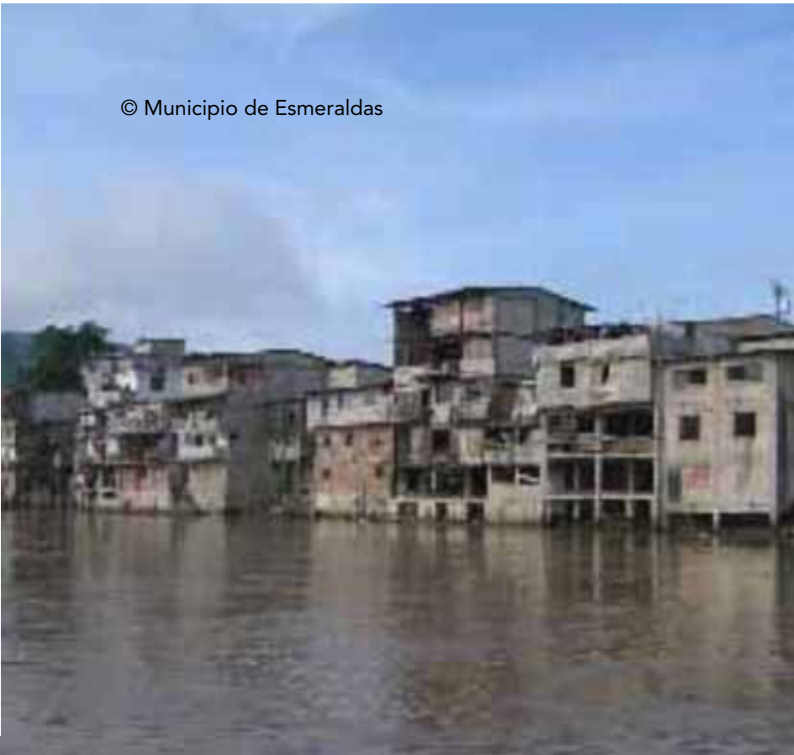
To be provided in the post-field tested version.



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Children playing within the tsunami affected areas, Aceh, Indonesia, 2005.  
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## 1.0 Introduction

Climate change is fast becoming one of the most significant challenges of the 21st century. While there may be uncertainty surrounding the scale, scope and pace of climate change, one thing is clear – **cities and towns everywhere will be exposed to significant climate change-driven impacts**. All of us will need to play a role in helping to adapt to these changes. It is also widely accepted that cities are major producers of the greenhouse gas emissions that contribute to climate change. Hence, cities need to play their part in both reducing greenhouse gas emissions and increasing their resilience to climate-driven impacts.

The United Nations Human Settlements Programme (UN-HABITAT) developed this guide for city planners and other allied professionals to better **understand, assess, and take action** on climate change at the local level. While climate change is a global issue, this guide is specifically intended for urban communities in low and middle income countries where the challenges are unique and the human stakes of planning for climate change are particularly high.

Adapting to new conditions brought by climate change will be challenging and demands strategic thinking and creative thinking from planners. To help support planners in developing and implementing their climate change adaptation and mitigation initiatives, this guide incorporates a **value-based**, decision-focused planning approach. Such an approach helps ensure that the city's particular social and economic challenges – be it poverty, population health, water and sanitation, etc. – frame the climate change planning process and provide the local community objectives that will be used to help evaluate and prioritize the resulting climate change policies, programs, and actions.

At the core of this approach is the belief that all planning -- spatial/physical, sectoral, environmental, organizational, economic, etc. -- is more effective if it is **strategic and driven by locally identified needs and values**. No matter the type of planning, all of it is ultimately about making the best decision possible with the resources available. The cornerstone of this guide, therefore, is the belief that good decision-making should be objective, transparent, participatory, and incorporate local values.

This guide also supports a **participatory** planning approach as the most effective way to deal with climate change. City planners, or those individuals charged with physical, spatial or sectoral planning in their communities, cannot meet the challenge alone. By engaging other climate change stakeholders in the planning process, guide users will be able to develop and implement more coordinated, appropriate and sustainable climate change actions that will have the support of key partners and stakeholders, are responsive to local values, and help achieve a broader range of local development objectives.

With a values-based, strategic, participatory planning approach as the foundation, this guide is designed to:

1. Provide planners with practical tools for addressing climate change through different urban planning processes;
2. Help planners to better gauge, prioritize and plan for real, emerging and potential climate change impacts at the local level;
3. Support the “mainstreaming” of climate change planning at the local level into spatial, physical, sectoral and comprehensive development plans;
4. Promote an inclusive, participatory climate change planning process that integrates strategic planning, local area participation and good decision-making; and
5. Support ongoing capacity building for urban planners and allied professionals.

So, what can planners do as climate change intensifies the already significant day-to-day challenges of planning and development? This is the question this guide seeks to answer.

## STRATEGIC, VALUE-BASED PLANNING

A systematic, participatory and transparent decision-making process that determines priorities, makes wise choices and allocates scarce resources (i.e., time, money, skills) to achieve agreed-upon objectives that are developed using local community values.

## 1.1 WHO SHOULD USE THIS GUIDE

This guide is intended for use by planners and people responsible for planning everywhere, but is intended to be of particular benefit to planners working in low and middle income countries with a basic knowledge of climate change and the desire to address it. While it is targeted at local government planners in particular, it recognizes that **all types of planners** (e.g., transportation planners, local economic development specialists, civil engineers, architects and urban designers, environmental experts, etc.) **at all levels** (e.g., county, region, state, province, etc.) have a role to play. While the terms ‘planner’, ‘urban planner’ and ‘city planner’ are used throughout this guide, they can be taken to represent all of these groups and individuals.

This guide also recognizes that many cities and towns may not have a staff person tasked with physical or town planning, let alone a planning department. Understanding this, this guide can also be used by **allied professionals** working in the larger field of urban land management and social development (e.g., civil engineers, local health officials, community economic development officers, etc.).

Finally, a third group that can use this guide are the **elected representatives, non-government professionals, civil society groups, donor agencies and private sector organizations** who individually and collectively play an important role in helping cities manage climate change risks and impacts.

Given the diversity of potential local government users, their differing capacity, available resources, experience, and the range of political contexts they will find themselves in, this guide presents a broad range of tools and information. Some of the material is more technical and may be beyond the capacity or experience of some users, while other materials are quite basic and may not be of great value to larger centres with more capacity and resources. Because of this, guide **users should feel comfortable using materials as their situation allows**, and neither feel dissuaded by components that may be beyond their current reach, nor underwhelmed by materials or planning steps that they may have already completed. We expect and hope that this guide has the flexibility to be used both as a **general resource and as a step-by-step planning guide**.

## 1.2 HOW TO USE THIS GUIDE

This guide’s **value-based strategic planning process** is organized around a four-step approach that incorporates innovative structured decision-making tools with a participatory, community-based methodology. Illustrated in Section 4.0 *Planning for Climate Change: The Planning Cycle*, the planning process is organized into **four modules** that correspond to the four strategic planning questions – *What is happening? What matters most? What can we do about it? Are we doing it?* Answering these questions will require guide users to go through a corresponding set of individual **steps**. Each of the nine planning steps is further broken down into more detailed **tasks**, many of which are supported by corresponding **tools**. The tools are provided in *Appendix 1: Tools*. Wherever possible, we have illustrated the planning steps and tasks by providing short examples, or mini case studies, based on climate change planning experiences from around the world.

While Section 2.0 explains the organization of the four planning cycle modules in more detail, the modules and their related steps are briefly outlined below.

**Table 1: Guide Organization and Framework**

| MODULE                   | PLANNING STEP                    | KEY QUESTIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MODULE A</b>          |                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| What is happening?       | 1-Getting Started                | <ul style="list-style-type: none"> <li>What needs to happen first?</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                               |
|                          | 2-Stakeholders and Participation | <ul style="list-style-type: none"> <li>Who needs to be involved and how?</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                         |
|                          | 3-Vulnerability Assessment       | <ul style="list-style-type: none"> <li>How is climate change affecting the local environment/community?</li> <li>How vulnerable are individuals, households, and communities?</li> </ul>                                                                                                                                                                                                                                                                                    |
| <b>MODULE B</b>          |                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| What matters most?       | 4-Values and Objectives          | <ul style="list-style-type: none"> <li>What does the community value?</li> <li>How do values inform climate change-related priorities and actions?</li> </ul>                                                                                                                                                                                                                                                                                                               |
| <b>MODULE C</b>          |                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| What can we do about it? | 5-Option Identification          | <ul style="list-style-type: none"> <li>What climate change options or actions can we undertake?</li> </ul>                                                                                                                                                                                                                                                                                                                                                                  |
|                          | 6-Option Evaluation              | <ul style="list-style-type: none"> <li>What climate-related actions would <u>best</u> support other community development objectives and priorities (e.g., poverty reduction, improved transportation)?</li> <li>How can we organize and prioritize climate actions to integrate, coordinate and mainstream them with other town planning and sectoral projects?</li> <li>What are the “low hanging fruit” or “quick win/low regret” actions could we undertake?</li> </ul> |
|                          | 7-Implementation                 | <ul style="list-style-type: none"> <li>How do we implement climate actions?</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>MODULE D</b>          |                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Are we doing it?         | 8-Monitoring and Evaluation      | <ul style="list-style-type: none"> <li>How can we monitor and evaluate our actions to see how effective they are?</li> <li>What should be monitored and who should be responsible for evaluating?</li> </ul>                                                                                                                                                                                                                                                                |
|                          | 9-Adjust and Modify              | <ul style="list-style-type: none"> <li>How can we be sure our climate-related actions stay relevant and effective in the face of changing climate impacts and risks?</li> </ul>                                                                                                                                                                                                                                                                                             |

This guide is designed to allow users to **enter the strategic planning process at different steps or modules**. It is anticipated that guide users and their cities will:

- Be at different stages of climate change planning (i.e., some may have already gone through the initial assessment outlined in Module A);
- Be using the guide for different purposes (i.e., one community may be using it to develop a broad climate change strategy, where another city might use it to integrate climate change actions in a particular, sectoral plan – a Land Use Plan, a Neighbourhood Plan, Energy Plan, Local Economic Development Strategy, etc.); and,

- Have different planning resources and capacities at their disposal (i.e., some communities may have the human resources and skill to undertake a process “in house”, while other communities may have to secure external funding or technical support).

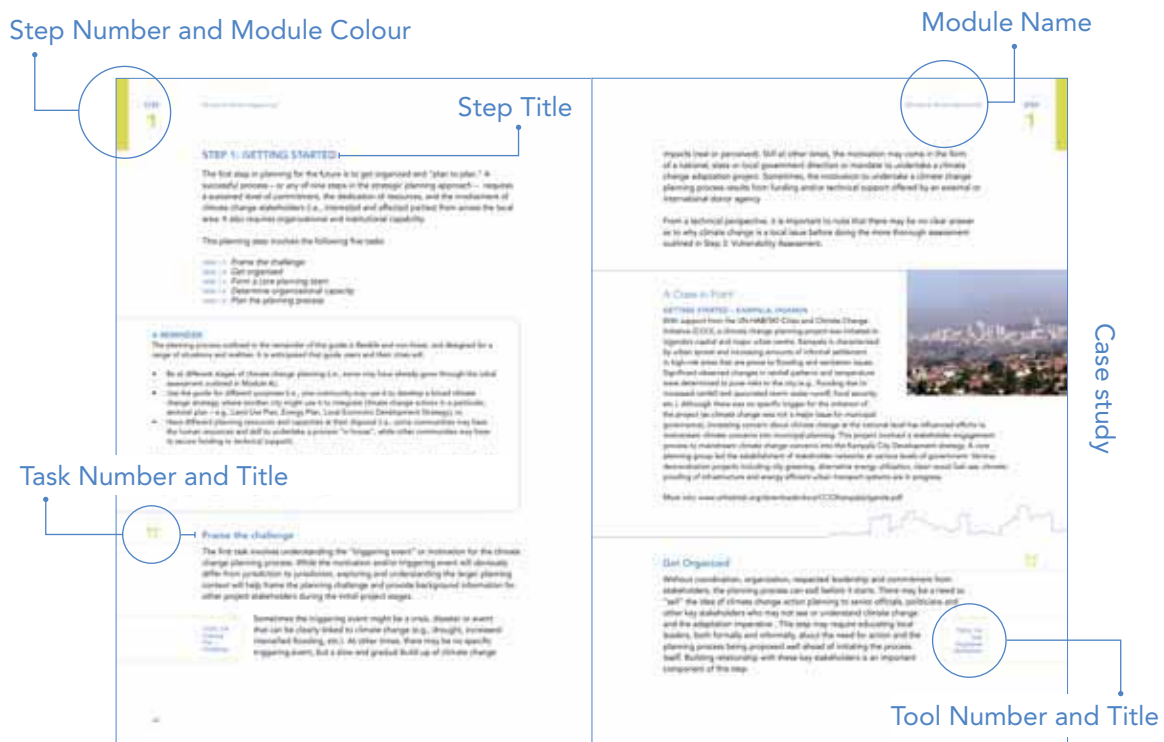
As a **non-linear** planning process, it is also understood that guide users will go back and revisit planning steps as new information or resources become available, or when new stakeholders enter the planning process. While people working in areas where planning for climate change is more advanced might enter the process in Module B or later, they are strongly encouraged to review the previous planning tasks to ensure that they have adequately covered them.

Additional supporting tools and supplementary information resources (guides, web sites, on-line tools and calculators, etc.) are indicated in each sub-section, with either the full tool or links to them provided in *Appendix 2: Other Resources*.

A glossary of common climate change and planning terms and principles is provided in *Appendix 3*, while a summary of global climate change initiatives, city alliances and funding opportunities is profiled in *Appendix 4*.

Finally, additional information on the case study illustrations or noted references in the manuals is provided in *Appendix 5*.

As illustrated, we have designed a way-finding system, so users can more easily navigate the guide to see where they are in the process at all times.



### 1.3 CLIMATE CHANGE ADAPTATION AND MITIGATION

The entry point of this guide is **adapting to climate change**. In this way, it is responsive to the predominant demands of urban planners to understand and prepare for the effects of climate change on their cities.

Urban planners are key players in land use, infrastructure development and urban expansion, municipal service provision, growth management, environmental planning, solid and liquid waste management, housing and building development, and site design. Because climate change adaptation involves actions in these areas, this guide focuses on related activities, strategies, plans and policies.

**Adaptation** is a process through which communities prepare to cope with an uncertain future climate. While the specific measures vary greatly across sectors -- ranging from physical land use plans that limit development in hazard areas, to protecting and preserving certain ecosystems to minimize potential climate impacts (e.g., flooding and erosion) -- four areas that are particularly important in the realm of climate adaptation planning are:

- Improving the adaptive capacity (awareness, knowledge, skills and resources) of planning institutions and stakeholders;
- Mainstreaming climate change adaptation (and mitigation) into existing development planning systems, policies and programs;
- Addressing and managing the socio-economic impacts of climate change, particularly their effect on vulnerable populations (e.g., managing rural-urban migration, supporting economic resilience, improving local food security issues, upgrading emergency response systems, etc.); and
- Enhancing the opportunity for coordination and cooperation between and amongst climate stakeholders on both a local level and between state, regional and national governments.

Adaptation does not mean that the negative impacts of climate change will be completely avoided, only that they will be less severe than if no planning had occurred.

**Mitigation** activities, on the other hand, help reduce the rate and/or magnitude of climate change by helping reduce human-generated greenhouse gas emissions and/or land use practices that exacerbate global warming (e.g. deforestation). Cities consume most of the global energy supply and subsequently are responsible for a significant proportion of GHG emissions. Therefore cities must be leaders in mitigating climate change, containing urban areas to minimize land clearing, and 'de-carbonizing' energy systems (e.g., the energy used for transportation, electricity, heating, industrial processes, and waste disposal). Urban planners are well positioned, and typically want to "play a part" in mitigating GHG emissions.

**ADAPTATION =**  
managing the unavoidable

**MITIGATION =**  
avoiding the unmanageable

While it is not the primary focus of this guide, **mitigation is a key component of climate change planning**. Planners can play an important role in mitigating climate change by leading the way in reducing greenhouse gas emissions through actions such as:

- Supporting and leading more sustainable and compact urban design;
- Encouraging and facilitating new green building technologies and development (buildings are major energy consumers and GHG emitters in both their construction and operation);
- Facilitating improved transportation networks with options that both reduce urban traffic congestion and support greener modes of transportation (public transportation, van and bus transportation, cycling, walking, etc.);
- Encouraging and facilitating new technologies and development for the treatment of liquid and solid wastes (wastewater treatment plants and landfills are sources of energy that can reduce the reliance on other energy sources that are large greenhouse gas emitters);
- Supporting sustainable energy production and distribution systems (e.g., urban solar and wind power, district energy systems, etc.); and,
- Supporting the conservation and rehabilitation of ecosystem for the mitigation services they provide (for example carbon sinks provided by forests)

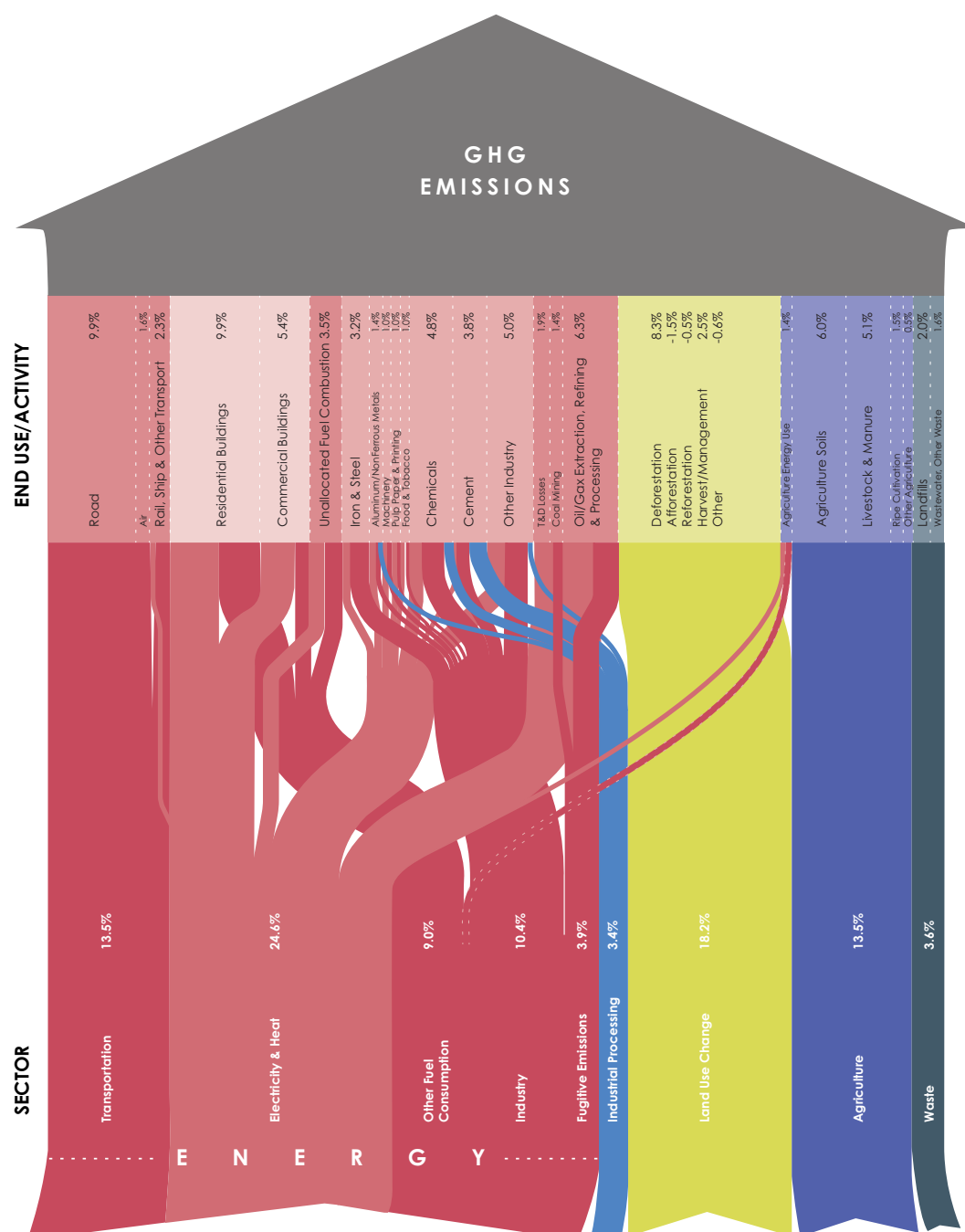
While cities definitely play a role in mitigation, the direction, mandate, resources and policy guidance to undertake broad-based mitigation activities most often comes from higher levels of government (typically federal or national governments). National standards for vehicle emissions and building codes are a couple of examples. Carbon cap and trade or carbon tax regimes are another. Certainly, there have been many cases, especially in the developed world, where cities have taken the lead on mitigation activities before there were (or in many cases are) national mandates for mitigation. Cities can also work together and lobby national governments to take action.

The strategic planning approach outlined in this guide includes a key step to screen climate actions by considering how they would (and could) also support mitigation. Strategy assessment tools will help urban planners identify mitigation measures within their sphere of influence, and figure out how to integrate them into existing local government and sectoral plans and policies.

While even aggressive measures by one city acting alone will not have a significant effect on global greenhouse gas conditions, proactive steps by many urban settlements around the world may well slow climate change impacts. Therefore cities (along with other actors) should take measures to reduce GHG emissions within their sphere of influence. This is particularly true in growing urban areas in developing nations, where some urban populations are projected to increase significantly – even double – over

the next 20 years. Paired with an increase in wealth, this population increase will have major impacts on emissions through urban expansion and redevelopment, increases in individual car ownership, changes in settlement patterns and pressures on municipal infrastructure. Global growth in GHG emissions will likely occur primarily in the building and transport sectors in low and middle income countries. Better urban planning and growth management today will help limit and mitigate future emissions, as well as increasing the resilience of urban areas to the impacts of climate change.

Figure 1: World GHG Emissions Flow Chart



## 1.4 KEY PRINCIPLES AND TERMS

Throughout this guide, you will read about several key principles for responding to climate change in cities and towns. This sub-section briefly introduces the most important principles and planning terms.

In terms of planning principles, UN HABITAT recognizes the crucial role that planners play in guiding more sustainable and environmentally friendly urban development, which in itself is a critical component of planning for climate change. With its strategic and spatial dimensions, urban planning is at the core of responding to a wide variety of issues, from sanitation and health to building safety. Climate change affects many different aspects of urban life, and it is for this reason that planning needs to engage climate-related issues directly. In the face of these issues, planners have reinvented key aspects the profession and its tools, and pursued new approaches and perspectives that promote innovation and creativity.

At the heart of these new planning approaches is the concept of broad-based sustainability, with environmental, social, economic, and cultural dimensions. Effective planning for climate change requires that careful attention be paid to balancing these different dimensions of sustainability. A balanced environmental, social and economic response to climate change – a paradigm shift towards sustainable urban development – is the underlying vision of this publication.

Most terms used in this guide are based on those used by the Intergovernmental Panel on Climate Change (IPCC), an intergovernmental scientific body tasked with evaluating the risk of climate change caused by human activity. The World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), two organizations of the United Nations, established the IPCC in 1988. A more comprehensive Glossary of Terms in Appendix 3 supplements the following list of key terms. More information on some of the terms is also provided in the document itself.

- **Adaptation:** The adjustment of human and city systems in response to actual or expected climatic changes or their effects to reduce and/or moderate the negative impacts of them. Adaptation does not mean that the negative impacts will be avoided, only that they will be less severe than if no planning had occurred.
- **Adaptive capacity:** A system's ability and efforts in both physical elements (infrastructure, material wealth, technology) and social/institutional elements (human capital, governance, institutional strength) to adapt to climate change impacts.
- **Climate change:** A change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.

## NEW URBAN PLANNING – THE VANCOUVER DECLARATION

Leading into the World Planners Congress in Vancouver, Canada in 2006, a position paper on urban planning was released, entitled the Vancouver Declaration. The policy document called for New Urban Planning - a new, proactive approach that focuses on sustainability and making the connections between people, economic opportunity and the environment. The new approach is based around the following ten principles, all of which have climate change planning implications, and underscore the fact that good urban planning supports and creates a foundation for climate planning<sup>1</sup>.

1. **Sustainability:** A practical focus on integrating social, economic and environmental considerations in human settlements development that considers the impact of today's developments on future generations.
2. **Integrated:** An integrated approach that combines and coordinates economic planning, physical planning, and environmental planning to deliver efficiency and effectiveness by adding value through policies that support, rather than undercut, each other.
3. **Integrated with Budgets:** A recognition that successful plans effectively link to private and public budgetary processes. Neither plans by themselves, nor unregulated market processes, can deliver more sustainable settlements.
4. **Planning with Partners:** Plan with all sectors of the community with a stake in the place, including governments, private sector organisations, voluntary agencies and civil society. New Urban Planning fosters voluntary collaboration amongst all these actors.
5. **Subsidiarity:** While national governments have important roles in setting national urban development policies and programs, subsidiarity recognizes the need for decentralization, with local governments playing a leading role, and empowerment of community-based organisations on matters that can be determined at neighbourhood level.
6. **Market Responsive:** New Urban Planning understands market demand, particularly in land and property markets, and is aware of the dynamics and potential of the informal sectors. It is responsive, but not reactive.
7. **Access to Land:** A supply of land in safe and accessible locations to meet the needs of all sectors of society is fundamental to achieving efficient and equitable settlements. Traditional town planning too often under-estimated needs, particularly of the poor. Equitable systems of land ownership and land management need to underpin successful urban planning.
8. **Appropriate Tools:** Urban development regulation and control should be strategic, affordable, effective, and sensitive to the needs of the poor while conserving essential ecological resources. New Urban Planning recognizes that rigid urban containment is not a feasible, equitable or affordable policy in conditions of rapid urbanization.
9. **Pro-poor and Inclusive:** Successful planning is inclusive, pro-poor, recognizes diversity and promotes equality. Plans can and should be driven by the objectives and priorities as expressed by all groups in the city.
10. **Cultural Variation:** New Urban Planning allows for a variety of outcomes according to cultural priorities and preferences.

<sup>1</sup> Adapted from: Reinventing Planning: A new governance paradigm for managing human settlements. World Planners Congress, June 2006

- **Exposure:** Is a measure describing the external stress brought about by climate change threats (sea level rise, change in temperature, change in precipitation and extreme weather events) in relation to population, resources and property.
- **Impact:** An effect of climate change on the structure or function of a city or town.
- **Integration:** An approach to climate change planning that considers larger and related sustainability issues (i.e., economic, social, governance, environmental, etc.). Integrated planning and action can deliver efficiency and effectiveness by adding value through policies, programs, plans and actions that support, rather than undercut, each other. See mainstreaming.
- **Mitigation:** Mitigation activities help to reduce the rate and/or magnitude of climate change by helping reduce human-generated greenhouse gas emissions.
- **Mainstreaming:** The process by which climate risks to city plans, programs, activities and policies are considered and adjusted to address these risks. Mainstreaming assumes that other projects can be enhanced – e.g., poverty reduction, urban sustainability, etc. -- and their benefits increased by integrating climate planning with them. Mainstreaming helps ensure that a city's plans and policies are not at odds with climate risks now and in the future.
- **Resilience:** The inherent ability of a city or town and its citizens to withstand impacts and rebuild or re-organize itself when necessary.
- **Sensitivity:** Describes the degree to which a system is affected by the biophysical impact of climate change. It considers the socio-economic context of the system being assessed.
- **Strategic planning:** A systematic, transparent and objective decision-making process that provides a process to determine priorities, make wise choices and allocate scarce resources (i.e., time, money, skills) to achieve agreed-upon objectives.
- **Participatory planning:** A community-based planning approach that works to involve all sectors of a community with a stake in climate planning, including local governments, the private sector, voluntary agencies and civil society.
- **Vulnerability:** Refers to the degree to which a group of people in a city (e.g., urban poor) is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, as well as the sensitivity and adaptive capacity of that system.

## 2.0 Planning for Climate Change: A Strategic, Values-based Approach

Addressing climate change is a daunting challenge. When coupled with large vulnerable populations, informal land and housing development, infrastructure limitations and poverty, the challenge of responding to climate change can at first appear overwhelming.

With so many challenges already at hand, how can urban planners be expected to also plan for and take action on climate change? **Where does climate change ‘fit’ in terms of a city’s priorities? What sectoral plans should include and/or address climate change? How?**

### 2.1 THE PLANNING FRAMEWORK

This guide takes the approach that climate change planning can, and should, augment and be **integrated** with existing planning and development activities across all sectors. Climate change is simply another key piece of information that should be considered during every planning process, to modify plans and to provide additional cost-benefit rationale for these modifications. Many climate change planning actions are consistent with planners’ responsibilities, including:

- Minimizing and/or improving housing and land development activities that occur in flood and slope hazard areas;
- Improving infrastructure for storm water management, solid and liquid waste management, access to safe drinking water, and the movement of goods and people;
- Protecting habitat and environmentally-sensitive areas in and around towns and cities;
- Improving emergency response capacities for disasters (particularly weather and climate-related events);
- Supporting local economic development to reduce poverty and improve quality of life; and,
- Supporting more sustainable development.

To help integrate climate change planning into current planning and urban development initiatives, and make it easier for town planners to take action on climate change, this

guide is **organized around a four step strategic planning approach** that incorporates innovative structured decision-making tools with a participatory, local values-based methodology<sup>2</sup>.

This guide incorporates a strategic planning approach with the belief that all planning -- spatial/physical, sectoral, environmental, organizational, economic -- is more effective if it is strategic. This is because no matter the type of planning, all of it is ultimately about making the best long-term decision possible. To plan for climate change adaptation using a more strategic approach will not only help communities decide what to do, but also how to do it and when to do it, making decision-making more transparent and objective. Integrating a values-based, participatory approach with strategic planning also helps ensure that **community capacity** (human resources, time, financial resources, political leadership and governance, etc.), **local knowledge** and **community values** are considered when identifying and prioritizing climate actions and integrating them into sectoral and day-to-day planning activities.

As a values-based, participatory activity, the climate change planning process is **not linear**. It is a more organic, iterative process that is designed to let communities revisit steps as new information becomes available, new stakeholders become involved, or other circumstances change. It is also an approach built around integration that seeks to be integrated and coordinated with other urban planning processes, tools and instruments.

The planning framework also respects the fact that each city is **unique** in terms of the **planning context** (i.e., capacity, governance, leadership, policy, pace of urban growth and urban development levels), **the current climate situation** (i.e., threats, vulnerability, adaptive capacity, level of GHG emissions), the **stage of planning for climate change** each community is in (i.e., some cities may be quite advanced, while others may be at “square one”), and that local values will differ with each community. This guide is designed for this range of situations and realities, and allows guide users to “enter” at different stages of the strategic planning process.

Here, it is important to note that there are **many climate change planning tools and guides available**. While none of them are based around the same strategic planning process used in this guide or incorporate its structured decision-making tools and values-based framework, we have highlighted areas where other guides can provide complimentary tools, case studies and other helpful resources. There is a wealth of valuable resources available, many of which are highlighted in Appendices 2, 4 and 5. We encourage users of this guide to review them and incorporate them in their own planning process wherever appropriate. Particularly relevant and useful tools are noted in the Modules themselves.

<sup>2</sup> The strategic planning approach has been used for equally challenging planning processes, including local economic development planning, health services delivery, physical land use planning and environmental planning in both the developed and developing world by local governments, state and regional planning agencies, international organizations (including UN-HABITAT) and the voluntary sector.

Figure 2: Planning for Climate Change



As illustrated, this guide's planning framework is organized around a four-phase process. Each phase, or module, asks one of the following guiding questions. Answering them requires users to go through a corresponding set of **steps**. Each of the nine planning steps is then broken down into more detailed **tasks**.

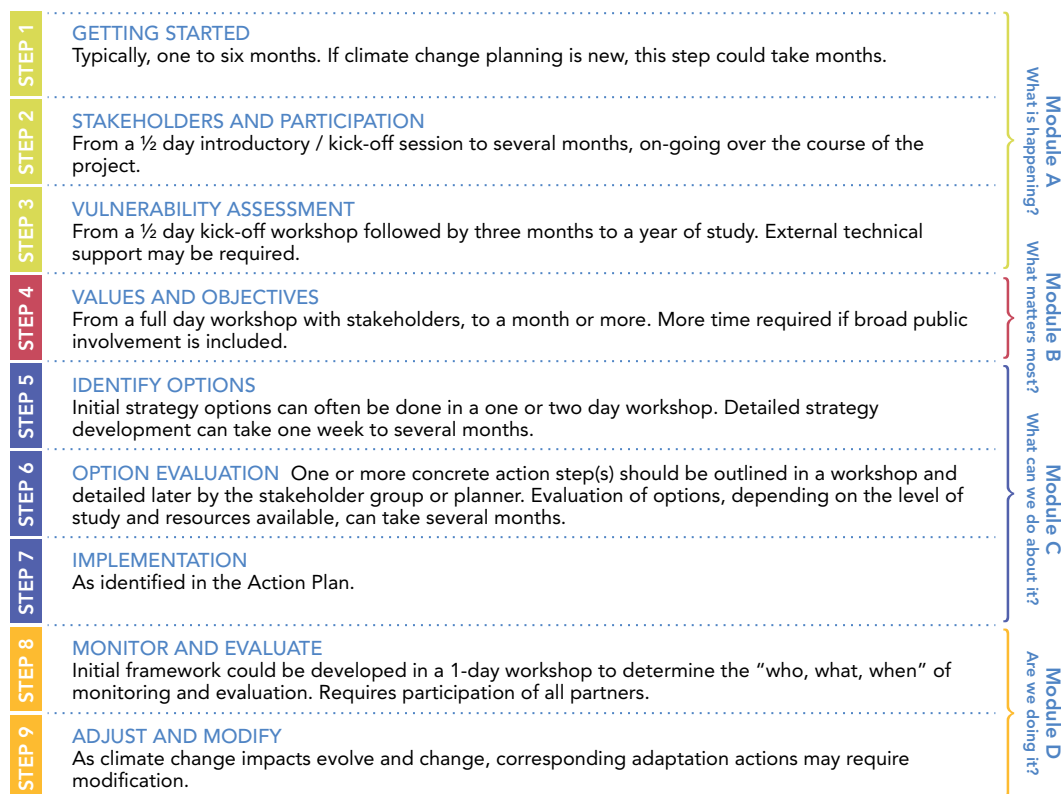
## 2.2 TIME REQUIREMENTS OF CLIMATE CHANGE PLANNING

One of the challenges of understanding climate change planning is to get a sense of how much time is required for each of the planning steps. While there are no hard rules regarding time requirements for each step of the process -- each planning process will involve different stakeholders, consider different climate change impacts and result in different actions -- developing a stand-alone Climate Change Action Plan or incorporating climate change adaptation strategies into existing sectoral plans could take as little as two months or as long as a year or more.

Timelines will also vary depending upon which stage a community enters the planning process at, the local government capacity and resources, the scale of what you are hoping to achieve through this process (i.e., a stand alone climate change strategy, a vulnerability assessment, a climate change education campaign, etc.), and the level of community engagement (outside of the project stakeholder group – see Step 2) you are considering. For communities interested in undertaking the entire climate change planning process, one method to reduce timelines is to organize a special planning retreat or conferences where several steps can be completed in a single setting. Typically, these events benefit from skilled facilitation and with local governments that function well (i.e., a local government with the capacity and will to enforce plans and regulations). They also require preliminary work (i.e., Module A: What is Happening?) so that the planning sessions are appropriately limited in scope.

The figure illustrates some general timelines to consider in the strategic planning process. It is important to note that every planning step should be carried out regardless of community resources. While some communities may have additional capacity or financial resources, a more basic and simplified approach is perfectly acceptable -- doing a ½-day workshop with volunteer stakeholders is better than leaving out a step if you cannot, for example, hire a specialist consultant.

**Figure 3: Climate Change Planning Process – Potential Time Requirements**



## 3.0 Climate Change: A Review

This section explains, in basic terms, the challenges generated by climate change.

***The Challenge of Climate Change*** provides a summary review of how and why climate change is affecting our planet's atmosphere and the biophysical cycles driven by it – water and air temperatures, weather, tides, etc. This sub-section summarizes the most relevant and important information in the extensive and often overwhelming body of data and research around climate change.

***Cities and Climate Change*** explains how the biophysical challenges generated by climate change in turn generate very real and growing impacts on cities and towns and, most importantly, the people that live there. This sub-section explains how these impacts can affect vulnerable groups – the poor, women, children, etc. – more severely, and explains where, how and through what policy and program avenues planners can play a role in responding to these impacts, preparing for future potentials, and mitigating a city's greenhouse gas emissions.

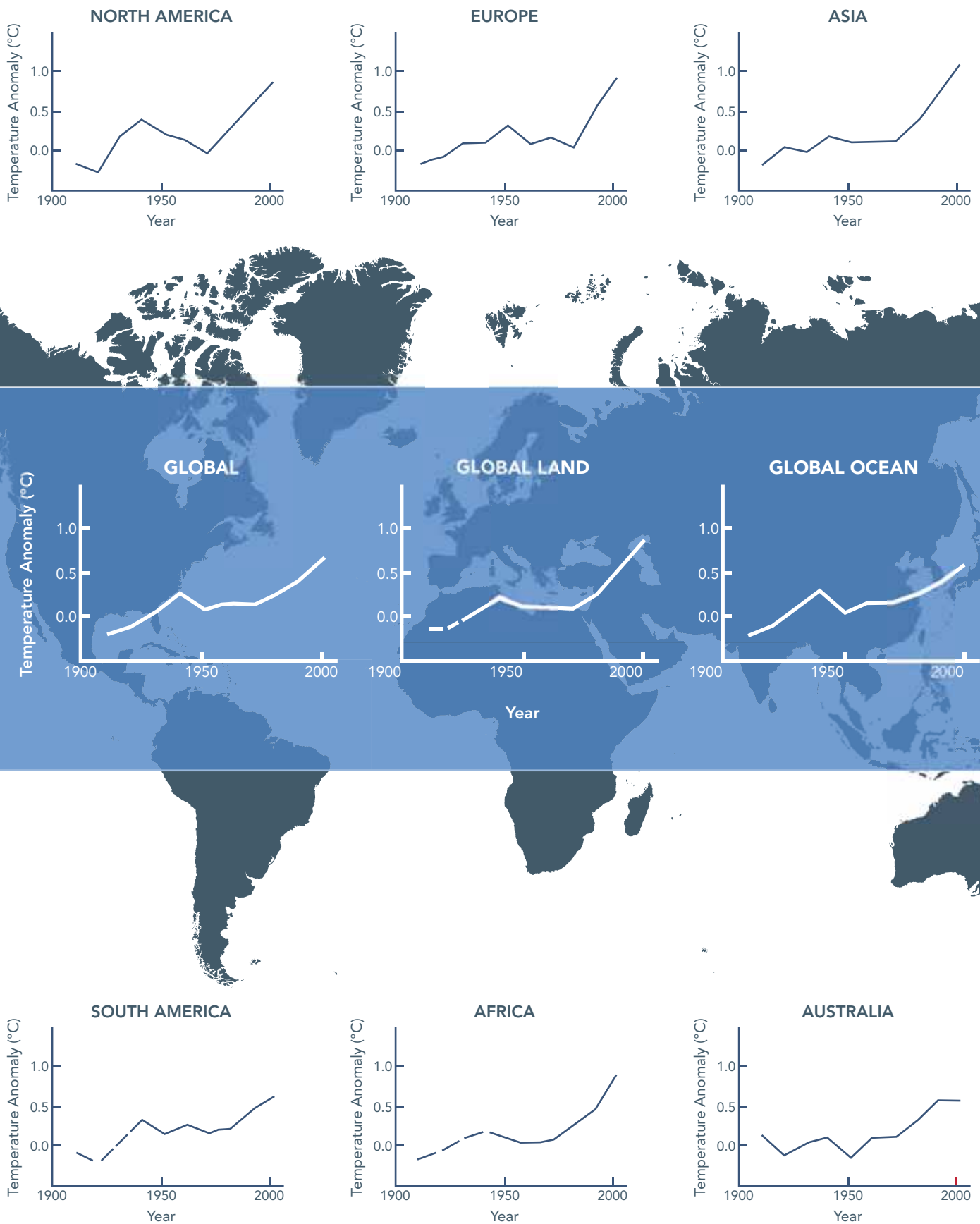
### 3.1 THE CHALLENGE OF CLIMATE CHANGE

Climate change refers to changes to the average weather or weather variability of a region or the planet over time. It is measured by changes in temperature, precipitation, wind, storms and other weather indicators.

The key climate change indicator that scientists look to is the average surface temperature of the earth. Over the past 50 years, the global average temperature trend increased by 0.65°C. Global ocean temperature is also an important factor to consider due to its affect on surface temperatures. The world's oceans are absorbing much of heat added to the earth's climate system and as the ocean circulates, much of that heat is released into the atmosphere, increasing the warming effect over time. No regions are immune to rising temperatures, though some have witnessed sharper increases in the last 25 years.

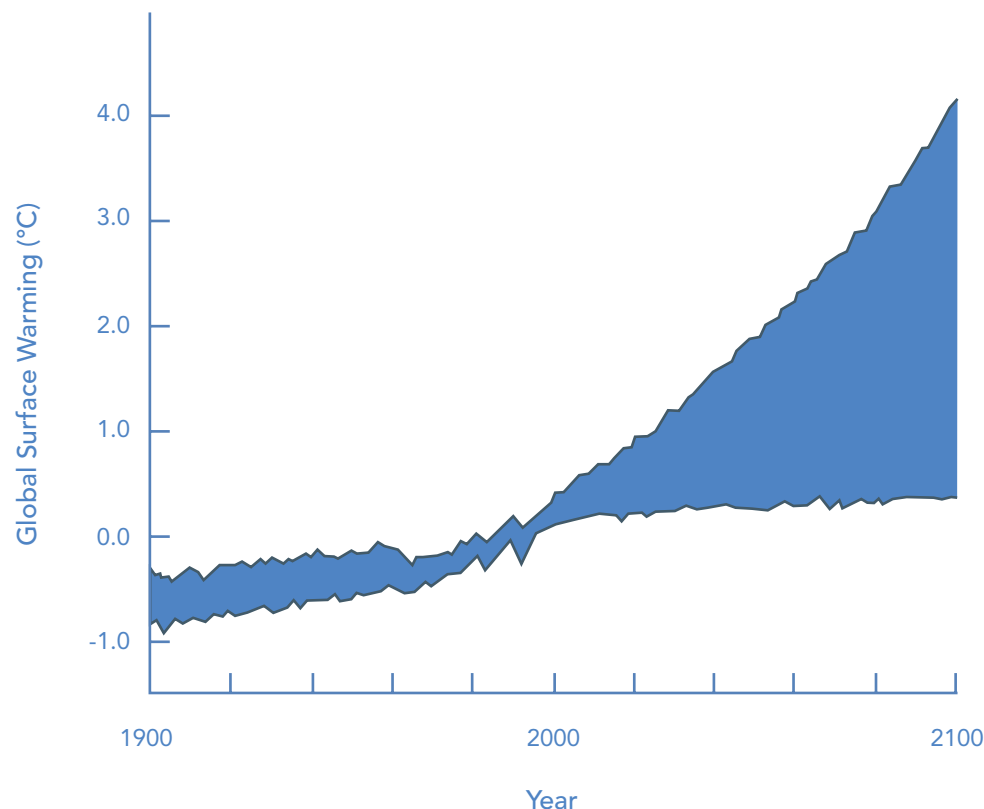
In its *4th Assessment Report* in 2007, the Intergovernmental Panel on Climate Change (IPCC) stated that, "Most of the observed increase in global average temperatures since the mid-20th century is very likely (>90%) due to the observed increase in anthropogenic greenhouse gas concentrations." The increase in carbon dioxide levels in the atmosphere – primarily from the burning of fossil fuels and land use change – is increasing global temperatures at a rate never before seen in human history.

Figure 4: Global and Continental Temperature Change



Adapted from: Figure SPM 4. IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)].

Figure 5: Global warming on the rise: best case to worst case scenarios



Adapted from: Figure SPM 5. IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Surface temperatures are expected to rise between 1 and 4°C over the next century. Rising temperatures are having a cascading effect, leading to **increased storm severity** and extent, **extended drought conditions**, **sea level rise** and associated **coastal erosion and flooding**, and increased or intensified **flash flooding**, among other biophysical effects.

Of course, warming and related changes will vary from region to region around the globe. Given the dynamic nature of the climate system, the nature of this **regional variation** is uncertain and will continue to be researched and studied.

These changes to the earth's weather system will in turn impact human settlements throughout the world, with particularly severe impacts in low and middle-income countries where the capacity to manage impacts may be less and vulnerable populations greater. Problems such as power outages, shoreline erosion, infrastructure failure, and contaminated water supplies, to name a few, will continue to challenge cities to assess emerging risks and vulnerabilities and adapt to them. Furthermore, rapid global urbanization will mean greater reliance on physical and social systems that are increasingly vulnerable to climate change related impacts, especially as the poorest are often forced to settle on the most vulnerable land.

## 3.2 CITIES AND CLIMATE CHANGE

Cities and towns are critical players in climate change. They concentrate a large proportion of people most at risk from, and vulnerable to, negative climate change impacts. UN-HABITAT strongly maintains that urban planning is increasingly important in managing climate change because well-planned cities are more adaptive to climate change and resilient to its negative impacts than unplanned, poorly managed cities.

With over 50% of the global population living in cities and urban populations projected to grow, they are our major centres of consumption and production. As such, they are great energy consumers and, as a result, great greenhouse gas emitters. They are also the hubs of economic, political and cultural activity, and centres of knowledge and innovation. With their creativity and capacity, they will play a major role in developing and implementing climate change adaptation and mitigation actions and strategies.

The figure illustrates two themes. First, cities are the major and growing energy consumers, forecast to be consuming almost three-quarters of the world's energy production by 2030. The second feature the graph illustrates is that non-OECD (Organization for Economic Cooperation and Development) cities, many of which are located in the developing world, are becoming increasingly large energy consumers as they develop and grow<sup>3</sup>. This trend raises many climate change-related questions, particularly around how these cities will develop over time, and the considerable opportunities that exist for a development approach that considers both mitigation and adaptation. If cities in the developing world are to successfully address the climate change challenge, a different development path from that pursued in developed countries will be required.

Our cities themselves are complex communities. The energy cities consume and the associated emissions they produce can be attributed primarily to building construction, cooling, heating and electrification, vehicle use, industry and manufacturing. Multiple urban planning considerations help determine the level and intensity of these emissions, including how we arrange our cities (urban form), population densities (urban density), and how we move in and through them (urban transportation). Additionally, how we manage the wastes we produce, both liquid and solid, can contribute to our greenhouse gas emissions or mitigate them.

### BUILDINGS AND CLIMATE CHANGE – CHALLENGES AND OPPORTUNITIES

**THE CHALLENGE:** Buildings are responsible for more than 40 percent of global energy use and one third of global GHG emissions, both in developed and developing countries. The main source of emissions from buildings is from the energy they consume for heating, cooling and lighting, but buildings are also major emitters of GHG emissions during their construction. It is expected that total emissions from buildings in rapidly industrializing countries will surpass emission levels from buildings in developed countries in the near future.

3 Founded in 1961, the OECD is an international economic organisation made up of 33 developed countries that seeks to stimulate economic progress and world trade. It defines itself as a forum of countries committed to democracy and the market economy that provides a setting to co-ordinate domestic and international economic policies of its members.

FIGURE 6: WORLDWIDE CITY CO2 EMISSIONS AND ENERGY DEMAND



Source: OECD/IEA (2008), World Energy Outlook 2008

**THE OPPORTUNITY:** There are significant opportunities to cost-effectively reduce building sector GHG emissions using existing technologies that can cut energy consumption by 30 to 80 percent in new and existing buildings (in both the developed and developing countries). If carefully planned, GHG mitigation strategies for buildings can stimulate the growth of new businesses and jobs, as well as contribute to other social development goals, such as better housing and access to clean energy and water. Urban planners play an important role in realizing this opportunity through their work on development control and regulation, influencing building standards and codes, and working with building developers.

### 3.2.1 URBAN CLIMATE CHANGE IMPACTS

The biophysical challenges generated by climate change give rise to additional and very real impacts on our cities and towns and the people that live in them. Of course, the impacts and threat potentials vary between cities depending on their:

- **Geographic location**, which will determine how they will be affected by climate change and the potential degree of those biophysical changes;
- **Specific geographic features**, which in combination with their general global location will help determine potential threats (i.e., is the town located on the coast? On a river delta? On a major river? In an already arid area where climate change exacerbates an already sensitive condition between urban water needs and scarce water resources?);
- **Area of climate change impact hazard lands**, which can be ascertained by asking questions such as, "How much development has occurred on steep or unstable slopes? Or on low lying, storm exposed or low lying or flood prone areas?" "What is the quality of development in those areas (i.e. are developments in hazard areas poorly built informal settlements or are they higher quality developments built to national construction standards?)" and,
- **Vulnerable population** - vulnerable groups living in the city and in its climate change hazard prone areas are more likely to be more affected by climate change impacts than other, less vulnerable groups (they have a lower capacity to effectively respond to or adapt to climate change impacts due to limited resources).

Table 2 summarizes major climate change impacts in urban areas. This is followed by more detailed information on three particularly key impacts: increased flooding, decreased water supplies, and increased droughts and heat waves.



Children stranded after a devastating floods in Sindh, Pakistan, Sindh, Pakistan, 2010. © UN-HABITAT pakistan

Table 2: Climatic Changes, Possible Impacts, and Potential Impacts on Cities<sup>4</sup>

| CLIMATIC CHANGE                                                   | POSSIBLE IMPACT                                                                                                                                                                   | POTENTIAL URBAN PLANNING-RELATED CONSEQUENCES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Increased Temperatures                                            | <ul style="list-style-type: none"> <li>Groundwater depletion</li> <li>Water shortages</li> <li>Drought</li> <li>Degraded air quality (smog)</li> </ul>                            | <ul style="list-style-type: none"> <li>Water shortages</li> <li>Distress migration to cities/towns due to droughts in rural areas</li> <li>Interruption of food supply networks and higher food prices</li> <li>Potential energy price increases (e.g., from reduced hydro-electricity generation in places where it exists)</li> <li>Exaggerated urban heat island effect</li> <li>Increased energy demands for cooling</li> <li>Need for higher and/or additional wastewater treatment</li> <li>Population health impacts (e.g., increased mortality during heat waves, decreased access to food/nutrition)</li> </ul>                                                |
| Increased Precipitation                                           | <ul style="list-style-type: none"> <li>Increased flooding</li> <li>Increased risk of landslides or mudslides on hazard slopes</li> </ul>                                          | <ul style="list-style-type: none"> <li>Interruption of food supply networks</li> <li>Property damage (homes and businesses)</li> <li>Disruption of livelihoods and city/town economies</li> <li>Damage to infrastructure not designed to standards of occurrences being experienced</li> <li>Distress migration to cities due to floods in rural areas</li> <li>Displacement and population movement from informal settlements built on steep slope hazard lands, etc.</li> <li>More favourable breeding grounds for pathogens (e.g., mosquitoes and malaria)</li> <li>Population health impacts (increased incidences of water-borne diseases like cholera)</li> </ul> |
| Sea-level Rise                                                    | <ul style="list-style-type: none"> <li>Coastal flooding</li> <li>Salt water intrusion into groundwater supplies in coastal areas</li> <li>Increased storm surge hazard</li> </ul> | <ul style="list-style-type: none"> <li>Displacement and population movement from coastal flood areas</li> <li>Property damage (homes and businesses)</li> <li>Damage to infrastructure not designed to standards of occurrences being experienced</li> <li>Disruption of livelihoods and city/town economies</li> <li>Population health impacts (injuries, increased mortality and illness)</li> </ul>                                                                                                                                                                                                                                                                  |
| Increased extreme weather episodes (storms, cyclones, hurricanes) | <ul style="list-style-type: none"> <li>More intense flooding</li> <li>Higher risk of landslides/mudslides on hazard slopes</li> </ul>                                             | <ul style="list-style-type: none"> <li>Property damage (homes and businesses)</li> <li>Damage to infrastructure not designed to standards of occurrences being experienced</li> <li>Population health impacts (injuries, increased mortality, distress)</li> <li>Disruption of livelihoods and city/town economies</li> <li>Interruption of food supply networks</li> </ul>                                                                                                                                                                                                                                                                                             |

<sup>4</sup> Source: adapted from Developing Local Climate Change Plans, UN-HABITAT/International Institute for Environment & Development (2010) and Willbanks et al (2007)

Three likely impacts of climate change on our cities and towns are described in more detail below. While there are certainly additional impacts generated by climate change, the three profiled below – flooding, water scarcity and the heat island effect – illustrate the range of climate impacts a community might face. As noted, impacts in each category can be expected to vary depending upon the region, size of city, and level of development. Additional information on impacts can be found in Appendix 2: Other Resources.

### Flooding:

Climate change has the potential to increase flooding in three ways:

- **Sea level rise:** Climate change is causing higher sea levels due to increased and growing glacial and polar ice melt. It is also causing sea levels to rise by warming the oceans themselves, which causes their overall volume to increase. There are estimates from the United Nations that sea levels could rise between 18cm and 59cm by the end of the 21st century. In combination with the increased frequency and magnitude of marine storms, including cyclones, typhoons, and hurricanes, storm surges associated with these events are becoming larger and more damaging. Currently, about 13 percent of the world's urban population (around 360 million people) live in the low-elevation coastal zones (i.e., less than 10-metres above sea level) and an estimated 10-million people are currently affected each year by coastal flooding. Small island states in the Pacific are particularly threatened by sea level rise.

The impacts of sea level rise on a given city will vary depending upon its location (i.e., sea level rise will not be uniform and forecast rises are different around the globe) and level of development (i.e., some cities may have built sea walls or preserved protective coastal areas like mangrove forests, while other cities have coastlines that are more prone to erosion). Urban planners, of course, are key players in determining appropriate actions to reduce vulnerability including: the location and scale of marine defences like sea walls; the identification and avoidance of development in sea level rise hazard areas (or ensuring that new development in hazard prone areas can withstand storm surges and related hazards); and the identification and protection of shoreline areas (like mangrove forests) that provide a natural defence for storm surges and coastal flooding (while providing mitigation benefits).

- **Increased/Intensified rainfall:** Most climate scientists agree that intense, heavy rainfall events are likely to increase in frequency and magnitude in certain parts of the world because of climate change. Due to the large amount of impermeable surface areas (roads, buildings, paved areas) in cities and towns, places with inadequately designed or limited storm sewer and drainage systems will be faced with flooding during these storm events. Damages and health impacts will be compounded in areas with open sewage ditches and/or a combined sewer-storm water system that tend to be overwhelmed during storms and introduce raw sewage into the flood waters. There is a growing body

of research that indicates increased rates of injury and death from flooding in urban areas (especially in Africa, Asia, Latin America and the Caribbean) with inadequate drainage and flood protection systems.

The impacts of increased/intensified rainfall will vary depending upon the region (i.e., different regions are forecast to be more subject to increased/intensified rainfall than other areas) and the urban area's level of development and infrastructure. For example, some lesser-developed cities may have more pervious or unpaved areas where rainfall can be more easily absorbed (absorption rates will depend on how parched the unpaved or pervious land is). Other cities may have more developed storm water management systems and infrastructure with which to manage the increased/intensified rainfall events, although the intensity of the events may well overwhelm even the most comprehensive systems. Urban planners play an important role in the development and upkeep of stormwater systems and can help make sure that new roads, buildings and infrastructure include stormwater features (e.g., infiltration areas, pervious surfaces, impoundment areas, rainwater gardens) in those regions facing increased/intensified rainfall episodes.



Damaged sea wall, Sorsogon City. © UN-HABITAT / Bernhard Barth

- **Increased/Intensified river flooding:** Increased and intensified rainfall from storms and, in certain places, bigger river flows due to increased glacial melt due to climate change, ultimately leads to higher incidences of rivers overflowing their banks. In urban areas, particularly those in low-lying areas or delta, this type of flooding has been increasing. UN-sponsored research indicates increased runoff and earlier spring melts in many glacier- and snow-fed rivers may be compounding this situation.

As with the other areas explored in the flooding theme, the impacts of river flooding vary depending upon the region (i.e., some cities are located on river deltas, river confluences, or around larger rivers) and the level of development (i.e., some cities may have built protective dikes or controlled development in the flood plain). Urban planners are key players in determining the location and scale of river dikes and other flood management systems. Local land use plans and enforcement can also regulate the location, type and scale of development in flood plains.

### Water scarcity:

Access to clean water will be threatened as climate change advances. Lack of access to safe drinking water and adequate sanitation is a major cause of ill health and life threatening disease. In many towns and cities in the developing world access to potable water is not universal and sanitation coverage is still low. UN-sponsored research indicates that by 2020 between 75 million and 250 million people could face climate change-driven water shortages in Africa alone. Similar scenarios have been projected for Asia. Many cities and towns will not only face increased water demands with population increases -- brought about in part from rural migration from water scarce areas -- but also water supply issues as their own fresh water sources are impacted by climate change. These problems will be further compounded in cities and towns with limited, poorly maintained or outdated water supply systems and infrastructure.

As with any climate impact, the scale and severity of potential impacts vary depending upon the region and where its water supply comes from (e.g., glacial fed water systems will be impacted differently than non-glacial fed systems). As both a supply and demand side issue, water scarcity also depends upon the size of the city and its water consumption patterns and rates. It also varies depending on the efficiency of water management systems and many other factors, including upstream diversions of potable water. As urban planners are typically involved in the development of local land use plans, infrastructure plans and water plans, there are many areas where planners can address and incorporate climate change adaptation around water scarcity (e.g., water efficient development and conservation strategies, reusing non-potable or grey water for some urban applications like irrigation as well as groundwater recharge, encouraging rain water capture and cisterns, etc.).

### Heat island effect:

Climate change will likely drive up temperatures in most cities and towns in Africa, Asia and South America. Higher temperatures will be compounded in urban areas by the urban heat island phenomenon – an occurrence where a city’s buildings, roofs, paved areas and other infrastructure hold and retain solar heat. This can make a city several degrees warmer than the surrounding rural areas, which have more green space. It is anticipated that towns and cities will be subject to more frequent and intense heat waves, which will directly impact the health and quality of life of urban residents. In Europe, Asia and North America, heat waves are associated with dramatic short-term increases in mortality for the elderly and very young.

Heat island effects will vary depending upon the region and the level of development (i.e., some cities may have fewer paved roads and/or other surfaces that absorb solar energy). Urban planners can help mitigate heat island effects by expanding urban green spaces and developing urban forestry programs where the number of trees in cities is increased.

**Table 3: Major Climate Threats and the Countries Most at Risk**

| THREAT  | LOW INCOME                                                                                    | MIDDLE INCOME                                             |
|---------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Drought | Chad, Eritrea, Ethiopia, India, Kenya, Malawi, Mauritania, Mozambique, Niger, Sudan, Zimbabwe | Iran                                                      |
| Flood   | Bangladesh, Benin, Cambodia, India, Lao PDR, Mozambique, Pakistan, Rwanda, Vietnam            | China, Sri Lanka, Thailand                                |
| Storm   | Bangladesh, Haiti, Madagascar, Mongolia, Vietnam                                              | China, Fiji, Honduras, Moldova, Philippines, Samoa, Tonga |
| Coastal | Bangladesh, Mauritania, Myanmar, Senegal, Vietnam, Pacific Islands                            | China, Egypt, Indonesia, Libya, Mexico, Tunisia           |



VULNERABILITY =  
EXPOSURE + SENSITIVITY  
(TO CLIMATE CHANGE)  
— ADAPTIVE CAPACITY

### 3.2.2 URBAN POPULATION VULNERABILITY

While the impacts of climate change are felt around the world, they are distributed unevenly with some areas and people being affected more than others. Vulnerability to climate change is also distributed unevenly in cities and towns, with some groups being impacted more severely than others. This sub-section explains three of the most climate change vulnerable groups who will require additional consideration in any climate planning initiative – the urban poor, women, and the elderly and young.

- **Urban poor:** It is widely acknowledged that climate change has a disproportionate impact on the lives of people living in poverty. It is also widely known that the urban poor often live in informal settlements located in areas most at risk from climate change weather events, including hazard areas like floodplains and steep, unstable slopes prone to erosion and failure. Due to this group's poverty, their capacity to reduce or avoid their exposure to direct and indirect climate change impacts is also reduced. In addition to hazard threats, this group's risk is compounded by their more limited ability to cope with the consequences of any climate change impact (i.e., illness, injury or loss of income, livelihood or assets). Simply put, poverty increases people's exposure to climate change impacts and climate change increases risks, therefore people living in poverty and poor communities are most vulnerable to climate change impacts

Food security risks for the urban poor are also likely to increase as climate change advances. In many places, a large percentage of food is still locally and regionally produced and shipped to nearby cities. Increasingly unpredictable seasons and extreme weather events such as droughts and floods may lead to crop failures or reduced harvests, which would impact city food consumption. Declines in marine harvests have also been partly attributed to climate change and increasing ocean temperatures.

Rural-urban migration and international migration is likely to increase as agricultural areas affected by climate change become more and more marginal. Accelerated urbanization further increases the pressure on local governments to provide housing and services for these climate change refugees. This segment of urban growth will increase as climate change impacts vulnerable lands.

- **Women:** In many poor, urban communities women (and girls) are likely to bear disproportionate hardship to the effects of climate change. Climate change will impact sectors that form the basis of livelihoods for which women are responsible, for example nutrition, water and energy supplies. Moreover, because of gender-based inequalities in terms of property rights, resources, access to information and socio-economic roles, the effects of climate change will have a disproportionately severe effect on women. As a result of gender-based inequalities, women need to be involved in the process of adaptation and processes need to be designed to be supportive and accessible.
- **The elderly and the young:** The elderly and the young are less able to avoid the direct and indirect impacts associated with climate change due their age and physical abilities. They are also less able to cope with any resulting injuries or illness. Urban heat waves have been shown to take a significant toll on elderly people and the very young. Many of the diseases that are predicted to become more common because of climate change, like malaria, have been shown to impact younger age groups.

### 3.2.3 CLIMATE PLANNING AND CITY PLANNING

The connections between town planning and climate change adaptation are strong and clear. Planners play a direct role in shaping and controlling land use and urban form – a significant determinant of both a city's adaptive capacity and climate change resilience, and the level of climate change impact risk for vulnerable urban populations. From a mitigation perspective, urban form is also a major driver of a city's greenhouse gas emissions.

Key areas where planners can support and lead adaptation and mitigation activities in more traditional physical planning capacities are summarized below.

- **Land use:** Careful attention to physical land use and development patterns (urban form) is a way for planners to manage and adapt to the effects of climate change. For example, planners are key players in the designation of land uses and can help shape settlement patterns to reduce and minimize exposure to lands that are climate hazards (e.g., steep and unstable slopes, flood zones, coastal areas subject to sea level rise and storm surges, etc.). From a mitigation perspective, city plans that promote more compact development patterns can create supportive conditions for alternative energy systems (e.g. district energy) thus reducing energy consumption and its associated greenhouse gas emissions. As urban populations increase the world over, effective land use planning will become more and more important. This is especially true in the developing world where municipalities have less control over development processes. Slum developments and informal settlements present a major challenge, as they are often located in areas that are vulnerable to multiple climate hazards. Forward-thinking planning processes that acknowledge climate change can help direct development and growth to more suitable areas and better manage growth now and into the future.
- **Environmental planning:** Planners play an important role in protecting and enhancing urban green spaces. In particular, planners can help relocate, minimize and/or prohibit development (planned and informal) out of environmentally sensitive areas like estuaries, wetlands and important coastal habitats like mangrove forests. Keeping development out of these areas can help improve a city's protection from riverine flooding and erosion, as well as marine storm surges and erosion. In addition to the climate protection and environmental benefits of these actions (i.e., habitat protection), other climate benefits can be realized, too. For example, urban green spaces can help cool the air, provide shade and reduce the amount of solar heat absorbing areas to help limit urban heat island effects. Green spaces also help act as carbon sinks to help mitigate carbon emissions. The increasing pressure that growing cities will mount on the environment they rely upon necessitates significant attention from planners. In order to alleviate this pressure, planners must consider how the environment that surrounds urban development will be affected as both populations and associated liquid and solid waste increase.

- **Storm water management:** Planners are critical players in improving a city's storm water management infrastructure that, in turn, is a key determinant in how well a city can handle and adapt to climate-related rainfall and flooding episodes. While some development is unavoidable in climate change hazard risk areas, planners can help regulate and control building forms and design (e.g., keeping living areas above flood hazard levels) and work to include stormwater management features in these areas (e.g., infiltration areas, pervious surfaces, impoundment areas). Urban planners, of course, are also key players in determining the location and scale of river dikes and other "hard" flood management systems.
- **Building and site design:** Local land use plans and development laws can be used to regulate the location, type and scale of development in climate hazard areas. Numerous siting and design features can be encouraged and/or required to make buildings more adaptable to climate impacts. For example, living areas can be required to be located at a suitable height so that they are above flood hazard levels. Tree planting and other sun shading can be required to reduce urban heat island effects and improve occupant safety and well-being. Buildings can also be designed to withstand other potential climate change effects, including more episodes of storm-related high winds. From a mitigation perspective, planners can encourage and promote more environmentally friendly design building design to reduce energy and water consumption.

As the role of urban planners increasingly crosses into other urban policy realms (e.g., social planning, local economic development, health, transportation, etc.), there are many other areas where city planner can support, and in many cities are already supporting, cross- and multi-sectoral urban sustainability planning activities and related climate change planning activities. As identified in the Vancouver Declaration, planning for urban sustainability (or new urban planning) is engaging multiple actors, communities and stakeholders.

In addition to the more traditional physical planning activities featured above, planners are increasingly supporting some of the following social, cultural and economic policy and program areas (as process stakeholders, technical supporters, policy developers, project and policy implementers, etc.).

- **Transportation Plans and Projects:** The transportation sector is typically responsible for about 1/3 of energy-related GHG production. Private automobiles account for a significant proportion of that activity. As automobile ownership rates climb in developing countries and urban development continues to sprawl, further separating the distances between the places people live, work and shop, this trend will continue to rise. Planners can help mitigate GHG emissions by working to reduce vehicle miles traveled and urban congestion through strategies such as compact, high density, mixed-use development. Strategically planned development can also direct development to areas less vulnerable to climate change impacts.

- **Local Economic Development Strategies:** A key component of both urban sustainability and climate change resilient cities is local economic health and well-being. Reducing poverty rates helps improve the adaptive capacity of more climate vulnerable groups. More climate vulnerable livelihoods can be identified and strengthened through such strategies. Green businesses that play a role in mitigating GHG emissions in addition to improving livelihoods and reducing both solid and liquid waste can be identified and supported. With both spatial elements (i.e., what kinds of businesses should be permitted where) and the underlying policy components, urban planners are key players in supporting local economic development strategy development and plan implementation.
- **Solid Waste Programs:** Landfills are large emitters of methane gas. Solid waste reduction initiatives and better management can not only reduce these emissions, but improve materials recycling rates, improve livelihoods and living conditions, and through initiatives like landfill gas capture or industrial composting generate valuable resources. In flood prone areas, a well-located landfill site can prevent contamination of natural aquatic areas and the water supply.
- **Wastewater Management:** Urban areas generate large amounts of domestic and industrial wastewater. Wastewater treatment plants historically are placed in the lowest areas of cities to allow flow with minimal pumping. With climate change these areas may become more susceptible to flooding with catastrophic effects for cities and towns by causing the release of contaminants that can produce waterborne disease.
- **Water Supply Management:** Water supplies are typically based on the demands of cities under historic weather patterns and may not withstand extreme periods of drought. Strategically planned storage reservoirs and water management can help mitigate climate effects resulting in water supply differences. Water supply management is of particular importance in rapidly growing cities in regions with limited and climate change threatened water supplies.
- **Community Health Programs:** A healthier population is a more climate change resilient population. Understanding this link and the obvious connections between urban form and public health, planners play a major role in supporting public health programs and policies. From slum upgrades to urban sanitation programs, and from service and infrastructure provision to land use management and controls that support more sustainable urban development, planners and public health workers share common goals.

- **Public Education Programs:** The most successful city plans and strategies are developed with community input and, ultimately, community support and buy-in. The outreach activities planners typically undertake in all types of planning and policy development projects – community meetings, focus groups, surveys, open houses, town hall meetings, newsletters and advertisements, stakeholder working groups – present significant opportunities to educate and inform the public about climate change, its connections to the policy or program area in discussion, and the related climate change impacts and risks. An aware and engaged community is a critical component of almost any urban sustainability initiative or climate change adaptation and mitigation activity, particularly those that might involve limiting development in certain areas and/or requiring public investment and funding.

Regardless of the planning capacity of local governments, almost any urban development or redevelopment initiative (policy, program, strategy or plan) can, and should, consider climate change. This process where current plans, strategies and policies are reviewed and expanded to include climate change adaptation and mitigation considerations is commonly referred to as mainstreaming.

Some of the projects and initiatives planners and allied professionals typically work on, and those cross-sectoral urban sustainability initiatives planners are increasingly involved with, are outlined in Table 4. The list identifies typical city plans, summarizes their general purpose, and highlights their potential climate change adaptation and mitigation features. Please note that this table will be referred at several points in Chapter 4 Planning for Climate Change: The Planning Cycle, when planners are both considering the potential mainstreaming climate change adaptation and mitigation options available to them, and when developing their final list of climate change planning activities,

It is also important to note here that while urban planners are definitely key players, they are far from being the only players in climate change planning. Knowing this, planners should work to engage and involve other city and local government departments and agencies, especially those individuals with prime responsibility for some of the urban sustainability plans outlined in this section. In addition to this, planners should also feel comfortable asking for outside expertise and assistance when and where required. Planning for climate change adaptation and mitigation is not an easy process and certain steps may require technical support and assistance. As will be made clear in the guide, there are many places where planners should seek help and input from climate specialists and other climate change stakeholders.

Table 4: Urban/Town Plans and Climate Change

| TYPE OF PLAN                                     | GENERAL PURPOSE                                                                                                                                                                                                                                                                                                                                                          | POTENTIAL CLIMATE CHANGE FEATURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Town Plan<br>City Plan<br>Physical Land Use Plan | <ul style="list-style-type: none"> <li>Identifies areas (zones) for different types of development (i.e., housing, commercial, industrial, etc.)</li> <li>Identifies development hazard areas (steep slopes, flood plains, etc.)</li> <li>To provide long-term policy direction on land use and development, transportation and overall community development</li> </ul> | <ul style="list-style-type: none"> <li>Highlight development “hot spots” or “no development areas” where climate change impacts are likely to be most severe</li> <li>Set policy direction on “climate friendly” and/or “climate resilient” infrastructure and servicing (i.e., stormwater management)</li> <li>Formally recognize climate change and highlight related impacts (i.e., build public awareness, political support)</li> <li>Land capability, suitability, and the feasibility of different development alternatives are analyzed to determine appropriate spatial relationships that form the basis of the generalized future land use maps</li> </ul>                                                            |
| Storm Water Management Plan                      | <ul style="list-style-type: none"> <li>Improves storm water management, including drainage and infrastructure</li> </ul>                                                                                                                                                                                                                                                 | <ul style="list-style-type: none"> <li>Identifies climate change-related storm water/flooding hazard areas</li> <li>Considers options for flood and coastal management, including promoting appropriate and sustainable defences and locating new development away from areas of highest risk</li> <li>Directs new infrastructure to “safer” areas not as exposed to climate change impacts (i.e., can attract or pull development to serviced areas)</li> <li>Accelerates investment in existing coastal and river flood defence programs to protect existing development in flood prone areas</li> <li>Identifies options to increase permeability of paved areas in drought prone and flood affected areas</li> </ul>         |
| Transportation Plan                              | <ul style="list-style-type: none"> <li>Improves road, pedestrian, transit and bicycle connections and infrastructure</li> </ul>                                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>Identify and improve “weak links” in transportation networks that are threatened by climate change impacts (e.g., bridges threatened by storm surges, roads subject to flooding, etc.),</li> <li>Identify and designate emergency transportation networks (i.e., roads and transportation links that could be used during a climate change impact event to transport people, supplies and any required relief supplies)</li> <li>Prioritize transportation network improvements that improve transportation connections for climate vulnerable groups</li> <li>Support climate change mitigation through reduced traffic congestion, prioritizing non-motorized transportation</li> </ul> |
| Local Economic Development Plan or Strategy      | <ul style="list-style-type: none"> <li>Identifies and prioritizes economic sectors and opportunities</li> <li>Identifies economic development priorities (i.e., jobs, capacity, infrastructure, etc.)</li> </ul>                                                                                                                                                         | <ul style="list-style-type: none"> <li>Reduces urban poverty levels for key climate change vulnerable groups (e.g., women, children, urban poor)</li> <li>Promotes “climate friendly” and/or “green development” opportunities</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| TYPE OF PLAN                         | GENERAL PURPOSE                                                                                                                                                            | POTENTIAL CLIMATE CHANGE FEATURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Informal Settlement Upgrade Plans    | <ul style="list-style-type: none"> <li>Develops policies and plans to improve services, infrastructure and sanitation</li> <li>Formalizes property ownership</li> </ul>    | <ul style="list-style-type: none"> <li>Identifies potential climate change impact risks (e.g., stormwater and flooding, slope failures, health) and responses to them (i.e., relocation, infrastructure improvements, etc.)</li> <li>Identifies and relocates housing from high hazard areas and/or develops “planned retreat” and/or relocation strategy</li> </ul>                                                                                                                                                 |
| Public Health Plan                   | <ul style="list-style-type: none"> <li>Typically focuses on disease prevention and public safety improvements</li> </ul>                                                   | <ul style="list-style-type: none"> <li>Identifies and prioritizes health risks (e.g., disease, accident, etc.) associated with climate change</li> <li>Supports, facilitates and expedites infrastructure and planning improvements to reduce climate change related public health impacts (e.g., supports improved storm water and waste treatment facilities, supports urban greening to reduce heat island effects, etc.)</li> </ul>                                                                              |
| Emergency Management Plan            | <ul style="list-style-type: none"> <li>Improves disaster response preparedness</li> <li>Identifies ‘hot spots’ (i.e., areas and groups vulnerable to disasters)</li> </ul> | <ul style="list-style-type: none"> <li>Identifies climate change disaster risks, likelihoods, and adaptive capacity</li> <li>Supports, facilitates and expedites infrastructure and planning improvements to reduce climate change-related disaster impacts</li> </ul>                                                                                                                                                                                                                                               |
| Sewer / Liquid Waste Management Plan | <ul style="list-style-type: none"> <li>Improves waste water/ sewer management, including and infrastructure</li> </ul>                                                     | <ul style="list-style-type: none"> <li>Identifies development and/or construction guidelines for “climate proof” facilities (i.e., facilities that are located and built to withstand and function during climate change impact events)</li> <li>Identifies and prioritizes high risk areas where new facilities are most needed to reduce climate change impacts amongst vulnerable groups</li> <li>Identifies options to reduce or reuse wastewater (grey water) for urban agriculture and horticulture</li> </ul> |
| Energy Management Plan               | <ul style="list-style-type: none"> <li>Improves energy generation options, distribution, and conservation</li> </ul>                                                       | <ul style="list-style-type: none"> <li>Identifies climate change-related risks to energy generation and distribution facilities</li> <li>Supports climate change mitigation (i.e., green energy, conservation)</li> </ul>                                                                                                                                                                                                                                                                                            |
| Water Management Plan                | <ul style="list-style-type: none"> <li>Improves water supply, management and distribution</li> <li>Improves water conservation</li> </ul>                                  | <ul style="list-style-type: none"> <li>Identifies climate change-related risks to municipal water supply, treatment and distribution and adaptive measures to counter them</li> <li>Identifies water conservation and water demand strategies and tools to better manage and adapt to future potential water shortages</li> </ul>                                                                                                                                                                                    |
| Solid Waste Management Plan          | <ul style="list-style-type: none"> <li>Improves solid waste management, including collection, handling and infrastructure</li> </ul>                                       | <ul style="list-style-type: none"> <li>Supports climate change mitigation through improved materials recycling and/or reuse and, where practical and feasible, landfill emissions capture</li> </ul>                                                                                                                                                                                                                                                                                                                 |

Any of the plans or strategies identified in the table can be modified or revised to consider and address climate change. These changes can be made when plans are updated and revised as required by planning legislation or policy, when new plans and strategies are developed, or as demanded by the local climate change context (i.e., the imperative to address climate change may be more critical in some cities where impacts are more pronounced and populations are more vulnerable to those impacts).

The process by which climate risks to city plans, programs, activities and policies are considered and the respective plans adjusted to address them is often referred to as “mainstreaming.” Mainstreaming assumes that other projects – e.g., poverty reduction, urban sustainability, etc. -- can be enhanced and their benefits increased by incorporating climate change actions and policies in them. Mainstreaming helps ensure that a city’s plans and policies are not at odds with climate risks now and in the future.

Increasingly, many cities and towns are developing stand-alone Climate Change Action Plans. Typically, these strategies are integrated and/or implemented through and with other sectoral plans and strategies. In the developing world, these planning processes sometimes involve external donors that support their development (e.g., UN agencies, bilateral aid, etc.).

While Table 4, *Urban/Town Plans and Climate Change*, focused on urban planning-related initiatives and strategies, it is important to consider the other determinants of adaptive capacity, including human capital, information and technology, organization and social capital, and political capital, or governance. These determinants are the responsibility of governments at multiple scales (including cities and towns) and are crucial to building the adaptive capacity of an area. Table 5 further outlines some of the determinants of adaptive capacity and how each type of capacity supports planners and planning in a climate context.

**Table 5: Determinants of adaptive capacity and relation to Climate Change Planning**

| DETERMINANT                           | DESCRIPTION                                                                                                                                             | RELATION TO CLIMATE PLANNING                                                                                                                                                                                                                                                                          |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Human capital                         | <ul style="list-style-type: none"> <li>Knowledge (scientific, “local”, technical, political), education levels, labour</li> </ul>                       | <ul style="list-style-type: none"> <li>Climate change vulnerability and risk assessments are facilitated and improved by a scientific understanding and knowledge of climate change, combined with good local knowledge, and the human resources to undertake climate change planning work</li> </ul> |
| Information and technology            | <ul style="list-style-type: none"> <li>Communication networks, computing tools, freedom of expression, technology transfer and data exchange</li> </ul> | <ul style="list-style-type: none"> <li>Climate change vulnerability and risk assessments are facilitated and improved by good technical data, data modelling capability, and the ability to share and distribute this information widely, freely and clearly</li> </ul>                               |
| Material resources and infrastructure | <ul style="list-style-type: none"> <li>Transport, water infrastructure, buildings, sanitation, energy supply and management</li> </ul>                  | <ul style="list-style-type: none"> <li>Well designed, constructed, sited, and managed infrastructure and services tend to be more adaptable or easier to adapt to climate change impacts and risks than poor resources and infrastructure.</li> </ul>                                                 |

| DETERMINANT                       | DESCRIPTION                                                                                                                                                                                        | RELATION TO CLIMATE PLANNING                                                                                                                                                                                                                                                                                 |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Organizational and social capital | <ul style="list-style-type: none"> <li>State-civil society relations, non-governmental and community-based organizations, relationships between institutions</li> </ul>                            | <ul style="list-style-type: none"> <li>Climate change policy development, implementation and enforcement are further improved in a collaborative, cooperative environment where climate change stakeholders (government, non-government, vulnerable groups, etc.) are able to work well together.</li> </ul> |
| Political capital (governance)    | <ul style="list-style-type: none"> <li>Modes of governance, leadership, participation, decision and management capacity</li> </ul>                                                                 | <ul style="list-style-type: none"> <li>Effective, efficient and community-supported climate change actions require a functioning local government that is capable and willing to enforce municipal laws, plans and regulations.</li> </ul>                                                                   |
| Wealth and financial capital      | <ul style="list-style-type: none"> <li>Municipal financial resources, resident incomes and wealth distribution, economic marginalization, fiscal incentives for climate risk management</li> </ul> | <ul style="list-style-type: none"> <li>Climate change adaptation actions require internal funding (and sometimes external support). Climate change vulnerability, and hence, the level of adaption required, can be reduced in communities with less urban poverty and economic marginalization.</li> </ul>  |

Adapted from: Eaking, H; Lemos, MC (2006). Adaptation and the state: Latin America and the challenge of capacity-building under globalization. *Global Environmental Change* (16).

In many cases, the development, implementation and ongoing monitoring of local government plans and strategies involve other stakeholders, including other levels of government (e.g., state, county, regional, national, federal and provincial governments), community organizations, non-government organizations (NGOs), academic institutions and local business associations and/or private sector partners. All of these groups and organizations play a role in planning for climate change.

## PLANNING FOR CLIMATE CHANGE:

### A “NO REGRETS” APPROACH TO TAKING ACTION

The World Bank estimates the cost of adapting to climate change in developing countries will range between USD75 and USD100 billion per year (USD2005). While this only represents 0.2 percent of projected GDP of all developing countries, it equals about 80 percent of the total disbursement of official development aid.

Given the cost of adaptation measures, the immediacy of other problems facing planners (e.g., sanitation, poverty reduction, etc.), and probable city budget constraints, planners are encouraged to first consider so-called “no regrets” adaptation actions. Also referred to as “low regret” options, “no regret” adaptation options are those where moderate levels of investment increase the capacity to cope with future climate risks. Ideally, they also contribute directly to larger community development goals (e.g., improving storm and sanitary sewers, water supply upgrades, etc.). These investments will not only address urgent community development issues, but will also very likely contribute to the city’s overall climate change preparedness and adaptive capacity. Often, these investments are also already planned and/or part of an existing strategy.

Other no regret actions typically include repairing and strengthening existing climate change impact defences (e.g., dikes, diversion channels, reservoirs, sea walls etc.) -- while ensuring that the changes do not result in any additional environmental impacts, as may be the case with some defences like sea walls -- and “climate proofing” critical but vulnerable infrastructure located in hazard areas (e.g., power and water facilities, hospitals, etc.).

*No regret* actions are further advisable given the uncertainty around future weather variability and climate change impacts. Climate change impacts will continue to occur, but their magnitude, location and effects will likely evolve as the global climate continues to change. By focusing on *no regret* climate change adaptations, uncertainty about future weather variability and climate can be overcome and managed effectively.

## 4.0 Planning for Climate Change: The Planning Cycle

# Module A

### WHAT'S HAPPENING?



This module includes **three planning steps** and will help planners answer these questions:

- STEP 1** *Are we ready to undertake a climate change planning process?*
- STEP 2** *Who needs to be involved in climate planning and how?*
- STEP 3** *How is climate change affecting our city?*

After completing this module, planners will have a clearer picture of what is happening in their city and how it is being affected by climate change. The need to address climate change will be clearly determined, and the right stakeholders to involve in climate change will be identified and engaged. The first two steps in this module are the foundation for any successful planning process. Many projects that stall return to these foundational planning steps after failing to get off the ground.

## STEP 1: GETTING STARTED

The first step in planning for the future is to get organized and “plan to plan.” A successful process – or any of nine steps in the strategic planning approach -- requires a sustained level of commitment, the dedication of resources, and the involvement of climate change stakeholders (i.e., interested and affected parties) from across the local area. It also requires organizational and institutional capability.

This planning step involves the following five tasks:

*TASK 1.1: Frame the challenge*

*TASK 1.2: Get organized*

*TASK 1.3: Form a core planning team*

*TASK 1.4: Determine organizational capacity*

*TASK 1.5: Plan the planning process*

### A REMINDER

The planning process outlined in the remainder of this guide is **flexible and non-linear**, and designed for a range of situations and realities. It is anticipated that guide users and their cities will:

- Be at different stages of climate change planning (i.e., some may have already gone through the initial assessment outlined in Module 1);
- Use the guide for different purposes (i.e., one community may use it to develop a broad climate change strategy, where another city might use it to integrate climate change actions in a particular sectoral plan – e.g., Land Use Plan, Energy Plan, Local Economic Development Strategy); or,
- Have different planning resources and capacities at their disposal (i.e., some communities may have the human resources and skill to undertake a process “in house”, while other communities may have to secure funding or technical support).

While people in areas where planning climate change is more advanced might enter the process in Module 2 or later, they are strongly encouraged to review the previous planning tasks to ensure that they have adequately covered them. The same applies to users who may be using the guide to support only a single step of the planning process (e.g., Step 3: Vulnerability Assessment).

### TASK 1.1

## Frame the challenge

The first task involves understanding the “triggering event” or motivation for the climate change planning process. While the motivation and/or triggering event will obviously differ from jurisdiction to jurisdiction, exploring and understanding the larger planning context will help frame the planning challenge and provide background information for other project stakeholders during the initial project stages.

#### TOOL 1-A Framing The Challenge

Sometimes the triggering event might be a crisis, disaster or event that can be clearly linked to climate change (e.g., drought, increased/intensified flooding, etc.). In rapidly growing communities, the struggle to effectively manage and direct urban growth away from climate change

hazard areas (e.g., low lying informal settlements) might be the catalyst. At other times, there may be no specific triggering event, but a slow and gradual build up of environmental, social, or economic impacts (real or perceived) that can be attributed to climate change. These impacts may relate to changes brought on by increasing urbanization, shifts in development patterns (e.g., rural/urban migration) and changing relationships to environmental systems. Still at other times, the motivation may come in the form of a national, state or local government direction or mandate to undertake a climate change adaptation project. Sometimes, the motivation to undertake a climate change planning process results from funding and/or technical support offered by an external or international donor agency.

From a technical perspective, it is important to note that there may be no clear answer as to why climate change is a local issue before doing the more thorough assessment outlined in *Step 3: Vulnerability Assessment*.

## A Case in Point

### GETTING STARTED – KAMPALA, UGANDA

With support from the UN-HABITAT Cities and Climate Change Initiative (CCCI), a climate change planning project was initiated in Uganda's capital and major urban centre. Kampala is characterized by urban sprawl and increasing amounts of informal settlement in high-risk areas that are prone to flooding and sanitation issues. Significant observed changes in rainfall patterns and temperature were determined to pose risks to the city (e.g., flooding due to increased rainfall and associated storm water runoff, food security, etc.). Although there was no specific trigger for the initiation of the project (as climate change was not a major issue for municipal governance), increasing concern about climate change at the national level has influenced efforts to mainstream climate concerns into municipal planning. This project involved a stakeholder engagement process to mainstream climate change concerns into the Kampala City Development strategy. A core planning group led the establishment of stakeholder networks at various levels of government. Various demonstration projects including city greening, alternative energy utilization, clean wood fuel use, climate-proofing of infrastructure and energy efficient urban transport systems are in progress.



More info: [www.unhabitat.org/downloads/docs/CCCIKampalaUganda.pdf](http://www.unhabitat.org/downloads/docs/CCCIKampalaUganda.pdf)

TASK  
1.2

## Get Organized

Without coordination, organization, respected leadership and commitment from stakeholders, the planning process can stall before it starts. There may be a need to “sell” the idea of climate change action planning to senior officials, politicians and other key stakeholders who may not see or understand climate change and the adaptation imperative. This step may require educating local leaders, both formally and informally, about the need for action and the planning process being proposed well ahead of initiating the process itself. Building relationships with these key stakeholders is an important component of this step, especially as these stakeholders may become more formally involved in the planning process as a member of the core team (see Task 1.2), or as a member of a project stakeholder group (see Step 2).

TOOL 1-B  
Getting  
Organized  
Worksheet

To help assess what should be done, consider the following questions:

**Who is going to lead the effort?**

- *If the local government is going to initiate the process, which departments will be involved in addition to the Planning Department (or equivalent)?*
- *If the project is being driven by an external organization (e.g., donor agency, International NGO, etc.), who is the local government liaison and contact? If it is an outside group, what power will they have? What will their mandate be?*

Whoever initiates the process, formal agreements or new structures might need to be created to direct, plan and fund the process.

TASK  
1.3

## Form a core planning team

It is a good idea to notify and seek commitment from key players in the government and the local area, such as council members, department heads, senior planning staff, and key representatives from local stakeholder organizations (e.g., important NGOs, donor agencies, etc.). Together, this group can be formally brought together as a core planning team. Often a core group is established before the actual planning work begins, with a designated leader responsible for its progress. This core planning team can act as an executive advisory committee and help provide valuable input, build relationships and linkages to important stakeholder groups, source and secure needed funding, and provide additional technical and human resources to the project. An effective core group can also “set the tone” for a positive, participatory and transparent process, in addition to promoting the inter-departmental and inter-agency cooperation that will help the overall planning process succeed.



### THE IMPORTANCE OF THE PROCESS LEADER OR FACILITATOR

All climate change planning requires cooperation and collaboration amongst a wide range of stakeholders. Because of this – and the fact that stakeholders may disagree on issues and approaches – having a good facilitator is critical. A good facilitator creates a positive and cooperative working environment and helps maximize group productivity and participation. A facilitator performs three main functions:

1. Assists the group to establish rules and procedures for the process;
2. Ensures that stakeholder communication is effective and fair; and,
3. Maintains group progress.

Much of the success of the process depends on the skill of the individual(s) managing or facilitating it. Sometimes additional training may be required or an outside facilitator may be necessary.

TASK  
1.4

## Determine organizational capacity

The initial issues discussed above need to be worked out by the lead organization/ department, the initiator or project facilitator. After consideration of these initial questions, the lead organization should determine its own capacity to implement the process (Tool 1-C). Here, if resources permit, it may be a good idea to hire someone with specific expertise to help get the process going and, potentially, to provide technical and capacity support throughout the strategic planning process.

TOOL 1-C  
External  
Assistance  
Assessment

At this step, it is also valuable to review and consider the local area's adaptive capacity, as illustrated in *Section 3.3.3: Climate Planning and City Planning*.

TASK  
1.5

## Plan the planning process

As previously discussed, the strategic planning framework respects the fact that each city is unique in terms of its planning context (i.e., capacity, governance, leadership, policy), current climate situation (i.e., threats, vulnerability, adaptive capacity), and stage of planning for climate change (i.e., some cities may be quite advanced, while others may be at "square one"). Because of this, it is very likely that the scope and anticipated results of each planning initiative will differ with each project.

It is important, therefore, to be as clear as possible about the scope or expectations for the project before getting started. Do you intend to go through the entire process and develop a stand-alone Climate Change Strategy? Or do you anticipate using the guide to support a more modest, but nevertheless critical step, like carrying out a Vulnerability Assessment? While the scope of the project can certainly change and evolve as you move through the process, having an idea of what you expect to achieve is important.

By having an understanding of the potential end goal, it will then be easier to both design the planning process and ensure that there are the resources to complete it (staff and stakeholder capacity, political/organizational support, funding). To help design the process, ask yourself these questions:

- *What is the scope of the project (climate change vulnerability assessment and baseline data to inform future work, an update to a sectoral plan to include climate change actions, a stand alone Local Government Climate Change Strategy)?*
- *What is the potential time frame?*
- *What resources will be needed – time, money, effort and skills?*
- *Where is funding for the planning process going to come from?*
- *Where is funding for implementation going to come from?*

- *What are the logistical and human resources challenges and opportunities of the local context (interest level of key stakeholders, political issues, communication issues, location of meetings, conflicts with other processes, bad experience of stakeholders with previous planning processes)?*
- *Is there a higher-level government program for climate change planning that could be used to support your city's initiative? This could be national climate change legislation that gives cities and local governments a specific role in national climate change strategies. In 45 countries National Adaptation Programmes of Action exist.*

Given the scale and scope of climate change, it is important to remember that the project does not have to result in "fixing everything." For cities with limited resources and capacity, it might be better to engage in a more modest, "first step" planning exercise instead of attempting something that is too ambitious that may "die in process" or never be implemented.

Here, it is worthwhile for the planner leading the process to take some time to **"walk through" the planning process** in its entirety as a desk review exercise to familiarize themselves with the planning process and to think about the questions you will be considering during the process -- *Who are the stakeholders and decision-makers and how could they be involved? What are the major climate vulnerabilities and risks? What do you think matters most to the local community? What plans and processes are underway or planned in the near future that could accommodate and benefit from climate change planning? What are some strategies or actions that could be undertaken? How could they be implemented, monitored and evaluated?* Going through the planning process in this manner will help flag potential issues, challenges and opportunities.

#### Step 1: Review Checklist

|   |                                                                           |   |
|---|---------------------------------------------------------------------------|---|
| ✓ | Is there organization and political leadership to support the process?    | ✓ |
| ✓ | Is there commitment to complete and implement the plan or project?        |   |
| ✓ | Has a core team been formed and/or the individual responsible identified? |   |
| ✓ | Is outside expertise required? If so, has it been retained?               |   |
| ✓ | Are resources secured – funding, time, human resources?                   |   |
| ✓ | Is the scope established?                                                 |   |
| ✓ | Has organizational and adaptive capacity been considered?                 |   |



Municipal workers constructing a water trench for road drainage, Kisi, Kenya, 2005. © UN-HABITAT

## NATIONAL ADAPTATION PROGRAMMES OF ACTION (NAPA)

Established through the United Nations Framework Convention on Climate Change's Least Developed Countries (LDCs) work program, the National Adaptation Programs of Action (NAPA) process is designed to help LDCs address climate change adaptation, identify vulnerabilities, and prioritize short-term actions. Recognizing that many LDCs have a high level of vulnerability and a low adaptive capacity, the process is intended to increase knowledge and build networks that may help LDCs prepare long-term adaptation plans. The NAPA process is not intended as a substitute for broader, long-term climate change planning, but it does help LDCs to identify their immediate needs.

Although they are prepared at the country level, NAPAs incorporate community level information, and report on existing grassroots coping strategies. Each NAPA includes a summary of existing vulnerability and adaptation plans, and barriers to implementation. A vulnerability assessment is included, along with a list of priority actions and projects.

If your country has prepared a NAPA, it may be useful source of information on the existing capacity, vulnerability, and adaptation planning initiatives in your region or local area. However, the quality of NAPAs is variable, so they should be included as only one of many sources.

For more information on the NAPA process, including completed NAPAs, and a local action coping database – please see: [http://unfccc.int/cooperation\\_support/least\\_developed\\_countries\\_portal/items/4751.php](http://unfccc.int/cooperation_support/least_developed_countries_portal/items/4751.php)

## STEP 2: STAKEHOLDERS AND PARTICIPATION

A participatory planning approach engages different stakeholders so that their issues, views, concerns and values can be included in the planning process. These stakeholders can also act as project “ambassadors” or “messengers” and help with ongoing project communication within their social and professional networks. While engaging stakeholders can take more time and requires more careful facilitation, it ultimately provides better, more durable results. Why? Because it not only engages those people who are most vulnerable to climate change impacts, but also those sectors and organizations whose participation will be critical in the implementation of resulting climate change actions.

Here, it is important to note that participatory planning also involves the identification and **engagement of stakeholders within the local government**. Inter-departmental cooperation and collaboration is crucial for successful climate planning, as multiple departments are likely going to be involved in the implementation of any adaptation project (e.g., Planning, Engineering, Finance, Health, etc.). Neighbouring municipalities and local governments should also be engaged where practical and feasible.

A well-designed participatory process can also help generate the new ideas and innovative approaches that responding to climate change demands. From the local government perspective, it can also help garner the critical **political support** of elected representatives and senior staff (although this may not be so easy in reality).

While stakeholders and their levels of participation will undoubtedly change over the course of a project, getting the right people involved from the beginning is a key step towards a successful outcome.

The four tasks listed below outline how to identify, establish and manage stakeholder and broader community engagement.

*TASK 2.1: Identify stakeholders*

*TASK 2.2: Establish the stakeholder group*

*TASK 2.3: Establish stakeholder group procedures*

*TASK 2.4: Determine level of community engagement*

### Identify stakeholders

**TASK  
2.1**

While stakeholder involvement can differ substantially from planning context to another, its objectives remain the same – to improve the planning process and build broader public awareness of, and support for, resulting climate change adaptations and mitigation actions. Stakeholders often act as ambassadors for the planning project, both within the local government, ensuring inter-departmental collaboration and awareness, and within the broader community. Working with and through the community, they can share information about the project, collect local climate change knowledge (vulnerabilities, risks, impacts), publicize events and share results.

Selecting stakeholders is a critical step in the planning process and warrants careful thought. The make-up of the group will help determine the level of community support for any resulting climate actions and the group's ability to develop new ideas, insights and implement actions. Beyond senior staff and local government representatives – who should be your first stakeholders in the process -- other typical stakeholders outside of local government include representatives from relevant non-governmental organizations (NGOs) and citizen-based organizations (CBOs), educational and academic institutions with expertise or experience in climate change. It also may be valuable to include regional governmental representatives, as much planning needs to address impacts that are more regional in nature and that require inter-agency cooperation to address.

Typically, stakeholders are organized as a planning, advisory and coordinating committee for the climate change planning effort. While every effort should be made to get the "right" stakeholders at the table, this process might end up being self-selecting, which is not a bad thing as a small committed group is better than a large, indifferent group. Here, it is important to clarify that the stakeholder group is an advisory group that helps support and improve project decision-making. They are not, however, the decision-makers unless specifically stipulated and agreed to their Terms of Reference (see Task 2.3). The purpose of the stakeholder group is to help represent a broad segment of the urban population affected by climate change in the planning process. They do provide critical insight into **what** decisions need to be made, **how** they should be made, and **why** some decisions should be made in a given way, but they are not typically decision-makers.

TOOL 2-A  
Stakeholder  
Identification  
Worksheet

The table illustrates a number of sectoral stakeholders and the potential contribution they could make to the planning effort through their involvement on the project. **Please note that the table is not exhaustive.** There are additional groups and organizations that could be considered. Depending on individual capacity, groups may bring additional or fewer resources to the planning process.

Table 6: Stakeholders and potential climate change planning contributions

| STAKEHOLDER                                                                                       | POTENTIAL CONTRIBUTION –<br>LINK TO CLIMATE CHANGE PLANNING                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>LOCAL GOVERNMENT</b>                                                                           |                                                                                                                                                                                                                                                                                   |
| Local government departments (e.g., Planning, Engineering, Transportation, Finance, Health, etc.) | Technical expertise, policy and program expertise, staff/administrative/logistical resources, funding and financial resources, vulnerability and risk assessment input, implementation support through existing planning programs/policies/initiatives, monitoring and evaluation |
| Local government elected representatives                                                          | Political support and leadership, technical expertise, policy and program expertise, vulnerability and risk assessment input, implementation support through existing planning programs/policies/initiatives                                                                      |
| Neighbouring local government representatives                                                     | Political support and leadership, technical expertise, policy and program expertise, vulnerability and risk assessment input, implementation support through existing planning programs/policies/initiatives and co-plans                                                         |

| STAKEHOLDER                                                       | POTENTIAL CONTRIBUTION –<br>LINK TO CLIMATE CHANGE PLANNING                                                                                                                                                                            |
|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>LOCAL AREA AND NON-GOVERNMENTAL</b>                            |                                                                                                                                                                                                                                        |
| Environmental groups                                              | Climate change knowledge, local knowledge, outreach and communications, technical expertise, funding channel, vulnerability and risk assessment input, implementation support, monitoring and evaluation                               |
| Neighbourhood groups                                              | Outreach/communications, local knowledge, vulnerability and risk assessment input, implementation support, monitoring and evaluation                                                                                                   |
| Local area leaders                                                | Community credibility and support, local knowledge, outreach and communications, vulnerability and risk assessment input, implementation support, monitoring and evaluation                                                            |
| Local religious groups                                            | Community credibility and support, outreach and communications, vulnerability and risk assessment input, implementation support, monitoring and evaluation                                                                             |
| Under-represented groups (e.g., women's and minority groups)      | Outreach and communications, vulnerability and risk assessment input, implementation support, monitoring and evaluation                                                                                                                |
| <b>PUBLIC</b>                                                     |                                                                                                                                                                                                                                        |
| District, regional and national governments                       | Staff and administrative support, funding, facilities and materials, outreach and communications, technical expertise, critical implementation support (policy development, implementation and enforcement), monitoring and evaluation |
| Sector boards and authorities (e.g. health, education, transport) | Outreach and communications, implementation support (sectoral policy development, local knowledge, implementation and enforcement), monitoring and evaluation                                                                          |
| Educational institutions (technical schools, universities)        | Staff and student support, climate change knowledge and technical expertise, facilities, outreach and communications, critical implementation support (policy development, implementation and enforcement), monitoring and evaluation  |
| International agencies                                            | Staff and administrative support, funding, technical expertise, implementation support, monitoring and evaluation                                                                                                                      |
| <b>BUSINESS AND LABOUR</b>                                        |                                                                                                                                                                                                                                        |
| Small and medium-sized businesses                                 | Funding, facilities and materials, outreach and communications, implementation support, monitoring and evaluation support, local knowledge, vulnerability and risk assessment input, political-community support                       |
| Trade and labour unions                                           | Funding, facilities and materials, outreach and communications, monitoring and evaluation, vulnerability and risk assessment input                                                                                                     |
| Real estate developers                                            | Funding, outreach and communications                                                                                                                                                                                                   |
| Banks, credit unions and other financial groups                   | Funding, facilities and materials, outreach and communications                                                                                                                                                                         |
| Chambers of commerce and business groups                          | Funding, outreach and communications, administrative support                                                                                                                                                                           |
| News media                                                        | Outreach, communications, public education, awareness raising                                                                                                                                                                          |
| Professional associations                                         | Technical support, climate change knowledge (e.g., professional engineering or planning association members), outreach and communications                                                                                              |
| Privately owned / managed utilities                               | Funding, facilities and materials, technology and infrastructure, expertise                                                                                                                                                            |



Men and women take part in  
Community-based reconstruction  
assistance in Beirut, Lebanon.  
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## IDENTIFYING PROJECT CHAMPIONS

When identifying a stakeholder group, it is important to identify individuals who can act as project champions. A champion is an individual whose energy, skills, political and administrative connections, or community profile can help to initiate and/or maintain the process, sustain commitment to the project (staffing, resources, etc.), and help ensure a good information flow between the stakeholder group, other project staff, and the broader community. Champions are able to build connections and networks with political, social, and economic actors that have institutional power, organizational capacity, and support. A champion may be a politically powerful person that can affect change who also happens to be climate-aware, a community leader who can motivate and educate in vulnerable communities, or a motivated planner (or other local government official) willing to put effort and time into the planning process. While a champion may not be evident at the beginning of the project and may emerge at later stages, they are important to identify, engage and support. Having a champion will help ensure success of the planning and implementation process and ensure that long-term benefits are realized.

Some questions to consider when identifying stakeholders and determining the larger public processes include:

- *Have all relevant stakeholders been identified? Consider:*
  - Their stake in the issue or vulnerability to climate change impacts (e.g., women, the urban poor);
  - Their stake in climate change mitigation (e.g. key emitters of GHGs)
  - Their formal position (e.g., government authority);
  - Their control over relevant resources (e.g., money, expertise); and
  - Their power to promote, hinder or block implementation (e.g., activist groups, lobby groups).
- *What can they bring to the process (skills, knowledge, experience)?*
- *Who has the skills, interest, political will, credibility and/or commitment to do the work that must be done? Have they been invited to participate?*
- *What roles and responsibilities will be given to which participants at each stage of the strategic planning process? Here it is worth noting that In medium to large cities it will be much easier to get stakeholders that are knowledgeable about climate change and broader, related issues, while in smaller cities it may be easier to get a committed group.*

## Establish the stakeholder group

### TASK 2.2

The optimal size of a stakeholder group depends on a common sense assessment of how many people are needed. If a group is too large, it is difficult to move forward and some participants might feel that their voices are being lost. If it is too small, it might not be representative enough (within the local government and with the broader community) and fail to generate support. Conventional wisdom suggests that a stakeholder group of less than 20 people is most effective.

TOOL 2-B  
Stakeholder  
Analysis  
Matrix

It is important to remember that not all stakeholders will be adequately represented in a meeting or committee setting. This is especially true for marginalized groups that are more vulnerable to climate change impacts. For this reason, other forms of participation should be considered in the process to allow these voices to be heard (e.g., "Tea-time discussions, "on the street" intercept interviews, focus groups, etc.).

The key roles and responsibilities of stakeholder group members includes:

- Representing local government departments and/or agencies
- Representing broader community interests and interest groups, including climate-vulnerable groups (e.g., women), business groups, environmental NGOs, professional associations (e.g., professional planners associations), universities, national/regional government representatives, etc.
- Ensuring that any engagement process is inclusive and engages the most climate change vulnerable groups
- Helping act as community ambassadors, messengers or public liaisons for the project

- Consulting with local government staff, public, stakeholder constituents (informally and formally)
- Providing reports, decisions of the group to other partner groups and departments within the local government
- Providing local knowledge and input for the determination of local climate change vulnerabilities and risks
- Defining local climate change priorities and assessing potential trade-offs
- Getting buy-in and commitment from key partners for implementation of climate change actions

Once the stakeholder group has been established, it is important to have a comprehensive kick-off meeting where the group is introduced to the project, presented with their role in the planning process (as an advisory committee providing decision support) and given an overview of climate change, from a global trends to local impacts.



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## A Case in Point

### PLANNING STAKEHOLDER GROUPS - ULAANBAATAR, MONGOLIA

As part of a Cities and Climate Change Initiative (CCCI) project, a 14 member stakeholder group was established to help lead, inform and guide a climate change planning initiative in what is probably the coldest capital city in the world. The stakeholder group includes representatives from the Ulaanbaatar local government, research and engineering organizations, NGOs and community representatives. The group was established to help guide a participatory impact and vulnerability studies in a pilot neighbourhood called Ger and to help build and strengthen institutional capacity and networking of stakeholders. Following the vulnerability assessment, the stakeholder group will be used to help prioritize climate change adaptation and mitigation activities.

More info: [www.fukuoka.unhabitat.org](http://www.fukuoka.unhabitat.org)

### Task 2.2: Review Checklist – Stakeholder Group Selection



|   |                                                                                         |     |
|---|-----------------------------------------------------------------------------------------|-----|
| X | Key decision-makers from local government departments and agencies                      | ... |
| X | Political and community leaders who can act as “champions” of the planning effort       | ... |
| X | Individuals or climate-vulnerable groups                                                | ... |
| X | Traditionally underrepresented groups – women’s groups, informal economy                | ... |
| X | People who can represent more than one interest                                         | ... |
| X | Individuals or groups willing or able to play a leadership role in the planning process | ... |

## Establish stakeholder group procedures

Clear operating terms or procedures are a critical element of a successful stakeholder group. Some key considerations include confidentiality, communications protocols, and rules for entering and leaving the group. These terms of reference should be formally agreed to by the members of the stakeholder group and, where necessary, periodically reviewed.

TOOL 2-C  
Stakeholder  
Terms of Reference  
Worksheet

By answering the following questions, many potential expectations of the stakeholder group can be effectively addressed:

- *What is the group empowered to do (e.g., give advice and make recommendations)?*
- *What process resources does the group have (e.g., what is the budget for renting space, group administration, technical support, etc.)?*
- *What implementation resources does the group have, or might have, to work with (e.g., are there local or national government funds, donor funds, etc.)?*
- *Are there time constraints?*
- *What are the reporting procedures?*
- *What are the roles and responsibilities of each member of the group?*
- *Can new members join part way through? If so, what is the process?*

### Task 2.3: Review Checklist - Stakeholder Group Terms of Reference



|   |                                                                                                                                 |  |
|---|---------------------------------------------------------------------------------------------------------------------------------|--|
| X | Activities to be jointly undertaken                                                                                             |  |
| X | Roles of the participants throughout the process                                                                                |  |
| X | Standards for information-gathering and sharing                                                                                 |  |
| X | Decision-making methods, including dispute resolution and review                                                                |  |
| X | Resources to be provided by each partner                                                                                        |  |
| X | Agreements on how the outcomes of the planning process will be integrated into the planning activities of the local government. |  |

(Source: ICLEI, 1996)

## Determine level of engagement

Determining when and how the community is to be involved in the climate change planning process will be one of the first tasks of the stakeholder group. While community participation is critical to collecting and confirming information on local climate change impacts, risks and priority actions, the best means of getting this information needs to be determined. It is also important to determine how this information can be collected and its use reported back to wider community in the most cost effective and culturally appropriate manner.

Here, it is important to recognize that community engagement processes can be expensive and time consuming. It will be the stakeholder group's responsibility to determine **the level of local community engagement most appropriate to the project**, the methods to engage them, and the points at which the engagement is to occur. Remember, too, that having multiple forms of consultation in different steps of the process, with different groups, can reduce "**consultation fatigue**" and allows participants to focus on the issues of direct concern to them only. Sometimes, engagement with the broader community will be extremely limited and generated primarily through the stakeholder group. This is one more reason to have a stakeholder group that represents a range of local community interests and voices. While a detailed public participation plan is not typically required, the stakeholder group should develop a simple brief that outlines: 1) the level of local community engagement to be undertaken and why; 2) the methods to be used; 3) the general timing of community outreach; and 4) how information and input collected will be reported back to the community to maintain project transparency.

**Table 7: Engagement – objectives and actions**

| POSSIBLE PUBLIC INVOLVEMENT - OBJECTIVES                                                                                                                                                                                                                                                                                                                                                                        | PUBLIC INVOLVEMENT - ACTIONS                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Raise climate change awareness – GHG emissions, vulnerabilities, impacts, risks</li> <li>• Establish common factual base of information</li> <li>• Gather advice, feedback and climate adaptation action ideas</li> <li>• Relationship building</li> <li>• Gain a better understanding of public opinion</li> <li>• Support communications and transparency</li> </ul> | <ul style="list-style-type: none"> <li>• Forums, open houses, 'Town hall meetings'</li> <li>• Workshops and focus groups</li> <li>• Stakeholder groups &amp; advisory committees</li> <li>• Social media (Internet, etc.)</li> <li>• Cell phone engagement Flyers and posters</li> <li>• Surveys</li> </ul> |

## STEP 3: VULNERABILITY ASSESSMENT

The third step in this module is to determine *how* climate change is impacting, or may impact your city, and *who* is most vulnerable to these impacts. This is a critical step in the planning process and one that may require additional time and resources to complete.

There are a number of potential approaches to determining climate change impacts and assessing vulnerability. The approach you use should be in the context of the challenges you framed in Module A, Task 1.1 "*Framing the Challenge*" and the resources (time, money, technical savvy, data, staff support, etc.) available to you.

This guide uses a hybrid, integrated approach to vulnerability assessment that draws on elements of various other approaches (see Box), but also utilizes a number of less technical steps that are easier for local governments with limited capacity to carry out. While the overall approach of this planning step is not resource intensive, tasks that could benefit from technical input (e.g. regional climatologists) or "scaled up" (i.e., have their scope increased) have been identified. The vulnerability assessment outlined in this section will:

- Help elicit and use stakeholder observations;
- Identify, organize and map climate change impacts;
- Document potential trends; and,
- Develop a profile of your community's overall vulnerability to climate change impacts.

The profile of climate change vulnerability that results from this step is, in many ways, a stand-alone product. This product can be used as the fundamental starting point for public communications and awareness building, political advocacy, and for fund-raising efforts.

Depending on the local context, several rounds of vulnerability assessments may be carried out. In the first instance a city-wide assessment could identify key vulnerable communities, sectors or locations. Based on stakeholder consultations, further rounds of assessments could be conducted to focus on prioritized areas, populations, or economic sectors.

It is important to note that a planner could develop the tasks described in this step in several different ways. For example, a planner could complete this step as part of a **desk exercise**, synthesizing information available in reports, Internet sources, etc. It could also be the outcome of a **technical workshop**, where experts are assembled to share their scientific knowledge and sector expertise. Finally, it could be organized as part of a larger **participatory group exercise**, engaging with the stakeholder group. Of course, it could also include elements of each of these approaches, too.

In keeping with this guide's overarching commitment to participatory planning processes, this planning step focuses on tools to support participatory group exercises and stakeholder group activities. Additional examples are provided to guide those with more capacity to undertake more detailed technical assessments. It is recognized that the specific tools used for any given task can vary widely depending on circumstances. Those with greater technical capacity and financial resources may have the opportunity to select from a more sophisticated set of tools, while those lacking capacity and resources can focus on tools that operate on a more basic level. At the end of this step a table has been assembled to help guide the selection of the most appropriate tools based on consideration of such factors.

This planning step involves the following six tasks:

*TASK 3.1: Conduct a Situation Assessment*

*TASK 3.2: Understand Impacts and Linkages*

*TASK 3.3: Document Trends: Back-casting, Future-casting*

*TASK 3.4: Document Sensitivities / Develop Community Impact Maps*

*TASK 3.5: Assess Adaptive Capacity*

*TASK 3.6: Summarize Vulnerability Assessment Ratings*

The Vulnerability Assessment methodology described in Step 3 has a primary focus on developing the information basis necessary for adaptation planning. Yet, we recognize that when engaged in climate change planning, stakeholders often aspire to simultaneously address their greenhouse gas emissions. Planners have a key role to play by supporting the development of policies and plans for compact urban design, improved transportation systems, sustainable waste management, renewable energy, etc. Indeed, when developing options to address key community vulnerabilities, it is important to investigate the potential for combined vulnerability reduction and emission reduction benefits (see Steps 5 and 6 of this Guide). It may be helpful to keep this in mind when undertaking the following steps.

#### TASK 3.1

### Conduct a Situation Assessment

*How is weather changing in the city? What types of climate change impacts are occurring in your area?* To answer these questions, planners need to work with local and regional stakeholders and any available technical support to identify climate-related changes that are affecting people's daily lives. It is important to note that there may be locally relevant research available that can be reviewed ahead of time.

TOOL 3-A  
Climate Change  
Observation  
Template

This could include regional or national climate change research and technical reports. If there is information and research available, it is recommended to carry out a desk review of the studies and reports and then to filter through it using the following steps.

## CLIMATE CHANGE PLANNING – MANY APPROACHES, NO ONE “RIGHT” WAY

The table summarizes some of the approaches to adaptation planning, and provides examples from different municipalities around the world. It is neither an exhaustive list of all possible approaches, nor are the approaches necessary mutually exclusive. This guide incorporates components of several approaches. Planners with additional resources or external expertise may want to combine approaches further and pull in additional elements into a hybrid, integrated approach of their own design.

**Table 8: Example Approaches to Climate Change Adaptation Planning**

| APPROACH                               | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                            | EXAMPLES*                                                                                                                                          |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Biophysical Impacts Approach           | <ul style="list-style-type: none"> <li>Science and scientist driven</li> <li>Dependent on climate projections and models</li> <li>Emphasis on physical systems</li> </ul>                                                                                                                                                                                                                                                                                              | Washington Climate Change Impacts Assessment                                                                                                       |
| Natural Hazards Vulnerability Approach | <ul style="list-style-type: none"> <li>Sectoral emphasis</li> <li>More emphasis on work with and by stakeholders</li> <li>Starts with current weather and vulnerabilities</li> <li>May use scientific projections</li> </ul>                                                                                                                                                                                                                                           | City Of Iqaluit's Climate Change Impacts, Infrastructure Risks & Adaptive Capacity Project - Cities in Climate Change Initiative (CCCI)/UN-HABITAT |
| Social Vulnerability Approach          | <ul style="list-style-type: none"> <li>Focus on social &amp; economic factors that lead to climate change vulnerability</li> <li>Bottom-up dialogue with impacted communities</li> <li>Actions focus on short term</li> </ul>                                                                                                                                                                                                                                          | Climate Change and Human Development in Vietnam                                                                                                    |
| Resilience Approach                    | <ul style="list-style-type: none"> <li>Focus on socio-ecological systems (e.g. fishery and the community)</li> <li>Refers to and analyzes:               <ul style="list-style-type: none"> <li>Capacity of physical systems to withstand shocks</li> <li>Organizational ability to respond to emergencies</li> <li>Social capacity to reduce negative consequences</li> <li>Economic capacity to reduce direct &amp; indirect financial losses</li> </ul> </li> </ul> | Dongting Lake Region, China                                                                                                                        |
| Adaptation Policy Approach             | <ul style="list-style-type: none"> <li>Better suited to communities that want to focus on already determined impacts</li> <li>Look to how other jurisdictions have approached similar impacts</li> <li>Considers future risks and possible policies; feasibility of implementation and compatibility with other policy goals</li> </ul>                                                                                                                                | London, UK                                                                                                                                         |

Adapted from Penny, J. (2010). Approaches to Assessing Climate Change Impacts and Adaptation Planning. Clean Air Partnership Webinar #1, January 19, 2010 and ICLEI Climate Change Adaptation Guide (Draft).

\*Examples: See the resources section in Appendix 5 for links to resources listed in this table.

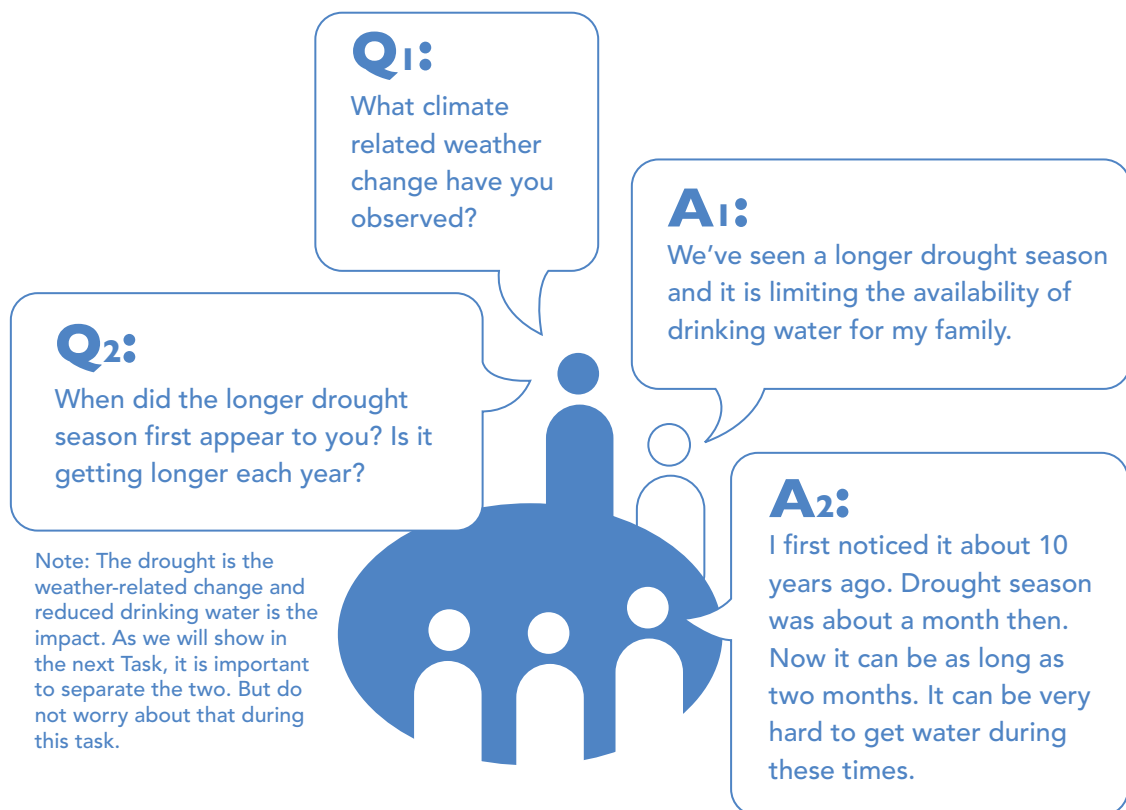
You will have already established a stakeholder group and provided a general overview of climate change and its impacts. The stakeholder group can now be guided through the situation assessment process. At this point, two questions can be put to the group:

- *What climate-related weather changes have you observed?*
- *How are these changes affecting people's daily lives?*

The answers to these questions will vary and there may not be agreement. Some answers may not even be related to climate change. While you may not capture every climate-related change and potential future impact, that is fine. The important thing is to allow the stakeholder group to share their observations and concerns and to engage the larger community in the planning project. You may want to avoid trying to get stakeholders to talk about issues you yourself or your planning department find important. What is "important" will be determined through the process, and can be examined in greater detail during future steps (Module B).

Stakeholders will also likely want to discuss impacts rather than the changes to the climate system. Naturally, people want to focus on the things that impact their lives, not necessarily the cause of the impact. As the planner, the important thing is for you to collect the information and try and get a sense of whether there is a trend. The dialogue box provides an example of how a typical discussion might go during the initial assessment stage.

Figure 7: Example Climate-related Weather Changes Dialogue



## GREENHOUSE GAS ASSESSMENTS – AN OPPORTUNITY FOR PARALLEL GAINS

Finding synergies between adaptation and mitigation efforts can help facilitate action on climate change on two fronts at the same time. An important part of this is building a good knowledge base about greenhouse gas emissions in the municipality. Plan developers may want to investigate the opportunity to undertake formal Greenhouse Gas Assessments in parallel with Step 3. Guidance and procedures for undertaking such assessments include:

1. Draft International Standard for Determining Greenhouse Gas Emissions for Cities (UN Environmental Programme /UN-HABITAT/World Bank, 2010).
2. International Local Government GHG Emissions Analysis Protocol (ICLEI - Local Governments for Sustainability 2009).
3. Guidelines for National Greenhouse Gas Inventories (Intergovernmental Panel on Climate Change, 2006)

These sources provide detailed guidance for undertaking baseline assessments of where and how urban areas generate greenhouse gases. Conducting a Greenhouse Gas Assessment at this stage can provide the basis for developing targets and actions that can be integrated at multiple steps of the overall climate change planning process.

Use Tool 3-A to record the stakeholder group's climate observation information. The list of observations and trends will likely be long when you are finished. There will also likely be repetition and overlap, which is fine. The next step is to work with the stakeholder group to organize the information in a limited number of categories so you can begin to assess how important the weather changes and climate impacts are to your community.

**Table 9: Example Climate Change Observation Template (Tool 3-A)**

| OBSERVATION                                                 | RECENT TREND                                                                                                                                                |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Longer drought season and less drinking water.              | <ul style="list-style-type: none"> <li>• Began about 10 years ago</li> <li>• Getting longer</li> <li>• At first was 1 month and now two months.</li> </ul>  |
| The river is flooding our neighbourhood during storm season | <ul style="list-style-type: none"> <li>• Getting worse</li> <li>• Flooding area is bigger</li> <li>• Neighbourhood is flooded for longer periods</li> </ul> |
| More power outages during hot season                        | <ul style="list-style-type: none"> <li>• The power outages are longer and more frequent</li> </ul>                                                          |

#### WHAT'S YOUR CITY'S POLICY SITUATION?

As part of your Situation Assessment task, it is also valuable and advisable to collect and review all local government plans and policies that may include climate change-related policies or background research (see Section 3.2.3 for a list of candidate plans and policies). These documents may also provide opportunities and options during later planning phases for mainstreaming climate change actions (see Module C).

## A Case in Point

### PRIMARY LIVELIHOOD IMPACTS PABEAN, PEKALONGAN, INDONESIA

As part of a municipal climate project facilitated by the UN-HABITAT CCCI, an assessment team carried out a vulnerability assessment of Pabean, a poor, low-lying neighbourhood in which 75% of all working adults work in the Batik industry (fabric dyeing). The Batik industry played an important role in the study, as it is the area's primary economic driver and a key pollutant of water sources. Seasonal flooding and storm surges pose major risks to Batik livelihoods, reducing productivity and disrupting trade, as well as posing serious health risks resulting from water contamination, drainage, and sewerage. Participatory workshops were held to gather information about the hazards climate change poses for community members. Structured interviews assessed how often work is impacted by climate related phenomena, such as flooding. The interviews also communicated the autonomous adaptation strategies adopted by individual community members, which were then used to brainstorm possible adaptation actions. An assessment of adaptive capacity focused on managing water-related hazards and reducing barriers to Batik production.



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More info:

<http://www.unhabitat.org/content.asp?cid=8988&catid=632&typeid=61&subMenuId=0&AllContent=1>

## Understand the Impacts and Linkages

### TASK 3.2

After the list of observations collected in Task 3.1 has been completed it needs to be organized. A helpful tool for doing this is an Influence Diagram. An Influence Diagram is a flow chart that graphically represents the relationship between a potential impact and its climate-related cause. Influence diagrams organize and present information in a concise way.

TOOL 3-B  
Influence  
Diagrams

At the end of this task, planners will end up with Influence Diagrams for each major climate change driver. Examples of climate change drivers include:

- Drought
- Flooding
- Heat Waves
- Sea Level Rise
- Storms

So, how can the observations collected in Task 3.1 be sorted? Begin by taping 6 to 10 large sheets of paper on the walls and have a marker available. With the stakeholder group, go through each observation and ask:

1. *Has this observation already been covered? If yes, move to the next observation on the list. If not, go to the next step. [Note: be careful to take notice of different opinions about trends. In many cases, people will be speaking from memory so the more observations the better]*
2. Determine whether the observation is a climate-related weather change or an impact. To understand the difference, go through 'The What Game'.

**Figure 8: The What Game**

The What Game is easy. For each observation simply ask the group: What Causes This? Keep asking this question until the answer is a weather-related change. For example:

**OBSERVATION:** There are more power outages during the hot season



3. Now, label one of the sheets taped on the wall "Drought" and, using arrows and boxes, record the results of The What Game (see sample Influence Diagram below). Leave room for other "pathways". You will find that many of the impacts people talk about can be traced back to common weather related changes. For example, an urban farmer may report having difficulty growing his or her crop and feel it is a climate-related impact. For illustrative purposes, the results of the farmer's crop What Game are also plotted in the Drought influence diagram (the lower pathway). This is an example of how The What Game can help focus the group on the relevant cause and not get too side-tracked.

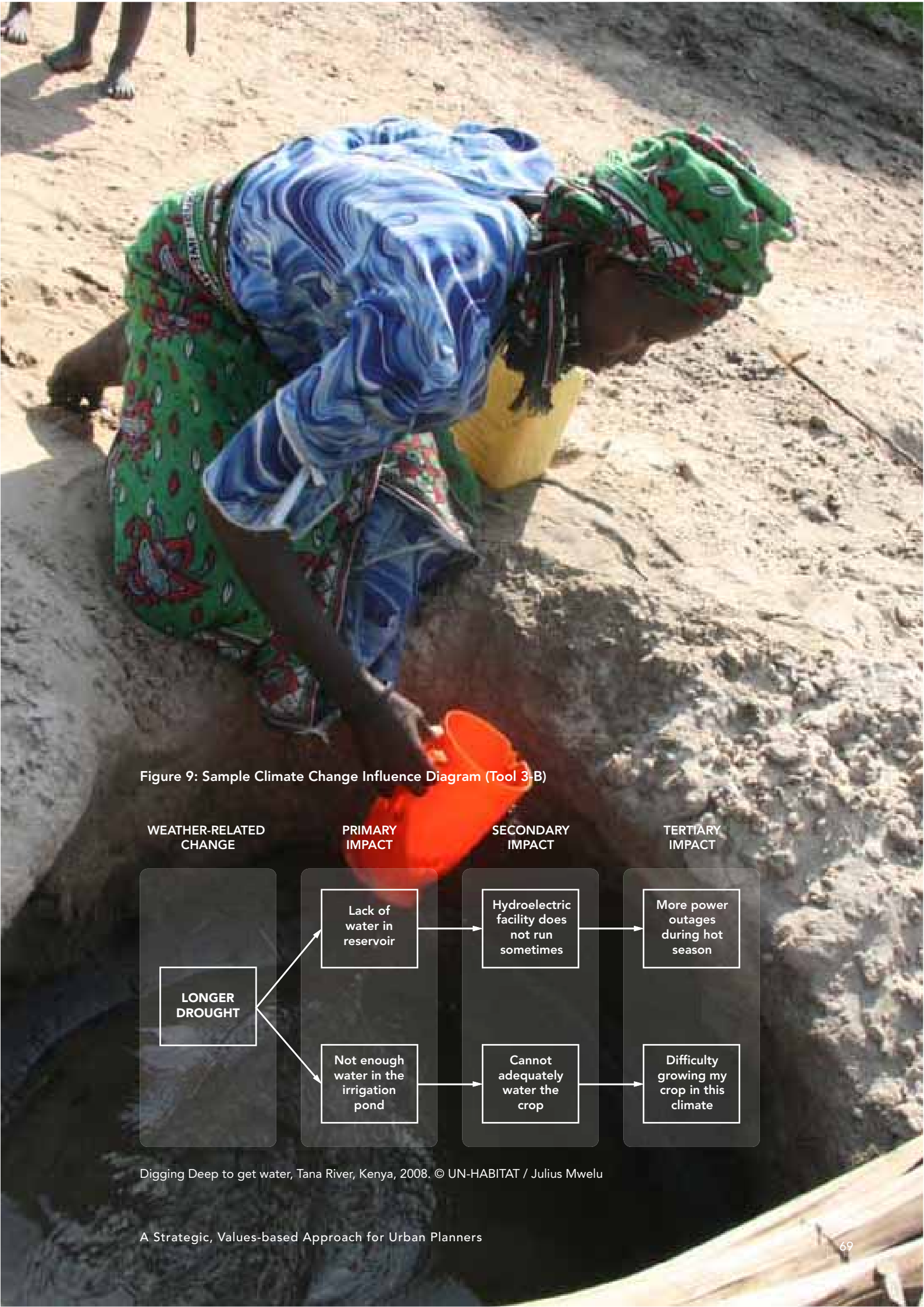
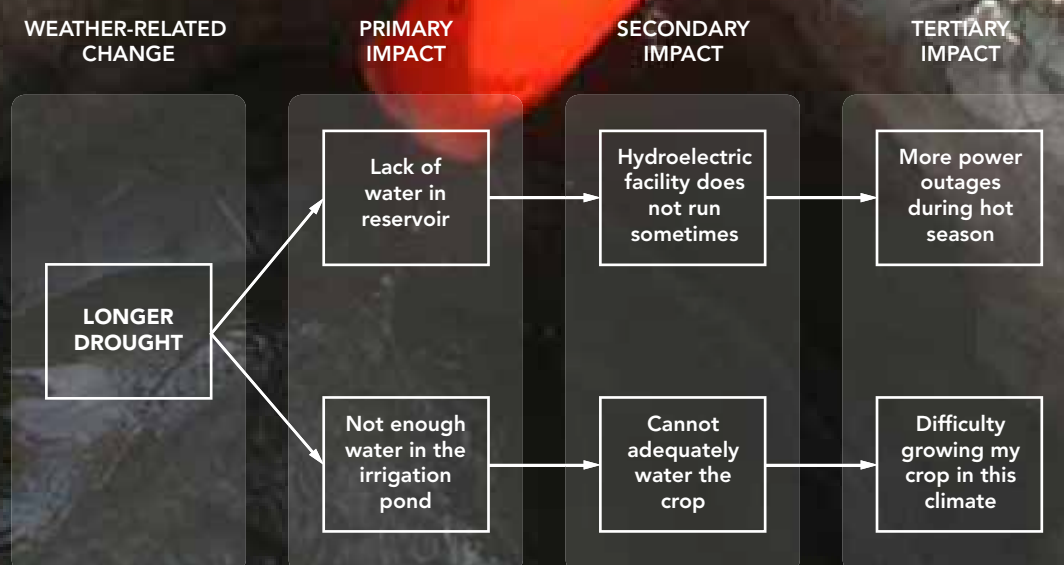


Figure 9: Sample Climate Change Influence Diagram (Tool 3-B)



Digging Deep to get water, Tana River, Kenya, 2008. © UN-HABITAT / Julius Mwelu

4. Note how the primary, secondary and tertiary impacts are distinguished in the sample Influence Diagram. This will be important when building strategies or selecting actions for addressing climate change. The weather-related change is not something communities will have control over, but planners may be able to manage primary and secondary impacts through various strategies. As well, there may be strategies that address multiple impacts. There should be a natural tendency in drawing linkages between weather-related changes to *biophysical impacts* (e.g., lack of water in reservoir) and then *human system impacts* (e.g., loss of crop production, loss of livelihood, human health, etc.). This should be encouraged, as the end-points of these pathways should point toward the impacts that directly matter to people.
5. Continue with *The What Game* until all of the weather-related observations are plotted on an Influence Diagram. At this point you should have all of your observations recorded on the large sheets taped up around the room. Be careful not to lose this information, as it will be required in the next step. At this point, it is likely that many stakeholder observations will be organized under just a few weather-related changes. This way of organizing information makes this easier for the next step.
6. If you meet with new stakeholder groups, use the same influence diagrams and add to them. There is no need to repeat work that has already been done! Note that influence diagrams are just as applicable to scientist groups as community members. Influence diagrams are powerful tools for organization information regardless of the level of technical knowledge.
7. At some point, you will need to validate the observations and trends you record. The influence diagrams form the foundation of your climate change plan, so it is important this information is accurate. Some options for validating information include:
  - **Technical Working Group:** If time and resources permit, consider forming a technical expert group to review the results of the earlier stakeholder sessions. This group would be made up of climate change specialists (e.g., climatologists, academics, etc.) with strong technical knowledge and skills.
  - **Local, regional, national and/or international scientific reporting:** This is a research-intensive option that typically requires familiarity with climate science reporting. Ideally, there will be someone in the core planning team that can play this role. Check for consistency with your country's National Adaptation Plan of Action report if it exists.
  - **Other local government planning initiatives:** Observations about climate-related issues like drinking water availability, power generation infrastructure and flooding may be referenced in other municipal and local government plans, including Physical Land Use Plans, Infrastructure Reports, Disaster Management, etc.. Crosschecking plans will also help "mainstream" climate change strategies into other planning initiatives in future steps.

### A WORD OF CAUTION

The sources of your information may range from community members to expert scientists. Scientific reporting is not necessarily a perfect substitute for local knowledge, nor is community input sufficient alone. Scientific observations are often regionally-focused and may not account for unique circumstances at the local level. Before adopting scientific reporting as “true”, validate findings with local people. Conversely, use scientific reporting as a way to check local reporting. Rarely do community members track weather related changes and impacts with accuracy, so often citizen input can benefit from the long-term trends documented in scientific studies.

The figure provides examples of climate-related changes and their primary and secondary impacts. It was derived from a summary report produced by the *Asian Cities Climate Change Resilience Network (ACCCRN)*.

**Table 10: Examples of Climate Related Changes, Primary and Secondary Impacts**

| LOCATION          | CLIMATE RELATED CHANGE                                 | PRIMARY IMPACTS                                                          | SECONDARY IMPACTS                                                                                            |
|-------------------|--------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Can Tho, Vietnam  | Increased dry season temperatures coupled with drought | Reduce or eliminate crop yields                                          | Poverty, food security, structural changes to economy, urban-rural migration                                 |
|                   | Sea level rise during peak monsoon season              | Flooding of agriculture lands and aquaculture facilities, destroys crops | Rural to urban migration as farming becomes too risky                                                        |
| Da Nang, Vietnam  | Increase in typhoon occurrence                         | Riverbank and coastal erosion                                            | Impacts to infrastructure and tourism economy                                                                |
|                   | Prolonged drought                                      | Reduces agricultural production, reduced availability of water           | Farmers switching crop patterns                                                                              |
|                   | Sea level rise                                         | Increased water levels in urban and coastal areas where tourism located  | Carries waste/pollution to other parts of City, causing health risks                                         |
| Quy Nhon, Vietnam | Flash Flooding, storm surge                            | Inundation and saline intrusion, erosion                                 |                                                                                                              |
|                   | Prolonged drought                                      | Less water availability                                                  | Less power generation capacity                                                                               |
| Gorakhpur, India  | Storms, heavy rainfall                                 | Flooding                                                                 | Clogs sewer system, vector born diseases, contamination of drinking water, limited power generation capacity |
|                   | Prolonged drought                                      | Degradation of water bodies                                              | Reduced water for crops/drinking                                                                             |
| Surat, India      | Coastal storms and cyclones, sea level rise            | Flooding                                                                 | Saline effect in drinking water, health problems, dislocation of poor located near rivers                    |

| LOCATION                  | CLIMATE RELATED CHANGE                                          | PRIMARY IMPACTS                                           | SECONDARY IMPACTS                                                                                        |
|---------------------------|-----------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Indore, India             | Increased precipitation with increased variability and severity | Dry rivers during low rain periods                        | Water shortage, constraint on industry                                                                   |
|                           |                                                                 | Flooding due to lack of stormwater management system      | Increased demand for pumping power, but less generation due to upstream drought                          |
|                           |                                                                 | Vector borne disease related to precipitation variability |                                                                                                          |
| Semarang, India           | Precipitation variability                                       | Flooding                                                  | Disruption of transport systems, economies, and livelihoods                                              |
|                           | Sea-level rise                                                  | Coastal erosion and land subsidence                       | Impacts to fisheries and coastal homes, migration from coastal areas to other parts of the City          |
|                           | Drought                                                         | Water scarcity                                            | Over-extraction of groundwater, inadequate water utility infrastructure, difficulty meeting power demand |
| Bandar Lampung, Indonesia | Longer dry season                                               | Low water availability                                    | Less rice production, hydroelectricity                                                                   |
|                           | Extreme rainfall events during wet season                       | Flooding                                                  | Deforestation and mangrove destruction, stress on drainage systems                                       |
|                           | Coastal erosion                                                 | Flooding                                                  | Salinization of water supply due to sea water inundation, soil salinization affects agriculture          |

Source: Asian Cities Climate Change Resilience Network (ACCCRN): Responding to the Urban Climate Challenge. Eds. ISET, Boulder, Colorado, USA, 60 pp.



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## A Case in Point

### COMMUNITY ENGAGEMENT BANDAR LAMPUNG, INDONESIA

With support from ACCCRN, a vulnerability assessment was undertaken in the Indonesian city of Bandar Lampung, one of Sumatra's most important ports. The assessment involved a historical climate analysis and future climate impact assessment, a community based vulnerability assessment, and a governance assessment in order to ascertain the city's overall adaptation capacity. A key step in this process were Shared Learning Dialogues, focus groups facilitated by the project team that enabled a range of stakeholders to come together and share their knowledge and perspectives. These dialogues allowed the project team to elicit community perceptions of climate risks and organize impacts and their linkages.

More info: <http://www.mercycorps.org/pressreleases/16928>  
<http://accrnindonesia.wordpress.com/>

## Document Trends: Back-casting, Future-casting

The next series of questions to address are:

- *How are the weather and climate related changes that affect our community likely to change in the future?*
- *Will they continue to follow the same trend? Fluctuate? Stabilize?*

These questions can be hard to answer, but they are worth spending time on because they will help you focus on the climate change drivers and weather changes most relevant to you. Why develop strategies and allocate resources to challenges that may lessen in the future?

There are two main approaches to developing future climate projections:

1. Extrapolating historical trends into the future; and
2. Deriving local/regional projections using climate change models (Atmosphere-Ocean General Circulation Models).

Both approaches have strengths and weaknesses. We recommend using both wherever practical and feasible (i.e., if capacity and resources exist). The goal should not be to predict what the local climate will be with accuracy, but to gain the best understanding possible of the range of possible future weather scenarios using all available lines of evidence. You can then begin to assess how vulnerable your community is to potential climate changes given the associated level of uncertainty. The level of uncertainty, available resources, level of concern and other criteria may influence the action taken to address an impact.

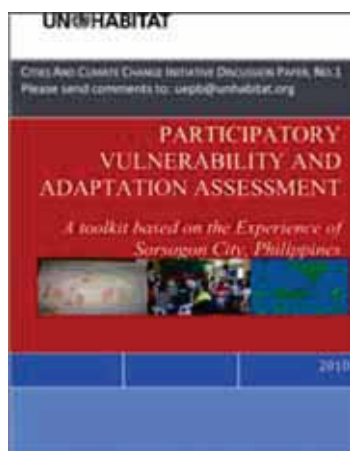
Ideally, historical trends will be informed by both local stakeholder knowledge and local/regional weather data. If you haven't already, we recommend you engage a local/regional climate-focused organization to assist you with gathering and interpreting historical trends and projecting possible future trends. It may be possible to access scientific climate models that provide climate related weather projections. A list of resources is provided below, along with an example methodology for developing more detailed climate change scenario projections.

If you are able to collaborate with a climate-focused organization that is able to assist you with historical weather data and climate projections, be sure to brief them on the results of the steps you have completed so far. It is important that any climate projections are suited to your local situation and planning context.

Using the following matrix template, record the climate-related changes identified in Task 3.1 and 3.2 down the left hand column, and summarize your available information from local stakeholder observations, historical weather data and climate change models (if available).

The challenge with this task is to reflect on all available lines of evidence, in order to make summary judgements regarding projections for each identified key climate change driver. When stating the summary projection, it is important to identify the direction of change and any key uncertainties. Providing a final rating of your confidence, which should be based on the level of consistency across the available lines of evidence and the range of uncertainty, adds to the transparency of your assessment.

TOOL 3-C  
Climate  
Change  
Trend Matrix



Draft Vulnerability Assessment Tool,  
© UN-HABITAT

### TOOLS AND RESOURCES

UN-HABITAT developed a climate change vulnerability and adaptation assessments guide. Based on on-the-ground experience from Sorsogon City, Philippines, the toolkit:

- Provides users with a better understanding of climate change vulnerability and adaptation assessment
- Introduces users to the basic steps of conducting a participatory climate change vulnerability and adaptation assessments with guidance, tools, and references for each step

Designed to be simple and readable document, this toolkit can be used by those who are not technically adept in climate science.

To download a copy go to:

[www.unhabitat.org.ph/climate-change/knowledge-productsoutputs](http://www.unhabitat.org.ph/climate-change/knowledge-productsoutputs)

Table 11: Example Summary Climate Change Projection Matrix (Tool 3-C)

| CLIMATE CHANGE DRIVER | EXTREME EVENT OR CHANGE TO AVERAGE | HISTORICAL TRENDS                                   |                                                                            | CLIMATE MODEL SCENARIO PROJECTIONS**                                                 | SUMMARY CLIMATE CHANGE PROJECTION                                                                                                                                                           |            |
|-----------------------|------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
|                       |                                    | STAKEHOLDER OBSERVATIONS                            | LOCAL / REGIONAL WEATHER DATA*                                             |                                                                                      | PROJECTED FUTURE CHANGE                                                                                                                                                                     | CONFIDENCE |
| Drought               | Extreme                            | Summer droughts lasting 4-5 weeks longer most years | Average length of summer dry periods increased by 15 days in last 30 years | Spring / Summer in year 2050:<br>+ 1.5oC Temp<br>- 10% Precip<br>- 18% soil moisture | <ul style="list-style-type: none"> <li>Generally increasing trend in length of dry season.</li> <li>Rate of change over time is uncertain, but expected to</li> </ul>                       | High       |
| Flooding              | Average                            | Some reports of higher spring flows in river        | Decrease in average regional precipitation during summer months            | As above                                                                             | <ul style="list-style-type: none"> <li>Generally stable - frequency of spring floods to remain consistent over time.</li> <li>Influence of land-use change in watershed unknown.</li> </ul> | Low        |
| Heat Waves            | Extreme AND Average                | Hotter almost every year; sometimes extremely so    | Average summer Temp increased by 0.8oC in last 30 years                    | Summer in year 2050:<br>+ 2oC Temp                                                   | <ul style="list-style-type: none"> <li>Increasing trend in both the frequency and duration of heat waves.</li> </ul>                                                                        | Very High  |
| Sea Level Rise        | n/a                                |                                                     |                                                                            |                                                                                      | <ul style="list-style-type: none"> <li></li> </ul>                                                                                                                                          |            |
| Storms                | n/a                                |                                                     |                                                                            |                                                                                      | <ul style="list-style-type: none"> <li></li> </ul>                                                                                                                                          |            |
| Etc.                  |                                    |                                                     |                                                                            |                                                                                      | <ul style="list-style-type: none"> <li></li> </ul>                                                                                                                                          |            |

\* See Appendix 2: Resources for relevant references.

\*\* See example methodology for how to organize and present Climate Model scenario projections

Each of the column headings in the Summary Climate Change Projection Matrix is described below:

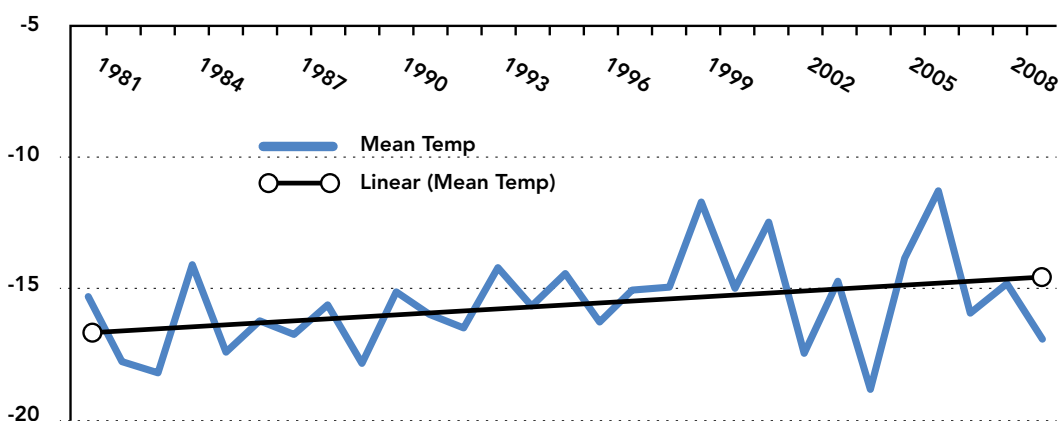
- **Climate Change Driver:** These are the main categories, as developed through the use of Influence Diagrams (Task 3.2). These are the main drivers that we need to prepare and adapt for.
- **Extreme Event or Change to Average:** Indicate the type of climate-related change in this column. Extreme weather events are those that worsen in severity and extent, and differ from changes to average conditions. For example, your community may experience tropical storms that aren't necessarily longer (on average) but have much higher winds and heavier rainfalls. If only the number or length of storms per year was considered, it may appear no action is required. But if the extremity of those storms is considered, management strategies may be necessary to manage impacts

#### CAUTION! Do not confuse annual weather volatility with changes in climate trends

Climate change can increase the variability and volatility of weather events and potentially mask underlying trends. For example, one year may have more rainfall than normal and the next year may have far less. It is very important to avoid basing your plan on short-term historical accounts. Look for long-term trends, ideally 30 years or longer. Weather volatility is important to notice as well because it can be an indicator of extreme weather events. It is important to plan for extreme events, not just changes in averages, because often the extreme events pose the greatest risk to a community. Weather is what you observe annually, climate is the trend or changes that you see over a period of years (ideally over 10 or 20+ years).

For example, the chart below is the historical spring temperature in Rankin Inlet, Canada (an Inuit Arctic community). The temperature is clearly trending upwards over the last 30 years. But note the increased volatility in temperature since 1995. This suggests the season is both getting warmer (on average) and experiencing greater variability in high and low temperatures.

**Spring Average Temperature, 1981-2008 (°C)**



Source: Hayhurst, K. and Zeeg, T. (2010). Tikirarjuaq (Whale Cove) Climate Change Action Plan. Prepared for Canadian Institute of Planners.

- **Historical trends:** Include information from local observations and historical data if possible. Historical data can be difficult to acquire and summarize. Tips for acquiring IPCC / regional data are described below.
- **Climate Model Scenario Projections:** Incorporate, if possible, changes that are projected using climate models, simulated representations of the earth's climate system based on its various components and their interactions and feedback processes. The IPCC is the most credible source for this information, but information is not likely available at a local scale (called "down-scaling"). Tips for acquiring IPCC data and regional / local data are provided below.
- **Summary Climate Change Projection:** This summary judgement should be based on the documented understanding of historical trends, as well as changes that are estimated using climate models (if possible), and any other available information. Specifics to include are:
  - **Directionality (Historical vs. Projected):** Provide a summary assessment of which way the trend is going. Is the level of change expected to increase at a greater rate in the future? Will it decrease? Remain the same? This important step will help planners focus efforts on climate-related changes that will likely have the greatest impacts.
  - **Uncertainty:** In the case of IPCC data and model results look for descriptions of "likelihood." IPCC future trends are often characterized in terms of likelihood (i.e., probability) using terms such as *virtually certain*, *very likely*, *likely*, *unlikely*, etc. (see Glossary of Terms). It is not important to figure out the exact probability, rather the goal should be to understand the full range of conditions that might arise for any given climate change driver.
  - **Confidence:** Record your confidence level in the accuracy of the summary projection. Are all lines of evidence supporting the same conclusion? Would gathering more information help, and should this be part of your plan? Being transparent about your confidence is an important consideration when you allocate scarce resources to the impacts most likely to affect your community.

Table 12 summarizes expected trends of major climate variables for different regions of the world. This table is a high-level summary of more detailed regional projections. It is not a perfect substitute for local projections, which can be generated in collaboration with a local/regional climate-focused agency or using the projection tools outlined in *Appendix 5: Sources and Noted Resources*.

## A Case in Point

### VULNERABILITY INDEX MAPPING SEMARANG, INDONESIA

Semarang is a coastal city located in Java, Indonesia. As part of the Rockefeller Foundation's Asian Cities Climate Change Resilience Initiative (ACCCRN), a local assessment team undertook a project to explore climate vulnerabilities, assess which populations and urban systems may be most vulnerable to future climate variation, and identify existing adaptation capacities. Currently almost all of Semarang's districts experience severe disruption of transport systems, economies, and livelihoods from flooding. A key part of the assessment was the mapping of vulnerability index that examined individual vs. collective exposure to climate impacts. The disaster risk maps that were produced supported scientific, community based and institutional assessments of adaptive capacity. It is important to note that these technical tools, however useful, must be coordinated with larger planning processes, and as they may be costly and require technical capacity, they may not be the most sustainable assessment process for a planning department with limited human and financial resources.

#### More Info:

<http://www.rockefellerfoundation.org/what-we-do/current-work/developing-climate-change-resilience/asian-cities-climate-change-resilience>

<http://accrnindonesia.wordpress.com/>



Table 12: Overview of expected regional trends of major climate-related changes

| WEATHER VARIABLE | AFRICA                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ASIA                                                                                                                                                                                                                                                                                                                                                                                                                                           | CENTRAL / SOUTH AMERICA                                                                                                                                                                                                                                                                                                                                                                                                                        | SMALL ISLANDS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Surface warming  | <ul style="list-style-type: none"> <li>Very likely higher than global increases</li> </ul>                                                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>Likely to be well above global mean in central and northern Asia, above global mean in eastern and south Asia, same as global mean in Southeast Asia</li> </ul>                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>Likely to be similar to the global increase in southern South America but larger elsewhere</li> </ul>                                                                                                                                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>Likely to be somewhat smaller than the global annual mean.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Precipitation    | <ul style="list-style-type: none"> <li>Likely decrease in northern Africa</li> <li>Likely decrease in southern Africa</li> <li>Likely increase in east Africa</li> </ul>                                                                                                                                                                                                                                                                                                | <p><b>Winter</b></p> <ul style="list-style-type: none"> <li>Very likely to increase in northern Asia and the Tibetan Plateau</li> <li>Likely to increase in eastern Asia and the southern parts of Southeast Asia</li> </ul> <p><b>Summer</b></p> <ul style="list-style-type: none"> <li>Likely to increase</li> <li>In northern Asia, East Asia, South Asia and most of Southeast Asia, but is likely to decrease in central Asia.</li> </ul> | <ul style="list-style-type: none"> <li>Likely to decrease in most of Central America and in the southern Andes (could be greater variability in mountainous areas.</li> <li>Winter precipitation in Tierra del Fuego and summer precipitation in south-eastern South America is likely to increase.</li> <li>It is uncertain how annual and seasonal rainfall will change over northern South America, including the Amazon forest.</li> </ul> | <ul style="list-style-type: none"> <li>Summer rainfall in the Caribbean likely to decrease in Greater Antilles but changes elsewhere and in winter are uncertain.</li> <li>Annual rainfall likely to increase in the northern Indian Ocean with increases likely in the vicinity of the Seychelles in Dec - Feb and in the vicinity of the Maldives in June - Aug, while decreases are likely in the vicinity of Mauritius in June - Aug.</li> <li>Annual rainfall is likely to increase in the equatorial Pacific, while decreases are projected east of French Polynesia in Dec - Feb.</li> </ul> |
| Other weather    | <ul style="list-style-type: none"> <li>Very likely heat waves/hot spells in summer will be longer duration, more intense and more frequent in East Asia.</li> <li>Fewer very cold days are very likely in East Asia and South Asia.</li> <li>Very likely increase in frequency of intense precipitation events in parts of South Asia, and in East Asia.</li> <li>Extreme rainfall and winds likely to increase in East Asia, Southeast Asia and South Asia.</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

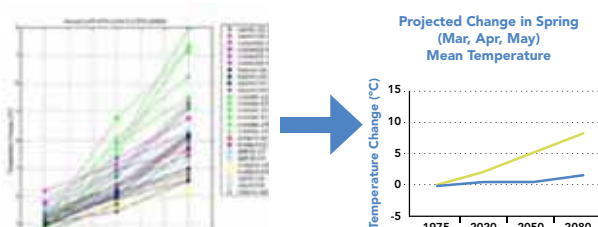
Notes: Projection regional surface warming trends are relative to projected global mean surface warming of 1.8 to 4 degC at the end of the 21st century. Projected sea level rise 0.2 to 0.6 m above 1990s levels by end of century.

Sources: Christensen, J.H., B. Hewitson, A. Busioci, A. Chen, X. Gao, I. Held, R. Jones, R.K. Kolli, W.-T. Kwon, R. Laprise, V. Magaña Rueda, L. Mearns, C.G. Menéndez, J. Räisänen, A. Rinke, A. Sarr and P. Whetton, 2007: Regional Climate Projections. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Figure 10: Example Methodologies for Documenting Climate Change Scenarios Projections from Global Climate Models

### 1. Access climate data for variables of interest:

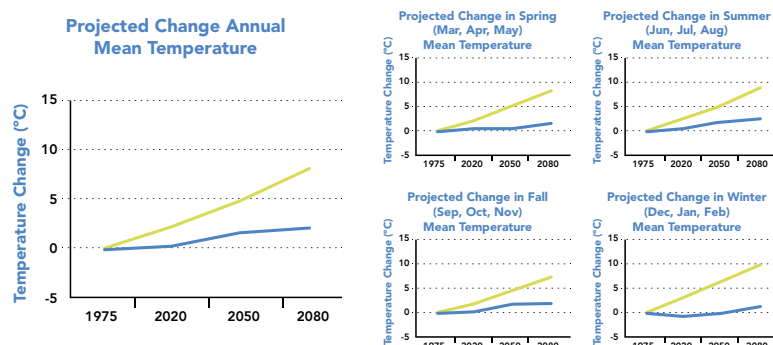
- Download climate data from a range of global (or regional) climate models run under a range of future GHG emission scenarios.
- Summarize the results for presentation purposes into a simple range (e.g., 10th to 90th percentiles) that captures both the trend and the range of uncertainty.



Tip: Websites where you can find global and regional climate models are provided in Appendix 2.

### 2. Focus on annual or seasonal scenarios (as necessary):

- Complete step 1 for both annual or seasonal projections as best necessary to inform the climate change driver of interest (e.g., summer season projections for drought).



Tip: Seasonal breakdowns may be more difficult to generate. Proceed with annual projections and refer to the IPCC Regional Climate Projections document (referenced below) for insight on how climate variables will differ seasonally. It is important not to allow lack of data to result in inaction.

### 3. Develop a summary of scenario projections:

- Develop a summary table of projections, focusing on making clear statements regarding the trends and key uncertainties.

| VARIABLE           | FOCUS PERIOD | RANGE OF MAGNITUDE / DIRECTIONS OF CHANGE | SUMMARY OF PROJECTIONS                                                                                                                                           |
|--------------------|--------------|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mean Temperature   | Annual       | +2.1 oC to +7.9 oC                        | <ul style="list-style-type: none"> <li>Generally projected to rise steadily over time, annually and seasonally</li> </ul>                                        |
|                    | Summer       | +2.3 oC to +8.5 oC                        |                                                                                                                                                                  |
|                    | Winter       | +1.0 oC to +9.5 oC                        |                                                                                                                                                                  |
| Mean Precipitation | Annual       | +1% to +17%                               | <ul style="list-style-type: none"> <li>Generally projected to rise over time, varying annually and seasonally</li> <li>Greatest uncertainty in summer</li> </ul> |
|                    | Summer       | -24% to +16%                              |                                                                                                                                                                  |
|                    | Winter       | -4% to +30%                               |                                                                                                                                                                  |
| Mean Soil Moisture | Annual       | 0% to -5%                                 | <ul style="list-style-type: none"> <li>Generally projected to decrease over time, annually and seasonally</li> </ul>                                             |
|                    | Spring       | 0% to -11%                                |                                                                                                                                                                  |
|                    | Summer       | -1% to -6%                                |                                                                                                                                                                  |
| Mean Wind Speed    | Annual       | -7% to +3%                                | <ul style="list-style-type: none"> <li>Significant uncertainty both annually &amp; seasonally</li> <li>Greatest uncertainty in winter</li> </ul>                 |
|                    | Summer       | -16% to +3%                               |                                                                                                                                                                  |
|                    | Winter       | -13% to +11%                              |                                                                                                                                                                  |

## Document Sensitivities / Develop Community Impact Maps

By now, there should be an understanding of, and focus on, the key climate change drivers (e.g. floods, droughts, etc.) that could potentially impact the region or community. But important questions remain:

- *What degree of change triggers significant impact? Are there specific thresholds of concern?*
- *Which specific locations are most at risk to the impacts associated with key climate change drivers?*
- *Who lives in risk prone areas, and what resources do they have available? What are the vulnerable sectors/livelihoods (e.g., women, the poor, etc.)?*

Working with the stakeholder group, core group or on your own, the task is to collect information to better understand what degree of change triggers a significant impact for each climate change driver. What is “significant” may in part depend on the community’s risk tolerance, values and ability to understand what’s at stake, pointing to the importance of a mix of technical accuracy and good stakeholder engagement early in the project. Perhaps the community can withstand some degree of change in some cases, giving more time to adapt. Or perhaps the impact is already imminent, and documenting the impending impact relative to clearly understandable and measurable thresholds can focus attention on the need for important infrastructure investments, or worse, guide emergency response monitoring.

TOOL 3-D  
Sensitivity  
Thresholds  
& Triggers

Use Tool 3-D to summarize all available information on thresholds and triggers for each identified climate change driver.

**Table 13: Example Sensitivity Thresholds and Triggers Template (Tool 3-D)**

| CLIMATE CHANGE DRIVER | PRIMARY / SECONDARY IMPACTS                                                                | THRESHOLDS & TRIGGERS                                                                                                                                  |
|-----------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Drought               | Domestic water supply<br>Power generation                                                  | At river flows less than 100 m <sup>3</sup> /s, reservoirs cannot be filled                                                                            |
|                       | Reduced agricultural production                                                            | More than one month droughts will require investments in irrigation (or a change to new crops)                                                         |
| Flooding              | Residential / Industrial area flooding                                                     | Dikes topped at a flow of greater than 100,000 m <sup>3</sup> /second, which causes a river stage increase of 1.5 metres at Low Bridge.                |
| Heat Waves            | Community health: increased rates of heat stroke and respiratory problems.                 | Clinics experience increased incidence rates at greater than 45°C for a week or longer.                                                                |
| Sea Level Rise        | <ul style="list-style-type: none"> <li>Residential and commercial area flooding</li> </ul> | <ul style="list-style-type: none"> <li>At 0.5m sea level rise – flood area is 10 ha</li> <li>At 1.0 m sea level rise – flood area is 200 ha</li> </ul> |
| Storms, Etc.          |                                                                                            |                                                                                                                                                        |

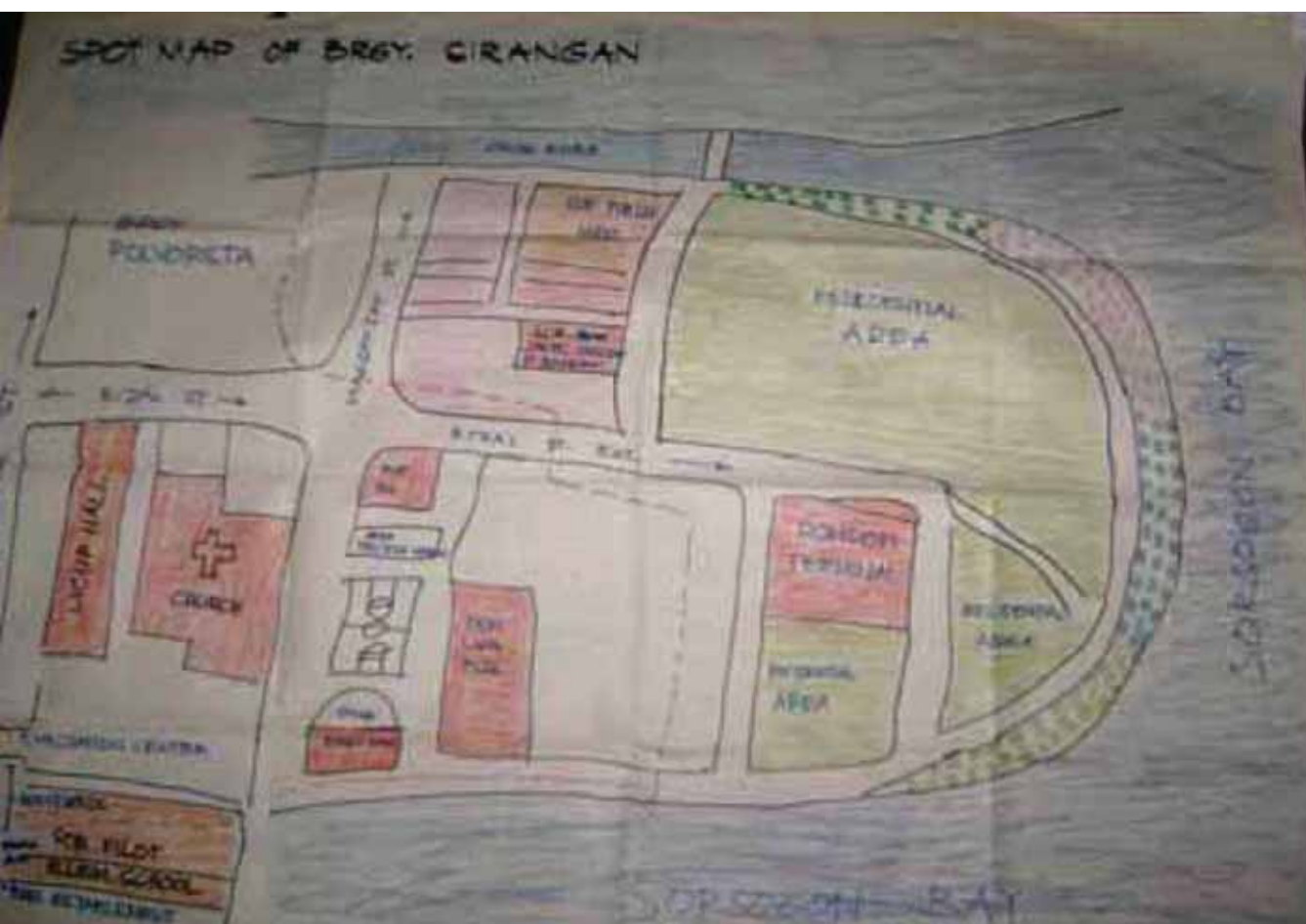
Note: Extra rows to be added as required for all identified climate change drivers.

In some circumstances, understanding the 'lay of the land' becomes an important communication and documentation tool. Referring to Figure 8, showing the effects of various sea level rise scenarios can help stakeholders decide the acceptable thresholds. For example, at 0.5 m of sea level rise the 10 ha of inundated area may be considered "low value" land but 200 ha of inundated area could be catastrophic for one or more neighbourhoods. Under a 0.5 m rise scenario, scarce resources may be better allocated elsewhere, where the opposite is true under a 1.0m rise scenario. Community-based mapping can help visualize impacts and identify thresholds.

**TOOL 3-E**  
Community  
Based  
Mapping

Mapping can be very powerful communication, documentation and awareness building tool. As a documentation tool, maps can be used to record what resources (biophysical or social) are most important to a community and where they are located. As a communication tool, maps can be developed to raise awareness and facilitate a dialogue among stakeholders, external agencies and government officials.

**Figure 11: Example Community Based Impact Maps (Tool 3-E). Community based maps can be hand drawn or developed in a GIS if resources allow.**



Source: Community map - CCCI Sorsogon, Philippines Project

To develop community-based maps to support your planning, do the following:

1. Obtain or create a base map of the planning area, and highlight on it key community resources, such as settlements, transportation routes and major infrastructure (water supply, energy, health care centres, etc.). Make several copies to mark up for each climate change vulnerability topic. The map can be digital, printed or hand drawn, depending on available resources.
2. Working with the stakeholder group, discuss each topic area that has emerged from the previous tasks, and ask: *In which areas are we most concerned about (insert topic area name. e.g., flooding)?* Mark up the maps with specific locations of interest and concern. Expect that participants will jump right into developing solutions. Document these ideas and explain how they will be used later during *Step 6: Option Evaluation*. Wherever possible, attempt to determine the specific 'indicators' or thresholds in these sessions, or through subsequent follow-up. Indicators are base-level data that describe the current situation in a given area of concern. These measures are used later in the planning process, when it comes time to monitor and evaluate the impact of climate actions (See Module B, Step 5 and Module D).
3. Working at your desk, or in collaboration with others, document on additional maps any sources of information that will help to develop an understanding of adaptive capacity in the community. This could include information such as population and demographics, household income per capita, literacy, life expectancy, etc.

## A Case in Point

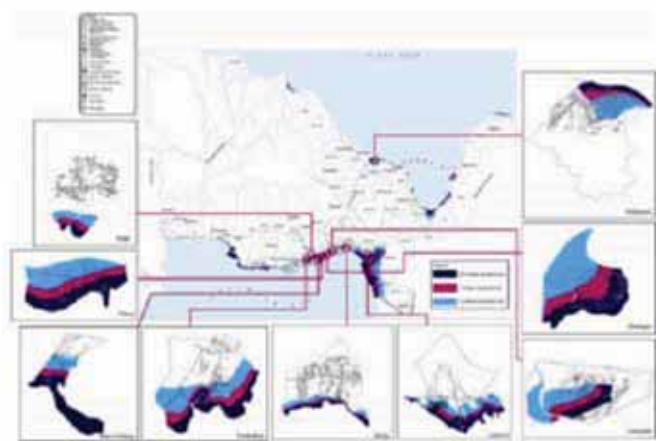
### COMMUNITY MAPPING SORSOGON CITY, PHILIPPINES

As part of a Cities and Climate Change Initiative (CCCI) project, the assessment team in Sorsogon City facilitated a participatory mapping exercise to support their climate vulnerability assessment. In this mapping initiative, community members shared their local knowledge and mapped hazards in a low-lying neighbourhood, or Barangay. The workshops were designed to collect information on people's actual experiences and possible indigenous methods of observing and recording changes in temperature, rainfall, sea level, and storm frequency. Information was confirmed by the project planning team and will be used to help update the existing City Land Use Plan and support policy work at the city's Disaster Coordinating Unit. This project was the basis for a vulnerability assessment toolkit published by UN-HABITAT. This guide is available through UN-HABITAT, and contains valuable information about this and other important vulnerability assessment processes

More info:

<http://www.unhabitat.org/ph/tools-and-technologies/253-vaa-toolkit>

**Hot Spot Mapping:** If resources and capacity in your local context allow, Hot Spot Mapping may be a useful extension of the community mapping process. While community mapping is necessary to validate specific local climate impacts, Hot Spot Mapping takes the process a step further by integrating local knowledge with technical tools. Essentially, Hot Spot Mapping involves overlaying various maps displaying different climate-related impacts to identify which areas are subject to the most impacts, or the greatest severity of a given impact. The community maps can then be overlaid or compared with the hot spot maps to identify which parts of a given locality are disproportionately exposed to or vulnerable to climate impacts. Both mapping processes are useful “checks and balances” for each other, as one may inform the knowledge gaps in the other. Hot spot mapping may rely on such technologies as GIS, although it could be done using existing maps of climate hazards and using imaging technology to align them with community maps.



### A Case in Point

#### HOT SPOT MAPPING SORSOGON CITY, PHILIPPINES

Sorsogon City undertook a hot spot mapping process as part of the vulnerability and adaptation assessment facilitated by the CCCI. Innovative mapping tools were used to integrate technical information with local community observation in order to identify the effects of climate-related hazards such as sea level rise. Following this, a hotspot mapping process was undertaken to identify especially vulnerable areas. Maps displaying different hazards were overlaid; areas that displayed a multitude of different hazards could then be identified as climate hotspots. This information was then used by the stakeholder group to identify five priority hot-spot Bangarays that will be the focus of demonstration projects. Local knowledge will also be employed and disseminated in the implementation process. Refer to the Participatory Vulnerability and Adaptation Assessment toolkit (published by UN-Habitat) for more information and examples of the maps produced.

More info: <http://www.unhabitat.org.ph/tools-and-technologies/253-vaa-toolkit>

## Assess Adaptive Capacity

How well is your community, agency and government able to respond to the identified climate change drivers and their impacts? This task can range from highly sophisticated to simple yet effective, depending on available resources. Some direct questions for an initial assessment are provided below. There are many more sophisticated tools for assessing adaptive capacity, depending on your resources. Examples include quantitative analysis of socio-economic indicators (e.g. education level, literacy, wealth, and access to technology) and adaptive capacity mapping. See Table 14 at the end of this section for a summary of some potential tools and references for these approaches. These are more costly, time consuming and technically demanding approaches, but may provide the level of detail you seek.

Use Tool 3-F to develop an overview perspective of your adaptive capacity, or to focus your assessment of adaptive capacity on a target sector as appropriate. The tool below is intended to get you started. In consultation with your colleagues and stakeholders, you may want to add criteria.

TOOL 3-F  
Adaptive  
Capacity  
Assessment

**Table 14: Adaptive Capacity Assessment Tool (Tool 3-F)**

| ADAPTIVE CAPACITY ASSESSMENT CRITERIA (EXAMPLE)                                                                                                                                                     | YES | NO |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| <b>AWARENESS:</b>                                                                                                                                                                                   |     |    |
| Are stakeholders in the area/sector aware there are current and/or potential impacts?                                                                                                               | ✓   |    |
| Is there an ability to communicate directly with the sector/area affected (e.g. basic communication infrastructure, a designated key point of contact, regular interaction, radio service, etc.)?   | ✓   |    |
| Are decision-makers aware of a) climate change and b) potential impacts in your jurisdiction?                                                                                                       | ✓   |    |
| <b>KNOWLEDGE:</b>                                                                                                                                                                                   |     |    |
| Has this area/sector undertaken previous efforts to study or address the climate change driver and potential impact?                                                                                |     | ✓  |
| Are there existing processes that you can integrate with?                                                                                                                                           |     | ✓  |
| Are there existing area/sectoral plans, including emergency response plans, that can be referred to?                                                                                                | ✓   |    |
| Are people in this area/sector literate, or do they require oral communication methods (e.g., radio programs, door to door campaigns, announcements at community gatherings)?                       | ✓   |    |
| <b>RESOURCES:</b>                                                                                                                                                                                   |     |    |
| Do you have adequate staff and allocated time to plan and implement adaptation actions?                                                                                                             |     | ✓  |
| Do you have access to adequate financial resources and funding?                                                                                                                                     |     | ✓  |
| Do people in the affected area have access to safe, clean drinking water in the event of a hazard occurrence?                                                                                       | ✓   |    |
| Is there political willingness to allocate resources to build adaptive capacity?                                                                                                                    | ✓   |    |
| Do the people in the affected area have resources to respond in an climate related hazard (e.g., access to basic transportation, adequate rations, ability to relocate temporarily, basic shelter)? |     | ✓  |

| ADAPTIVE CAPACITY ASSESSMENT CRITERIA (EXAMPLE)                                                                                   | YES | NO |
|-----------------------------------------------------------------------------------------------------------------------------------|-----|----|
| <b>SKILLS:</b>                                                                                                                    |     |    |
| Are there specific agencies, community groups, and/or NGOs that have the mandate and skills to focus on the specific sector/area? | ✓   |    |
| Are there trained emergency response teams for this sector/area?                                                                  |     | ✓  |
| Are there notable community/neighbourhood “leaders” that can quickly organize people in the event of a hazard occurrence?         | ✓   |    |
| Are there adequate medical services in close proximity?                                                                           |     | ✓  |

A city’s capacity to respond to a given climate change impact is based on its level of awareness, knowledge, resources, and skills. The more checkmarks in the yes column suggest a higher ability to respond to an impact. Determining capacity is not an exact science, so some subjective judgement will be required. However, as you develop your plan and implement in later stages, you can circle back and refine your assessment.

## A Case in Point

### ADAPTIVE CAPACITY IDENTIFICATION NEGOMBO, SRI LANKA

With support from the UN-HABITAT CCCI, an assessment team made up of local technical experts undertook a vulnerability assessment in Negombo, Sri Lanka. Following a climate hazard identification, a risk mapping process and sensitivity analysis, the team undertook a quantitative adaptive capacity assessment using tools provided in the Participatory Vulnerability and Adaptation Assessment toolkit. Using secondary data sources, the team identified a set of relevant indicators to assess Negombo’s adaptive capacity. These were modified through discussions with core stakeholders before being assigned value weights (between 0 and 1). Working through the weighted data allowed the assessment team to come up with an adaptive capacity score. Note that this project did not include qualitative measures, and did not include extensive community consultation, but resulted in a useable assessment considering limited time and resources available.

More info:

[http://www.fukuoka.unhabitat.org/programmes/ccci/pdf/Sri\\_Lanka\\_flyer\\_Aug2010.pdf](http://www.fukuoka.unhabitat.org/programmes/ccci/pdf/Sri_Lanka_flyer_Aug2010.pdf)





## Summarize Vulnerability Assessment Ratings

Vulnerability refers to the degree to which a group of people in a city (e.g., urban poor) are susceptible to, and unable to cope with, adverse effects of climate change like climate variability and extreme weather events. Vulnerability is often defined as a function of *exposure*, *sensitivity* and the community's *adaptive capacity*.

The first two elements - *exposure* and *sensitivity* – determine impact potential. For example, general exposure to flooding might be the result of increases in average precipitation or storm severity in a region. Settlement areas in low lying delta and other floodplain areas are particularly sensitive to flooding. The combination of this exposure and sensitivity is what creates the potential for impact.

TOOL 3-G  
Summary  
Vulnerability  
Rating Matrix

Determining the overall vulnerability also requires assessing this potential for impact in conjunction with an understanding of a community's *adaptive capacity*. Continuing the example above, those communities with a good awareness of the potential for impact, access to financial and human resources, and strong social networks are better positioned to adapt to climate change, and therefore less vulnerable than those communities without such means and awareness.

The purpose of this Vulnerability Assessment task is to pull these threads together in a manner that helps to focus attention on those priority areas that are most vulnerable, in an overall sense, to climate change impacts. The previous steps in this module provide all the key information that you require.

Working methodically through each climate change driver that has been identified, and on a sector by sector or location by location basis, we want to synthesize what we have learned so far using three simple questions:

1. **Impact:** What is the potential for impact from climate change driver \_\_\_\_\_ in sector \_\_\_\_\_?
2. What is the potential for impact from climate change driver \_\_\_\_\_ in \_\_\_\_\_ location?
3. **Status:** What is our current level of capacity and preparedness to deal with such an impact?

Remember that any given climate change driver (e.g., drought) may have impacts across multiple sectors (e.g., water supply, electricity generation, food security) or in many separate locations. To determine which sectors and locations might be affected, review the primary and secondary impacts columns of your influence diagrams (Tool 3-B), scan your sensitivity thresholds and triggers (Tool 3-D), and consult your community based maps (Tool 3-E) as required.

In order to focus attention on areas of highest priority, we want to rate our answers to these questions – High, Medium, Low, or some other scale that works best. Considerations when answering include:

- Is there evidence of local observations for this climate change driver (Tool 3-A)?
- Are there clear linkages between this driver and the specific impacts that may occur (Tool 3-B)?
- Which sectors are most likely to be impacted (Tool 3-B and 3-D)?
- Is the trend/projection for this climate change driver to increase, decrease or remain the same (Tool 3-C)?
- Are there specific locations of interest or concern (Tool 3-E)? How many and where?
- Are these also the areas with the most marginalized/vulnerable citizens?

Use the following matrix template to record the summary result of this vulnerability assessment exercise. Priority areas to focus on in subsequent steps will likely be those where the potential for impact is High, and the status of capacity and preparedness is Low.

In cases where multiple climate change drivers have been identified with the potential for impact across multiple sectors or multiple locations, this summary matrix can be viewed as a synthesis of your Vulnerability Assessment. This synthesis should be the step where the highest priorities for action planning (Step 5) are identified. For example, if the potential for increased impact from flooding of low lying settlement areas is rated as high, and the level of preparedness is low, this result should stand out as a key outcome of the vulnerability assessment. Detailed documentation should now be assembled and packaged (e.g., influence diagrams, sensitivity thresholds and triggers, community impact maps, etc.) to justify the priorities and set the stage for next steps.

Table 15: Example Summary Vulnerability Rating Matrix (Tool 3-G)

|                        |                | SECTORS / LOCATIONS OF INTEREST |         |                |         |              |         |         |         |         |         |               |         |         |         |
|------------------------|----------------|---------------------------------|---------|----------------|---------|--------------|---------|---------|---------|---------|---------|---------------|---------|---------|---------|
|                        |                | Settlements                     |         | Transportation |         | Water Supply |         | Waste   |         | Energy  |         | Food Security |         | Etc.    |         |
|                        |                | Impact?                         | Status? | Impact?        | Status? | Impact?      | Status? | Impact? | Status? | Impact? | Status? | Impact?       | Status? | Impact? | Status? |
| CLIMATE CHANGE DRIVERS | Drought        | L                               | L       | L              | L       | L            | M       | L       | L       | L       | L       | L             | L       |         |         |
|                        | Flooding       | M                               | L       | H              | M       | M            | M       | H       | L       | M       | L       | L             | L       |         |         |
|                        | Heat Waves     | L                               | L       | L              | L       | L            | M       | L       | L       | L       | L       | L             | L       |         |         |
|                        | Sea Level Rise | H                               | L       | H              | M       | L            | M       | H       | L       | M       | L       | L             | L       |         |         |
|                        | Storms         |                                 |         |                |         |              |         |         |         |         |         |               |         |         |         |
|                        | Etc.           |                                 |         |                |         |              |         |         |         |         |         |               |         |         |         |

IMPACT: High, Medium, Low based on a combined, overview assessment of the potential exposure to the climate change driver and the sensitivity to impact.

STATUS: High, Medium, Low based on a combined, overview assessment of the adaptive capacity of the community/area and their state of implementation.

You will be revisiting the outcomes of the Vulnerability Assessment in Step 5, Identify Options.

Again, there are many more sophisticated tools available to conduct a Vulnerability Assessment. Use of these tools will depend on your resources and capacity. The table provides a summary of required resources and references for these approaches. These are more costly, time consuming and technically demanding approaches, but may provide the level of detail you seek.

### Step 3: Review Checklist - Vulnerability Assessment



|   |                                                                                                                                                                                                             |  |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| X | Record stakeholders' perceptions of changing climate and trends                                                                                                                                             |  |
| X | Record stakeholders' perceptions of primary and secondary impacts driven by climate change.                                                                                                                 |  |
| X | Document the cause and effect pathways from changes in climate to impacts using influence diagrams.                                                                                                         |  |
| X | Corroborate results of perceived climate changes and potential impacts using local, regional, national and/or international scientific reporting. Seek both historical trends and future model projections. |  |
| X | Document known thresholds and triggers for sensitive impacts.                                                                                                                                               |  |
| X | Develop community based maps to document specific locations of concern with stakeholders.                                                                                                                   |  |
| X | Rate the current level of capacity and preparedness to deal with each potential impact that is identified.                                                                                                  |  |
| X | Rate the potential impact from each identified climate driver in each sector.                                                                                                                               |  |

Table 16: Vulnerability Assessment Tools

| TOOLS                                                                 | TECHNICAL CAPACITY | DATA NEEDS | TIME | COST USD | PARTICIPANT REQUIREMENTS | REFERENCES / CASE EXAMPLES                                                       |
|-----------------------------------------------------------------------|--------------------|------------|------|----------|--------------------------|----------------------------------------------------------------------------------|
| <b>TASK 1: SITUATION ASSESSMENT</b>                                   |                    |            |      |          |                          |                                                                                  |
| Focus groups                                                          | ●                  | ●          | ●    | ●        | ●                        |                                                                                  |
| Structured interviews                                                 | ●                  | ○          | ●    | ●        | ●                        |                                                                                  |
| Scientific hazard assessment                                          | ●                  | ●          | ●    | ●        | ○                        | Arivat and Whale Cove, Nunavut Climate Change Adaptation Plan (not online yet)   |
| Review other planning reports (e.g., Disaster Management Plans)       | ●                  | ●          | ●    | ○        | ○                        |                                                                                  |
| Field Mapping GPS / GIS                                               | ●                  | ●          | ●    | ●        | ●                        |                                                                                  |
| Surveys (written or internet-based)                                   | ●                  | ●          | ●    | ●        | ●                        |                                                                                  |
| Community perception elicitation                                      | ●                  | ○          | ●    | ●        | ●                        | Kampung Community in Jakarta, Indonesia                                          |
| Other                                                                 | ○                  | ○          | ○    | ○        | ○                        |                                                                                  |
| <b>TASK 2: UNDERSTANDING THE IMPACTS AND LINKAGES</b>                 |                    |            |      |          |                          |                                                                                  |
| Simple impacts organizational tables                                  | ○                  | ○          | ○    | ○        | ○                        | Sorsogon City, Philippines PARTICIPATORY VULNERABILITY AND ADAPTATION ASSESSMENT |
| Other                                                                 | ○                  | ○          | ○    | ○        | ○                        |                                                                                  |
| Other                                                                 | ○                  | ○          | ○    | ○        | ○                        |                                                                                  |
| <b>TASK 3: DOCUMENT TRENDS: BACK-CASTING, FUTURE-CASTING</b>          |                    |            |      |          |                          |                                                                                  |
| Downscaling local projections from regional / global models           | ●                  | ●          | ●    | ●        | ○                        | Sorsogon City, Philippines PARTICIPATORY VULNERABILITY AND ADAPTATION ASSESSMENT |
| Other                                                                 | ○                  | ○          | ○    | ○        | ○                        |                                                                                  |
| Other                                                                 | ○                  | ○          | ○    | ○        | ○                        |                                                                                  |
| <b>TASK 4: DOCUMENT SENSITIVITIES / DEVELOP COMMUNITY IMPACT MAPS</b> |                    |            |      |          |                          |                                                                                  |
| Vulnerability index mapping                                           | ●                  | ●          | ●    | ●        | ●                        | UN Habitat. TECHNICAL MAPPING SEMARANG, INDONESIA                                |
| Neighbourhood/Vulnerability Mapping                                   | ●                  | ●          | ●    | ●        | ●                        | Vulnerability and Adaptation Assessment. Case of Pekalongan City - Indonesia     |
| Hot spot mapping                                                      | ●                  | ●          | ●    | ●        | ●                        | Sorsogon City, Philippines PARTICIPATORY VULNERABILITY AND ADAPTATION ASSESSMENT |
| GIS / Visualizations (e.g., sea level rise)                           | ●                  | ●          | ●    | ●        | ○                        |                                                                                  |
| Other                                                                 | ○                  | ○          | ○    | ○        | ○                        |                                                                                  |
| Other                                                                 | ○                  | ○          | ○    | ○        | ○                        |                                                                                  |
| <b>TASK 5: ASSESS ADAPTIVE CAPACITY</b>                               |                    |            |      |          |                          |                                                                                  |
| Adaptive capacity mapping                                             | ●                  | ●          | ●    | ●        | ●                        | UN Habitat. TECHNICAL MAPPING SEMARANG, INDONESIA                                |
| Individual versus collective vulnerability analysis                   | ●                  | ●          | ●    | ●        | ●                        | UN Habitat. TECHNICAL MAPPING SEMARANG, INDONESIA                                |
| Social vulnerability assessment                                       | ●                  | ●          | ●    | ●        | ○                        | Vulnerability and Adaptation Assessment. Case of Pekalongan City - Indonesia     |
| Quantitative Assessment of Adaptive Capacity                          | ●                  | ●          | ●    | ●        | ○                        | Sorsogon City, Philippines PARTICIPATORY VULNERABILITY AND ADAPTATION ASSESSMENT |
| Other                                                                 | ○                  | ○          | ○    | ○        | ○                        |                                                                                  |
| Other                                                                 | ○                  | ○          | ○    | ○        | ○                        |                                                                                  |
| <b>TASK 6: SUMMARIZE VULNERABILITY ASSESSMENT RATINGS</b>             |                    |            |      |          |                          |                                                                                  |
| Disaster risk mapping                                                 | ●                  | ●          | ●    | ●        | ●                        | UN Habitat. TECHNICAL MAPPING SEMARANG, INDONESIA                                |
| Impact-specific Quantitative Exposure & Sensitivity Analysis          | ●                  | ●          | ●    | ●        | ●                        | Sorsogon City, Philippines PARTICIPATORY VULNERABILITY AND ADAPTATION ASSESSMENT |
| Other                                                                 | ○                  | ○          | ○    | ○        | ○                        |                                                                                  |
| Other                                                                 | ○                  | ○          | ○    | ○        | ○                        |                                                                                  |

## KEY

○ Indicates low requirement (e.g. Low technical capacity required)

● Indicates medium requirement (e.g. Medium amount of time)

● Indicates high requirement (e.g. High cost)



# Module B

## WHAT MATTERS MOST?



This module includes **one planning step** and will help planners answer the following question:

**STEP 4** *What community values and objectives must be considered when developing climate change strategies and action plans and how can we identify them?*

Local values matter. They are what people care about and therefore should drive the ways that planners think about climate change issues. Identifying these values and incorporating them into the planning process is necessary for both “localizing” climate change and the mainstreaming of climate change planning. Ultimately, objectives help to ensure that project stakeholders and the broader community understand and support resulting climate change actions.

In the context of this manual we refer to issues as the concerns, problems, challenges, or opportunities that key individuals and the broader community have identified as important. *Values* are what matter to people in the context of possible consequences, and provide the underlying motives for people to care about the issues. *Objectives* articulate and define values so that they can be used in the planning process. The objectives developed in this step will provide the basis for establishing priorities, making trade-offs and setting a direction for climate change adaptation and mitigation actions. Ultimately, they will support the process of building consensus around the resulting climate actions – the core of decision-making.

After completing this module, planners will have a better understanding of the community issues and values that are most affected by climate change, and which of them are most important. Along with the technical facts uncovered by *Step 3: Vulnerability Assessment*, the objectives identified during this planning step will be used in *Step 5: Identify Options* to help create climate action options and strategies that are meaningful to the community. They will also be used in *Step 6: Option Evaluation* to help compare and evaluate the different options, actions and strategies by how well they support and meet community values.

## ISSUES =

Community concerns, problems, challenges, opportunities

## VALUES =

What people care about in a given context

## OBJECTIVES =

Articulate and define values so they can be used in the planning process

### A VALUES-FOCUSED APPROACH VS. AN ALTERNATIVES-FOCUSED APPROACH

Most approaches to planning and decision-making focus on determining what alternatives are available to solve a problem rather than why it is a problem in the first place. This type of thinking is referred to as an alternatives-focused approach, and it tends to be reactive.

In contrast, a values-focused approach is more proactive. It puts the emphasis on deciding what is important to people in the context of possible consequences (what are their interests and objectives?) and then determines how best to achieve those objectives. Such an approach not only allows you to better define, or even re-define, the climate change issues confronting you, but it can also lead to the development of better, more creative alternatives.

#### Why a values-focused approach?

Here are eight reasons why a values-focused approach is preferred in a climate change planning context.

- **Facts and values** – As it will be described in more detail in Module C, this approach uses both objective facts and subjective values to inform the planning process.
- **Clarity** – By separating people from the problem, this approach can make decision-making less positional and more interest-based, objective and clear.
- **Multiple perspectives** – The approach facilitates a broader understanding of the multitude of perspectives that are important to consider when making climate change decisions.
- **Holistic** – By involving more community stakeholders, the approach tends to be more inclusive and typically takes into account non-material aspects of community wellbeing (i.e., values).
- **Local knowledge** – The approach can integrate multiple types of knowledge, expertise and qualitative information along with more scientific, quantitative information.
- **Creative** – Focusing on values helps to encourage more creative thinking.
- **Democratic** – Acknowledging the different values that people hold can build common ground and enable shared understanding of the climate change challenge. The likelihood that local residents will support an alternative is higher if their local values have been taken into account in the design of the alternative.
- **Flexible** – The approach is structured in a way that explicitly addresses multiple objectives and is better suited for evaluating complex issues like climate change.

## STEP 4: VALUES AND OBJECTIVES

Identifying community issues, values and objectives might take longer than expected. This is because this step involves tools and approaches that some planners may not have used or experienced before. Because of this, it is important to spend some extra time with this planning step to ensure the resulting objectives are complete and concise. Well-constructed objectives will not only provide direction and focus for decision-making, but will also help direct the monitoring and evaluation framework for the climate change actions and/or strategies that result from this process. Step 4 involves the following tasks:

*TASK 4.1: Identify key community issues (concerns, problems, challenges, opportunities)*

*TASK 4.2: Organize issues*

*TASK 4.3: Restate issues as objectives*

*TASK 4.4: Assess relevance of objectives to climate change*

*TASK 4.5: Identify gaps*

*TASK 4.6: Develop measures for objectives*

### TASK 4.1

#### Identify community issues (concerns, problems, challenges, opportunities)

Planners need to work with the community to understand and identify the issues that are important locally. Identifying these issues and incorporating them into the planning process is a crucial feature of mainstreaming climate change planning. The community issues identified in this task will be converted into objectives in the next step. These objectives will then provide the basis for setting directions, establishing priorities and making trade-offs regarding climate change adaptation and mitigation actions.

The first task in setting objectives is to review the local area's situation and the Vulnerability Assessment conducted in Step 3. To help, consider the following questions:

- *What problems and challenges do we see in the future?*
- *Was there a triggering event that led to this plan – what was it?*
- *What opportunities may arise?*
- *What weaknesses do we need to overcome?*

Following this initial discussion, the stakeholder group and/or community members should next spend some time brainstorming all the important development issues facing their community. Here it is important not to limit the brainstorming to climate change issues only, but to encourage participants to identify all community development issues. The answers will likely be far ranging and include issues from a range of sectors – housing, sanitation, health, economic development, transportation, etc. – and a range of scales – neighbourhood, city, region, etc.

Identifying key issues is a good opportunity to let the stakeholders “unload” their thoughts and concerns to get everything out on the table. This should be highly

participatory. The benefit of using brainstorming is that it is non-judgemental: anyone can contribute an idea to the list without fear of ridicule or immediate rejection. Exercises that encourage independent thinking combined with group contributions are often a productive way to initiate this task (see Tool 4a). Issue identification is critical to a successful process.

When getting stakeholders to brainstorm their community issues, get them to write them down on small note cards (one issue per card) that can be taped to a wall. This will make it easier for the facilitator to start organizing the issues in Task 4.2.

#### A “PARKING LOT” FOR CLIMATE ACTIONS

A common challenge at this point in the process is to not get side-tracked with climate change adaptation and mitigation actions. While the facilitator should encourage the group to focus on issues rather than actions, this might not be possible. Rather than cut people off, use the action as a way to understand the more fundamental reason why they want to undertake the actions, thereby identifying the objective. Also, be sure to record the action idea (on a flip chart paper or other means) and indicate to the person that provided the idea that it has been “parked” and will be revisited in Step 6. This will open the process to more creative solutions during Step 6.

### Organize issues

#### TASK 4.2

Once you have identified the “raw” issues on note cards, the next step is to make sense of the “issues chaos” by grouping ideas in general categories and putting higher level and lower level issues together. Doing a good job of organizing and assessing the issues will help to separate people from the problems, as well as values and perceptions from the facts.

The planner or facilitator should first organize the issues that were brainstormed in the previous task into general groups or themes (e.g., health, economic development, infrastructure, transportation, etc.). Be aware that some issues may fit under multiple categories or themes.

## Restate issues as objectives

### TOOL 4-A Issues to Objectives Matrix

Once the issues are organized into general categories, the next step is to restate them as objectives and to begin thinking about *why* the objectives are important to the community and *which ones matter most*. During this task, the objectives will be organized again as *means objectives* (i.e., supporting, symptom or “driver” objectives) are separated from *ends objectives* (i.e., final, “big picture” objectives), and underlying causes from potential effects.

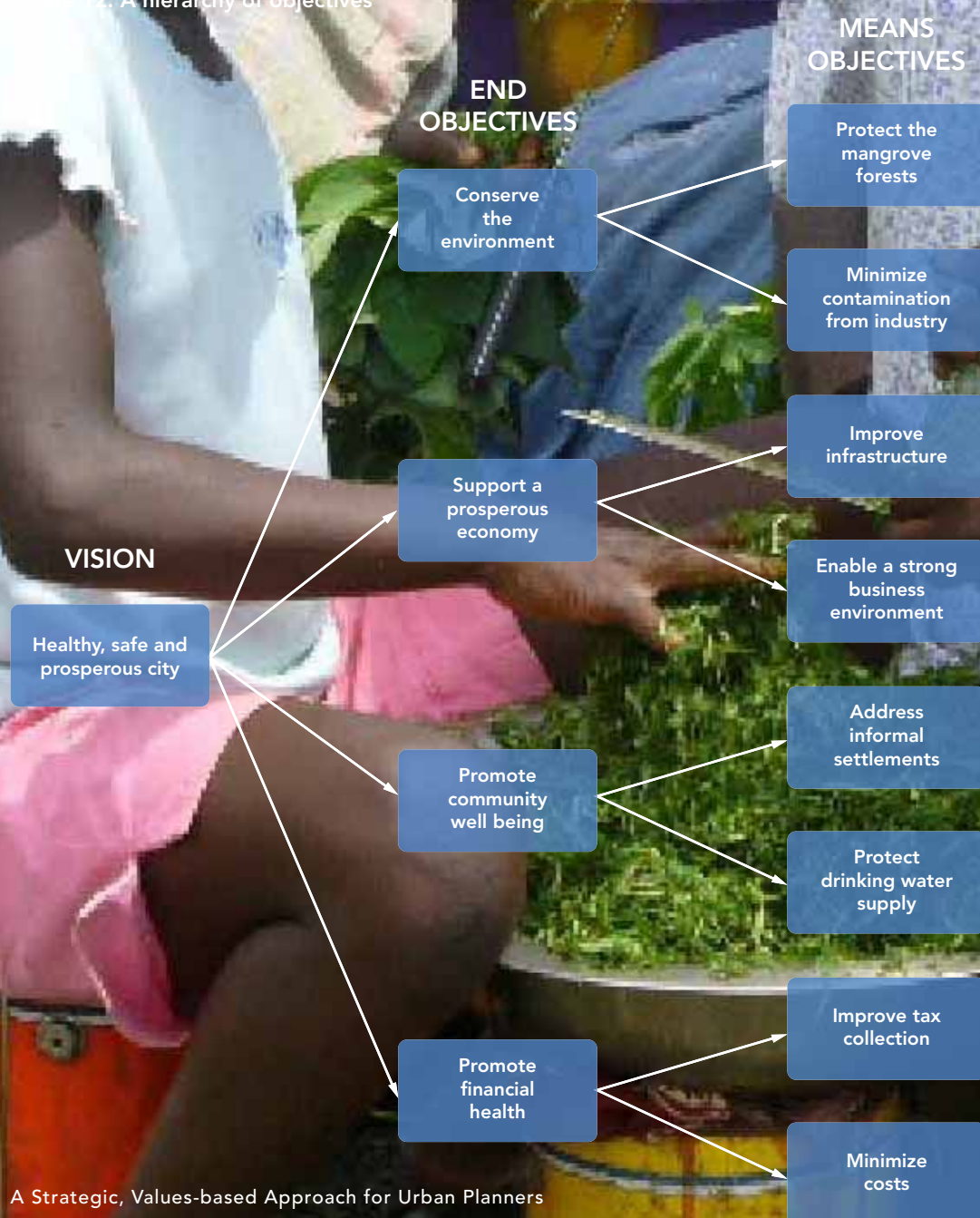
An objective is formed by converting issues into succinct goal statements that indicate how you would like to manage, minimize or mitigate the issue. This is done by combining a verb that describes a direction of preference (e.g., “increase”, “reduce”, “maximize”, etc.) with a noun that describes the object of importance (e.g., “Reduce risk of coastal storm surges,” “Improve citizen’s health” or “Minimize urban poverty”).

Objectives are the basis for generating and designing strategy options, and also provide criteria for their evaluation. They act as a checklist to make sure that climate change adaptation or mitigation actions that result from the strategic planning process also address local community development issues and local area values. If the set of objectives is incomplete or stakeholder interests are not represented, sub-optimal strategies that have a lower probability of successful implementation might be generated in the next phase of the process. Furthermore, alienation of stakeholders due to omission of their issues and interests might have a negative impact on the planning process later on.

The facilitator will begin the activity by taking an issue from the wall and linking it backward to its core, or root cause. Ask the group “Why is it an issue?” Keep asking “Why?” until the cause and effects of an issue are well understood. To identify systemic cause-effect relationships, two to five “Why?” questions might have to be posed. While conducting this exercise, answers might converge, making it apparent that many issues have a common cause. The results of the discussion can be recorded by the facilitator on flip chart sheets and taped to a wall.

The desired outcome of this step is a simplified hierarchy of objectives. The figure illustrates an example of how issues identified in Task 4.1 and assessed in Task 4.2 can be grouped and restated as end and means objectives. As illustrated, it is often useful to use the participants’ exact wording to show how their issues are being incorporated into the analysis.

Figure 2: A hierarchy of objectives



## Assess relevance of objectives to climate change

TOOL 4-B  
Objectives Analysis:  
Relevance to  
ClimateChange

Once objectives have been identified and organized into means and ends, the next step is to assess the relevance of climate change to the objectives. Using a simple table or matrix, go through the means objectives and ask yourself (or stakeholders), “Are climate change impacts *affecting, worsening, or exacerbating any of the objectives?*”

If climate change impacts are affecting objectives, discuss the current situation and capture the main outcomes on the table.

Table 17: Climate Change and Community Development Objectives

| OBJECTIVE                    |                                      | AFFECTED BY CLIMATE CHANGE? |   | DESCRIPTION OF LINK TO CLIMATE CHANGE                                                |
|------------------------------|--------------------------------------|-----------------------------|---|--------------------------------------------------------------------------------------|
| END                          | MEANS                                | Y                           | N | See Vulnerability Assessment                                                         |
| Conserve the environment     | Protect the mangrove forests         | ✓                           |   | Development (upstream and direct) causing destroying mangroves                       |
|                              | Minimize contamination from industry | ✓                           |   | Occasional flooding leaches pollutants into river and sea                            |
| Support a prosperous economy | Improve infrastructure               | ✓                           |   | Roads susceptible to erosion and impassable during floods                            |
|                              | Enable a strong business environment |                             | ✓ | Not affected                                                                         |
| Promote community well-being | Address informal settlements         | ✓                           |   | Severe storms and flooding put informal settlements at river mouth at increased risk |
|                              | Protect drinking water supply        | ✓                           |   | Increased flood incidents contaminate water supply                                   |
| Promote financial health     | Improve tax collection               |                             | ✓ | Not affected                                                                         |
|                              | Minimize costs (short-long term)     | ✓                           |   | A range of climate change options will have a range of associated costs              |

The reason for going through this activity will become apparent in Module C when you develop and evaluate strategies.

## Identify gaps

Once local objectives are organized and assessed for their relevance to climate change, consider other objectives that may have been overlooked but are typically considered in climate change planning, such as:

- Reducing or mitigating GHG emissions
- Promoting sustainable resource management

Then ask, “Are there any gaps in the list of identified objectives? Can any of the objectives be modified to include some of the ones that were overlooked?” The purpose of this step is to assess whether you have overlooked any climate change related planning objectives. Although local values are the core of the objective identification process, it is important to analyze these objectives in a broader context to make sure that they are as comprehensive as possible.

TOOL 4-C  
Climate Change  
Objectives Gap  
Checklist

## Develop measures for objectives

### TASK 4.6

In this step you will identify performance measures for the planning objectives. Identifying what is important to measure provides insight into what is fundamentally important, and is the basis for dialogue. Performance measures give meaning to the objectives that everyone can understand.

Performance measures help in other practical ways as well. Because objectives provide the framework for planning and evaluation, how their performance is measured will help identify change actions and options (described in Step 5) and, ultimately, will be the means for evaluating which options, or climate actions, best address climate change issues (described in Step 6). Finally, performance measures will likely form the basis of on-going monitoring and evaluation (Step 8) of climate change related actions.

### What is a performance measure?

A performance measure (e.g., Number of transit users) is directly linked to its objective (e.g., Reduce private vehicle use). The measures should:

1. Be clearly linked to an objective;
2. Clarify the scale and impact of actions;
3. Indicate content and direction for future action;
4. Use information that can be obtained within the period of time defined by the plan (survey, statistics, expert judgment, local knowledge); and
  - **Be responsive enough to be able to measure progress within the time period.**

At times it may be challenging to determine performance measures for a given objective. This may be because no data is available, or because an objective cannot be adequately measured using quantitative data and must use more qualitative measures. As illustrated, there are three types of measures: natural measures, constructed scales and proxy measures.



Vehicular traffic along a street in Islamabad, Pakistan, Asia & Pacific, 2006.  
© UN-HABITAT

Table 18: Measure Types

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Natural Measure   | Often official statistics are kept on climate change indicators and will reflect how well an objective is being met.<br><i>Example:</i> population living in identified “hot spots”                                                                                                                                                                                                                                                                          |
| Constructed Scale | When hard data is not available, constructed scales are useful. The data can be gathered through surveys or structured interviews with experts.<br><i>Example:</i><br>High (describe) – Moderate (describe) – Low (describe)<br>(e.g., adequacy of government emergency response plan as measured in survey, post climate emergency and/or disaster)<br>These scales can also be quantified on a 1-10 scale, for example, 10 being “High” and 1 being “Low.” |
| Proxy Measure     | Used when a measurable indicator is available that adequately reflects how well an objective is being achieved, though the indicator is only indirectly related to the objective.<br><i>Example:</i> Climate change stability can be measured using migration statistics                                                                                                                                                                                     |

Natural measures are used when a clear, quantifiable measure for an objective is readily available (e.g., % of city with storm water system coverage, Amount of protected coastal mangrove forests, volume of GHGs generated by transportation sector, etc.). For other objectives, natural measures may not exist. For example, the effectiveness of a local government’s disaster response plan will likely be more difficult to measure quantitatively. In these cases, qualitative or quantitative constructed scales (high-medium-low) in combination with expert judgment can be used. Proxy measures may also be helpful.

The table below illustrates the connection between the end objectives and means objectives and the measures used for them.

Table 19: From End Objectives to Measures

| OBJECTIVE                    |                                  | AFFECTED BY CLIMATE CHANGE? | DESCRIPTION OF LINK TO CLIMATE CHANGE                                                | PERFORMANCE MEASURES                            |
|------------------------------|----------------------------------|-----------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------|
| END                          | MEANS                            | Y                           | See Vulnerability Assessment                                                         |                                                 |
| Conserve the environment     | Protect the mangrove forests     | ✓                           | Development (upstream and direct) causing destruction of mangroves                   | Hectares of mangrove forests                    |
|                              | Reduce GHG emissions             | ✓                           | GHG are root cause of global warming and climate change                              | GHG emissions (tonnes)                          |
| Support a prosperous economy | Improve infrastructure           | ✓                           | Roads susceptible to erosion and impassable during floods                            | # of potential days of inaccessibility          |
| Promote community wellbeing  | Address informal settlements     | ✓                           | Severe storms and flooding put informal settlements at river mouth at increased risk | # of people living in high risk settlements     |
|                              | Protect drinking water supply    | ✓                           | Increased flood incidents contaminate water supply                                   | Days of undrinkable water (boil water advisory) |
| Promote financial health     | Minimize costs (short-long term) | ✓                           | A range of climate change options will have a range of associated costs              | Present value of local currency                 |

## A Case in Point

### COMMUNITY VALUES & OBJECTIVES

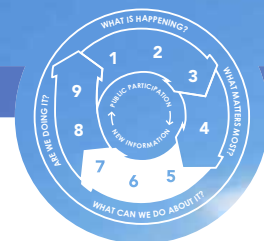
#### CLIMATE ACTION PLANNING, NUNAVUT

The Government of Nunavut, with the support of the Canadian Institute of Planners and Natural Resources Canada, coordinated the development of pilot climate change action plans in several northern Arctic hamlets. Inuit people and the Arctic resources they depend on (in terms of fish, animals, and plants) are highly vulnerable to climate change. In order to address this pressing concern, planners worked with community focus groups and leaders to understand their values in relation to identified climate change vulnerabilities. Objectives were developed from these discussions and subsequently used as the basis of brainstorming actions and responses.



# Module C

## WHAT CAN WE DO ABOUT IT?



This module includes **three planning steps** and will help planners answer these questions:

- STEP 5** *What options are there to respond to climate change in our city? How can we best combine actions into complete strategies?*
- STEP 6** *What options, actions and strategies should we undertake and how can we evaluate and prioritize them?*
- STEP 7** *How can we best implement the priority climate change actions and strategies?*

After completing this module, planners will have developed either a clear climate change action plan/strategy, or a plan to integrate/mainstream climate change actions into current planning activities (e.g., incorporating climate actions and policies into a city's physical land use plan). To get to this stage, planners will not only identify and organize climate change actions, but also evaluate and prioritize them according to local objectives and vulnerabilities. While the entire strategic planning process is cyclical and iterative, it is especially so during *Step 5: Identify Options* and *Step 6: Option Evaluation*. There are significant gains to be had in evaluating and re-evaluating climate change actions against community objectives, technical realities and the local planning for climate change context.

## STEP 5: IDENTIFY OPTIONS

The first step in planning for the future is to develop, organize and refine candidate climate change actions or strategies that can build the adaptive capacity of a city (and, if possible, facilitate emissions mitigation) in the face of climate change. The sectoral vulnerabilities highlighted in *Step 3: Vulnerability Assessment* and the community objectives identified in *Step 4: Values and Objectives* can be used to help brainstorm actions and strategies. It may also help at this stage to review current policies and plans that may be related to climate change to ascertain the potential for mainstreaming. You may want to reflect on the content of *Section 3.2.3 Climate Change and City Planning* to refresh the links between planning and climate impacts.

It is important to note that a planner could develop the tasks described in this step in several different ways depending upon time and resources available, and the overall scope and scale of the project (i.e., a small project organized by a single planner “off the side of their desk” would likely require only desk research). For example, a planner could complete this step as part of a **desk exercise**, synthesizing information available from city plans, reports and policies (refer to Table 3, in Section 3.2.3 to see what kind of plans and policies may be available that would support mainstreaming climate change options), Internet sources, etc. It could also be the outcome of a **technical workshop**, involving both city staff from multiple city departments (e.g., Health, Engineering, Transportation, etc.) and available climate change experts are assembled to share information about their climate change relevant plans, policies and projects, their scientific knowledge and their sector expertise. Finally, it could be organized as part of a larger **participatory group exercise**, engaging with the stakeholder group. Of course, it could also include elements of each of these approaches, too.

Regardless of the approach taken, there should be a list of viable alternatives that could be implemented to help adapt to (and in some cases, mitigate) climate change by the end of this step. These strategies and actions will be further refined and prioritized in Step 6: Option Evaluation. This planning step involves the following tasks:

**TASK 5.1:** *Generate Candidate Climate Change Options*

**TASK 5.2:** *Organize, Screen and Rank Options*

**TASK 5.3:** *Assemble Strategies*

It is important to note that a city may create a comprehensive climate change plan to address multiple vulnerabilities, or simply identify one or two key climate change actions in a critical sector that are best mainstreamed into other plans. In all cases, the challenge is to choose the action(s) that will have the **greatest positive impact, given the range and level of importance of each objective**.

### TASK 5.1

## Generate Candidate Climate Change Options

There are many ways to generate candidate climate change options, or actions. Whatever group you are working with (i.e., Stakeholder Group, Technical Working Group, etc.), participants should be challenged to “think big”, to be creative, and to

generate the widest possible range of candidate climate change actions. No idea should be rejected or ignored at this stage; preliminary ideas will be honed down during later “reality checks” and evaluation, but it is important not to start out by limiting options. An initial action that may seem impossible or too expensive at first glance may, in fact, turn out to be the source of new, creative actions that meet multiple objectives.

There are three distinct, yet complementary approaches to be used during this task. Planners should use methods that make the most sense given their local context, available time and resources.

### 1. Consult Generic Option/Action Checklists

Thankfully, the international community has awoken to the threats that climate change can pose urban communities and numerous planners are working on similar challenges. Planners will want to “mine” available actions and ideas as a starting point for a desk-based exercise, or as a source of ideas (and ideas “bank”) for stakeholder climate action brainstorming sessions. More and more resources are becoming available all the time. To develop an initial generic action list of your own, start wide and gradually narrow your focus to your specific location. To help guide initial desk research, ask:

TOOL 5-A  
Generic  
Action  
Worksheet

- *Have international organizations published any recent action lists?*
- *Has a similar urban community in your country or region recently undertaken a climate change planning exercise that you can learn from?*
- *Have any sector or master plans been recently developed for your area that set out broad actions or policies? Scan them with a fresh focus on the potential for addressing climate change vulnerabilities.*

See the *Table 12: Quick Start Actions* for a list of potential “low hanging fruit” and “first step” climate actions that also lend themselves to mainstreaming. Also review Table 3 in Section 3.2.3, which provides a list of candidate urban plans and policy program areas that would support climate change mainstreaming options.

### 2. Build off of your Vulnerability Assessment results from Step 3

If you are working with a stakeholder group, now is the time to re-engage them. You should provide presentations and review summary information to explain the key results of the Vulnerability Assessment. While a review of *Step 3: Vulnerability Assessment* was carried out in Module B, it is worthwhile to review it again, particularly if there are new stakeholders who have joined the process. Working systematically through each identified vulnerability, ask specific questions within a formal brainstorming session:

TOOL 5-B  
Vulnerabilities  
to Actions  
Worksheet

- How can we minimize the potential impact from climate change driver \_\_\_\_\_ in location \_\_\_\_\_?
- How can we increase our adaptive capacity and level of preparedness to deal with the potential impact?

For example, flooding may have been identified as a possible effect of climate change. The generic action checklist would identify things like dikes, dams, building code updates and land use zoning updates as typical responses. Sometimes such initiatives are already underway, but may require modification through the mainstreaming of climate change to update the existing action; in other cases there may be a complete lack of any sort of planning. The brainstorming here would build on these responses and make them local: “improve dikes along waterfront, manage dams on the river differently to account for increased precipitation, etc.”

### 3. Use your Ends and Means Objectives from Step 4

A final complementary way to generate candidate actions is to review results from Step 4: *Values and Objectives* and ask: What actions could be undertaken to address the priority objectives? To do this, take each of the priority strategic objectives separately and think about what actions could be carried out to achieve that objective.

#### TOOL 5-C Objectives to Actions Worksheet

This task can pick up exactly where you left off with the documentation of Ends and Means objectives at the end of Step 4. Consider each objective and its specific link to climate change and ask, “*How can we best achieve this objective or address this vulnerability?*” Add your brainstormed actions to the final column of Table 20.

**Table 20: Potential Quick Start Options/Actions**

| IMPACTS                  | ACTIONS                                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Notes and Considerations | In general, cities should begin by repairing and strengthening existing climate defences (e.g., sea walls) and carrying out “low regrets” actions that also contribute directly to larger community development goals (e.g., improve storm and sanitary sewers, water supply upgrades, etc.)            |
|                          | High priority should also be given to “climate proofing” vulnerable infrastructure located in hazard areas (e.g., power and water facilities, hospitals, etc.)                                                                                                                                          |
|                          | New, large-scale engineering works should be avoided unless part of a more comprehensive program that includes spatial planning and land use regulation                                                                                                                                                 |
|                          | New infrastructure should be located in low hazard zones                                                                                                                                                                                                                                                |
|                          | Focus on the location of major new infrastructure projects as the key to guiding private sector growth (i.e., if you are looking to pull development back from hazard areas, make investments only in more climate secure areas, these public investments will “attract” additional private investment) |
| Groundwater depletion    | Risk Prediction and Mapping                                                                                                                                                                                                                                                                             |
|                          | Repair and improvement of “low regrets” infrastructure (e.g., reservoirs, water supply network, etc.)                                                                                                                                                                                                   |
|                          | Disaster Response Plan – Relief aid                                                                                                                                                                                                                                                                     |
| Water shortages          | Risk Prediction and Mapping                                                                                                                                                                                                                                                                             |
|                          | Repair and improvement of “low regrets” infrastructure (e.g., reservoirs, water supply network, etc.)                                                                                                                                                                                                   |
|                          | Disaster Response Plan – Relief aid                                                                                                                                                                                                                                                                     |

| IMPACTS                                                                                                            | ACTIONS                                                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Salt water intrusion into groundwater supplies in coastal areas                                                    | Risk Prediction and Mapping                                                                                                                 |
|                                                                                                                    | Repair and improvement of “low regrets” infrastructure and existing defences (e.g., sea walls, dikes, diversion channels, reservoirs, etc.) |
|                                                                                                                    | Climate proofing vulnerable infrastructure located in hazard areas (e.g., water, power, medical facilities)                                 |
|                                                                                                                    | Early warning system for disaster events                                                                                                    |
|                                                                                                                    | Evacuation Plan                                                                                                                             |
|                                                                                                                    | New flood protection infrastructure (e.g., sea walls, dikes, diversion channels, reservoirs, etc.)                                          |
| Increased riparian flooding and erosion                                                                            | Improved Building Codes                                                                                                                     |
|                                                                                                                    | Coastal Flooding Risk Prediction and Mapping                                                                                                |
|                                                                                                                    | Repair and improvement of “low regrets” infrastructure and defences (e.g., sea walls, dikes, diversion channels, reservoirs, etc.)          |
|                                                                                                                    | Other “low regrets” infrastructure improvements (e.g., sewage, water supply, drainage systems, etc.)                                        |
| Increased coastal flooding and erosion                                                                             | Climate proofing vulnerable infrastructure in hazard areas (e.g., water, power, medical facilities)                                         |
|                                                                                                                    | Coastal Flooding Risk Prediction and Mapping                                                                                                |
|                                                                                                                    | Repair and improvement of “low regrets” infrastructure and defences (e.g., sea walls, dikes, diversion channels, reservoirs, etc.)          |
|                                                                                                                    | Other “low regrets” infrastructure improvements (e.g., sewage, water supply, drainage systems, etc.)                                        |
|                                                                                                                    | Climate proofing vulnerable infrastructure in hazard areas (e.g., water, power, medical facilities)                                         |
|                                                                                                                    | Early warning system for disaster events                                                                                                    |
|                                                                                                                    | Evacuation Plan                                                                                                                             |
|                                                                                                                    | New flood protection infrastructure (e.g., sea walls, dikes, diversion channels, reservoirs, etc.)                                          |
| Increased storm surge hazard                                                                                       | Improved Building Codes                                                                                                                     |
|                                                                                                                    | Risk Prediction and Mapping                                                                                                                 |
|                                                                                                                    | Land Use Plan                                                                                                                               |
| Increased risk of landslides or mudslides on hazard slopes                                                         | Disaster Response Plan - Relief aid                                                                                                         |
|                                                                                                                    | Climate proofing vulnerable infrastructure (e.g., water, power, medical facilities)                                                         |
|                                                                                                                    | “Low regrets” infrastructure improvements (e.g., sewage, water supply, drainage systems, etc.)                                              |
| Displacement and population movement from informal settlements built on steep slope or flooding hazard lands, etc. | Disaster Response Plan - Relief aid                                                                                                         |
|                                                                                                                    | Climate proofing vulnerable infrastructure (e.g., water, power, medical facilities)                                                         |
|                                                                                                                    | “Low regrets” infrastructure improvements (e.g., sewage, water supply, drainage systems, etc.)                                              |

| IMPACTS                                                                                                      | ACTIONS                                                                                               |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Distress migration to cities/towns due to droughts in rural areas                                            | Risk Prediction and Mapping                                                                           |
|                                                                                                              | Climate proofing vulnerable infrastructure (e.g., water, power, medical facilities)                   |
| Damage to infrastructure not designed to standards of occurrences being experienced                          | Disaster Response Plan - Relief aid                                                                   |
|                                                                                                              | Risk Prediction and Mapping                                                                           |
|                                                                                                              | Tree planting program                                                                                 |
|                                                                                                              | Material use (reflective roofs, white roofs, green roofs, etc.)                                       |
| Exaggerated urban heat island effect                                                                         | Relief Aid                                                                                            |
|                                                                                                              | “Low regrets” infrastructure improvements (e.g., sewage, water supply, drainage systems, etc.)        |
| Potential energy price increases (e.g., from reduced hydro-electricity generation in places where it exists) | Disaster Response Plan - Relief aid                                                                   |
|                                                                                                              | Climate proofing vulnerable infrastructure (e.g., water, power, medical facilities)                   |
|                                                                                                              | “Low regrets” infrastructure improvements (e.g., sewage, water supply, drainage systems, etc.)        |
| Interruption of food supply networks and higher food prices                                                  | Risk Prediction and Mapping                                                                           |
|                                                                                                              | Climate proofing vulnerable infrastructure (e.g., water, power, medical facilities)                   |
|                                                                                                              | “Low regrets” infrastructure improvements (e.g., sewage, water supply, drainage systems, etc.)        |
| More favourable breeding grounds for pathogens (e.g., mosquitoes and malaria)                                | Risk Prediction and Mapping                                                                           |
|                                                                                                              | Disaster Response Plan - Relief aid                                                                   |
|                                                                                                              | Climate proofing vulnerable infrastructure (e.g., water, power, medical facilities)                   |
|                                                                                                              | “Low regrets” infrastructure improvements (e.g., sewage, water supply, drainage systems, etc.)        |
| Population health impacts (e.g., increased mortality during heat waves, decreased access to food/nutrition)  | Risk Prediction and Mapping                                                                           |
|                                                                                                              | Repair and improvement of “low regrets” infrastructure (e.g., reservoirs, water supply network, etc.) |
|                                                                                                              | Disaster Response Plan – Relief aid                                                                   |

Table 21: Example of brainstorming actions from identified objectives.

| OBJECTIVE                    |                                  | DESCRIPTION OF LINK TO CLIMATE CHANGE                                                | BRAINSTORMED ACTION LIST                                                                                                                                                         |
|------------------------------|----------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| END                          | MEANS                            | See Vulnerability Assessment                                                         |                                                                                                                                                                                  |
| Conserve the environment     | Protect the mangrove forests     | Development (upstream and direct) causing destruction of mangroves                   | <ul style="list-style-type: none"> <li>• Create environmental protection zone for remaining mangrove forests</li> </ul>                                                          |
|                              | Reduce GHG emissions             | GHG are root cause of global warming and climate change                              | <ul style="list-style-type: none"> <li>• Improve energy efficiency of municipal systems</li> <li>• Re-vegetate degraded lands and claim carbon credits</li> </ul>                |
| Support a prosperous economy | Improve infrastructure           | Roads susceptible to erosion and impassable during floods                            | <ul style="list-style-type: none"> <li>• Install better drainage culverts</li> <li>• Build dikes along the river</li> </ul>                                                      |
| Promote community wellbeing  | Address informal settlements     | Severe storms and flooding put informal settlements at river mouth at increased risk | <ul style="list-style-type: none"> <li>• Zone most vulnerable areas for non-settlement uses</li> <li>• Develop community warning and evacuation systems</li> </ul>               |
|                              | Protect drinking water supply    | Increased flood incidents contaminate water supply                                   | <ul style="list-style-type: none"> <li>• Build new reservoir in a safe area</li> <li>• Eliminate contamination sources by zoning industrial activity to new locations</li> </ul> |
| Promote financial health     | Minimize costs (short-long term) | A range of climate change options will have a range of associated costs              | <ul style="list-style-type: none"> <li>• Research all sources of National and International funding</li> </ul>                                                                   |

As with issue identification, it is important to use independent thinking techniques, brainstorming and other tools for generating candidate actions in an inclusive way. Using breakout groups - with each group developing actions for a single priority objective or vulnerability - is often a productive approach if the group is large enough. It is often common for stakeholders with similar concerns to be interested in detailing the same priority objective, means objective or sector issue. The result should be a set of actions to achieve a particular objective, or multiple objectives if a sector approach is taken.

## MITIGATION ACTIONS

It is important to be on the lookout for GHG mitigation actions that support potential climate change adaptation actions and quick starts. If you haven't generated candidate GHG reduction actions already, consider adding them to your list now.

It can often be helpful to scan the list of adaptation actions already developed and ask: "Is there any way we can implement this adaptation action, AND reduce our GHG emissions at the same time?" Some examples of actions with combined adaptation and mitigation benefits include:

- Afforestation/reforestation of degraded watershed lands can help to reduce runoff and flooding (adaptation) and sequester carbon in growing trees (mitigation).
- Improving agricultural and agroforestry practices (e.g., conservation tillage can improve water retention, nutrient recycling, crop productivity and ultimately food security (adaptation) can simultaneously improve energy efficiency, reducing the reliance on fossil fuels and generating agricultural waste streams suitable for biofuels (mitigation).
- Land-use planning and zoning can be used to strategically reduce travel times between workers and workplaces (mitigation) and encourage settlement in less vulnerable locations (adaptation)

The integration of actions and strategies that have simultaneous adaptation and mitigation benefits is a topic of great interest. There is also potential international funding that can be accessed for mitigation actions that also generate adaptation benefits.

## Organize, Screen and Rank Actions

At this point you should have assembled a long list or multiple lists of candidate climate change actions. Now it is time to organize the actions, screen out those that are unworkable in your local context, and, if applicable, assemble individual actions into comprehensive strategies.

**Organize:** Depending on the approach used to generate candidate actions, either by key vulnerabilities and/or objectives, some degree of basic organization is already emerging. But it is also very likely that your lists of actions will be long and messy. As a first step in getting organized, consider the following:

- *Which actions are related? Are there duplicates that can be eliminated?*
- *Is there synergy with other actions? Should they be combined?*
- *Conversely, are some actions mutually exclusive?*
- *Are some actions identifying a higher degree of detail of other actions? (Think of a logical way to group higher-level and lower-level actions.)*

You should sort actions into clearly defined categories. There is no right or wrong way to organize long lists, and flexibility may be needed to tailor to your needs. Some options for organizing your actions into categories and sub-categories might include:

- **By Sector:** Building off the vulnerability assessment results, use sector of interest categories such as settlements, water supply, food security, community health, etc.
- **By Location:** Building off community-based maps, use specific locations of concern such as areas prone to flooding, water shortage, etc.
- **By Timing:** Some actions may need to be staged, e.g., building flood control structures before modifying settlement zoning. It is often useful to further organize actions into short term (1-5 years), medium term (5-10 years) and long term (10+ years) categories. This is particularly critical when assessing larger infrastructure projects, as the useful life of existing infrastructure should be assessed to determine when modifications for adaptation should be incorporated.
- **By Cost:** Some actions may be capital intensive and require national or international funding, while other less costly actions could, potentially, be funded locally through current budgets and program areas, or mainstreamed with already funded initiatives.

Choose the structure to organize the actions that best suits your overall planning problem. One simple template to follow is to first sort by Sector or Location, and then distinguish by timeframe – short, medium and long term (Table 22). Think of this exercise as sorting all possible actions into their appropriate bins, recognizing that you may want to drop any given action into multiple bins if that action is appropriate for multiple sectors or locations.

TOOL 5-D  
Organizing  
Actions  
Worksheet

Table 22: Organizing potential actions by sector, location and timing

| SECTOR                     | SECTOR   | SECTOR   | SECTOR   | SECTOR   |
|----------------------------|----------|----------|----------|----------|
| LOCATION                   | LOCATION | LOCATION | LOCATION | LOCATION |
| <b>SHORT TERM ACTIONS</b>  |          |          |          |          |
|                            |          |          |          |          |
|                            |          |          |          |          |
|                            |          |          |          |          |
| <b>MEDIUM TERM ACTIONS</b> |          |          |          |          |
|                            |          |          |          |          |
|                            |          |          |          |          |
|                            |          |          |          |          |
| <b>LONG TERM ACTIONS</b>   |          |          |          |          |
|                            |          |          |          |          |
|                            |          |          |          |          |
|                            |          |          |          |          |

**Screen and Rank:** ‘Screening out’ or ‘screening in’ is the next level of getting organized. In some cases, candidate actions may be impractical. In other cases, some candidate actions are easily implemented and you will want to highlight them for immediate priority. Some criteria to guide this first order screening include:

- **Local relevance and suitability:** *Are there any material or cultural differences that may constrain the opportunity for this action in this location?*
- **Stakeholder acceptability:** *Will local residents accept this action or approach in their area?*
- **Technical feasibility:** *Will the necessary design, implementation and maintenance support be available?*
- **Ease of implementation:** *Can this action be implemented at the local level? Can it be implemented within a reasonable timeframe?*
- **Relative effectiveness:** *How well will this action work relative to other options?*
- **Relative cost:** *Is this a multi-million dollar action or a quick fix? Are other options more cost effective?*
- **Mainstreaming Potential:** *Does this action support other planning initiatives that are being addressed or need to be addressed?*

Once a comprehensive list of actions has been generated, organized and screened, it can be put to use in a variety of ways. If your main focus is mainstreaming, then the task may be to take the actions that you have identified for a given sector and investigate ways of integrating them into a plan or policy response for that sector. However, in some cases, a local area will only have the capacity and resources for a single action. In these cases, the challenge is to choose the one action that will have the greatest positive impact on all the objectives, with a focus on the high priority objective(s). In either case, having an understanding of how different actions compare with one another can be helpful.

Use Tool 5-E<sup>5</sup> (Table 23) to support the screening and ranking of candidate climate change actions. The tool simply involves rating individual actions using your screening criteria above, or other criteria that are appropriate for the given context. Use the tool for each sector or location as required.

TOOL 5-E  
Screening  
& Ranking  
Table

Table 23: Example Screening and Ranking Methodology

|          | Local Sustainability | Acceptability | Feasibility | Implem. Ease | Effectiveness | Cost | Mainstream Potential | TOTAL |
|----------|----------------------|---------------|-------------|--------------|---------------|------|----------------------|-------|
| Action 1 | 3                    | 3             | 2           | 2            | 2             | 2    | 3                    | 17    |
| Action 2 | 2                    | 2             | 2           | 2            | 1             | 3    | 2                    | 14    |
| Action 3 | 1                    | 2             | 2           | 1            | 3             | 1    | 2                    | 12    |
| etc.     | 1                    | 1             | 1           | 1            | 1             | 1    | 1                    | 7     |

Ratings: high = 3, medium = 2, low = 1

Experience suggests that most strategies should include three typical aspects: Common Actions, Low Regret Options, and “Low Hanging Fruit”. Your highest ranked actions are likely the best candidates.

- **Common Actions:** When combining actions or mainstreaming them into existing planning processes or initiatives, some actions may need to be a part of every strategy (e.g., public outreach and information).
- **“Low-Hanging Fruit” and Visible Results:** Some actions might be obvious, simple ones that are easily attainable, commonly desired, universally agreed upon and can be implemented quickly. These “low-hanging fruit” do not require more detailed evaluation. These actions are perfect for pilot projects or just simple projects that help to generate trust, motivation and momentum.
- **“Low Regret” Options:** So-called “low regrets” adaptation actions are planning projects and investments that contribute directly to larger community development goals (e.g., improving storm and sanitary sewers, water supply upgrades, etc.) and support the objectives developed in Module B (e.g., Conserve the environment, Support a prosperous economy, etc.). Low regrets investments not only address urgent community development issues, but will also very likely contribute to a city’s overall climate change preparedness and adaptive capacity. Often, these investments are also already planned and/or part of an existing strategy. Low regrets interventions often also support general urban sustainability planning initiatives.

5 Adapted from Mainstreaming Climate Change Adaptation: A Practitioner’s Guide (CARE International in Vietnam, 2009)

In most cases, all three types of actions will come out on top when ranked against your screening criteria. You can still do more, such as assembling comprehensive strategies as will be discussed next. But even if you make it this far, you have accomplished the organization and ranking of climate change actions that can then be used in any of a number of mainstreaming planning initiatives.

## PLANNING FOR CLIMATE CHANGE:

### A “NO REGRETS” APPROACH TO TAKING ACTION

Given the cost of adaptation measures, the immediacy of other problems facing planners (e.g., sanitation, poverty reduction, etc.), and probable city budget constraints, planners are encouraged to first consider so-called “no regrets” adaptation actions. Also sometimes referred to as “low regrets” actions, no regrets actions are planning projects and investments that contribute directly to larger community development goals (e.g., improving storm and sanitary sewers, water supply upgrades, etc.). These investments will not only address urgent community development issues, but will also very likely contribute to the city’s overall climate change preparedness and adaptive capacity. Often, these investments are also already planned and/or part of an existing strategy.

Other *no regrets* actions typically include repairing and strengthening existing climate change impact defences (e.g., dikes, diversion channels, reservoirs, sea walls etc.) -- while ensuring that the changes do result in any additional environmental impacts, as may be the case with some defenses like sea walls -- and “climate proofing” critical but vulnerable infrastructure located in hazard areas (e.g., power and water facilities, hospitals, etc.).

*No regrets* actions are further advisable given the uncertainty around future weather variability and climate change impacts. Climate change impacts will continue to occur, but their magnitude, location and effects will likely evolve as the global climate continues to change. By focusing on *no regret* climate change adaptations, uncertainty about future weather variability and climate can be overcome and managed effectively.

## Assemble Strategies

In many cases, such as developing a comprehensive plan across multiple sectors or locations, a further task of assembling strategies will be required. A strategy is a logically consistent set of individual actions, combined to create a comprehensive plan or policy response. Assembling climate change strategies can be as simple as connecting dots: moving from one action to the next, in order to complete a picture of a resilient city that can handle the impacts of climate change. Building upon your organized candidate action lists, creating a strategy involves selecting one or more actions from each category and combining them to create a comprehensive strategy, normally with a recognizable theme or approach.

When addressing climate change, there is rarely one single “best” action or a “quick fix,” especially when an urban area is trying to achieve many objectives. The key is to design strategies that target the city’s specific objectives and context, and that garner a wide range of support to ensure successful implementation.

Organizing actions into strategies might be affected by timing, where “x” must happen before “y” can happen. Some strategies might address particular objectives more than others, or be limited in their effectiveness by various constraints, such as funding. Strategies can be designed to focus explicitly on one objective or sector, or to minimize/avoid impacts among multiple objectives. Creating good strategies is an iterative process, guided by the climate change objectives and by new information.

If you have dozens of candidate actions across several categories, there are a multitude of possible combinations that could form a strategy. However, it is important to make your strategy comprehensive and coherent. For example, many actions may be identified as priorities, but not all of them may logically go together, or alternatively, some may need to be done in concert. Questions to help guide the development of a coherent strategy include:

- *Is there a unifying “theme” that can guide the selection of actions (e.g., flood risk reduction)?*
- *Which actions will best support the achievement of the objectives developed in Step 4: Values and Objectives?*
- *Do some actions in one category have pre-requisites in another category?*
- *Are there synergies or efficiencies to be generated if you can implement different actions from each category simultaneously?*
- *Do you have a fixed budget that should be used to constrain the selection of actions (e.g., a 5-year capital plan)?*

A strategy table is a logical way to visually represent alternative strategies in terms of specific selections made from various categories of actions. Strategy tables can be applied at several levels of organization. Consider the need to develop a plan for flood management in a low-lying coastal settlement. You have already brainstormed, organized and screened

TOOL 5-F  
Strategy  
Table

down to the most promising list of short, medium and long-term actions. Now you are ready to assemble different combinations of actions based on a logical theme. Figure 13 provides an illustrative example of how two alternative strategies can be developed from an organized action list. In the example, 'Strategy A' represents a hard engineering approach to the problem, while 'Strategy B' represents a soft engineering approach. While both strategies share some short-term common actions like raising awareness and creating evacuation plans, they differ in their medium and long-term approach to the climate change vulnerability. These competing strategies will need to be evaluated in terms of how well they might achieve planning objectives for flood risk reduction, environmental protection, and cost. That step comes next.

**Figure 13: Example application of a strategy table to develop two alternatives for flood management in a low-lying coastal settlement.**

| <b>STRATEGY A</b>                                                                                                       |  | <b>STRATEGY B</b>                                                                                                       |  |
|-------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------|--|
| <b>SECTOR: Settlements, Flood Management</b>                                                                            |  | <b>SECTOR: Settlements, Flood Management</b>                                                                            |  |
| <b>LOCATION: Mangrove Town</b>                                                                                          |  | <b>LOCATION: Mangrove Town</b>                                                                                          |  |
| <b>SHORT TERM ACTIONS</b>                                                                                               |  | <b>SHORT TERM ACTIONS</b>                                                                                               |  |
| <ul style="list-style-type: none"> <li>Raise community awareness</li> <li>Develop emergency evacuation plans</li> </ul> |  | <ul style="list-style-type: none"> <li>Raise community awareness</li> <li>Develop emergency evacuation plans</li> </ul> |  |
| <ul style="list-style-type: none"> <li>Flood-proofed building codes</li> </ul>                                          |  | <ul style="list-style-type: none"> <li>Flood-proofed building codes</li> </ul>                                          |  |
| <ul style="list-style-type: none"> <li>Stewardship support for mangrove forests/ river riparian protection</li> </ul>   |  | <ul style="list-style-type: none"> <li>Stewardship support for mangrove forests/ river riparian protection</li> </ul>   |  |
| <b>MEDIUM TERM ACTIONS</b>                                                                                              |  | <b>MEDIUM TERM ACTIONS</b>                                                                                              |  |
| <ul style="list-style-type: none"> <li>Build rock/concrete dykes along river</li> </ul>                                 |  | <ul style="list-style-type: none"> <li>Build rock/concrete dykes along river</li> </ul>                                 |  |
| <ul style="list-style-type: none"> <li>Build rock/concrete breakwater &amp; seawall</li> </ul>                          |  | <ul style="list-style-type: none"> <li>Build rock/concrete breakwater &amp; seawall</li> </ul>                          |  |
| <ul style="list-style-type: none"> <li>Bioengineering (swales, re-vegetation, etc.) along riverbank</li> </ul>          |  | <ul style="list-style-type: none"> <li>Bioengineering (swales, re-vegetation, etc.) along riverbank</li> </ul>          |  |
| <ul style="list-style-type: none"> <li>Restore/expand mangrove forests as natural breakwaters</li> </ul>                |  | <ul style="list-style-type: none"> <li>Restore/expand mangrove forests as natural breakwaters</li> </ul>                |  |
| <b>LONG TERM ACTIONS</b>                                                                                                |  | <b>LONG TERM ACTIONS</b>                                                                                                |  |
| <ul style="list-style-type: none"> <li>Urban/settlement zoning and land use planning</li> </ul>                         |  | <ul style="list-style-type: none"> <li>Urban/settlement zoning and land use planning</li> </ul>                         |  |
| <ul style="list-style-type: none"> <li>Integrated coastal zone management planning</li> </ul>                           |  | <ul style="list-style-type: none"> <li>Integrated coastal zone management planning</li> </ul>                           |  |
| <ul style="list-style-type: none"> <li>Relocate settlement</li> </ul>                                                   |  | <ul style="list-style-type: none"> <li>Relocate settlement</li> </ul>                                                   |  |

Strategy tables can also be used to assemble broader strategies that span multiple locations or sectors. Continuing with the above example, let's suppose that the planning scope for this low-lying coastal settlement area extends beyond flood management, and includes developing a secure energy supply, a long-term water management plan and strategy for food security. The strategy table approach could be applied to develop alternative strategies within each sector, and then again at a 'portfolio level', where alternative combinations of strategies from across sectors are put together in a logical fashion. For example, hard engineering works along river corridors could be built to support energy transmission line requirements, or bioengineering approaches to mangrove restoration and swales could be integrated with a strategy to enhance urban agricultural production.

Figure 14: Hypothetical application of a strategy table to develop a portfolio-level strategy to address climate change vulnerabilities in the settlement flood protection, energy supply, water supply and food security sectors for a low-lying coastal settlement

| PORTFOLIO LEVEL STRATEGY |             | LOCATION: Mangrove Town |                  |
|--------------------------|-------------|-------------------------|------------------|
| 1. Settlements & Housing | 2. Energy   | 3. Water & Waste        | 4. Food Security |
| Strategy 1A              | Strategy 2A | Strategy 3A             | Strategy 4A      |
| Strategy 1B              | Strategy 2B | Strategy 3B             | Strategy 4B      |
| Strategy 1C              | Strategy 2C | Strategy 3C             | Strategy 4C      |
| Strategy 1D              | Strategy 2D | Strategy 3D             |                  |
| Strategy 1E              |             |                         |                  |

#### Step 5: Review Checklist - Identify Options



|   |                                                                                                                    |  |
|---|--------------------------------------------------------------------------------------------------------------------|--|
| X | Generate candidate climate change options/actions for consideration in your plan.                                  |  |
| X | Organize, screen and rank the options/actions to support your specific requirements.                               |  |
| X | Assemble coherent strategies as logical sets of options/actions to meet a specific sector or location requirement. |  |

## A Case in Point

### STRATEGY DEVELOPMENT

#### BATTICALOA AND NEGOMBO, SRI LANKA

In March 2010, with the support of UN-HABITAT's Cities and Climate Change Initiative, the University of Moratuwa (UOM) the Ministry of Environment and the Local Authorities of Batticaloa and Negombo initiated the formulation of a city development strategy for Sri Lankan cities to respond to Climate Change. A Green House Gas (GHG) inventory and a participatory assessment of the cities' vulnerabilities to climate change is being carried out, the results of which will be used in the preparation of city development plans, the formulation of the city development strategy, and the integration of climate change aspects into the planning process. A key aspect of this process (highlighted by the project stakeholder group) will be the implication of adaption efforts with mitigation opportunities facilitated by Clean Development Mechanisms (CDM). The national policy on CDM is currently being formulated with the objective of establishing institutional, financial, human resource, and legislative frameworks necessary for the development of a mechanism for trading Certified Emissions Reductions (CERs) and Emission Removal Units (ERUs) earned through CDM activities.

More info: <http://www.unhabitat.org.ph/>

## STEP 6: OPTION EVALUATION

The second planning step in this Module involves comparing and evaluating the options, actions and strategies developed in Step 5. This step will help planners and stakeholders decide which strategies best meet the identified community objectives, address the local climate change vulnerabilities, and 'fit' with current urban planning priorities and gaps. It is important to consider how a given action will perform in your local context, in terms of political will, integration with other projects (mainstreaming), capacity, and resources.

This planning step involves the following three tasks:

*TASK 6.1: Assess Consequences of Options, Actions and Strategies*

*TASK 6.2: Evaluate Options and Strategies*

*TASK 6.3: Assess Mainstreaming Opportunities, Refine Options and Strategies and Decide*

### TASK 6.1

### Assess Consequences of Options, Actions and Strategies

This task integrates Step 4 and Step 5, where estimated consequences of the actions or options and strategies are presented in terms of the objectives and performance measures using available knowledge and predictive tools. The assessment of consequences is an analytical task and does NOT involve the assessment of value-based judgments about the relative importance of those consequences or the identification of a preferred strategy

This task can be undertaken in a number of ways, depending on your scope and available resources:

- **Predictive Models:** Scientists, economists and other subject specialists should design predictive models as decision aids, not as complex models of ecological, social or economic processes. To be useful, predictive models must first be capable of integrating predictions of the influence of climate change drivers (e.g., increased precipitation trends, sea level rise) on potential impacts (e.g., frequency of flooding). In addition, predictive models must be capable of incorporating the potential effects of alternative adaptation options (e.g., dikes). Some circumstances may require linking together the outputs of several predictive models to enable the estimation of the full consequences (i.e., both costs and benefits) of adaptation options.
- **Expert Judgement Elicitations:** Expert judgments can be an important tool for assessing consequences. Like modeling and data collection, expert judgements should be performed according to accepted standards, incorporating best practices related to expert selection, elicitation protocols, bias avoidance, treatment of uncertainty and documentation of all assumptions.
- **Local Knowledge Elicitations:** In some circumstances, holders of local or traditional knowledge are the only available means of assessing the potential

consequences of actions on objectives. Local knowledge elicitations can use the same protocols as expert judgement elicitations, with careful attention to details such as using clearly defined questions and providing adequate context for the judgments. Be aware that such elicitations can take a significant amount of time and resources.

Available resources and capacity will largely drive your selection of the most appropriate method. More often than not, the number of assessments to be made will far outstrip the available budget and resources available. If this is the case, focus your resources on high priority assessments with high uncertainties – assessments where predictive models and expert judgements are most needed to help calculate performance measure results in natural or proxy units (see Table 18 in Step 4: Values and Objectives). Remember though, that it is always possible to develop constructed scales for performance measures to use in your assessments and to rely on expert judgement or local knowledge holder elicitations. See Tool 6-A for advice on getting the most out of structured elicitations.

TOOL 6-A  
Structured  
Elicitations

Depending on the situation, once you have assessed the consequences of actions or strategies, you may have all that you require to set out an action plan for addressing your key climate change vulnerabilities. Perhaps your key vulnerability is related to the potential for drought and subsequent impact on food security. If your assessment points clearly toward the need for improved conservation, irrigation practices or development of a water storage pond as the best means of solving the problem, then jump to Step 7 and start developing your action plan for making it happen. However, in those cases where the relative costs, potential effectiveness and benefits of different actions, and linkages to other planning objectives are such that the choice of the best action or strategy is not immediately obvious, you will want to evaluate your options in a formal and systematic manner.

## Evaluate Options and Strategies

TASK  
6.2

A helpful tool for evaluating options and strategies is a Consequence Table<sup>6</sup>. A Consequence Table is a succinct summary matrix illustrating the performance of each strategy on each objective, based on the assessed consequences. It should convey all of the information that is critical to understanding and comparing alternative strategies. It should expose the key trade-offs and uncertainties that are relevant to choosing among and between strategies under consideration. A Consequence Table can be a critical tool for ensuring that dialogue among stakeholders and decision makers is based on a common understanding of the expected outcomes of different alternatives.

TOOL 6-B  
Consequence  
Table

<sup>6</sup> A good place to learn about alternative evaluation techniques in more detail is: Hammond, J.S., R. Keeney and H. Raiffa, *Smart Choices*. 1999 Harvard Business School Press.

By way of example, consider the assessment of the two flood management strategies that were developed for a low-lying coastal settlement (Step 5, Task 5.3). Let's suppose that using a combination of modelling, expert judgement and local knowledge elicitations that you are able to assemble an assessment of the consequences of each strategy on each objective (Table 24). The numbers in the example consequence table are provided for illustrative purposes only.

Table 24: Example Consequence Table

| OBJECTIVE                    |                               | PERFORMANCE MEASURE                           | STRATEGY A                | STRATEGY B                 |
|------------------------------|-------------------------------|-----------------------------------------------|---------------------------|----------------------------|
| END                          | MEANS                         |                                               | Hard Engineering Approach | Green Restoration Approach |
| Conserve the environment     | Protect the mangrove forests  | Hectares of mangrove swamp                    | ✗ 200                     | ✓ 2500                     |
|                              | Reduce GHG emissions          | GHG tons (construction & maintenance)         | ✗ 1500                    | ✓ -200                     |
| Support a prosperous economy | Improve road infrastructure   | # of potential days / year of inaccessibility | ✓ 20                      | ✗ 100                      |
| Promote community wellbeing  | Reduce Flood Risk             | Annual flood probability                      | ✓ 2                       | ✗ 5                        |
|                              | Protect drinking water supply | Days of undrinkable water (scale 1-10)        | 10 to 20                  | 10 to 20                   |
| Promote financial health     | Minimize costs (long term)    | Levelized annual cost (over 30 years)         | ✗ 500                     | ✓ 100                      |

This type of matrix allows alternative strategies and their potential trade-offs to be identified, reviewed, and discussed. It can serve as the basis for discussing which *consequences* are *more or less important*, and which set of *trade-offs* is *more or less acceptable*. These discussions can often lead to important insights about what matters most in a given context. More often than not, the discussion of trade-offs will be a catalyst towards developing new and improved strategy (or strategies) that better balance results across competing objectives (see Task 6.3 below).

In most cases you will be able to work directly with your stakeholder group using a Consequence Table to frame your discussions. If there are a large number of alternative strategies and/or performance measures, use techniques such as *Dominance* and *Sensitivity Assessments* (see text box) to simplify the range of choices under consideration. In most circumstances, you will be able to use the Consequence Table to guide a holistic ranking of strategies to indicate which strategies might best achieve your objectives in an overall sense.

## DOMINANCE & SENSITIVITY ASSESSMENTS

In some cases you may have five or six, or more, different options or strategies to be evaluated using five, six or more different performance measures. In such cases, your Consequence Table can become quite large, and the evaluation task quite daunting. Two analytical techniques for simplifying a large Consequence Table are Dominance and Sensitivity Assessments.

### Dominance Assessments

Systematically review the results in your Consequence Table. One alternative is dominated by another alternative if it performs worse on at least one performance measure and the same or worse on every other measure. When you discover such dominated alternatives, remove them from further consideration, since there is no constituency that would prefer it. You may also want to consider removing alternatives from consideration that are 'practically dominated', that is, they are outperformed by another alternative on all but one or two performance measures.

### Sensitivity Assessments

A performance measure is insensitive to the alternatives when its value does not change across the range of alternatives. When a criterion is insensitive to the alternatives – regardless of how important it is in a general sense – then it is not useful in selecting among them and can be eliminated for this set of alternatives. Note that if new alternatives are subsequently introduced, you will need to re-visit whether these performance measures are still insensitive.

Note that there is an inter-play between dominance and sensitivity assessments. As some alternative strategies are removed from a Consequence Table, other insensitive performance measures may emerge that can be removed from consideration. The fewer the alternatives and performance measures on the table, the easier your evaluation task becomes!

The use of Consequence Tables as a participatory planning tool as described in this task is broadly derived from the field of Structured Decision Making<sup>7</sup>, which in turn has roots

<sup>7</sup> Visit the United Nations Environment Programme's MCA4climate (Multi-Criteria Analysis for climate change: developing guidance for sound climate policy planning) website at [www.mca4climate.info/](http://www.mca4climate.info/). The site provides insights on new aspects of economic thinking related to climate change policy-making, such as uncertainty and dynamics, and will make a series of recommendations on how to tackle critical and pertinent issues pertaining to climate policy analysis.

You can also visit [www.climate-decisions.org](http://www.climate-decisions.org) for information and examples on how structured decision-making can help guide the thinking and actions of decision makers who deal with climate change adaptation decisions. Another website, [www.structureddecisionmaking.org](http://www.structureddecisionmaking.org), provides additional information on the key concepts of structured decision-making. The website's content focus is on environmental resource management decisions, but, as shown by this guide, the principles of structured decision-making are universal and can be applied in any context.

in the discipline of Decision Analysis and the sub-disciplines of Multi-Attribute Trade-off Analysis or Multi-Criteria Analysis. There may be applications where the consequences are high, the trade-offs are complicated, and you need a more analytical approach to evaluate your strategies. In such cases – and provided you have the expertise and resources available – you can draw upon additional tools from these disciplines, using your consequence table as the launching point. In general, these tools involve structured methods for more explicitly weighting the importance of each performance measure, normalizing the consequence table results, and ranking the alternatives based on an aggregate score (e.g., swing-weighting, pairwise comparisons, etc.).

Alternatively, you can also draw more sophisticated tools from the discipline of economics. Again using your Consequence Table as a launching point, *Cost Benefit Analysis*, which seeks to derive a total net cost or benefit in financial terms by monetizing all consequences, or *Cost Effectiveness Analysis*, which seeks to find the least cost option to achieve a specified target benefit, can be attempted. Still other approaches, including *Socio Economic Analysis*, and *Multiple Accounts Analysis / Evaluation*, are also available broadly from the economics discipline.

**Table 25: Comparison of a Range of Evaluation Tools and Methods**

| TOOLS                                                 | TECHNICAL CAPACITY | DATA NEEDS | TIME | COST USD | PARTICIPANT REQUIREMENTS |
|-------------------------------------------------------|--------------------|------------|------|----------|--------------------------|
| <b>TASK 1: ASSESS CONSEQUENCES</b>                    |                    |            |      |          |                          |
| Predictive Modelling                                  | ●                  | ●          | ●    | ●        | ○                        |
| * Expert Judgement Elicitations                       | ◐                  | ◐          | ◐    | ◐        | ○                        |
| * Local Knowledge Holder Elicitations                 | ◐                  | ◐          | ◐    | ◐        | ○                        |
| <b>TASK 2: EVALUATE STRATEGIES</b>                    |                    |            |      |          |                          |
| * Consequence Tables (starting point for other tools) | ◐                  | ◐          | ◐    | ◐        | ◐                        |
| Multi-Criteria Analysis (weighting & aggregation)     | ●                  | ◐          | ●    | ●        | ◐                        |
| Cost Benefit Analysis                                 | ◐                  | ◐          | ◐    | ◐        | ◐                        |
| Cost Effectiveness Analysis                           | ●                  | ●          | ●    | ●        | ◐                        |
| Socio Economic Analysis                               | ●                  | ◐          | ◐    | ●        | ◐                        |
| Cost Benefit Analysis                                 | ●                  | ●          | ●    | ●        | ◐                        |

\* Tools Discussed in this guide - see Appendix 1

#### KEY



Indicates low requirement  
(e.g. Low technical capacity required)



Indicates medium requirement  
(e.g. Medium amount of time)



Indicates high requirement  
(e.g. High cost)



## Assess Mainstreaming Opportunities, Refine Options and Strategies and Decide

The task of evaluating strategies, especially when undertaken as an integral part of a participatory stakeholder process, is often the most engaging part of the whole planning cycle. As the evaluation process unfolds there will undoubtedly be insights and lessons that emerge into the nature of your climate change vulnerabilities, the strengths and weaknesses of the actions and strategies identified to date, and, most importantly, “what matters most” in your specific planning context.

Your evaluation thus far should provide the information necessary to: 1) better assess mainstreaming opportunities, and 2) refine your strategies.

### Mainstreaming Opportunities

Mainstreaming focuses on integrating climate change actions into pre-existing or emerging plans, programs and policies. Reflecting on the results of your strategy development and evaluation tasks to date, consider:

- *Have any new opportunities emerged to mainstream specific actions into other plans, programs or policy development initiatives?*
- *Do any of the actions you’ve identified to date require coordination with other initiatives in order to maximize the potential for benefit, or minimize the potential for working at cross-purposes?*
- *Can any ‘low hanging fruit’ actions be simply handed over for immediate implementation as a part of existing department or program responsibilities?*

It may be that the most important achievements of your planning exercise are near completion. You have formally considered climate change vulnerabilities, brainstormed actions, and evaluated their efficacy. Depending on the answers to the above questions, you may want to begin the process of methodically integrating climate change actions into existing plans, programs or policy development initiatives.

### Refine Strategies

Alternatively, there may be more work to be done as a result of your evaluations to date in order to tackle any identified challenges or integrate new ideas. Consider the following:

#### **New Actions & Information Requirements:**

- *Are there any new actions that have been identified to address weaknesses in your strategies?*
- *Can any actions be refined to more effectively meet your objectives, or address the climate change vulnerability?*
- *Have any uncertainties hindered your ability to effectively evaluate actions or strategies? Can long-term data gathering be developed as a specific action?*

**Planning Constraints:**

- *Does the cost of actions identified to date exceed your available budget? Do you need to prioritize the most important actions, or seek out other sources of funding that will be required?*
- *Have you run up against firm planning constraints (E.g., zoning requirements, building codes) that constrain your ability to implement an important climate change action? Do you need to coordinate with other levels of government – regional, national – to revise policies or standards?*

**Capacity:**

- *Has the strategy development and evaluation process uncovered capacity issues – lack of knowledge, skills, etc. – that need to be addressed? Are there specific capacity-building actions that need to be developed?*

**Funding:**

- *Are there any national and/or international sources of funding that could be used for plan implementation? Some funding sources may be identified in existing regional or national climate change plans - for example, your country may finance local projects as part of a national climate change adaptation strategy. Or, local projects identified through your country's NAPA process may be eligible for Global Environment Facility (GEF) funding. For more information on international funding sources, please see Appendix 4.*

At this point you should take what you have learned and quickly revisit Steps 5 and 6. As you brainstorm new actions, re-develop strategies and conduct new evaluation for a second time through, you will find the process can move quite quickly.

Your goal for the end of this step is to formally decide upon and document the best climate change strategy for your planning context. Work with your stakeholder group and decision makers as required to ensure there is agreement across the board on the preferred overall strategy prior to embarking on Step 7.

As discussed previously, it is expected that planners and project facilitators will have different levels of influence over decision-making, depending on what local political contexts allow. Some planners will have substantial authority over decision-making while others may have next to no role at all. There are many cities where planners report to their political superiors – council, mayor, etc. – with reports and recommendations. The policies in place in your local context that govern decision-making may have a large impact on the decisions that are made. Something that may appear as a done deal to you and the stakeholder group may not be the decision that is officially made.

In order to avoid sub-optimal decision results, it is of top most importance that you maintain an active role in the decision-making process and show that your project has a broad support base, as demonstrated by the stakeholder group. A chosen climate strategy will likely be more compelling if the planner/project facilitator can demonstrate

high levels of involvement and concrete support of the stakeholder group. This level of support is also linked to the facilitation and engagement capacity of project champions. Bureaucrats and politicians may be more interested and supportive of the project if they can see that it is representative of the constituents of the municipality. It is important to make sure that the decision makers are informed, engaged, and supportive of the planning process.

## A Case in Point

### STRATEGY EVALUATION MAPUTO, MOZAMBIQUE

With support from the UN-HABITAT CCCI, a team carried out a preliminary assessment with stakeholder involvement of the impacts of climate change on the City of Maputo. Based on this assessment, the stakeholder group (made up of local government representatives, private sector and civil society actors, NGOs, and community members) developed strategies to address the impacts identified as threats to the people and infrastructure of Maputo. Through a participatory strategy evaluation process, the stakeholder group appraised the potential benefits, costs, and likelihood of implementation using tools similar to the ones described in this guide. The evaluation identified the protection of threatened mangroves surrounding a vulnerable neighbourhood as a suitable pilot project. The aim of this intervention is to provide clear and physical limits of the mangrove area, and to make a recently approved master plan legally binding, including special provisions for the protection of endangered species.

More info:

[http://www.unhabitat.org/downloads/docs/CCCI\\_MaputoMozambique.pdf](http://www.unhabitat.org/downloads/docs/CCCI_MaputoMozambique.pdf)



## STEP 7: IMPLEMENTATION

The last planning step in this module focuses on moving from ideas to actions. Although implementation may appear to be the most difficult step in the climate change planning process, all the work you have completed up to this point, the planning networks you have established working with the stakeholder group, and the multiple “reality checks” you have already brought your climate change action through should make final implementation relatively straightforward, effective and successful.

By the time you are ready to undertake this step, all the necessary resources should be committed and a clear path of action defined, at least on paper. Agreeing on the strategy or action to pursue, however, **is not the end of the process**. Putting your carefully designed adaptation and mitigation plans into action is the most important step in the climate change planning process. Unfortunately, it also at this step where climate change actions and strategies often become derailed.

Too often, once plans have been produced, participants and leaders are misled in thinking that they have finished the process and the well-designed plan/action/strategy ends up on a shelf gathering dust. It is precisely this lack of follow-through that has frustrated so many participants in different planning process and made cynics of so many stakeholders. Poor implementation has other common causes, including:

- A lack of political will to act;
- Changes in organizational or political leadership just prior to implementation;
- Committed resources and funding do not come through; and,
- Crisis management takes priority over longer-term (but ultimately more effective) climate change planning.

Paying close attention to these issues early in the planning process, as early as during *Step 1: Getting Started*, can increase the probability of successful implementation. As a double-check, here are some key questions to ask at the beginning of strategy implementation:

- *Are the partnerships that the strategy requires too complex?*
- *Are the deadlines realistic?*
- *What is likely to go wrong?*
- *Are there contingency plans in place for when things go wrong?*
- *Are we doing everything we can to minimize the risk of non-implementation?*

This planning step involves the following five tasks:

**TASK 7.1:** *Identify and address institutional/governance gaps*

**TASK 7.2:** *Identify the “anchor” department or agency*

**TASK 7.3:** *Formally mainstream and link actions to established policy instruments*

**TASK 7.4:** *Develop an action plan*

**TASK 7.5:** *Maintain learning and knowledge*

## Identify and address institutional/governance gaps

In order to address the implementation issues outlined above, it is important to identify and address institutional gaps and gaps in governance that may have a negative impact on the success of project implementation. These gaps may have been first identified at the beginning of the planning process in *Step 1: Getting Started*. It is important, however, to review these and *other gaps that may have arisen during the course of the climate planning process*. Some key questions to ask at this stage include:

1. *What were the institutional/governance gaps that this project has encountered?*
2. *How were they addressed?*
3. *Have there been any developments in municipal politics/governance systems that may prove to be gaps?*
4. *How can these gaps be addressed?*
5. *If the gaps cannot be addressed, how can we modify our action/strategy to compensate for the barriers these gaps present?*

These questions can be answered by the core planning team or discussed with the stakeholder group. Use tool 7-A to help you organize this gap analysis process. Once the governance gaps have been resolved, it is time to allocate project leadership and responsibility to an “anchor” agency, as discussed in the following task.

TOOL 7-A  
Governance  
Gap Checklist

## Identify the “anchor” department or agency

The success of many different climate change project implementations can be traced back to a strong institutional foundation, namely the local government department or agency that will be the primary implementer for the climate strategy and act as the “anchor” for the project. Identifying a body to fulfill this role may appear obvious, however, it is important to make sure that the project “anchor” or lead department/agency has the capacity, resources, and leadership to not only implement the strategy actions they are responsible for. The anchor department/agency must also be able to:

- Manage and/or support other departments or agencies involved in strategy implementation;
- Maintain project support and momentum with the project’s broader stakeholder network or group; and,
- Ensure political support and/or maintain engagement with elected officials and community leaders.

Working through the governance gaps identified in Task 7.1 will have helped to begin identifying candidate anchor groups and their organizational capacity. It may also help to review section 3.2.3 in order to see what departments might be best able to accommodate the climate change action or strategy in their current operations and capacity. Re-examining current city planning and department responsibilities may help you to figure out where collaboration between departments could occur, and how your

climate change strategy could be developed through current channels of infrastructure, technology, and financial resources. Choosing the right anchor will help make all of the following steps easier to accomplish.

Once this task has been completed, it may be wise to ensure that the identified department or agency is officially committed to project implementation through a contract, Memorandum of Understanding, or related document/agreement.

### TASK 7.3

## Formally mainstream and link actions to established policy instruments

As reviewed in *Step 6: Option Evaluation*, Task 6.3, mainstreaming climate change planning into established policy instruments and physical planning processes is essential to ensure that actions are durable, integrated, and sustainable. Regardless of the scale of your proposed project, action or strategy, it is important to now formally revisit how and where climate change planning (and the strategy or action that has resulted from this process) can be mainstreamed into existing local government policies, programs and planning.

Some “typical” plans, programs and processes where climate change planning can be included or formalized include:

1. Physical land use plans or community plans
2. Development approval processes, including building codes
3. Infrastructure plans (sewer, water, road, transit, etc.)
4. Environmental plans, policies and programs
5. Disaster response and management plans
6. Community health and social development programs
7. Economic development programs or projects
8. City and/or participatory budgeting processes
9. Corporate plans and strategies

A more comprehensive list of city plans and policy programs can be found in Table 4 in Section 3.2.3. Table 20, *No Regret Climate Actions* in Step 5, Task 5.1 provides additional examples.

Of course, mainstreaming climate change planning into urban planning practices and related policies may take time, especially if institutional adaptations and adjustments are required. Making climate change adaptation and mitigation a part of doing regular city business can happen, however, as evidenced in many cities where climate change planning was formally brought into their civic agendas in and around the time of the Kyoto Protocol (1997).

In order to finalize mainstreaming, ensure that the anchor department has established positive and collaborative linkages with those departments and agencies that will be mainstreaming stakeholders. As with the previous task, it is advisable to formalize

mainstreaming opportunities that are to occur in the future (e.g., incorporating a climate change section when the city's physical plan or official development plan is next reviewed and updated) through a Memorandum of Understanding, or related document/agreement.

## Develop an action plan

### TASK 7.4

The final task prior to the actual implementation of the project or strategy is the creation of an action plan. An action plan is a detailed document that outlines exactly what will occur during the project implementation, who will be in charge of project actions, when they will occur, how they will be undertaken, and the staffing/logistical/budget for each task. The action plan must be very explicit in terms of what is required from different stakeholders, contractors, or external agencies. In essence, the action plan is the "script" for the implementation: it is the primary mechanism to make sure that everyone plays his or her part.

There are many possible ways to organize your action plan. You may find it most helpful and logical to organize this plan chronologically. This way, the work required is organized in a linear fashion, thereby making it easier to track progress, make sure deadlines are reached and ensure that the project is staying within the allocated budget. Much of the information required for this action plan may be taken from the results of *Step 6: Option Evaluation*.

Use tool 7-B to create an action plan. If you have identified phases for your action or strategy, you can start detailing the process required for each phase. If this has not been completed, it may be helpful now to break down your project into identifiable sections. The level of detail you provide is up to you, however, it may be more helpful in the long run to make the action plan as detailed as possible.

TOOL 7-B  
Action  
Plan  
Worksheet

Begin by *describing in detail* the activities that will occur during the project implementation in the left hand column. Then work to the right across the chart, filling out each specific activity (or phase, depending on how you decide to organize your plan):

- Institutions involved
- Project leader (person responsible)
- Resources required
- Budget
- Timeframe

The key to a successful implementation is a detailed, well-understood, clearly communicated action plan. Aspects of the action plan that are unclear, vague or left to interpretation may turn into problems later on. Of particular concern is the budget. Realistic budgeting that considers a number of different scenarios is essential to provide contingency when things go wrong. Under-estimating the budget can lead to

an incomplete project. Different budget scenarios and corresponding courses of action should be considered and accounted for in the action plan.

After this is done, resources have been verified, all necessary collaborators committed, and government approval provided, it is time to start work!

When the project implementation has begun, use the final columns in the action plan to note phase progress, and finally, completion. A detailed action plan will allow you to communicate the rationale for project organization, document progress, and ensure that those working on the project are held accountable for their responsibilities.

#### TASK 7.5

### Maintain learning and knowledge development

The final task in the implementation process feeds into Module D. It is important to maintain learning and knowledge development of all project stakeholders, community members, and institutional officials. It is important to disseminate progress updates about the project to keep people informed, involved, and supportive of the project. If there is a snag in the project, these public engagement updates will ensure transparency and increase public support of the climate change planning process.

### A Case in Point

#### IMPLEMENTATION – ESMERALDAS, ECUADOR

The city and province of Esmeraldas is considered one of the most vulnerable regions to the effects of climate change in Ecuador. In 2007, almost 60% of the population lived in areas with medium to high risks of floods or landslides. With support from the UN-Habitat Cities and Climate Change Initiative (CCCI), a team carried out an assessment with stakeholder involvement of the impacts of climate change on the City of Esmeraldas. The CCCI team identified and analysed five models and nine emission scenarios for the area. From this assessment, a stakeholder group - including government and community representatives - evaluated a number of key climate adaptation actions. An important development has been the preparation of a participatory land use plan for the city, and the zoning of riverbanks. In addition, a participatory effort by citizens and professionals has resulted in a proposed reforestation plan for the city's hillsides, including a proposal to declare them protected woodlands. In coordination with the Ministry of Environment, the municipality is implementing an environmental management plan for the Teaone River.

More Info: [http://www.unhabitat.org/downloads/docs/CCCI\\_EsmeraldasEcuador.pdf](http://www.unhabitat.org/downloads/docs/CCCI_EsmeraldasEcuador.pdf)



# Module D

## ARE WE DOING IT?



This module includes **two planning steps** and will help planners answer these questions:

- STEP 8** *Is our plan/strategy/action working and making a difference? Are stakeholders doing what they said they would do?*
- STEP 9** *How can we address changes and/or incorporate new climate change information?*

Asking, “Are we doing it?” is fundamental step in gauging the success of a climate change planning process. Answering the question requires that the climate action(s), strategy or plan that were developed and implemented through the planning process are monitored and evaluated. The information gathered during these planning steps might indicate a need to adjust or fine tune the climate action(s), strategy or plan to better meet strategic objectives and community needs.

After completing this module, planners will understand what monitoring and evaluation are, and why they are critical to any successful climate change plan or initiative.



## WHAT IS MONITORING AND EVALUATION?

**Monitoring:** Strictly speaking, monitoring means to “observe” or to “check performance.” Monitoring is a continuous process of collecting information, using indicators to gauge the process or project. Regular monitoring allows the timely identification of successes or failures. There are two common forms of monitoring:

- Compliance monitoring ensures that what was agreed upon is actually done (e.g., climate hazard areas were mapped by the municipality)
- Impact monitoring gauges the impact of actions in relation to the objectives (e.g., the upgrading of the sea wall reduced episodes of coastal storm-surge flooding by 80%)

## STEP 8: MONITORING AND EVALUATION

Often overlooked or downplayed, monitoring and evaluation is one of the most critical steps in the entire planning process. *Is the climate change adaptation or mitigation project, policy or program generating the desired effects? Are project or program stakeholders and agencies doing what they agreed to do in Step 7 - Implementation?* These are important questions that this planning step seeks to answer.

Here, it is important to note that monitoring and evaluation (M&E) is not conducted to find fault and be critical. It is a vehicle for accountability and a management tool for improving adaptation and mitigation measures. When conducted regularly, M&E is a proactive management tool that provides timely and reliable information for adjusting and modifying specific climate change actions, programs or plans.

Effective monitoring and evaluation will sound the alarm when:

- Internal and external circumstances have changed – something that should be expected when dealing with a phenomenon as dynamic as climate change;
- Key opportunities are being missed;
- Stakeholders or agencies are not carrying out previously agreed to tasks; or,
- Adaptation and/or mitigation measures are no longer effective.

M&E will help ensure that adjustments and fine-tuning of project activities can occur and that changes in local priorities can be accommodated so that the climate strategy, plan or action remains useful over time.

This planning step involves the following four tasks:

**TASK 8.1:** *Prepare a monitoring and evaluation framework*

**TASK 8.2:** *Determine monitoring and evaluation partners and responsibilities*

**TASK 8.3:** *Establish documentation and reporting protocol*

**TASK 8.4:** *Evaluate results of monitoring program*

**Evaluation:** Evaluation uses the information from monitoring to analyze the process, programs and projects to determine if there are opportunities for changes and improvements. Evaluation, like monitoring, should promote learning. In the implementation stage of any climate adaptation or mitigation project or strategy, evaluation is used to determine if the actions are meeting the strategic objectives efficiently, effectively and/or at all.

## Prepare a monitoring and evaluation framework

### TOOL 8-A Monitoring Framework Worksheet

The objectives developed in *Step 4: Values and Objectives* serve as the framework for both monitoring and evaluation, and will indicate the degree to which the action being measured meets the objectives established by project stakeholders. This is the reason why the indicators developed in *Step 5: Identify Options* were measurable and linked to objectives.

When first developing your framework, keep the following considerations in mind:

**Be systematic:** It is important to be systematic and consistent in the information you collect for monitoring and evaluation purposes. Information not collected in the same manner (i.e., at different times, using different information sources, etc.) may not be comparable over time.

**Measurability:** Monitoring measures might be more extensive than the initial measures developed during Step 4, Values and Objectives. Additional information may be sought to reduce uncertainties about how well the action(s), plan or strategy are performing. Some products for measuring include:

- **Outputs:** Concrete and tangible activities carried out by project stakeholders in the implementation of specific climate change adaptation and/or mitigation activities (e.g., Development of housing relocation plan, incorporation of climate change policies in community land use plan, extending of sea wall or dike system, etc.). These outputs are referred to as compliance.
- **Outcomes:** Short-term impacts or effects that can be attributed, at least in part, to climate change adaptation and mitigation activities (e.g., requests for “climate proof” building guidelines, media coverage of local climate change, etc.).
- **Impacts:** Overall changes in the local area observable in the long-term (e.g., reduction of GHG emissions, decreased “high risk” climate vulnerable population). Impacts are influenced by many factors external to the project.
- **Reach:** the scope of who is influenced by the climate change planning activities (e.g. involvement of traditionally marginalized and climate change vulnerable groups).

**Linked to Objectives:** For each objective (End and Means Objectives), all indicators should be listed along with where/how relevant information pertaining to the indicator can be accessed or gathered. This is essential for the demonstration of transparency in data collection and analysis, and will help ensure that the data collected is also relatively easy and cost-effective to gather.

Here, it is best to seek information and data already being collected by another party (e.g., through the census, property rolls, energy utility information, etc.). Standardized indicators also allow for maximum use of already-published data, minimizing the need for additional data gathering, information management and cost. By choosing commonly tracked and easy-to-access indicators, monitoring can become a more useful tool for comparisons (i.e., to other jurisdictions or areas of government).

In most cases, quantitative (statistical/number) indicators will best convey information about the state of climate change-related environmental, economic, or social conditions. However, qualitative indicators might also be used to enhance understanding of local impacts of climate change adaptation and mitigation initiatives. Qualitative data can be more expensive to collect, as it may involve surveys or other outreach programs.

In other cases, specific data will need to be gathered or a number of indicators analyzed together in order to track performance accurately. In some cases, new data collection programs might need to be established.

**Table 26: An Example of Linking Objectives, Indicators and Information Sources**

| MEANS OBJECTIVE              | INDICATOR                                                                                                                                         | SOURCE OF INFORMATION                                                                                                                                                                                              |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Protect the mangrove forests | <ul style="list-style-type: none"> <li>Hectares of mangrove forest</li> <li>Hectares of protected mangrove forest</li> </ul>                      | <ul style="list-style-type: none"> <li>State, National or Local Government data (e.g., Dept. of Environment, Physical Planning Dept., etc.)</li> <li>Relevant local or international environmental NGOs</li> </ul> |
| Reduce flood risk            | <ul style="list-style-type: none"> <li>Annual flood probability (scale 1-10)</li> <li>% of Hot Spot areas with storm drainage coverage</li> </ul> | <ul style="list-style-type: none"> <li>Engineering Department</li> </ul>                                                                                                                                           |
| Reduce GHG emissions         | <ul style="list-style-type: none"> <li>GHG tonnes</li> </ul>                                                                                      | <ul style="list-style-type: none"> <li>State, National or Local Government data</li> <li>NGOs</li> </ul>                                                                                                           |

**Benchmarks and Baseline Information:** To understand how the strategy impacts identified objectives, it is essential to know what has changed. To do this requires baseline information or benchmarks. Once established, these benchmarks are used to compare indicators over time.

**Table 27: Benchmarks**

| INDICATOR                                                                                                                    | BENCHMARK                                                                                |                                                                      | MONITORING |      |
|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------|------------|------|
| (linked to objectives)                                                                                                       | 2005                                                                                     | 2010                                                                 | 2015       | 2020 |
| <ul style="list-style-type: none"> <li>Hectares of mangrove forest</li> <li>Hectares of protected mangrove forest</li> </ul> | <ul style="list-style-type: none"> <li>800 ha</li> <li>15% (protected status)</li> </ul> | <ul style="list-style-type: none"> <li>650 ha</li> <li>8%</li> </ul> |            |      |
| <ul style="list-style-type: none"> <li>% of hot spot areas with storm drainage coverage</li> </ul>                           | <ul style="list-style-type: none"> <li>37%</li> </ul>                                    | <ul style="list-style-type: none"> <li>40%</li> </ul>                |            |      |

## Determine monitoring and evaluation partners and responsibilities

Developing an effective M&E program requires assigning responsibility for regular data collection and analysis. Core stakeholders who were tasked with responsibilities in implementing the climate change project/plan/strategy should continue to be involved in the collection of data and the reporting of results to their constituents and agencies. Individual involvement can vary. For example, stakeholders can have a:

- Direct and substantive role (contributing funding, ideas, information);
- Supportive and technical role (research, data collection, information analysis); or a,
- Promotional role (lobbying, campaigning, advocating).

Given the importance of local values to the climate change planning process, involving local residents or volunteers in monitoring and evaluation is another approach that can serve to capture local knowledge on impacts, effects and results of climate action. While involving a larger group in M&E activities requires additional time and resources, their input can justify these additional costs.

Given the wide-ranging impacts of climate change adaptation and mitigation actions, different individuals or stakeholder groups may experience and interpret the outcomes of climate change initiatives differently. For some groups, the change might be positive and their vulnerabilities reduced and/or adaptive capacity increased, while for others these changes might also include negative components (e.g., loss of agricultural land to reforestation initiatives, moving to a different area of the city to reduce risks, etc.). It may be necessary to understand outcomes from many different perspectives — sometimes in direct conflict with one another. To get a comprehensive understanding of the outcomes of a particular climate change initiative, it is important to involve diverse stakeholders in the local area to determine and interpret the indicators being monitored and/or evaluated.

## Establish documentation and reporting protocol

The timing of monitoring will differ with each project, as will the nature of the objectives monitored and the indicators used. While some projects might lend themselves to shorter monitoring periods because indicators are gathered on a more frequent basis (e.g., building permits, traffic counts, etc.), it is likely that a more thorough performance evaluation of climate change initiatives might then occur on an annual or longer basis. Climate change monitoring periods will likely be longer given both data collection norms (e.g., GHG emission inventories are typically calculated annually, census reporting periods are typically four or five years, etc.) and the amount of time inherent to common adaptation projects (e.g., infrastructure upgrades, population relocations, habitat restoration, etc.).

Ongoing monitoring is a reflective process. The results obtained from monitoring should be fed back into the plan, influencing its future design and direction (e.g. new knowledge might cause action plans to be rethought to meet objectives). A final, but often overlooked, aspect of an effective monitoring effort is the

establishment of capacity and procedures for the documentation and communication of results. Here, several important questions regarding documentation and communication should be considered:

- *How will the monitoring process be documented and communicated?*
- *What happens to the data?*
- *Who gets access to it?*
- *How will it be communicated?*
- *How will the results be used and by whom?*

Although documentation might seem costly or burdensome, answering the questions above and establishing the resources to document and share monitoring data will provide savings and benefits when the plan is implemented, evaluated and revised in years ahead. A documentation program can be used to make reporting consistent and reliable. Since a great deal of information is gathered during the implementation of projects, a documentation program (guidelines, format, frequency, etc.) can ensure that this information is available for future analysis, assessment and planning exercises.

Results should be regularly communicated to the local area, to assess responses and to encourage awareness of, involvement in, and support for climate change adaptation and mitigation initiatives.

### Evaluate and report results of monitoring program

#### TASK 8.4

Unlike monitoring, evaluation is not a continuous process. Instead, it occurs at strategic points during the implementation process (e.g., with project phases; at the end of the planning period, or several years after the implementation of a plan/project). Evaluations several years after the end of a given project can provide knowledge about the longer-term results and benefits. This is particularly the case for climate change mitigation projects, which typically require lengthy periods of time for certain benefits to be observable and confirmed.

TOOL 8-B  
Evaluation  
"How To"  
Worksheet

Evaluation is similar to monitoring because it uses the information from the monitoring process to analyze the plans, projects and strategies to determine if there are opportunities for improvement. Evaluation, like monitoring, should promote learning. Evaluation is used to determine if actions taken are meeting the strategic objectives, efficiently, effectively and/or at all – and if any of these aspects need to change.

Before an evaluation process is initiated, it is wise to anticipate all four tasks in the process ahead of time. Several questions, as listed below, can help with this stage:

- *Why is the evaluation being undertaken?*
- *What is the evaluation expected to achieve?*
- *What type of evaluation is most suitable – who will be involved (e.g., participatory, external expert-based, combined)?*
- *When is project evaluation to take place?*
- *How will the evaluation process be documented and communicated?*
- *How will the results be used and by whom?*

Evaluations should include core stakeholders involved in the design, implementation and monitoring of climate change projects/plans/policies, and might include local residents in general. How these stakeholders are included is a question of design. They could conduct the entire evaluation themselves, or an external evaluator could be involved.

In some cases, it might be important to have someone outside of the local area evaluate the success of certain projects, if politics or connections make it difficult for an objective analysis to be conducted internally. The results of monitoring and evaluation by local residents and stakeholders can then complement these external evaluations.

With an effective monitoring program in place, the development of an evaluation framework should be straightforward. As shown below, an evaluation will identify successes and shortcomings, and attempt to explain them. The evaluation framework will look similar to the monitoring framework, except that anticipated results are compared with actual results.

**Table 28: Evaluation Framework Example**

| <b>OBJECTIVE<br/>(evaluation criteria)</b>                     | <b>ANTICIPATED<br/>IMPACT (expected<br/>change from baseline)</b> | <b>ACTUAL IMPACT<br/>(actual change from<br/>baseline)</b> | <b>COMMENTS</b>                                                |
|----------------------------------------------------------------|-------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|
| Hectares of protected mangrove forest                          | 18%                                                               | 54%                                                        | Project exceeded expectations. This was due to...              |
| % of storm drainage network coverage in identified "Hot Spots" | 37%                                                               | 25%                                                        | Project fell short of expectations. This was due in part to... |

In addition, more probing questions should be included in the substantive analysis. These questions might be organized according to the following themes: adequacy and effectiveness, efficiency, contextual review, and adjustment and recommendations. Possible questions to guide an evaluation using this approach are provided in Tool 8-B.

Like monitoring, the results of the evaluation should be communicated both to the stakeholders and the community in general. As part of the reporting process, a built-in, local-area feedback mechanism might be important to help direct efforts to adjust or rethink the climate change project/plan/strategy.

#### Step 8: Review Checklist - Monitoring and Evaluation

|   |                                                                                                                               |   |
|---|-------------------------------------------------------------------------------------------------------------------------------|---|
| X | Identify key performance indicators to measure the success of action plans towards meeting objectives.                        | ✓ |
| X | Develop a monitoring program for measuring each objective, specifying when the project monitoring and evaluation is to occur. |   |
| X | Identify who is to complete the evaluation.                                                                                   |   |
| X | Ensure the results of the evaluation are communicated to advisory committees, stakeholders and the community.                 |   |
| X | Assess overall progress toward meeting objectives, resultant changes and local area response to changes.                      |   |
| X | Set up follow-up evaluation.                                                                                                  |   |

## A Case in Point

### COMMUNITY BASED MONITORING

#### CLIMATE ACTION PLANNING, NUNAVUT

The Government of Nunavut, with the support of the Canadian Institute of Planners and Natural Resources Canada, coordinated the development of pilot climate change action plans in several northern Arctic hamlets. The need for improved monitoring of climate change trends and impacts was identified in many plans, and adopting a community based approach was decided as the best way to collect important information and simultaneously to raise community awareness and to develop skills and capacity, especially among the youth. Some of the actions included local observation of shoreline erosion, with a focus on storm surge events (event severity and duration, wave height, shoreline decrease) and a program for community observation of extreme weather events and associated impacts on community infrastructure (emergency preparedness, water quality).



## STEP 9: ADJUST AND MODIFY

Climate change is a dynamic issue. Because information and knowledge will grow over time, impacts will change over time, and new and different effects may emerge, any responses to climate change must also be flexible and dynamic. With a good monitoring and evaluation process in place, planners will be able to identify where and when adjustments in the climate change strategy or action may need to be made. In some cases, fundamental changes may be required or community objectives may need to be revisited. In short, adjustments and modifications are expected and should occur whenever new information or new priorities demand it.

Just as city plans are updated regularly, climate plans and strategies should be revisited and revised on a regular basis. Given the rapidly changing realities of climate change, including accelerated impacts and potential emerging negative feed back loops, it is suggested that plans and strategies should be formally reviewed at least every five years

# Appendices

## APPENDIX 1: TOOLS

The following tools are designed to help urban planners, or other project facilitators tasked with climate change planning projects, to work through the strategic planning process and its four modules. While the tools are best used in conjunction with the larger strategic planning process, every planning process will be different and may not require every tool to be used. The tools can also be used to support discrete steps or smaller planning projects (e.g., Vulnerability Assessment, Stakeholder Assessment, Monitoring and Evaluation).

In this guide, each tool is linked to individual planning steps and associated tasks. This is clearly referenced in the Appendix and in the corresponding section. Please read the associated sections, as examples of the tools in action are often provided.

## STEP 1, TASK 1.1: GETTING STARTED

## Tool 1-A Framing the challenge<sup>1</sup>

### SUGGESTED TIME

1 to 2 hours

### RATIONALE AND COMMENTS

- The core group and/or stakeholder group may want to use these questions to explore the larger planning context and to frame the climate change planning challenge
- Answers can be shared with other project stakeholders during the initial project stages to build project awareness and to help “sell” the project to groups or individuals who may not understand the challenge of climate change.
- Answers will help provide context around resource limitations for the process.

### PROCEDURE

Answer the following questions with the appropriate group to help determine the focus, motivation, context and rationale for the climate change planning process (i.e., Why was the process initiated? What are the expectations of the process?)

| KEY QUESTIONS                                                                                                                                                                                                                                                                    | RESPONSES |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Describe in some detail the “triggering event” or motivation for the climate change planning process. (e.g., a crisis or event clearly linked to climate change? Emerging impacts? Policy direction or mandate for climate change planning? Available donor funding or support?) |           |
| Why was it selected at this time?                                                                                                                                                                                                                                                |           |
| Who is affected by the current situation?                                                                                                                                                                                                                                        |           |
| Who or what will be affected if nothing is done?                                                                                                                                                                                                                                 |           |

<sup>1</sup> Adapted from Fisher, Fred, 2001. Building Bridges between citizens and local governments -Through Participatory Planning. Part 2. Toolkit. p. 29

STEP 1, TASK 1.2: GET ORGANIZED

## Tool 1-B: Getting Organized

### SUGGESTED TIME

As needed

### RATIONALE AND COMMENTS

To be used as a guide for process leader and/or core team

### PROCEDURE

Discuss and answer at the outset of the planning process.

| KEY QUESTIONS                                                                                                                                                                                                                                                                                                                                                                                | RESPONSES |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <p><b>Who will lead the effort?</b></p> <ul style="list-style-type: none"> <li>Which department, individual or agency (Physical Planning, Public Works, Health, etc.)?</li> <li>If local government capacity is limited what about an NGO?</li> <li>For NGOs or other groups, what power will they have? What is their mandate?</li> </ul>                                                   |           |
| <p><b>What are the anticipated constraints?</b></p> <ul style="list-style-type: none"> <li>What should the general scope be – a sectoral plan, a broad climate change strategy, a demonstration project?</li> <li>What is the planning time frame?</li> <li>What resources are anticipated – staff time, money, effort, and skills?</li> <li>Where is funding going to come from?</li> </ul> |           |
| <p><b>Who should be invited to get the process going?</b></p> <ul style="list-style-type: none"> <li>How should staff from different departments be involved?</li> <li>Are there other key stakeholders that can help initiate the process?</li> </ul>                                                                                                                                       |           |
| <p><b>What is the process that will be followed?</b></p> <ul style="list-style-type: none"> <li>Does the planning process need to be adjusted to fit with local cultural and area needs?</li> <li>How will decisions be made and implemented?</li> </ul>                                                                                                                                     |           |

## STEP 1, TASK 1.4: DETERMINE ORGANIZATIONAL CAPACITY

**Tool 1-C: Is outside help is needed?****SUGGESTED TIME**

30 minutes

**RATIONALE AND COMMENTS**

Expert support and facilitation leadership may make the process more effective and efficient.

**PROCEDURE**

Have each participant answer the questionnaire, discuss answers and determine if outside assistance is needed.

| KEY QUESTIONS                                                                                                                                                                                           | YES | NO |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| Was the core group able to adequately answer all the questions in Tool 1a “Getting Organized”?                                                                                                          |     |    |
| Is there someone in the group with strong climate change knowledge (i.e., someone with an understanding of key concepts -- climate impacts, risks, vulnerability, adaptive capacity, etc.)              |     |    |
| Is the core group and leadership in agreement that there is no need to have someone from outside the local area facilitate (e.g., someone who does not have a stake in the outcome)?                    |     |    |
| Is there a staff member or trained facilitator in the core group that can create an environment for constructive and cooperative interaction and maximize productivity of group work and participation? |     |    |
| Do they have a good understanding of planning techniques and structured group processes?                                                                                                                |     |    |
| Can they help the group to establish rules and procedures for the process?                                                                                                                              |     |    |
| Can they ensure that communication between stakeholders is effective and fair, without being swayed by powerful or outspoken members?                                                                   |     |    |
| Can they balance the need to push the process forward (due to budget or time constraints) and the need for participants to reflect and understand?                                                      |     |    |

If the core group, leadership or evaluators can answer “Yes” to all of the above questions, then there is no need to hire outside expertise. If the group answers “No” to any of these questions, outside expertise should be considered.

STEP 2, TASK 2.1: IDENTIFY STAKEHOLDERS

## Tool 2-A: Stakeholder Identification

### SUGGESTED TIME

1 to 2 hours

### RATIONALE AND COMMENTS

Working partnerships are critical for a successful planning process. Having a complete listing of stakeholders is the first step in identifying key stakeholders, forming a stakeholder group, identifying where different stakeholders could participate (creating a broad public involvement plan) and understanding process/implementation.

### PROCEDURE

First, ask participants to fill out the worksheet. It may be a good idea to break the group into stakeholder analysis working groups (e.g., government, NGO, private sector, etc.). Have participants read their answers until all are stated. Use a flipchart to record group responses and record these on a worksheet.

| KEY QUESTIONS                                                                                                    | RESPONSES |
|------------------------------------------------------------------------------------------------------------------|-----------|
| Who is most impacted by/at risk of/vulnerable to known climate change impacts (e.g. the urban poor)?             |           |
| Who should be included because of their relevant formal position (e.g. government authority)?                    |           |
| Who should be included because they have control over relevant resources (e.g., money, expertise)?               |           |
| Who has power to hinder or block adaptation activity implementation (e.g., lobby groups, implementing agencies)? |           |
| Comments:                                                                                                        |           |

## STEP 2, TASK 2.2: ESTABLISH THE STAKEHOLDER GROUP

## Tool 2-B: Stakeholder Analysis Matrix

## SUGGESTED TIME

1 hour

## RATIONALE AND COMMENTS

This will help in assessing the stakeholders and developing a stakeholder group and public involvement plan.

## PROCEDURE

Use the list generated in Tool 2-A to fill out the matrix below. First, ask participants to fill out the worksheet. It may be a good idea to break the group into small working groups (e.g., government, NGO, private sector, etc.). Have participants read their answers until all are stated and discuss differences in the assessments. Use both a flipchart and worksheet to record group responses.

| STAKEHOLDER                                                                           | DESCRIPTION OF KEY INTEREST | DESCRIPTION OF KEY POTENTIAL CONTRIBUTIONS | PARTNERSHIP ASSESSMENT*                                     |           |
|---------------------------------------------------------------------------------------|-----------------------------|--------------------------------------------|-------------------------------------------------------------|-----------|
|                                                                                       |                             |                                            | Is their involvement:                                       |           |
|                                                                                       |                             |                                            | (a) <b>Essential:</b> process will fail without involvement |           |
|                                                                                       |                             |                                            | (b) <b>Important:</b> process may suffer without it         |           |
|                                                                                       |                             |                                            | (c) <b>Minor:</b> nice to have                              |           |
|                                                                                       |                             |                                            | Current                                                     | Potential |
| <b>GOVERNMENT:<br/>MUNICIPAL, PROVINCIAL, NATIONAL, TRADITIONAL</b>                   |                             |                                            |                                                             |           |
|                                                                                       |                             |                                            |                                                             |           |
|                                                                                       |                             |                                            |                                                             |           |
|                                                                                       |                             |                                            |                                                             |           |
|                                                                                       |                             |                                            |                                                             |           |
|                                                                                       |                             |                                            |                                                             |           |
|                                                                                       |                             |                                            |                                                             |           |
|                                                                                       |                             |                                            |                                                             |           |
| <b>NGO (NON-GOVERNMENTAL ORGANIZATION) AND<br/>CBO (COMMUNITY-BASED ORGANIZATION)</b> |                             |                                            |                                                             |           |
|                                                                                       |                             |                                            |                                                             |           |
|                                                                                       |                             |                                            |                                                             |           |
|                                                                                       |                             |                                            |                                                             |           |
|                                                                                       |                             |                                            |                                                             |           |
|                                                                                       |                             |                                            |                                                             |           |
|                                                                                       |                             |                                            |                                                             |           |

[illegible]

\* Consider the following issues when assessing stakeholders:

- Their stake in the issues (e.g., vulnerable groups, environmental NGOs);
- Their formal position (e.g., government authority);
- Their control over relevant resources (e.g., money, expertise), and;
- Their power to promote, hinder or block adaptation implementation (e.g., lobby groups, implementing agencies).

## STEP 2, TASK 2.3: ESTABLISH STAKEHOLDER GROUP PROCEDURES

**Tool 2-C: Worksheet to Develop a Sample Terms of Reference for a Stakeholder Committee<sup>2</sup>****SUGGESTED TIME**

1 – 2 hours

**RATIONALE AND COMMENTS**

Establishing Terms of Reference (TOR) for the stakeholder group will avoid many potential problems and pitfalls.

**PROCEDURE**

Use as a guide for the core group to develop a TOR for the comment and feedback of the stakeholder group. This will use the meeting time more efficiently. Alternatively, use the following questions as a guide for the stakeholder group.

**USE THE ANSWERS FROM THESE QUESTIONS TO WRITE-UP A TERMS OF REFERENCE THAT ALL STAKEHOLDERS CAN SIGN.**

What are the basic tasks of scheduling meetings? Writing agendas? (e.g., Who will do it? How will the agenda be agreed to?)

What activities are to be jointly undertaken?

What are the roles and responsibilities of the participants throughout the process (e.g., provide leadership, represent community interests, support community engagement, support implementation activities)?

What are the resources to be provided by each participant?

What are the decision-making methods, including dispute resolution and review?

What are the agreements on how the outcomes of the planning process will be integrated into the planning activities of the local authority?

What is the communication protocol? With other members? With members' constituents? With the media? With public officials?

What is the protocol for letting members into, and out of, the process – when and how?

Have participants identified alternate representatives?

<sup>2</sup> Adapted from ICLEI, 1996. The Local Agenda 21 Planning Guide. Toronto.

STEP 3, TASK 3.1: CONDUCT A SITUATION ASSESSMENT

Tool 3-A: Climate Change Observation Template

SUGGESTED TIME

½ Day workshop

RATIONALE AND COMMENTS

Obtaining local observations engages stakeholders directly in the information gathering aspects of planning. Information can be integrated and cross-referenced with technical data gathering efforts in later steps.

PROCEDURE

Set the context for the discussions as required by describing the importance of tapping into local knowledge as part of developing the overall situation assessment. Describe how local observations will be integrated and cross-referenced with technical data collection efforts.

Pose two simple questions to the group:

- What climate-related weather changes have you observed?
- How are those changes affecting your daily life?

Document specific observations and trends using the table below.

| OBSERVATION | RECENT TRENDS |
|-------------|---------------|
|             |               |
|             |               |
|             |               |
|             |               |
|             |               |
|             |               |

**STEP 3, TASK 3.2: UNDERSTAND THE IMPACTS AND LINKAGES**
**Tool 3-B: Climate Change Influence Diagrams**
**SUGGESTED TIME**

½ Day to Full Day workshop

**RATIONALE AND COMMENTS**

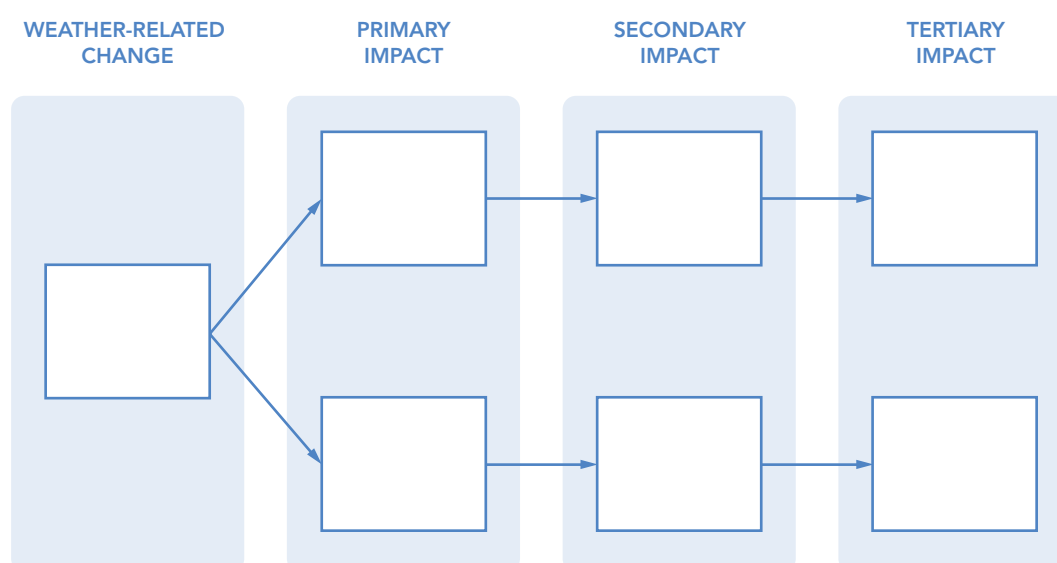
Influence diagrams that graphically represent the cause and effect relationships are a powerful way to organize, synthesize and communicate the linkages between climate change drivers and potential impacts.

**PROCEDURE**

Assemble a list of observations (Tool 3-A) and other identified potential impacts. Use flip charts, whiteboards or equivalent to draw out cause and effect relationships using box and arrow diagrams (see example below).

Note that several potential impact areas can likely be traced back to a single weather-related change.

Aim to develop and organize Influence Diagrams into major climate change driver categories: Drought, Flooding, Heat Waves, Storms, Sea Level Rise, etc.



STEP 3, TASK 3.3: DOCUMENT TRENDS: BACK-CASTING, FUTURE-CASTING

## Tool 3-C: Climate Change Trend Matrix

### SUGGESTED TIME

- As needed for data gathering and modelling.
- Historical data gathering and future climate change modelling can require substantial time commitments.
- Full day workshop to develop final summaries of projected future change and confidence.

### RATIONALE AND COMMENTS

The Vulnerability Assessment needs to be grounded in the best available information regarding historical weather trends and future climate predictions. This step aims to synthesize all available information on historical weather trends (stakeholder observations and historical data) and future climate model predictions.

### PROCEDURE

1. List the major climate change driver categories (Tool 3-B) in column 1, and accompanying qualifier in column 2.
2. Summarize stakeholder observations (Tool 3-A), local weather data, and climate model projections.
3. Synthesize all available information in a workshop setting into Summary Climate Change Projections for each driver. Clearly highlight the major uncertainties and resultant confidence in the summary statements.

| CLIMATE<br>CHANGE<br>DRIVER | EXTREME<br>EVENT OR<br>CHANGE TO<br>AVERAGE | HISTORICAL TRENDS           |                                   | CLIMATE MODEL<br>SCENARIO<br>PROJECTIONS** | SUMMARY CLIMATE CHANGE PROJECTION                               |            |
|-----------------------------|---------------------------------------------|-----------------------------|-----------------------------------|--------------------------------------------|-----------------------------------------------------------------|------------|
|                             |                                             | STAKEHOLDER<br>OBSERVATIONS | LOCAL / REGIONAL<br>WEATHER DATA* |                                            | PROJECTED FUTURE<br>CHANGE<br>• Directionality<br>• Uncertainty | CONFIDENCE |
|                             |                                             |                             |                                   |                                            |                                                                 |            |
|                             |                                             |                             |                                   |                                            |                                                                 |            |
|                             |                                             |                             |                                   |                                            |                                                                 |            |
|                             |                                             |                             |                                   |                                            |                                                                 |            |
|                             |                                             |                             |                                   |                                            |                                                                 |            |
|                             |                                             |                             |                                   |                                            |                                                                 |            |
|                             |                                             |                             |                                   |                                            |                                                                 |            |

\* See Appendix 2: Resources for relevant references.

\*\* See example methodology for how to organize and present Climate Model scenario projections

### STEP 3, TASK 3.4: DOCUMENT SENSITIVITIES

### Tool 3-D: Sensitivity Thresholds and Triggers

## SUGGESTED TIME

As needed.

## RATIONALE AND COMMENTS

Documenting key impact thresholds and triggers for each climate change driver provides the benchmark for understanding relative urgencies and thus priorities .

## PROCEDURE

Research all available information regarding each climate change driver (flooding, drought, etc.) and impact areas (water supply, settlement areas, etc.).

Identify known thresholds and triggers for each and document in the table below.

[illegible]

## STEP 3, TASK 3.4: DEVELOP COMMUNITY IMPACT MAPS

## Tool 3-E: Community-based Mapping

### SUGGESTED TIME

½ to Full Day workshop.

### RATIONALE AND COMMENTS

Most climate change impacts will be site-specific.

Maps can be used to support the development of actions and strategies, and to raise awareness / facilitate dialogue among stakeholders and decision makers.

### PROCEDURE

Work systematically with stakeholder group to identify specific areas of interest and concern for each identified climate change driver.

Follow the three steps below.

To develop community-based maps to support your planning, do the following:

1. Obtain or create a base map of the planning area, and highlight on it key community resources, such as settlements, transportation routes and major infrastructure (water supply, energy, health care centres, etc.). Make several copies to mark up for each climate change vulnerability topic.
2. Working with the stakeholder group, discuss each topic area that has emerged from the previous tasks, and ask: In which areas are we most concerned about (insert topic area name)? Mark up the maps with specific locations of interest and concern. Wherever possible, attempt to determine the specific 'indicators' or thresholds in these sessions, or through subsequent follow-up.
3. Working at your desk, or in collaboration with others, document on additional maps any sources of information that will help to develop an understanding of adaptive capacity in the community. This could include information such as population and demographics, household income per capita, literacy, life expectancy, etc.

STEP 3, TASK 3.5: ASSESS ADAPTIVE CAPACITY

## Tool 3-F: Adaptive Capacity Assessment

### SUGGESTED TIME

As needed.

### RATIONALE AND COMMENTS

Understanding your capacity to adapt and level of preparedness is key to developing an overall climate change plan. Specific actions and strategies may be needed to address deficiencies in adaptive capacity just as they would be needed to address specific impacts.

### PROCEDURE

Conduct as a desk exercise. Add additional criteria as required.

Augment with spatial assessment using results of Tool-3E if available.

| ADAPTIVE CAPACITY ASSESSMENT CRITERIA (EXAMPLE)                                                                                                                                                    | YES | NO |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| <b>AWARENESS:</b>                                                                                                                                                                                  |     |    |
| Are stakeholders in the area/sector aware there are current and/or potential impacts?                                                                                                              |     |    |
| Is there an ability to communicate directly with the sector/area affected (e.g. basic communication infrastructure, a designated key point of contact, regular interaction, radio service, etc.)?  |     |    |
| Are decision-makers aware of a) climate change and b) potential impacts in your jurisdiction?                                                                                                      |     |    |
| <b>KNOWLEDGE:</b>                                                                                                                                                                                  |     |    |
| Has this area/sector undertaken previous efforts to study or address the climate change driver and potential impact?                                                                               |     |    |
| Are there existing processes that you can integrate with?                                                                                                                                          |     |    |
| Are there existing area/sectoral plans, including emergency response plans, that can be referred to?                                                                                               |     |    |
| Are people in this area/sector literate, or do they require oral communication methods (e.g., radio programs, door to door campaigns, announcements at community gatherings)?                      |     |    |
| <b>RESOURCES:</b>                                                                                                                                                                                  |     |    |
| Do you have adequate staff and allocated time to plan and implement adaptation actions?                                                                                                            |     |    |
| Do you have access to adequate financial resources and funding?                                                                                                                                    |     |    |
| Do people in the affected area have access to safe, clean drinking water in the event of a hazard occurrence?                                                                                      |     |    |
| Is there political willingness to allocate resources to build adaptive capacity?                                                                                                                   |     |    |
| Do the people in the affected area have resources to respond in a climate related hazard (e.g., access to basic transportation, adequate rations, ability to relocate temporarily, basic shelter)? |     |    |
| <b>SKILLS:</b>                                                                                                                                                                                     |     |    |
| Are there specific agencies, community groups, and/or NGOs that have the mandate and skills to focus on the specific sector/area?                                                                  |     |    |
| Are there trained emergency response teams for this sector/area?                                                                                                                                   |     |    |
| Are there notable community/neighbourhood "leaders" that can quickly organize people in the event of a hazard occurrence?                                                                          |     |    |
| Are there adequate medical services in close proximity?                                                                                                                                            |     |    |

## STEP 3, TASK 3.5: SUMMARIZE VULNERABILITY ASSESSMENT RATINGS

## Tool 3-G: Summary Vulnerability Assessment Matrix

### SUGGESTED TIME

As needed for preparation time.

Full day workshop to develop with Stakeholder Working Group.

### RATIONALE AND COMMENTS

The Vulnerability Assessment needs to be summarized in a concise manner to serve as the basis for the action planning steps, and to highlight key priorities.

### PROCEDURE

1. List the major climate change driver categories (Tool 3-B) along the left column of the table.
2. Decide on the most appropriate organization of your Summary Vulnerability Assessment. Options include organizing by Sector (e.g., water supply, settlements, food security, etc.) or by Location (e.g., community A, neighbourhood B, region C, etc.). List those categories along the top row of the chart.
3. For each combination of climate change driver and sector / location, rate the overall potential for Impact and overall Status of adaptive capacity and state of preparedness.
4. Highlight highest priorities – situations where the Impact rating is High and Status rating is Low.

|                        | SECTORS / LOCATIONS OF INTEREST |         |         |         |         |         |         |         |         |         |         |         |         |         |
|------------------------|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|                        |                                 |         |         |         |         |         |         |         |         |         |         |         |         |         |
|                        | Impact?                         | Status? | Impact? | Status? | Impact? | Status? | Impact? | Status? | Impact? | Status? | Impact? | Status? | Impact? | Status? |
| CLIMATE CHANGE DRIVERS |                                 |         |         |         |         |         |         |         |         |         |         |         |         |         |
|                        |                                 |         |         |         |         |         |         |         |         |         |         |         |         |         |
|                        |                                 |         |         |         |         |         |         |         |         |         |         |         |         |         |
|                        |                                 |         |         |         |         |         |         |         |         |         |         |         |         |         |
|                        |                                 |         |         |         |         |         |         |         |         |         |         |         |         |         |
|                        |                                 |         |         |         |         |         |         |         |         |         |         |         |         |         |

**IMPACT:** High, Medium, Low based on a combined, overview assessment of the potential exposure to the climate change driver and the sensitivity to impact.

**STATUS:** High, Medium, Low based on a combined, overview assessment of the adaptive capacity of the community/area and their state of implementation.

## STEP 4, TASK 4.3: RESTATE ISSUES AS OBJECTIVES

## Tool 4-A: Issues to Objectives Matrix

### SUGGESTED TIME

2 – 3 hours

## RATIONALE AND COMMENTS

Establishing objective matrices will help to visually organize objectives and their correlating issues, descriptions, and linkages to the climate change context. They will also provide participants a means of identifying performance measures for each objective as well as potential data gaps that could impact future planning and monitoring.

## PROCEDURE

**Step One:** At the end of the second day of the workshop, the facilitator and/or core planning team should compile the data collected into matrices, drawing a matrix for each objective on individual flip chart sheets. Each matrix should be filled out in its entirety – except for the final two columns (Possible performance measures and key data gaps).

**Step Two:** Break the stakeholders into small groups according to experience, expertise, geographic area, or the like. Provide each group with one or more of the matrices and ask them to identify potential performance measures and data gaps. Groups should fill out the remaining columns in each of the matrices. If any strategy options have been identified or discussed that relate to the objective, place them in the bottom row of the matrix for later analysis.

**Step Three:** Each group shall nominate a representative to present the matrices to the workshop for review. Allow participants to provide feedback, adding additional measures if necessary. Be sure to leave the matrices on the wall for use in the prioritization exercise to follow.

| ISSUE | DESCRIPTION AND LINK TO CLIMATE CHANGE | OBJECTIVE | POSSIBLE PERFORMANCE MEASURE | KEY DATA GAPS that would help inform Climate Change |
|-------|----------------------------------------|-----------|------------------------------|-----------------------------------------------------|
|       |                                        |           |                              |                                                     |

Related possible actions or strategy options for use in Module C

## Tool 4-B: Objectives Analysis; Relevance to Climate Change

2 – 3 hours

## PROCEDURE

If climate change is having an affect on the objectives, discuss the current situation and capture the main outcomes on the table. Next, consider the results of the Vulnerability Assessment and discuss what the future potential impacts of climate change could be on the particular objective.

[illegible]

STEP 4, TASK 4.5: IDENTIFY GAPS

Tool 4-C: Climate Change Objectives Gap Checklist

SUGGESTED TIME

1 – 2 hours

RATIONALE AND COMMENTS

The purpose of this process is to provide a moment of reflection, to see if the process has overlooked or ignored more global climate planning objectives. Although local values are the core of the objective identification process, it is important to analyze these objectives in a broader context to make sure that they are as comprehensive as possible.

PROCEDURE

Once local objectives are organized and assessed for their relevance to climate change, consider other objectives that may have been overlooked but are typically considered in climate change planning, such as:

- Reducing or mitigating GHG emissions
- Promoting sustainable resource management

Once some of these other objectives have reviewed, ask, “Are there any gaps in the list of identified objectives? Can any of the objectives be modified to include some of the ones that were overlooked?”

| IDENTIFIED OBJECTIVES | TYPICALLY CONSIDERED OBJECTIVES | GAPS | POSSIBLE MODIFICATIONS |
|-----------------------|---------------------------------|------|------------------------|
|                       |                                 |      |                        |
|                       |                                 |      |                        |
|                       |                                 |      |                        |
|                       |                                 |      |                        |
|                       |                                 |      |                        |
|                       |                                 |      |                        |
|                       |                                 |      |                        |
|                       |                                 |      |                        |

## STEP 5, TASK 5.1: GENERATE CANDIDATE CLIMATE CHANGE ACTIONS

**Tool 5-A: Generic Action Worksheet****SUGGESTED TIME**

Research task. 2 – 5 days.

**RATIONALE AND COMMENTS**

Save time by leveraging existing information and tracking down potential actions as identified by others.

**PROCEDURE**

Conduct as a research / desk exercise.

1. Summarize your vulnerabilities (refer to results from Tool 3-G if available).
2. Conduct general research. Seek out generic climate change actions from international organizations, similar urban areas in your region, sector plans, etc.
3. List potential actions in column 2 and document sources in column 3 for future reference.

| CLIMATE CHANGE<br>VULNERABILITY | GENERIC ACTIONS TO<br>CONSIDER | SOURCE REFERENCE |
|---------------------------------|--------------------------------|------------------|
|                                 | •                              |                  |
|                                 | •                              |                  |
|                                 | •                              |                  |
|                                 | •                              |                  |
|                                 | •                              |                  |
|                                 | •                              |                  |
|                                 | •                              |                  |
|                                 | •                              |                  |
|                                 | •                              |                  |
|                                 | •                              |                  |

STEP 5, TASK 5.1: GENERATE CANDIDATE CLIMATE CHANGE ACTIONS

## Tool 5-B: Vulnerabilities to Actions Worksheet

### SUGGESTED TIME

- 1 Day of Preparation
- ½ Day Workshop

### RATIONALE AND COMMENTS

Working directly from your identified climate change vulnerabilities is the most direct method of brainstorming potential actions.

### PROCEDURE

1. List the key climate change drivers, sectors or locations of interest in Column 1. Summarize from the results of your Step 3 Vulnerability Assessment (Tool 3-G)
2. Briefly describe the potential for impact in column 2 (Consider the results of Tools 3-C, 3-D and 3-E if available).
3. Brainstorm potential actions and list them in Column 3.
4. Next, briefly describe the level of capacity and preparedness in column 2 (Consider the results of Tools 3-F if available).
5. Brainstorm potential actions and list them in Column 3.
6. Repeat for each driver, sector or location as required.

| DRIVER / SECTOR / LOCATION    | CLIMATE CHANGE VULNERABILITY                                                                                      | BRAINSTORMED ACTION LIST |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>CLIMATE CHANGE DRIVER:</b> |                                                                                                                   |                          |
| Sector / Location:            | IMPACT: Describe the potential for impact (How is exposure increasing? Where and how are we sensitive to impact?) | •<br>•<br>•              |
|                               | STATUS: Describe our level of capacity and preparedness (Consider resources, awareness, etc.)                     | •<br>•<br>•              |
| <b>CLIMATE CHANGE DRIVER:</b> |                                                                                                                   |                          |
| Sector / Location:            | IMPACT:                                                                                                           | •<br>•<br>•              |
|                               | STATUS:                                                                                                           | •<br>•<br>•              |
| <b>CLIMATE CHANGE DRIVER:</b> |                                                                                                                   |                          |
| Sector / Location:            | IMPACT:                                                                                                           | •<br>•<br>•              |
|                               | STATUS:                                                                                                           | •<br>•<br>•              |

## STEP 5, TASK 5.1: GENERATE CANDIDATE CLIMATE CHANGE ACTIONS

## Tool 5-C: Objectives to Actions Worksheet

## SUGGESTED TIME

- 1 Day of Preparation
- ½ Day Workshop

## RATIONALE AND COMMENTS

Working directly from your identified objectives is a values-focused method of brainstorming additional potential actions.

## PROCEDURE

1. List your primary ends and means objectives in columns 1 and 2. Use the results of Step 4 (TOOL 4-A) if available.
2. Note the primary climate change vulnerability in column 3. (Consider the results of Step 3 as required).
3. Brainstorm potential actions and list them in Column 4.

| OBJECTIVE           |       | CLIMATE CHANGE VULNERABILITY | BRAINSTORMED ACTION LIST          |
|---------------------|-------|------------------------------|-----------------------------------|
| END                 | MEANS |                              | How can we achieve the objective? |
| Environment         |       |                              | •<br>•                            |
|                     |       |                              | •<br>•                            |
| Community Wellbeing |       |                              | •<br>•                            |
|                     |       |                              | •<br>•                            |
| Economy             |       |                              | •<br>•                            |
|                     |       |                              | •<br>•                            |
| Financial           |       |                              | •<br>•                            |
|                     |       |                              | •<br>•                            |

STEP 5, TASK 5.2: ORGANIZE, SCREEN AND RANK ACTIONS

Tool 5-D: Organizing Actions Worksheet

SUGGESTED TIME

2 – 4 hours

RATIONALE AND COMMENTS

The first step after brainstorming all the possible options is to organize them. Think through the most appropriate framework of organization given the context of your planning and the results of the vulnerability assessment.

PROCEDURE

This desk exercise involves the organization of actions from the previous tasks by sector and or location, followed by distinguishing them by short term, medium term and long term.

| SECTOR              | SECTOR   | SECTOR   | SECTOR   | SECTOR   |
|---------------------|----------|----------|----------|----------|
| LOCATION            | LOCATION | LOCATION | LOCATION | LOCATION |
| SHORT TERM ACTIONS  |          |          |          |          |
|                     |          |          |          |          |
|                     |          |          |          |          |
|                     |          |          |          |          |
| MEDIUM TERM ACTIONS |          |          |          |          |
|                     |          |          |          |          |
|                     |          |          |          |          |
|                     |          |          |          |          |
| LONG TERM ACTIONS   |          |          |          |          |
|                     |          |          |          |          |
|                     |          |          |          |          |
|                     |          |          |          |          |

## STEP 5, TASK 5.2: ORGANIZE, SCREEN AND RANK ACTIONS

## Tool 5-E: Screening and Ranking Table

## SUGGESTED TIME

- 1 Day of Preparation
- ½ Day Workshop

## RATIONALE AND COMMENTS

Screening out unworkable actions will help to narrow your options. Identifying the highest-rated actions that meet basic criteria can help identify 'low hanging fruit' or 'low regrets' options. Ranking supports both.

## PROCEDURE

Start with your organized list of actions (Tool 5-D). Working on a sector by sector, or location by location basis, rate each action on a 3-point scale for the following criteria:

- **Local relevance and suitability:** Are there any material or cultural differences that may constrain the opportunity for this action in this location?
- **Stakeholder acceptability:** Will local residents accept this action or approach in their area?
- **Technical feasibility:** Will the necessary design, implementation and maintenance support be available?
- **Ease of implementation:** Can this action be implemented at the local level? Can it be implemented within a reasonable timeframe?
- **Relative effectiveness:** How well will this action work relative to other options?
- **Relative cost:** Is this a multi-million dollar or a quick fix? Are other options more cost effective?
- **Mainstream Potential:** Does this action support other planning initiatives that need are being addressed or need to be addressed?

Sum the total score for each action and rank accordingly.

|          | Local Sustainability | Acceptability | Feasibility | Implem. Ease | Effectiveness | Cost | Mainstream Potential | TOTAL |
|----------|----------------------|---------------|-------------|--------------|---------------|------|----------------------|-------|
| Action 1 |                      |               |             |              |               |      |                      |       |
| Action 2 |                      |               |             |              |               |      |                      |       |
| Action 3 |                      |               |             |              |               |      |                      |       |
| etc.     |                      |               |             |              |               |      |                      |       |

Ratings: high = 3, medium = 2, low = 1

STEP 5, TASK 5.3: ASSEMBLE STRATEGIES

## Tool 5-F: Strategy Tables

### SUGGESTED TIME

- 1 Day of Preparation
- 1 Day Workshop

### RATIONALE AND COMMENTS

Strategies are necessary when you plan to undertake multiple actions simultaneously or in sequence. Whether you are planning for a single vulnerability in a single location, or developing a comprehensive plan that spans multiple sectors, you want to assemble your actions in a manner that takes best advantage of possible synergies and avoids potential conflicts.

### PROCEDURE

If developing a strategy for a single sector / location:

- Assemble the organized and screened list of actions (Tool 5-D and 5-E)
- Select a 'theme' to guide your strategy: examples could include targeting a priority objective, emphasizing a particular approach (environmentally friendly) or working within a budget constraint. Seek synergies and avoid conflicting actions.
- Select a suite of actions from your short term, medium term and long term actions that make sense for the identified theme.
- Repeat.

If developing a portfolio level strategy for multiple sectors / locations:

4. Assemble the resultant strategies from above.
5. Select a 'theme' to guide your portfolio. Seek synergies and avoid conflicting actions.
6. Select a suite of strategies that make sense for the identified theme.
7. Repeat as required.

| SECTOR:             |  | PORTFOLIO LEVEL STRATEGY |           |                  |                  | LOCATION: |  |
|---------------------|--|--------------------------|-----------|------------------|------------------|-----------|--|
| LOCATION:           |  | I. Settlements & Housing | 2. Energy | 3. Water & Waste | 4. Food Security |           |  |
| SHORT TERM ACTIONS  |  |                          |           |                  |                  |           |  |
| MEDIUM TERM ACTIONS |  |                          |           |                  |                  |           |  |
| LONG TERM ACTIONS   |  |                          |           |                  |                  |           |  |

STEP 6, TASK 6.1: ASSESS CONSEQUENCES OF OPTIONS, ACTIONS AND STRATEGIES

## Tool 6-A: Structured Elicitations

### SUGGESTED TIME

2 – 4 hours per elicitation

### RATIONALE AND COMMENTS

When predictive models are unavailable, structured elicitations can be used to get either experts or local knowledge holders to assess the potential for future climate change impacts.

### PROCEDURE

Follow the steps below.<sup>3</sup>

### STEPS:

1. Identify multiple experts and / or local knowledge holders based on an explicit selection process and criteria (e.g., experience).
2. Clearly define the question for which a judgment will be elicited, making sure that the question separates (as much as possible) technical judgments from value judgments. Examples include:
  - a. Relative to now, what will the frequency on flooding be 20 years from now?
  - b. The most recent flood affected 500 homes over a ½ square kilometre. How many homes over what area might be affected by future flooding 20 years from now?
3. Decompose complex judgments into simpler ones. This will improve both the quality of the judgment and, to the extent it helps to separate a specific technical judgment from the management outcomes of that judgment, its objectivity.
4. Document the expert or local knowledge holder's conceptual model – their underlying belief in how climate change drivers will affect the potential for impact. Influence Diagrams (Tool 3-B) are an effective tool for this. This documentation will improve the quality of the judgment and its communication to others.
5. Elicit judgments to the stated question, expressing judgements using defined Performance Measures (see Tool 4-?). Specific methods include:

Fixed value methods: Estimate the impact as being either higher or lower relative to a stated benchmark (e.g., the current state). Use fixed ranges if necessary.

*E.g., The current average flood frequency is 1 year in every 10. Will the future flood frequency increase or decrease? (1 year in 5, 1 year in 20, etc.)*

<sup>3</sup> Adapted from <http://www.structureddecisionmaking.org/ToolsExpertJudgments.htm>

Probability interval methods: Estimate the probability of impact across a range of intervals. Usually it's useful to focus on medians and extremes. First elicit the upper and lower extremes (usually using a fixed probability of 5%). Then elicit a median estimate, i.e., the belief that the true value lies above or below the value.

*E.g., Extremes: The most recent flood affected 500 homes. Given your understanding of potential climate change, what is the largest (smallest) number of homes that could be impacted by a flood 20 years from now? (For the expert: at the 95% or 5% probability level).*

*Median: What is your best guess of the number of homes that might be affected? (For the expert: the number of homes where there is an equal 50% probability that the true value could be higher or lower than).*

6. Characterize uncertainty in the judgment explicitly, listing all key uncertainties
7. Document conditionalizing assumptions. Differences in judgments are often explained by differences in the underlying assumptions or conditions for which a judgment is valid.

*E.g., What did you assume regarding the degree of upstream watershed development / deforestation when making your estimate?*

8. Explore competing judgments collaboratively, through workshops involving local and scientific experts, with an emphasis on collaborative learning.

STEP 6, TASK 6.1: EVALUATE OPTIONS AND STRATEGIES

Tool 6-B: Consequence Table

SUGGESTED TIME

As required.

RATIONALE AND COMMENTS

Whether working with a stakeholder group or political decision makers, a Consequence Table can provide a concise means of summarizing and communicating the relative performance of alternative strategies.

PROCEDURE

- Summarize the objectives and performance measures from Step 4 as rows in the matrix.
- Place the title of alternative strategies as headings in the final columns of the matrix.
- Fill in the consequences of each strategy on each objective using as required: predictive models, expert judgment or local knowledge holder elicitations (Tool 6-A).
- When complete, use Dominance and Sensitivity Assessments to simplify.

| OBJECTIVE           |       | PERFORMANCE MEASURE | STRATEGY A | STRATEGY B | STRATEGY C | STRATEGY D |
|---------------------|-------|---------------------|------------|------------|------------|------------|
| END                 | MEANS |                     |            |            |            |            |
| Environment         |       |                     |            |            |            |            |
|                     |       |                     |            |            |            |            |
| Community Wellbeing |       |                     |            |            |            |            |
|                     |       |                     |            |            |            |            |
| Economy             |       |                     |            |            |            |            |
|                     |       |                     |            |            |            |            |
| Financial           |       |                     |            |            |            |            |
|                     |       |                     |            |            |            |            |

## STEP 7, TASK 7.1: IDENTIFY INSTITUTIONAL/GOVERNANCE GAPS

**Tool 7-A: Institutional/Governance Gap Checklist****SUGGESTED TIME**

As required.

**RATIONALE AND COMMENTS**

It is important to identify and address institutional gaps and gaps in governance that may have a negative impact on the success of project implementation. These gaps may have been addressed earlier, in Step 1. It is important, however, to review these and other gaps that may have arisen during the course of the climate planning process.

**PROCEDURE**

Ask the following key questions and record answers on the checklist below:

1. What were the institutional/governance gaps that this project has encountered?
2. How were they addressed?
3. Have there been any developments in municipal politics/governance systems that may prove to be gaps?
4. How can these gaps be addressed?
5. If the gaps cannot be addressed, how can we modify our plan to compensate for the barriers these gaps present?

| What institutional gaps have we encountered so far? | How were they addressed? | Have there been any developments that may result in new gaps? | How can these new gaps be addressed? | How can we modify? |
|-----------------------------------------------------|--------------------------|---------------------------------------------------------------|--------------------------------------|--------------------|
|                                                     |                          |                                                               |                                      |                    |
|                                                     |                          |                                                               |                                      |                    |
|                                                     |                          |                                                               |                                      |                    |
|                                                     |                          |                                                               |                                      |                    |

STEP 7, TASK 7.4: DEVELOP ACTION PLAN

## Tool 7-B: Action Plan Worksheet

### SUGGESTED TIME

As required.

### RATIONALE AND COMMENTS

An action plan is a stringently detailed document that outlines exactly what will occur during the project implementation. In essence, the action plan is the “script” of the implementation: it is the primary mechanism to make sure that everyone plays his or her part.

### PROCEDURE

Begin by describing in detail the activities that will occur during the project implementation in the left hand column. Then work to the right across the chart, filling – out each specific activity (or phase, depending on how you decide to organize your plan):

- Institutions involved
- Project leader (person responsible)
- Resources required
- Budget
- Timeframe

As the implementation process progresses, fill out notes in the progress column. Finally, check off the completion column.

TOOL  
**7-B**

STEP 8, TASK 8.1: PREPARE A MONITORING AND EVALUATION FRAMEWORK

## Tool 8-A: Monitoring Framework Worksheet

### SUGGESTED TIME

As required.

### RATIONALE AND COMMENTS

Monitoring is the continuous process (monthly, annual) of routinely gathering information on all aspects of a climate change adaptation or mitigation project or program. It should be a collaborative process with the core stakeholders (i.e., project implementers) involved in some aspect (e.g., data collection, evaluation, review, etc.).

Monitoring is used to:

1. Inform decision making on project implementation;
2. Analyse the current situation;
3. Identify problems and find solutions;
4. Discover trends and patterns.

The monitoring program should regularly collect data on those performance measures for the objectives developed in Step 4 and used in the strategy option evaluation in Step 6. In some instances there may be time and opportunity to collect data for previously unspecified but more direct performance measures.

### PROCEDURE

- Answer the key monitoring questions below.
- For each strategic objective determined in Step 4, develop a monitoring matrix sheet similar to the one on the facing page.
- Specify the data source, collection frequency, and documentation format, and the terms of results communication, storage, and access by completing the Monitoring Matrix.

### KEY MONITORING QUESTIONS

- *Has a monitoring framework been completed using the original objectives?*
- *Are there other monitoring specific objectives?*
- *What uncertainties are being addressed through the monitoring program?*
- *Have performance measures (indicators) for monitoring been agreed to?*
- *What is the source of data?*
- *Who is to do the monitoring, data collection and evaluation?*
- *How often is the data to be collected?*
- *How will the monitoring process be documented and communicated?*
- *How will it be communicated? How will the results be used and by whom?*
- *What happens to the data? Who gets access to it?*

| MANAGER OR STAFF RESPONSIBLE:                                                 |                        |                     |             |             |             |             |
|-------------------------------------------------------------------------------|------------------------|---------------------|-------------|-------------|-------------|-------------|
| OBJECTIVE<br>(Monitoring<br>criteria)                                         | PERFORMANCE<br>MEASURE | BASELINE<br>MEASURE | PERIOD<br>1 | PERIOD<br>2 | PERIOD<br>3 | PERIOD<br>4 |
|                                                                               |                        |                     |             |             |             |             |
| DATA SOURCE                                                                   |                        |                     |             |             |             |             |
| DATA COLLECTION FREQUENCY                                                     |                        |                     |             |             |             |             |
| DATA COLLECTION METHODS<br>(e.g. third party statistics, survey, etc.)        |                        |                     |             |             |             |             |
| PARTIES INVOLVED AND RESPONSIBILITIES<br>(collection, management, evaluation) |                        |                     |             |             |             |             |
| DOCUMENTATION FORMAT                                                          |                        |                     |             |             |             |             |
| RESULTS:<br>storage location, communication plan, and access                  |                        |                     |             |             |             |             |

STEP 8, TASK 8.4: EVALUATE RESULTS OF MONITORING PROGRAM

## Tool 8-B: Evaluation "How To" Worksheet

### SUGGESTED TIME

As required.

### RATIONALE AND COMMENTS

Evaluations should be undertaken in a collaborative way either by the implementing agency or agencies and department(s). The goal of evaluation should be to improve the climate adaptation or mitigation project/program/strategy and to promote learning.

### PROCEDURE

Use the questions below to guide the evaluation preparation, research and reporting.

### EVALUATION PREPARATION

- *Why is the evaluation being undertaken?*
- *What is the evaluation expected to achieve?*
- *What type of evaluation is most suitable?*
- *When is project evaluation to take place?*
- *How will the evaluation process be documented and communicated?*
- *How will the results be used and by whom?*

### EVALUATION SUBSTANCE

How well are the actions achieving the objectives? (Use the framework below)

| OBJECTIVE<br>(evaluation criteria) | ANTICIPATED<br>IMPACT (expected<br>change from baseline) | ACTUAL IMPACT<br>(actual change from<br>baseline) | COMMENTS |
|------------------------------------|----------------------------------------------------------|---------------------------------------------------|----------|
|                                    |                                                          |                                                   |          |
|                                    |                                                          |                                                   |          |
|                                    |                                                          |                                                   |          |
|                                    |                                                          |                                                   |          |

#### ADEQUACY AND EFFECTIVENESS

- *Has the action plan been satisfactorily implemented?*
- *Has the action plan adequately achieved the stated objectives?*
- *Have sufficient resources been organized to carry out the action plan?*
- *Have the leadership and capacities of the individuals and organizations involved been sufficient?*
- *Will the partnerships and networks formed in the climate change planning process be sustained and strengthened?*
- *Have the adverse impacts, both anticipated and unexpected, been adequately addressed?*
- *Can the results be sustained?*

#### EFFICIENCY

- *Could resources have been used differently or been substituted to produce more results within the estimated costs?*
- *Could the same results been achieved for less money or effort?*
- *Would a strategy option plan have produced the same or better results at a lower cost?*
- *Were the resources managed in the most efficient way possible to achieve the objectives?*

#### REVIEW

- *Have local climate conditions and circumstances changed?*
- *Have local priorities changed?*
- *Has new climate change information been introduced that changes things?*
- *What were the unanticipated impacts? What changes need to be made to address them?*

#### ADJUSTMENT AND RECOMMENDATIONS

- *How must project/plan/strategy implementation change to better meet objectives?*
- *Have climate and/or community conditions changed so much that a complete review of objectives and actions is necessary?*

## APPENDIX 2: OTHER RESOURCES

There are a large number of climate change adaptation and mitigation planning resources and tools available. This section highlights particularly useful, relevant and accessible resource documents and websites. Collectively, these resources would provide planners an effective resource library.

Please note that the list is by no means exhaustive. There is a wealth of information available and new tools emerging every few months. Planners should seek to “bookmark” key climate change planning websites (many of which are provided here) and work to stay current on available literature, case studies and tools.

### Publications

- Title:** Adaptation Policy Frameworks for Climate Change: Developing Strategies, Policies, and Measures (APF)
- Author:** United Nations Development Programme (UNDP)  
One United Nations Plaza  
New York, NY 10017 USA  
Tel: +1 (212) 906-5000  
Fax: +1 (212) 906-5001
- Source:** <http://www.undp.org/climatechange/adapt/apf.html>
- Topic:** Developed by UNDP on behalf of the Global Environment Facility, APF provides a structured approach to developing and implementing adaptation strategies. The APF process can be used to develop and establish adaptation-related projects or for exploring the potential to add adaptation considerations to other types of projects. The tools have been designed to work at any population level - from regional to local. The APF website provides chapters of the document available for download, along with additional information and background on the five-stage process, including links to associated technical papers
- 
- Title:** Climate Resilient Cities - A Primer on Reducing Vulnerabilities to Disasters
- Author:** The World Bank  
1818 H Street NW, Washington, DC 20433, U.S.A  
[www.worldbank.org](http://www.worldbank.org)
- Year:** July, 2009
- Source:** Publication  
[http://siteresources.worldbank.org/INTEAPREGTOPURBDEV/Resources/Primer\\_e\\_book.pdf](http://siteresources.worldbank.org/INTEAPREGTOPURBDEV/Resources/Primer_e_book.pdf)
- Topic:** This guidebook and toolkit was prepared for local government in East Asia, to inform local officials about climate change. The publication aims to engage government and other stakeholders in a city assessment and participatory approach, in order to identify areas of vulnerability and identify possible solutions.

It includes a toolkit for vulnerability assessment, identifying “hot spots”, and is intended to motivate communities to develop adaptation, mitigation, and preparedness strategies in response to climate change impacts. Information on “sound practices” is provided, along with a list of additional resources.

- 
- Title:** A Toolkit for Designing Climate Change Adaptation Initiatives
- Author:** United Nations Development Programme (UNDP)  
Bureau of Development Policy Environment and Energy Group  
One United Nations Plaza  
New York, NY 10017, USA  
<http://www.undp.org/climatechange>
- Source:** <http://www.lowcarbonportal.org/show/7B74F684-F203-1EE9-BC94B1A482AEA1EE>
- Topic:** UNDP’s climate change adaptation toolkit is aimed at a wide range of individuals and organizations, all of whom may all play a part in supporting and designing climate change adaptation initiatives. Organized into four main sections, the toolkit builds on UNDP experiences supporting countries at the national, regional, and community level. The toolkit also provides a useful range of tools, and an accompanying list of climate change resources.
- 
- Title:** Asian Cities Climate Change Resilience Network (ACCCRN): Responding to Urban Climate Change
- Author:** Institute for Social and Environmental Transition (ISET)  
948 North Street, Suite 9, Boulder, Colorado 80304, U.S.A.  
[www.i-s-e-t.org](http://www.i-s-e-t.org)
- Year:** 2009
- Source:** Publication  
[http://www.rockefellerfoundation.org/uploads/files/2d4557bc-6836-4ece-a6f4-fa3eda1f6c0c-acccrn\\_cop15.pdf](http://www.rockefellerfoundation.org/uploads/files/2d4557bc-6836-4ece-a6f4-fa3eda1f6c0c-acccrn_cop15.pdf)
- Topic:** The document profiles ten Asian cities that are part of the Rockefeller Foundation’s ACCCRN program. The case studies summarize each city’s experiences, challenges, and lessons learned, and provide an overview of the vulnerability and capacity context in each city.
- 
- Title:** Building Climate and Disaster Resilience into City Planning and Management Processes
- Author:** The World Bank  
Sustainable Development Department  
East Asia and the Pacific Region  
1818 H Street NW, Washington, DC 20433, U.S.A  
[www.worldbank.org](http://www.worldbank.org)
- Year:** 2009

**Source:** Publication  
[http://www.preventionweb.net/files/12506\\_buildingclimateandEN.pdf](http://www.preventionweb.net/files/12506_buildingclimateandEN.pdf)

**Topic:** Case studies are used to illustrate the ongoing application of the World Bank's "Climate Resilient Cities" framework, in East Asia, the Middle East, and Africa. The document provides an overview of the "Climate Resilient Cities" process, with information on the issues and challenges emerging as individual cities work through the process.

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**Title:** Handbook for Conducting Technology Needs Assessment for Climate Change

**Author:** United Nations Development Programme (UNDP) and United Nations Framework Convention on Climate Change Secretariat (UNFCCC)  
 One United Nations Plaza  
 New York, NY 10017, USA

**Year:** 2009

**Source:** Publication  
[http://unfccc.int/ttclear/pdf/TNAHandbook\\_9-15-2009.pdf](http://unfccc.int/ttclear/pdf/TNAHandbook_9-15-2009.pdf)

**Topic:** In this Handbook, the role of low carbon technologies in meeting the climate change challenge is addressed by assessing technology needs in developing countries, with a view to both mitigation and adaptation. The process, known as a technology needs assessment (TNA), is essentially a systematic approach by which to identify, evaluate, and prioritize technological means for achieving sustainable development ends.

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## Websites

**Title:** UNDP Portal on Low-Carbon and Climate-Resilient Development

**Author:** United Nations Development Programme (UNDP)  
 One United Nations Plaza  
 New York, NY 10017 USA  
 Tel: +1 (212) 906-5000  
 Fax: +1 (212) 906-5001

**Source:** <http://www.lowcarbonportal.org/>

**Topic:** Developed by the UNDP, the primary purpose of this website is to share knowledge and develop the capacity of national and sub-national governments in creating, financing, and implementing low-carbon and climate change-resilient strategies (LCCRS). The approach used throughout the site is based on three key themes - formulating, financing, and implementing - intended to address stakeholder knowledge gaps. The site includes links to related UNDP publications, and associated tools and resources, including an up-to-date list of funding opportunities, grouped by themes, e.g. community-based adaptation initiatives, climate risk financing, etc.

---

**Title:** UNITAR Climate Change Programme (CCP)  
**Author:** United Nations Institute for Training and Research (UNITAR)  
 International Environment House  
 Chemin des Anémones 11-13  
 CH-1219 Châtelaine, Geneva - Switzerland  
 T: +41 22 917 8400  
 F: +41 22 917 8047  
 UN Switchboard: +41 22 917 1234  
**Source:** <http://www.unitar.org/ccp/>  
**Topic:** UNITAR (the UN body responsible for knowledge-sharing, training and capacity building) operates a Climate Change Programme, designed to build human capacity in developing countries to address the impacts of climate change. UNITAR's CCP website includes information about their programs, along with links to other resources and useful publications.

**Title:** Least Developed Countries Portal  
**Author:** United Nations Framework Convention on Climate Change (UNFCCC)  
 UNFCCC secretariat  
 Haus Carstanjen  
 Martin-Luther-King-Strasse 8  
 53175 Bonn, Germany  
 Phone: (49-228) 815-1000  
 Fax: (49-228) 815-1999  
**Source:** [http://unfccc.int/cooperation\\_support/least\\_developed\\_countries\\_portal/items/4751.php](http://unfccc.int/cooperation_support/least_developed_countries_portal/items/4751.php)  
**Topic:** The UNFCCC's Least Developed Countries (LDCs) Portal provides information on National Adaptation Programs of Action (NAPAs), the LDC fund, and detailed project information, including a database of local climate change coping strategies.

**Title:** Cities in Climate Change Initiative  
**Author:** Sustainable Urban Development Network (SUD-net)  
 UN-HABITAT  
 PO Box 30030, Nairobi 00100, Kenya  
 Tel: +254 20 7623706  
 Fax: + 254 20 762 3477  
 E-mail: [urban.planning@unhabitat.org](mailto:urban.planning@unhabitat.org)  
[www.unhabitat.org](http://www.unhabitat.org)  
**Source:** <http://www.unhabitat.org/content.asp?typeid=19&catid=570&cid=6003>  
**Topic:** UN-HABITAT's website provides an overview of the Cities in Climate Change Initiative, part of the Sustainable Urban Development Network (SUD-net). The website includes information on the experiences of the program's pilot cities, along with a resource library, which includes up-to-date information and reports from UN-HABITAT.

**Title:** Adaptation Learning Mechanism  
**Author:** Global Environment Facility (GEF)  
 Energy and Environment Group  
 Bureau for Development Policy  
 United Nations Development Program (UNDP)  
 Tel: (212) 906- 6018  
 Fax: (212) 906- 6998  
 New York City, U.S.A.  
**Year:** Launched in 2008  
**Source:** <http://www.adaptationlearning.net/>  
**Topic:** The Adaptation Learning Mechanism is a knowledge-sharing platform, which has been developed to spread information about on-the-ground experiences, tools, and relevant resources. The project focuses on adaptation practices, mainstreaming, and capacity building in developing countries. Resources are searchable by theme (e.g. education, coastal zone management, etc.), type (e.g. guidance and tools, research, training material, etc.), or by keyword.

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**Title:** MCA4climate (Multi-Criteria Analysis for climate change: developing guidance for sound climate policy planning)  
**Author:** United Nations Environment Programme (UNEP)  
**Year:** Launched in 2009  
**Source:** [www.mca4climate.info/#](http://www.mca4climate.info/#)  
**Topic:** The site provides insights on new aspects of economic thinking related to climate change policy-making, such as uncertainty and dynamics, and will make a series of recommendations on how to tackle critical and pertinent issues pertaining to climate policy analysis.

**Title:** Preparing Cities for Climate Change: An International Assessment of Urban Adaptation Planning  
**Author:** Department of Urban Studies and Planning  
 Massachusetts Institute of Technology  
 77 Massachusetts Avenue, 9-320, Cambridge, MA 02139-4307, U.S.A.  
**Source:** <http://web.mit.edu/jcarmin/www/urbanadapt/index.htm>  
**Topic:** A project led by Professor JoAnn Carmin, the website profiles a comparative research project that is investigating the types of climate adaptation plans being developed internationally and the varying factors influencing the approaches cities and municipalities are taking to climate change adaptation planning. The website provides links to published research (updated as they become available) and information on international case studies.

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**Title:** Climate Decisions  
**Author:** Institute of Resources and Environment,  
 UBC School of Community and Regional Planning  
 Room 428, Lasserre Building, 6333 Memorial Rd, Vancouver, BC, Canada,  
 V6T 1Z2  
**Year:** Launched in 2008  
**Source:** <http://climate-decisions.org/index.htm>  
**Topic:** The website project is part of the University of British Columbia's  
 component of the Climate Decision Making Center at Carnegie Mellon  
 University. The website provides an overview of structured decision making  
 processes and climate change adaptation, with a resource library containing  
 links to other sites, toolkits, and case studies.

**Title:** Climate Change Group - International Institute for Environment and  
 Development (IIED)  
**Author:** International Institute for Environment and Development (IIED)  
 IIED's Head Office  
 3 Endsleigh Street  
 London, England  
 WC1H 0DD  
 Tel: +44 (0) 20 7388 2117  
 Fax: +44 (0) 20 7388 2826  
 email: [info@iied.org](mailto:info@iied.org)  
**Source:** <http://www.iied.org/climate-change/home>  
**Topic:** Through local, grassroots partnerships, by working with regional and  
 national government, IIED assists vulnerable communities in strengthening  
 their capacity for climate change adaptation. Their website includes links to  
 their national and local partners, along with information on IIED's key areas  
 of focus, and links to an extensive publication library.

## On-line Tools and Downloadable Tools

**Name of Tool:** The Climate Mapper  
**Organization:** United States Agency for International Development (USAID),  
 National Aeronautics and Space Administration (NASA), Institute  
 for the Application of Geospatial Technology (IAGT), University of  
 Colorado, CATHALAC  
**Summary  
 Description:** The Climate Mapper is a free 'plug-in' for the NASA World Wind 3D  
 virtual globe as well as the SERVIR-Viz virtual globe interface. The  
 purpose of the Climate Mapper is to make the results of climate  
 change models accessible to a broad user community. With the  
 Climate Mapper, users can assess and compare climate change  
 projections for the 2030s and 2050s against 3D visualizations  
 of landscape. This should enhance vulnerability assessments as  
 development planners consider adaptation strategies for projects.

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Target group:</b>          | Planners, academic institutions, general public                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Cost:</b>                  | Free                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Capacity Requirements:</b> | Low to moderate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Web link:</b>              | <a href="http://www.iagt.org/focusareas/envmon/climatechg.aspx">http://www.iagt.org/focusareas/envmon/climatechg.aspx</a>                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <hr/>                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Name of Tool:</b>          | Climate Change Data Portal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Organization:</b>          | World Bank                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Summary Description:</b>   | <p>Designed to provide an entry point to climate related data and tools, the Climate Change Data Portal provides access to comprehensive global and country climate change data. It is intended to act as a knowledge-sharing platform to collect, integrate, and display information relevant to climate change.</p> <p>Links are included to relevant global climate-related databases, and the portal contains historical and projected spatially referenced data, a webGIS visualization tool, and useful links to country-level information.</p> |
| <b>Target group:</b>          | Policy Makers and Development Practitioners.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Cost:</b>                  | Free online tool                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Capacity Requirements:</b> | Low to moderate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Web link:</b>              | <a href="http://www.worldbank.org/climateportal">http://www.worldbank.org/climateportal</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <hr/>                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Name of Tool:</b>          | CI:grasp (Climate Impacts: Global & Regional Adaptation Support Platform)                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Organization:</b>          | Potsdam Institute for Climate Impact Research (PIK) and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Summary Description:</b>   | <p>Currently in active development, CI:grasp is an interactive information platform, including three main information layers designed to offer information on climate change, physical and socio-economic impacts, and adaptation options and experiences. Designed as an interactive and evolving tool, the website can be updated by users, who will be able to add ongoing projects to CI:grasp's online maps. The website will include links to additional climate change adaptation resources.</p>                                               |
| <b>Target group:</b>          | Decision makers looking to integrate climate change adaptation planning within their ongoing projects, e.g. governmental agencies, sector specialists, development agencies, NGOs, etc.                                                                                                                                                                                                                                                                                                                                                               |
| <b>Cost:</b>                  | Free online tool                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Capacity Requirements:</b> | Moderate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Web link:</b>              | <a href="http://www.ci-grasp.org/">http://www.ci-grasp.org/</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <hr/>                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Name of Tool:</b>          | weADAPT (a platform that includes a range of climate change tools)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Organization:</b>          | Stockholm Environment Institute (SEI) e.a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Summary</b>                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description:</b>           | <p>weADAPT is a climate change adaptation platform, combining a set of activities, tools and services developed in collaboration with the Stockholm Environment Institute (SEI), the University of Cape Town and additional partners. Tools include:</p> <p><i>Climate Change Explorer (CCx)</i>, a software tool that enables the user to access and use local climate data, designed to enable non-expert users to look at a range of climate change projections, as part of a robust adaptation decision making process. CCx is available for download and provides downscaled projections for over 1000 stations in Africa and 300 in Asia from 10 GCM models. Guidance is provided to non-expert users interpret the data, and to assess its relevance in making adaptation decisions, incorporating uncertainty into the process.</p> <p><i>wikiADAPT</i> is a web-based knowledge sharing platform, incorporating information on other resources, and documenting and sharing experiences in adaptation research, practice and policy-making.</p> <p><i>weADAPT's Adaptation Layer in Google Earth</i> is designed as a user-friendly resource that presents a variety of climate change related information (including videos and graphics) and makes it easy to find. Also under development is the Adaptation Decision Explorer, a decision support tool designed to screen adaptation options.</p> |
| <b>Target group:</b>          | Any interested decision-makers, e.g. project officers, planners, NGOs, donor agencies, policy makers, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Cost:</b>                  | Tools and resources are free to download and use. Some additional cost may be involved in accessing and processing input data for downscaling, and for analyzing output downscaled data. Some support services – including training – are also offered through weADAPT.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Capacity Requirements:</b> | Low to moderate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Web link:</b>              | <a href="http://www.weadapt.org/">http://www.weadapt.org/</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

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|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Name of Tool:</b> | Quality Standards for the Integration of Adaptation to Climate Change into Development Programming (CCA QS)                                                                                                                                                                                                                                                                                                  |
| <b>Organization:</b> | United Nations Development Programme (UNDP)                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Summary</b>       |                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description:</b>  | <p>UNDP's CCA QS is designed to provide a concise, structured framework to incorporate climate change adaptation practices into existing and future development programming. The tool includes a framework for best practices, along with guidance in identifying climate change risks and opportunities, and integrating adaptation considerations and measures into development programs and projects.</p> |

|                               |                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Target group:</b>          | Project and program planners and implementers                                                                                                                                                                                                                                                                                                                                                              |
| <b>Cost:</b>                  |                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Capacity Requirements:</b> | Moderate to high                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Web link:</b>              | Currently in development, the document will be available through the UNDP website in the future.                                                                                                                                                                                                                                                                                                           |
| <hr/>                         |                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Name of Tool:</b>          | Adapting to Coastal Climate Change: a Guidebook for Development Planners                                                                                                                                                                                                                                                                                                                                   |
| <b>Organization:</b>          | United States Agency for International Development (USAID)                                                                                                                                                                                                                                                                                                                                                 |
| <b>Summary Description:</b>   | Created as a companion to USAID's existing "Adapting to Climate Variability and Change" guidebook, this manual is designed to provide a more detailed and sector-specific guidance for responding to climate change impacts in coastal areas. The process requires an inclusive and participatory planning process lasting approximately 1-3 years.                                                        |
| <b>Target group:</b>          | Coastal planners, practitioners, and policy makers.                                                                                                                                                                                                                                                                                                                                                        |
| <b>Cost:</b>                  | Free online resource.                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Capacity Requirements:</b> | Moderate                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Web link:</b>              | <a href="http://www.crc.uri.edu/">http://www.crc.uri.edu/</a>                                                                                                                                                                                                                                                                                                                                              |
| <hr/>                         |                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Name of Tool:</b>          | CRiSTAL (Community-based Risk Screening Tool – Adaptation & Livelihoods)                                                                                                                                                                                                                                                                                                                                   |
| <b>Organization:</b>          | International Institute for Sustainable Development (IISD)                                                                                                                                                                                                                                                                                                                                                 |
| <b>Summary Description:</b>   | Created to help project designers and managers, CRiSTAL is a screening process designed to integrate risk reduction and climate change adaptation into community-level projects. The Microsoft Excel-based tool is continually updated, based on feedback from ongoing training sessions. CRiSTAL's website contains links to other community-based planning resources, and adaptation planning resources. |
| <b>Target group:</b>          | Project planners and managers working at the community level.                                                                                                                                                                                                                                                                                                                                              |
| <b>Cost:</b>                  | Free online tool                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Capacity Requirements:</b> | Low to moderate (training workshops are available)                                                                                                                                                                                                                                                                                                                                                         |
| <b>Web link:</b>              | <a href="http://www.cristaltool.org/">http://www.cristaltool.org/</a>                                                                                                                                                                                                                                                                                                                                      |
| <hr/>                         |                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Name of Tool:</b>          | Statistical DownScaling Model (SDSM)                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Organization:</b>          | Environment Agency, UK                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Summary Description:</b>   | Developed as an open-source tool, the SDSM aims to provide daily, transient climate risk information. Historic and projected data is available for the 1961 – 2100 time period, and although it has been primarily used for water resource management, it is applicable to multiple sectors.                                                                                                               |

**Target group:** Decision makers seeking to incorporate climate change considerations into ongoing planning processes, e.g. local and regional government, NGOs, etc.

**Cost:** Free online tool but requires registration

**Capacity Requirements:** Moderate

**Web link:** [www.sdsm.org.uk](http://www.sdsm.org.uk)

---

**Name of Tool:** Climate Analysis Indicators Tool (CAIT)

**Organization:** World Resources Institute (WRI)

**Summary Description:** Part of a wider toolkit of country level climate change data, the CAIT database includes information on historical impacts, particularly from disaster events, along with a range of useful information on human development indices. Data may be manipulated by country, and cross-referenced with migration-related data. All major data sources are listed, along with related climate data resources.

**Target group:** Decision makers seeking to incorporate climate change considerations into ongoing planning processes, e.g. local and regional government, NGOs, etc.

**Cost:** Free online tool but requires registration

**Capacity Requirements:** Low to moderate

**Web link:** <http://cait.wri.org>

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**Name of Tool:** ClimateWizard

**Organization:** The Nature Conservancy

**Summary Description:** ClimateWizard allows users to:

- View historic temperature and rainfall maps for anywhere in the world
- View state-of-the-art future predictions of temperature and rainfall around the world
- View and download climate change maps in a few easy steps

ClimateWizard enables technical and non-technical audiences alike to access leading climate change information and visualize the impacts anywhere on Earth. The first generation of this web-based program allows the user to choose a state or country and both assess how climate has changed over time and to project what future changes are predicted to occur in a given area. ClimateWizard represents the first time ever the full range of climate history and impacts for a landscape have been brought together in a user-friendly format.

**Target group:** Decision makers seeking to incorporate climate change considerations into ongoing planning processes, e.g. local and regional government, NGOs, etc.

**Cost:** Free online tool

**Capacity Requirements:** Low

**Web link:** <http://www.climatewizard.org/>

## APPENDIX 3: GLOSSARY OF TERMS

Most definitions used in this guide are based on those used by the International Panel on Climate Change (IPCC), the leading global climate change research organization. The glossary of terms below uses IPCC definitions.

**Adaptation:** Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects. Various types of adaptation exist, e.g. anticipatory and reactive, private and public, and autonomous and planned. Examples are raising river or coastal dikes, the substitution of more temperature-shock resistant plants for sensitive ones, etc.

**Adaptation benefits:** The avoided damage costs or the accrued benefits following the adoption and implementation of adaptation measures.

**Adaptive capacity:** A system's ability and efforts in both physical elements (infrastructure, material wealth, technology) and social/institutional elements (human capital, governance, institutional strength) to adapt to climate change impacts.

**Adaptation costs:** Costs of planning, preparing for, facilitating, and implementing adaptation measures, including transition costs.

**Anthropogenic:** Resulting from or produced by human beings.

**Anthropogenic emissions:** Emissions of greenhouse gases, greenhouse gas precursors, and aerosols associated with human activities, including the burning of fossil fuels, deforestation, land-use changes, livestock, fertilisation, etc.

**Climate:** Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. The relevant quantities are most often surface variables such as temperature, precipitation and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. In various parts of this report different averaging periods, such as a period of 20 years, are also used.

**Climate change:** Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes, external forces, or to persistent anthropogenic changes in the composition of the atmosphere or in land use. Note that the United Nations Framework Convention on Climate Change

(UNFCCC), in its Article 1, defines climate change as: 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'. The UNFCCC thus makes a distinction between climate change attributable to human activities altering the atmospheric composition, and climate variability attributable to natural causes.

**Food security:** A situation that exists when people have secure access to sufficient amounts of safe and nutritious food for normal growth, development and an active and healthy life. Food insecurity may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level.

**Greenhouse effect:** Greenhouse gases effectively absorb thermal infrared radiation, emitted by the Earth's surface, by the atmosphere itself due to the same gases, and by clouds. Atmospheric radiation is emitted to all sides, including downward to the Earth's surface. Thus greenhouse gases trap heat within the surface-troposphere system. This is called the greenhouse effect.

**Greenhouse gas (GHG):** Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. This property causes the greenhouse effect. Water vapour (H<sub>2</sub>O), carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>) and ozone (O<sub>3</sub>) are the primary greenhouse gases in the Earth's atmosphere. Moreover, there are a number of entirely human-made greenhouse gases in the atmosphere, such as the halocarbons and other chlorine and bromine containing substances, dealt with under the Montreal Protocol. Beside CO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub>, the Kyoto Protocol deals with the greenhouse gases sulphur hexafluoride (SF<sub>6</sub>), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).

**(Climate change) Impacts:** The effects of climate change on natural and human systems. Depending on the consideration of adaptation, one can distinguish between potential impacts and residual impacts:

- Potential impacts: all impacts that may occur given a projected change in climate, without considering adaptation.
- Residual impacts: the impacts of climate change that would occur after adaptation.

**Integration:** An approach to climate change planning that considers larger and related sustainability issues (i.e., economic, social, governance, environmental, etc.). Integrated planning and action can deliver efficiency and effectiveness by adding value through policies, programs, plans and actions that support, rather than undercut, each other. See mainstreaming.

**Likelihood:** The likelihood of an occurrence, an outcome or a result, where this can be estimated probabilistically, is expressed in IPCC reports using a standard terminology defined as follows:

| TERMINOLOGY            | LIKELIHOOD OF THE OCCURRENCE / OUTCOME |
|------------------------|----------------------------------------|
| Virtually certain      | >99% probability of occurrence         |
| Very likely            | >90% probability                       |
| Likely                 | >66% probability                       |
| More likely than not   | >50% probability                       |
| About as likely as not | 33 to 66% probability                  |
| Unlikely               | <33% probability                       |
| Very unlikely          | <10% probability                       |
| Exceptionally unlikely | <1% probability                        |

Source: IPCC 4th Assessment Report, Annex II Glossary.

**Mainstreaming:** The process by which climate risks to city plans, programs, activities and policies are considered and adjusted to address these risks. Mainstreaming assumes that other projects can be enhanced – e.g., poverty reduction, urban sustainability, etc. -- and their benefits increased by integrating climate planning with them. Mainstreaming helps ensure that a city's plans and policies are not at odds with climate risks now and in the future.

**Mitigation:** Technological change and substitution that reduce resource inputs and emissions per unit of output. Although several social, economic and technological policies would produce an emission reduction, with respect to Climate Change, mitigation means implementing policies to reduce greenhouse gas emissions and enhance sinks

**Participatory planning:** A ground-up, community-based planning approach that works to involve all sectors of a community with a stake in climate planning, including local governments, the private sector, voluntary agencies and civil society.

**Resilience:** The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change.

**Sea level change/sea level rise:** Sea level can change, both globally and locally, due to (i) changes in the shape of the ocean basins, (ii) changes in the total mass of water and (iii) changes in water density. Factors leading to sea level rise under global warming include both increases in the total mass of water from the melting of land-based snow and ice, and changes in water density from an increase in ocean water temperatures and salinity changes. Relative sea level rise occurs where there is a local increase in the level of the ocean relative to the land, which might be due to ocean rise and/or land level subsidence.

**Sensitivity:** Sensitivity is the degree to which a system is affected, either adversely or beneficially, by climate variability or climate change. The effect may be direct (e.g., a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea level rise).

**Storm surge:** The temporary increase, at a particular locality, in the height of the sea due to extreme meteorological conditions (low atmospheric pressure and/or strong winds). The storm surge is defined as being the excess above the level expected from the tidal variation alone at that time and place.

**Strategic planning:** A systematic decision-making process that provides a process to determine priorities, make wise choices and allocate scarce resources (i.e., time, money, skills) to achieve agreed-upon objectives.

**Vulnerability:** Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.

## APPENDIX 4: GLOBAL CLIMATE INITIATIVES AND PROGRAMS

Numerous international agencies and stakeholders recognize the critical role cities will play in climate action. This attention has resulted in the development of numerous initiatives that are looking to support and link cities in their climate planning. The table summarizes some of the larger initiatives.

**Name:**

Urban and Local Government Strategy

**Organizing Agency / Institution:**

World Bank

**Website / Contact:**

<http://www.wburbanstrategy.org/urbanstrategy/>

**Notes:**

The Urban Strategy was updated in 2009 to directly address climate change in urban areas, and seeks to help local governments to develop cities that are economically, socially, and environmentally sustainable.

The World Bank will support local government through a combination of knowledge programs and dissemination, financing strategies, partnerships and collaboration, and through measurement and monitoring programs.

**Name:**

Competitive Cities and Climate Change

**Organizing Agency / Institution:**

Organization for Economic Co-operation and Development (OECD)

**Website / Contact:**

<http://www.oecd.org/gov/cities/climatechange>

**Notes:**

"Competitive Cities and Climate Change" is one of the focus areas of the OECD (an EU-based inter-governmental organization with 33 national members).

An international conference was held in 2008, addressing governance, land use, and planning. OECD research in this area continues to address the financing options available to cities, along with analysis of local policy addressing climate change, the effect of spatial planning on CO2 emissions, and best practices / key opportunities for action in urban areas.

**Name:**

Copenhagen City Climate Catalogue

**Organizing Agency / Institution:**

Partnership between the City of Copenhagen and ICLEI (Local Governments for Sustainability)

**Website / Contact:**

<http://www.climate-catalogue.org/>

**Notes:**

Part of the Local Government Climate Roadmap (launched in 2007), the City Climate Catalogue is intended to centralize information on community climate action, including individual targets and achievements. The site includes community summaries, and information on steps taken to reduce GHGs.

---

**Name:**

Climate Neutral Network

**Organizing Agency / Institution:**

United Nations Environmental Program (UNEP)

**Website / Contact:**

<http://www.unep.org/climateneutral/>

**Notes:**

The Climate Neutral Network is a UNEP pilot program, aimed at information sharing on CO<sub>2</sub> reduction, and the move toward carbon neutrality.

Participants include all levels of government, along with private sector organizations and companies, and the network is self-policing (information is not verified by UNEP).

---

**Name:**

Climate Protection Program (CaPP)

**Organizing Agency / Institution:**

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)

**Website / Contact:**

<http://www.gtz.de/en/themen/3958.htm>

**Notes:**

Administered by GTZ, the Climate Protection Program seeks to assist developing countries to meet their commitments under the Framework Convention on Climate Change.

The program's aim is to mainstream climate protection within the activities of the German Development Corporation, including mitigation and adaptation measures. Activities include national and regional climate studies, training and capacity building, policy research on long-term climate protection, and research into climate protection in developing countries.

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**Name:**

Cities in Climate Change Initiative (CCCI)

**Organizing Agency / Institution:**

United Nations Human Settlements Program (UN-HABITAT)

**Website / Contact:**

<http://www.unhabitat.org/content.asp?typeid=19&catid=570&cid=6003>

**Notes:**

Part of UN-HABITAT's Sustainable Urban Development Network (SUD-Net), the CCCI was established support cities in developing and least developed countries, as they develop climate change mitigation and adaptation policies and strategies.

CCCI and UN-HABITAT work with a range of stakeholders, including all levels of government, local communities, research institutions, capacity building agencies, and the private sector. Current activities include establishing networks between stakeholders, localization and implementation of national adaptation and mitigation strategies, and capacity building.

.....

In addition to these programs, there are a number of emerging funding programs for climate action that can be harnessed by local governments for their planning and implementation activities. First developed under the Kyoto Protocol and refined through additional international climate summits, some of these funds are relatively complex and may not yet be easily accessed by local level, city governments. More information is available in Appendix 2: Other Resources.

**Name:**

Clean Development Mechanism (CDM)

**Organizing Agency / Institution:**

Kyoto Protocol

**Website / Contact:**

<http://cdm.unfccc.int/index.html>

**Notes:**

The CDM was developed to allow a country with an emission-reduction or emission-limitation commitment (under the Kyoto Protocol) to establish an emission-reduction project in a developing country.

The mechanism is intended to encourage sustainable development and to reduce emissions, providing industrialized countries with some flexibility as they work to meet their emission reduction or limitation goals.

An Executive Board, answerable to countries that have ratified the Kyoto Protocol, oversees the CDM. Approved projects must provide additional reductions when compared to a "business-as-usual" scenario, and project funding must not result in funds being diverted from official development assistance.

Updated information on program policy and guidelines is provided through the CDM website, listed above.

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**Name:**

Adaptation Fund

**Organizing Agency / Institution:**

Kyoto Protocol

**Website / Contact:**

[http://unfccc.int/cooperation\\_and\\_support/financial\\_mechanism/adaptation\\_fund/items/3659.php](http://unfccc.int/cooperation_and_support/financial_mechanism/adaptation_fund/items/3659.php)

**Notes:**

The Adaptation Fund was established under the Kyoto Protocol, to finance climate change adaptation projects and programs in developing countries that are particularly vulnerable to the impacts of climate change.

The fund is financed in part through a 2% share of the proceeds generated by Clean Development Fund project activities, and is supervised and managed by the Adaptation Fund Board (AFB). The World Bank currently serves as the trustee of the Fund, and the Global Environmental Fund provides secretariat services.

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**Name:**

Global Environment Facility (GEF)

**Organizing Agency / Institution:**

The GEF partnership currently includes 182 member governments, along with private sector and agency partners, including UNDP, UNEP, and the World Bank. For a full list of partners, see the GEF website, listed below.

**Website / Contact:**

<http://www.thegef.org/gef/>

**Notes:**

Established in 1991, the GEF currently operates as an independent financial organization, and is currently the largest funder of projects intended to improve the global environment. The GEF provides grants to developing countries, and countries with economies in transition, in addition to non-governmental and community-based organizations.

A range of projects may be eligible for GEF funding, including programs and projects related to climate change. For current funding policies, deadlines, and eligibility, see the GEF website, listed above.

## APPENDIX 5: REFERENCES AND NOTED RESOURCES

This section includes noted resources and references from the guide.

### Step 3: Vulnerability Assessment

**Table 7: Example Approaches to Climate Change Adaptation Planning References**

Contact information:

|                       |                                                                                                                                                                                                                                                                                                                             |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Washington</b>     | <a href="http://cses.washington.edu/cig/res/ia/waccia.shtml">http://cses.washington.edu/cig/res/ia/waccia.shtml</a>                                                                                                                                                                                                         |
| <b>Iqaluit</b>        | <a href="http://www.city.iqaluit.nu.ca/apps/UPLOADS/files/1180121069-31802.pdf">http://www.city.iqaluit.nu.ca/apps/UPLOADS/files/1180121069-31802.pdf</a>                                                                                                                                                                   |
| <b>Vietnam</b>        | <a href="http://hdr.undp.org/en/reports/global/hdr2007-2008/papers/chaudhry_peter%20and%20ruysschaert_greet.pdf">http://hdr.undp.org/en/reports/global/hdr2007-2008/papers/chaudhry_peter%20and%20ruysschaert_greet.pdf</a>                                                                                                 |
| <b>China</b>          | <a href="http://drh.edm.bosai.go.jp/Project/Phase2/2Events/14_CASi2/7_Liu_Jin.pdf">http://drh.edm.bosai.go.jp/Project/Phase2/2Events/14_CASi2/7_Liu_Jin.pdf</a>                                                                                                                                                             |
| <b>London</b>         | <a href="http://www.london.gov.uk/lccp/publications/docs/adapting-climate-change-london.pdf">http://www.london.gov.uk/lccp/publications/docs/adapting-climate-change-london.pdf</a>                                                                                                                                         |
| <b>New York State</b> | <a href="http://www.nyserda.org/programs/Environment/EMEP/conference_2009/presentations/Solecki_DeGaetano_Horton_Climate%20Change%20in%20New%20York%20State.pdf">http://www.nyserda.org/programs/Environment/EMEP/conference_2009/presentations/Solecki_DeGaetano_Horton_Climate%20Change%20in%20New%20York%20State.pdf</a> |

### Climate Scenario Data and Modelling Sources

#### IPCC Data Distribution Centre

<http://www.ipcc-data.org/>

The DDC provides climate, socio-economic and environmental data, both from the past and also in scenarios projected into the future. Technical guidelines on the selection and use of different types of data and scenarios in research and assessment are also provided. The DDC is designed primarily for climate change researchers, but materials contained on the site may also be of interest to educators, governmental and non-governmental organizations, and the general public.

#### Regional Climate Projections

URL: <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter11.pdf>

A comprehensive overview source of regional and sub-regional climate projections for many parts of the world, including Africa, Asia, Central and South America, and Small Islands.

#### Canadian Climate Change Scenarios Network

URL: <http://www.cccsn.ca>

A user-friendly website resource where users can download historical weather data, construct climate scenarios, access tools for statistical downscaling, and develop visualization maps.

#### ENSEMBLES downscaling portal

<http://grupos.unican.es/ai/meteo/ensembles/index.html>

This tool helps users downscale projection results from Global Circulation Models to regional scale resolution. Some technical competency is required. One of the ENSEMBLES project's aims is maximizing the exploitation of the results by linking the outputs of the ensemble prediction system to a range of applications, including

agriculture, health, food security, energy, water resources, insurance and weather risk management, which use high resolution climate inputs to feed their models. To cover the gap between the global coarse simulations and the regional high-resolution needs, downscaling techniques are required, both dynamical and statistical.

### **Guidebook for Planners on Mapping Climate Change Vulnerability and Impacts Scenarios at Sub-National Level**

United Nations Development Programme (UNDP)

<http://europeandcis.undp.org/lowcarbon/show/6ED21719-F203-1EE9-BEDC74A1971EB279>

Deigned for those working at the sub-national levels, this guidebook has been created by UNDP to help planners to identify and map the nature of current and future vulnerability to climate change. The guidebook is aimed at planners with little or no prior knowledge of climate change. Currently, the guidebook is still in draft form, with an up-to-date version provided at the website above.

## **Step 6: Option Evaluation**

In addition to the structured decision making approach featured in this guide, and its use of a Consequence Table, there are other option evaluation techniques that can be used. The following definitions are summary only and not comprehensive.

**Cost-Benefit Analysis:** A relatively simple and widely used technique for deciding whether to make a change. As its name suggests, you simply add up the value of the benefits of a course of action, and subtract the costs associated with it. Costs are either one-off, or may be ongoing. Benefits are most often received over time. The framework for cost-benefit analysis is based on the monetary valuation of the impact of the proposed climate change adaptation or mitigation initiative. All benefits and costs must be translated into a common measure (usually dollars, Euros, etc.) at a common point in time (through net present value calculations). Formal cost-benefit is most useful for simple investment decisions, but could be used to evaluate and consider some climate change actions. However, cost-benefit analysis can be fraught with difficulties. First, benefits are often “avoided climate impacts.” Dissimilar benefits and costs must also be converted to a common denominator. For example, if safety is a benefit (i.e., a reduction in the loss of life from a climate change associated event or disaster), what is the value of human life? The nature of benefits and costs can also be “hidden in the numbers.” This hides the pros and cons of an initiative from stakeholders and therefore benefit-cost analysis is a poor tool for gaining support among different groups. For these reasons, and others, formal benefit-cost analysis has fallen out of favour for many applications.

**Socio-Economic Analysis:** A similar approach to cost-benefit analysis, where benefits and costs are still enumerated, but they are also illustrated. Where benefits and costs are quantified in similar measures, they can be compared directly. Where benefits and costs are in dissimilar measures, it will ultimately up to the stakeholders to determine if the trade-offs are worthwhile. It is a useful tool in a more participatory climate change planning process involving a stakeholder group, as benefits and costs are left in their natural measures (and more easily understood than the economic assumptions made in a traditional cost-benefit analysis). Stakeholders often appreciate being told the ‘story behind the analysis.

