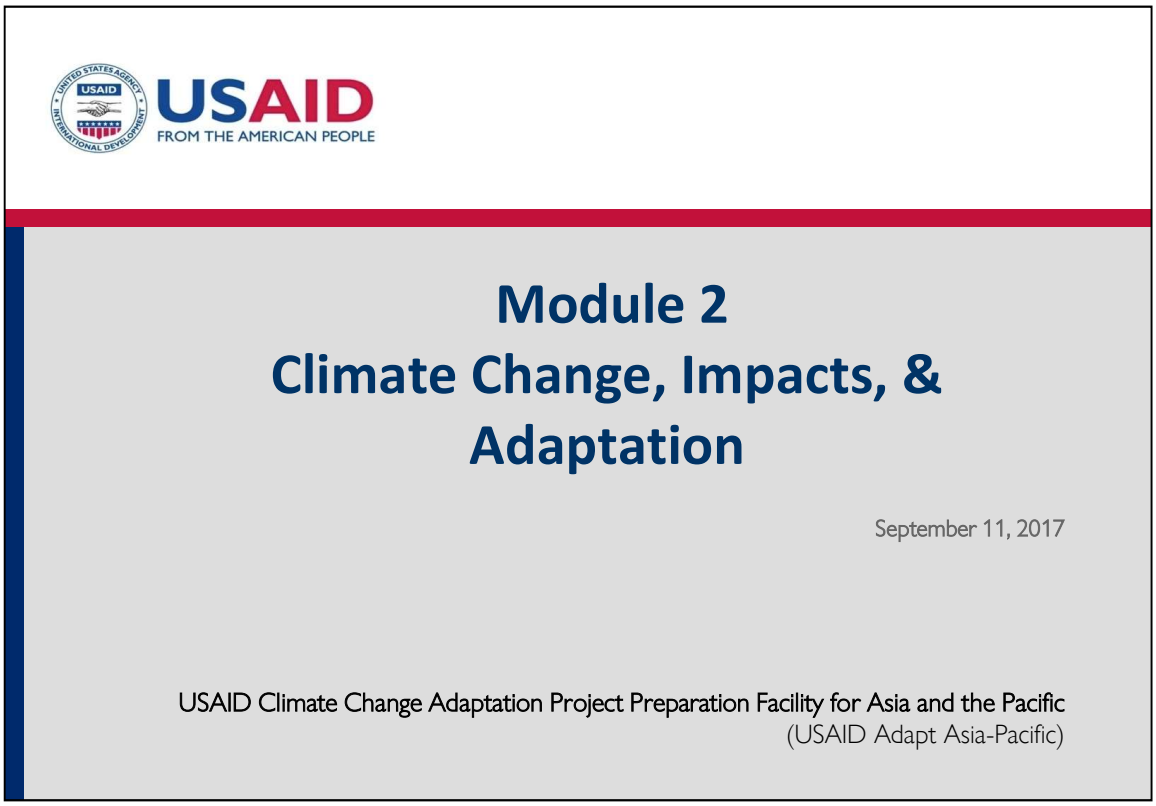


Facilitator Note: This module will occupy the entire first day of the training after the opening ceremony and other administrative procedures. It consists of some overview material, followed by the topics listed below. In the afternoon the module includes a "workshop" session in which the participants will break out into work groups and participate in several activities that appear at the end of the module. This module requires some "localization" prior to delivery to make the course as relevant as possible in the country of delivery. There are facilitator notes throughout the module which draw your attention to the parts that need local modification; we suggest that you review the module at least one week prior to delivery so that you have time to prepare the appropriate materials.

Module 1 will cover:

- Course overview and logistics
- Introduction to climate change
- Understanding the need for adaptation to climate change

Materials needed

- LCD projector and screen
- Flipchart and markers

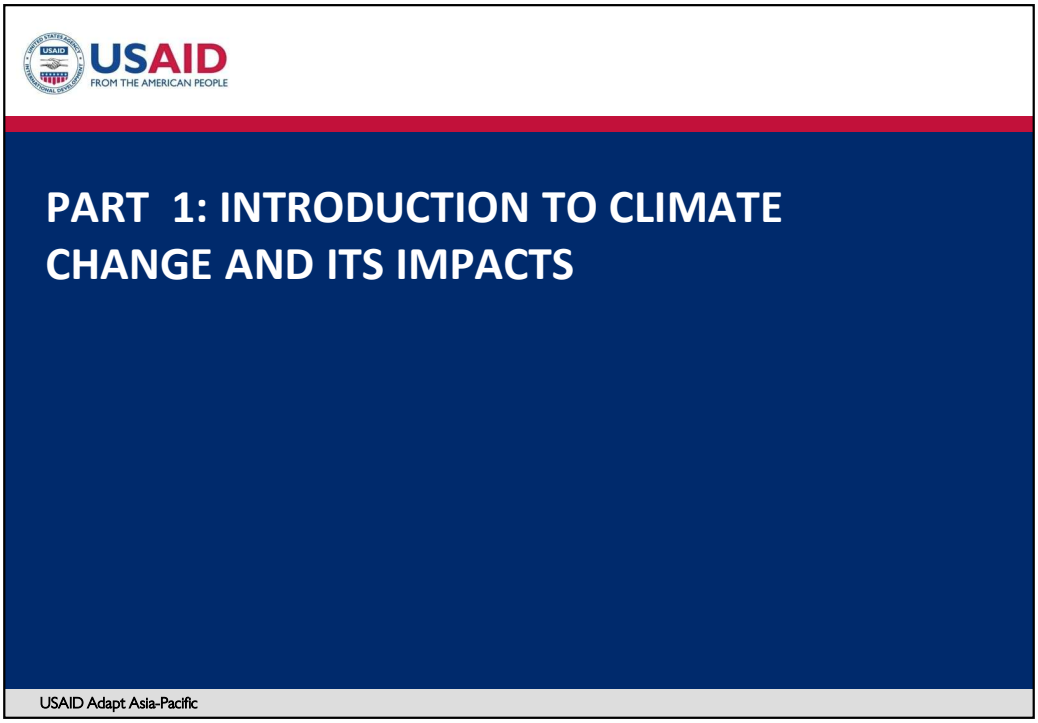
- Whiteboard and markers
- Post-it notes and pens

Module 2: Finance for Adaptation

This module will cover the main sources of finance for adaptation, focusing on the main international funds, and how to access their resources. If the country in which the materials are being implemented has a domestic fund, the module will cover the domestic fund. Full details for localization of this module can be found in the instructor guide. In addition, the It will include the global Adaptation Fund (AF), Green Climate Fund (GCF), Global Environment Facility (GEF), etc. The aim of the module is to inform participants of the various sources, their requirements for access, an orientation to their formats for project concepts and proposals, and the main features of project proposals that they seek.

Outcomes of module 2: *Trained government personnel who understand the basics of identifying international climate finance for use in future CCA projects in their countries*.

Objective of module 2: Training materials on the various sources of international financing for CCA projects. The materials will be adequate for presenting a one-day module to a group of country officials, including slides, case studies and supporting notes/source information.



Facilitator note: this first part of module 1 will cover the following topics in sequence:

--What is climate change

--What causes it

--What sorts of impacts does it have

--What does the severity of the impacts depend on

--What are specific projections at various scales starting with global moving down to local

--What sources of information are available to the participants

GOALS—IMPORTANCE—OBJECTIVES—OVERALL FIT

GOAL: The goal of this section is to introduce important concepts related to climate change, and to provide participants with a general understanding of the physical processes associated with climate change as well as tools and techniques utilized by climate scientists to develop projections about future climate. Participants will develop an understanding of country specific manifestations of climate change as well as impacts.

IMPORTANCE: The material in this section is important for a number of

reasons. First, adaptation projects that are submitted to funders/donors are judged against a number of criteria, including scientific rigor. This means that the information on which vulnerability assessments and needs assessments must be valid and reasonable, or else the project is not likely to receive approval. Thus a solid understanding of climate change processes, as well as their local impacts, is crucial for project development. A second reason why a solid understanding of the fundamentals of climate change is important is that experience has shown conclusively that a key determinant for marshalling political and popular support for adaptation measures is effective communication about the potential local impacts of climate change. In other words, we want to be able to "bring it all home" and explain how climate change affects the lives of our citizens, how it could impact the bottom lines of our private sector, and also how it could potentially threaten the tremendous gains in social and economic development that we have made over the past decades.

More directly related to managing projects is the fact that many application processes begin with a description of climate impacts. For example, the Adaptation Fund (AF) process calls for applicants to "outline relevant climate change scenarios according to the best scientific information" available. The Green Climate Fund proposal template requires applicants to "describe the scale and intensity of vulnerability of the country and beneficiary groups, and elaborate how the project/programme addresses the issue (e.g. the level of exposure to climate risks for beneficiary country and groups, overall income level, etc" (Item E.4.1).

OBJECTIVES

1.1.A. Participants will be able to describe the general physical processes that are contributing to climate change, including greenhouse gas emissions

1.1.B. Participants will describe the national and sub-national physical manifestations of climate change in their country.

1.1.C. Participants will explain the expected impacts of climate change at different scales, ranging from global impacts to specific impacts at the national and subnational scale where the training is being conducted.

--What are the existing threats at the national and subnational level, and how could these be modified by climate change? Are there potentially new threats?

--How is CC going to affect the various sectors in your country?

1.1.D. Participants will identify reliable sources of information concerning potential impacts of climate change at the national and subnational scale where the training is being conducted.

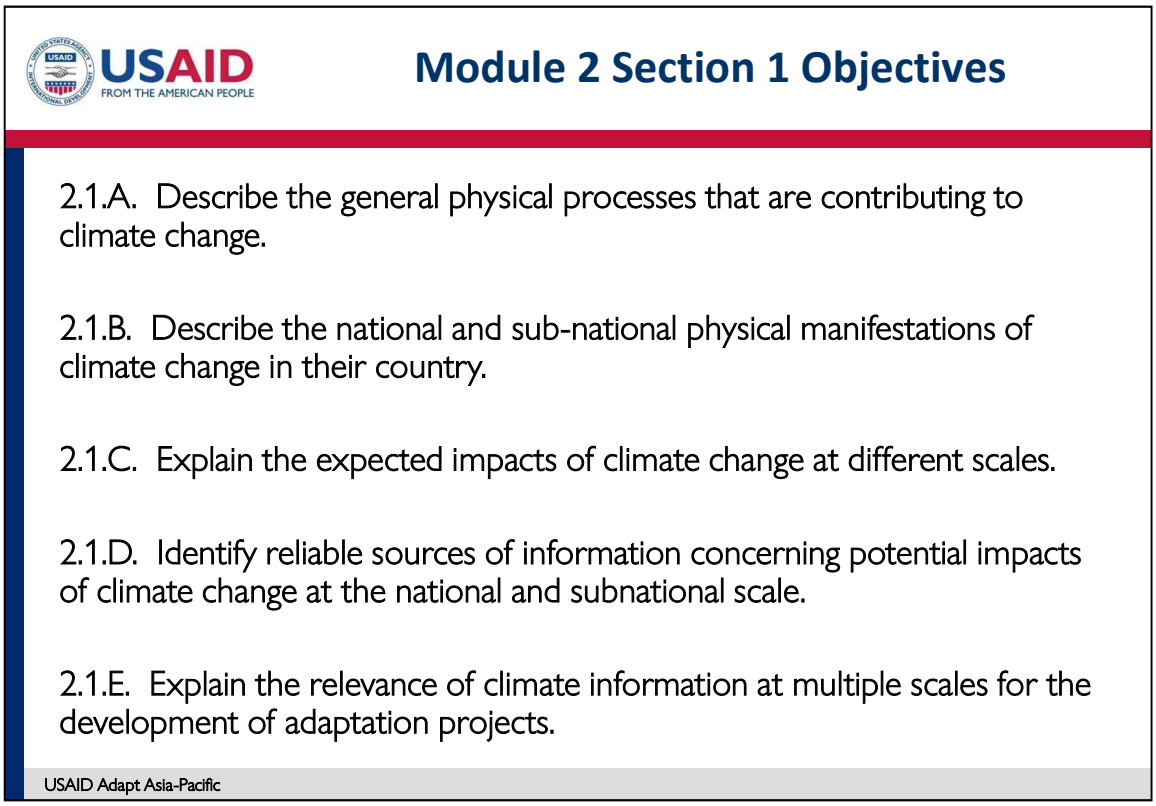
--This addresses the question of "where do you go to get reliable

information”.

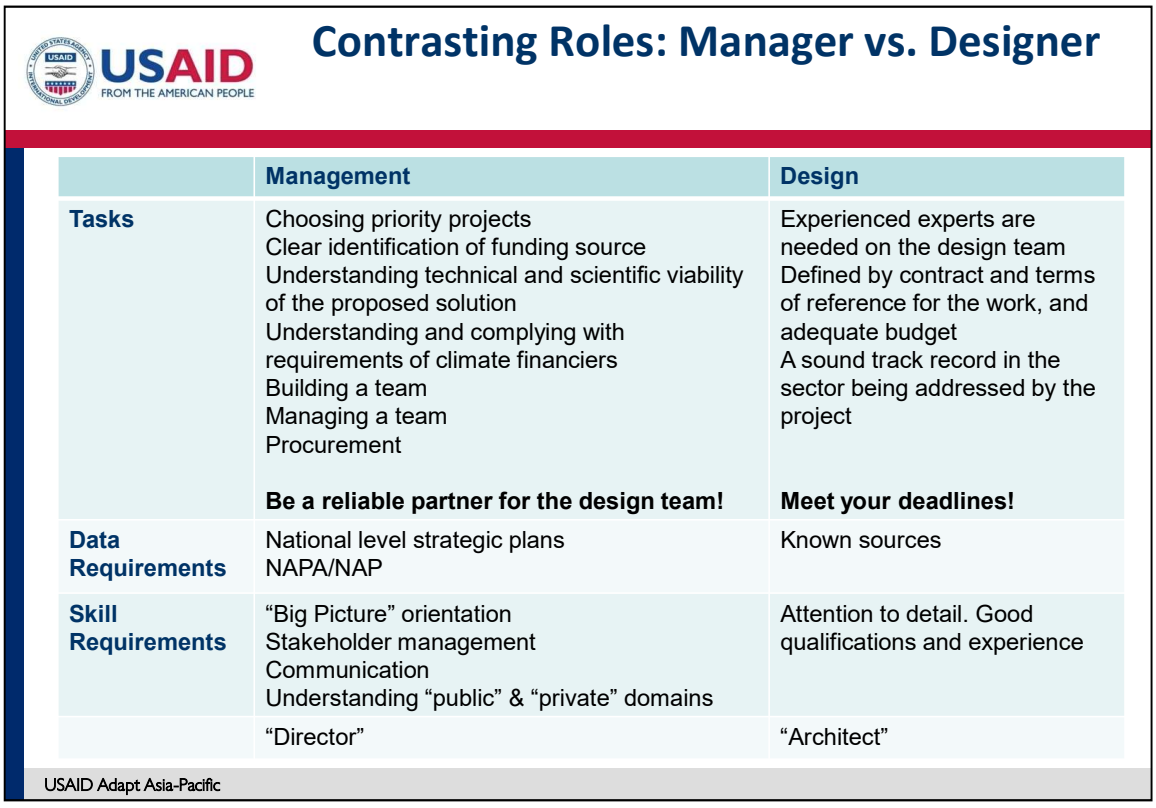
1.1.E. Participants will explain the relevance of climate information at multiple scales for the development of adaptation projects.

OVERALL FIT

The information presented in this section will form the basis of climate change adaptation project proposals. As noted above, a first step in developing bankable proposals is a description of the **context** of the project/program. The context includes not only the physical challenges (i.e. a description of the climate change processes based on the best available science), but also the socio-economic impacts and the relevance of these to broader development objectives. Thus the material presented in this section will enable the participants to manage the first stages of the proposal development process according to best practices and in line with successful projects that have already been approved and carried out by various funds.

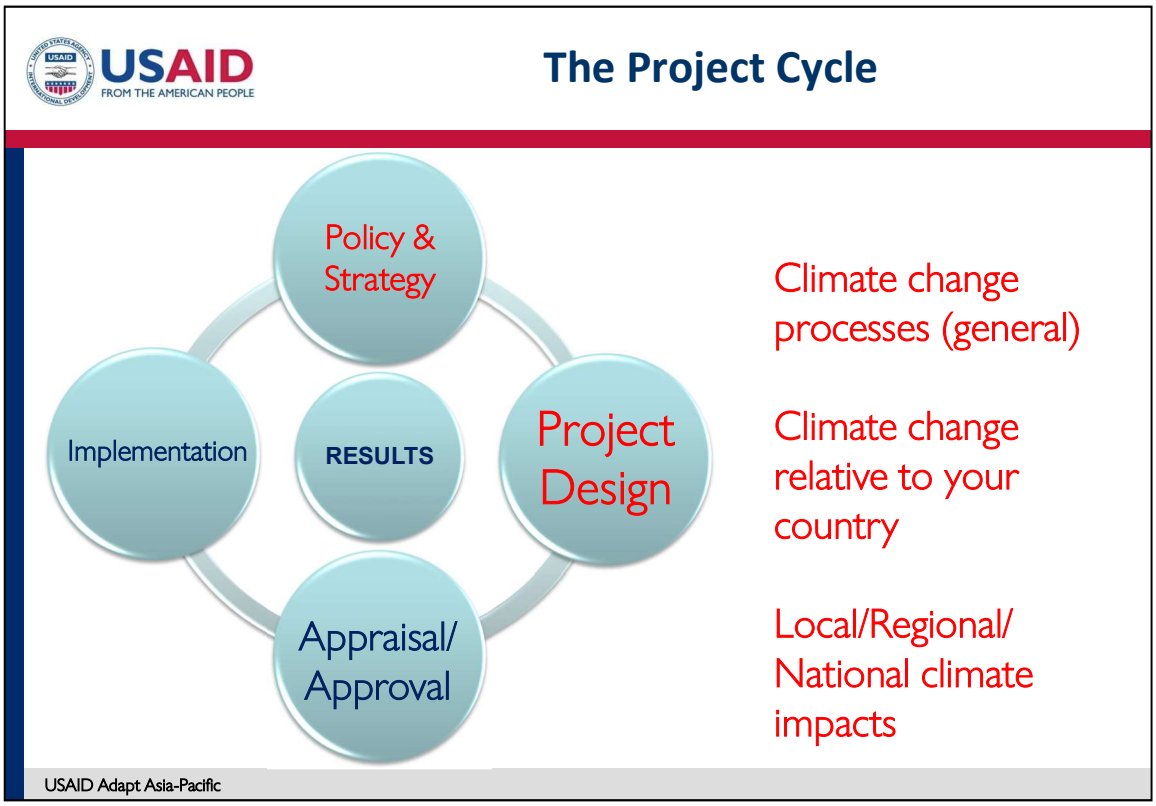


This slide describes the specific objectives for this section.



This slide presents an overview of the roles of the management team and the design team in project development. Here we reemphasize that this course focuses on **management**, rather than **design** aspects of project development. We will touch on this from time to time throughout the course.

Understanding the roles of the management and design teams will help you achieve the best results and get the most out of the design team.



This is a diagram of the project cycle, which we'll discuss more in depth in module 5. We've included it here to describe the relevance of today's material in the context of managing projects and securing support from financiers. At this point we're at the **policy & strategy** stage. When you develop a project, there are several pre-requisites in terms of the context of the project. These include a statement about the physical aspects of climate change in your country, which builds on a general understanding of climate change. The material in this section will help you effectively address those items in a project proposal.

Examples include:

- Green Climate Fund C.2.: "Describe the baseline scenario (i.e. emissions baseline, climate vulnerability baseline, key barriers, challenges and/or policies) and the outcomes and the impacts that the project/programme will aim to achieve in improving the baseline scenario".

- Adaptation Fund A: "Describe the project/programme components, particularly focusing on the concrete adaptation activities of the project, and how these contribute to climate resilience". To do this, you need to know about climate processes.

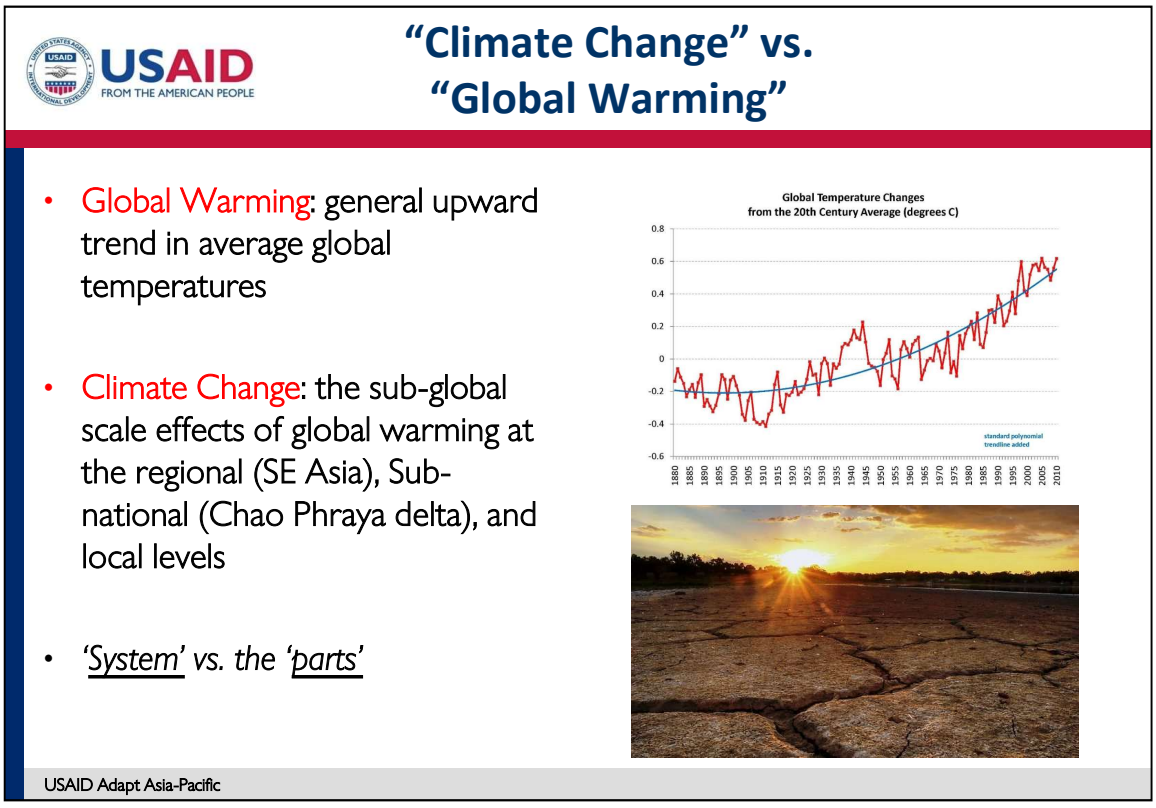
The material on this slide addresses **learning objective 1.1.E.**

Project Description of Climate Change

How do you construct your description of climate change processes?

- GLOBAL: General processes
  - Sources of information?
- NATIONAL: Regional processes
  - Agencies and reports?
- SUBNATIONAL: If available
  - Universities? NGOs?

Remember that information is evolving



Climate Change vs. Global Warming: These two terms are related, but they are fundamentally different. Sometimes they are confused, but the difference between these is relatively straightforward and simple to understand.

"**Global Warming**" refers to the overall warming of the Earth's atmospheric system. As you can see from the graph there is a general upward trend in average global temperature closely associated with measured increases in Greenhouse Gas (GHG) emissions, such as carbon dioxide and methane. These gasses serve to "trap" heat in the atmosphere, so the overall temperature at the surface of the earth and in the lower atmosphere increases. This process is a global process.

In addition, you may choose to point out that higher temperatures mean that there is more water vapor evaporated into the atmosphere. Water vapor is an important greenhouse gas, so the water vapor effect is an example of a potential feedback….the more water vapor that is evaporated, the more warming there is, and so forth.

"**Climate change**" refers to how this global warming is manifested at the sub-global scale. What are the local effects of increased climate instability? Because of the complexity of the atmosphere, the changes are not always as simple as just an increase in temperature. There are all sorts of geographic variables, including ocean currents, topography, atmospheric circulation, etc. that influence how these higher global temperatures are expressed locally. In fact, some areas may experience more intense

colder weather, and in some places snowfall totals may actually increase. However, all of these are local or regional manifestations of an overall warming trend.

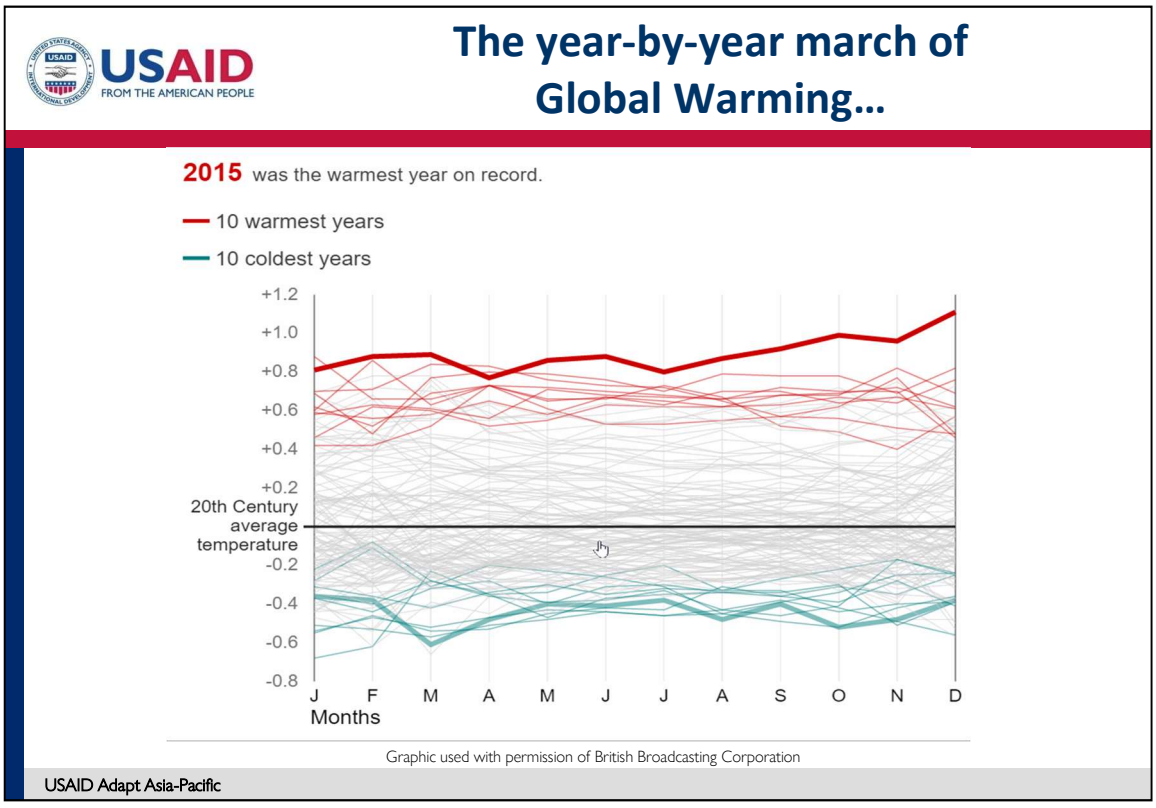
TOPIC FOR DISCUSSION: Ask the participants for examples of climate change that they have heard of or encountered.

--One of the important concepts that we are going to be building on throughout this module is thinking about "**systems**," or systemically. Many of you probably inherently think in terms of systems; after all, cities are systems, and as planners your job is to think about the functioning of that system. But sometimes we get too focused on the individual parts of the system, like being in a tunnel (aka silo thinking). This can limit our creativity in approaching problems. So in this module series we are going to stay focused on systems, which in the long run will help us achieve our goal of increasing resilience to climate change.

The material on this slide addresses **learning objective 1.1.A.**

First graph is from US National Oceanic and Atmospheric Administration (NOAA) and shows that 2010 was the hottest year on record. The graph was released in 2011 and was sourced from http://www.huffingtonpost.com/peter-h-gleick/the-graph-that- should-be-_b_808747.html.

The second image is from http://www.news.com.au/national/australians-have- limited-understanding-of-climate-change-climate-institute-finds/story-fncynjr2- 1226434161510.



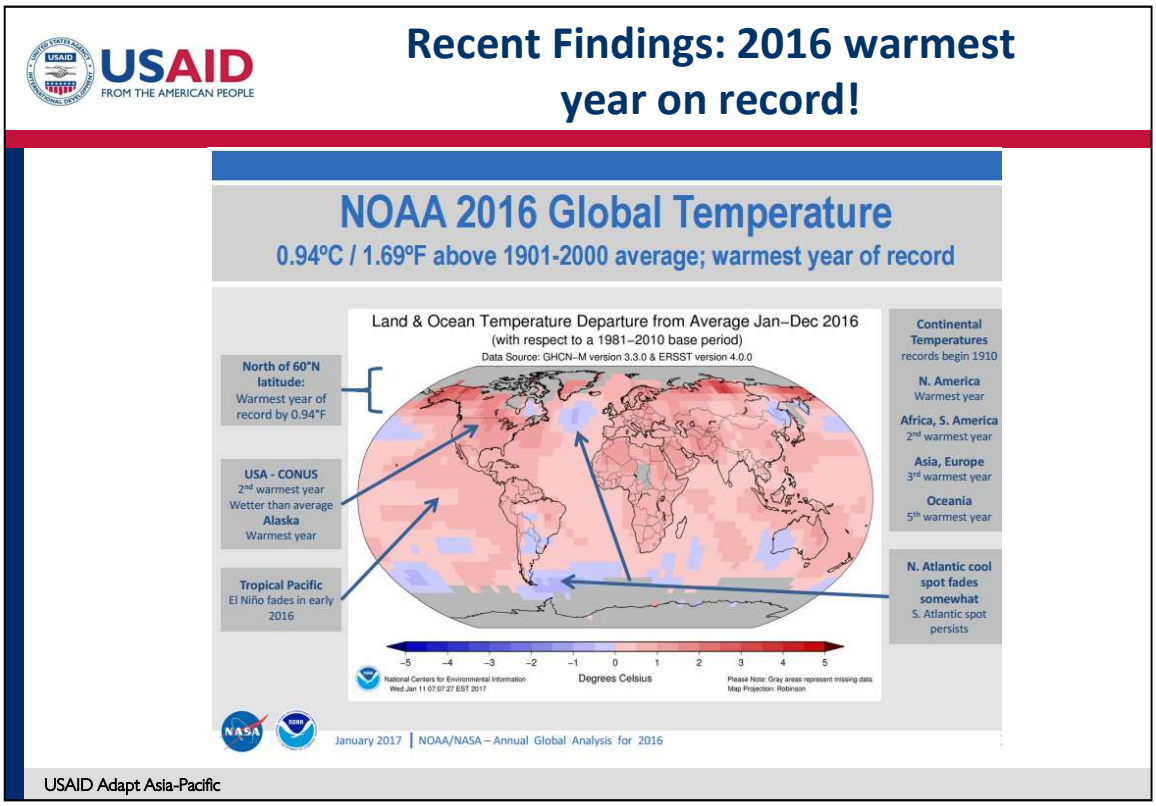
This graph shows, year by year, monthly global average temperatures beginning in 1880. The data comes from the United States National Oceanic and Atmospheric Administration. The graphic was assembled by the BBC and comes from "Climate Change: 2015 'shattered' global temperature records by a wide margin". Matt McGrath, BBC News January 20 2016. http://www.bbc.com/news/science-environment-35354579 last accessed 1/22/16. Use permission granted by BBC.

Note that the heavier blue lines represent the 10 coldest years since 1880. All ten of these years happen early on in the animation. On the other hand, the heavier red lines represent the 10 warmest years since 1880, all of which have occurred in the past 20 years. The gradual upward trend is caused by increasing concentrations of greenhouse gases in the atmosphere.

The animation is looped, so it will automatically start again. Allow it to play through several times and ask the participants for comments.

You may wish to point out that as of the writing of this module (March 2016), the first two months of 2016 had significantly surpassed the hottest year on record.

The material on this slide addresses **learning objective 1.1.A.**

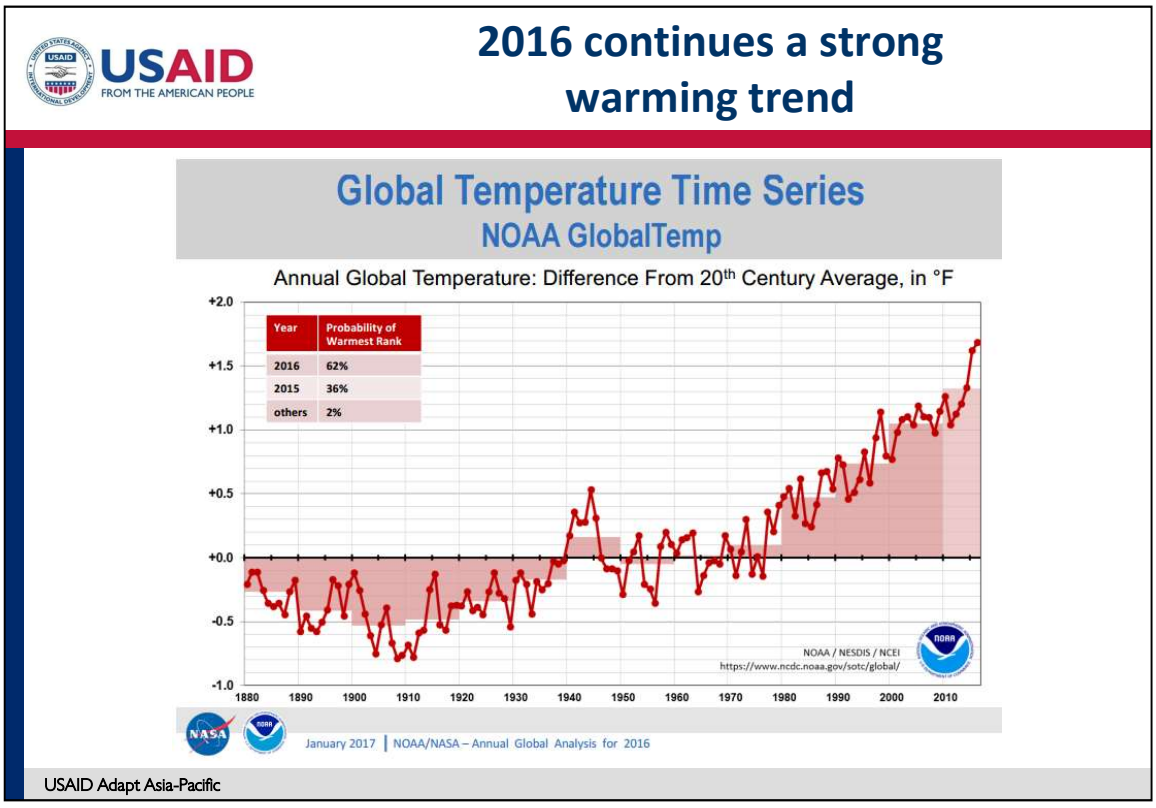


The material in this slide was taken from NOAA/NASA's Annual Global Analysis for 2015, released in January 2016. NOAA is the United States National Oceanic and Atmospheric Administration, whereas NASA is the National Aeronautics and Space Administration. These two US government agencies conduct extensive research on the global climate.

Note that the graphic indicates on average, 2015 was the warmest year globally, 0.9 C above the 21st century average. Additional points to note:

- In Asia it was the hottest year on record
- In the Indian ocean it was the hottest year on record. This is concerning because warmer sea temperatures contribute to more intense tropical storms.
- The Java Sea and South China Sea also exhibited much warmer than average temperatures. This could increase evaporation and storms, but sea temperatures also affect aquatic ecosystems and migratory patterns of important fish species.
- 2015 was the first full year to break the 1 degree Celsius barrier above pre-industrial levels. This is a key benchmark. At the COP21 talks in Paris (which will be discussed in a few minutes), leaders from all of the world promised to keep the global rise in temperatures well below 2 degrees in a bid to avoid dangerous climate change.

The material on this slide addresses **learning objective 1.1.A.**



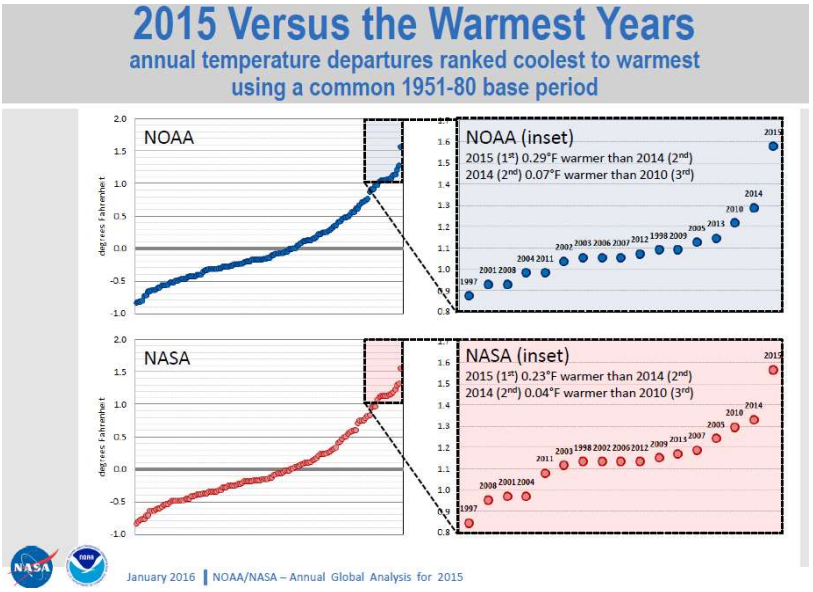
This slide demonstrates a clear warming trend since the year 1880.

The material in this slide was taken from NOAA/NASA's Annual Global Analysis for 2015, released in January 2016. NOAA is the United States National Oceanic and Atmospheric Administration, whereas NASA is the National Aeronautics and Space Administration. These two US government agencies conduct extensive research on the global climate.

Note: 1.62 degrees F = 0.90 degrees Celsius

The material on this slide addresses **learning objective 1.1.A.**

A clear warming trend…



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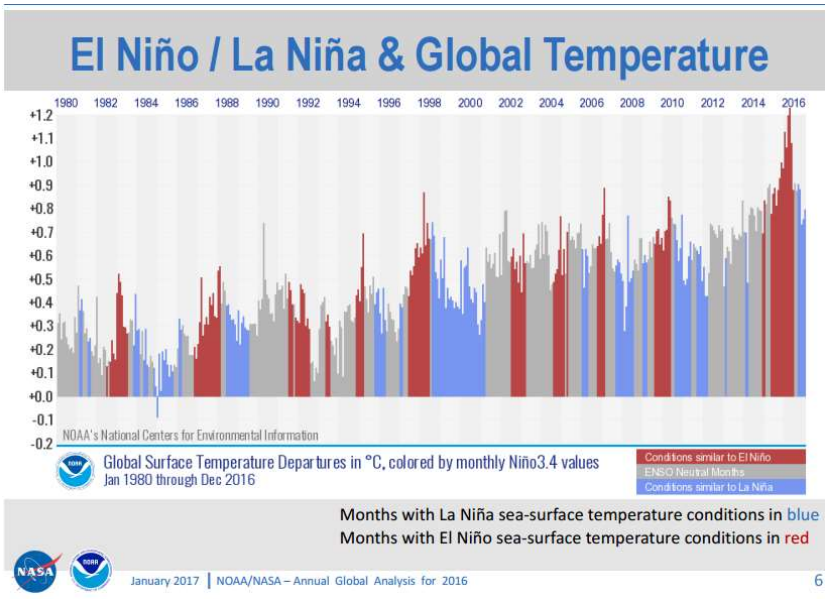
The material in this slide was taken from NOAA/NASA's Annual Global Analysis for 2015, released in January 2016. NOAA is the United States National Oceanic and Atmospheric Administration, whereas NASA is the National Aeronautics and Space Administration. These two US government agencies conduct extensive research on the global climate.

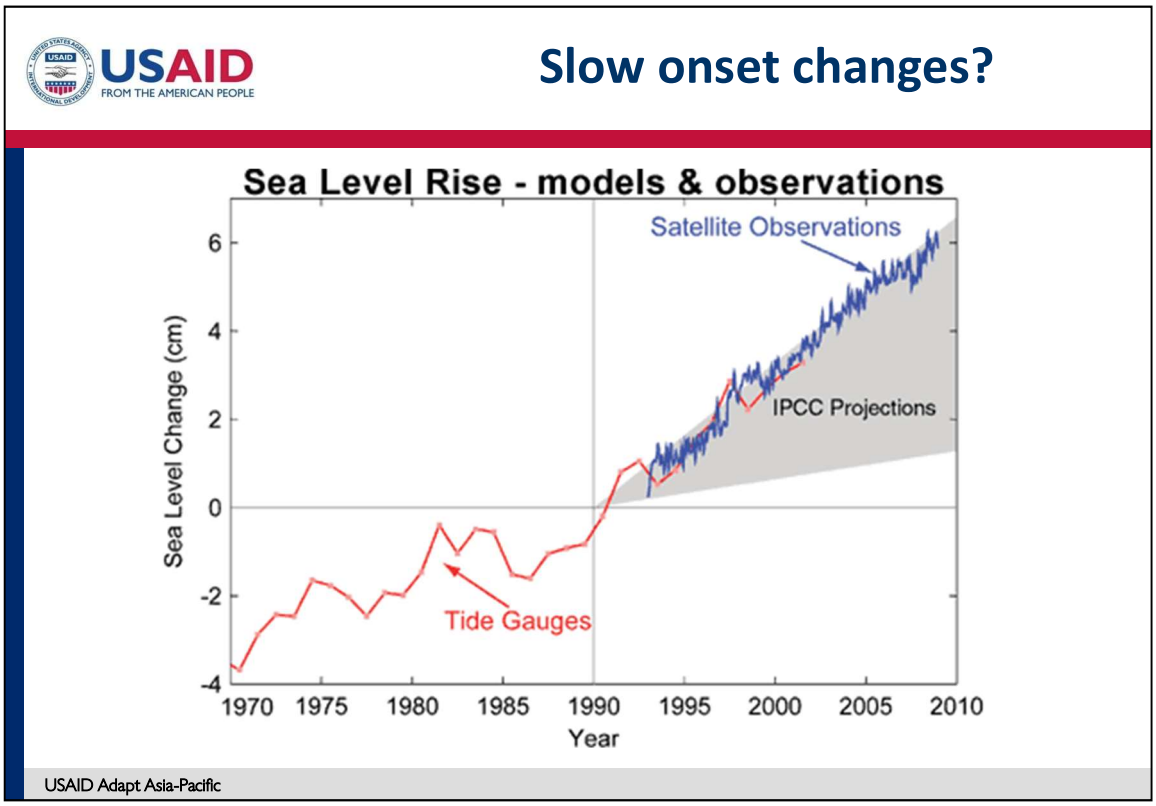
Note that the temperatures on these graphs are in Fahrenheit, but the warming trend is the same no matter what temperature scale is used. Every year since 1997 (except 1999) has been warmer than the 1951-1980 average. All years since 2000 have been hotter than any previous year, and 3 of the hottest years on record have been in the past 5 years.

Taking a longer view also shows that the warming trend is apparent despite the existence of shorter-term oscillations, which can serve to mask (to a certain degree) the general trend towards a warming world. For example, the El Nino Southern Oscillation, the North Atlantic Oscillation, and the Pacific Decadal Oscillation are all multi-year cycles that create "noise" for the overall climate signal. Some of these cycles have cool phases, which can serve to hide or mask the longer-term temperature trajectory. For example, the recently reported "pause" in global warming, which was used by some media outlets to cast doubt on the overall warming trend, was really just a function of one of these multi-year oscillations in its cool phase.

The material on this slide addresses **learning objective 1.1.A.**

Global Warming & ENSO





In the next few slides we will discuss the types of impacts associated with climate change. These can be understood in terms of the speed at which the impact occurs (sudden or slow onset), and also the type of impact (direct or indirect).

One example of a slow onset change is sea level rise (SLR). Sea level has been rising slowly for many decades at a fraction of a centimeter per year, but this rate has accelerated since the 1970s. It will continue to rise, but at an increasing rate. In this way it is like the slow onset of cancer. This graph indicates that sea level rise over the past 25 years has been at the higher end of IPCC model projections that were produced in 1990. This is a chance to emphasize the point that climate scientists can make "educated guesses" about the future impacts of climate change, but all of the factors that influence climate are so complex that there is always an element of uncertainty. This uncertainty comes from a number of different sources, including:

--It is hard to predict demographic, economic, and social trends into the future. These have a big bearing on climate change. What kinds of demographic, economic, and social trends are taking place in your country that interact with climate change?

--We don't know how successful our leaders will be in mitigating greenhouse gases in the future. There is a great deal of uncertainty about "emissions concentration pathways".

--The oceanic-atmospheric system is extremely complex, and although our understanding of it has increased tremendously over the past two decades, there are still a lot of processes we

don't fully understand. For example, research is ongoing about how cloud cover and atmospheric water vapor content will affect climate change. There are also certain potential "tipping points", or sudden, irreversible changes, that could dramatically alter our climate futures. Knowing when and if these tipping points will be reached is the subject of ongoing research and scientific debate.

Note: A recent report suggests that the world is already "locked in" to at least 5 meters of sea level rise, though there is a great deal of uncertainty about the pace at which this will happen, with estimates ranging from a couple of centuries to a couple of millennia, but there is little doubt that the rise is inevitable. Moreover, unless aggressive mitigation actions are taken soon, a rise of over 20 meters will soon be unavoidable, according to the same study (see https://www.newscientist.com/article/mg22630253-300-latest-numbers-show-at-least-5-metres-sea-level-rise-locked-in/, last accessed 3/21/2016).

--**Point for discussion:** Are there other examples of slow onset changes that you have heard of or are aware of?

--Possible answers include changes in seasonality, changes in phenology, changes in the number of hot/dry days/nights, increasing temperatures.

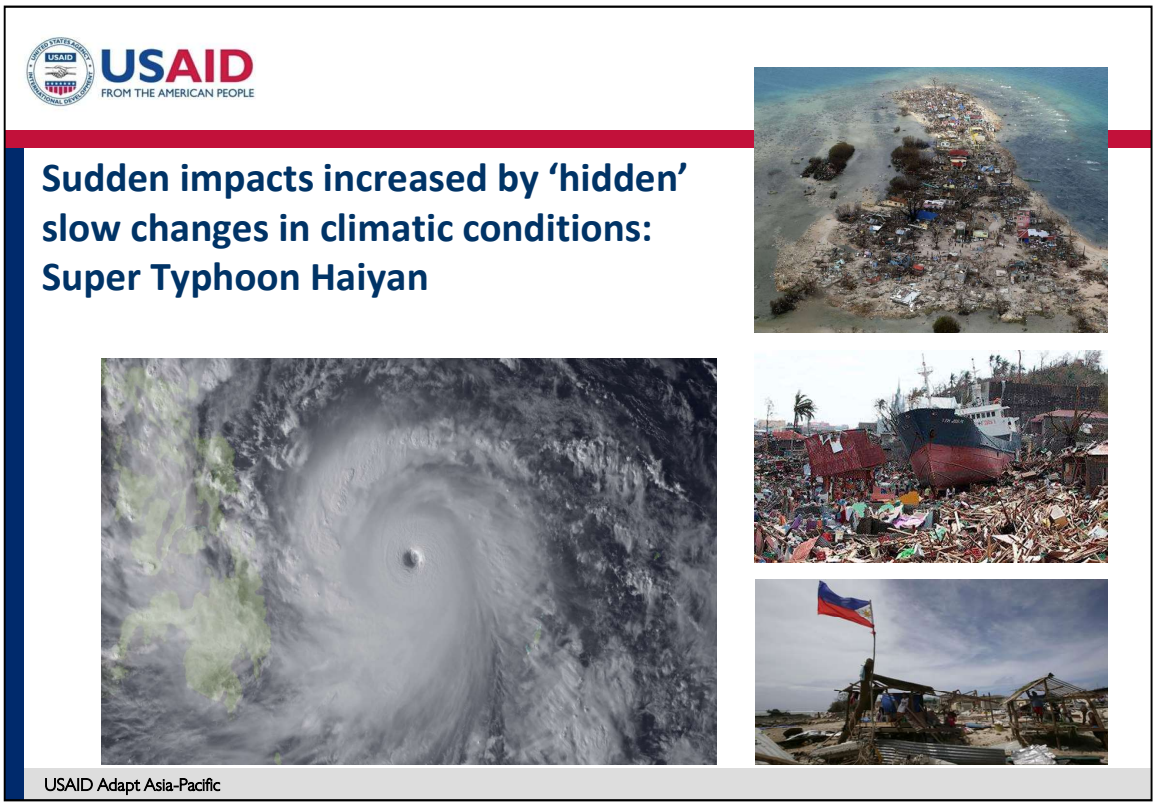
--**Point for discussion**: Thinking about slow onset versus sudden shocks, do we need to think about these in different ways? Do they call for different responses on the part of different levels of government? What sorts of resources and capabilities are needed for each? Has your national government begun to consider these impacts?

--**Point for discussion**: What constraints does uncertainty create for adaptation planning? Do these constraints mean that communities, cities, and countries should not adapt?

--Sudden shocks may require a great deal of expenditure at one time, as well as real time coordination of efforts. Slow onset changes require longer term commitment, coordination, and planning.

The material on this slide addressed **Learning Objective 1.1.C.**

Graphic is from http://www.skepticalscience.com/sea-level-rise-predictions.htm.



In addition to slow onset changes, there are a number of sudden onset changes to consider as well.

Example: Super-typhoon Haiyan is an example of this type of sudden, direct impact. By some accounts, this was the most powerful tropical storm ever recorded. Most of us are probably familiar with the impacts of this typhoon. Scientists say that one of the factors that contributed to the strength of this storm was abnormally high sea-surface temperatures. This is important for typhoons because they are fueled by high sea-surface temperatures: the higher the surface water temperature, the more powerful the storms can become.

This illustrates part of the complexity of climate change impacts. The direct, sudden onset impacts are the easiest to perceive. However, there are also longer time-scale processes of change that interact with shorter-term events such as a tropical storm. In this case, at least three longer-term processes need to be taken into consideration when discussing tropical storms.

1. There are indications that there is a "better than even" chance that global warming will lead to an increase in very intense tropical storms.

2. The AR5 also predicts that storms will be increasingly intense, and that the average

size and intensity of storms will increase. One factor contributing to this is the aforementioned gradual increase in sea-surface temperatures, which increase evapotranspiration, which is essentially the "engine" that powers a tropical storm.

3. Gradual sea level rise. Sea level rise increases coastal erosion, but it also enhances the height of storm surges and storm tides (the "storm tide" is the combined effect of storm surge and normal tidal action).

Therefore one of the takeaway points to bear in mind is that, even if we feel like we've made adequate preparations for events like tropical storms today based on past occurrences, these preparations may not be adequate into the future due to the shifting baseline effect. In other words, because of climate change the threats we currently face will in many cases in all likelihood be more intense in the future.

The material on this slide addressed **Learning Objective 1.1.C.**

For more information on global warming and tropical storms, see the following resource from the United States Governments' National Oceanic and Atmospheric Administration (NOAA): http://www.gfdl.noaa.gov/global-warming-and-hurricanes.

A useful VOA video resource on Haiyan and climate change can be http://www.voanews.com/content/climate-change-linked-to-typhoon-haiyan/1788993.html. 2m42s.

How Do We Know: Global

"Assess…the scientific, technical and socio-economic information relevant to understanding…human-induced climate change, its potential impacts and options for adaptation and mitigation."

To download:
http://www.ipcc.ch/report/ar5/wg1/

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How do we know about impacts of climate change? Over the next few slides we will discuss a variety of sources of information, from the global scale down to the local. At the global level, we can turn to the Intergovernmental Panel on Climate Change (IPCC). The IPCC is an UN-affiliated organization established in 1988 to aggregate and disseminate scientific knowledge on climate change.

The mission of the IPCC. The facilitator may choose to discuss the various aspects of this mission with the participants. One of the key points that should come out is that the IPCC aggregates and assesses current research on climate change. It is not a research institution by itself.

The report pictured, along with the link, is the working group 1 report from the IPCC's Fifth Assessment Report (AR5). This synthesis describes the physical science of climate change and represents the "state of the art" in terms of our understanding of climate change and global warming. This report is the fifth synthesis report (the first was released in 1990) and was released in 2013. There will eventually be a sixth assessment report. The participants would likely also be interested in the report of IPCC Working Group II, which was released in 2014 , as well. This report covers impacts, adaptation, and vulnerability from climate change. It has chapters for every region on the planet, including Asia.

The 32-page Summary for Policymakers can be accessed and downloaded at http://ipcc-

wg2.gov/AR5/images/uploads/WG2AR5_SPM_FINAL.pdf. The entire report can be downloaded chapter-by-chapter at https://ipcc-wg2.gov/AR5/report/full-report/.

In addition to the regional chapters, there is a great deal of information that would be of interest to the participants, including chapters on urban areas, human health, livelihoods and poverty, adaptation planning, etc. Both of the reports mentioned here (the summary for policy makers and the full report) are included on the resources CD that is provided to participants.

The material on this slide addresses **learning objective 1.1.D.**

Source: IPCC website at http://www.ipcc.ch/ (accessed: 1/30/2014).

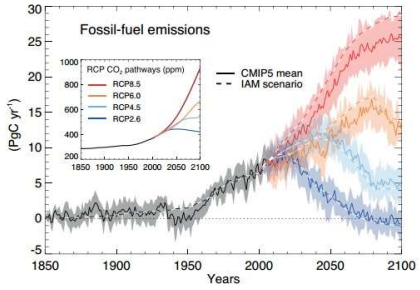
A useful video resource on the IPCC AR5 report, produced by the IPCC (15m53s) can be found at https://www.youtube.com/watch?v=F-Hcu3jH8G4.

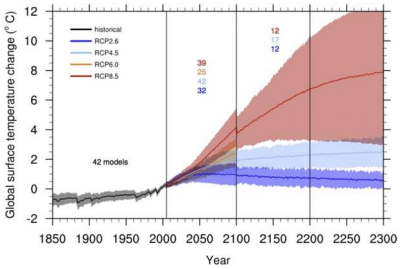
What Will Happen in the Future?

It depends!

- Future emissions
- Carbon dioxide uptake in the oceans
- Feedbacks & tipping points

We are already committed to some degree of climate change.





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Facilitator: This slide addresses the overarching theme of **uncertainty**. The point to emphasize here is that part of the uncertainty that we have to deal with arises from our imperfect understanding of oceanic and atmospheric processes that shape the physical aspects of climate change.

It depends. As we've noted, it is difficult to predict future conditions because they are contingent on so many variables, including the amount of greenhouse gas emissions in the future. It is also difficult to predict because climate processes are the result of complex interactions between many different systems, and we don't fully understand these interactions.

Future emissions. Much of what happens in the future will depend on how successful we are in limiting greenhouse gas emissions in the future. For each of its assessment reports, the IPCC develops several scenarios of future emissions. These are then used in complex computer models, which generate projections for the future. There are several dozen of these computer models in use around the world. Coordination of the models is the task of the Coupled Model Intercomparison Project, which is now in its 5th phase. The IPCC uses an "ensemble" of models to generate projections for use in its assessment reports.

Carbon dioxide uptake in the oceans. Currently about 25% of the anthropogenic CO2 currently enters the ocean and is dissolved there. This has changed the ocean's

chemistry, and there is a great deal of uncertainty as to how much CO2 the oceans can actually absorb.

Feedbacks & tipping points. Feedbacks are relationships between at least two phenomena. If feedbacks take the form of feedback loops, it means that there is a continuous relationship between the phenomena. We use the term "negative feedback loop" to refer to self regulating systems. Positive feedbacks, on the other hand, are those in which the related phenomena encourage or amplify one another, and so a positive feedback loop is one that moves away from homeostasis or self regulation. Positive feedback loops may eventually reach a tipping point, beyond which the system cannot move back to equilibrium. The tolerance of Earth's bio-physical systems is very difficult to predict, and hence scientists are concerned about a number of potential climate change tipping points, beyond which climate change will accelerate and lead to abrupt change. These abrupt changes include rapid sea ice melting, changes in ocean circulation patterns, and abrupt shifts in marine productivity.

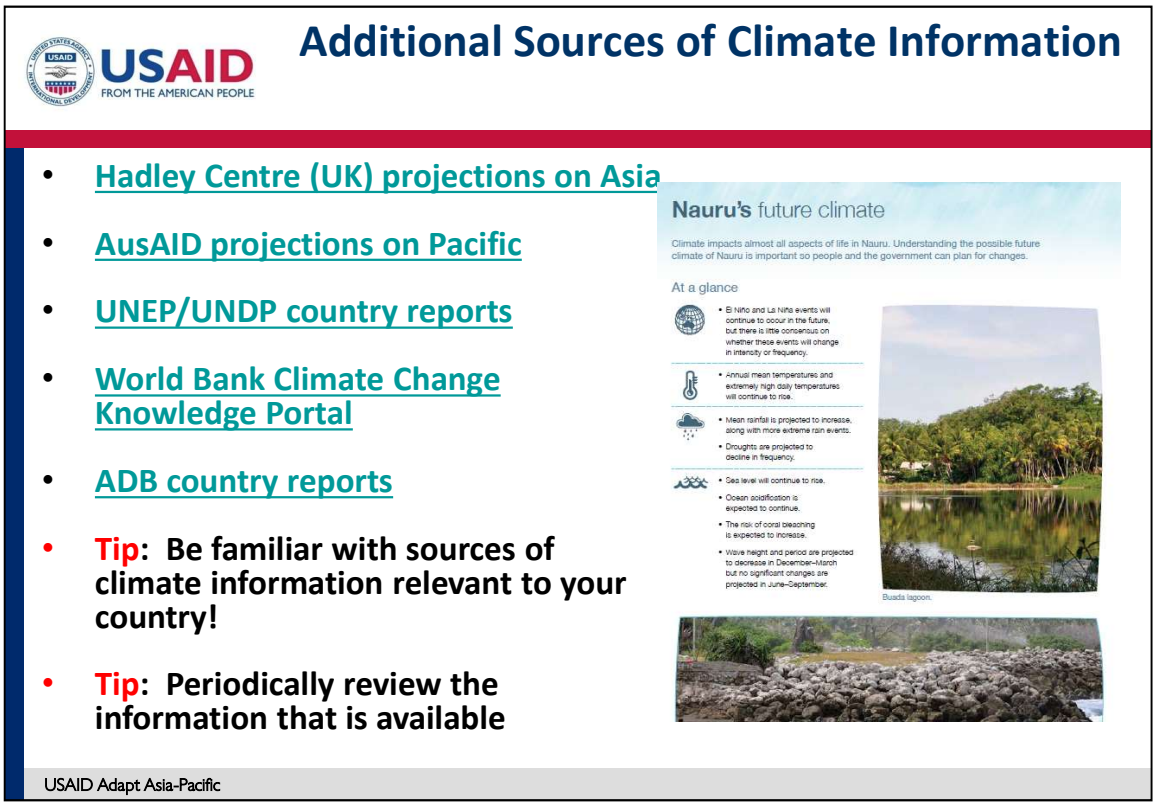
We are already committed to some degree of climate change. Regardless of how successful we are in curbing future emissions, because of the greenhouse gasses that are already in the atmosphere, we are **committed** to some degree of global warming and climate change in the future. Some of these emissions have long **residence times** in the atmosphere, and thus they will be contributing to warming for decades, and in some instances centuries into the future. In other words, some degree of warming is an absolute certainty, which means that every country will experience some climate change, and in most places this is already being experienced and observed.

The images in this slide are both from the AR5 report.

The top image shows the different representation concentration pathway scenarios used by the IPCC. Each pathway represents different increases in anthropogenic radiative forcing, accounting both for greater GHG concentrations and aerosols (which have a cooling effect). The pathways are named after the quantity of radiative forcing increase between 1750 and 2100. For example, RCP8.5 is associated with a +8.5 watts/square meter increase in radiative forcing since 1750. Note that we are currently on the 8.5 trajectory.

Then in the lower image we have what this means for average global temperatures. The "jog" at the year 2100 is because each of the lines represents an ensemble of models, and fewer models were running after 2100, and so the average changes.

The material on this slide addresses **learning objective 1.1.A.**



FACILITATOR: Before the course is delivered, edit this slide to include sources of information relevant to the country of delivery.

Besides the IPCC, there are many useful sources for global, regional, and national level climate change information. On this slide we provide several suggestions; new information is being generated all the time.

Tip: Be familiar with sources of climate information relevant to your country. It would also help to ensure that your staff and department are aware of and familiar with relevant sources of information, as these can feed into the project development process.

Tip: Periodically review the information that is available. As noted new information is being produced all the time, and so it is useful to conduct periodic reviews for new information and sources. Periodic reviews should be scheduled and are part of a responsive and learning agency.

UNEP/UNDP country reports.
http://www.geog.ox.ac.uk/research/climate/projects/undp-cp/. These country-level climate data summaries are intended to address the climate change information gap for developing countries by making use of existing climate data to generate a series of country-level studies of climate observations and the multi-model projections made

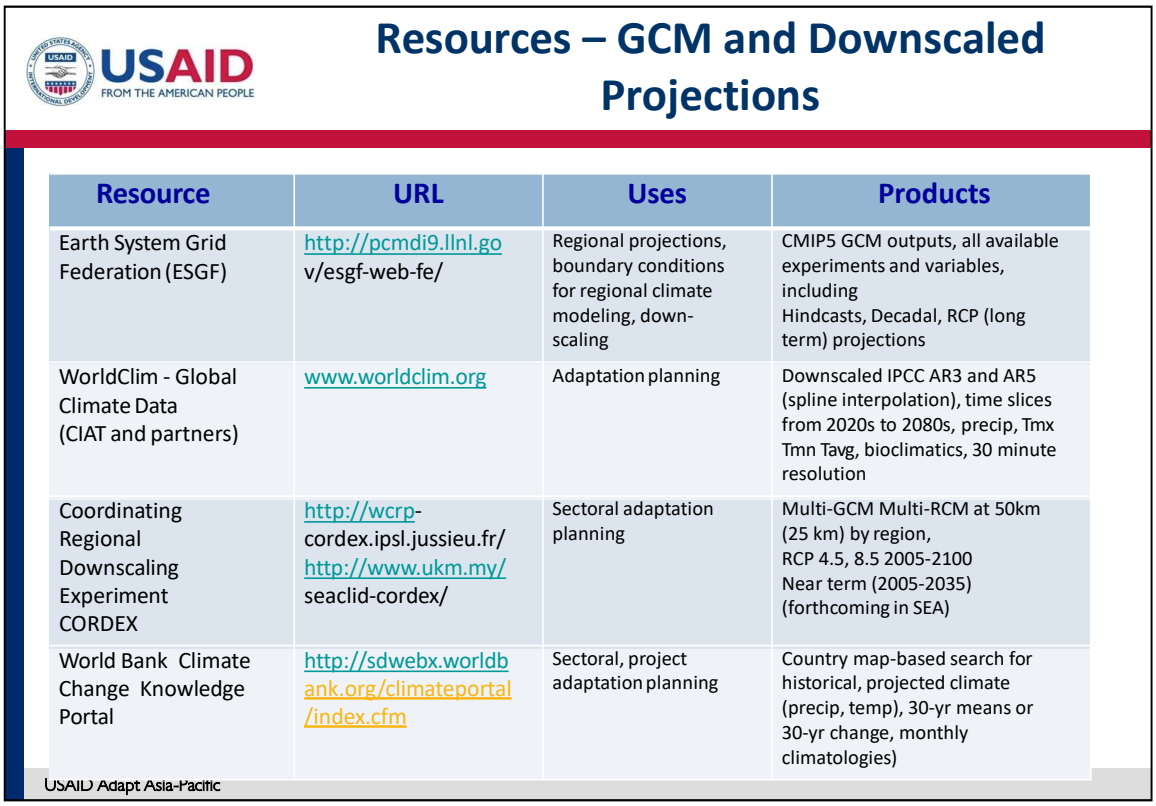
available through the WCRP CMIP3. A consistent approach has been applied for 52 developing countries in order to produce an 'off the shelf' analysis of climate data, and also make available the underlying data for each country for use in further research.

For each of the 52 countries, a report contains a set of maps and diagrams demonstrating the observed and projected climates of that country as country average time series as well as maps depicting changes on a 2.5° grid and summary tables of the data. A narrative summarizes the data in the figures, and placing it in the context of the country's general climate.

A dataset containing the underlying observed and model data for that country, is made available for use in further research projects. The files are smaller and more manageable than the global fields made available by the PCMDI, and in text format which can easily downloaded, read and manipulated.

The image in this slide is from Current and Future Climate of Nauru, developed by the Pacific-Australia Climate Change Science and Adaptation Planning Program and supported by AusAID. The full document is included in the "Nauru" folder in the resources pack and is included here to provide an example of the type of information that is available. **Facilitator**: You may choose to replace this resource with something else.

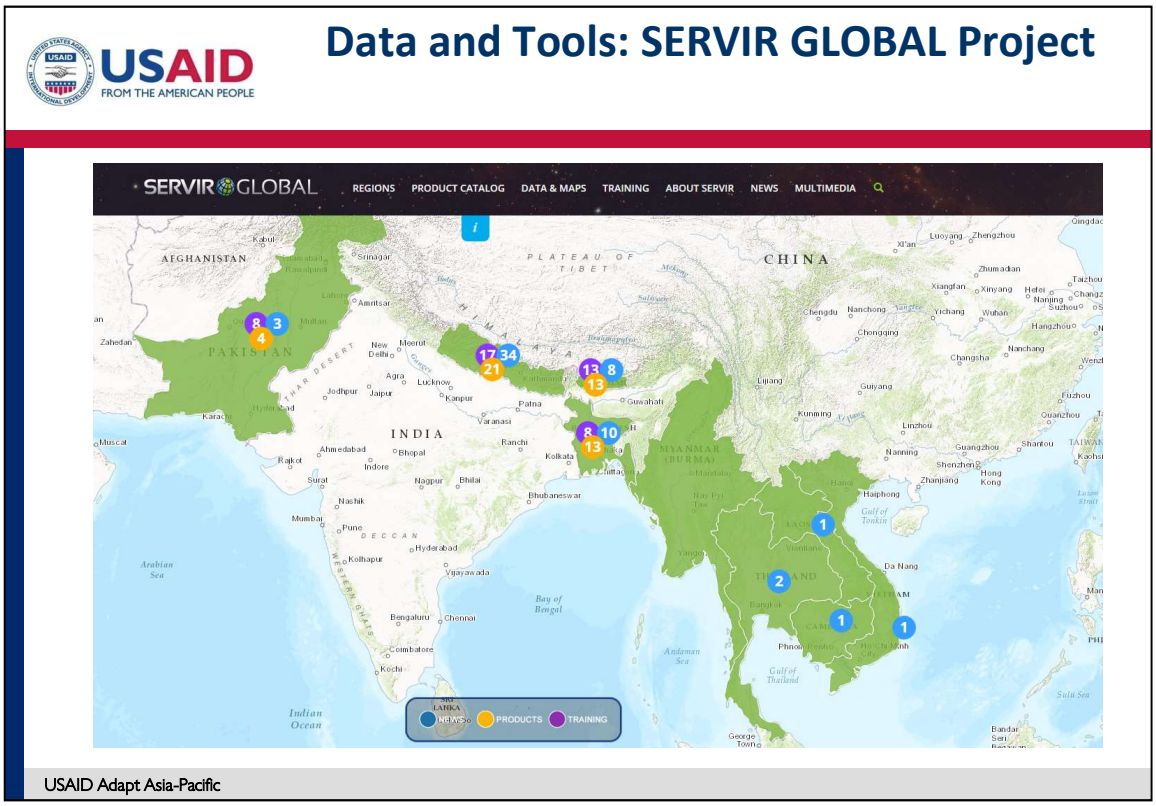
The material on this slide addresses **learning objective 1.1.D.**



Note to Facilitator:

Various sources of models

The material on this slide addresses **learning objective 1.1.D.**



Facilitator: If this slide is not relevant to your country, remove it.

SERVIR is a joint development initiative of NASA (National Aeronautics and Space Administration) and the United States Agency for International Development (USAID). It works in partnership with leading regional organizations world-wide to help developing countries use information provided by Earth observing satellites and geospatial technologies for managing climate risks and land use. The SERVIR program aims to empower decision-makers with tools, products, and services to act locally on climate-sensitive issues such as disasters, agriculture, water, and ecosystems and land use.

There are two SERVIR sites covering USAID Adapt Asia-Pacific countries: SERVIR Himalaya and SERVIR Mekong.

SERVIR Mekong is developing tools and applications that are both integrated with the open data portal and allow for leveraging state of the art remote sensing technologies. These tools are being built using a demand-driven process that is organized around an open call system. You can visit their site (http://servir.adpc.net/tools) and submit an idea for potential development. They also provide a number of satellite data products for download and viewing.

SERVIR Himalaya connects space to villages by generating geospatial information, including Earth observation data from satellites, geographic information systems, and predictive models useful to developing countries in the region. SERVIR-Himalaya works with ICIMOD; find out more at http://www.icimod.org/servir-himalaya.

The material on this slide addresses **learning objective 1.1.D.**

NEXT: National-level sources of information

Know the relevant agencies/ministries/institutions related to climate change, scientific research, and atmospheric/oceanic processes

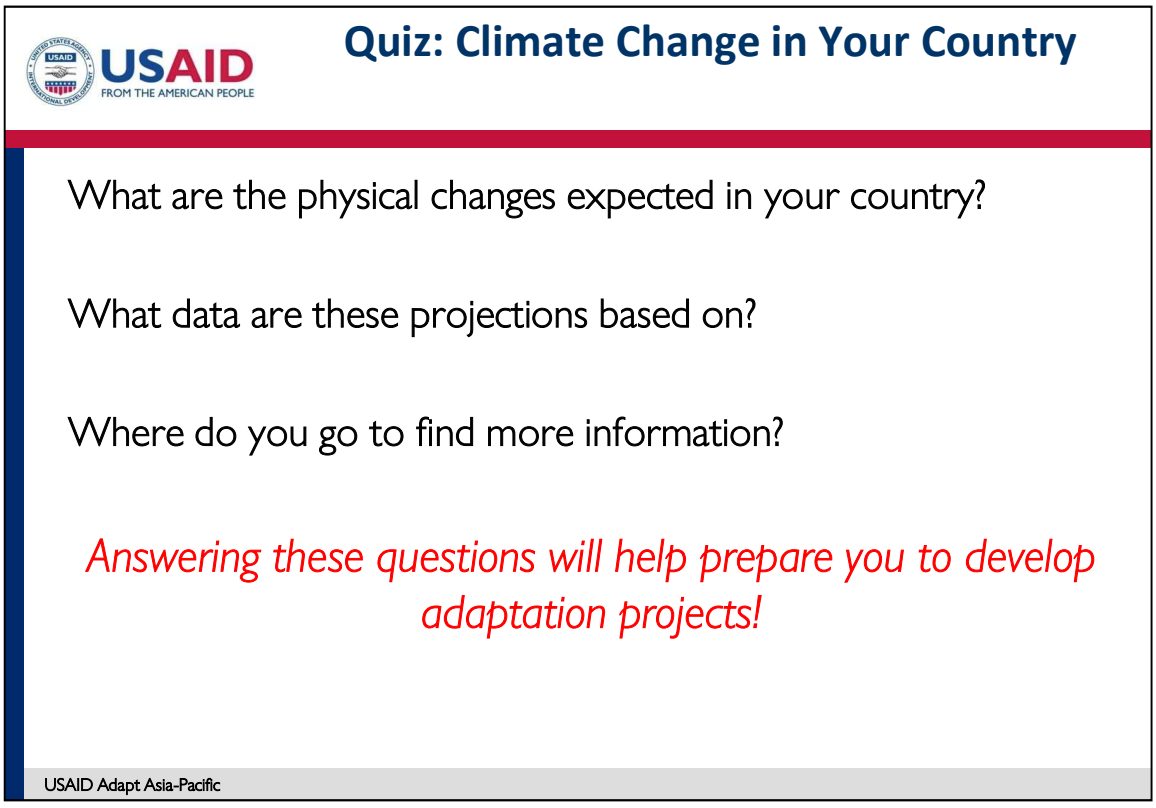
Be familiar with the reports they produce, their data portals, and other aspects of data and information management!

NEXT: Subnational Sources of Information

Are there subnational plans in place?

Research/Downscaled projections/vulnerability assessments?

- ✓ University studies
- ✓ International NGOs
- ✓ Local NGOs



Facilitator: At this point engage the participants in a discussion about the physical manifestations of climate change in the country where the training is being conducted. Ask the participants to address the questions one by one. Check for mastery of the physical processes involved to ensure that all of the participants understand them.

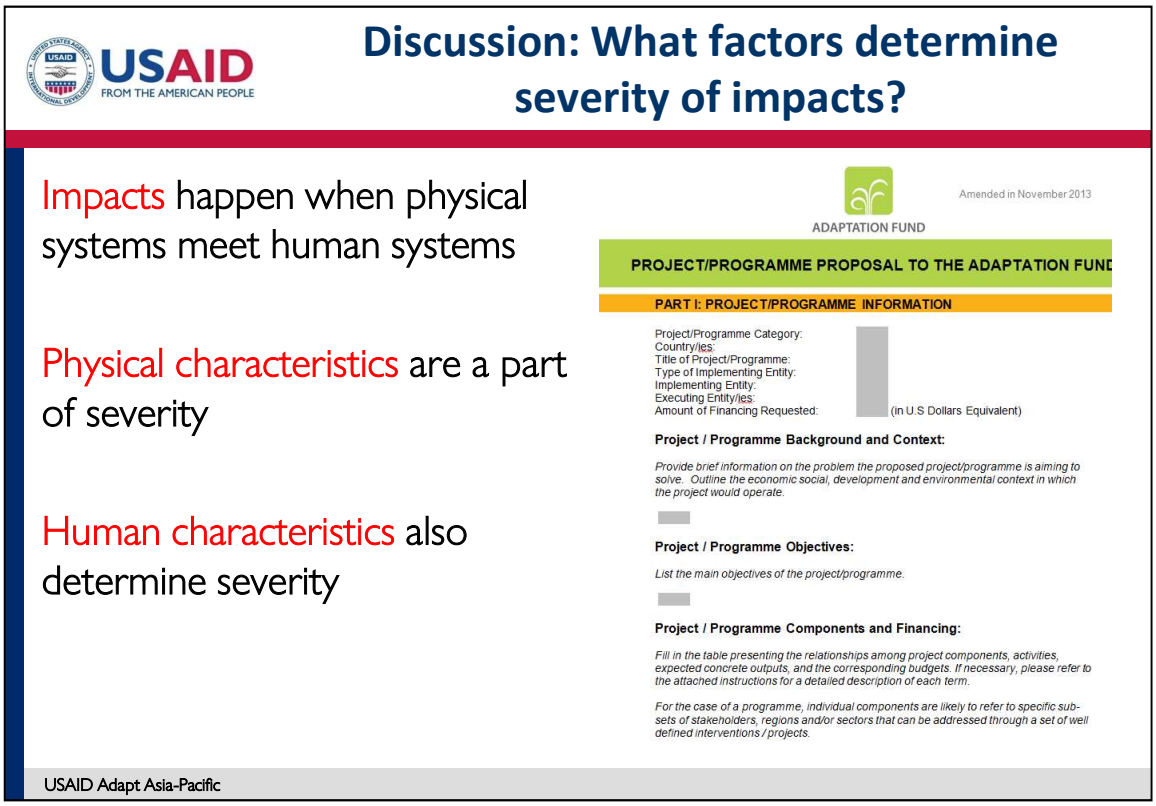
What are the physical changes expected in your country? Participants should be able to describe country-scale processes as well as regional processes.

What data are these projections based on?

Where do you go to find more information?

Point out to the participant that a solid understanding of the expected manifestations of climate change, as well as a knowledge of the data upon which the projections are based, is a feature of the beginning of virtually all project proposals. Thus it is important to be able to coherently explain the effects that climate change is projected to have on the weather and climate of your country and its sub regions.

The material on this slide addresses **Learning Objective 1.1.B.**



The next step is to think about **impacts.** Impacts happen when physical processes meet human systems. As noted earlier some climate change processes are gradual, taking place over years or decades. For example, seasonal shifts happen over years, and sea level rise takes place over decades. These are changes in averages, and so the impacts will appear over time. Some physical processes have much more immediate manifestations, like tropical storms and floods, are more immediate, as the represent changes in extremes. These events are dramatic, and their impacts are immediate.

Impacts are determined by a wide range of physical factors. For example, impacts of a tropical storm depend on wind speed, storm surge height, physical features of the affected area (geology, shape of the coast, topography, etc.).

What are the impacts of the climate change processes identified as relevant to your country? Focus on a recent disaster event. What factors determine the severity of these impacts? Participants should begin with the physical processes (e.g. storm surge flooding, wind damage). Describe how impacts varied according to geographic location. Then ask the participants if some areas were hit harder than other areas for other reasons. What factors contributed to this?

Facilitator Note: To compliment this discussion you may choose to develop an impact chain. There is also an impact chain activity in the workshopping section of the module, so instead of having breakout groups do it, it would be best to do this as a whole-class

activity. Basically a demonstration, and then the "practice" is in the workshopping section later in the day. The impact chain is optional and should be used only if you determine that there is a need.

One of the outcomes of this discussion should be that the participants point out that impacts are determined not only by physical processes, but also by socio-economic factors as well. Participants should be encouraged to describe direct and indirect impacts. The practical tie-in is that when developing project proposals (e.g. for the Adaptation Fund), the climate analysis and vulnerability assessments precede program components. Project appraisers emphasize again and again that these elements of the proposal must be thoroughly and coherently developed, but a weakness of many proposals is that they are not. In the words of one seasoned professional, "I'm personally most interested in these aspects—if they are not clear (and mostly they are not in the initial proposals I've reviewed), then I am not happy until these are clear".

On the right side of the slide we have included a snapshot of the first page of the Adaptation Fund application. A firm understanding of both climate change as well as the physical, social, and economic impacts will make this section compelling to reviewers and increase the chances of approval. In the next few slides we will be discussing vulnerability assessments, which is an essential tool for understanding these fundamental points.

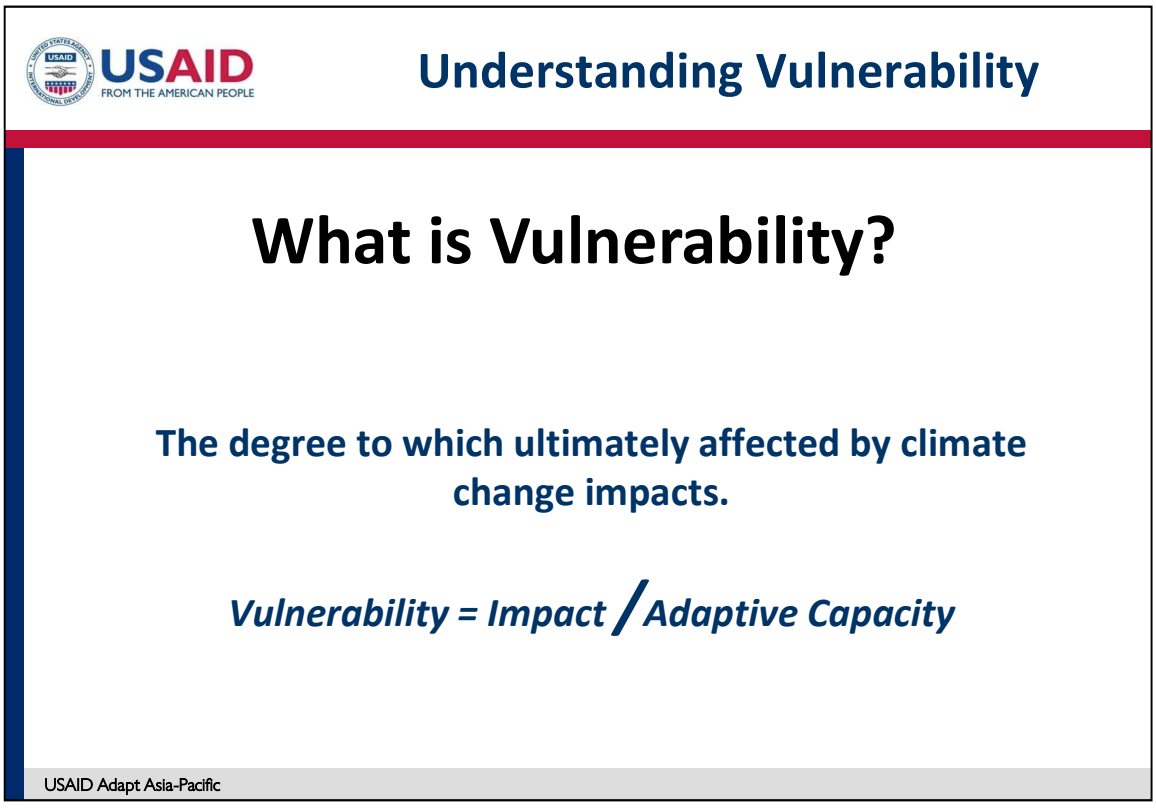
Point out to the participants that this exercise helps us to understand that climate change is having and will continue to have a wide range of impacts, and so a variety of adaptation strategies will be necessary.

The material on this slide addresses **learning objective 1.1.E.**

Describing the impacts

How do you describe the issue you want to address?

- Baseline socioeconomic/demographic conditions
- Current trends (e.g. marketization, urbanization)
- How are the physical processes changing the situation?



In order to understand this interface of physical and socio-economic processes, we rely on **vulnerability assessments**. Vulnerability assessments will provide you with information that will enable you to determine your most urgent priorities for climate change adaptation, including the identification of places, assets, and most importantly people that stand to suffer the most from climate change. Good project proposals are grounded in rigorous vulnerability assessments, which generally form a key component of policy and strategy documents. However, vulnerability assessments can also be conducted on existing and in-the-pipeline projects to determine how susceptible they are to potential damage from climate change processes. In fact, the ADB now requires vulnerability assessments to be conducted on all of the projects it funds.

Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity. In most formulations, vulnerability is envisioned as the impacts of climate change moderated by adaptive capacity. For example, if adaptive capacity is low, vulnerability will tend to be high. However, a group with higher adaptive capacity and facing the same threat will be less vulnerable than the group with lower adaptive capacity.

Note: This is a very important concept in terms of climate finance, because many financiers (e.g. Adaptation Fund, ADB) make explicit mention that projects should benefit the most vulnerable. Thus when you are preparing a project document for external funding, you will need to be explicit about the vulnerability your project addresses and how it was determined.

The material on this slide addresses **learning objective 1.1.C.**

This picture is of children in Tacloban after Super Typhoon Haiyan, known in the Philippines as "Yolanda".

What made Tacloban vulnerable? What makes particular social groups vulnerable?

Ask the participants to brainstorm groups that would be most vulnerable in this situation. Then ask the participants to imagine a disaster that has afflicted their home country. The participants should know a significant amount about the local/national disaster, and so the facilitator should **ask** the participants who the most vulnerable groups were, and why they were vulnerable. **Write** the answers on the flipchart or white board. These groups might include women, the elderly, disabled (mentally and physically), those without extended family networks, migrant laborers. These groups would be vulnerable for a variety of reasons, including the fact that they don't have support networks, and also the fact that the government that provides support services for them has its capacity severely diminished by the hurricane.

Photo is from NPR. http://www.npr.org/blogs/thetwo-way/2013/11/09/244118213/super-typhoon-leaves-more-than-100-dead-in-philippines.

The material on this slide addresses **learning objective 1.1.C.**

This picture is from a landslide in Rio de Janeiro in Brazil in 2010. **Ask** the participants if they are familiar with a scenario such as this one. **Ask** who the most vulnerable groups are in these situations. They may point to the people living or working on the slope. However another important thing to point out (if the participants don't point it out) is the road that has been washed out. What impacts might that have? Often recent migrants and the poor are the ones who are building on steep and unstable slopes.

Source: http://www.dailymail.co.uk/news/article-1264146/Brazil-floods-95-dead-Rio-Janeiro-flooded.html.

The material on this slide addresses **learning objective 1.1.C.**

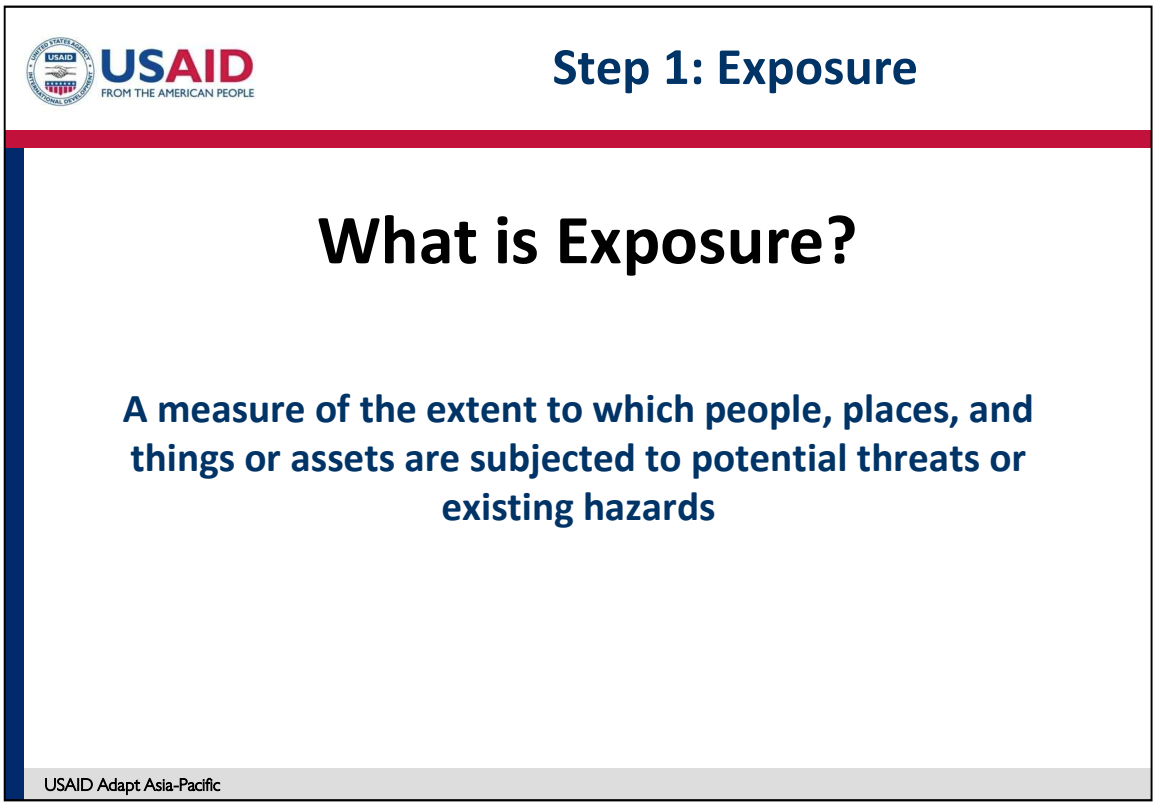
This picture is of a flooded power station during the Bangkok flood in 2011. This vulnerability affects critical infrastructure.

Ask the participants what the direct impacts of the flood are on this particular structure. Then **ask** them what indirect impacts it would have if the power generating facility went down. We know that the power facility is vulnerable, but who else is most vulnerable if the power station is compromised?

From the Bangkok Post.

http://www.bangkokpost.com/multimedia/photo/262686/a-bird-eye-on-the-floods.

The material on this slide addresses **learning objective 1.1.C.**



One very useful tool for assessing potential impacts of climate change is **vulnerability assessment**. Though there are many frameworks for conducting vulnerability assessments, one of the most common utilizes the exposure-sensitivity-impacts-adaptive capacity heuristic. Here we will provide a brief overview of this methodology; participants that are interested in further details may find a wide variety of resources online, or they may choose to access USAID Adapt Asia-Pacific's Urban Climate Change Adaptation and Resilience (UCCA) training program, which provides details and step-by-step guidance for conducting vulnerability assessments.

The first step of vulnerability assessments is to determine **exposure**, which is defined on this slide. Exposure is mainly a geographic characteristic, and for many threats is easily mapped.

Notes for Facilitator:

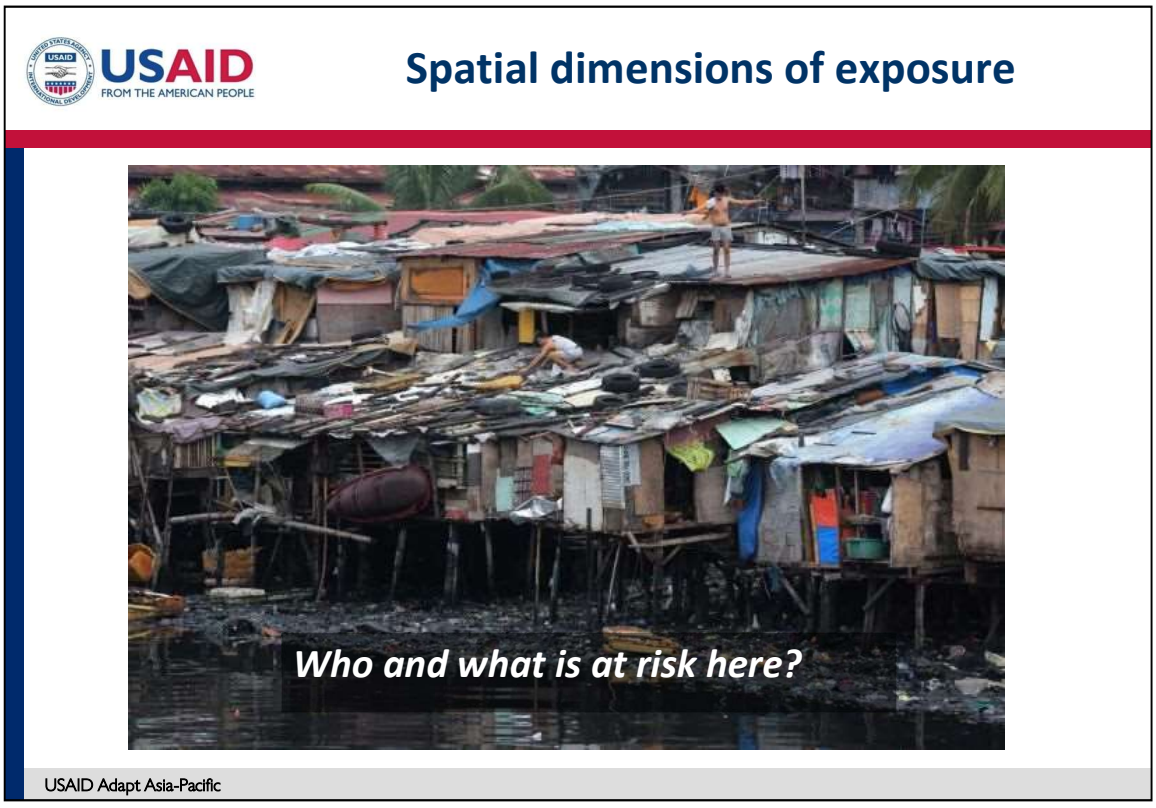
The facilitator can add that exposure in the context of climate change is limited to potential climate threats, but that there are many other non-climate-related risks or threats, such as earthquakes and urban fires. Exposure may depend on the nature of the threat (e.g. an increase in temperature) to people, places, and things or 'assets,' and the extent to which the threat will increase in the future (e.g. in intensity and/or frequency). When we discuss exposure, we will address three simple questions:

1. Who and what is at risk?
2. What are they at risk from?
3. When are they at risk?

When determining exposure, it is important to have as much accurate information about not only disasters and emergencies that have occurred in the past, but also about what might happen in the future.

Encourage a discussion of exposure. Exposure includes considerations of who, where (which places in a town or city), and what 'things' or assets are likely to be at risk from different kinds of climate threats. **Ask** the participants what contributes to exposure. **Ask** the participants if there are social, economic, and/or political processes that contribute to increased exposure.

The material on this slide addresses **learning objective 1.1.C.**



The first major component of exposure is the "**who and what**" dimension. For example, if the threat you are addressing is flooding, what areas could potentially be flooded? In the case of flooding, determining exposure might be as simple as developing a map which illustrates flood potential with assets and areas that could be inundated. Other threats are more difficult to map, such as droughts.

These are stilt houses in Manila Bay. Exposure here is determined by geographic location. But, continuing with the discussion from the previous slide, are there processes that push people into exposed situations? It is important to recognize that ***marginality*** can increase exposure to climate change.

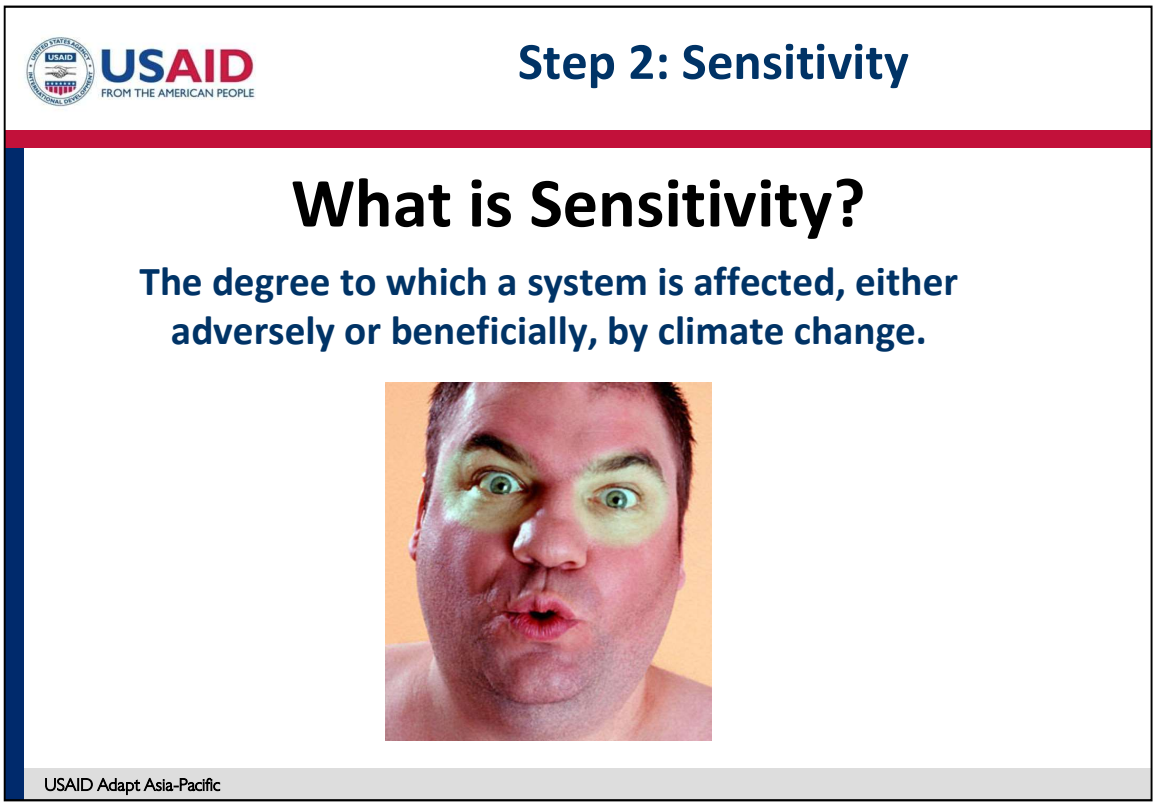
Are you familiar with scenes like this? If you live in a coastal area, do people built stilt houses like this? Who lives in houses like this? Why do they built these types of houses? What other marginal areas do people settle in that might expose them to climate change impacts? Examples might include river banks and steep hill slopes. How does your city address these types of problems? Is it the government's responsibility to do anything about this? Why or why not?

What are some ways that exposure could be decreased?

Source is http://www.newstimes.com/news/world/article/Hundreds-of-thousands-flee-

from-Philippine-typhoon-5622181.php.

The material on this slide addresses **learning objective 1.1.C.**



After determining measures of exposure, the next step is to ascertain **sensitivity**. On the slide we have a commonly used definition of sensitivity. Sensitivity refers to how much an asset, area, or group, is affected by exposure to a hazard. In other words, ask the question "**to what degree will the exposed systems be significantly affected by projected changes in climate?"** A good, easy to imagine example of sensitivity has to do with sunburn, as is demonstrated in this picture. Lighter skinned people tend to sunburn more easily than those with deeper skin tones. You may have noticed this in the tropics. This is because the skin pigment melanin absorbs UV radiation, which causes sunburn in people with less melanin in their skin. Thus people with less melanin in their skin are more **sensitive** to sun, even though they may be **exposed** to the same amount of sunlight (or even less!) as someone with more melanin.

Ask the participants if an asset or group can be **exposed** but not **sensitive**. What would be an example of this?

Ask the participants if an asset or group can be **sensitive** but not **exposed**. What would be an example of this? This one is a little more challenging. An easy way to envision this would be to think about indirect impacts. For example, if there is a drought that affects an agricultural region far away from the city, the residents of the city might not be exposed directly to the drought, but they may end up paying much higher prices for food. This is an example of sensitivity. This is an important concept to think about because it underscores the fact that climate change has cross-sectoral (rural-urban, inter-agency) impacts and that the impacts aren't confined to discreet locations, and that there are

complex, indirect impacts.

Make the point that there are differences in sensitivity as well. Different groups can be exposed to the same threat, but experience it differently because of different levels of sensitivity. We often find that certain groups, in particular, women, are more sensitive to climate stressors. This is due to many factors….women constitute the majority of the world's poor and are more dependent on natural resources that may be threatened by climate change. They also often face social, economic, and political barriers. When coupled with unequal access to resources and to decision-making processes, limited mobility places women in rural areas in a position where they are disproportionately affected by climate change.

The picture in this slide is from http://a3.files.beautyeditor.ca/image/upload/c_fit,cs_srgb,dpr_1.0,q_80,w_620/MTIzNjEzMTkwMjQ1MjIxOTAy.jpg.

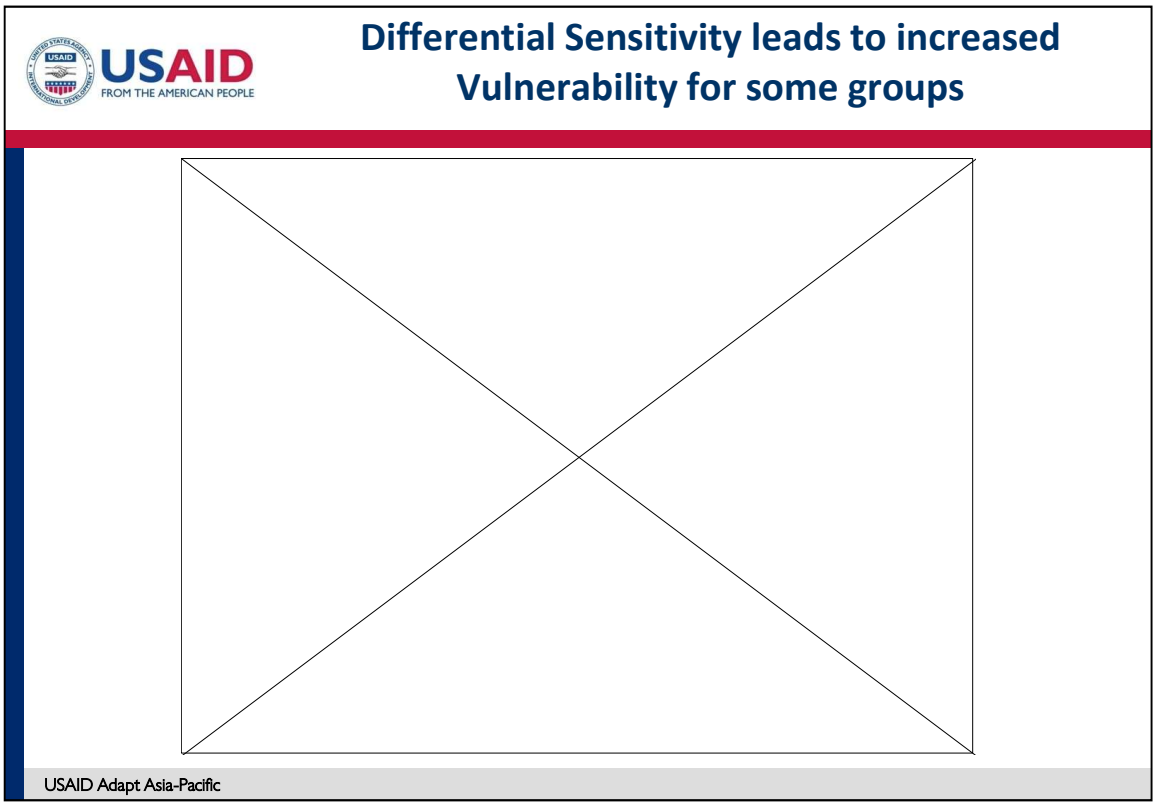
The material on this slide addresses **learning objective 1.1.C.**

An example of differences in sensitivity

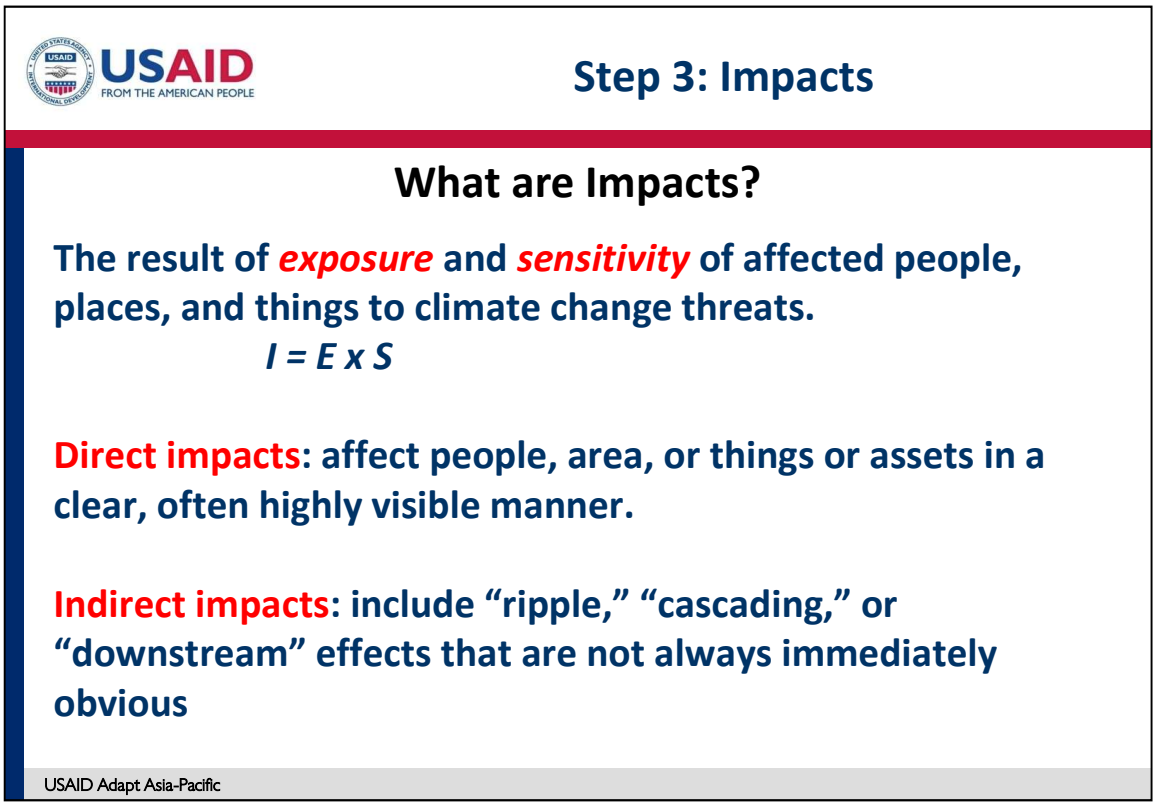
USAID Adapt Asia-Pacific

Most of us can remember this image, or one similar to it. This photo was sourced from the World Food Program (https://www.wfp.org/photos/gallery/returning-aceh-10-years-after-tsunami, last accessed 3/21/2016). The mosque in this image was able to survive the tsunami, whereas everything around it was destroyed. The mosque has columns on the ground floor that allowed the water to pass through.

This is a powerful symbol for many people. We can discuss the structural characteristics that enabled the mosque to survive, but there are also non-structural elements of sensitivity. Can you think of some of them?



This video is called “Climate Change and Gender” and was produced by the UNDP and GEF. It is 2m34s and can be accessed from https://www.youtube.com/watch?v=579XPcc5ERw

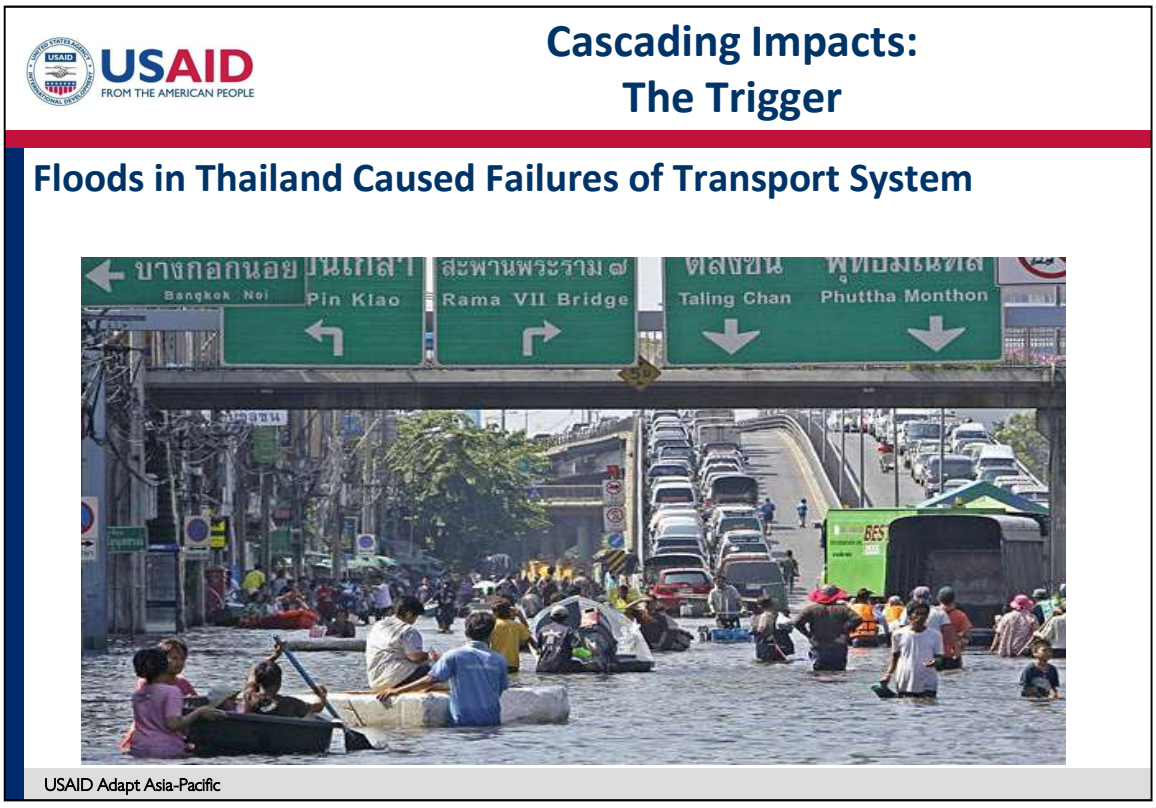


Defining impact. Impact is the product (the result of) exposure combined with sensitivity. So it follows that there would be two potential ways to address impacts: the first would be to decrease exposure. The second would be to decrease sensitivity. **Ask** the participants if they can think of approaches that would broadly fall into one of these two categories, or both.

Impacts can be **direct** or **indirect**. The facilitator can ask for some examples of each. If the participants have a hard time generating indirect impacts, the facilitator should prompt them. For example, if a road is washed out, what is the impact on food security? Examples of impacts include loss of life and damage due to storms, flooding, fire, or earthquake; famine or disease; failed systems such as energy supply, food distribution, water supply and wastewater treatment, trash collection/disposal, medical and emergency services, etc.

This is also a good place to utilize some sort of concept mapping or impact chain activity so that the groups can discuss direct and indirect impacts.

The material on this slide addresses **learning objective 1.1.C.**



In this slide and the two following slides we can see an example of ripple or **cascading** effects. These slides tell a story of flooding and direct, indirect, and cascading impacts in Thailand. The massive flooding in Bangkok in 2011 rippled through the entire Thai economy and had significant indirect impacts on the country that it has still not fully recovered from.

In this case, the trigger for a cascading impact (you might also think of it as a "domino effect") was a major flood. In this slide we see that episodic floods can interfere with transport systems. This disruption can last for days or weeks at a time, but take years or even decades to fully recover from. This was Bangkok in late 2011.

This series of slides represents cascading impacts; be clear that the situation was not necessarily triggered or associated with climate change in any significant way. The case is, however, very instructive for the types of cascading impacts that might be driven by enhanced climate stressors.

The material on this slide addresses **learning objective 1.1.C.**

Cascading Impacts: Indirect impacts

Transport Infrastructure Failures Caused Breaks in Supply Chains

USAID Adapt Asia-Pacific

Disruption of the transport infrastructure can delay or interrupt supply chains. In turn, interruption of parts and material supply chains can result in closed manufacturing plants for weeks or months.

The material on this slide addresses **learning objective 1.1.C.**

Cascading Impacts: Direct Impact

USAID Adapt Asia-Pacific

Closed plants can put workers out of work for weeks or months. Lost wages will result in reduced consumption of food and services----and thus create further ripples through the economy. Other examples of cascading events that come to mind?

Other examples:

--What happens when there are prolonged interruptions in electricity? What "ripple effects" does that set off – economically, socially, and physically?

--What about failures in the water system?

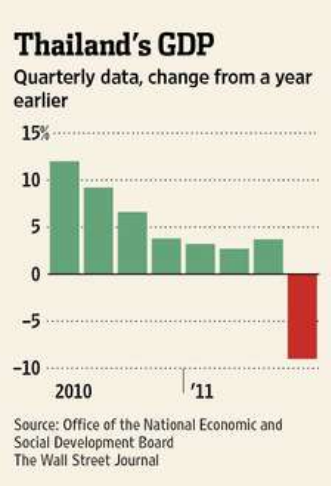
--Can you describe an example of a ripple impact that has occurred in your city?

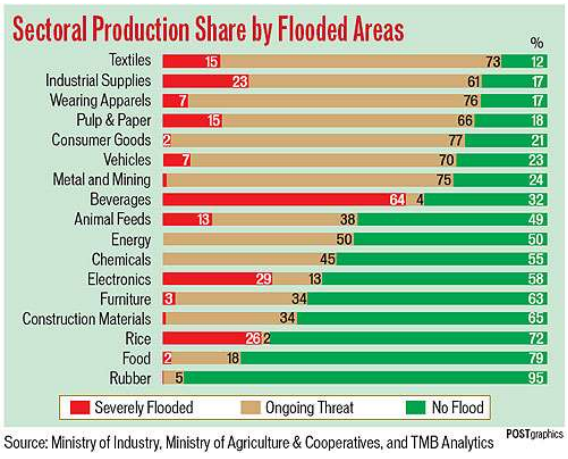
The material on this slide addresses **learning objective 1.1.C.**

USAID
FROM THE AMERICAN PEOPLE

Cascading Impacts: Systemic Disruption

Economic ripples cascaded through the Thai economy in 2011 and 2012 … and beyond to global markets, with future negative implications for industrial investment in Thailand.





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The 2011 flooding eventually led to a significant slowdown in the Thai economy.

GDP graphic from Wall Street Journal.

Sectoral graphic is from the Bangkok Post. Source: http://www.bangkokpost.com/learning/learning-from-news/264786/floods-losses-to-thailand-economy.

The capacity of a community or system to cope with a disturbance and to respond and recover from it by adapting, learning, and transforming itself in order to maintain its essential functions, identity, and structures. Adaptive capacity is the way that an asset, group, or area is able to respond to an impact.

This is another way of thinking about '**resilience**.' The facilitator should ask for some examples.

Ask the participants the following questions and make notes on the flipchart/whiteboard:

--What attributes of a person might make them cope with a major personal shock or change? A personal shock or change might include losing one's job, losing one's home to a fire or flood.

--What attributes of a community increase its adaptive capacity?

--What attributes of an asset or urban system (e.g., water treatment, energy supply, food distribution, etc.) would increase its adaptive capacity or resilience to various climate or disaster risks?

Some examples of adaptive capacity might include the following:

--Knowledge of climate risks, conservation agriculture skills, good health to enable labor

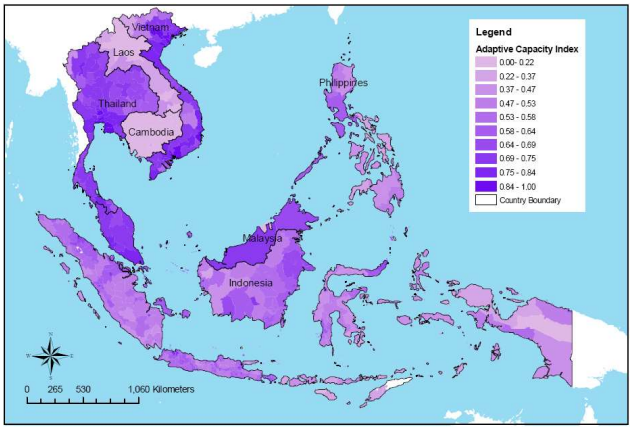
--Women's saving and loan groups, farmer based organizations, traditional social support mechanisms

--Seed and grain storage facilities

--Micro insurance; diversified income sources.

The material on this slide addresses **learning objective 1.1.C.**

Examples of Adaptive Capacity



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Here are some examples of adaptive capacity.

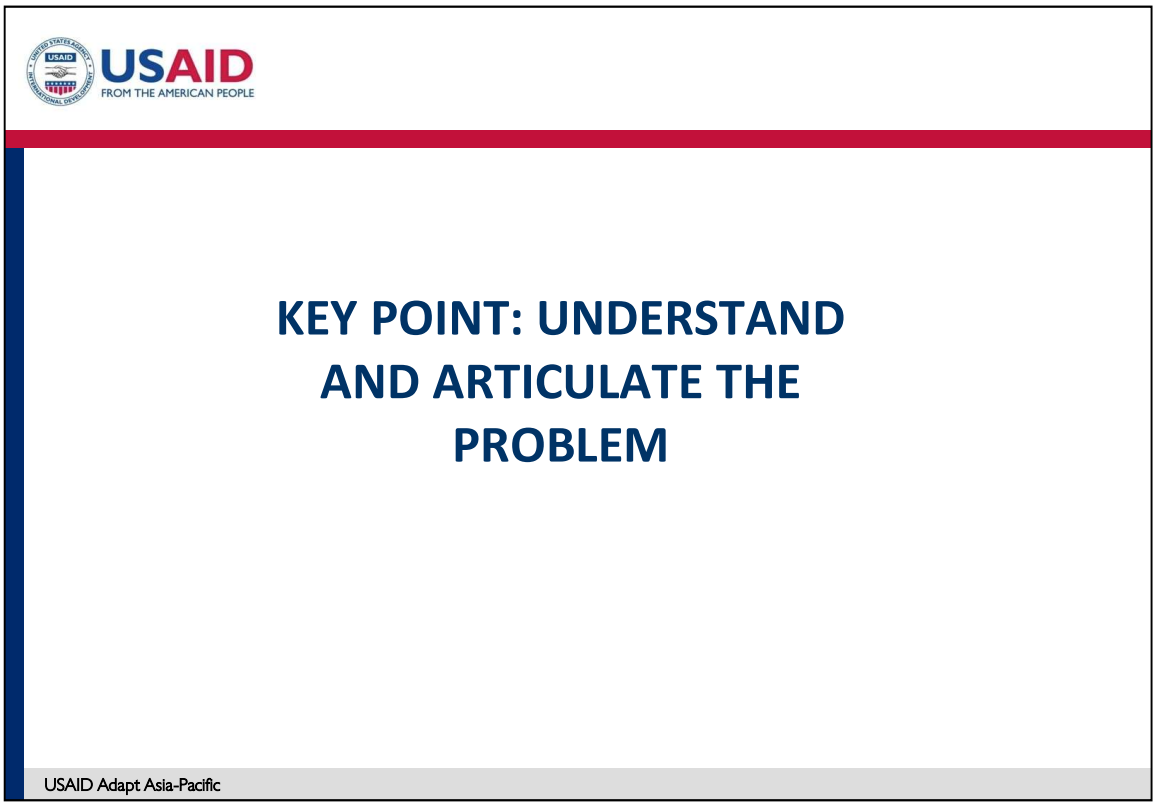
The first image is of rice barns from the Tana Toraja area on Sulawesi in Indonesia. Credit: Wikipedia http://en.wikipedia.org/wiki/Rice_barn.

The second image is a rotating savings and credit association for women in Pakistan. Credit: Reboot. http://reboot.org/2012/11/08/informalizing-financial-services/.

The last image is a 2005 adaptive capacity map from the International Development Research Center. From this we can see that there are significant variations in adaptive capacity throughout SE Asia. The variables used to determine this index are income per capita, literacy, life expectancy, poverty, and inequality. **Ask** the participant what these variables would have to do with adaptive capacity (if anything).

Credit: PreventionWeb
http://www.preventionweb.net/english/professional/maps/v.php?id=7874.

The material on this slide addresses **learning objective 1.1.C.**

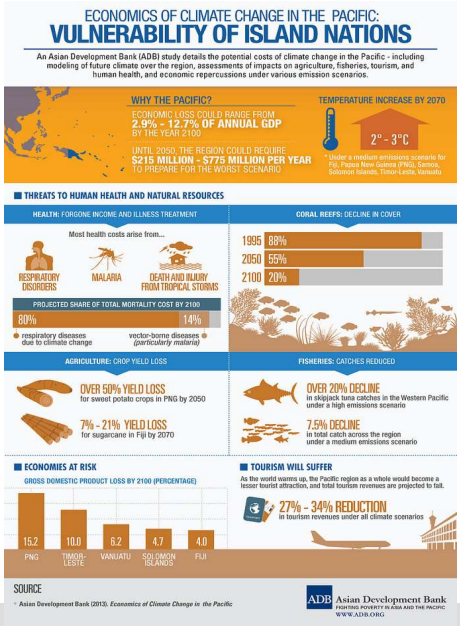


This is an important point. In order to justify the use of public funds for adaptation, we need to be able to describe not only the physical processes of climate change, but also their local manifestations and the importance of these impacts in terms of national development goals.

The material on this slide addresses **learning objective 1.1.E.**

General Aspects of Vulnerability to Climate Change in the Pacific

- Sea level rise
- Tropical storm patterns and intensity
- Altered rainfall patterns
- More hot days



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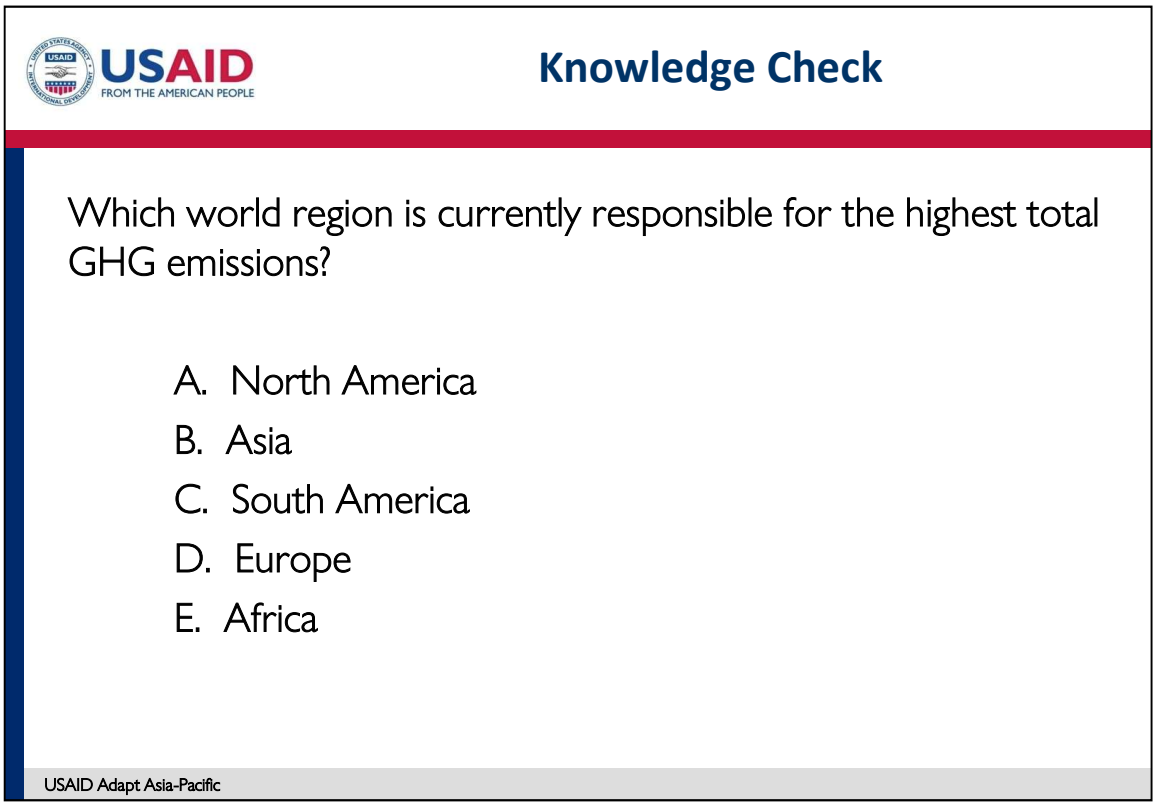
The graphic on this slide is sourced from the Asian Development Bank and was downloaded from http://iwlearn.net/iw-projects/3591/news/cti-iw-learn/ddaff093e6e39ab7b9f19ac33a3f7d5e. The graphic was last modified on 12/9/2015, and was last viewed on 1/25/2016.

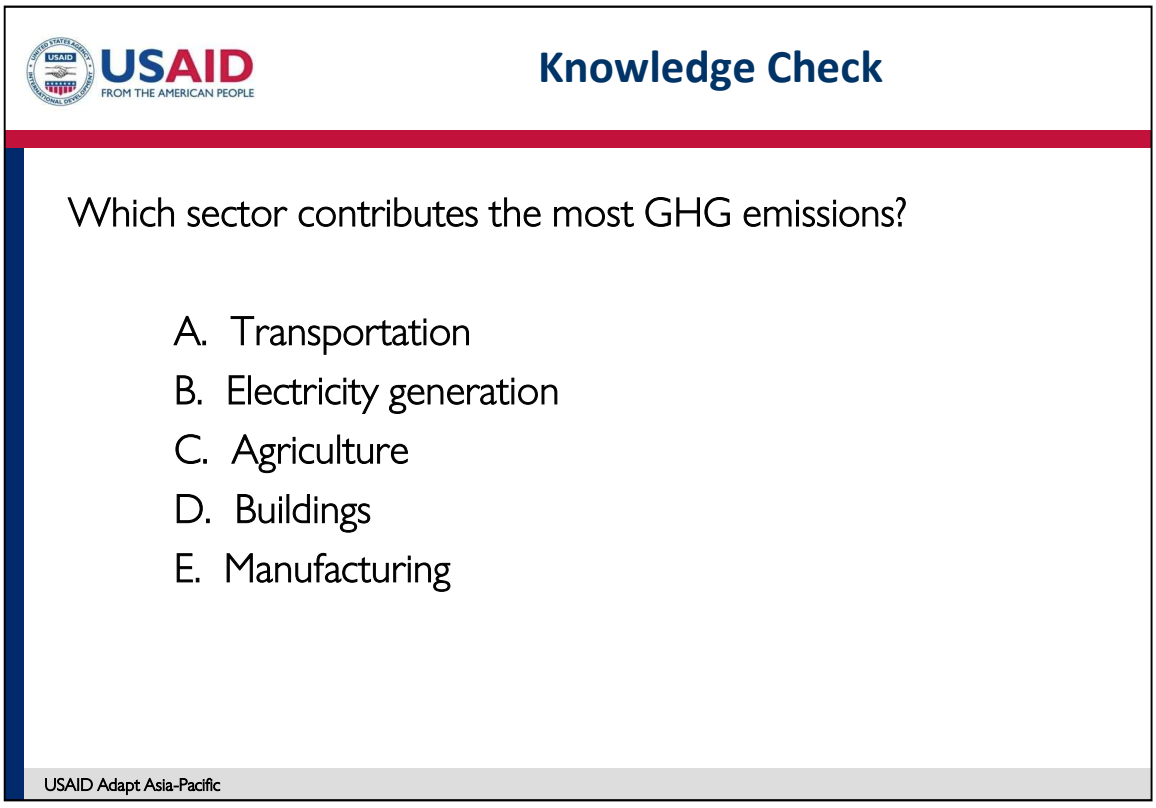
ASK the participants to discuss and describe the impacts these aspects of climate change could potentially have. You may choose to divide the participants into groups, and have each group address one of these aspects. After a 20-30 minute discussion, the participants can report on the results of their discussion to the broader group.

The material on this slide addresses **learning objectives 1.1.B & 1.1.C.**



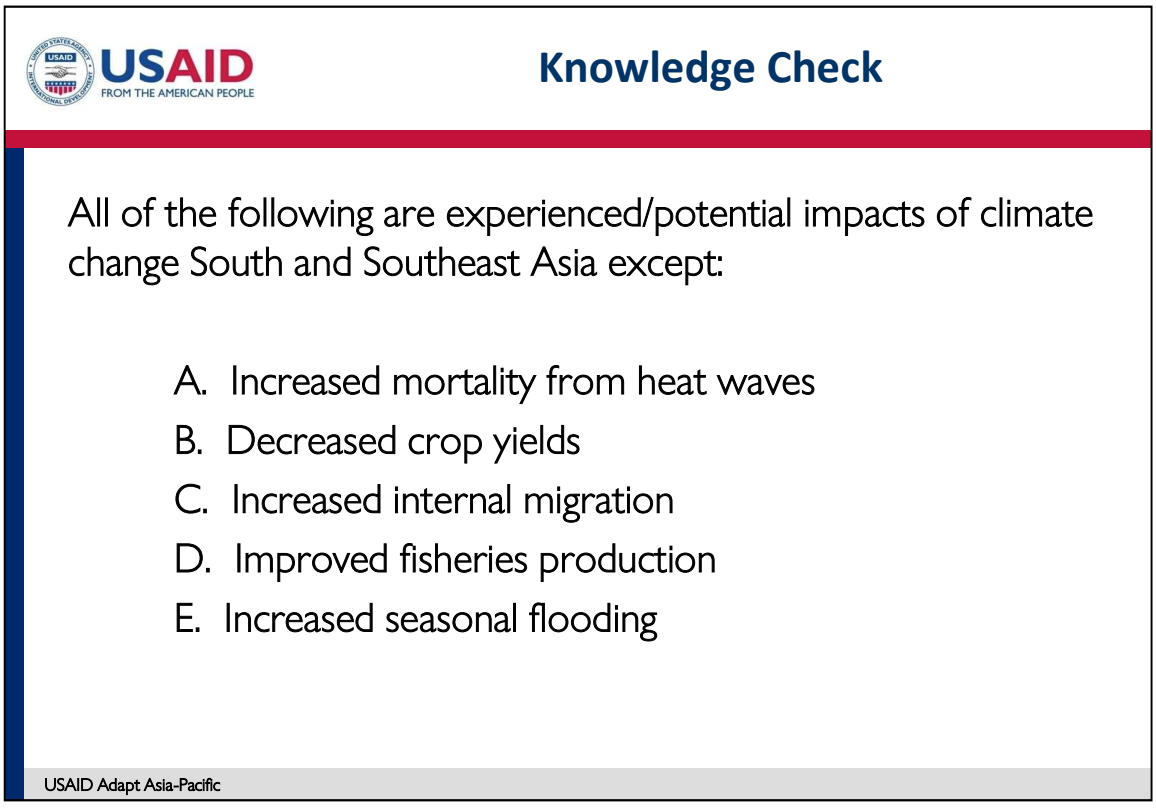
The correct answer is "B", Asia.

This slide assesses **learning objective 1.1.A.**



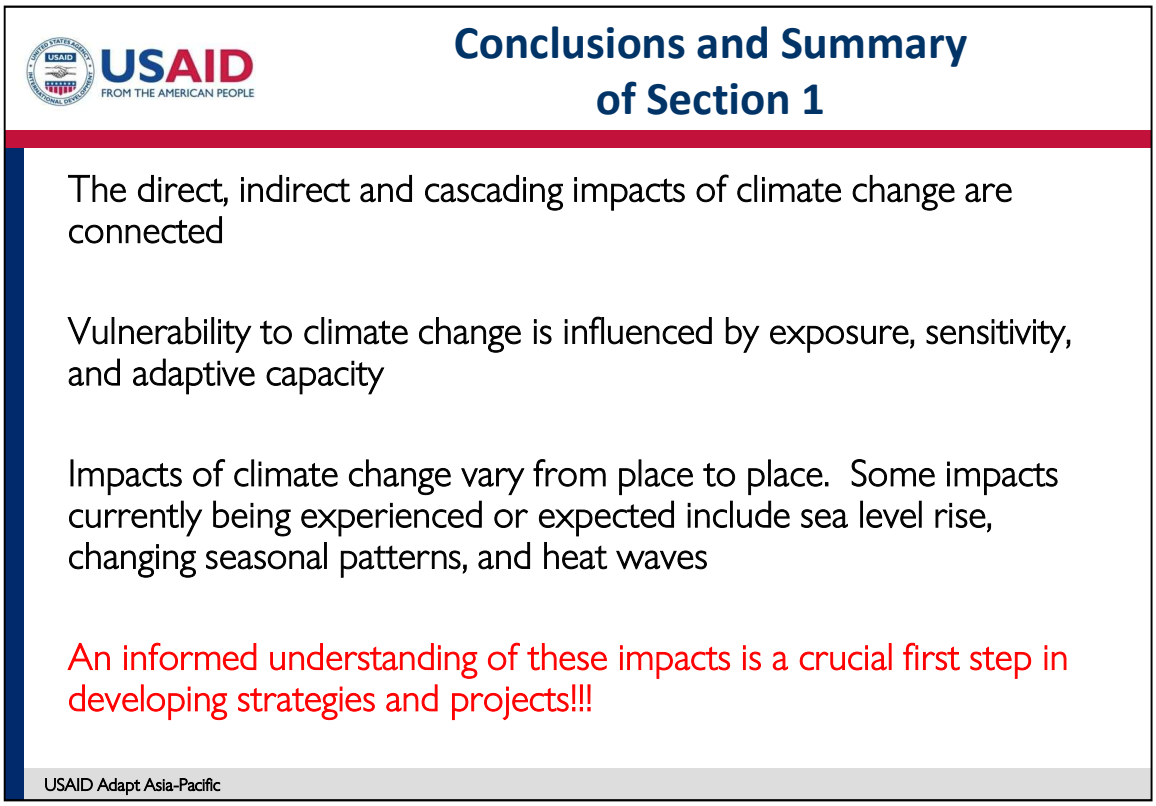
The correct answer is “B”, electricity generation.

This slide assesses **learning objective 1.1.A.**

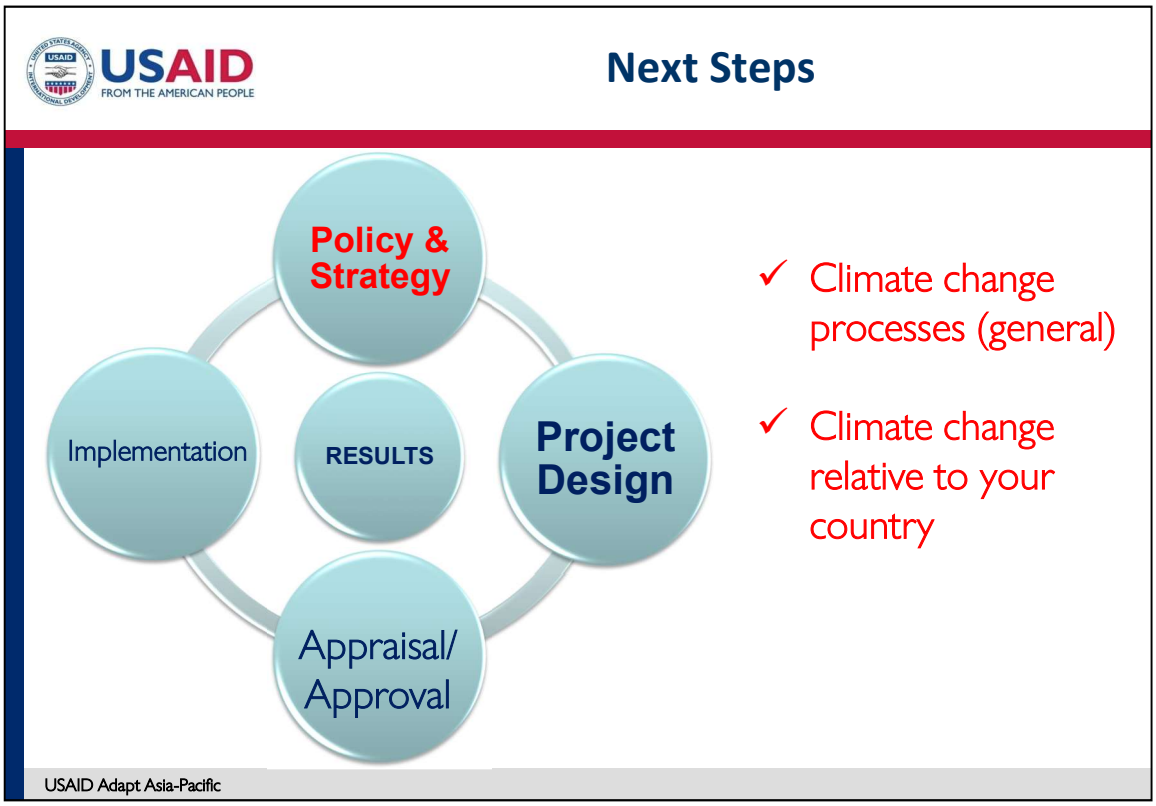


Facilitator: the default question is for South and Southeast Asia overall. Modify this slide ahead of presentation to refer to impacts in your country. The correct answer for the default question is D ("improved fisheries production").

This slide assesses **learning objective 1.1.C.**



This slide assesses **learning objectives 1.1.A, 1.1.B, 1.1.C, 1.1.D, & 1.1.E.**



Let's return to our project cycle to see where we are.

What is operationalizable about what we just learned? What can you do? This slides describe some concrete steps that the participants can take using the information covered in part 1!

Develop a localized understanding of climate change impacts. This will enable you to….

--…develop ways to disseminate information on climate change and potential impacts to stakeholders

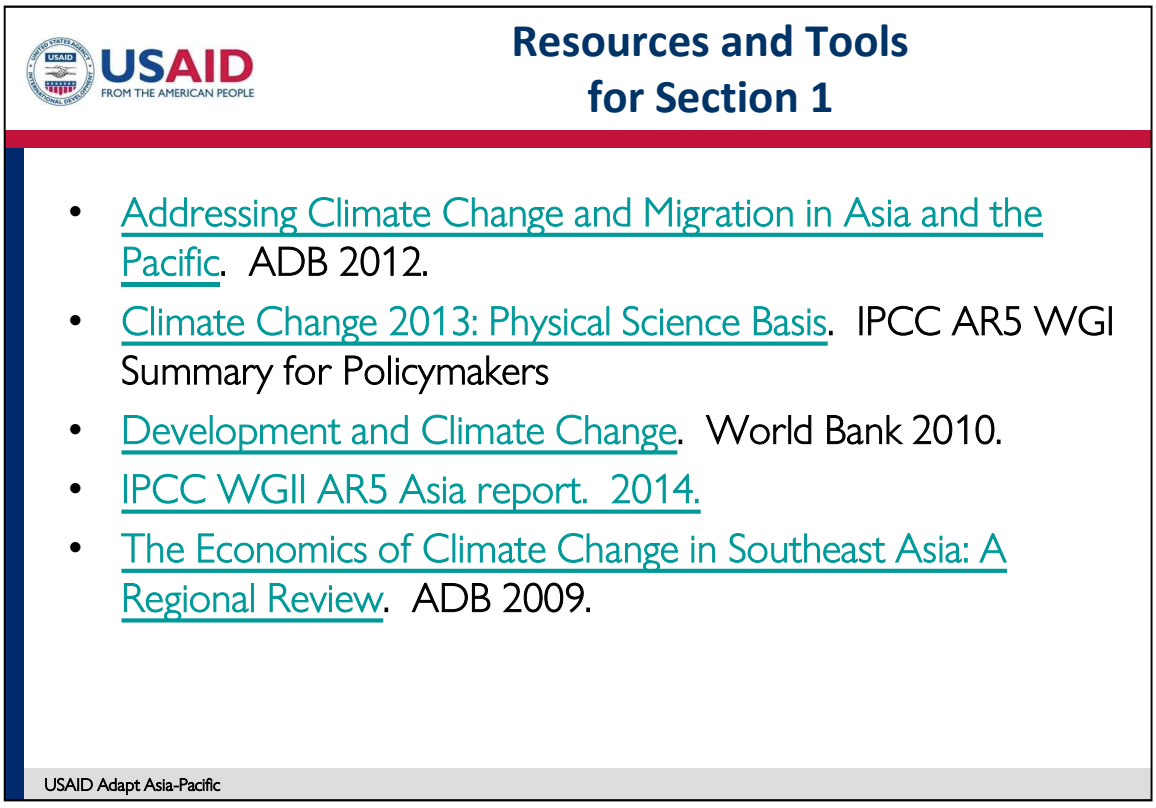
--…"facilitate dialogues on the needs for climate resilient projects/programmes and investment needs at the national, sub-national, and sectoral levels" (OECD 2015:19).

Develop a broad understanding of your sectoral and geographic vulnerabilities

--…begin the proposal development process. Virtually all proposals include a general description of climate change which leads into a more specific discussion of impacts in the proposed project area.

This will enable you to develop a compelling and effective "Project Background and Context".

This slide assesses **learning objective 1.1.E.**



Addressing Climate Change and Migration in Asia and the Pacific. ADB 2012. Download at https://www.google.co.th/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0ahUKEwjmmar-pJ_LAhUTBY4KHc-sAfMQFgggMAE&url=https%3A%2F%2Fipcc-wg2.gov%2Fnjlite_download2.php%3Fid%3D10771&usg=AFQjCNFpxhKjeSUwZFZSkyNRwLIdokK7VA&bvm=bv.115339255,d.c2E; also included in participant resources pack.

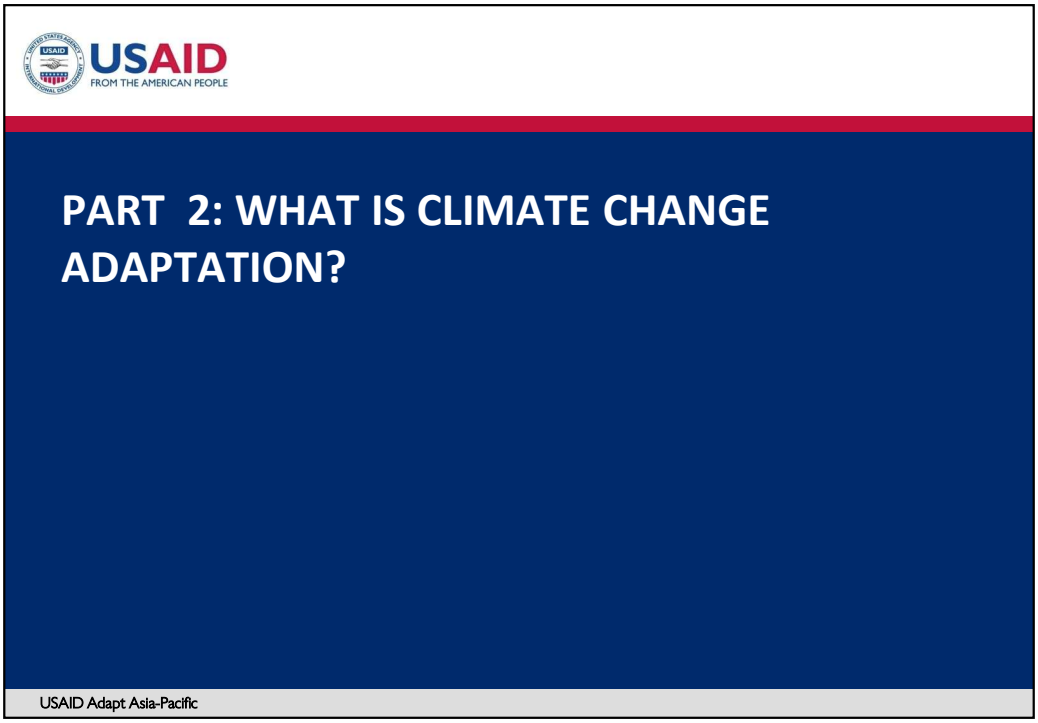
Climate Change 2013: the Physical Science Basis: Summary for Policymakers. IPCC 2013 AR5 WGI report. This should be emphasized as essential reading; a short document (+/-35pp) that summarizes the main findings from the AR5 Working Group I report. Download at https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WGIAR5_SPM_brochure_en.pdf; also included in participant resources pack.

Development and Climate Change. World Bank 2010. Download at http://siteresources.worldbank.org/INTWDR2010/Resources/5287678-1226014527953/WDR10-Full-Text.pdf; also included in participant resources pack.

IPCC WGII AR5 Asia Report. 2014. Download at https://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap24_FINAL.pdf; also included in

participant resources pack.

The Economics of Climate Change in Southeast Asia: A Regional Review. ADB 2009. Download at http://www.adb.org/sites/default/files/publication/29657/economics-climate-change-se-asia.pdf, also included in participant resources pack.



Facilitator Note: These are the general topics covered in this section and the order in which they are covered:

--Discussing socio-economic processes that interact with climate change

--Defining adaptation and risk management

--Why is adaptation/risk management important/needed?

--What does adaptation look like? What are different forms of adaptation?

--How can you link adaptation with other development goals?

--National strategies and action plans

This section should take approximately 2-2.5 hours.

GOALS—IMPORTANCE—OBJECTIVES—OVERALL FIT

GOAL: The goal of this section is to define adaptation, demonstrate the need for adaptation planning and to describe several forms that adaptation takes.

IMPORTANCE: This information is important because adaptation takes many forms, some of which are more effective and efficient in given situations than others. Adaptation to future climate conditions will require a broad range of strategies and project types, including stand-alone adaptation projects, but most adaptation will be **climate proofing** existing infrastructure and in-the-pipeline projects. An understanding of the different types of adaptation will help participants develop bankable project proposals and effectively address the most urgent and pressing climate threats. In addition, this section discusses existing socio-economic conditions and processes which will help to shape climate impacts in the future. A thorough understanding of these processes of change and how they interact with climate change enables participants to describe the context for adaptation projects.

OBJECTIVES:

1.2.A. Participants will define adaptation and explain the need for adaptation measures in their countries.

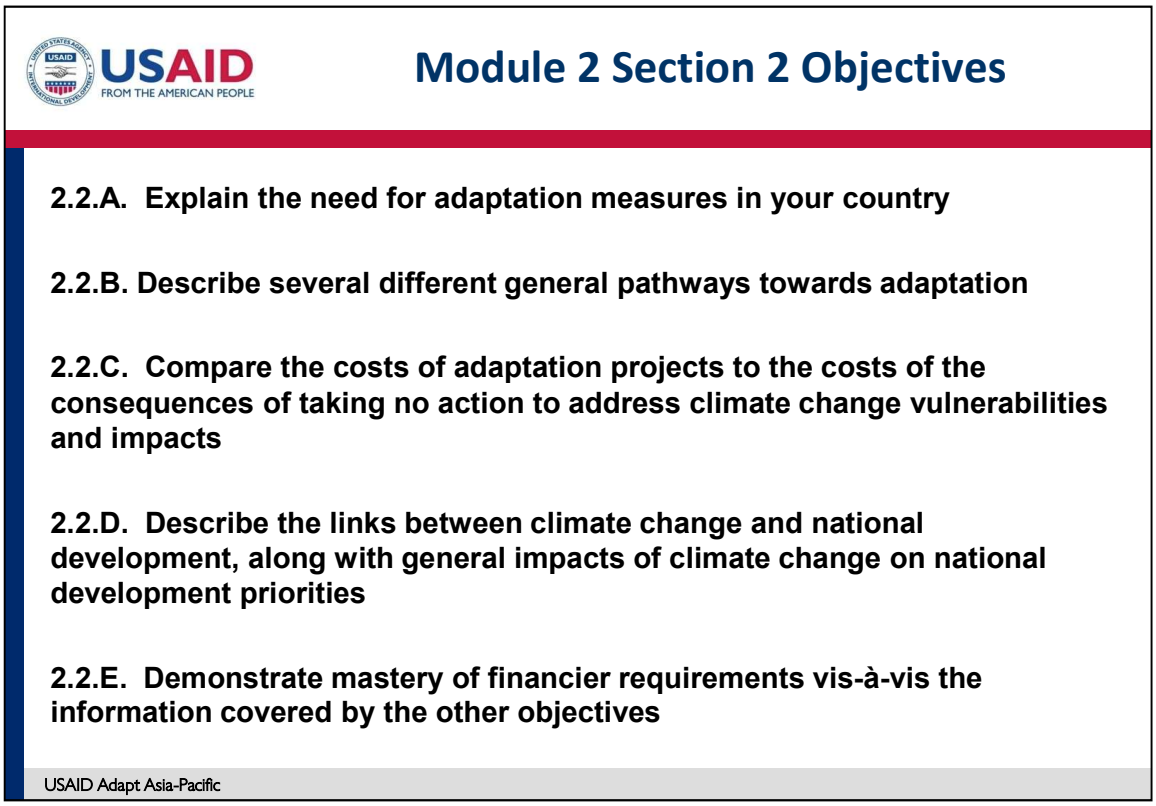
1.2.B. Participants will describe several different general pathways towards adaptation.

1.2.C. Participants will compare the costs of adaptation projects to the costs of the consequences of taking no action to address climate change vulnerabilities and impacts.

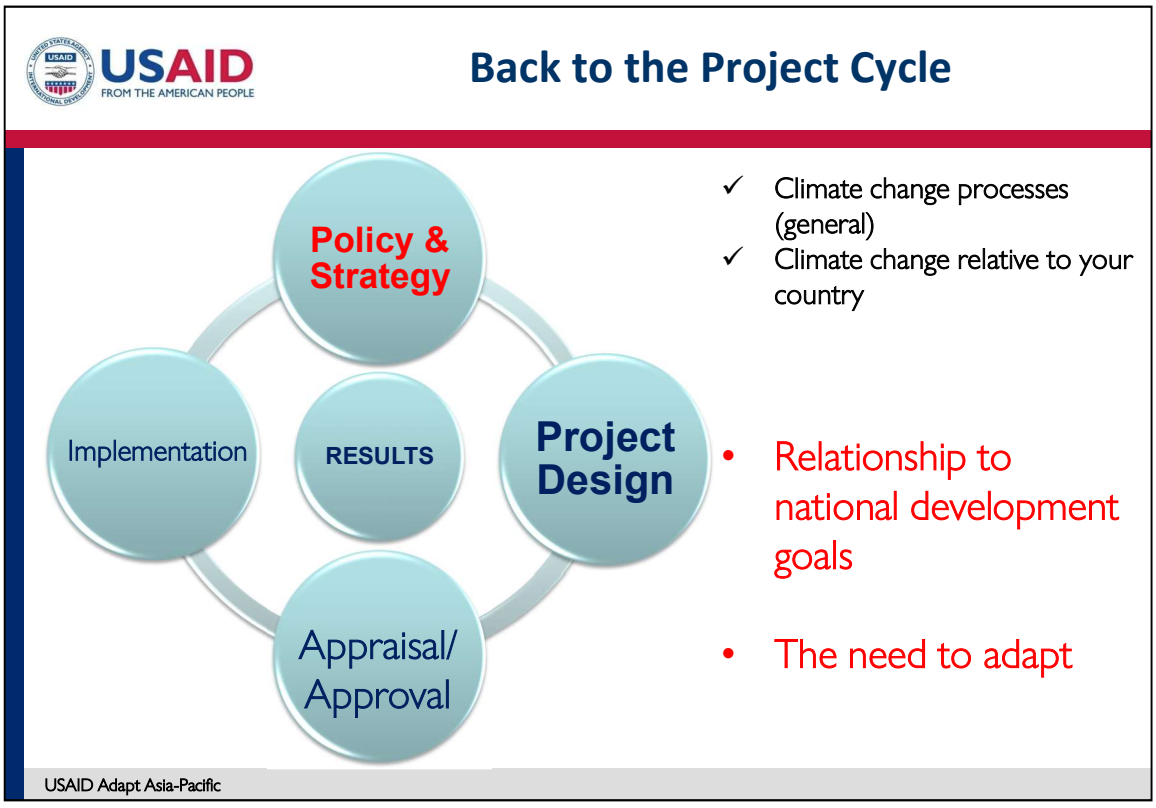
1.2.D. Participants will describe the links between climate change and national development, along with general impacts of climate change on national development priorities.

1.2.E. Participants will demonstrate mastery of financier requirements vis-à-vis the information covered by the other objectives.

OVERALL FIT: Most funders expect a description of how proposed projects fit in with national policy frameworks and strategies. In this section, we will discuss how adaptation can fit in with broader development frameworks.

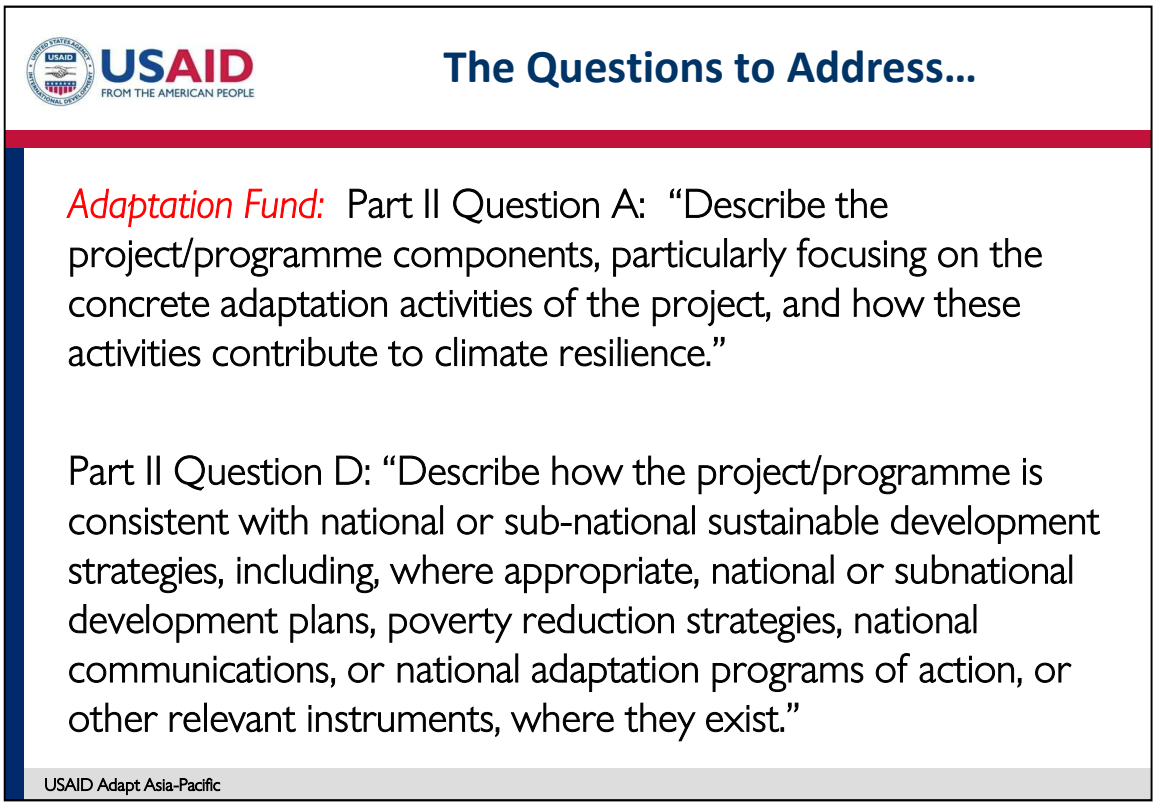


This slide describes the specific objectives for this section.



Let's return to our project cycle to see where we are. In the first section we understood the physical processes associated with climate change as well as some potential manifestations of climate change here at home, at the national and subnational level. We now know where to go for information about climate processes. We understand how important this information is for developing adaptation projects and for the funding processes.

In this section we'll link our climate change information to making the case for the need for adaptation, which is another important part of the project and proposal development process. Specifically, we need to be able to link climate change to national development goals and explain how climate change could potentially damage or derail the progress we've made towards achieving development objectives. On the next two slides we'll show you some questions from actual financing applications that will help to underscore the practical significance of what we are covering in this section. These questions should help keep you focused on why this material is useful.



These are two questions quoted directly from the Adaptation Fund application. These are the questions we would like the participants to be able to address by the end of this section. We will discuss the Adaptation Fund more fully in module 2 (tomorrow). Although the main focus of this section is to explain the need for adaptation and the form that it will take in the host country, referring to the Adaptation Fund provides a practical grounding for this section as well.

(i) The short answer to A is – draw from the project framework the list of components and outputs/activities, showing how each one contributes to climate resilience.

[***AF Guidance****: Describe how the activities will help with adaptation to climate change and improve climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience. Decision 10/CP.7 establishing the Adaptation Fund stipulates that it shall finance concrete adaptation projects and programmes. In the AF Operational Policies and Guidelines, a concrete adaptation project is defined as "a set of activities aimed at addressing the adverse impacts of and risks posed by climate change. The activities shall aim at producing visible and tangible results on the ground by reducing vulnerability and increasing the adaptive capacity of human and natural systems to respond to the impacts of climate change, including climate variability. Adaptation projects/programmes can be implemented at the community, national, regional and transboundary level. Projects/programmes concern activities with a specific objective(s) and concrete outcome(s) and output(s) that are measurable, monitorable, and*

verifiable."

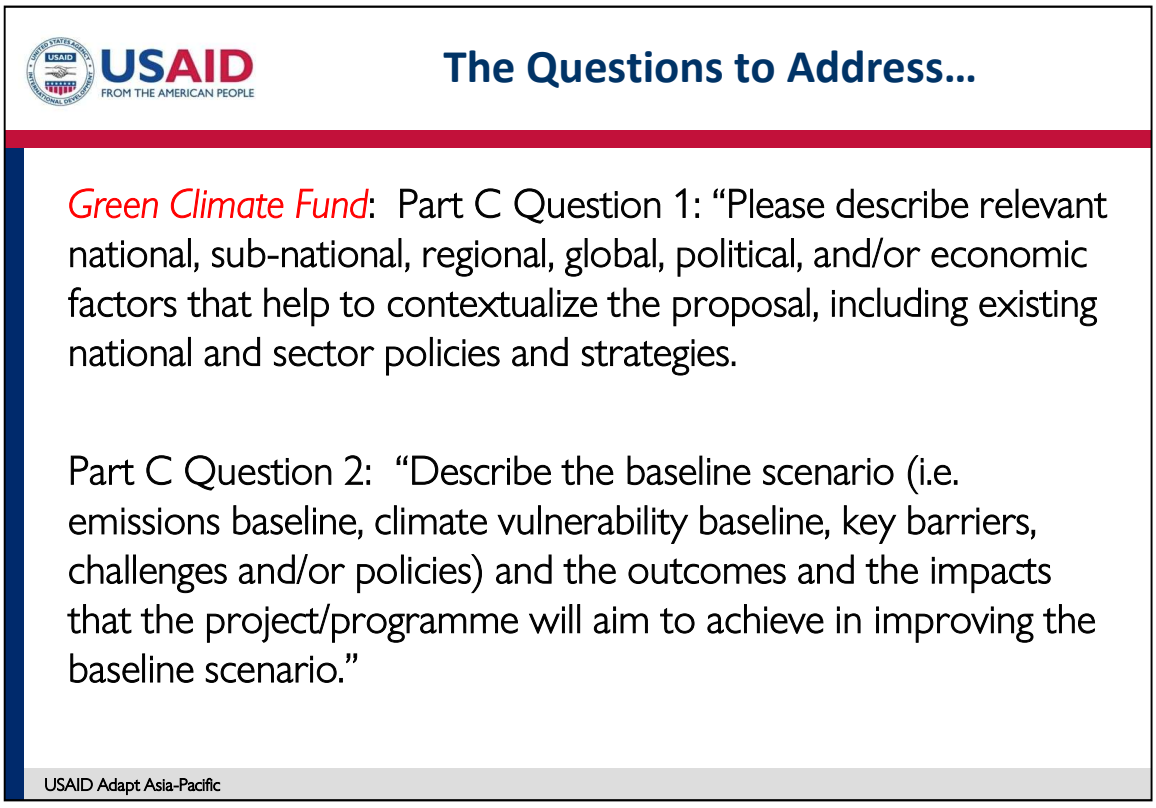
The project objective has to be aligned with the Adaptation Fund Results Framework. The project/programme activities should align with its overall goal and objectives hence ensuring the cohesion of the components among themselves. It should be distinguished from a "business-as-usual" development or environmental protection project by clearly demonstrating that the proposed adaptation measures are suited or adequate for the identified climate threats. The project/programme proposal should therefore explain the project rationale in relation to the climate scenario(s) outlined in the background and context section. Finally, the non-climatic barriers to achieving the project objective, whenever relevant, should be taken into account when designing the project/programme.

For a fully developed proposal, the activities will have to be detailed to a sufficient level and their appropriateness in responding to the threats posed by the likely climate scenarios should be outlined in detail in the background and context section and quantified in terms of magnitude and uncertainty. The description should include information on project location and scope, and should have clearly defined activities including technical specifications, where appropriate. For a fully developed proposal, the alignment with Adaptation Fund fund-level objectives has to be specified at the project/programme outcome level as described in the document "AF Results Framework and Baseline Guidance – Project level".

Suggestions: briefly describe each component and activity to show how it addresses climate change adaptation. Make sure the component and activity descriptions used match those used elsewhere in the document (in the PRF for example), to avoid confusion. Provide illustrations, photos or diagrams to help the reader to understand the proposal. See some examples below.]

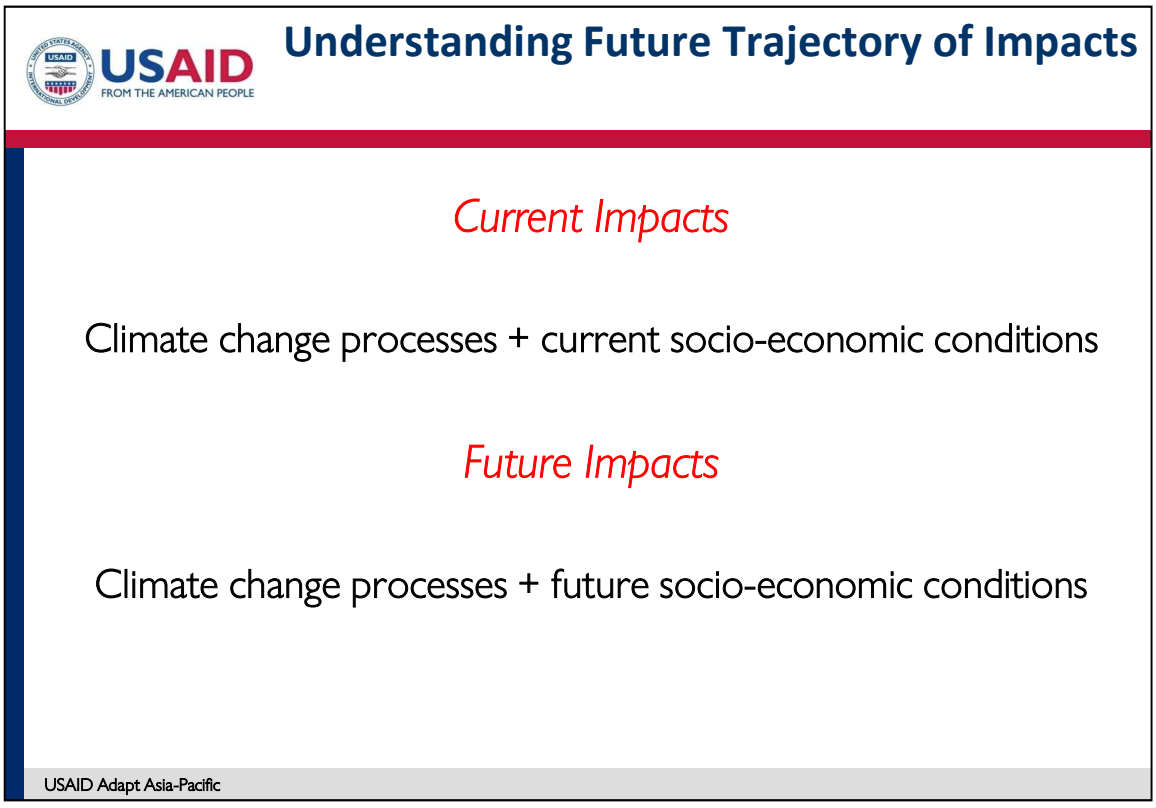
(ii) [***AF Guidance:*** *The relevant plans and strategies have to be identified. This includes at a minimum the most important adaptation-related plans and strategies and the most important relevant sectoral plans and strategies in the country. For a fully developed proposal, the compliance of the project/programme with the relevant plans and strategies has to be explained in detail.*

Suggestions: in a table provide a brief analysis of the key national and sub-national strategies for sustainable development, and show how the project complies with the requirements of these strategies.]



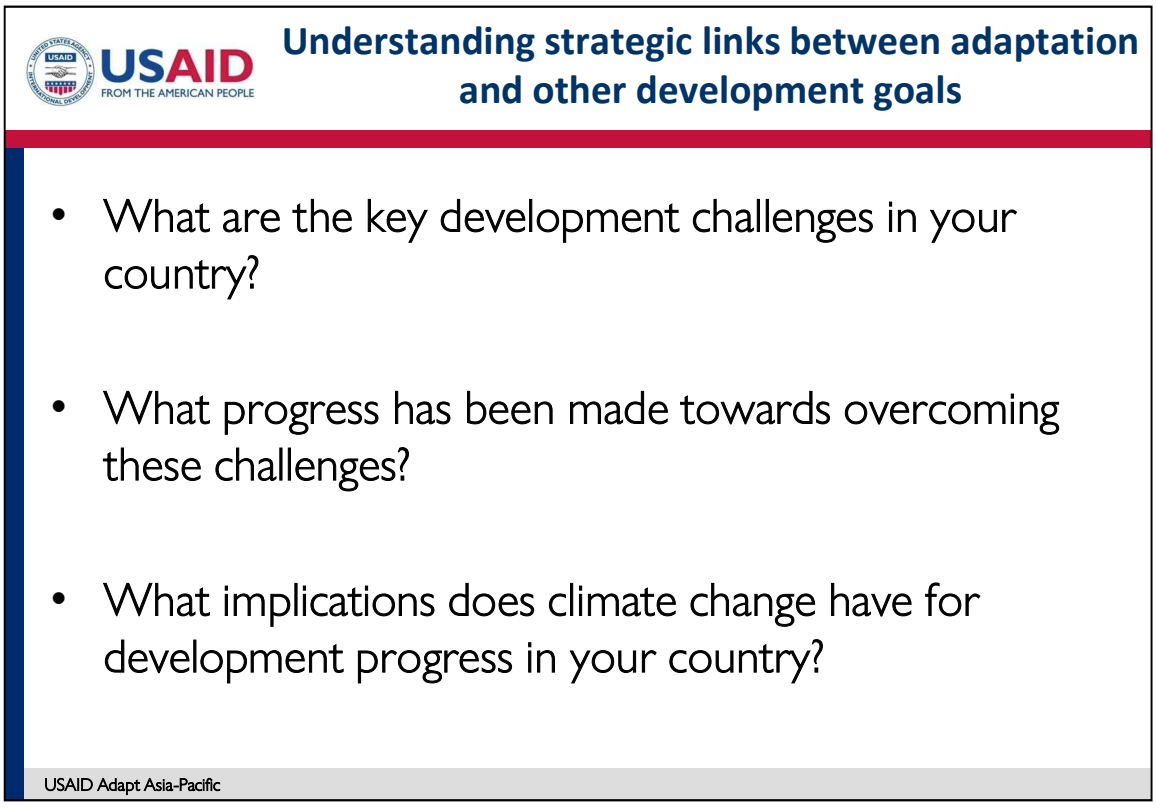
These are two questions quoted directly from the Green Climate Fund application. These are the questions we would like the participants to be able to address by the end of this section.

Please bear these in mind as we work through section 2.



In this simple slide we reiterate the point that impacts are not just a function of the physical processes themselves (e.g. a typhoon), but they also are shaped by existing socio-economic conditions. For example, in the last section we described how certain groups can be more exposed or sensitive to impacts, and thus they are more vulnerable. So a key aspect of addressing climate change is to understand the **drivers of vulnerability**.

At the same time, future impacts will be shaped not only by the increasing magnitude of climate and meteorological stressors (e.g. more intense typhoons), but also by the socio-economic processes taking place in your country.



An important point to make here is that you need to link adaptation to existing development goals for several reasons…

- Co benefits: this means that activities that support climate change adaptation also provide other development benefits as well.
- Adaptation has to be funded somehow and so it needs to be linked to something in the budget that already has resources attached to it. We will see in this section that most adaptation is not and will not be stand-alone projects; rather it will be folded into other projects and programs (**mainstreamed**), or will consist of climate proofing existing infrastructure. Thus adaptation will draw on many different resources, from locally generated revenues to existing budget items to international funds. Therefore understanding where climate change adaptation fits in with other budgetary priorities is essential for efficient planning.
- Avoiding *maladaptation*. We will discuss the concept of maladaptation more comprehensibly in a later module. In short, maladaptation refers to strategies that might provide short-term benefits, but end up increasing vulnerability over the long term. An understanding of development challenges in your country will help to avoid maladaptive outcomes.
- Most funders, in the concept note and project development stages, require an explanation and rationale for how the strategy or project fits in to the bigger picture. For example, how does the project influence efforts to achieve the MGDs. Or how does the project fit in with sectoral strategies or national strategic plans.

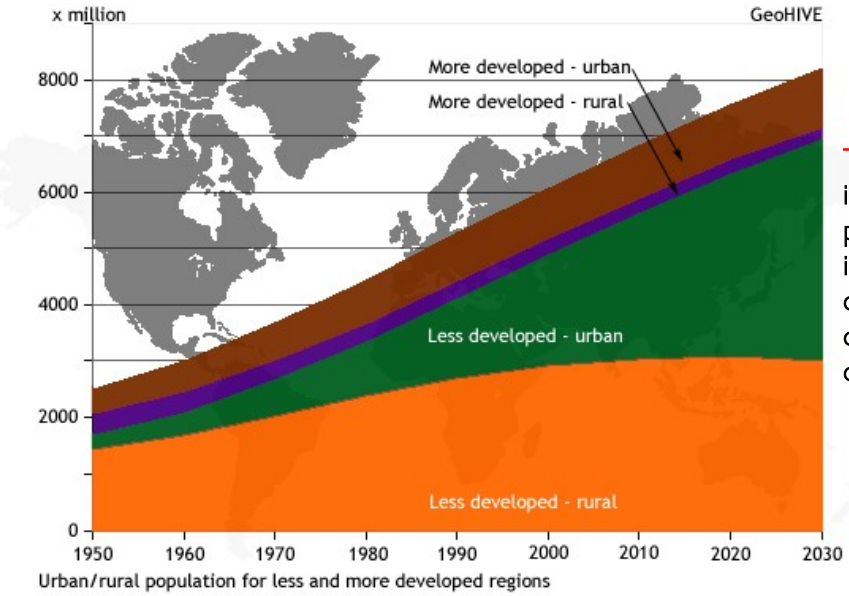
What are the key development challenges in your country?

What progress has been made towards overcoming these challenges?

What implications does climate change have for development progress in your country?
This helps you to communicate that addressing climate change is an urgent priority.

Also note here that the United Nation's Sustainable Development Goal #13 is to take urgent action to combat climate change and its impacts.

Graph depicting huge increase in urban populations in LDCs



Urban/rural population for less and more developed regions

Tip: Be able to identify and explain processes that interact with climate change to make development challenges!

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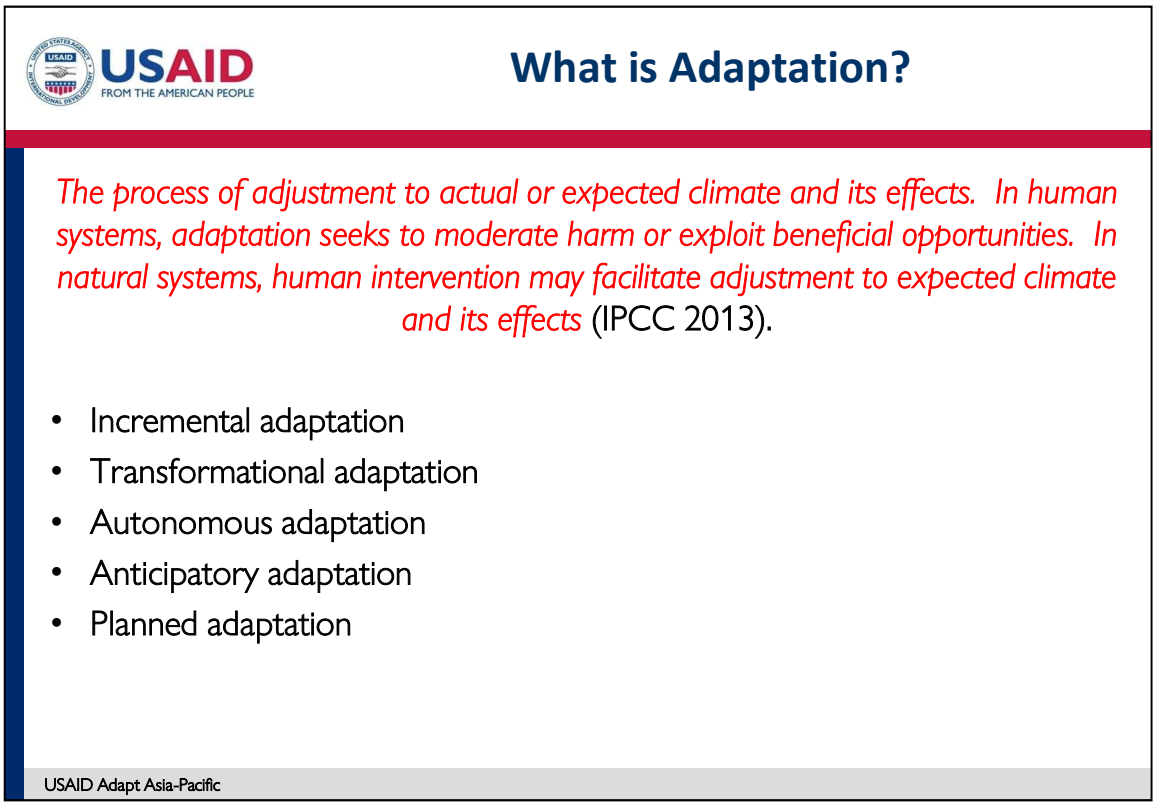
Climate change processes are not happening in isolation; rather there are a number of other socio-economic processes that interact with climate change to exacerbate, increase the complexity of, and in some cases, mitigate the impacts of climate change. One of these processes is **urbanization**.

This graph from 2010 makes the point visually that population growth is happening most dramatically in less developed countries (LDCs). And among these populations, the majority of growth (70%) is occurring in secondary cities, not the mega-cities of the world, and are primarily fueled by migration of rural poor into those cities looking for better employment opportunities.

Another issue that might need to be covered is international migration, especially in the Pacific region where there is a lot of outmigration, and where countries are at least partially dependent on remittances, e.g. Philippines. What are current migration trends related to your country? Does your country rely heavily on remittances from citizens working abroad? How might climate change affect migration?

A third issue would be economic development. How does climate change impact economic development?

Source of graphic: https://geopolicraticus.files.wordpress.com/2010/05/urban_rural.png.



Understanding and clearly communicating the challenges allows you to make the case for **adaptation**. On this slide we present the IPCC definition of adaptation. Note that adaptation includes moderating harm, but it also includes beneficial opportunities. Adaptation has multiple dimensions, and so we often refer to different aspects of adaptation. Here are a few that will be used in this course:

Incremental adaptation. Adaptation actions where the central aim is to maintain the essence and integrity of a system or a process at a given scale.

Transformational adaptation. Adaptation that changes the fundamental attributes of a system in response to climate and its effects. Transformational adaptation refers to longer term processes.

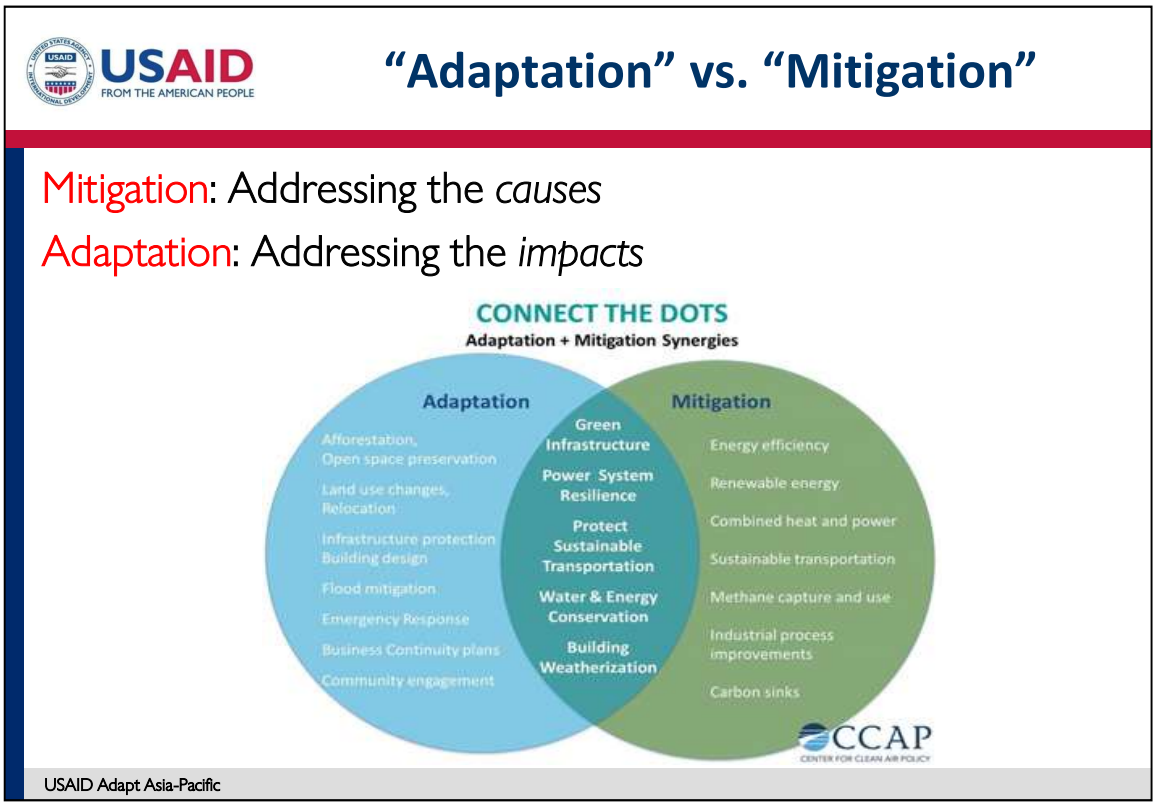
Autonomous adaptation. Adaptation in response to experienced climate and its effects, without planning explicitly or consciously focused on addressing climate change. Often also referred to as spontaneous adaptation.

Anticipatory adaptation. Adaptation that takes place before impacts of climate change are observed. Also referred to as proactive adaptation.

Planned adaptation. Adaptation that is the result of deliberate policy decision, based

on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state.

The material on this slide addresses **learning objectives 1.2.A & 1.2.C**

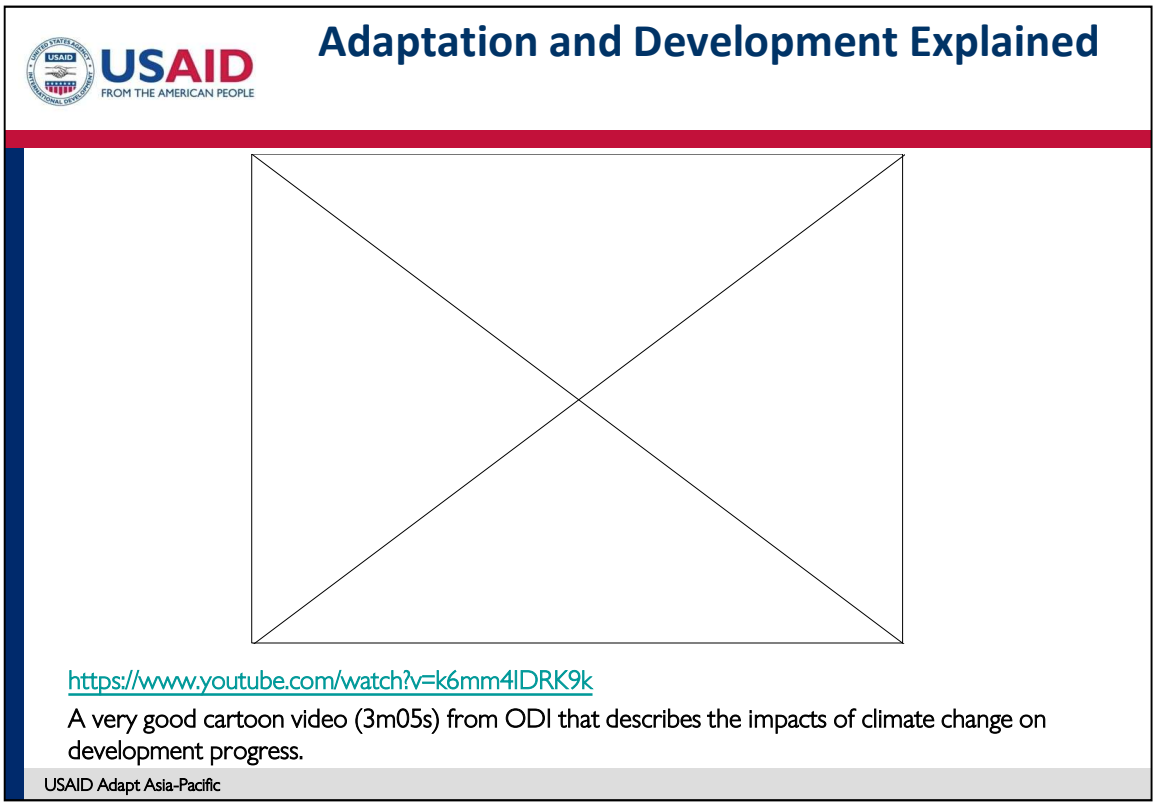


The diagram in this slide presents an opportunity to emphasize the difference between adaptation and mitigation and to explain synergies between them. **Mitigation** refers to addressing the causes of climate change by limiting and decreasing greenhouse gas emissions. For more than two decades the world was focused primarily on mitigation activities, and currently the vast majority of climate finance is targeted at actions that aim to decrease greenhouse gas emissions.

Adaptation refers to activities that help us address the impacts of climate change. Adaptation is becoming an increasingly important part of addressing climate change, because most countries are already experiencing the impacts of climate change. These impacts will increase in the future, even if mitigation activities are successful. This is because of the vast amount of greenhouse gases that have already been added to the atmosphere.

There is significant overlap between adaptation and mitigation, though, and you will find that many activities have both adaptation and mitigation components.

Diagram sourced from http://renewcanada.net/wp-content/uploads/2009/10/mortimer-diagram.jpg.



Facilitator: This video is called "Zero Poverty….Think Again" and was produced by the Overseas Development Institute (ODI). The video is 3m05s and can be accessed at https://www.youtube.com/watch?v=k6mm4IDRK9k. The video can be accessed online, but in case you have no internet access or the link is broken, an mp4 format copy of the video is included in the resource materials. You can embed this in the PowerPoint or show it in an external viewer. The file is labeled "zero poverty: think again" and will open with Windows Media Player and VLC media player, as well as other software applications.

Find out more about ODI at http://www.odi.org/zero-poverty.

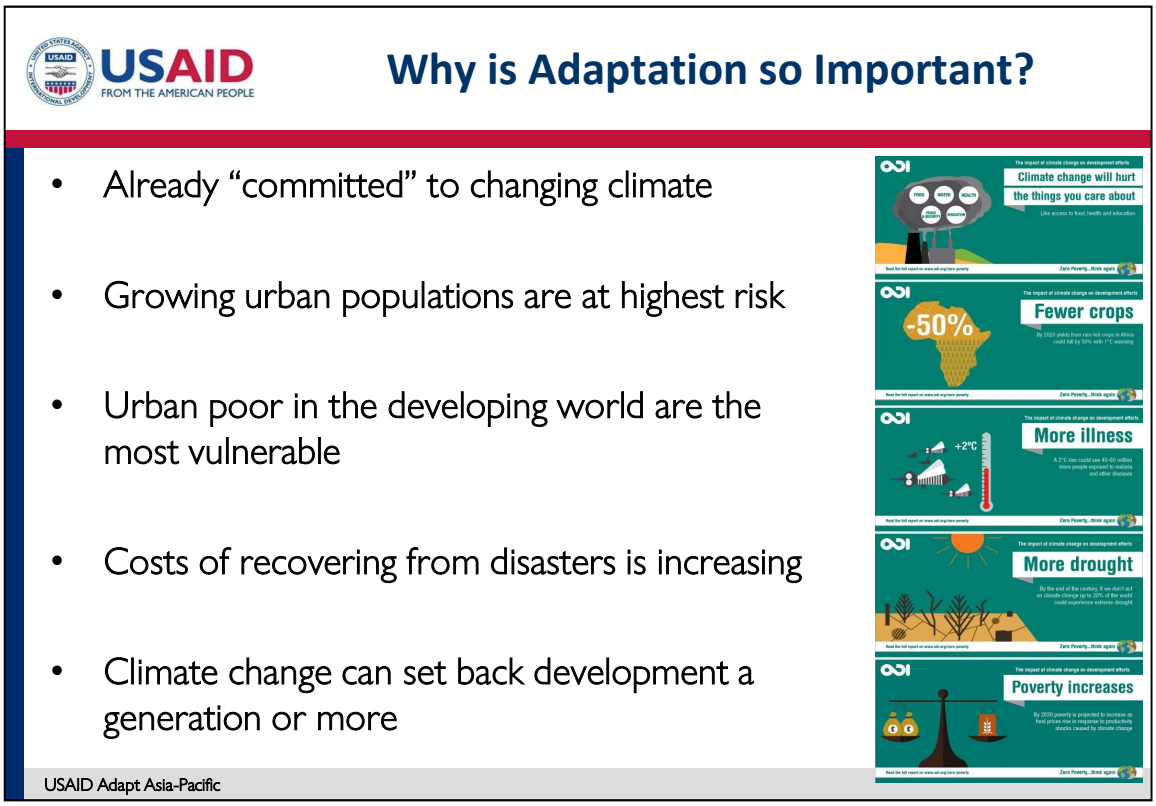
Discussion questions:

What sorts of potential impacts did the feature mention?

What sector, or level of government, is responsible for addressing climate change?

Are there any indications here as to the distribution of impacts from climate change?

The video and discussion address **learning objectives 1.2.A, 1.2.D, & 1.2.E.**



Already committed to changing climate. Climatologists often use the term "committed climate change" to refer to changes in our climate that have already occurred or will occur even if aggressive mitigation proves successful in limiting future greenhouse gas emissions. Committed climate change is a result of greenhouse gases that **have already been added to the atmosphere**. In other words, committed climate change means that the climate will continue to change because a) we have already changed the composition of the atmosphere such that the thermal characteristics are different than the pre-industrial era and so the climate will respond to these changes, and b) some greenhouse gasses have long "residence times" in the atmosphere, which means that they will continue to produce a warming effect into the future.

Growing urban populations are at highest risk. Adaptation considers not only physical aspects of climate change, but also socio-economic processes and conditions that shape the impacts of a changing climate. Demographic characteristics are a key influence on climate change impacts. The global urban population is expected to double from 3.7 billion to over 7 billion in next two decades (by 2030), most of it in urban slums of cities in the developing world, particularly in South Asia and Sub-Saharan Africa. (Ref: Systems of Cities report, World Bank, p.1 (foreword), 2009 and WB 2013 reference above.)

Urban poor in the developing world are the most vulnerable. Various studies, practically all, mention poorer urban residents as the key group to build resilience strategies and programs around. They comprise a large proportion of the "vulnerable

populations" that are cited by many World Bank and UNDP studies (among others) as key to address in taking a "pro-poor" approach to building resilience and sustaining social and economic progress/development.

Costs of recovering from disasters is increasing. The costs of climate-induced "disasters" is climbing rapidly, and is expected to accelerate even more in the next 10-20 years as more and more climate change impacts take their toll on human life, assets, and livelihoods as well as on ecological systems providing enormous and multiple types of benefits to society that are not incorporated into national accounting systems of gross national product (GNP) or gross domestic product (GDP). Cities are particularly "vulnerable" to CC impacts because many of the world's largest cities are located in low-lying coastal areas or along major rivers, and other vulnerable sites (mainly due to their historic trading and political advantages provided by the location on major river or ocean commercial routes).

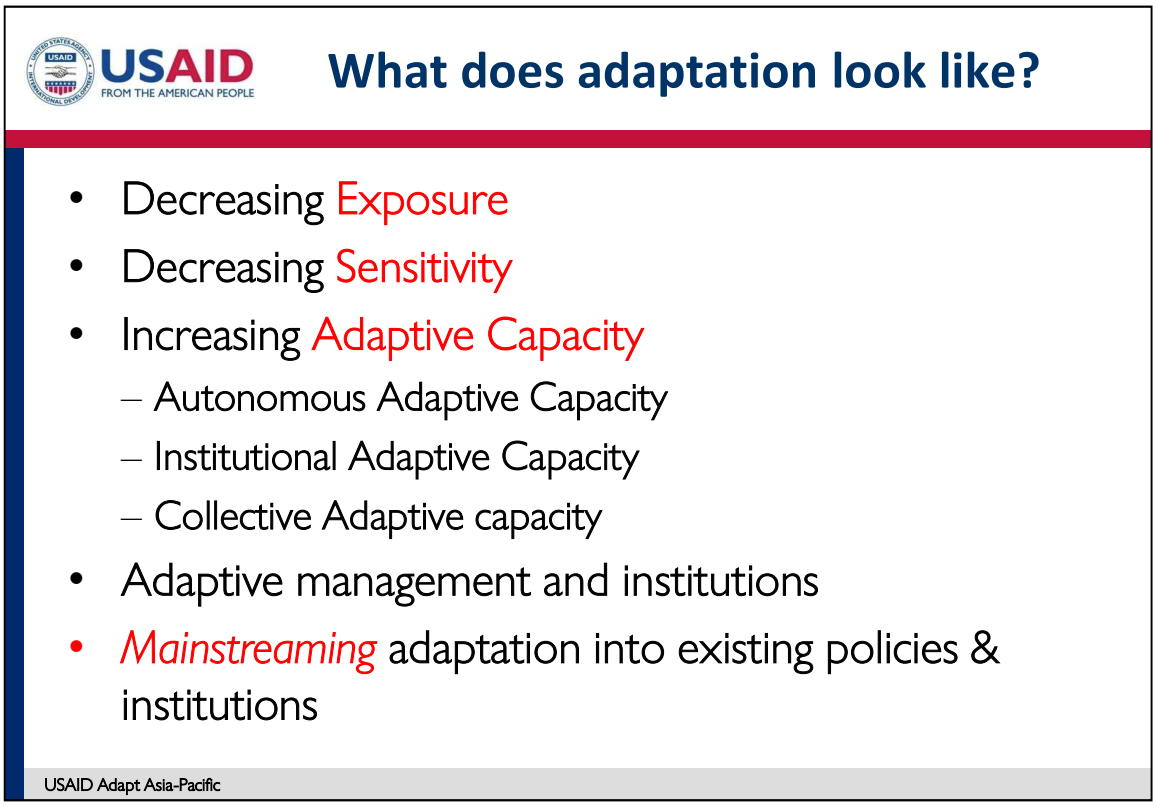
Despite this vulnerability, most cities are not prepared for or equipped to deal with CC impacts. Since they have not yet incorporated climate change adaptation and resilience (CCA) measures into their annual planning & budgeting processes nor incorporated them into their longer-term capital improvements budgets for public facilities and infrastructure, they are ill-prepared for and not resilient to coming CC impacts. As we will see in a moment, costs for climate change related disasters are increasing.

Can set back development a generation or more. Lastly, climate change threatens much of the progress made over the past few decades in terms of improving the human condition around the world. Climate change is a fundamental threat to development, and if we don't confront climate change we will not be able to end poverty. Climate change and global warming will have impacts on agriculture, water resources, ecosystems, and human health, and these impacts will be far worse if we do not take action to adapt. In the words of US Secretary of State John Kerry: "On a range of crosscutting issues from global hunger to global health, changing global temperatures and weather patterns will inject a new element of chaos into the already-fragile existences of the world's poorest people. Among the predictions are more famine and drought, expanding epidemics, more natural disasters, more resource scarcity and significant human displacement."

Note that John Kerry made this statement in an editorial article in 2010 when he was still a US Senator. The source for the quotation is http://www.huffingtonpost.com/john-kerry/climate-change-development_b_733060.html.

The material on this slide addresses **learning objective 1.2.A**.

The graphic featured in this slide is from the Overseas Development Institute and was sourced from http://visual.ly/impact-climate-change-development-efforts. The graphic references an ODI website, www.odi.org/zero-proverty, which provides a great deal of information on the nexus of climate change and development.



Here we are broadly looking at the types of actions and strategies that fall under the umbrella of adaptation.

In the first section of today's module we discussed the concept of vulnerability to climate change and some of the factors that influence vulnerability. The vulnerability framework lends itself to identifying relatively straightforward approaches to decrease vulnerability. Here we will discuss general ways to decrease vulnerability. This should help you to think about different types of projects (and project components). In general, you can decrease exposure, decrease sensitivity, and/or increase adaptive capacity. Each of these approaches has its advantages and disadvantages and will be appropriate in different circumstances. All three may be part of an adaptation portfolio. A guiding principle here is that **resources are limited,** and so you want to develop an adaptation portfolio that is the most cost effective. We also want to take into consideration geographic factors and the political economic context.

Decreasing exposure is relatively straightforward and entails either removing or mitigating the threat, or moving people or assets out of harm's way. For example, relocating residents out of flood plains or areas prone to sea level rise.

Decreasing sensitivity refers to approaches that strengthen people or assets against the impacts of climate change. Examples include the construction of

sea walls and coastal armoring. However, in many cases governments are biased towards hard engineering solutions, but decreasing sensitivity also encompasses a whole range of socio-economic, non-structural measures that strengthen people and institutions in the face of climate change, leaving them less vulnerable.

Increasing adaptive capacity. Adaptive capacity refers to the ability of people, communities, and institutions to mitigate the impacts of climate change. Many adaptation efforts aim to increase adaptive capacity. However, whereas the role of governments in decreasing sensitivity and exposure are usually direct and often capital intensive, the government's role in increasing adaptive capacity is in many cases more of a facilitation role. Increasing adaptive capacity can be very cost-effective, and can often generate co-benefits, as it entails addressing socio-economic factors that hinder the ability of people to adapt to climate change and disasters. Here we describe three types of adaptive capacity:

- Institutional adaptive capacity refers to actions taken by governments
- Collective adaptive capacity refers to the latent capability of or actions taken by communities/groups. Collective adaptive capacity is strongly linked to social capital. Examples of collective adaptive capacity include rotating savings and credit associations (ROSCAS), mutual cooperation arrangements, kinship networks, and other formal and informal institutions existing in communities. In some instances governments can support or encourage the development of collective adaptive capacity.
- Autonomous adaptive capacity refers to actions that individuals take to reduce their vulnerability. Governments can indirectly influence autonomous adaptive capacity in many ways, including improving educational opportunities and making climate/meteorological information available in a form that is helpful to end-users in making their own adaptation decisions.

Adaptive management and institutions. Although physical projects and climate proofing are what comes to mind when most people think of adaptation, a large part of adaptation will be addressing institutional and management issues. This requires a paradigm shift in the way that governments and their agencies address climate change.

Mainstreaming adaptation into existing policies & institutions. Adaptation may also take place outside the vulnerability framework. For example, governments and other organizations may seek to make governance and management procedures more resilient to climate change.

The material on this slide addresses **learning objective 1.2.C.**

Decreasing Exposure

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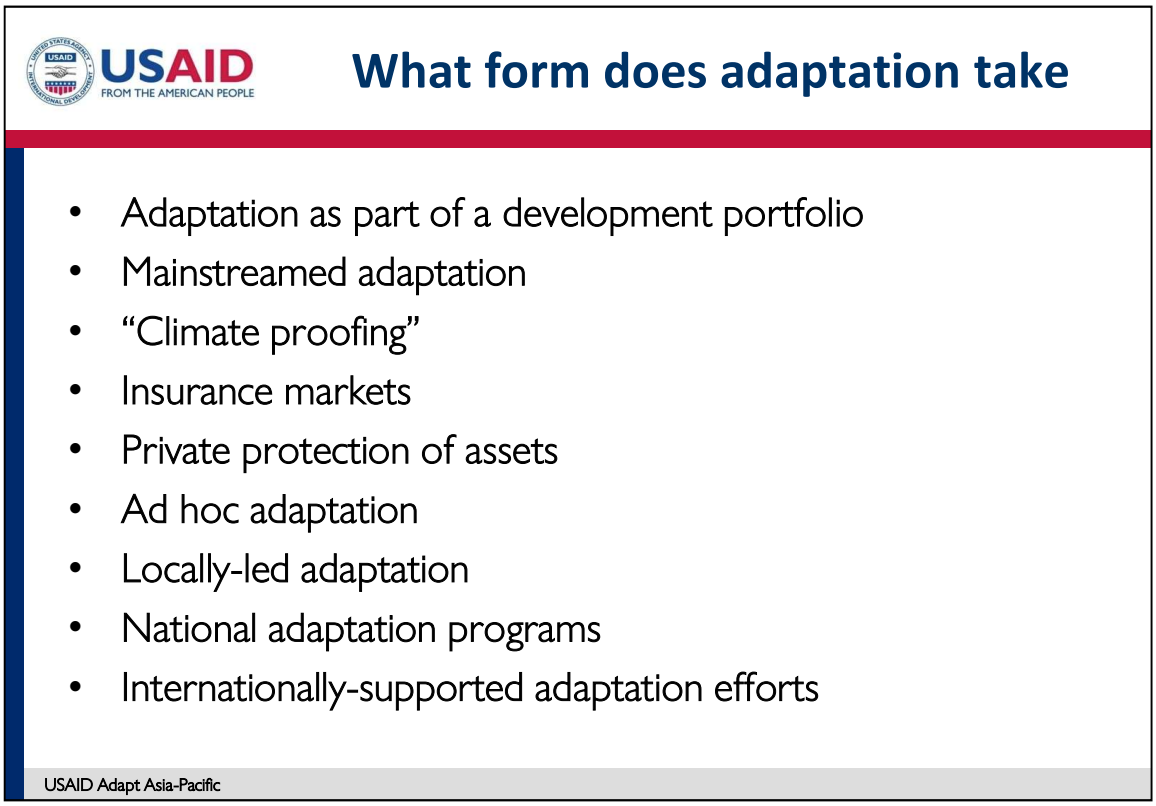
The image here is from SPREP (https://www.sprep.org/climate-change/upheaval-of-fiji-communities-as-climate-change-impacts-are-felt, last accessed 3/21/2016) and depicts the Fijian village of Vunidogoloa, which was the first village in Fiji to be relocated in 2014 under the country's climate change program, as climate change impacts had reached the village in the form of seawater flowing into the village compound at high tide, damaging homes and crops.

This image is from the World Bank (http://www.worldbank.org/en/topic/education/brief/girls-education; last accessed 3/21/2016).

Decreasing sensitivity often consists of structural options, as will be discussed in module 2 tomorrow. However, there are many non-structural measures that can be taken to reduce sensitivity of people, and especially the most vulnerable groups, including women. Quality education helps decrease sensitivity because it enables people to make decisions that decrease their vulnerability. This is particularly true for girls and women, who are in general more vulnerable to climate change impacts and underserved by educational services.



Here we are looking at how adaptation is "packaged" and funded and managed. Not the substance, but rather the practical issues on design and implementation.

Adaptation as part of a development portfolio.

Mainstreamed adaptation: This includes things like

- Building codes and ordinances that institutionalize climate change adaptation into planning processes.

"Climate Proofing". This refers to modifications to existing and in the pipeline projects to make them resilience to the expected impacts of climate change. The ADB defines climate proofing as

- "a process that aims to identify risks that an investment project may face as a result of climate change, and to reduce those risks to levels considered to be acceptable"
- "a measure aimed at mitigating the climate risk to which a project is exposed".

Currently the Asian Development Bank requires that all projects be subjected to screening procedures designed to determine and remediate vulnerabilities to climate change.

Insurance Markets

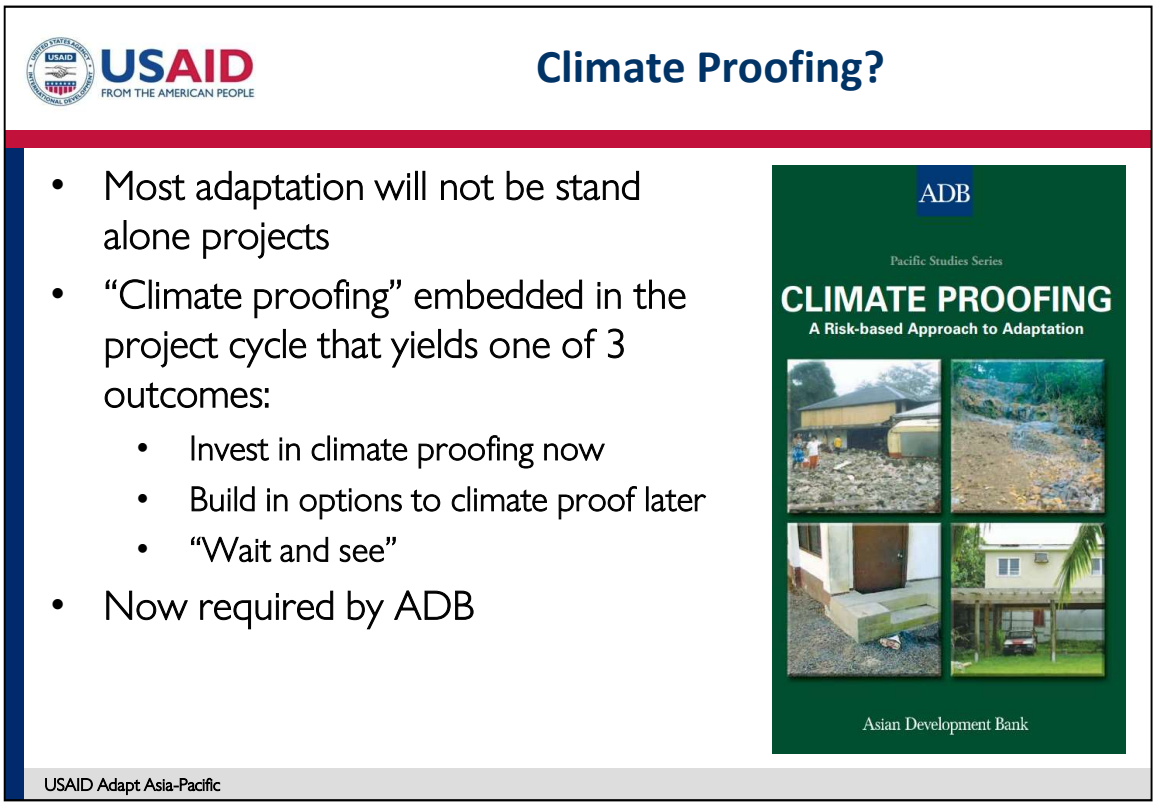
Private Protection of Assets. Much of the adaptations that will be necessary in the future will be made by the private sector, either as firms or individuals. In general, the private sector implements adaptation measures as they relate to the bottom line. Individuals make adaptation decisions based on experience, available information and understanding of vulnerabilities and impacts, as well as available resources. Does the government have a role to play vis-à-vis the private sector?

Ad hoc adaptation. This refers to adaptation projects that are specifically designed and implemented to address climate impacts.

National Adaptation Programs. Most countries have developed national adaptation policies of one sort or another. These will be addressed in depth in module 2.

Internationally-supported adaptation efforts.

The material on this slide addresses **learning objective 1.2.C.**



Although this training series focuses on project proposal development and project finance, it is important to understand the concept of "climate proofing" as well. The ADB defines climate proofing as

- "a process that aims to identify risks that an investment project may face as a result of climate change, and to reduce those risks to levels considered to be acceptable"
- "a measure aimed at mitigating the climate risk to which a project is exposed".

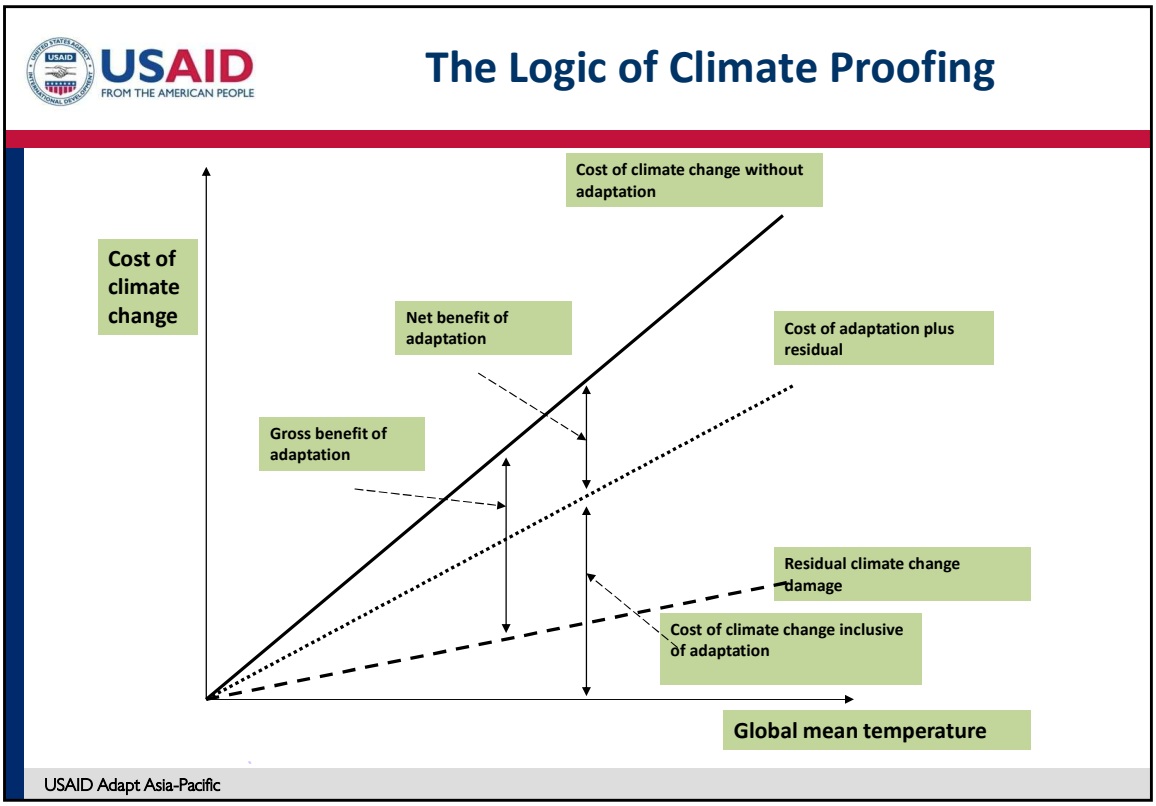
Most adaptation will not be stand alone projects. The vast majority of adaptation work that is done in the future will not be stand-alone adaptation projects, but will consist of retrofitting and modifications to existing and in-the-pipeline projects. Existing infrastructure, especially in transportation and energy, can be highly vulnerable to the impacts of climate change. These impacts will have consequences for the design, construction, location, and operation of power infrastructure. Inadequate attention to impacts can increase the long-term costs of transportation and energy sector investments and reduce the likelihood that these investments deliver the intended results. Other elements of climate proofing will include updated planning and engineering standards. Currently in most cases these standards look to historical experience as a reference, but in a world of changing climate this will no longer be sufficient.

Climate proofing embedded in the project cycle. Thus climate proofing is necessary. The ADB has developed a methodological approach for building adaptation into

investment projects, and divides the method into six different sets of activities. These activities are embedded within the regular project cycle and yield one of three decisions:

- **Invest in climate proofing now**.
- **Build in options to climate proof later**. Do not invest now in climate proofing, but ensure that the project is designed in such a way as to be amenable to be climate proofed in the future if and when circumstances indicate this to be a better option than not climate proofing.
- **Wait and see**. Make no changes to project design, monitor change in climate variables and their impacts on the infrastructure assets, and invest in climate proofing in and when needed at a later point in time.

The image on this slide is the cover of the ADB's publication, Climate Proofing: A Risk Based Approach to Adaptation, 2005. The document can be downloaded at http://www.adb.org/sites/default/files/publication/28796/climate-proofing.pdf and is also included in the participant resources pack.



In this slide we demonstrate the economic reasons for climate proofing. In the future it will be impossible to avoid all costs of climate change, but adaptation (in particularly in the form of climate proofing) will help us to avoid some of the costs.

Illustrative example:

This problem can be presented in a simple diagram reflecting the *rising costs of adaptation as global mean temperatures rise.* In reality the costs may or may not be in a straight line – but for simplicity of presentation and understanding the principles, let's assume they are.

The solid line shows the costs of climate change without adaptation, rising steadily as temperatures rise.

The large dotted line shows the residual (remaining) climate change after a CCA intervention – costs have come down, in gross terms.

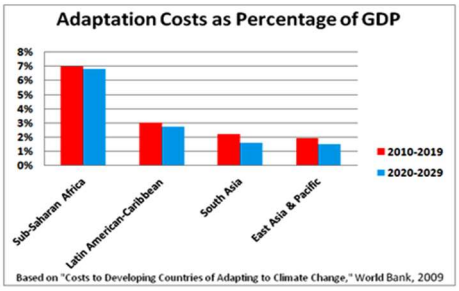
The small dotted line shows the net costs after a CCA intervention – i.e. a smaller gain or net benefit due to the intervention. The net benefit from adaptation is less than the gross benefit due to the cost of the intervention.

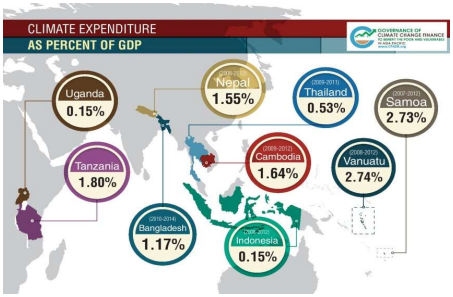
Note again that there will be residual negative impacts that cannot be fully offset by the project. The full area of the loss is only partially offset by the project.

The material on this slide addresses **learning objective 1.2.D.**

Costs of Adaptation

- Costs of adaptation increase over time
- Costs may be $150 billion to $300 billion/year by 2050
- Costs of adaptation contingent on future warming, in-country processes
- Demand for funding exceeds supply BY FAR





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Costs of adaptation increase over time. Because the planet is already warming and the impacts of climate change are already being felt by people and on infrastructure, taking action to address these impacts will increase over time. In other words, since adaptation reduces the cost of future impacts, the sooner we take action to adapt, the greater the cost-effectiveness will be over time in avoided damage. Moreover, taking preventative action is virtually always more cost effective than taking remedial action.

Costs may be $150 billion to $300 billion/year by 2050. Likewise, estimates of adaptation costs have increased over time. For example, in 2007, a UNFCCC study estimated adaptation finance needs for developing countries at approximately $28 billion annually by 2050, whereas a recent UNEP report (2014) estimated a maximum cost for adaptation at $300 billion annually by 2050.

Costs of adaptation contingent on future warming, in-country processes. As we have noted, the world is already committed to a certain amount of warming and associated climate change. However, beyond this the magnitude of warming depends on the success of global mitigation efforts, development trajectories, technological change, and a host of national and sub-national socioeconomic processes. Thus it is difficult to put a precise dollar amount on future adaptation needs.

Demand for funding exceeds supply by far. Despite increased commitments on the part of developed countries to support adaptation in developing countries, adaptation

funding demand by far outstrips available funds, and it is very likely that this will **always** be the case. This means that it is critical to identify the most urgent needs, and to develop cost-effective and efficient strategies.

The topmost image here is from a World Bank Report entitled "Cost to Developing Countries of Adapting to Climate Change" (2009). The graphic was sourced from http://blogs.worldbank.org/files/dmblog/Cost%20of%20Adapting%20to%20Climate%20Change%20to%20GDP(2).png.

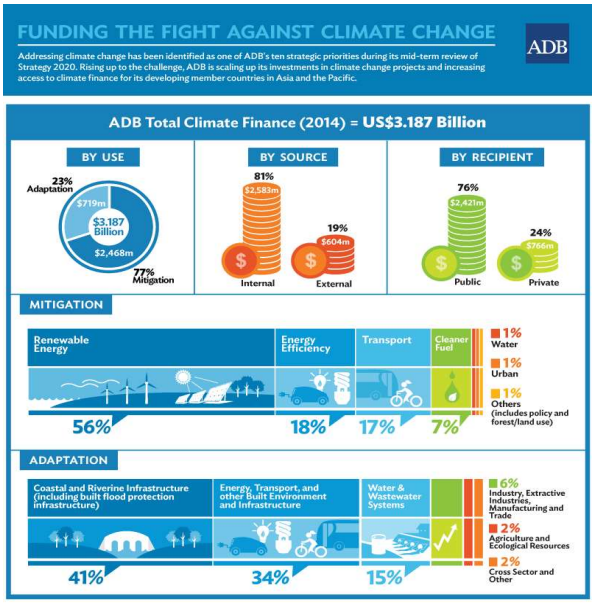
The second map is sourced from the Governance of Climate Change Finance to Benefit the Poor and Vulnerable in Asia Pacific Project, http://www.climatefinance-developmenteffectiveness.org/publication/results-infographic-climate-related-expenditure. This website has a tremendous amount of other useful information as well.

Information on this slide addresses **learning objective 1.2.D.**

Information from this slide was drawn from a World Resources Institute blog, http://www.wri.org/blog/2015/04/costs-climate-adaptation-explained-4-infographics last accessed 3/2/2016.

Costs of CC & Adaptation in Asia

- Models indicate that costs will increase over time and be "prohibitively high" in the long term
- Potential loss of 8.8% GDP in South Asia by 2100; 2.5% with mitigation
- Expedient adaptation based on rigorous and timely evidence needed



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Addressing climate change has been identified as one of ADB's ten strategic priorities during the mid-term review of its Strategy 2020. The review was conducted in 2015, and as a result ADB is scaling up its investments in climate change projects and increasing access to climate finance for its developing member countries in Asia and the Pacific.

Emphasize the need to pay the costs of adaptation in those areas of highest priority:

- Coastal areas
- Vulnerability to sea level rise
- The most vulnerable infrastructure
- The most vulnerable communities.

The Asian Development Bank, to support its focus on adaptation to climate change, has conducted studies on the costs of climate change adaptation in member countries. For example, the ADB's report on the costs of adaptation in South Asia (see references slide) examined the economic costs associated with the impacts of climate change and the cost and benefits of adaptation in Bangladesh, Bhutan, India, the Maldives, Nepal, and Sri Lanka. The study aimed to (i) assess the biophysical impacts of climate change in the region, including individual country impacts, and (ii) estimate the total economic loss to the countries in the region by 2100, taking into account the different scenarios and impacts projected across vulnerable sectors, and then to estimate the magnitude of

funding for adaptation measures required to avert such potential losses. Results of the study will aid development of future policies and programs for climate change adaptation in the region, including initiatives for regional cooperation and capacity building in climate change management. The study covered the following sectors: agriculture, terrestrial ecosystems, water, marine and coastal resources (except Bhutan and Nepal), health, and energy. This slide details some findings from that study.

Models indicate that costs will increase over time and be "prohibitively high" in the long term.

Potential loss of 8.8% GDP in South Asia by 2100; 2.5% with mitigation. "Economic findings using an integrated assessment model suggest that the total climate change cost in South Asia will increase over time and will be prohibitively high in the long term. Without global deviation from a fossil-fuel-intensive path, South Asia could lose an equivalent 1.8% of its annual gross domestic product (GDP) by 2050, which will progressively increase to 8.8% by 2100 on average under the business-as-usual (BAU) scenario. The model suggests that the Maldives will be hardest hit in GDP loss, while Bangladesh, Bhutan, India, Nepal, and Sri Lanka are projected to face 2.0%, 1.4%, 1.8%, 2.2%, and 1.2%, respectively, loss of annual GDP by 2050. However, should the global community take actions along the Copenhagen–Cancun agreements to keep the global mean temperature rise below or within 2o C, the region would only lose an average of 1.3% of GDP by 2050 and roughly 2.5% by 2100. The difference between the results from the two scenarios indicates the benefits from a global shift toward the Copenhagen–Cancun (C–C) scenario" (ADB 2014).

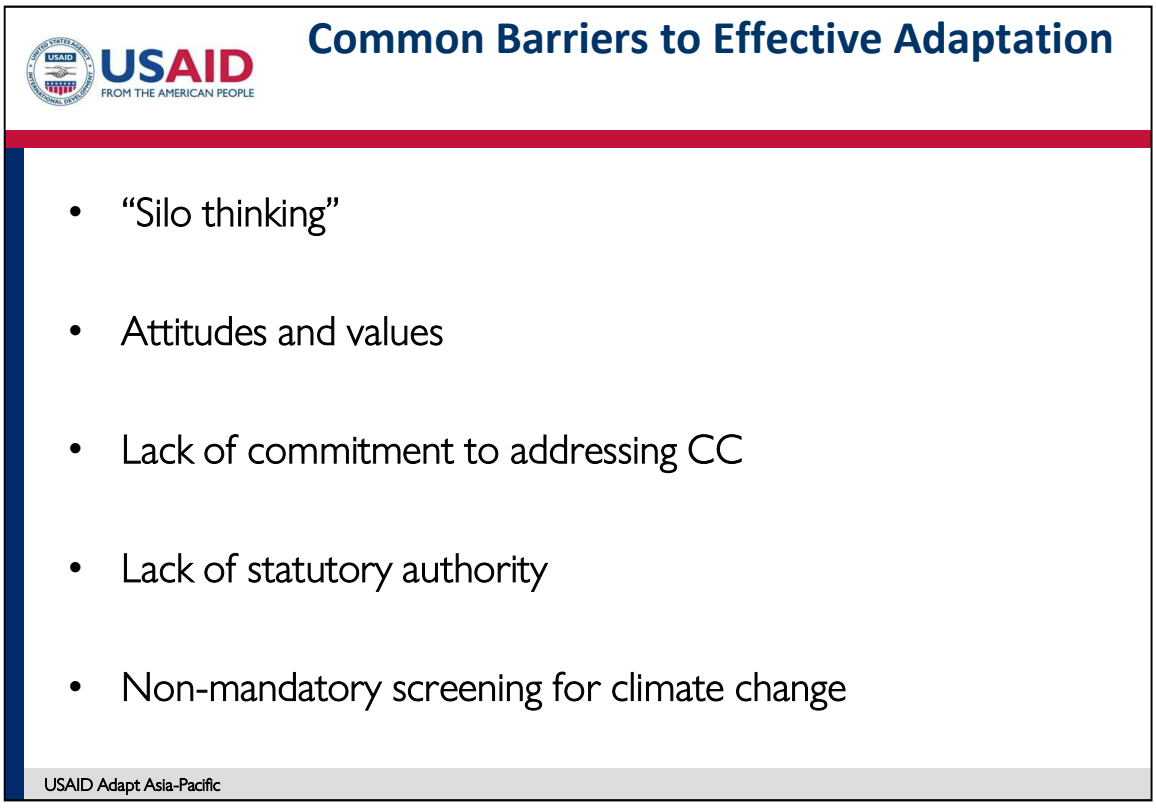
Another ADB study (2009) estimated that the costs of climate change in Indonesia, the Philippines, Thailand, and Viet Nam could equal a loss of nearly 7% of their combined GDP by 2100.

Other studies have aimed to assess the costs of adaptation to climate change, generally presented as the investment necessary to restore an estimated baseline reference of development. Annual adaptation costs have been estimated to reach approximately $40 billion in Asia and the Pacific over the period 2010-2050. For the Pacific region alone, ADB estimated that the region would require $447 million on average every year until 2050 (approximately 1.5% of GDP) to prepare for a worst-case climate change under the business-as-usual scenario. The cost could be as high as $775 million or 2.5% of GDP per annum. A World Bank report on the economics of climate change adaptation is an influential example of such studies at the global level, with estimates of the global cost of adaptation ranging from $70 to $100 billion up to 2050 (in 2005 prices).

Expedient adaptation based on rigorous and timely evidence needed. It is evident that adaptation needs depend on global mitigation progress. It will be more challenging and costly to adapt to climate impacts under the BAU scenario than to adapt to lower-emission scenarios. The region's adaptation response needs not be confined to symptomatic treatment of threats to traditional patterns of economic activity. More efficient regional economic diversification can

create entirely new patterns and supporting infrastructure to take their place. In other words, policy makers need to take early action to adapt to climate risks, and this action needs to be informed by rigorous and timely evidence (ADB 2014).

The graphic on this slide was produced on 6/4/2015 and is sourced from http://www.adb.org/news/infographics/funding-fight-against-climate-change, last viewed 1/25/2016.



Institutional and governance barriers are the most common type of barrier for effective adaptation, not just in developing countries, but developed countries as well (Ekstrom and Moser 2013). However, in developing countries there often exists a "fundamental governance deficit" such that there is no effective planning process into which climate change adaptation and resilience can be incorporated or mainstreamed.

Silo thinking. Isolated government departments and sector-based structures of agencies, which make coordination difficult. Often, the bigger the department/agency, the less interested they are in coordination with others

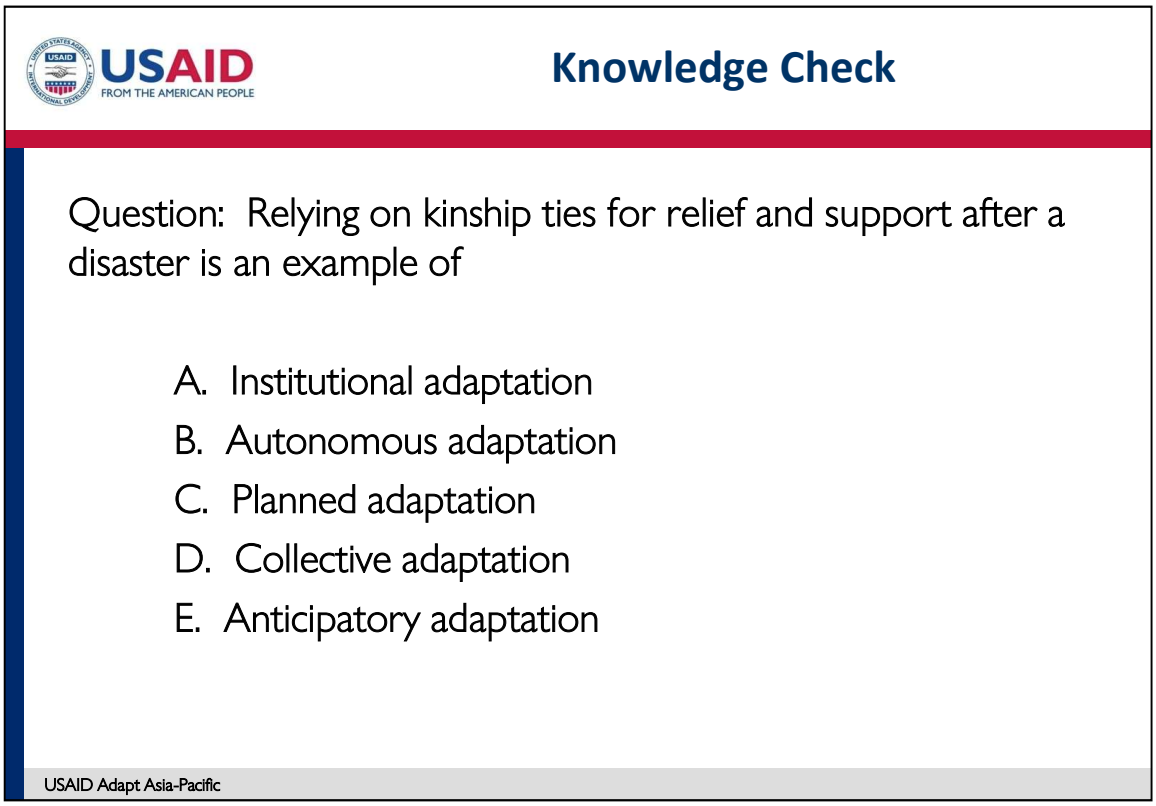
Attitudes and values. This includes a lack of interest in adaptation, a status-quo mindset, the inability to accept change, and narrow self-interests which can hinder or delay adaptation processes.

Lack of commitment to addressing climate change. Climate change doesn't show up in a lot of planning documents. Part of this can be attributed to the fact that climate change adaptation is such a complex, cross-sectoral and cross-scalar issue (in other words, it's everyone's problem), and so it becomes no one's problem in terms of responsibility. It is so complex that it doesn't easily fall under the purview of one agency (Fuchs et al 2011).

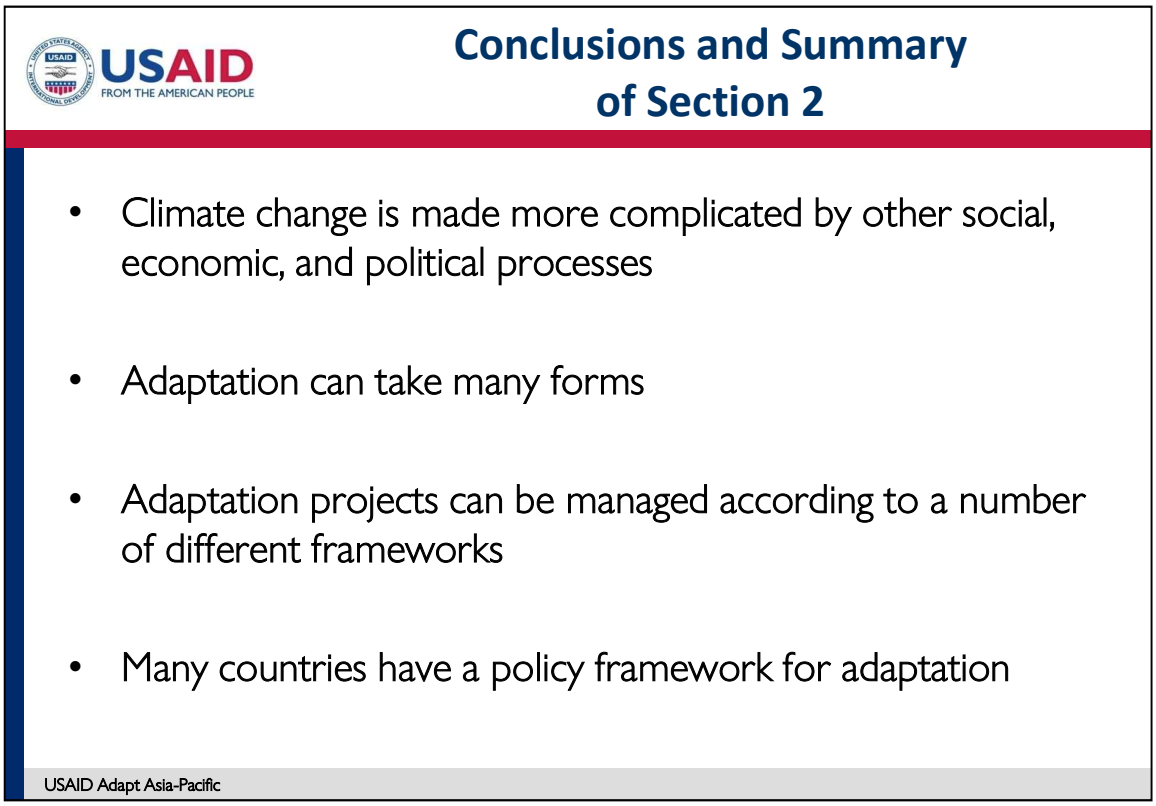
Anecdote from a project professional: “We saw this lack of commitment when a certain agency was building a road and they had a deadline. The last thing they want to do is to deal with the climate change assessment because this is time consuming and requires resources. And in the past they have gotten away with it. Often they get away with it by ‘paying lipservice’ to climate change; there has been no rigor in the analysis and treatment of climate change as an actual threat to the future feasibility or longevity of the project”. This anecdote illustrates the “business as usual” approach to project design and implementation, and the pitfall of simply grafting climate change adaptation onto the normal way of designing and implementing projects. This approach can undermine the potential gains of the project, and in extreme instances, can lead to **maladaptive outcomes**, or results that actually leave you more vulnerable to climate change than you were before the project was implemented.

Lack of statutory authority. No legal basis for action.

Non-mandatory screening for climate change. CC is not a formal requirement for screening at the country level.



D. Collective Adaptation

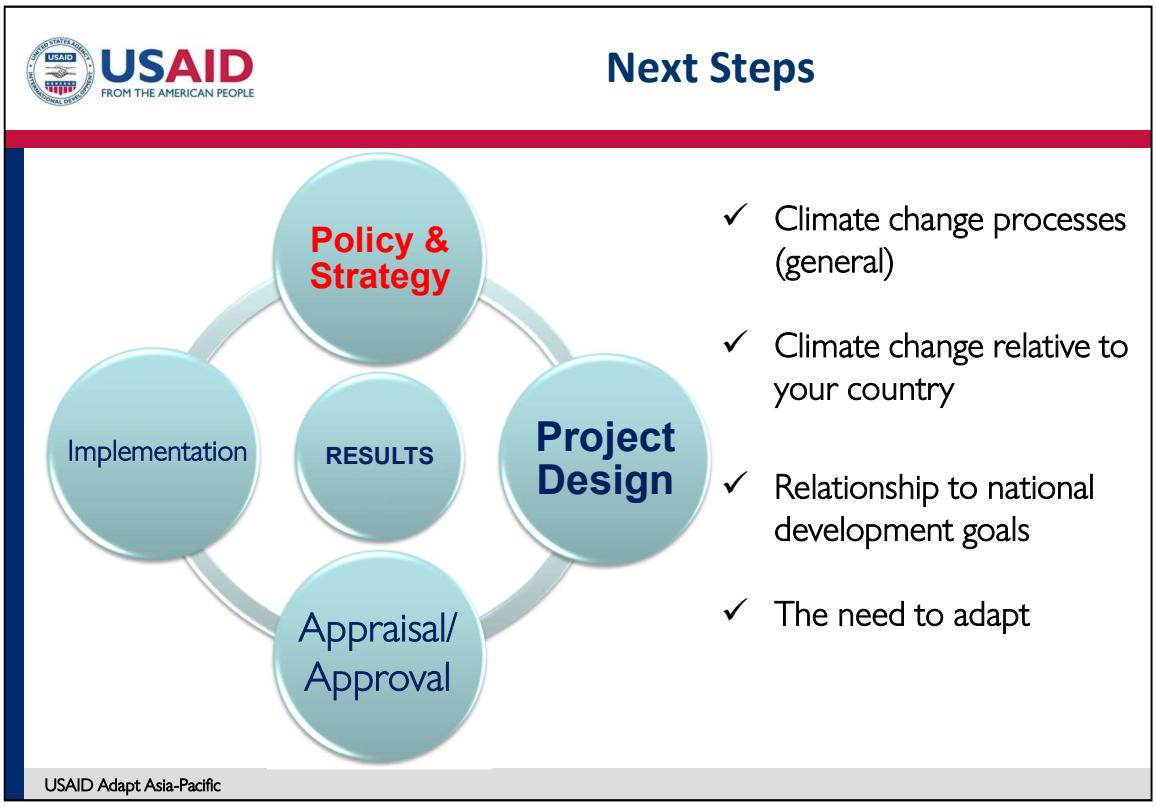


Climate change is made more complicated by other social, economic, and political processes.

Adaptation can take many forms.

Adaptation projects can be managed according to a number of different frameworks.

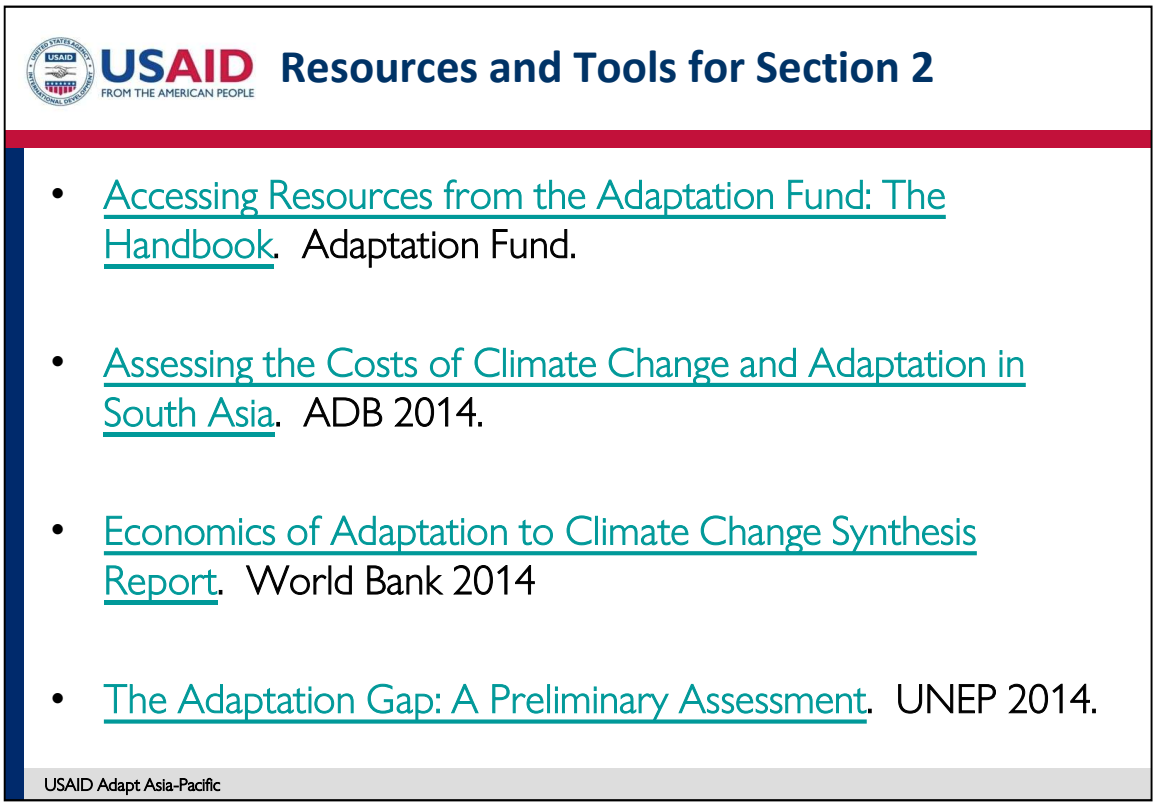
Many countries have a policy framework for adaptation.



Gather, analyze and disseminate national climate information.

Create and institutionalize a clear explanation of the relationship between climate change and national development.

Develop a coherent and concise explanation and understanding of the need for adaptation in your country.

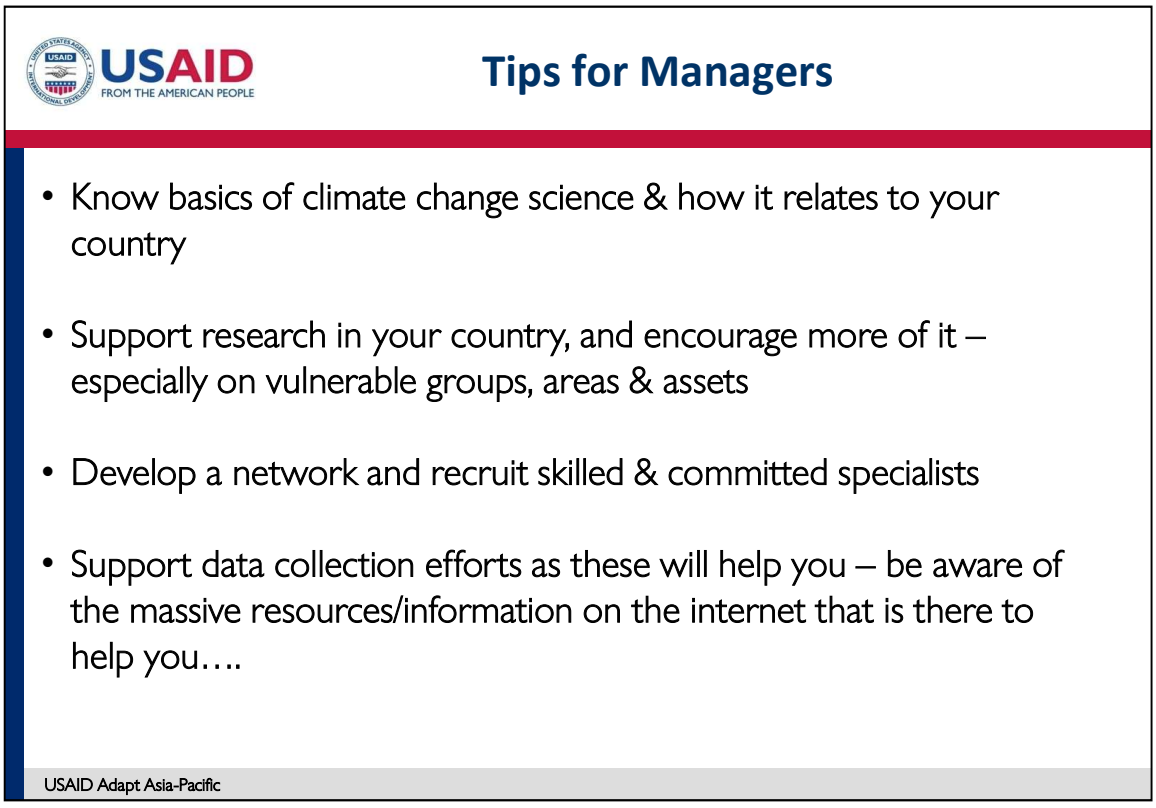


Accessing Resources from the Adaptation Fund: The Handbook. Adaptation Fund. Download at http://www.sanbi.org/sites/default/files/documents/documents/adaptation-fund-handbook.pdf. Synopsis: "This handbook provides developing country governments, organizations, and other stakeholders with guidance on how the Adaptation Fund can serve the growing adaptation needs in vulnerable developing countries. This introduction gives an overview of key aspects of the Fund and offers brief guidance on: How to access resources from the Fund; how to prepare project proposals; how to nominate and accredit national implementing entities" (5).

Assessing the Costs of Climate Change & Adaptation in South Asia. ADB 2014. Download at http://adb.org/sites/default/files/pub/2014/assessing-costs-climate-change-and-adaptation-south-asia.pdf; also included in participant resources pack.

Economics of Adaptation to Climate Change: Synthesis Report. World Bank 2010. Download at https://openknowledge.worldbank.org/bitstream/handle/10986/12750/702670ESW0P10800EACCSynthesisReport.pdf?sequence=1, also included in participant resources pack.

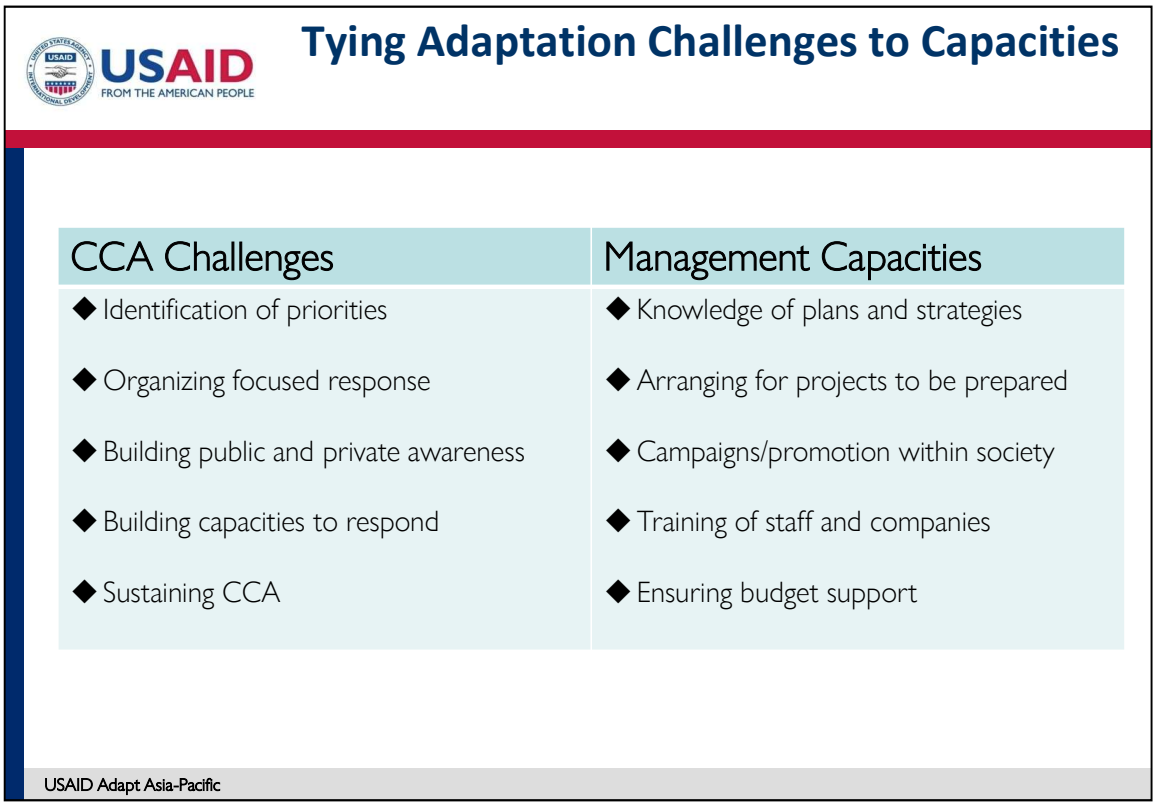
The Adaptation Gap: A Preliminary Assessment. UNEP 2014. Download at http://www.unep.org/climatechange/adaptation/gapreport2014/portals/50270/pdf/AGR_FULL_REPORT.pdf, also included in participant resource pack.



The above measures will make officials better informed generally and better able to interact with specialist project design teams. AND be better managers…

CCA projects need to be developed in a way that has been proven to work successfully. The method of preparation that is suggested in this course is participatory in nature, and is based on the elements recommended by the major international development banks, and climate finance agencies such as the Adaptation Fund and Green Climate Fund.

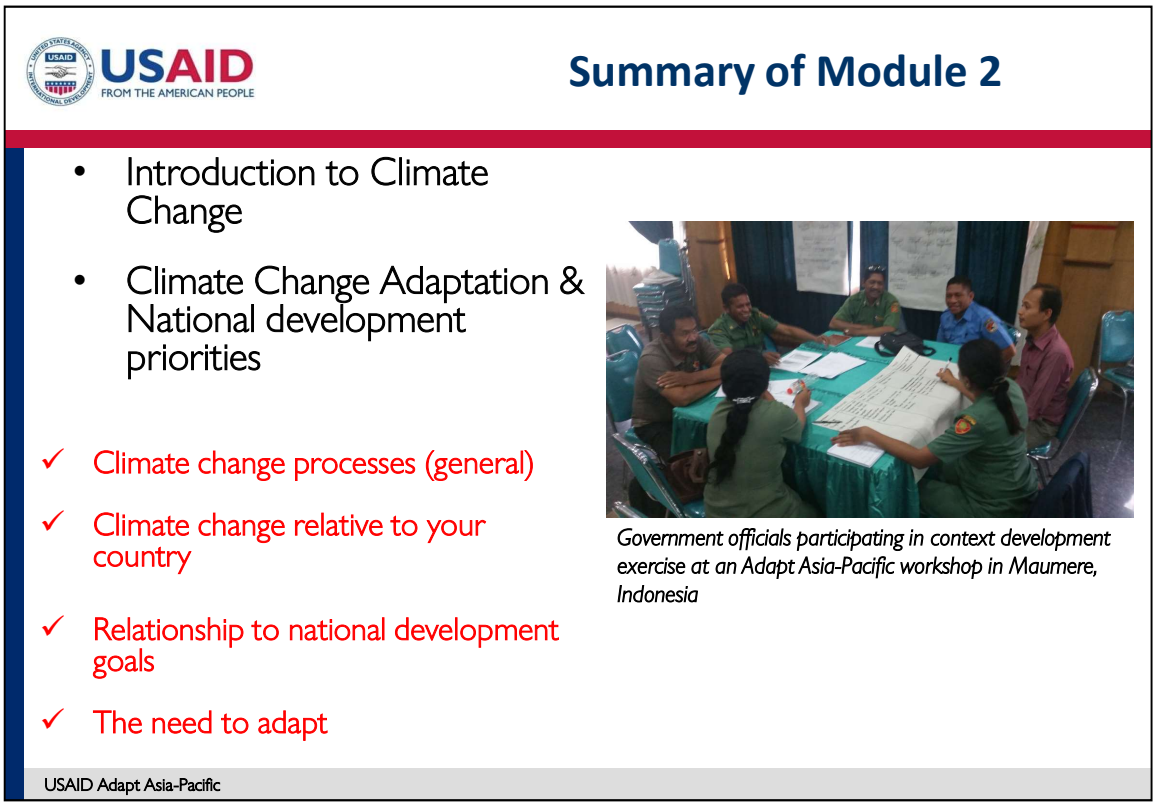
Adequate planning, finance and analysis are all required to prepare a CCA project that will be implemented successfully.



This slide summarizes the challenges associated with climate change adaptation and the management capacities necessary for addressing them, as follows:

- Priorities: CCA priorities at the country level should be identified accurately in the NAP, mapped in terms of timing (short term coastal zone, longer term) and level of vulnerability. Managers should understand the priorities and be able to react appropriately.
- Organizing a response: projects and other modalities can be designed to deliver the responses. These can be financed domestically or internationally, and depending on who is financing the intervention the level of presentation and analysis will differ.
- Building awareness: providing society with awareness of CC and how best to respond is a function for government and the private sector. Governments can fund campaigns to build awareness and interventions in all sectors, and encourage private interventions, as appropriate.
- Building capacities to respond: public and private capacity is needed.
- Sustaining CCA interventions: through budget support, as necessary.

- See later slide **Table 1: Risks of Climate Change for Key Development Sectors**



Note to Facilitator: The bullets in black refer to the topics we have covered. Those in red refer to the aspects of a project proposal we have covered.

We have covered a basic introduction to climate change, the need for adaptation, and the basic requirements for determining how to address CCA – through gathering appropriate data, modeling the future climate, identifying and managing risks and identifying vulnerable groups and places as a first step to decision-making about the needs for CCA interventions.

Project identification, design and preparation for CCA is one of the instruments governments can employ under National Action Plans. They can either fund these themselves or seek external finance.

Module 2 Outcomes SELF CHECK

- Understand sources of climate information relevant to project design and how to access these sources of information
- Develop a localized climate change narrative describing physical processes that can be used in a project design document
- Describe climate change impacts and justify why adaptation is necessary, and what might result if adaptation does not happen

A Hui Hou!