

Climate Change Resource Directory

Water Infrastructure Capacity Building Team | Capacity Building for Sustainable Communities | July 2012



Background and Purpose

The impacts of a changing climate – from sea level rise to altered weather patterns – will affect local governments' efforts to manage stormwater, treat wastewater, and provide clean drinking water in their communities. This resource list was compiled to help local governments plan and implement climate change adaptation strategies. It was developed by the Environmental Finance Center Network through the Capacity Building for Sustainable Communities program funded by the U.S. Department of Housing and Urban Development and the Environmental Protection Agency. Through this program, EFCN is providing capacity building and technical assistance to recipients of grants from the federal Partnership for Sustainable Communities. Learn more about the Partnership and its work to help towns, cities, and regions develop in more economically, environmentally, and socially sustainable ways: www.sustainablecommunities.gov.

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Toolkits and Websites

Title / Program	Link	Description
Climate Adaptation Knowledge Exchange (CAKE)	http://www.cakex.org/	Aimed at building a shared knowledge base for managing natural systems in the face of climate change, this website helps users by vetting and organizing information available, building a community via an interactive online platform, creating a directory of practitioners to share knowledge and strategies, and identifying and explaining data tools and information available from other sites.
Climate Ready Estuaries, US EPA	http://water.epa.gov/type/oceb/cre/index.cfm	The Climate Ready Estuaries (CRE) program works with coastal managers to: 1) assess climate change vulnerabilities, 2) develop and implement adaptation strategies, 3) engage and educate stakeholders, and 4) share the lessons learned with other coastal managers. The CRE website offers information on climate change impacts to different estuary regions, access to tools and resources to monitor changes, and information to help managers develop adaptation plans for estuaries and coastal communities.
Climate Ready Water Utilities, US EPA	http://water.epa.gov/infrastructure/watersecurity/climate/	EPA's Climate Ready Water Utilities initiative provides resources for the water sector to adapt to climate change by promoting a clear understanding of climate science and adaptation options and by promoting consideration of integrated water resources management planning in the water sector.
Climate Ready Water Utilities Toolbox	http://www.epa.gov/safewater/watersecurity/climate/toolbox.html	Provides access to resources containing climate-related information relevant to the water sector. These resources include several categories of information and can be searched by geographic region, water utility type and size, water resources, climate change impact, and climate change response strategies.
NOAA Climate Portal	http://www.climate.gov/#dataServices	The "go to" website for NOAA's climate data, products, and services for all users.
NOAA Adaptation Toolkit	http://collaborate.csc.noaa.gov/climateadaptation/default.aspx	A resource for state and local officials to share climate adaptation activities and resources. The site also includes basic climate change information and training materials useful for outreach efforts.
NOAA Coastal Inundation Toolkit	http://csc.noaa.gov/digitalcoast/inundation/	Provides the tools and information communities need to understand and address coastal flooding.
ICLEI Climate Resilient Communities Program	http://www.icleiusa.org/climate_and_energy/Climate_Adaptation_Guidance/climate-resilient-communities-program	This program is the first comprehensive, national climate adaptation program tailored to local governments. ICLEI member local governments receive access to ICLEI's ADAPT tool, climate science reports, technical guidance, and training and networking events.
ICLEI Climate Adaptation Guidance	http://www.icleiusa.org/climate_and_energy/Climate_Adaptation_Guidance	Website with resources for local governments undertaking adaptation, including free adaptation resources, information on climate impacts by region, and recorded webinars on key adaptation topics.
Strategic Foresight Initiative	http://www.fema.gov/about/programs/oppa/strategic_foresight_initiative.shtm#3	FEMA launched the Strategic Foresight Initiative (SFI) to promote broader and longer-term thinking about a changing climate and the effects on the emergency management community. Website includes documents and research that provide insight to emergency management professionals.

Impacts

Title	Link	Author	Date	Type	Description
Literature Synthesis on Climate Change Implications for Water and Environmental Resources	http://www.usbr.gov/research/docs/climatechange/angelitsynthesis.pdf	US Department of the Interior	2011	Literature review	Summarizes recent literature on the past and projected effects of climate change on hydrology and water resources and then summarizes implications for key resource areas featured in reclamation planning processes.
Marshes on the Move: A Manager's Guide to Understanding and Using Model Results Depicting Potential Impacts of Sea Level Rise on Coastal Wetlands	http://www.csc.noaa.gov/publications/Marshes_on_the_move.pdf	NOAA Coastal Services Center; The Nature Conservancy	2011	Practice guide	Provides a basic understanding of the parameters and uncertainties involved in modeling the future impacts of sea level rise on coastal wetlands.
Climate Change Indicators in the United States	http://www.epa.gov/climatechange/science/indicators/download.html	US EPA	2010	Report	Presents 24 indicators that show trends related to the causes and effects of climate change. Most of the indicators focus on the United States, but some include global trends to provide context or a basis for comparison.
Coastal Sensitivity to Sea Level Rise: A Focus on the Mid-Atlantic Region	http://www.epa.gov/climate/climatechange/effects/coastal/sap4-1.html	US EPA, NOAA, USGS	2009	Report	One of 21 climate change synthesis and assessment products commissioned by the U.S. Climate Change Science Program (CCSP), the report examines the effects of sea level rise, impacts on coastal communities, and opportunities to prepare for those consequences, focusing on the eight coastal states from New York to North Carolina.

Adaptation and Mitigation

Title	Link	Author	Date	Type	Description
Harnessing Nature: The Ecosystem Approach to Climate-Change Preparedness	http://www.defenders.org/publications/harnessing-nature.pdf	Defenders of Wildlife	2012	Report	Describes the strategy of “harnessing nature” – preserving and rebuilding green infrastructure such as floodplains, wetlands, and forests – as an essential, viable, and cost-effective approach to climate-change preparedness. Includes recommendations to help communities incorporate ecosystem-based measures into their climate-change adaptation plans.
Adapting to Climate Change: A Planning Guide for State Coastal Managers	http://coastalmanagement.noaa.gov/climate/docs/adaptationguide.pdf	NOAA Office of Ocean and Coastal Resource Management	2011	Practice guide	Helps state and territorial coastal managers develop and implement adaptation plans to reduce the impacts and consequences of climate change and climate variability. Written in response to a request from state coastal managers for guidance on adaptation planning in the coastal zone.

City of Lewes Hazard Mitigation and Adaptation Action Plan	https://imageserv5.team-logic.com/mediaLibrary/54/Lewes_Hazard_Mitigation_and_CClimate_Adaptation_Action_Plan_FinalDraft_8-2011.pdf	City of Lewes, Delaware	2011	Sample plan	One of the best examples of integrating hazard mitigation and climate adaption in a local planning document.
Iowa Climate Change Adaptation and Resilience Report	http://epa.gov/smartgrowth/pdf/iowa_climate_adaptation_report.pdf	US EPA	2011	Report	Report from a project in which EPA and FEMA worked with state and local leaders in Iowa to figure out how the latest science on changing weather patterns due to climate change could be integrated into local and state planning efforts to adapt to and mitigate future natural disasters.
Preparing for Change: Tools, Strategies and Opportunities for Assessing Community Vulnerability and Adaptation to Climate Change	http://www.efc9.org/publications/2011/FinalAdaptation3.pdf	Environmental Finance Center at Dominican University of California	2011	Practice guide	Addresses tools and strategies to reduce the negative consequences of climate change on vulnerable communities, with a brief discussion on how the tools and strategies could be adapted to assess coastal zones and water resources. Contains an extensive list of resources to assess community risk to climate change and plan adaptations.
Rolling Easements Primer	http://water.epa.gov/type/oceb/cre/upload/rollingeasementsprimer.pdf	US EPA	2011	Guide	A primer on more than a dozen approaches for ensuring that wetlands and beaches can migrate inland, as people remove buildings, roads, and other structures from land as it becomes submerged.
Workshop: Integrated Modeling to Characterize Climate Change Impacts and Support Decision Making	http://www.epa.gov/crem/2011climate.html	US EPA	2011	Conference	Convened to facilitate the use of integrated modeling to inform and improve policy decisions relevant to climate change adaptation and mitigation strategies. Purposes were to ensure that model development aligns with climate change policy design, management and decision-making needs; connect climate change data producers with the data users; and highlight successful case studies of systems analysis and integrated modeling for climate change impacts. Workshop materials are available for download.
America's Climate Choices: Adapting to the Impacts of Climate Change	http://nas-sites.org/americasclimatechoices/sample-page/panel-reports/panel-on-adapting-to-the-impacts-of-climate-change/	National Research Council	2010	Report	Calls for a national adaptation strategy to support and coordinate decentralized efforts. Recommendations include that the federal government should provide technical and scientific resources that are currently lacking at the local or regional scale, incentives for local and state authorities to begin adaptation planning, guidance across jurisdictions, shared lessons learned, and support of scientific research to expand knowledge of impacts and adaptation.
Olympia, WA Sea Level Rise Planning Case Study	http://www.cakex.org/case-studies/683/	Kirsten Feifel, Climate Adaptation Knowledge Exchange	2010	Case study	Summarizes a project of the City of Olympia's Public Works Department to respond to sea level rise as part of the City's hazard mitigation planning process.

Climate Ready Estuaries Program Synthesis of Adaption Options for Coastal Areas	http://water.epa.gov/type/oceb/cre/upload/CRE_Synthesis_1-09.pdf	Climate Ready Estuaries Program, US EPA	2009	Report	Introduces key physical impacts of climate change on estuaries and reviews on-the-ground adaptation options available to coastal managers to reduce their systems' vulnerability to climate change impacts.
Urban Planning Tools for Climate Change Mitigation	http://dcs.sala.ubc.ca/docs/lincoln_tools%20for_climate%20change%20final_sec.pdf	Lincoln Institute of Land Policy	2009	Report	Reviews the relationship between urban planning and greenhouse gas (GHG) emissions as a key component of climate change, provides characteristics of GHG decision support tools, and evaluates the strengths and limitations of a cross section of existing tools using those characteristics.
Adaptation Options for Climate-Sensitive Ecosystems and Resources	http://www.climate-science.gov/Library/sap/sap4-4/final-report/	US Climate Change Science Program	2008	Report	Provides a preliminary review of adaptation options for climate-sensitive ecosystems and resources in the United States.
Planners and Climate Change Action: An Approach for Communities	http://efc.muskie.usm.maine.edu/docs/planners_and_clim_change_action_4_communities.pdf	Maine Policy Review	2008	Article	Brief overview of responsibilities local officials must face to ensure that their towns are adequately prepared for the coming challenges. It provides some of the arguments that underlie planners' obligations and suggests a means to categorize necessary responses over time.

Guidance for Water and Wastewater Utilities

Title	Link	Author	Date	Type	Description
Climate Change Handbook for Regional Water Planning	http://www.water.ca.gov/climatechange/CCHandbook.cfm	CA Department of Water Resources, EPA, US Army Corps of Engineers, others	2011	Handbook	Provides a framework for considering climate change in water management planning. Key decision considerations, resources, tools, and decision options are presented that will guide resource managers and planners as they develop means of adapting their programs to a changing climate.
Managing Climate Change Impacts on Water Resources: Adaptation Issues, Options, and Strategies	http://www.awra.org/meetings/Baltimore2011/index.html	American Water Resources Association	2011	Conference	This conference addressed (1) what climate adaptation strategies, decision-making approaches, planning and evaluation methods do water managers and water professionals need to prepare for climate impacts on water resources? (2) what kinds of assessment and planning approaches do we need, what kind of solutions may be available, how much will they cost, what kind of institutional adaptation may be necessary, and what might be the environmental and socioeconomic impacts and considerations that need to be taken into account?
Climate Change Impacts on Water: An International Adaptation Forum	http://www.waterclimateforum.org/index.html	Association of Metropolitan Water Agencies and others	2010	Conference	This conference kick-started an effort to push water adaptation issues onto the American policy agenda, by sharing ideas on a range of topics from how to adapt water management to climate change to getting results from local and national policy makers. Presentations are available for download.

Decision Support Planning Methods: Incorporating Climate Change Uncertainties into Water Planning	http://www.wucaonline.org/assets/pdf/actions_whitepaper_012110.pdf	Water Utility Climate Alliance	2010	White paper	Presents multiple-outcome planning techniques to water utilities interested in incorporating climate change into their planning. Helps water utilities learn about and evaluate new planning techniques, called Decision Support Planning Methods (DSPMs), for use in their own climate adaptation efforts.
Confronting Climate Change: An Early Analysis of Water and Wastewater Adaptation Costs	http://www.nacwa.org/images/stories/public/2009-10-28ccreport.pdf	Association of Metropolitan Water Agencies	2009	Report	An early cost assessment of adaptations to address some of the likely impacts of climate change on our nation's drinking water and wastewater utilities through 2050.
Sustainable Infrastructure for Small System Public Services: A Planning and Resource Guide	http://www.rcac.org/assets/green_infra/gig.pdf	Rural Community Assistance Corporation	2009	Guide	Developed to help small to medium water utilities integrate and initiate green elements into their facilities and projects. Provides informational material, worksheets, examples, case studies and resources on water conservation, energy efficiency and renewable energy for small utilities.

Vulnerability Assessments

Title	Link	Author	Date	Type	Description
Scanning the Conservation Horizon: A Guide to Climate Change Vulnerability Assessment	http://www.nwf.org/News-and-Magazines/Media-Center/Reports/Archive/2011/Scanning-the-Horizon.aspx	National Wildlife Federation and others	2011	Guide	Provides conservationists and resource managers a way to understand the impact of climate change on species and ecosystems and supports efforts to safeguard valuable natural resources.
Climate Change Vulnerability Assessments: A Review of Water Utility Practices	http://water.epa.gov/scitech/climatechange/upload/climate-change-vulnerability-assessments-sept-2010.pdf	US EPA	2010	Report	Examines and documents the steps taken by some of the leading utilities in an attempt to identify the emergent characteristics of water utility climate change vulnerability assessments.
Coastal Inundation Mapping Guidebook	http://www.csc.noaa.gov/digitalcoast/inundation/_pdf/guidebook.pdf	NOAA Coastal Services Center	2009	Practice guide	Provides guidance on how to prepare coastal inundation maps, including preparing data, modeling water levels, and mapping and visualizing inundation.
US Climate Change Science Program Synthesis and Assessment Products	http://www.globalchange.gov/publications/reports/scientific-assessments/saps	US Climate Change Science Program	Various	Reports	The US Climate Change Science Program developed a series of 21 synthesis and assessment products (SAPs) to provide information on climate change that is useful to policymakers, resource managers, stakeholders, and the public.

Tools and Models

Title	Link	Author	Date	Type	Description
Climate Resilience Evaluation & Awareness Tool (CREAT)	http://water.epa.gov/infrastructure/watersecurity/climate/creat.cfm	US EPA	On-going	Web-based tool	An interactive software tool designed for water and wastewater utilities to assess the risk of climate change impacts on their assets, operations, and missions and to develop adaptation plans. Available for download on EPA's website, CREAT guides users through a flexible, systematic assessment process, featuring: (1) libraries of utility assets that may be impacted by climate and adaptive measures that can be used to reduce potential consequences, (2) a climate change-related threat list developed from climate change projections with links to relevant adaptive measures, (3) the ability to update when new climate data becomes available over time so utilities can use current and historical data as part of their adaptive planning, (4) a series of 10 reports that can be generated to help users communicate assessment results and better inform decision making and planning.
ClimateWizard	http://www.climatewizard.org/index.html	The Nature Conservancy	On-going	Website / tool	Enables technical and non-technical audiences to access climate change information and visualize impacts anywhere on Earth. Users can view historic temperature and rainfall maps for anywhere in the world, view future projections of temperature and rainfall, and download climate change maps.
Adaptation Database and Planning Tool (ADAPT)	http://www.icleiusa.org/tools/adapt/adaptation-database-and-planning-tool-adapt	ICLEI	On-going	Web-based tool	Online tool that guides local government users through ICLEI's "Five Milestones for Climate Adaptation" planning process. Walks users through the process of assessing vulnerabilities, setting resiliency goals, and developing plans that integrate into existing hazard and comprehensive planning efforts.
Critical Facilities Flood Exposure Tool	http://www.csc.noaa.gov/digitalcoast/tools/criticalfacilities	NOAA Coastal Services Center	On-going	Web-based tool	Provides an initial assessment of a community's critical facilities and roads that lie within the 1% annual chance flood zone established by FEMA. Helps coastal managers quickly learn which facilities may be at risk.
Template for Assessing Climate Change Impacts and Management Options (TACCIMO)	http://www.taccimo.sgc.p.ncsu.edu/	USDA Forest Service	On-going	Web-based tool	Connects forest planning to current climate change science. Designed for use by land managers for forest plan provisions, the tool provides access to the most current climate change projections and science, including the likely range of projected future climate for any state, county, or National Forest and linked peer-reviewed scientific statements describing effects and management adaptation options.

Land Use Planning

Title	Link	Author	Date	Type	Description
Getting Smart About Climate Change	http://transformgov.org/en/knowledge_network/documents/kn/document/105215/getting_smart_about_climate_change	ICMA and the Smart Growth Network	2011	Report	Outlines nine strategies for successfully applying smart growth principles to climate concerns on the local and regional levels.
Residential Coastal Construction Manual	http://www.fema.gov/rebuild/mat/fema55.shtm	FEMA	2011	Manual	Prepared by FEMA with assistance from other agencies, organizations, and professionals involved in coastal construction and regulation, this manual is intended to help designers and contractors identify and evaluate practices that will improve the quality of construction in coastal areas and reduce the economic losses associated with coastal disasters.
Local Climate and Energy Strategy Guide - Smart Growth: A Guide to Developing and Implementing Greenhouse Gas Reduction Programs	http://www.epa.gov/statelocalclimate/documents/pdf/smart_growth_guide.pdf	US EPA	2010	Practice guide	Describes how smart growth strategies can help local governments reduce greenhouse gas emissions and improve quality of life.

Funding and Finance

Title	Link	Author	Date	Type	Description
Financing the Resilient City: A demand driven approach to development, disaster risk reduction, and climate adaptation	http://www.iclei.org/fileadmin/user_upload/documents/Global/Publications/Report-Financing_Resilient_City-Final.pdf	ICLEI	2011	Report	Provides a conceptual framework for better understanding how to integrate climate and other risk reduction measures in urban areas and systems. Calls for more locally responsive climate financing investment strategies and instruments. Also discusses climate financing for adaptation and how it can be mobilized, leveraged and innovated for the local level.
Preserving Assets in At-Risk Municipalities: Financial Strategies for Climate Change Adaptation	http://efc.muskie.usm.maine.edu/docs/preserving_assets_atrisk_municipalities.pdf	New England Environmental Finance Center	2009	Brief	Intended to help coastal municipalities identify course of actions toward increasing their resilience in the face of sea level rise, storm surge, and tidal flooding. Focuses especially on financial resources that will need to be allocated toward the various strategies identified.
Guidebook of Financial Tools: Paying for Environmental Systems	http://www.epa.gov/envirofinance/	US EPA	2008	Guidebook	Good overview of various financial options available to fund programs including climate adaptation.