

# Climate Change Adaptation Planning: Background Material

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## Introduction

The climate is changing and causing a host of serious consequences for people around the world. In the United States, Native Americans and Alaska Natives will likely be disproportionately impacted compared to their non-Native counterparts. Alaskan Native villages, for example, are already experiencing acute and rapid changes, such as warmer temperatures, rising sea levels, permafrost thaw, and loss of sea ice. More than 30 villages are experiencing severe coastal and river erosion and need to relocate to higher ground. Other types of impacts on tribes include changing precipitation patterns, changes to local ecosystems and culturally important plant and animal species, and more frequent and severe extreme weather events.

Tribes can be proactive, and plan and prepare for climate change impacts. They can build resiliency that allows social and ecological systems to thrive under stress from the vagaries of nature and human activities. Tribes can draw on their past experiences to aid them in adapting to a changing climate, but they may also need to adopt novel and innovative adaptation techniques.

How individual tribes plan and prepare for climate change will vary, and it is important to note that there are many ways to plan, prepare, and adapt to climate change. Your tribe should tailor its planning approach to the needs and resources of the tribe.

**Key Terms:** As you read and learn about climate change adaptation planning, you will encounter some terms that are used in a climate change context. Please refer to the list of Key Terms at the end of this document for operational definitions of the most common terms.

## Guiding Principles for Adaptation

The Interagency Climate Change Adaptation Task Force (White House Council on Environmental Quality) recommends governments, communities, private sector, and others to consider guiding principles when designing and implementing adaptation strategies and to use a flexible framework for adaptation planning<sup>1</sup>.

The following guiding principles are based on those suggested by the Task Force:

- **Adopt integrated approaches.** Climate change preparation and response should be integrated into core policies, planning, practices, and programs whenever possible.
- **Prioritize the most vulnerable.** Adaptation plans should prioritize helping people, places, natural systems, and infrastructure that are most vulnerable to climate impacts. They should also be designed and implemented with meaningful involvement from all

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<sup>1</sup> *Progress Report of the Interagency Climate Change Adaptation Task Force: Recommended Actions in Support of a National Climate Change Adaptation Strategy*, Interagency Climate Change Adaptation Task Force (White House Council on Environmental Quality), 10/5/10. See p. 10 and 21-22 for guiding principles, p. 27-29 for core elements of flexible framework. [www.whitehouse.gov/sites/default/files/microsites/ceq/Interagency-Climate-Change-Adaptation-Progress-Report.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ceq/Interagency-Climate-Change-Adaptation-Progress-Report.pdf)

parts of society. Issues of inequality and environmental justice associated with climate change impacts and adaptation should be addressed.

- **Use best-available science.** Adaptation should be grounded in best-available scientific understanding of climate change risks, impacts, and vulnerabilities. Adaptive actions should not be delayed to wait for further, more complete understanding of all climate change impacts, as there will always be some uncertainty, impacts from climate change are already happening, and the timeline for seeing results from adaptation actions may be long. Plans and actions should be adjusted as our understanding of climate impacts increases and as changing circumstances dictate.
- **Build strong partnerships.** Adaptation requires coordination across multiple sectors, geographical scales, and levels of government and should build on the existing efforts and knowledge of a wide range of stakeholders. Because impacts, vulnerability, and needs vary by region and locale, adaptation will be most effective when driven by local or regional risks and needs.
- **Apply appropriate risk-management methods and tools.** A risk management approach can be an effective way to assess and respond to climate change because the timing, likelihood, and nature of specific climate risks are difficult to predict and subject to change. Risk management approaches are already used in many critical decisions today (e.g., for fire, flood, disease outbreaks), and can aid in understanding the potential consequences of inaction as well as options for risk reduction.
- **Apply ecosystem-based approaches.** Ecosystems provide valuable services that help to build resilience and reduce the vulnerability of people and their livelihoods to climate change impacts. Integrating the protection of biodiversity and ecosystem services into adaptation strategies will increase resilience of human and natural systems to climate and non-climate risks, providing benefits to society and the environment.
- **Maximize mutual benefits.** Adaptation should, where possible, use strategies that complement or directly support other related climate or environmental initiatives, such as efforts to improve disaster preparedness, promote sustainable resource management, and reduce greenhouse gas emissions including the development of cost-effective technologies.
- **Continuously evaluate performance.** Adaptation plans should include measurable goals and performance metrics to continuously assess whether adaptive actions are achieving desired outcomes. In some cases, the measurements will be qualitative until more information is gathered to evaluate outcomes quantitatively. Flexibility is a critical to building a robust and resilient process that can accommodate uncertainty and change.

## Frameworks for Adaptation Planning

Many guidebooks and tools are available that provide frameworks for planning and guidance for the adaptation planning process. We recommend that you review different frameworks and guidebooks before starting climate change planning with your tribe. We also suggest that you review climate change adaptation plans that have been developed by other tribes and local governments.

The process of adaptation planning presented here is based on concepts and material in the guidebook *Preparing for Climate Change: A Guidebook for Local, Regional, and State*

*Governments.*<sup>2</sup> The guidebook provides a framework for adaptation planning and outlines steps to follow in the planning process.

Here are the basic steps for planning and preparing for climate change, adapted from the guidebook. More information is provided later about assessing impacts, vulnerabilities, and risks and developing adaptation strategies.

- 1) Initiate your climate change planning effort—“Getting Started”
  - Gather information about how climate is changing in your region
  - Scope the climate change impacts to the major sectors/resources important to your tribe
  - Build and maintain support with your tribal leadership and community
  - Seek tribal council approval of a resolution supporting a tribal climate change adaptation initiative
  - Create a climate change planning team and select the team leader
  - Develop tribe’s planning guide that outlines the goals, process, schedule, responsibilities, and products of the climate change adaptation initiative
  - Build internal and external partnerships
  - Seek funding to support the tribe’s climate change adaptation initiative
- 2) Assess the climate change impacts and vulnerabilities
  - Develop climate change scenarios based on available information
  - Identify/characterize current and projected impacts on sectors and planning areas of interest (more in depth than initial scoping)
  - Assess the vulnerabilities of the sectors and planning areas to those impacts
- 3) Assess risks and prioritize areas for planning
  - Assess risks posed by climate change impacts
  - Prioritize sectors and planning areas for development of adaptation strategies
- 4) Develop adaptation strategies
  - Develop adaptation goals—major results the tribe wants to accomplish
  - Develop and prioritize adaptation actions
- 5) Write and integrate adaptation plan
  - Write adaptation plan, provide draft for review by others, finalize plan
  - Seek tribal council approval of climate change adaptation plan
  - Integrate (“mainstream”) into other management and planning activities/documents
- 6) Implement the adaptation plan
  - Identify feasible first steps
  - Build leadership and community support

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<sup>2</sup> *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments*, Climate Impacts Group and King County, WA, 2007, <http://cses.washington.edu/cig/fpt/guidebook.shtml>

- Build partnerships for implementing adaptation actions
  - Locate funding; be ready for “windows of opportunity”
  - Ensure you have the right implementation tools
  - Implement adaptation actions
- 7) Measure your progress and update your plan
- Track progress in implementing actions, attaining goals; evaluate effectiveness of adaptation actions
  - Continue monitoring changes in climate and the impacts; regularly review basic assumptions
  - Update plan regularly to respond to changing circumstances and/or data as new information becomes available

### **Assess the Impacts of Climate Change**

One of the first steps in the climate change planning process is to **gather information about observed and projected changes in climate for your region**. Using this information, you can then assess how these changes in climate might affect your tribal lands, natural and cultural resources, infrastructure, and people. Possible sources of relevant information about observed and projected changes in climate include:

- national and regional assessment reports, including the U.S. Global Change Research Program’s national climate assessment
- federal agencies
- state environmental departments
- universities
- regional climate centers (including the Dept. of Interior’s Climate Science Centers and Landscape Conservation Cooperatives)
- nearby tribes and local governments—they may already have identified sources of information relevant to the region
- your tribe’s monitoring records
- tribal elders—their observations of changes that have been occurring--Traditional Knowledge (or Traditional Ecological Knowledge, Indigenous Knowledge, etc.)

**Note:** if you are including Traditional Knowledge (TK) in the adaptation planning process, clarify if the TK is meant for internal review only, or if and how the TK will be shared. TK should not be included in any publically available reports or deliverables without tribal consent.

The existing data you might want to gather include things such as precipitation, temperature, sea level rise, extreme weather events, frost dates, and distribution and ranges of species. You might consider establishing ongoing monitoring programs that will provide baseline data about current conditions and data about changes in the local climate and about particular impacts on your tribal lands.

In assessing the potential impacts of climate change, focus on the sectors (general groupings used to describe any resource, ecological system, management area, etc.) that are important to

your tribe. Sectors can be organized within three broader, general categories: Natural Environment (naturally occurring resources), Built Environment (human-made infrastructure), and Social Environment (areas impacting human life); see below for examples of sectors that might be in the different categories. Please note that there are other ways of organizing the information and that there is some overlap among the categories below.

### **Natural Environment**

- Water Resources (freshwater, groundwater, wetlands)
- Forest Resources
- Fish and Wildlife
- Plants
- Ecosystems
- Shorelines/Beaches

### **Built Environment**

- Land use (Housing, hazardous sites, recreation, agriculture)
- Utilities (water supply, wastewater, energy, waste management, communications)
- Transportation (access, infrastructure, public transit, marine/port facilities)

### **Social Environment**

- Human Health
- Cultural Resources and Traditions
- Economy
- Emergency Services (police, fire, other)

**Assess how changes in climate might impact a specific sector and planning area** (subcategory of a sector). For example, for the sector “Utilities” and planning area “Water Supply”, a specific impact might be “Decreased water supply during summer because of diminished source (stream/snowpack).”

Consider the **geographic extent** (i.e., is this an impact that will be restricted to certain parts of the tribal lands?) and estimated time frame of the impact (you can use “near-term”, “medium-term” or “long-term”). Indicate the **probability** of that impact occurring (How likely is it that this impact will occur?) and the **confidence** in the prediction. Indicate the **consequences** of impact—consider economic, legal, social, cultural, and other consequences if the impact occurs, and consider the costs and scale of the impact. You can use qualitative ratings such as terms “Low,” “Medium,” or “High”.

### **Vulnerability**

Another step in the planning process is to assess the vulnerabilities of the systems in the planning areas—their susceptibility to harm. Vulnerability is a function of 1) how sensitive the system is to climate and climate changes (this called **sensitivity**) and 2) its capacity to accommodate change with minimum disruption or cost (**adaptive capacity**). It will also depend on how much the system is exposed to climate change or specific climate change impacts (**exposure**).

## Sensitivity & adaptive capacity → vulnerability

Some things to consider when assessing the sensitivity:

- Are there already existing stresses on the system?
- Relevant climate conditions and how they affect the system
- How the stresses on the system will change with changing climate conditions
- Will the demand for a resource increase with climate change?
- For plant and animal species, is the species of concern located near the edge of its range?
- Is there an impact threshold associated with the system? (for example, a temperature threshold for coldwater fish)

Some things to consider when assessing the adaptive capacity:

- Is the system already able to accommodate changes in climate?
- Are there barriers to the system’s ability to accommodate changes in climate? (examples: regulations based on historic climate conditions; other competing uses of the system; high number of organizations involved in managing the system; biologic, geographic, or physical barriers)
- Are there existing stresses on the system that will reduce its ability to adapt to climate change?
- Will the rate of climate change be faster than the adaptability of the system?

When rating the sensitivities, adaptive capacities, and the vulnerabilities, you can use qualitative ratings such as terms “Low,” “Medium,” or “High.” This matrix may help you in rating the vulnerabilities:

**Vulnerability Matrix**

SENSITIVITY	ADAPTIVE CAPACITY		
	HIGH	MEDIUM	LOW
HIGH	MEDIUM	MEDIUM-HIGH	HIGH
MEDIUM	MEDIUM-LOW	MEDIUM	MEDIUM-HIGH
LOW	LOW	MEDIUM-LOW	MEDIUM

### Risks and Prioritization

You will also need to assess the risks to the systems—knowing the risks will help you prioritize areas for planning and action. Consider the consequences and probability of an impact when assessing the risk. Other factors to consider include the geographic scale of the risk, how much time there is for planning before the impact occurs, and how community members view the risk.

Note that there are other ways of assessing the risks. For example, when the Swinomish Tribe developed their adaptation plan, they considered the vulnerability (instead of consequences) and the probability.

**Consequences & probability → risk**

When rating the risks, you can use qualitative ratings such as “Low,” “Medium,” or “High.” This matrix may help you in rating the risks:

**Risk Matrix**

CONSEQUENCES	PROBABILITY		
	HIGH	MEDIUM	LOW
HIGH	HIGH	MEDIUM-HIGH	MEDIUM
MEDIUM	MEDIUM-HIGH	MEDIUM	MEDIUM-LOW
LOW	MEDIUM	MEDIUM-LOW	LOW

After you have identified potential impacts of climate change and assessed the vulnerabilities and risks, you will need to identify areas that are a high priority for planning, as it unlikely that your tribe will have the resources to address all planning areas. **Priority planning areas** should be those which your tribe identifies as very important because of the associated vulnerabilities and risks.

**Vulnerability & risk → priorities**

When ranking the priority, you can use qualitative ratings such as “Low,” “Medium,” or “High.” This matrix may help you in identifying areas that are a high priority:

RISK	VULNERABILITY	
	HIGHER	LOWER
HIGHER RISK	HIGHER PRIORITY	MEDIUM PRIORITY

**Identifying Priority Planning Areas**

LOWER RISK	MEDIUM PRIORITY	LOWER PRIORITY
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## Develop Adaptation Strategies: Goals and Actions

Once the higher priority planning areas have been identified, the next step is to set adaptation goals and actions.

**Adaptation Goal:** Major result that your tribe wants to accomplish, for example, “Reduce property damage caused by sea level rise, erosion by storms, and flooding.”

**Adaptation Action:** Action that your tribe might take to accomplish the goal, for example, “Build seawalls; Relocate community to less vulnerable site.” The actions will depend on many factors, including the kinds and amounts of resources available to your tribe.

Consider the following when setting adaptation goals:

- Try to address the guiding principles for adaptation
- Engage others outside of your climate change planning team—get input from the tribal leadership and community
- Be clear about the timeframe for accomplishing the goal
- Be open to regular re-evaluation of policies and practices in light of known and projected climate change impacts

Some things to consider when developing adaptation actions:

- Modify policies, practices, and procedures
- Develop new options (such as creating “cooling centers” to use during extreme heat events; diversifying community’s economic base)
- Build new or upgrade existing infrastructure
- Required authorities and capacities to undertake the action (and do these already exist within the tribe?)
- Potential partners within and outside the tribe
- Timeframe within which the action needs to happen
- Potential funding needs and sources of funding

Once you have developed adaptation goals and actions, you can write a climate change adaptation plan (or you can call it a climate change action plan, preparedness plan, adaptive management plan, ...). Work with each department of the tribal government to integrate the adaptation plan into ongoing planning and management activities of all tribal departments. It might be included in other plans such as a natural resource plan, drought management plan, or disaster preparedness plan, etc... The ultimate goal of developing and implementing a climate change adaptation plan is to make your tribe more resilient to climate change.

## Key Terms:



*Note: The following terms are based on adaptations by the US Environmental Protection Agency<sup>3</sup> from the National Research Council's four volume series titled America's Climate Choices (2010).*

- **Adapt, Adaptation:** Adjustment in natural or human systems in response to the effects of a changing environment in a manner that attempts to exploit beneficial opportunities or moderate negative effects.
- **Adaptive capacity:** The ability of a system to adjust to environmental changes (including climate change, climate variability, and weather extremes), to moderate potential damages, to take advantage of opportunities, or to cope with the consequences, with minimum disruption or cost. A system with high adaptive capacity can better deal with climate change impacts than one with low adaptive capacity.
- **Climate Change:** Changes in the Earth's physical systems that occur over very long time periods, rather than over shorter natural or seasonal cycles; often refers to changes resulting from warming caused by increased greenhouse gas concentrations
- **Mitigation (as used in climate change context):** An intervention to reduce the causes of changes in climate, such as through reducing emissions of greenhouse gases to the atmosphere.
- **Planning Area:** A subcategory of a sector, it is an area in which the tribal government manages, plans, or makes policy affecting the services and activities associated with built, human, and natural systems. Example: within the sector Utilities, you might have planning areas of Water Supply and Electricity.
- **Resilience:** In the context of environmental change, the capability to anticipate, prepare for, respond to, and recover from threats from such changes with minimal damage to well-being.
- **Risk:** This is a function of the magnitude of the potential **consequences** of an impact and **probability** (likelihood) that the impact will happen. See Risk Matrix.
- **Sector:** a general grouping used to describe any resource, ecological system, management area, etc. that may be affected by climate change. Example: Transportation, Emergency Services, Human Health, Cultural Resources and Traditions, Water Resources, Forest Resources, Air Quality.
- **Sensitivity:** Degree to which a system (natural, human, built) is affected by changes in climate or climate change impacts. If it is likely to be affected, it is considered sensitive to climate change.
- **System:** built, natural, and human networks that provide important services within a community or region

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<sup>3</sup> US Environmental Protection Agency (2012). National Water Program 2012 Strategy: Response to Climate Change [EPA-850-K-12-004]. <http://water.epa.gov/scitech/climatechange/2012-National-Water-Program-Strategy.cfm>

- **Vulnerability (impact level):** Degree to which a system is susceptible to or unable to cope with adverse effects environmental change, including climate change, climate variability, and weather extremes. It is a function of both the *sensitivity* of the system and its *adaptive capacity*. It is also a function of the character, magnitude, and rate of climate variation to which a system is exposed (*exposure*). A system that is sensitive to climate and has low adaptive capacity would be considered vulnerable to climate change impacts. See Vulnerability Matrix

