

Climate Change Adaptation Measures and Resources List

Adaptation can be defined as preparing for and coping with the impacts of a changing climate on both humans and natural systems. In some cases, adaptation can be implementing measures that integrate the most current information about future climate changes into regular planning and decision-making.

Adaptation can be thought about in several ways:

1. Near term or no regrets actions: These actions are taken to address climate change impacts you know are or will occur, even if there is uncertainty around the degree of the impact. For example, if you know sea-level will rise, you may immediately begin incorporating that consideration into efforts in the coastal zone.
2. Bottom-up approach: For this approach, look at current conservation actions and think about how they may need to be adjusted to account for climate change impacts.
3. Top-down approach: For this approach, identify what changes are projected to occur and design conservation actions to address these changes.

An important goal of adaptation strategies should be to improve local resilience, or the ability of a natural community to bounce back from or adapt to climate impacts. In creating an adaptation plan to address impacts to wildlife and their habitats, the following steps and considerations can be a starting point:

- Develop an understanding of how the climate might change in your region. For instance, will there be increased periods of drought or more frequent flooding, or both?
- Identify potential vulnerabilities to a changing climate and assess the risk levels of those vulnerabilities.
- Develop adaptation strategies that will help to minimize those risks.
- To what extent will the strategy, if successfully implemented, reduce the risk? What is the sustainability of the adaptation measure? This includes human resources as well as other resources.
- Prioritize strategies, considering other adaptation tools, costs, timing for implementation, and feasibility.
- Develop an overall plan that is coordinated with other regional partners/stakeholders.

The following are examples of adaptation measures discussed in literature on climate change that are aimed toward impacts that affect wildlife and their habitats:

Manage for drought- and heat tolerant species to reduce potential stresses. Re-establishing more fire- and drought-tolerant species (e.g., longleaf pine) could improve resistance to severe fire disturbances and drought in certain habitats. Restoring historical fire-maintained communities using controlled burns would lead to a reduction in water demand, water stress, wildfire fuel loads, and wildfire risk as temperatures increase.

Reduce the impact of current stressors. Invasive species are best addressed using an early detection/rapid response approach. Improving water infiltration to groundwater reservoirs by decreasing impervious surface densities could reduce runoff and increase the quantity of groundwater storage for dry periods. Reduce or remove the effects of migration barriers (e.g., roads, dams) by installing wildlife crossings (roads); providing fish passage mechanisms at dams; or removing non-essential dams from waterways.

Frequent prescribed burning helps maintain pineland habitats. Where increased drought or longer heat periods occur due to climate change there will be longer fire seasons. Frequent prescribed burning in pinelands reduces fuel loads, thereby reducing risks of catastrophic fires, and puts less particulate emissions into the air. Intense wildfires can destroy plant seeds and root stocks, which may lead to habitat conversion and allow colonization by non-native and/or invasive plant species. Prescribed burns may also improve health of the system, which in turn supports carbon sequestration over time and may increase soil capacity for carbon storage.

Support wide-spread representation of natural systems. Manage for ecological function and biological diversity. Ensure that natural communities (coastal, terrestrial, freshwater, and marine) have redundant representation of habitats and species. Establishing or preserving “refugia” where climate change impacts are expected to be less severe will be important for protecting species that will be affected by climate change elsewhere. Existing areas that are already preserved such as parks or wildlife refuges may play a key role.

Establishing and/ or preserving wildlife corridors Improve habitat connectivity to allow species and habitats to shift. As temperatures warm, species may be pushed northwards or to higher altitudes as habitats shift. Some species may not be able to accommodate this change by moving; however, for those that can move, establishing or protecting existing corridors will help ensure their movement and survival. Corridors that connect habitat patches must be protected and managed to maximize the health and resilience of these communities. They are especially important for species movement when habitats are lost to sea level rise.

Identify your organization’s current level of climate adaptation and coordinate additional planning efforts to share information about local adaptation options. Facilitate ecological transitions through proactive management and restoration strategies. Identify the level of climate adaptation already incorporated in current land management plans and practices and review areas for improvement. Coordinate revision of land management plans with organizations that manage

similar natural resources. Look for opportunities to develop regional-scale adaptations for similar ecosystems subject to similar stressors.

References

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Final Report: A Climate Change Action Plan. 2008. Virginia Governor's Commission on Climate Change.

Florida's Energy and Climate Change Action Plan. 2008. Center for Climate Strategies.
www.flclimatechange.us.

Florida's Wildlife: On the front line of climate change. 2008. Climate Change Summit Report. Florida Fish and Wildlife Conservation Commission.
http://www.myfwc.com/CONSERVATION/ClimateChange_index.htm

Glick, P., B.A. Stein, and N.A. Edelson, editors. 2011. *Scanning the Conservation Horizon: A Guide to Climate Change Vulnerability Assessment*. National Wildlife Federation, Washington, D.C.
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New York State Climate Action Council Interim Report. 2010. New York State Energy Research and Development Authority. <http://www.nyclimatechange.us/InterimReport.cfm>.

Report on the U.S. EPA Southeast Climate Change Adaptation Planning Workshop. 2010. U.S. EPA. Washington, DC. www.epa.gov/region4/clean_energy/Task.5.Report.05.10.2010.pdf

The University of North Carolina at Chapel Hill Climate Change Committee Report. 2009. L. Band and D. Salvesen, editors. UNC Institute for the Environment.

Wildfire, Prescribed Fire, and Climate Change in Florida. 2007. Kevin Robertson, Ph.D., Tall Timbers Research Station. www.talltimbers.org/images/.../Wildfire-PF-ClimateChange6-07.pdf

Climate Change Adaptation Resource List

North Carolina Interagency Leadership Team

<http://www.ncdot.gov/programs/environment/development/interagency/NCILT/>

Adaptation Planning – What U.S. States and Localities are Doing

http://www.pewclimate.org/docUploads/State-Adapation-Planning-02-11-08_0.pdf

Adapting to Climate Change: The Public Policy Response

<http://www.rff.org/RFF/Documents/RFF-Rpt-Adaptation-NeumannPrice.pdf>

Adapt or Bust, 360 Risk Project report by Lloyd's of London Insurance

http://www.lloyds.com/News_Centre/360_risk_insight/The_debate_on_climate_change/

American Planning Association

<http://www.planning.org/research/energy/database/index.htm>

Are We Ready? Preparing for the Public Health Challenges of Climate Change

http://www.naccho.org/topics/environmental/climatechange/upload/Are-we-ready_14_view.pdf

Ask the Climate Question: Adapting to Climate Change Impacts in Urban Regions

http://www.ccap.org/docs/resources/674/Urban_Climate_Adaptation-FINAL_CCAP%206-9-09.pdf

Climate Change Adaptation

<http://conserveonline.org/workspaces/climateadaptation>

Climate Change and Northeast Agriculture

<http://www.climateandfarming.org>

Climate Change Project-Level Guidance

<http://conserveonline.org/workspaces/climateadaptation/documents/tools-and-methods/climate-change-project-level-guidance/view.html>

Climate Literacy: “The Essential Principles of Climate Sciences”- A Guide for Individuals and Communities

http://www.climate.noaa.gov/index.jsp?pg=/education/edu_index.jsp&edu=literacy

Climate Monitoring

<http://www.ncdc.noaa.gov/climate-monitoring/index.php>

Climate Sensitive Ecosystems

<http://www.climatescience.gov/Library/sap/default.htm>

Climate Services portal - National Oceanic and Atmospheric Administration

<http://www.climate.gov/>

Climate Wizard – The Nature Conservancy

<http://www.climatewizard.org/>

Coastal Climate Adaptation Resources – National Oceanic and Atmospheric Administration

<http://community.csc.noaa.gov/climateadaptation/>

Economic Impacts of Climate Change on North Carolina, Center for Integrative Environmental Research

<http://www.cier.umd.edu/climateadaptation/North%20Carolina%20Economic%20Impacts%20of%20Climate%20Change%20Full%20Report.pdf>

EPA: Climate Change

http://epa.gov/climatechange/downloads/Climate_Basics.pdf

Frequently Asked Questions About Global Warming and Climate Change: Back to Basics

http://www.epa.gov/climatechange/downloads/Climate_Basics.pdf

ICLEI Local Governments for Sustainability

<http://www.iclei.org/>

<http://www.icleiusa.org/action-center/planning/sustainability-planning-toolkit/>

NASA Global Change Master Directory

<http://gcmd.gsfc.nasa.gov/>

NASA Scientific Visualization Center

<http://svs.gsfc.nasa.gov/index.html>

NOAA's National Climatic Data Center la Niña / el Niño

<http://www.ncdc.noaa.gov/oa/climate/elnino/elnino.html>

North Carolina Sea Level Rise Risk Management Study

<http://www.ncsealevelrise.com/>

NPR Special Series: Climate Connections

<http://www.npr.org/templates/story/story.php?storyId=9657621>

One North Carolina Naturally

<http://www.climatechange.nc.gov>

Oregon Energy Planning Council

<http://www.oregon.gov/ENERGY/RENEW/OPEC/index.shtml>

Oregon Department of Energy Community Planning Tool

<http://www.oregon.gov/ENERGY/GBLWRM/docs/CommunityEnergyPlanningTool.pdf>

Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments (ICLEI)

<http://cses.washington.edu/cig/fpt/guidebook.shtml>

Regional Conservation Assessment

<http://conserveonline.org/workspaces/climateadaptation/documents/incorporating-cc-adaptation-into-regional>

Sea Grant's Coastal Heritage Magazine

<http://www.scseagrant.org/Sections/?cid=82>

Southern Appalachian Webcams

<http://www.weatherwebcams.org>

State Climate Office of North Carolina

<http://www.nc-climate.ncsu.edu/>

The Nature Conservancy Albemarle-Pamlico Peninsula

<http://www.nature.org/popups/misc/art26153.html>

The Nature Conservancy Climate Wizard

<http://www.climatewizard.org/>

The Pew Center on Global Climate Change

<http://www.pewclimate.org>

Transportation and Climate Change Clearinghouse

<http://climate.dot.gov/about/overview/science.html>

UK Climate Impact Programme

<http://www.ukcip.org.uk>

United States Global Change Research Program

<http://www.globalchange.gov/>

(look in publications section: Global Climate Change Impacts in the United States; includes chapter "Southeast Regional Highlights")

U.S. Drought Portal

<http://www.drought.gov>

U.S. Global Change Research Program

<http://www.globalchange.gov>

Vulnerability Assessments

<http://conserveonline.org/workspaces/climateadaptation/documents/tools-and-methods/vulnerability-assessments>

What Science is Telling Us about Climate Change - National Science Foundation

http://www.nsf.gov/news/special_reports/degree/?WT.mc_id=USNSF_51