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CLIMATE-RESILIENT DEVELOPMENT

A FRAMEWORK FOR UNDERSTANDING AND ADDRESSING CLIMATE CHANGE

MARCH 2014

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CLIMATE-RESILIENT DEVELOPMENT: A FRAMEWORK FOR UNDERSTANDING AND ADDRESSING CLIMATE CHANGE

Prepared for:
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Global Climate Change Office, Climate Change Resilient Development Project
Washington, DC

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ACRONYMS

CDCS	Country Development Cooperation Strategy
CIA	Central Intelligence Agency
DFID	United Kingdom Department for International Development
FEWS NET	Famine Early Warning Systems Network
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
NAP	National Adaptation Plan
NAPA	National Adaptation Programme of Action
OECD	Organisation for Economic Co-operation and Development
PRSP	Poverty Reduction Strategy Paper
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development

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PREFACE

The USAID Global Climate Change Office is pleased to release this framework for understanding and addressing the risks of climate change for development. This framework updates the approach presented in 2007 in USAID's *Adapting to Climate Variability and Change: A Guidance Manual for Development Planning*.

This framework promotes a "development-first" approach, helping to achieve development goals despite climate change. It walks readers through a process of understanding development goals in a given country or community, the inputs and conditions necessary to achieve those goals, and the stresses – climate and non-climate – that can impede progress toward those goals, in order to then identify priority adaptation measures.

Changes to the climate system are already affecting the conditions under which developing country economies must operate; in many places those conditions will continue to change. Our goal is to offer a simplified approach to helping decision-makers at all levels understand the risks and opportunities that climate change may pose, and address them in ways that enable development to continue despite a changing climate.

In developing the framework, we worked under the following assumptions:

- Climate variability already impacts economic sectors in developing countries and addressing climate variability and change is important for the long-term success of development assistance
- Stakeholder involvement is critical – local knowledge and memory of climate changes over time can help identify adaptation options; building stakeholder ownership of project design and implementation is key to project success
- Stakeholders will know more about their development priorities than we will (or than a tool can anticipate); decision-makers are already dealing with uncertainty such as weather and markets
- The methods employed should be simple enough to meet needs in the field, but provide rigorous enough information on which to base decisions
- We should provide a suite of resources at different levels of detail so that different audiences can find the resource that is right for their needs

We hope you will find this framework to be useful. We view it as a "living document" that we will update from time to time. We also welcome case studies that can be added to the updated versions. We encourage you to send comments on the framework to climatechange@usaid.gov.

Most importantly, we hope this framework will help developing countries better understand and adapt to the challenges of a changing climate.

EXECUTIVE SUMMARY

Climate change is one of many challenges developing countries must recognize and respond to in planning for the future. By increasing risks to human health, welfare, and ecosystems, climate impacts can threaten primary development goals such as reducing poverty, increasing access to education, improving child health, combating disease, or managing natural resources sustainably.

This framework facilitates the systematic inclusion of climate considerations in development decision-making. The framework's objective is to support the development process by assisting development practitioners in identifying, evaluating, selecting, implementing, and adjusting actions to reduce climate vulnerabilities and improve development outcomes. The climate-resilient development framework described here is designed to promote actions that ensure progress toward development goals by including climate stressors, both climate variability and climate change.

The framework focuses on how climate can be incorporated into existing planning and decision-making processes – also known as mainstreaming – and focuses on achieving development goals – which we call a "development-first" approach. This framework supplements and builds upon the United States Agency for International Development project cycle management framework with additional tools designed to simplify the challenge of understanding how climate impacts can affect development strategies, programs, and projects.

The climate-resilient development framework provides a five-stage, systematic process for understanding and prioritizing current and projected climate-related vulnerabilities. The first three stages of this framework differ more from conventional development practice than the last two stages, and so the framework spends more time discussing the first three stages. The five stages are:

- **Scope**, the first stage in the framework, establishes the development context and assesses vulnerability at an appropriate level of detail to support initial cursory analysis. It includes understanding development goals, identifying the key inputs and enabling conditions for meeting those goals, and identifying climate and non-climate stressors that may put key inputs at risk and undermine the enabling environment, compromising the development goals. It is also important to determine what decisions are being made in the development context, their timeframe, and whether they can be influenced by this process. This provides context for all subsequent stages of the framework.

- **Assess**, the second stage in the framework, conducts more detailed assessment of the vulnerability of key inputs and the broader system identified in the scoping stage to climate and non-climate stressors. This stage also evaluates the capacities of stakeholders and implementing partners to deal with potential impacts or take advantage of opportunities. Assessment provides information and needs to be carried out at the level of detail necessary to support strategy, program, or project design. It should integrate climate information that appropriately aligns with the scope for action.

- **Design**, the third stage in the framework, focuses on identifying, evaluating, and selecting actions to reduce the impact of climate and non-climate stressors. Climate stressors are explicitly considered in order to design actions that reduce vulnerability and support climate-resilient development. This can include actions that minimize potential damage (e.g., increase flood protection), take advantage of opportunities (e.g., capture and store rainfall where average precipitation may increase), or cope with unavoidable impacts

(e.g., by speeding recovery or spreading risk through insurance programs). The design stage should include strategic consideration of the potential for impact.

- **Implement and Manage**, the fourth stage in the framework, puts the actions selected in the design stage into practice. Because addressing climate stressors does not fundamentally alter the nature or challenges of implementation, development practitioners should build upon established practices. However, in addition to monitoring the performance of actions, it will also be necessary to monitor climate change and variability.

- **Evaluate and Adjust**, the fifth stage in the framework, involves analyzing implementation progress and adjusting the strategy, program, or project as needed or providing additional support to improve performance. Evaluation is especially important to assess and respond to changing climate conditions and to incorporate changes in climate knowledge. Additional efforts may be warranted to ensure that climate stressors are taken into account during this stage in order to adjust development initiatives appropriately.

Climate-resilient development is about adding considerations of climate variability and climate change to development decision-making in order to ensure that progress toward development goals now includes consideration of climate impacts.

1. INTRODUCTION

1.1 WHY DOES CLIMATE CHANGE MATTER IN COUNTRIES WITH CRITICAL DEVELOPMENT CHALLENGES?

Developing countries already confront many challenges to improving their economies and the lives of their citizens. In a country where children suffer from malnutrition and disease or where there is inadequate clean drinking water or a lack of sanitation facilities, why pay attention to climate change?[1] The answer to this question is threefold: (1) climate change can pose risks to meeting many development goals, such as the provision of sufficient, clean water; (2) considering climate change can enhance the sustainability of benefits provided by development strategies, programs, and projects as well as bring alternative development approaches to light; and (3) considering climate change presents an opportunity to address development challenges, including risks from current climate variability, with a fresh perspective.

Climate change will impact human health, agriculture, urban development, and many other sectors. Increases in temperature and changes in precipitation patterns are expected to directly and significantly affect crop yields for rain-fed agriculture, with subsequent impacts on food security and livelihoods. Increases in temperature and changes in the frequency and intensity of rainfall are expected to shift the geographic range and incidence of vector-borne diseases such as malaria and dengue fever. Anticipated increases in flooding can limit economic growth by destroying infrastructure and property in vulnerable areas. Sea level rise can harm vital coastal ecosystems, increase damages from storm surges, and make coastal freshwater aquifers more saline. These changes in climate can exacerbate existing non-climate stressors such as deforestation, migration and population growth, and increasing demands for water.

Such climate change impacts can put development goals, such as increasing the rate of economic growth, reducing poverty, improving access to education, bettering child health, combating disease, and sustaining the environment, at risk. These development goals should guide climate change adaptation decisions. To make

1. For definitions of "climate change" and other key terms used in this framework, refer to Appendix A.

the best use of limited resources to support development over the long-term, climate stressors need to be identified and assessed when selecting actions to include in a development strategy. This framework facilitates the systematic inclusion of climate considerations in development planning and implementation.

Readers may notice that there is a significant overlap between addressing vulnerability to climate variability (i.e., current climate) and vulnerability to climate change (i.e., future climate). Many development initiatives are vulnerable to *current climate* stressors, such as droughts, floods, and cyclones. Climate change may already be increasing those vulnerabilities and may further increase them in the future. The phrase "climate impacts" is used throughout this document to refer both to the impacts of current climate variability as well as *projected* climate change.

Readers may also note that many of the adaptation options envisioned in the discussions that follow are "no-regrets" options (i.e., they make sense based on current climate alone and are further justified when climate change is considered). Such options may be sufficient to adapt to climate change in coming years and decades. However, over the longer-term, very significant changes in climate are expected. These changes may require much more substantial adaptations than no-regrets approaches alone. In planning for climate change, it is very important to keep this in mind and allow for significant adaptations to be planned for and implemented, especially over longer timeframes.

1.2 WHAT IS DIFFERENT ABOUT CLIMATE-RESILIENT DEVELOPMENT?

Climate-resilient development means ensuring that people, communities, businesses, and other organizations are able to cope with current climate variability as well as adapt to future climate change, preserving development gains, and minimizing damages. Climate-resilient development is about adding consideration of climate impacts and opportunities to development decision-making in order to improve development outcomes, rather than implementing development activities in a completely new way. Climate risks cannot be eliminated, but negative impacts on people and economies can be reduced or managed. Climate-resilient development helps minimize the costs and consequences of climate impacts so they do not hinder progress toward development goals.

In general, climate-resilient development differs from traditional development in the following ways:

- **Looks forward and plans for the future**. Climate change impacts are being felt today, and will continue for centuries to come. Climate change is causing shifts in weather beyond historical experience in many places and the past may no longer be a good predictor for the future. Development practitioners should identify the climate challenges ahead and relate them to current challenges of climate variability.

- **Identifies climate stressors and utilizes appropriate climate information**. Climate stressors should be taken explicitly into account in development planning. Relevant information that aligns with the nature and timescale of your operating environment should be used, ranging from observed trends to modeled projections. For short-term activities, like agricultural extension, information on the next growing season is most relevant. For long-lived infrastructure investments, 50- to 100-year estimations – covering the life of the investment – will be more useful.

- **Reduces vulnerability to climate stressors**. Climate-resilient development must effectively reduce harm caused by climate change. That requires an understanding of what makes someone or something vulnerable, and taking actions to reduce those vulnerabilities. Actions that may decrease vulnerabilities include helping people become better equipped to prepare for or adjust to stressors, shifting locations or

fortifying high-value areas to reduce exposure to stressors, or changing what people depend upon so they are less sensitive to those stressors.

- **Promotes flexibility and robustness**. Despite great advances in science, climate change impacts are uncertain and will remain so. The continuous changes and occasional surprises of political and economic systems are familiar to development practitioners; the climate system similarly defies precise forecasts. Embedding flexibility or robustness into development activities involves employing multiple approaches to managing risk, favoring choices that still generate benefits if climate changes to a greater or lesser extent, and managing risk in an adaptive manner.
- **Continues over time as the needs of countries and communities evolve and climate stressors change**. Adaptation is necessarily a continuous process rather than a one-time action because the climate will continue to change, new information about climate stressors will become available and should be integrated into responses, new response options will emerge, and we will learn what works well and what can be improved.

There are numerous guidance documents covering climate change adaptation, and several organizations have used the idea of a "climate lens" to communicate that development goals and programs need to be viewed differently in light of climate change. In a 2009 document that summarized the literature and experiences of donors and international nongovernmental organizations, the Organisation for Economic Co-operation and Development (OECD) describes a **climate lens** as a tool to examine a strategy, policy, plan, program, or regulation by considering:

1. The extent to which a measure under consideration could be vulnerable to risks arising from climate variability and change
2. The extent to which climate change risks have been taken into consideration in the course of the formulation of this measure
3. The extent to which it could increase vulnerability, leading to maladaptation or, conversely, miss important opportunities arising from climate change
4. For pre-existing strategies, policies, plans, and programs that are being revised, determine amendments that might be warranted in order to address climate risks and opportunities[2]

Different institutions have employed a range of approaches to assess these considerations and to integrate climate resilience into their work based on the results. Many approaches begin with climate data, using future projections as the starting point for evaluating risks and opportunities. Climate information is an essential input to climate-resilient development, but a data-first approach has proven to have some drawbacks: (1) climate affects many sectors, so such an approach can be overly broad and not provide a strategic focus toward priority areas of existing social, economic, and environmental needs; (2) it can create a mismatch between the timeframe of climate projections (often 2050s, 2080s, or 2100s) and policy, planning, and management timeframes (often shorter); (3) it can give uncertainty too prominent a role when climate models disagree (e.g., on the direction of change in precipitation); and (4) the information generated may not be policy-relevant or actionable because it was not developed to inform a specific decision.

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2. OECD. 2009. *Integrating Climate Change Adaptation into Development Co-operation.* OECD. Paris, France. p. 79.

These limitations will be familiar to many groups working on adaptation. For instance, according to the Independent Evaluation Group's 2013 *Adapting to Climate Change: Assessing the World Bank Group Experience, Phase III*:

> "Downscaled climate models have so far proven to be of limited operational use for planning at the Bank Group. …Analytic projects at both IFC [International Finance Corporation] and the World Bank have done [climate modeling], often innovatively. For the most part, these exercises have yielded such a wide span of projections that their authors have defaulted to "no-regret" recommendations that are robust to climate outcomes."[3]

This is consistent with the United States Agency for International Development's (USAID's) own experience, which has shown that a more successful approach begins with understanding development priorities, current stressors, and vulnerabilities, and then bringing climate impacts into focus over relevant timescales to understand current and future risks and identify priorities for action – a "development-first" approach. This approach requires climate information, but only the information that is going to increase understanding of priority sectors or regions and lead to more informed planning and decision-making, which the framework described below facilitates.

The process of working with stakeholders to identify which sectors to focus on helps identify additional information needs. Long-term climate information is relevant to certain but not all activities – decisions around agriculture occur on shorter timescales than those around infrastructure. Stakeholders adopt this approach because they understand how current climate stressors affect their development objectives. They can begin to identify vulnerabilities and adaptation needs without needing a comprehensive understanding of climate models. Climate modeling also comes at a financial cost, so wisely utilizing resources for assessment can leave more money for taking action.

This framework reflects these lessons learned and presents a practical, participatory, and cost-effective approach to climate-resilient development.

1.3 HOW DOES THIS FRAMEWORK RELATE TO OTHER USAID CLIMATE CHANGE GUIDANCE?

In 2007, USAID's Global Climate Change Team issued *Adapting to Climate Variability and Change: A Guidance Manual for Development Planning* to help development practitioners determine whether a new or existing project is vulnerable to climate stressors and, if so, how to identify, assess, and select actions to reduce vulnerability. The USAID vulnerability and adaptation approach described in the 2007 document focused at the project level. This approach reflected several realities within USAID at the time: first, USAID felt there was an opportunity to fill a gap with guidance at the project level; and second, there was very little dedicated funding for adaptation, so adaptation work would have to be incorporated into other development projects. At that time, most donors, including USAID, were just beginning to grapple with how to address climate change, and there was a sense that many of the projects being developed in other sectors were vulnerable to climate stressors.

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3. Independent Evaluation Group. 2013. *Adapting to Climate Change: Assessing the World Bank Group Experience. Phase III.* Independent Evaluation Group. Washington, DC. p. 104.

In 2010, USAID began programming substantial resources specifically dedicated to climate change adaptation. Based on lessons learned in applying the original guidance, and this new reality of having sufficient funds for dedicated adaptation programs, USAID recognized a need to revise its adaptation guidance to inform the design of new projects and programs. This gives staff the latitude to integrate adaptation into a broader range of development strategies, programs, and specific projects. We have developed this approach through applications in St. Lucia, Barbados, the Philippines, Jamaica, Tanzania, West Africa, Nepal, and Peru.

The framework proposed in this document recommends beginning with the development outcomes a country, community, or USAID Mission hopes to achieve and assessing how climate change may affect the achievement of those goals. We call this a **"development-first"** approach to climate change adaptation. Rather than treat adaptation as a unique aspect of development, creating an entirely new or parallel set of processes, this framework incorporates consideration of climate stressors into existing processes – a process typically known as mainstreaming. To mainstream climate considerations into development planning, certain steps are integrated into the existing project cycle or planning process (see Exhibit 1).

EXHIBIT 1. USAID'S CLIMATE-RESILIENT DEVELOPMENT FRAMEWORK.

Not all development processes follow the generic project cycle exactly, so this framework has been structured to enable development practitioners to pick and choose useful elements from the framework, depending on their relevance to the practitioners' role in the development process.

In addition to this framework for climate-resilient development, USAID is producing several companion documents that provide guidance on specific issues and sectors. The vulnerability assessment annex focuses in greater detail on how to analyze climate impacts in the assess stage. The evaluating adaptation options annex elaborates on the design stage of the framework. The water annex and coastal annex are sector-specific applications of the general framework proposed here. The governance annex and the marginal populations annex were developed because these two issues are considered critical for climate-resilient development. The climate change and conflict annex considers the relationship between climate and non-climate stressors that can lead to or exacerbate conflict and security challenges. These documents are further summarized in Exhibit 2.

EXHIBIT 2. COMPANION DOCUMENTS TO THE USAID CLIMATE-RESILIENT DEVELOPMENT FRAMEWORK.

Title	Description
Climate Change Vulnerability Assessment: An Annex to the USAID Climate-Resilient Development Framework	Describes a process and good practices for conducting a climate change vulnerability assessment.
Evaluating Adaptation Options: An Annex to the USAID Climate-Resilient Development Framework	Describes an approach for evaluating adaptation action alternatives to ascertain whether an adaptation option or suite of options is likely to be a sound choice for a particular circumstance and makes sense for sustaining and supporting climate-resilient development.
Climate Change and Water: An Annex to the USAID Climate-Resilient Development Framework	Summarizes the potential impacts of key non-climate and climate stressors on water resources, provides a set of principles to inform adaptation in the water sector, and describes adaptation actions that can be used to improve water-sector resilience to climate impacts.
Climate Change and Coastal Zones: An Annex to the USAID Climate-Resilient Development Framework	Summarizes the potential impacts of key non-climate and climate stressors on coastal zones, provides a set of principles to inform coastal adaptation, and describes adaptation actions that can be used to improve coastal resilience to climate impacts.
Governing for Resilience: An Annex to the USAID Climate-Resilient Development Framework	Explains where and how governance considerations fit into the climate-resilient development framework, and lays out a process for identifying governance barriers and opportunities.
Working with Marginal Populations: An Annex to the USAID Climate-Resilient Development Framework	Discusses factors that contribute to differences in vulnerability, provides guidelines to inform consideration of these differences in the climate-resilient development framework, and highlights entry points for integrating these considerations.
Climate Change and Conflict: An Annex to the USAID Climate-Resilient Development Framework	Provides guidelines to inform planning, design, and implementation of development programs in which climate change and conflict may interact.

1.4 WHO SHOULD USE THIS FRAMEWORK?

This framework for climate-resilient development has been written for a broad audience of development practitioners, adaptation practitioners, city planners, resource managers, and other decision-makers in national, regional, and local government agencies. A primary audience is USAID staff, both those dealing with dedicated adaptation funding as well as those programming sector investments that are likely to be affected by climate change (e.g., food security, health, water, disaster risk reduction, governance, biodiversity). A second primary audience is USAID's implementing partners, including in-country development practitioners and project proponents. This framework complements USAID's 2012–2016 Climate Change and Development Strategy, which identifies adaptation as one of USAID's three strategic objectives on climate change.[4]

The framework presented here is flexible enough to be used over a wide range of geographic scales, jurisdictional levels, and development sectors. It is intended to provide input to or complement the analyses normally undertaken in the course of development strategy, program, and project design. For development practitioners not primarily focused on adaptation, the framework can be used to identify and address climate stressors that may affect broader development goals. For those involved explicitly with adaptation activities, the framework ensures that initiatives support priority development goals and consider important linkages between climate and non-climate stressors.

4. USAID has prepared internal guidance that accompanies this strategy to help USAID Mission and Bureau staff account for climate concerns in USAID development programming.

2. THE FRAMEWORK

The climate-resilient development framework describes the elements that combine to produce desired development outcomes, the interactions between these elements, and the process that is followed to plan, implement, monitor, and evaluate strategies, plans, programs, or projects. The key difference with a traditional development planning framework is the explicit consideration of climate stressors that can affect the attainment of development objectives. Climate stressors add an additional degree of complexity to development planning through their interactions with other elements of a system.

The climate-resilient development framework takes a "development-first" approach and is consistent with the traditional project cycle. The framework lays out a stepwise process to scope, assess, design, implement/manage, and evaluate/adjust actions required to achieve development goals. These five stages are summarized below. Subsequent sections provide additional details on the types of tasks that development planners will undertake to deal with climate considerations, and briefly describe some of the important interactions between climate stressors and other elements at each stage of the process.

- **Scope –** This stage establishes the development context and assesses vulnerability at an appropriate level of detail to support initial planning. It includes understanding development goals, identifying the key inputs and enabling conditions for meeting those goals, and identifying climate and non-climate stressors that may put key inputs at risk and undermine the enabling environment, compromising the overall development goals. It is also important to determine what decisions are being made, their timeframe, and whether they can be influenced by this process. This provides the context for all subsequent stages of the framework.

- **Assess –** This stage involves carrying out more detailed assessment of the vulnerability of key inputs and/or the system identified in the scoping stage to climate and non-climate stressors, as well as the capacities of stakeholders and implementing partners to deal with potential impacts or take advantage of opportunities. The assessment should provide actionable information, so it needs to be carried out at the level of detail necessary to support strategy, program, or project design, and it should integrate climate information that appropriately aligns with the scope for action.

- **Design –** This stage focuses on identifying, evaluating, and selecting actions to reduce the impact of climate and non-climate stressors. Climate stressors are explicitly considered in order to design actions that reduce vulnerability and support climate-resilient development. This can include actions that minimize potential damage (e.g., increase flood protection), take advantage of opportunities (e.g., capture and store rainfall where average precipitation amounts may increase), or cope with unavoidable impacts (e.g., by

speeding recovery or spreading risk through insurance programs). The design stage should include strategic consideration of the potential for impacts.

- **Implement and Manage –** This stage puts the actions selected in the design stage into practice. Because addressing climate stressors does not fundamentally alter the nature or challenges of implementation, development practitioners should build upon established practices. Climate change and variability introduce a new dimension into the monitoring of implementation progress.

- **Evaluate and Adjust –** This stage involves analyzing implementation progress and adjusting the strategy, program, or project as needed or providing additional support to improve performance. While this stage is also similar to conventional development practice, evaluation is especially important to assess and respond to changing climate conditions and to incorporate changes in climate knowledge. Additional efforts may be warranted to ensure that climate stressors are specifically taken into account during this stage in order to adjust development initiatives appropriately.

The first three stages of this process are described here in considerable detail, as they are largely what distinguish climate-resilient development from conventional development. Each of these stages is accompanied by boxes that provide an example from activities in Jamaica and the Philippines with which USAID has been involved.[5] Less time is spent on the final two stages because they are not fundamentally different from traditional development practice and are discussed at length elsewhere.

The following sections also focus primarily on climate considerations within the framework. We do not focus on non-climate considerations because development practitioners have extensive experience addressing the non-climate aspects of development. We focus on climate because climate stressors have rarely been consistently or systematically integrated into development decision-making.

2.1 SCOPE

Climate is likely to affect a broad swath of the economy and society in a given country. Trying to assess everything that could be affected would be an overwhelming and time-consuming task. We recommend that practitioners focus on issues that are important to development and likely to be affected by climate. The scoping stage is the typical starting point for strategy, program, or project planning because it is directed toward focusing your efforts and investments on high-priority issues. Aligning those efforts and investments with host country development priorities can also help to build host country buy-in and support. In the scoping stage we will:

- Frame the planning process by identifying the development goals important to the country, community, or sector you are working with; and identify inputs and enabling conditions necessary to achieve those development goals

- Consider the impacts of climate and non-climate stressors on those inputs, and consider the needs and opportunities for addressing the various stresses affecting inputs and undermining development

These scoping tasks are described in Sections 2.1.1–2.1.2. Each section provides a brief description of how a development practitioner should approach each scoping task.

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5. USAID. 2012. *Climate Change: Towards the Development of a Policy Framework for Jamaica.* USAID. Washington, DC. Available: http://www.usaid.gov/climate/jamaica-climate-workshop-report.

THE CLIMATE-RESILIENT DEVELOPMENT FRAMEWORK IN PRACTICE IN JAMAICA

In 2012, the Government of Jamaica asked USAID to assist with the development of a new national climate change policy. Jamaica's Ministry of Water, Land, Environment, and Climate Change, with help from USAID, convened a stakeholder workshop entitled *Climate Change: Toward the Development of a Policy Framework for Jamaica* in Kingston on July 26 and 27, 2012. Participants included representatives from multiple government ministries, the private sector, and civil society.

The objectives of the workshop were to (1) begin to develop a national climate change policy framework for Jamaica, (2) create inter-ministerial interest in and ownership of the policy, and (3) facilitate consideration of the cross-sectoral impacts of climate change.

2.1.1 FRAME THE PLANNING PROCESS

Our first task is to frame the planning process by identifying relevant development goal(s) such as sustainable livelihoods or improved human health, as well as the critical requirements needed to meet these goals. Some of these are inputs, such as water or labor, while others are best described in terms of enabling conditions, such as laws, regulations, and policies.

Development goals can be identified from existing national development frameworks as well as climate change strategies, policies, and plans. See Exhibit 3 for some potential sources of information. These sources provide an overview of a country's development priorities that adaptation efforts should support, as well as the economic, political, institutional, and social contexts that frame all climate-resilient development efforts. Analyzing these sources can serve as the sole means of identifying development priorities when resources are limited, but we generally recommend making stakeholder engagement an integral part of this process. It may also be important to consider whether there is a role for climate considerations to play in prioritizing among multiple development goals.[6]

6. For example, while food security may be a priority development goal, increasing local agricultural productivity may not be feasible in already marginal lands under projected climate change. In such a situation it might be important to consider alternative development goals, such as diversifying livelihoods by attracting industry or tourism to increase community wealth and enable greater importation of food.

EXHIBIT 3. SELECTED INFORMATION SOURCES OF USE IN THE SCOPE STAGE.

Type of information	Source and description
Development frameworks	
USAID partner country priorities	• USAID Country Development Cooperation Strategies (CDCSs). (http://www.usaid.gov/results-and-data/planning/country-strategies-cdcs)
National development needs and investment areas	• Poverty Reduction Strategy Papers (PRSPs): Priority development goals, key limitations and challenges, policies and strategies, costs of achieving goals. (http://www.imf.org/external/np/prsp/prsp.aspx)
National economic, political, social, and demographic data	• Central Intelligence Agency (CIA) World Fact Book: Recent data by country. (https://www.cia.gov/library/publications/the-world-factbook/)
National statistics on economy and climate stressors	• ND-GAIN Index. (http://index.gain.org/)
Climate change strategies, policies, and plans	
Climate data and projections, assessments of vulnerability, and adaptation needs, priorities, and options by country	• National Communications submitted to the United Nations Framework Convention on Climate Change (UNFCCC): Country context, broad priority development and climate goals, overviews of key sectors, historical climate conditions, projected climate changes and sectoral impacts, potential priority adaptation measures, and limitations, challenges, and needs. (http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php) • National Adaptation Programmes of Action (NAPAs) submitted to the UNFCCC: Country context, key development and climate goals, historical climate conditions, projected climate changes and sectoral impacts, priority adaptation needs and activities, and funding needs. May be out of date, and will be replaced by National Adaptation Plans (NAPs) in the future. (http://unfccc.int/cooperation_support/least_developed_countries_portal/submitted_napas/items/4585.php) • Famine Early Warning Systems Network (FEWS NET) Country Climate Trend Analysis Factsheets: Summaries of historical climate trends over the past few decades, climate projections, and potential implications for food security in various countries. (http://chg.geog.ucsb.edu/data/trends/index.html)
Existing and planned adaptation actions	• Adaptation Partnership: A review of existing and planned adaptation actions that includes a summary of regional needs and priorities as well as country profiles that cover country-specific adaptation needs and priorities and relevant policies and strategic documents. (http://www.adaptationpartnership.org/index.php?option=com_content&view=article&id=4&Itemid=6)
Adaptation strategies, policies, and plans	• Adaptation Learning Mechanism: A knowledge-sharing platform that hosts a wide range of country-specific adaptation related information, including strategies, policies, and plans. (http://www.adaptationlearning.net/)

DEVELOPMENT GOALS IN JAMAICA

Jamaica developed a national development plan called Vision 2030 Jamaica with input from multiple ministries and stakeholders. Vision 2030 Jamaica is the "roadmap" for making Jamaica "the place of choice to live, work, raise families and do business" and lays out more than a dozen development objectives. Workshop participants focused on a subset of those objectives that are economically important and likely to be sensitive to climate stressors. Working in small groups comprised of representatives from different government ministries and from outside government, participants focused on tourism, agriculture, energy, transportation, and water. They also identified dependencies among these sectors and their respective development goals.

Next is to identify the inputs and enabling conditions necessary to achieve the development goal that has been selected. Climate change will affect development through its impacts on specific inputs, not an entire sector. Identifying those inputs enables understanding of the causal relationships between a specific stressor and a key input, and then addressing that stressor through development initiatives. For example, the idea that "climate change affects agriculture" is not actionable. However, the idea that "a shortened rainy season will affect a particular variety of maize" indicates that the key issues are water availability and a specific crop variety. In response, you might try to address the need for water early in the growing season, or look for a shorter-season maize variety. Specific cause-and-effect relationships are easier to address than general associations. These specific relationships will be further explored in the next stage of the framework.

Inputs[7] may include physical inputs such as roads, natural inputs such as water, social inputs such as institutions, human inputs such as labor, and economic inputs such as financial resources. The purpose of identifying inputs is to determine what is needed to achieve development goals in order to later determine if and how those inputs could be affected by climate (and non-climate) stressors. For instance, tourists often visit small islands to enjoy beaches and snorkel or scuba dive along coral reefs. Increasing this kind of coastal tourism may be a development goal for a particular country. Inputs for successful tourism include clean water, reliable transportation, hotels and restaurants, and vibrant coral reefs and associated biodiversity. Some of these inputs – like fish, corals, transportation infrastructure, and water resources – could be affected by climate (and non-climate) stressors.

These inputs are shaped by broader political, economic, and social conditions, which we call enabling conditions.[8] Enabling conditions are elements of the sociopolitical environment that can affect whether development goals are achieved, such as regulatory regimes or market mechanisms. Enabling conditions can have a significant impact on a development initiative's ability to support development goals. For instance,

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7. The United Kingdom Department for International Development's (DFID) livelihoods framework identifies five types of capital: human, natural, financial, social, and physical. These categories align with the categories of inputs and enabling conditions described in this document and facilitate understanding of the resources and capacities required to achieve desired development outcomes. (DFID. 1999. *Sustainable Livelihoods Guidance Sheets.* DFID, London, UK. p. 5.)

8. Enabling conditions are sometimes referred to collectively as the enabling environment. These social, political, and economic conditions are often governance-related and can play an important role in determining how inputs are used and, thus, whether development goals can be achieved. Examples include legal and regulatory frameworks, enforcement mechanisms for those frameworks, political stability, and accountability among stakeholders and institutions (USAID. Forthcoming. *Governing for Resilience: An Annex to the USAID Climate-Resilient Development Framework.*).

safeguarding coastal infrastructure requires enforcement of coastal zoning regulations. Informed decisions about coastal development strategies, programs, or projects must include critical consideration of enabling conditions such as the regulatory environment, willingness to enforce regulations, and enforcement capacity, among other enabling conditions. Issues related to enabling conditions are addressed in greater detail in the governance annex and the vulnerability assessment annex.

INPUTS TO KEY ECONOMIC SECTORS IN JAMAICA

Working in small groups, stakeholders identified important inputs for each key economic sector mentioned in *Vision 2030 Jamaica*. They found that some "sectors" were actually inputs into other sectors. For instance, transportation was identified as a key input for health services, manufacturing, and tourism. This exercise helped to highlight shared inputs and underscore the relationships among sectors and between the responsible ministries. A "Wordle" was produced to show the frequency with which inputs were identified across the different groups. This is just one way to graphically show which inputs or resources are identified most frequently; choose a method that suits your audience.

ENABLING CONDITIONS IN JAMAICA

The participants also identified important conditions that enable inputs to be used effectively. The central theme of the workshop was to address the gaps in Jamaican policy to sufficiently address climate change. Other, more specific governance and financial issues were also identified; these include the need for proper legislation, effective zoning, and better enforcement of regulations. The Wordle (above) also includes the enabling conditions that were identified at the workshop. Determining needed enabling conditions helped to inform brainstorming of potential response options in later stages of the process. The importance of planning and awareness helped guide the dialogue toward ways to improve these areas for climate-resilient development.

2.1.2 IDENTIFY CLIMATE AND NON-CLIMATE STRESSORS

The second task is to identify climate and non-climate stressors that might affect the development strategy, program, or project under consideration. Stressors directly and indirectly affect the inputs identified in the previous subtask. Climate stressors could include changes in sea level, precipitation, temperature, or extreme events, while non-climate stressors could include corruption, pollution, deforestation, and other existing development challenges.

Climate stressors include climate variability (e.g., some years are marked by higher temperatures or longer dry periods than other years) as well as climate change (e.g., average temperatures are anticipated to increase over time). Thus, climate stressors can include differences in drought conditions that are experienced from year to year, as well as changes in longer-term trends of drought frequency or severity. Extensive information is available to identify climate stressors, including data and information on historical climate variability, recent trends, and climate projections and anticipated impacts. The documents and sources listed in Exhibit 3 (page 11) can be used to inform the identification of climate stressors and to understand the potential impacts of climate change. Other important sources of information include national weather services, agricultural extension services, international scientific associations, peer-reviewed publications, global climate modeling archives, local knowledge and observations,[9] and more. Additional sources of climate information are listed in the vulnerability assessment annex.

CLIMATE STRESSORS IN JAMAICA

Once participants had identified key inputs and enabling conditions, they began laying out the climate stressors currently or potentially affecting each input. Temperatures are already increasing, and tropical storms take a heavy toll. Looking ahead, participants noted that the labor force, an input for tourism, will be increasingly affected by tropical storms and heat waves. Workers may lose access to their workplaces if roads are damaged by storms. They may be injured or killed by storms, and their productivity and health may be impacted by rising temperatures. Participants also noted that the marine and beach environment will be increasingly affected by ocean acidification, tropical storms, and sea level rise.

Non-climate stressors are critical to consider because they directly affect the success of development strategies, programs, and projects – in some cases dwarfing the impact of climate stressors. Addressing only one set of stressors may be insufficient for achieving your overall objectives. Because most development practitioners have extensive experience in assessing the impacts of non-climate stressors, we do not provide comprehensive guidance here. However, climate and non-climate stressors may interact to create very serious challenges, potentially magnifying the negative impacts of either type of stressor alone. For example, a city might face increasingly intense rainfall, leading to more flooding, but it may also have storm sewers blocked with trash. The best way to address the flooding problem quickly may be to address the non-climate stressor: poorly maintained sewers. Yet increased rainfall intensity due to climate change may mean that even well-maintained storm sewers are too small to manage current or anticipated flooding events.

9. Although local knowledge and observations can provide valuable insights, they can be unreliable and should be cross-referenced with information from other sources.

NON-CLIMATE STRESSORS IN JAMAICA

The workshop participants also identified a set of non-climate stressors adversely affecting the achievement of Jamaica's development objectives. These stressors included crime and violence, lack of enforcement of regulations, pollution, and economic shocks. Participants recognized that addressing both the climate and non-climate stressors will be important for achieving their overall development objectives.

Flooded areas around Bangkok, Thailand, October 24, 2011.[10]

The final task in the scoping stage is to brainstorm the needs and opportunities for addressing the various stresses affecting inputs and undermining development. In most cases, needs identified in the scoping stage should be examined in greater detail to flesh them out and ensure that actions taken to meet these needs will adequately resolve the issues caused by the stressors. In some cases, a more detailed climate vulnerability assessment will be needed; in others, an approach or potential solution may be clear, and the task of tailoring the solution to local circumstances will be simpler. In either case, the next stage – assessment – is the stage at which you will develop a more detailed understanding of problems and solutions.

2.2 ASSESS

In the assessment stage, you will develop a deeper understanding of the conditions that contribute to the vulnerability of key inputs identified in the scoping stage as well as the broader system[11] of concern. Vulnerability is the degree to which something or someone can be harmed by or cope with a stressor. The vulnerability of a system or resource is comprised of three elements: exposure to a stressor, sensitivity to that stressor, and adaptive capacity to respond to that stressor (see the Key Definitions Box for definitions).

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10. Source: Wikimedia Commons, 2011. Available: http://commons.wikimedia.org/wiki/File:Defense.gov_photo_essay_111024-M-ZN194-140.jpg.

11. Systems are the individuals, households, businesses, public service providers, government bodies, and other organizations that use and supply inputs to produce development goals. (USAID. Forthcoming. *Climate Change Vulnerability Assessment: An Annex to the USAID Climate-Resilient Development Framework*.)

Vulnerability assessments generally serve two purposes: (1) to determine what sectors or regions may be most vulnerable to inform strategy development, and/or (2) to understand the sources of vulnerability for a particular strategy, policy, program, or project. The former might allow you to decide whether to prioritize the tourism or agriculture sector, or to work in a coastal community or an inland location. The latter might help you understand how and why a sector, region, or population is vulnerable in order to design interventions to reduce that vulnerability. For example, if crops are failing in a specific community, a vulnerability assessment can tell you whether the problem is exposure to droughts, sensitivity of crops to heat or salinity, lack of adaptive capacity of farmers to anticipate or respond to these stressors, or some combination of these factors. This helps you to tailor actions to address the problem effectively.

This task can be challenging given uncertainties about exactly how climate will change in the future. By focusing on the information you need to assess the inputs, conditions identified in the scoping stage, and the timescale of climate information needed to inform decision-making, considerable uncertainty can be removed. Projections for rainfall at the end of the century may vary widely, but for a farmer deciding what to plant next season, a forecast of next season's rains is far more relevant and can be provided more readily.

The scope and level of detail of a vulnerability assessment should depend upon the type of decision that needs to be made about the best way to achieve a development goal or respond to climate and non-climate stressors that put that development goal at risk. It is also important to consider practical aspects related to the development strategy, program, or project in order to properly define the appropriate level of analytic effort. While practical considerations are treated in more detail in the vulnerability assessment annex, a few key questions for illustrative purposes include:

- Who is the intended audience for the assessment?
- What level of detail and type of information are necessary to make the decision the assessment is supporting?
- How much time is available for the assessment?
- What resources and capacities (e.g., budget, technical expertise, political capital) are available?

It is also important to identify which decisions are being made that could be affected by the assessment results, and what opportunities exist for influence, integration, or leveraging of results. Is somebody making a decision whose outcome could be improved by considering climate risks? What is the timeframe of that decision – for how long will the decision have consequences? Most farmers' planting decisions are relevant for a season, while a decision about building a dam has implications for many decades. Examining the political and policy contexts for opportunities may help narrow the range of potential adaptation options considered in the design stage and, consequently, determine the scope of analytical activities necessary in the assessment stage. For example, if budget resources of $10 million are available where previously only $10,000 was available, a very different range of adaptation options may need to be considered, requiring a different level of analytical effort. Furthermore, windows of opportunity for integrating climate into development decisions may arise during capital improvement plan updates, management plan revisions, and other periodic processes. Much of this information will have been provided during the scoping stage.

Information for a vulnerability assessment can be obtained through a number of methods including desk studies, consultations, workshops, technical analyses, field visits, and modeling. The method(s) should be selected depending on the information required, and resource and time availability.

KEY DEFINITIONS

Vulnerability is the degree to which something can be harmed by or cope with stressors such as those caused by climate change. It is generally described as a function of exposure, sensitivity, and adaptive capacity.

Exposure is the extent to which something is subject to a stressor. For example, flooding is a climate stressor that can affect infrastructure. Infrastructure built in a floodplain is exposed to this stressor, but infrastructure built at higher elevations is not exposed to flooding.

Sensitivity is the extent to which something will change if it is exposed to a stressor. For example, agricultural crops are sensitive to increased night-time temperatures. However, some plants will fail at lower temperatures and are thus more sensitive to this climate stressor than others. Crop choice can reduce an individual farmer's sensitivity to increased temperatures. Considering the example of infrastructure in a floodplain, two buildings in the floodplain may both be exposed, but one built on stilts or designed to allow water to flow through would be less sensitive.

Adaptive capacity is the "combination of the strengths, attributes, and resources available to an individual, community, society, or organization that can be used to prepare for and undertake actions to reduce adverse impacts, moderate harm, or exploit beneficial opportunities."* Adaptive capacity is fundamentally about the ability of an affected system to change in response to climate stressors. This could be about the capacity of an ecosystem to adapt to warmer temperatures, but it is more often understood in terms of people, businesses, and their communities. In particular, highly networked and wealthier communities often have more adaptive capacity than isolated and poorer communities.

*IPCC. 2012. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation.* Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK and New York. p. 556.

The vulnerability assessment annex (forthcoming) discusses the different types of methods, their costs and benefits, and other considerations for choosing a method. The annex also presents examples of questions that can help to assess exposure, sensitivity, and adaptive capacity for a number of key development sectors.

2.3 DESIGN

The design stage focuses on identifying actions that can reduce vulnerabilities determined in the scoping and assessment stages. This may include actions to reduce climate vulnerability or more traditional development actions to reduce the impacts of non-climate stressors. Climate-resilient development design includes four steps: (1) identifying adaptation options, (2) selecting evaluation criteria, (3) evaluating options, and (4) selecting a course of action.

2.3.1 IDENTIFY ADAPTATION OPTIONS

A number of approaches may be used to identify adaptation options, including consulting stakeholders, engaging informed experts, and drawing on the experience of other organizations or jurisdictions that have faced similar problems. Stakeholders are a good source of options, and may have already identified needs and opportunities during the scoping stage that can be expanded upon. Stakeholders can also contribute knowledge about which options are locally appropriate, and provide insight into which options they would prefer and champion. Experts are another common source of options. They often have extensive experience working in and across specific environments, geographies, or jurisdictions that give them insight into how to address specific vulnerabilities. Best practices and lessons learned by other organizations or jurisdictions can

be identified through a literature review, a survey of targeted jurisdictions, or interviews with knowledgeable individuals.

Thinking broadly about adaptation approaches can facilitate the identification of creative adaptation options that might otherwise never be considered. Climate impacts pose a range of risks, and not all of these risks can be managed or managed in the same way. The best options are the ones that most effectively and efficiently address the risk. In some cases, you may need to build the capacity of key actors to access and use information. In others, there may be policy obstacles that need to be removed before effective action can be taken. In still others, a high-value asset must be protected at all cost, requiring an intervention such as a seawall to protect a coastal city. Elsewhere, ecosystem restoration might be the most effective option. Generally speaking, however, it is important to consider a combination of options.

USAID's Climate Change and Development Strategy prioritizes adaptation results in three broad areas, which can be helpful for identifying adaptation options to achieve each result:

1. **Improving access to science and analysis for decision-making**, such that:

   a. Supply of relevant climate data and predictions, analysis, and decision support tools is improved
   b. Stakeholders have better access to climate data and predictions, analysis, and decision support tools
   c. Relevant institutions have greater capacity to use and analyze climate data and predictions, analysis, and decision support tools

2. **Establishing effective governance systems for adaptation**, such that:

   a. Participation of public, civil society, and private sectors in climate change adaptation policy and action is increased
   b. Capacity of public institutions to integrate climate change adaptation into policy and administration is strengthened
   c. Coordination by government institutions on climate change adaptation policy is improved

3. **Identifying and taking actions that increase climate resilience**, such that:

   a. Adaptation actions are piloted and their effectiveness is tested
   b. Information about effective adaptation actions is communicated
   c. Barriers to widespread adoption of effective adaptation actions are reduced

A range of hard (i.e., physical) and soft (i.e., institutional) actions can be used across these categories, and each type has its pros and cons. Hard approaches carry higher risk because they can be costly both upfront and through operations and maintenance requirements, technically complex, damaging to the natural environment, and hard to reverse. On the positive side, however, they can be very effective if designed properly, and are highly visible, which is often favored by locals and donors. Another concern with hard approaches, like a levee, is that they can result in development in areas that are highly exposed when an extreme event eventually results in conditions that exceed the structure's threshold. Soft approaches like reforming existing policies and regulations, and building capacity for improved information, resource management, and planning can be challenging because they take time and commitment to see through, may be subject to ineffective political processes, and depend on individuals in government who may not remain in their positions long enough to have an impact. On the positive side, soft approaches can be more sustainable and flexible, can have a wide impact, and may be less costly than hard approaches.

ADAPTATION APPROACHES

Sustain losses: Take no adaptation action. Sustaining losses may be appropriate when the existing system is capable of dealing with climate impacts, when inputs likely to be affected are not worth sustaining, or when costs of protection are prohibitive. Even if immediate action is not deemed necessary, continued monitoring of climate and other factors affecting vulnerability can help to ensure that adaptation actions are taken if and when needed.

Cope: Better manage climate stressors that cannot be avoided. Examples include improving early warning systems and disaster preparedness.

Share losses: Reduce vulnerability by reducing sensitivity or increasing adaptive capacity through, for instance, water sharing or insurance programs.

Adjust: Modify behavior or practices in response to climate stressors. Examples include incentivizing rainwater harvesting and water conservation or switching to flood-, drought-, or saline-resistant crop varieties.

Reduce the impact: Reduce exposure to a climate stressor. For instance, diverting rainwater that can cause floods can help to decrease the potential impact of heavy rains.

Defend, armor, and protect: Modify an input. Examples include constructing flood channels, embankments, and seawalls to defend coastal areas from inundation due to sea level rise or elevating houses to decrease the impact of floods.

Relocate: Move inputs such as settlements, infrastructure, or crop and grazing lands. This approach takes a longer-term view to adaptation, and the feasibility of this option can vary dramatically based on geographical, political, financial, technological, and social constraints.

Research: Develop new strategies and technologies, such as water reuse or desalination technologies.

In most cases, a combination of adaptation approaches will be needed. In the example of coastal agriculture under threat from sea level rise and storms, implementing a set of adaptation options might involve sharing losses through crop insurance, adjusting by diversifying livelihood activities into less climate-sensitive sectors, defending through sea walls, and conducting research to identify and/or develop saline-tolerant crops. This set of approaches will likely reduce vulnerability better than any individual approach.

IDENTIFYING ADAPTATION OPTIONS IN JAMAICA

Participants agreed that an important action was to create a national climate policy to guide and coordinate domestic and development partner investments related to climate change. During the workshop, participants identified sequences of actions needed to enable effective adaptation; for example, changes in zoning codes are required for changes in land use. They also identified linkages and dependencies among important sectors, with the intention of continuing to work in multi-disciplinary teams. Participants also recommended that the national policy should include an overarching policy that sets national aims, and revisions to the policies that govern key economic sectors to embed climate change adaptation and greenhouse gas emission reductions there. Jamaica's Ministry of Water, Land, Environment, and Climate Change began developing a policy framework immediately after the workshop concluded; and the draft policy was presented to the cabinet in October 2013.

Participants also identified a need for better weather and climate information tailored to the needs of decision makers in vulnerable sectors. USAID, the Climate Services Partnership, and the Meteorological Service of Jamaica formed a working group with Jamaica's Agricultural Extension Service. The working group is developing a drought forecast tool (the contribution of the meteorological service and Columbia University's International Research Institute for Climate and Society) and tools to help farmers know what to plant, how to manage water, and how to manage pests in dry years (the agricultural extension service's contribution). Together, farmers should be better equipped to manage a key climate stressor that undermines productivity in the agriculture sector.

It is also important to consider actions that may improve the enabling environment within which other climate-resilient development activities are occurring. For instance, improving coordination between institutions or promoting integration across different economic sectors can help to avoid maladaptation and unintended consequences arising from uncoordinated actions by one institution or sector.

2.3.2 SELECT CRITERIA, ANALYZE OPTIONS, AND SELECT A COURSE OF ACTION

The process of identifying adaptation actions is likely to yield many more options than a development practitioner can possibly implement. It is important to analyze options according to a set of agreed criteria that reflect the key considerations relevant to your decision-making context, and apply these criteria to inform choices in a systematic and strategic way.[12] Below, we describe some criteria for evaluating options. The first three – effectiveness, feasibility, and cost – are likely to be useful in any context. The next five may be useful

12. Note that the multi-criteria analysis proposed here is not the only way to analyze adaptation options. Traditional cost-benefit analyses, triple bottom line assessments, classic decision analysis/decision trees, and other techniques may be more appropriate in a particular context. The 2007 USAID guidance, *Adapting to Climate Variability and Change: A Guidance Manual for Development Planning* covers this topic on pages 15-17 in "Step 3: Conduct Analysis" (see http://pdf.usaid.gov/pdf_docs/PNADJ990.pdf). USAID is also developing a short annex on choosing among options (USAID. Forthcoming. *Evaluating Adaptation Options: An Annex to the USAID Climate-Resilient Development Framework*).

depending on the priorities of those weighing the options, or to help select among options of similar effectiveness, feasibility, and cost. This list of criteria is suggestive, not comprehensive.

- **Effectiveness** – How well does the option reduce the specific climate risks of concern and generate the primary benefit sought (e.g., damages reduced, costs avoided, lives saved) over an appropriate time horizon? How well does it address the applicable climate-related vulnerabilities (e.g., reduce exposure and/or sensitivity, and/or increase adaptive capacity)? Does the option align with and promote overall development goals?

- **Feasibility** – Is there sufficient technical and financial capacity, political support, and cultural acceptance to implement the option? Is the option relatively straightforward to implement and maintain from a technical perspective (e.g., Is an infrastructure solution relatively easy to build and operate)? Will key institutional actors and stakeholders support the action (e.g., Will necessary zoning regulations be enacted and enforced)? Is this an activity that can be funded with resources available for development assistance?

- **Cost** – What are the costs to implement the option, when considering both initial costs and longer-term costs of operation and maintenance?

- **Unintended consequences** – To what extent are there costs and other unintended negative consequences associated with the option, beyond the direct expense of its implementation? For example, construction of a seawall to protect communities against sea level rise may adversely impact the near-shore coastal ecosystem or harm local fisheries.

- **Additional benefits** – To what extent might an option provide significant co-benefits, in addition to reducing the specific climate-related risk of concern? For example, building a dam and associated reservoir may be an option to enhance water supply reliability for a key urban or agricultural region, given the increased variability of rainfall and increased risk of prolonged drought. However, the dam may also provide other benefits, such as the potential to generate hydropower, improve downstream flood protection, or develop lake-based tourism and recreational sectors.[13]

- **Implementation timing** – How long will it take to develop and implement the option? Can the option be implemented within relevant planning/funding/political timelines? Will the option yield benefits within the implementation timeframe?

- **Flexibility** – How easily can adjustments be made in response to evolving conditions and/or information? Are there incremental steps that can be taken (e.g., Would a dam be designed and constructed such that its height can be increased cost-effectively in the future, if and when changing climate conditions indicate more water storage or flood protection is needed)? Note that a flexible option may sacrifice optimality to some degree. Flexibility may be an especially important consideration for options that are intended to be long-lived, are relatively costly, and/or have irreversible consequences.

- **Robustness** – Does the option perform well under a wide range of possible climate futures? It may be relatively costly to select an option that is more robust, so the incremental cost of additional robustness may need to be taken into consideration.

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13. In this example, the dam might also generate unintended costs, such as disrupting riparian and aquatic ecosystems. Any such costs should be considered along with the benefits the dam might provide.

IDENTIFYING AND ANALYZING ADAPTATION OPTIONS FOR ILOILO, PHILIPPINES

In July 2012, a team of experts applied the climate-resilient development framework in an assessment of water security and climate issues in the municipality of Iloilo, Philippines and the upstream Tigum-Aganan watershed.* The Metro Iloilo area faces significant vulnerability to intense flooding events, agricultural and consumptive water scarcity, and poor water quality – issues anticipated to worsen under climate change. The objectives of this assessment were to (1) identify current and future water security and climate risks to Iloilo's economic growth, (2) engage local partners in the assessment and lay a foundation for building capacity and ownership of potential solutions, and 3) identify and analyze a set of options for addressing these risks. The technical team conducted a desktop review; consulted with stakeholders at the national, regional, provincial, municipal, *barangay* (i.e., district or neighborhood), and household levels; and conducted site visits to existing water infrastructure, ongoing water projects, reforestation projects, private and government housing developments, and commercial developments.

Based on their analysis, the technical team proposed 22 preliminary adaptation options for the Metro Iloilo community and funding partners to consider to address both climate and non-climate stressors. Each option was described and then assessed through four criteria, rated low, medium, or high: (1) the effectiveness of the option with regard to addressing stressors on water security under current conditions as well as under climate change; (2) the feasibility of the option according to technical, data, financing, policy, or social considerations; (3) the affordability of the option, primarily in financial terms, but also social and environmental costs when appropriate; and (4) the implementation timing, measured as short-, medium-, or long-term.

A color-coded table was used to allow a quick comparison and discussion. Red indicated low scores based on the average of the four assessment criteria, yellow indicated medium scores, and green indicated high scores. Examples of high-scoring recommendations included expanding potable water supply options by developing community-based water projects, such as treatment of community wells or rainwater harvesting, and addressing the immediate challenges associated with the lack of sanitation through an information and education campaign. Options that scored lower included improving knowledge management through standardized procedures for data collection, storage, and quality across the monitoring network for water supply, quality, and flooding, as well as development of a clearinghouse for information on the Iloilo and Tigum-Aganan watersheds.

*USAID. 2013. *An Assessment of Water Security, Development, and Climate Change in Iloilo, Philippines and the Tigum-Aganan Watershed.* USAID, Washington, DC. Available: http://www.usaid.gov/sites/default/files/documents/1865/WaterSecurityIloilo_Final_March_2013.pdf.

After identifying specific criteria, they should be used to evaluate adaptation options. Such an evaluation can be qualitative or quantitative. Each criterion can be evaluated in a descriptive textual format or scored based on a systematic or quantitative method such as green, yellow, or red; high, medium, or low; or ranking scores from 1 to 5. Scoring can be conducted as part of a participatory exercise with stakeholders or as an expert-driven evaluation. However you present criteria and scores to stakeholders, it is important to be transparent about which factors will drive a decision among options. Application of criteria can be carried out as a quick analysis of options based on inputs from experts and stakeholders or as a more detailed analysis such as cost-benefit analysis, quantitative risk assessment, or a feasibility study. The level of effort devoted to the analysis of options should be consistent with the scale of the decision, the size of the investment, and time and resource constraints, among other factors.

2.4 IMPLEMENT AND MANAGE

Implementation focuses on putting the actions that were selected at the design stage into practice. Implementation builds upon established project management practices because including climate stressors does not fundamentally alter the nature or challenge of implementation.

However, a key difference from how implementation may have been carried out in the past is that the climate is continuing to change even as implementation occurs. One way to address this is through a flexible, adaptive approach to implementation and management that incorporates new information and learning, responds to shifting conditions, and takes advantage of new opportunities that increase the likelihood of success.

Climate stressors introduce additional dynamic elements of changing information and impacts that affect how monitoring systems are designed. Baseline climate information and a monitoring and evaluation implementation plan should be established to later determine if actions are performing as designed and if not, whether poor performance is a result of changing climate conditions or the implementation effort. For these reasons, the evaluate and adjust stage described below is particularly important. The implement and manage stage should be part of a continuous process where the performance of an adaptation action, as well as changes in climate stressors, are proactively monitored to support an iterative process of implement/manage and evaluate/adjust.

2.5 EVALUATE AND ADJUST

Evaluation focuses on assessing the results of strategy, program, or project implementation to improve performance, ensure accountability, and promote learning. Generally, evaluation should not be done very differently than in a conventional development approach. The framework presented in this document can be used to produce the elements of a logical framework; each step or layer in the logical framework can be used to develop indicators and targets. There should be direct feedback to the implementation stage to improve outputs and outcomes of any particular action, and also possibly to the design stage.

Climate change poses some additional challenges for evaluation. Specifically, evaluation should consider the performance of a strategy, program, or project under changing climate conditions, e.g., assessing whether observed climate change, variability, or extreme events have affected the performance and fulfillment of goals. Critically distinguishing between the different reasons for poor performance – such as a design flaw, substandard project implementation, an unpredictable climate surprise, or poor projections of climate

stressors – could yield very different potential adjustments for improving project performance. A more proactive monitoring program may be required to gather the kinds of information needed to manage adaptively as suggested above. Uncertainties about how climate will change and the need for adaptive management make it particularly important to give special consideration to implementation and evaluation upfront.

In addition, in climate-resilient development, there is the important issue of understanding how to attribute performance to make important adjustments. Is performance attributable solely to an adaptation action, or is success (or failure) attributable to other factors as well? For instance, a 2006 USAID case study in La Ceiba, Honduras found that the effectiveness of levees to protect against floods was undermined by weak land tenure and a lack of housing, which led poor, homeless people to locate their homes in "free" land in the flood zone between the river and the levees.[14] Careful analysis will be important so adjustments to climate-resilient development strategies appropriately account for changing development circumstances, changing climate conditions, and an evolving understanding of the causal factors of project performance and impact.

14. Stratus Consulting. 2006. *Honduras Pilot Study Report: Climate Change and Coastal Resources and Flood Planning in La Ceiba. Final Report.* USAID, Washington, DC.

3. NEXT STEPS

The framework described in this document is based on lessons learned while enabling climate-resilient development planning in USAID partner countries. The framework is intended to engage country partners in a stakeholder-driven process to co-design actions that protect development investments from climate risks. We view this as a living document. We welcome comments and suggestions and will update the framework periodically.

In the coming months, USAID plans to release annexes to this framework that will take the reader into more detail on specific topics. Planned annexes include:

- *Climate Change Vulnerability Assessment*
- *Evaluating Adaptation Options*
- *Climate Change and Water*
- *Climate Change and Coastal Zones*
- *Governing for Resilience*
- *Working with Marginal Populations*
- *Climate Change and Conflict*

For further information, to provide comments, or to obtain training materials or case studies related to this framework, please contact USAID's Global Climate Change Office at climatechange@usaid.gov.

APPENDIX A – GLOSSARY

Adaptation is "the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities."[15] In natural systems, adaptation is a reaction to an actual change in climate since ecosystems cannot anticipate or plan for climate change.[16] Adaptation actions seek to enhance resilience and reduce climate vulnerability in the near- and long-term by decreasing exposure or sensitivity, or by increasing adaptive capacity.

Adaptive capacity is the "combination of the strengths, attributes, and resources available to an individual, community, society, or organization that can be used to prepare for and undertake actions to reduce adverse impacts, moderate harm, or exploit beneficial opportunities."[17] The factors that can increase adaptive capacity include financial resources, access to technology, information, skills, infrastructure, effective institutions, and equity.[18]

Climate refers to long-term weather conditions, in terms of mean conditions (e.g., average temperature and precipitation in July) and variability (e.g., how often monsoons occur, highest precipitation amounts), over a certain time period in a given area. The World Meteorological Organization uses 30 years of observations to determine climate.[19] Climate varies from place to place as well as over time. In simple terms, "climate is what you expect, weather is what you get."

Climate change is the persistent change in climate, including the mean state and/or expected variability, over decades or longer.[20]

Climate impacts are the effects on natural and human systems of climate variability and climate change.

Climate projections are potential future climate conditions (e.g., higher sea levels, warmer temperatures, wetter or drier rainy seasons). These are typically generated from climate models. Climate projections may be accompanied by assumptions about change in socioeconomic conditions (e.g., income, technology, greenhouse gas emissions).

Climate resilience is the capacity of a system to "anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions."[21] Applied to social systems,

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15. IPCC. 2012. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation.* IPCC. Cambridge University Press, Cambridge, UK and New York. p. 582.

16. *Ibid.*

17. *Ibid.*

18. Equity has to do with the degree to which access to resources is evenly distributed among populations within a society, or there is marginalization or exclusion of different sectors of the population (e.g., women, racial, ethnic, or religious minorities).

19. *Ibid.*

20. *Ibid.*

21. *Ibid.*

resilience is the capability to anticipate, prepare for, respond to, and recover from significant stressors with minimum damage to social well-being, the economy, and the environment. Essentially, the more resilient a system (e.g., ecosystem, village, country) is, the less vulnerable it is to climate change (and climate variability such as extreme events).

Climate stressors are climate factors that can affect the functioning of a system. For example, rising temperatures and greater rainfall variability may affect agricultural productivity, with implications for food security. Climate stressors can also limit the potential success of development interventions.

Climate variability is variations in climate, including the normal highs and lows, wet and dry periods, hot and cool periods, and extreme values. It can refer to day-to-day variability (e.g., heat wave). It can also refer to year-to-year variability (e.g., long-term dry or wet period). It can even refer to decadal scale variability. But, variability over a multi-decadal scale can be thought of as climate change. A key point is that even within a changing climate, there is still climate variability. So, next year could be cooler than this year. That does not mean the climate is cooling, because over time, average temperatures are rising.

Enabling conditions are components of the sociopolitical environment that affect development goals, such as legal or regulatory regimes, government or private sector corruption, political stability, legal rights, effective market mechanisms, and educational opportunities. Enabling conditions make up the broader political, social, and economic conditions that shape the use of inputs. Enabling conditions include the institutional factors that affect adaptive capacity.

Exposure is the extent to which something is subject to a climate stressor; in other words, whether it is in harm's way. Exposure is defined by the Intergovernmental Panel on Climate Change (IPCC) as the "presence of people; livelihoods; environmental services and resources; infrastructure; or economic, social, or cultural assets in places that could be adversely affected"[22] by a climate stressor.

Inputs are the factors that support or enable development. Inputs include financing, technology, training, and information.

Mainstreaming refers to the integration of climate stressors into existing planning and decision-making processes. It means that existing institutions and processes can include climate change as an additional consideration. For example, strategic planning would not only account for changes in population, economic conditions, and trade patterns, etc., but also changes in climate.

Non-climate stressors are development challenges such as environmental degradation, corruption, population growth, and pollution that can harm the functioning of a system, thus hindering the achievement of development goals.

Sensitivity is the extent to which something will be positively or negatively affected if it is exposed to a climate stressor.[23] For example, a building along the coast that is elevated will be less sensitive to a storm surge than a building that is not elevated. Some crops are more likely to wilt in extreme heat than other crops and thus are more sensitive to heat.

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22. *Ibid.*

23. IPCC. 2007. *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC, Geneva, Switzerland. p. 104.

Vulnerability to climate change is the "propensity or predisposition to be adversely affected"[24] by climate stressors. It is a function of a system's exposure, sensitivity, and adaptive capacity. The more exposed or sensitive a system is to climate change (or climate variability, including extreme events), the more vulnerable it will be. The greater the adaptive capacity of a system or society (e.g., the wealthier, better organized it is), in general, the less vulnerable it will be.

Weather is the state of the atmosphere in a given place at a given time, and refers to the actual temperature, wind speed and direction, the amount and form of precipitation (e.g., rain, snow, hail), and cloudiness. Examples include wind speeds this morning, rainfall this spring, and temperatures in May. A compilation of weather data over 30 years is typically used to determine climate (e.g., the average temperature and precipitation).

24. IPCC. 2012. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation.* IPCC. Cambridge University Press, Cambridge, UK and New York. p. 582.

APPENDIX B – SAMPLE DIRECT AND INDIRECT CLIMATE IMPACTS BY SECTOR

Sector	**Direct** (closely connected to climate change)	**Indirect** (caused by a sequence of changes linked to climate change)
Agriculture	• Reduced yields • Increased crop pests and livestock disease • Decreased soil fertility • Heat stress for field workers	• Reduced nutrition • Reduced incomes • Food insecurity • Migration • Reduced access to markets
Disadvantaged/ marginalized groups	• More time spent collecting water • Less able to escape floods/storms • Heat stroke from hard labor	• Food insecurity • Reduced time for schooling • Reduced income
Health	• Extreme weather events such as droughts, floods, typhoons, heat waves, and hurricanes threaten human life • Rising temperatures increase risk of heat stress • Rising water temperatures can enable spread of waterborne diseases	• Damage to health infrastructure and human morbidity/mortality due to disasters • Shifting and expansion of disease transmission zones, altered seasonality, and increased activity of vectors that transmit diseases like malaria, dengue fever, and yellow fever • Increases in plankton blooms that feed vibrio cholera, leading to greater incidence of cholera • Decreased yields of staple food crops such as corn and rice, leading to increases in malnutrition and under-nutrition • Decreased water quality and quantity, which can compromise sanitation efforts and increase the incidence of diarrhea • Increased ground level ozone, which may adversely impact air quality, especially in urban settings
Humanitarian assistance/ disasters	• Death from droughts and floods • Health impacts from heat waves • Infrastructure destruction from storms	• Diminished economic growth • Reduced food security • Increased human population migrations

Sector	**Direct** (closely connected to climate change)	**Indirect** (caused by a sequence of changes linked to climate change)
Infrastructure	• Damaged infrastructure for energy, transportation, water resources, communications, and other sectors from extreme climate events • Inundation of infrastructure from sea level rise • Damage to paved roads and rail from excess heat	• Lost productivity due to disruptions in piped water and sewerage services if infrastructure is damaged • Higher operating costs and/or shorter lifetime of water systems, and potential for rising water prices • Loss of transportation system efficiency • Electricity blackouts/brownouts
Natural resources management	• Increased soil erosion • Shifting habitat suitability • Specialist species loss/migration • Coral harm (warmer/more acidic water)	• Agricultural expansion encroachment • Pressure from human migration • Land use/human/animal conflicts • Water pollution due to flood/drought
Water	• Droughts/floods • Drinking water contamination from flooded sanitation systems • Saltwater intrusion • Changing inputs to water storage due to changes in volume and timing of rainfall, or surface and groundwater flows • Increased evaporative losses as temperature rises	• Reduced agricultural output • Reduced food security • Water-use conflicts • Spread of waterborne diseases if treatment systems fail or flooding occurs • Displacement of populations if water resources shift or are impaired • Increased travel distances to collect water if supplies are no longer safe and productive • Unhygienic conditions in the event of storms or flooding

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