



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

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Overview

The scientific community has reached a strong consensus that the climate is changing. Current projections by the Intergovernmental Panel on Climate Change (IPCC) indicate the continental United States can expect temperature increases of between 5.4°F and 12.6°F by the year 2100.¹ This warming will have significant consequences, causing a rise in sea-level and the gradual inundation of coastal areas as well as an increase in both beach erosion and flooding from coastal storms, changes in precipitation patterns, increased risk of droughts and floods, stronger hurricanes, threats to biodiversity, and a number of potential challenges for public health. It is generally understood that impacts felt today are a result of emissions from decades past, and based on our current, and even higher emission levels today, we are already committed to greater warming, precipitation changes, and sea level rise in the future. Both the U.S. House of Representatives and the Senate are working on climate change legislation to address both greenhouse gas emission reduction policies (mitigation) as well as policies to cope with the inevitable impacts from climate change (adaptation). While the House passed H.R. 2454, the American Clean Energy and Security Act (ACES), in June 2009, the Senate is not expected to vote on their version of climate and energy legislation until later this year.² In the meantime, over 32 states are taking action to reduce their own GHG emissions, while only 10 are in the process of state adaptation planning.

While governments act to mitigate future climate change, they must also plan now to address the current and projected impacts. This preparation includes risk and vulnerability assessments, prioritization of projects, funding and allocation of both financial and human resources, solution development and implementation, and rapid deployment of information sharing and decision-support tools. Corresponding to the size of the challenge, impacts can span entire communities and regions. As such, adaptation is dependent upon numerous stakeholders from federal, state and local government,

¹ IPCC. 2007. Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

² For more information on the ACES Act, see the Pew Center's website, <http://www.pewclimate.org/acesa>.

science and academia, the private sector, and the general public to develop solutions to these complex problems for which prior solutions may not exist. Adaptation planning requires creativity, compromise, and collaboration across agencies, sectors and traditional geographic boundaries.

This paper focuses on adaptation planning efforts by both state and local governments. Many of these efforts are in their earliest stages. Some states are including adaptation within the scope of their state Climate Action Plans addressing GHG emissions. A few others have recognized the need for separate and comprehensive adaptation commissions to parallel their mitigation efforts. Many are simply responding to climate impacts as they occur, without necessarily attributing the impacts to climate change. Regardless of the basis for the response, states can learn a great deal from each other, and from localities where adaptation planning and implementation are already occurring. While comprehensive and proactive adaptation planning is still in its early stages, as states and localities complete their GHG mitigation plans, adaptation planning is gaining greater attention and resources.

State Adaptation Planning

At present, most states have focused on mitigation plans to reduce GHG emissions, and have not yet begun to consider adaptation strategies to reduce the impacts from climate change. For many states, the impacts do not yet seem as imminent or as threatening as they are in Alaska or other especially vulnerable regions, while other states may not yet attribute these impacts to climate change. The exceptions are Alaska, California, Florida, Maryland, Massachusetts, New Hampshire, New York, Oregon, Virginia, and Washington, all of which have adaptation planning efforts in progress [See Figure 1 – State Adaptation Plans]. These efforts will help to define federal and state roles in climate impact response, where decisive and coordinated planning, funding and action are needed to reduce ecosystem, economic, and human impacts. They will also drive the standardization of planning methodologies, adoption of adaptation networks for information sharing, the emergence of services organizations for planning and implementation support, and the development of policies and best practices.

Figure 1 – State Adaptation Planning Efforts

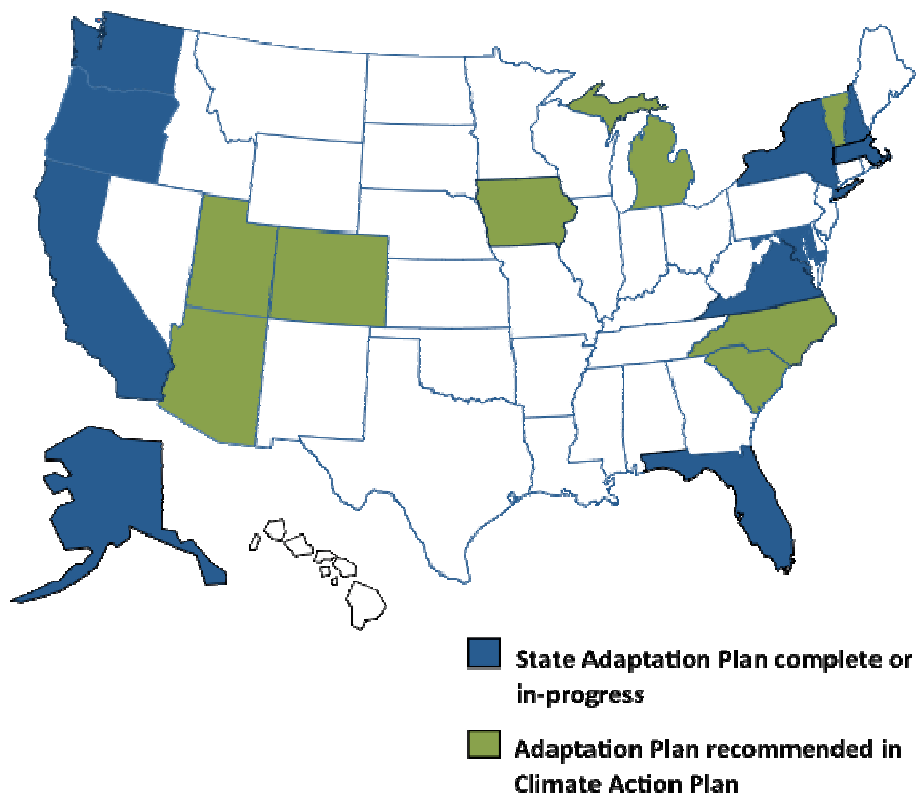


Table 1: State Adaptation Planning Efforts provides a summary for each state that has initiated efforts to create a statewide adaptation plan (states in blue in Figure 1). It also provides an overview of states that have recommended adaptation planning in their Climate Action Plans, but have not yet started a plan (states in green in Figure 1).

Table 1: State Adaptation Planning Efforts

State	Adaptation Planning or Measures	Responsible Organization
Alaska	<p>1) The Alaska Climate Impact Assessment Commission, established in 2006 by the Alaska Legislature (House Concurrent Resolution 30), submitted their Final Commission Report to the state legislature in 2008, assessing the effects of climate change on citizens, resources, the economy and assets of the State. The Commission’s report is available at: http://www.housemajority.org/coms/cli/cli_finalreport_20080301.pdf.</p> <p>With the assessment complete, the Sub-Cabinet for Climate Change created by Governor Palin in 2007 is responsible for developing and implementing Alaska’s overall Climate Change Strategy, which includes a response plan with policy recommendations, prioritization of vulnerabilities, and funding to address the impacts from climate change. In response, an Alaska Climate Change Adaptation Advisory Group (AAG) was formed in 2007, with four Technical Work Groups (TWGs) focused in the following areas:</p> <ul style="list-style-type: none"> Public Infrastructure Health & Culture Natural Systems Economic Activities. <p>Meetings for these groups and “Catalogs” of potential policy options are available for all four TWGs as they work through their planning process. Recommendations were due from the AAG to the Sub-Cabinet by June 2009.</p>	<p>Climate Impact Assessment Commission: http://www.dec.state.ak.us/air/cc.htm</p> <p>Alaska Climate Change Sub-Cabinet: http://www.climatechange.alaska.gov/</p> <p>Alaska Climate Change Adaptation Advisory Group: http://www.climatechange.alaska.gov/aag/aag.htm</p>
Public Infrastructure	<p>This team is addressing the physical impacts of climate change on Alaska’s built environment and transportation. Potential “adaptation option categories” include: highways, roads and bridges; airports; buildings; seawalls and river shoreline protection; landfills, sewage and septic systems, water systems; air, ocean, river and rural non-road transportation; utility and fuel infrastructure; and national defense infrastructure.</p>	<p>http://www.climatechange.alaska.gov/aag/pi.htm</p>
Health & Culture	<p>This team is addressing the impacts of climate change on human health and population cultures within the state. Potential “adaptation option categories” include but are not limited to: waterborne diseases, vector-borne diseases, food security and food-borne diseases, flooding, thermal extremes (heat waves, thinning ice risks, etc), wildfires, toxic exposures, mental stress, healthcare and emergency response systems, traditional knowledge and culture, summer and winter sports and recreation, gardening, and energy demand.</p>	<p>http://www.climatechange.alaska.gov/aag/hc.htm</p>

State	Adaptation Planning or Measures	Responsible Organization
Natural Systems	This team is addressing the impacts of climate change on biodiversity and ecosystem health within the state. Potential "adaptation option categories" include but are not limited to: agriculture; boreal and temperate forests and dependent species; forestry; tundra and alpine ecosystems and dependent species; freshwater systems and dependent species; marine, sea ice, coastal environment and dependent species; fishing (commercial); subsistence fishing, hunting and trapping; sport hunting; tourism and watchable wildlife.	http://www.climatechange.alaska.gov/aag/ns.htm
Economic Activities	This team is addressing the impacts of climate change on the state's economy through the examination of sectors such as: oil and gas, mining, ocean transportation and financial services, such as the insurance industry.	http://www.climatechange.alaska.gov/aag/ea.htm
	<p>2) The Immediate Action Workgroup (IAW) under Commissioner Hartig, Chairman of Governor Palin's Executive Sub-cabinet on Climate Change, was established in 2007 to address known threats to communities caused by coastal erosion, thawing permafrost, flooding, and fires, such as Newtok, Shishmaref, Kivalina, Koyukuk, Unalakleet and Shaktoolik. Their first Recommendations Report to the Sub-cabinet was completed in April 2008 and is available at: http://www.climatechange.alaska.gov/docs/iaw_rpt_17apr08.pdf.</p> <p>Their second report "Recommendations to the Governor's Sub-Cabinet on Climate Change" provides recommended actions and policies the IAW feels should be implemented in 2009-2010 for communities facing imminent threats, and is available at: http://www.climatechange.alaska.gov/docs/iaw_finalrpt_12mar09.pdf</p> <p>Other IAW reports and presentations are available at their website (see right) and under "Relevant Climate Change Links and Documents" from the Sub-Cabinet website: http://www.climatechange.alaska.gov/doc-links.htm.</p>	<p>Immediate Action Work Group (IAW): http://www.climatechange.alaska.gov/iaw.htm</p>
Arizona	An appendix to the state's Climate Change Action Plan (CC-5) recommends that the Governor "appoint a task force or advisory group to develop recommendations for the state climate change adaptation strategy. Moreover, the Governor should direct state agencies and other appropriate institutions to identify and characterize potential current and future risks in Arizona to human, natural and economic systems, including potential risks to water resources, temperature sensitive populations and systems, energy systems, transportation systems, vital infrastructure and public facilities, and natural lands (e.g., forests, rangelands, and farmland)."	<p>Climate Change Action Group</p> <p>2006 Plan: http://www.azclimatechange.gov/index.html</p>

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California	<p>1) On November 14, 2008, Governor Schwarzenegger issued Executive Order S-13-08 directing state agencies to plan for sea-level rise and climate impacts. Key components of the Executive Order are:</p> <ul style="list-style-type: none"> a. Developing a statewide Climate Adaptation Strategy. A Draft was released August 3, 2009 for a 45-day public comment period. Coordinated by the Resources Agency, with four other state agencies and nine other departments, six Working Groups were organized to develop the Strategy: <ul style="list-style-type: none"> Biodiversity & Habitat Infrastructure Public Health Oceans and Coastal Resources Water Working Landscapes Working Group meetings and proposed strategies are available. See more detail below. b. Requesting the National Academy of Science to assemble a panel to assess sea level rise impacts on California, to inform state planning efforts; c. Develop a final California Sea Level Rise Assessment Report by no later than December 2010 that provides guidance on how to plan for sea level rise, including a synthesis of projected impacts on state infrastructure; d. Directs state agencies planning construction projects prior to the release of the assessment report, in areas vulnerable to sea-level rise, to consider sea-level rise scenarios for 2050-2100 in their plans; and e. Directs Business, Transportation and Housing agencies to develop a report assessing the vulnerability of transportation systems to sea level rise within 90 days. A Preliminary Transportation Assessment was released February 2009. 	<p>CA Resources Agency / Climate Action Team</p> <p>CA Adaptation Site: http://www.climatechange.ca.gov/adaptation/</p> <p>Preliminary Transportation Assessment: http://www.climatechange.ca.gov/adaptation/documents/2009_Preliminary_Trans_Assessment.pdf</p>
	<p>2) Executive Order S-3-05, signed by Governor Schwarzenegger in June 2005 established the Climate Action Team and requires a biennial science assessment report on climate change impacts and adaptation options for California. The Climate Action Team, operating under the direction of Cal EPA, is comprised of members from the Business, Transportation and Housing Agency, and the Dept. of Food and Agriculture, Resources Agency, Air Resources Board, Energy Commission and the Public Utility Commission, and is responsible for coordinating state-level climate change actions. The CAT completed their current draft "Climate Action Team Biennial Report" in March 2009.</p> <p>The report details the climatic changes and impacts to the state across multiple sectors including: Agriculture, Air quality, Coastal, Energy, Forestry, Public health, and Water. The report also identifies the economic implications of those climatic changes and impacts, including the costs of adapting. An inventory of current federal and state research efforts, as well as future research needs are also detailed.</p>	<p>Climate Action Team: http://www.climatechange.ca.gov/climate_action_team/index.html</p> <p>2009 Biennial Report: http://www.energy.ca.gov/2009publications/CAT-1000-2009-003/CAT-1000-2009-003-D.PDF</p>

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Colorado	<p>1) Governor Bill Ritter recognized the need for the state’s Climate Action Plan to be a living document, one that will require additions going forward. As such, he signed Executive Order B007 08 in April 2008 creating a Climate Change Advisory Panel to make policy and program recommendations to achieve the goals of the Climate Action Plan, and specifically to “identify mechanisms to conduct adaptation planning for climate change.” The panel met for the first time in June 2009 to begin fulfilling its duties.</p>	<p>EO B007 08: http://www.colorado.gov/cs/Satellite/GovRitter/GOVR/1233327301854?rendermode=preview</p>															
	<p>2) In their Climate Action Plan, the state’s Climate Action Panel made 70 policy option recommendations, of which 15 are adaptation recommendations. Of the 15, 14 address projected effects on state water supplies (Chapter 8 – Water Adaptation), including use, rights, resources, etc., while one recommends an assessment of state vulnerabilities to climate change and development of associated adaptation plans (Chapter 7 – Cross-Cutting Issues).</p>	<p>Rocky Mountain Climate Organization 2007 Plan: http://www.coloradoclimate.org/</p>															
Florida	<p>1) Created by Governor Crist and the Florida Legislature in the 2008 Legislative session, the Florida Energy & Climate Commission is housed within the Executive Office of the Governor and is the primary organization for state energy and climate change programs and policies. The Commission is responsible for reviewing the Energy and Climate Change Action Plan annually, making recommendations and monitoring legislative actions to ensure they meet the intended objectives. With its 60 day window, the 2009 Legislature took up only mitigation recommendations however, it is presumed that many of the adaptation recommendations do not require legislative action and can be implemented via Executive Order or through guidance to agencies.</p>	<p>Florida Energy and Climate Commission: http://myfloridaclimate.com/climate_quick_links/florida_energy_climate_commission/energy_climate_change_policy</p>															
	<p>2) A July 2007 Executive Order (07-128) signed by Governor Crist created the Governor’s Action Team on Energy and Climate Change; tasking it with creating a comprehensive Energy and Climate Change Action Plan for the state. One of the 6 Action Teams focused on Adaptation was tasked with developing “adaptation strategies to combat adverse impacts to society, public health, the economy, and natural communities in Florida.” The Final Energy and Climate Change Action Plan was completed in October 2008. Chapter 8 provides a summary “framework” or set of adaptation objectives for state consideration in areas including:</p> <table border="0" data-bbox="436 1052 1409 1317"> <tr> <td>Climate Adaptation Science</td> <td>Emergency Preparedness & Response</td> </tr> <tr> <td>Public sector planning (local, regional, state)</td> <td>Human Health</td> </tr> <tr> <td>Ecosystems and Biodiversity</td> <td>Social Effects</td> </tr> <tr> <td>Water Resources Management</td> <td>Organizing State Government</td> </tr> <tr> <td>Built Environment and Community Protection</td> <td>State Funding and Financing</td> </tr> <tr> <td>Transportation and other Infrastructure</td> <td>Public Education & Outreach</td> </tr> <tr> <td>Economic Development</td> <td>Coordination</td> </tr> <tr> <td>Insurance: property and casualty</td> <td></td> </tr> </table> <p>Specific recommendations are made for Research, Planning, Protection of Ecosystems and Biodiversity, the Built Environment, and Public Education and Outreach. Appendix F of the Action Plan provides recommended strategies to address each of the Framework objectives and specific goals.</p>	Climate Adaptation Science	Emergency Preparedness & Response	Public sector planning (local, regional, state)	Human Health	Ecosystems and Biodiversity	Social Effects	Water Resources Management	Organizing State Government	Built Environment and Community Protection	State Funding and Financing	Transportation and other Infrastructure	Public Education & Outreach	Economic Development	Coordination	Insurance: property and casualty	
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Florida	<p>3) “Florida’s Resilient Coasts: A state policy framework for adaptation to climate change” (2007) was written by the Center for Urban and Environmental Solutions. This discussion document considers the key issues and potential policy options for the following Public Sector Planning & Investment areas and is available at: http://www.cuesfau.org/publications/FloridasResilientCoasts-2-18-08.pdf</p> <ul style="list-style-type: none"> Land use planning and building regulation Water supply and delivery Transportation and Infrastructure Conservation of natural lands and marine life Beaches and beach management Extreme events: emergency preparedness and response 	<p>FAU Center for Urban and Environmental Solutions and the National Commission on Energy Policy</p> <p>2007 Policy Framework: http://www.deq.state.va.us/export/sites/default/info/documents/climate/Florida_Climate_Change.pdf</p>
Iowa	<p>Senate File 485 signed by Governor Culver in April 2007 created the Iowa Climate Change Advisory Council to consider and determine the best strategies for reducing greenhouse gas emissions in the state. The final GHG mitigation plan makes one cross-cutting policy recommendation for the state to create an adaptation strategy. The Council will continue to evaluate policies and strategies for implementing recommendations.</p>	<p>Iowa Climate Change Advisory Council</p> <p>2008 Final Report: http://www.iaclimatechange.us/</p>
Kansas	<p>On March 21, 2008, Governor Kathleen Sebelius signed Executive Order 08-03, which established the Kansas Energy and Environmental Policy Advisory Group (KEEP) to recommend steps the state could take to reduce its greenhouse gas emissions. In the January 2009 Interim Report to the Governor, the Cross-Cutting Working Group created Cross Cutting Issue 7 – Adaptation and Vulnerability recommending the State: 1) Conduct comprehensive adaptation planning to address state, regional, and local vulnerabilities and 2) “Identify several major sectors of the Kansas economy that are particularly vulnerable to climate impacts, and develop and incorporate adaptation measures into existing emergency plans and other policies. Examples might be the Insurance Commission, Division of Emergency Management, Department of Agriculture, Department of Transportation, Kansas National Guard, and possibly transportation infrastructure.” The Final Report is due by the end of 2009.</p>	<p>Kansas Energy and Environmental Policy Advisory Group</p> <p>2008 Interim Report: http://www.ksclimatechange.us/</p>

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<p>Maryland</p>	<p>On April 20, 2007, Governor Martin O’Malley signed an Executive Order (01.01.2007.07) establishing the Maryland Climate Change Commission (MCCC) charged with developing an action plan that addresses both mitigation and adaptation. Maryland’s Adaptation and Response Working Group (ARWG) was chaired by the MD Department of Natural Resources and co-chaired by the MD Department of Planning (MDP). The ARWG was comprised of 4 Technical Working Groups (TWGs):</p> <ul style="list-style-type: none"> Existing Built Environment and Infrastructure Future Built Environment and Infrastructure Resources and Resource-Based Industries Human Health, Safety & Welfare <p>The state released its Climate Action Plan in August 2008. From an impact and adaptation perspective the focus was solely on Sea-Level Rise and Coastal Storms (land erosion). Chapter 5 – Comprehensive Strategy for Reducing Maryland’s Vulnerability to Climate Change is noted as Phase 1, however no subsequent adaptation planning for other sectors is funded or authorized at this time. Recommendations focus on the state’s financial and economic well-being; protecting human habitat and infrastructure; protecting human health, safety and welfare; and protecting natural resources. It also calls for the development of state and local adaptation planning tools. Chapter 6, Building a Federal-State Partnership, provides recommendations on the federal role in coastal adaptation planning, including intergovernmental coordination at the federal level, coordination with coastal states, additional financial support mechanisms, and a coordinated national monitoring, assessment and forecasting system. Chapter 7, Legislative Updates and Next Steps, provides an update on legislative action taken to respond to the Interim Action Plan released in 2008, which included some adaptation measures, as well as providing the next set of recommendations associated with implementing the plan. This includes creating an Office of Climate Change within the Governor’s Office, requiring state agencies and large capital investment projects to conduct a Climate Impact Assessment, and having agencies implement appropriate climate change and sea level rise measure on state lands, as well as through the process of allocating state fiscal resources.</p>	<p>Maryland Commission on Climate Change: http://www.mdclimatechange.us/</p> <p>2008 Report: http://www.mde.state.md.us/Air/climatechange/index.asp</p>
<p>Massachusetts</p>	<p>1) On August 7, 2008, Massachusetts Governor Deval Patrick signed the Global Warming Solutions Act, which in addition to GHG reduction mandates, called for the secretary to “convene an advisory committee to analyze strategies for adapting to the predicted impacts of climate change in the commonwealth,” and for the committee to be comprised of “representatives with expertise in the following areas: transportation and built infrastructure; commercial, industrial and manufacturing activities; low income consumers; energy generation and distribution; land conservation; water supply and quality; recreation; ecosystems dynamics; coastal zone and oceans; rivers and wetlands; and local government.” The Climate Change Adaptation Advisory Committee was assigned in May and is organized into 5 sub-committees: Natural Resources & Habitat, Local Economy, Human Health & Welfare, Key Infrastructure, and Coastal Zone & Ocean. Their report is due by the end of the year.</p>	<p>Climate Change Adaptation Advisory Committee: http://www.mass.gov/dep/public/committee/ccaac.htm</p>

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Massachusetts	2) The state's Department of Fish and Game has developed and is implementing a number of adaptation strategies to help protect, restore and manage fish and wildlife in the state.	MA Department of Fish and Game: http://www.mass.gov/dfwel/e/
Michigan	Established by Governor Granholm in November of 2007 under Executive Order 2007-42, the Michigan Climate Action Council released its Climate Change Plan for the state in March 2009. Although the Plan was originally to include "an assessment of climate change impacts" and "adaptive measures for state and local units of government, businesses, and Michigan residents to ... better prepare for the effects of climate change in Michigan," the final plan did not include these items due to time and resource constraints. The Council recommends analyzing the State's vulnerability and creating an Adaptation Plan for key sectors.	Michigan Climate Action Council 2009 Final Report: http://www.miclimatchange.us/ewebeditpro/items/O46F17159.pdf
New Hampshire	In November 2007, Governor Lynch issued Executive Order 2007-3 creating the Climate Change Policy Task Force. The Task Force was comprised of 6 working groups, with one dedicated to Adaptation, and was tasked with creating a New Hampshire Climate Action Plan . The Final report was released in March 2009. Chapter 3 – Adapting to Change , defines the impacts to the state, including economic, human health, natural systems and infrastructure. Chapter 5 – Summary of Actions , summarizes strategies approved by the Task Force from the 6 working groups. For Adaptation, this represents 7 key recommendations addressing areas such as Public Health, Natural Systems, the Economy, and Extreme Weather Events), and one of which includes "Developing a Climate Change Adaptation Plan for the State" to support public and private planning. For each recommendation, Appendix 4.9 – Plan for how to Address Existing and Potential Climate Change Impacts , provides a framework with mechanisms to move the recommendations forward including executive or legislative action required, responsible parties, timeframes, resource requirements, barriers, costs and benefits. Appendix 4.8 – Lead by Example in Government Operations details a recommendation to require state agencies to incorporate climate change mitigation and adaptation into their planning and programmatic activities.	Climate Change Policy Task Force: http://des.nh.gov/organization/divisions/air/tsb/tps/climate/action_plan/index.htm 2009 Final Report: http://des.nh.gov/organization/divisions/air/tsb/tps/climate/action_plan/nh_climate_action_plan.htm

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New York	<p>The Office of Climate Change was created within the Department of Environment of Environmental Conservation, and is tasked with leading the development of programs and policies to address both mitigation and adaptation in the state.</p> <p>In 2007, the State’s Legislature created the New York State Sea-Level Rise Task Force to assess impacts to the state from sea-level rise and make associated recommendations. The initial scope of recommendations will include standards and enforcement in the areas of: coastal development, wetlands protection, shoreline armoring and post-storm recovery; as well as adaptive measure to protect and support the migration of habitats and species and incorporating climate change impacts into state environmental agency plans. The Task Force began its efforts in June 2008, and is scheduled to complete their report by the end of 2009.</p>	<p>Office of Climate Change: http://www.dec.ny.gov/about/43166.html</p> <p>State Sea-Level Rise Task Force: http://www.dec.ny.gov/energy/45202.html</p>
North Carolina	<p>The state’s Climate Action Plan includes Cross-Cutting Issue CC5 - State Climate Change Adaptation Strategy. CC5 calls for the state to “develop, adopt, and implement a state Climate Change Adaptation Plan that includes identification of: (a) potential short-term, mid-term, and long-term impacts of climate change scenarios likely to affect the state and (b) implementation mechanisms for addressing these impacts.” http://www.ncclimatechange.us/ewebeditpro/items/O120F10923.pdf</p> <p>Adaptation Issues Matrix for CC5 is a comprehensive list of state adaptation issues and preliminary recommendations, addressing flooding, forestry, fishing and tourism industries, public health, water supply and quality, etc. that the Advisory Group recommends be included in an adaptation plan.</p>	<p>Div of Air Quality (DAQ), Climate Action Plan Advisory Group: http://www.ncair.org/monitor/eminv/gcc/</p> <p>CC5-Adaptation Matrix: http://www.ncclimatechange.us/ewebeditpro/items/O120F10922.pdf (pgs 26-36)</p>
Oregon	<p>1) In 2007, the Oregon Legislature enacted HB 3543, creating a permanent Global Warming Commission, as well as the Oregon Climate Change Research Institute. The Commission has dual responsibilities for advising the Governor and the Legislature as it pertains to the state’s Climate Change mitigation and adaptation strategies. In their 2009 Report to the Legislature, the Commission recommends the legislature support the findings of their Natural Resources Committee, which are provided in the report. Such recommendations include “internalizing climate change adaptation into agency work programs,” to include an inter-agency task force, and “developing an integrated water management program.” It is unclear what actions may have resulted from the prior work efforts of the CCIG or CLI (see below).</p>	<p>Global Warming Commission: http://egov.oregon.gov/ENERGY/GBLWRM/GWC/index.shtml</p> <p>2009 Report to the Legislature: http://egov.oregon.gov/ENERGY/GBLWRM/GWC/docs/09CommissionReport.pdf.</p>

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Oregon	<p>2) The Climate Change Integration Group was formed in 2006 by Governor Kulongoski, with the primary objective of developing specific recommendations for climate change adaptation strategies, processes, and policies for government agencies, private industry, and the general public. Their charter included creating a strategy to focus on immediate actions for the most affected sectors, with a follow-up report in 2007 to focus on a more comprehensive assessment and longer term strategies.</p> <p>In January 2008, CCIG completed a report “A Framework for Addressing Rapid Climate Change;” with a chapter for Preparation and Adaptation. However, this chapter provides only high-level principles that are not sector specific, such as having all government agencies create plans, and having plans consider larger scales to incorporate cross sector or regional issues. The chapter identified the need for more to be done, and considered it the responsibility of the successor group – the Global Warming Commission. This report also acknowledges and incorporates input from the Climate Leadership Initiative that partnered with CCIG on this effort (see below).</p>	<p>Climate Change Integration Group: http://egov.oregon.gov/ENERGY/GBLWRM/CCIG.shtml</p> <p>2008 CCIG Framework: http://www.oregon.gov/ENERGY/GBLWRM/docs/CCIGReport08Web.pdf</p>
	<p>3) The Climate Leadership Initiative at the University of Oregon created a report titled “Preparing the Pacific Northwest for Climate Change: A Framework for Integrative Preparation Planning for Natural, Human, Built and Economic Systems” (2008), as a part of its Climate Preparation Program, and co-sponsored by the CCIG (above). It is intended to facilitate preparation by private and public entities in the Pacific Northwest.</p>	<p>University of Oregon Institute for a Sustainable Environment: http://climlead.uoregon.edu</p> <p>2008 CLI Report: http://climlead.uoregon.edu/programs/scenariosplanning.html</p>

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<p>Pennsylvania</p>	<p>Act 70 of 2008 passed by the State legislature created the Pennsylvania Climate Change Advisory Committee led by the Department of Environmental Protection (DEP) to oversee implementation of the provisions in the Act. Among other items, the Act called for an Impact Assessment Report for stated sectors due to climate change. A Draft report commissioned by the DEP, Pennsylvania Climate Impact Assessment Report, was released May 29, 2009. The report includes detailed impact assessments for the following sectors:</p> <ul style="list-style-type: none"> Water Resources Forests and Wildlife Aquatic Ecosystems and Fisheries Agriculture Energy Human Health Tourism and Outdoor Recreation Insurance and Economic Risk <p>Most of the sector chapters also include some adaptation strategies, additional information needs, and barriers and opportunities. The Act also calls for a Climate Action Plan to be created within 15 months, however, the Plan requirements are limited to mitigation and the Act does not call for an Adaptation Plan, beyond the Impact Assessment report.</p>	<p>Climate Change Advisory Committee:</p> <p>http://www.depweb.state.pa.us/energy/cwp/view.asp?a=1532&q=546710&energyNav= </p> <p>2009 Draft Report:</p> <p>http://www.depweb.state.pa.us/energy/lib/energy/docs/climatechangeadvcom/general_information/climate_impacts_assessment_draft_(060109).pdf</p>
<p>South Carolina</p>	<p>Established in February 2007 by Governor Sanford under Executive Order 2007-04, the Climate Energy and Commerce Advisory Committee (CECAC) released their Final Report in July 2008. Under a Cross-Cutting issue for Adaptation and Vulnerability (CC-5), the Committee recommends the formation of a Blue Ribbon Commission on Adaptation to Climate Change to develop a state Climate Change Adaptation Plan that identifies potential impacts to the state and makes recommendations to mitigate those impacts “to humans, natural and economic systems, water resources, temperature-sensitive populations and systems, energy systems, transportation systems, communications systems, vital infrastructure and public facilities, natural lands (such as coastal areas, wetlands, forests, and farmland).”</p>	<p>South Carolina Climate, Energy & Commerce Advisory Committee (CECAC)</p> <p>2008 Final Report:</p> <p>http://www.scclimatechange.us/plenarygroup.cfm</p>
<p>Utah</p>	<p>The Blue Ribbon Advisory Council Report on climate change submitted to Governor Huntsman by the Council mentions adaptation in its Cross Cutting Options section, option CC-5. The council recommends development of adaptation strategies and policies, with a primary focus on water, drought and reduced snow pack.</p>	<p>UT Blue Ribbon Advisory Council (BRAC) on Climate Change</p> <p>2007 Report:</p> <p>http://www.deq.utah.gov/BRAC_Climate/index.htm</p>

State	Adaptation Planning or Measures	Responsible Organization
Vermont	<p>1) In December 2007, Secretary Crombie of the Agency for Natural Resources appointed a Climate Change Transition Team to follow-up on the recommendations made by the Governor's Commission on Climate Change in their 2007 Report (below). The Transition Team created work plans for implementing each of the 38 recommendations in the Commission's report. For the Adaptation Cross-Cutting issue, a high-level evaluation of requirements (e.g. funding) or barriers to moving forward is provided. A report of Proposed Draft Work Plans was released in October 2008.</p>	<p>Climate Change Transition Team</p> <p>2008 Workplan Report: http://www.anr.state.vt.us/air/Planning/htm/ccvtactions.htm</p>
	<p>2) The Governor's Commission on Climate Change Report (2007) addresses adaptation in Appendix I- Cross Cutting Issues CC-5. The report recommends the government partner with Vermont academic institutions for research and policy recommendations. Also, the commission recommends the immediate formation of a Commission on Adaptation to Climate Change to create a Climate Change Adaptation Plan. The report recognizes the potential need to integrate with the state's Emergency Response Plan and associated stakeholders. The Commission was established by Governor Douglas under a 2005 Executive Order (07-05) and put into statute by the General Assembly in 2006.</p>	<p>Governor's Commission on Climate Change (GCCC); Dept of Environmental Conservation</p> <p>2007 Report: http://www.anr.state.vt.us/air/Planning/htm/ClimateChange.htm</p>
Virginia	<p>The Governor's Commission on Climate Change was established by Executive Order 59 (2007) under Governor Kaine, to create a Climate Change Action Plan. The Plan was to include projected impacts on natural resources, human health, industries including agriculture, forestry, tourism and insurance, and recommendations to prepare for such impacts.</p> <p>The Commission's Adaptation and Sequestration workgroup developed recommendations spanning monitoring and projections, public and human health, coastal and shoreline management, local planning, infrastructure protection and planning, floodplain management and insurance industry participation, emergency planning response and recovery, multi-state natural resource plans, and water resource management. The plan calls for a separate Sea Level Rise Adaptation Strategy to be developed by 2011. Specific responsibilities to respond are listed for individual state agencies/departments including: Commerce and Trade, Environmental Quality (DEQ), Transportation, Health (VDH), Conservation and Research (DCR), Natural Resources, Game and Inland Fisheries (DGIF), Historic Resources (DHR), Water Control Board, Marine Resources Commission, and the General Assembly. Additionally, recommendations to support local planning and address existing legislative or other barriers to action are included.</p>	<p>Governor's Commission on Climate Change: http://www.deq.virginia.gov/info/climatechange.html</p> <p>2008 Final Plan: http://www.deq.virginia.gov/export/sites/default/info/documents/climate/CCC_Final_Report-Final_12152008.pdf</p>

State	Adaptation Planning or Measures	Responsible Organization
Washington	<p>1) On May 21, 2009, Governor Gregoire signed Executive Order 09-05, "Washington's Leadership on Climate Change," to address both the reduction of greenhouse gas emissions as well as impacts to the state's water supply and vulnerable coastlines. The Order calls for an evaluation of the potential impacts from sea level rise on the state's coastline and development of recommendations to address those impacts. The Order also calls for the development of guidelines, tools and recommendations to assist the state and water uses in preparing for impacts to water resources as a result of climate change impacts.</p>	<p>2009 Executive Order: http://www.ecy.wa.gov/climatechange/2009EO/2009EO_signed.pdf</p>
	<p>2) In 2007, Preparation / Adaptation Working Groups (PAWGs) were formed, as part of the state's overall Climate Advisory Team, to develop recommendations for the Governor on how Washington can prepare and adapt to the impacts of climate change. The PAWGs were organized around 5 sectors, where prior state research indicated the greatest impacts from climate change to Washington:</p> <ul style="list-style-type: none"> Agriculture Forestry Resources Human Health Water Resources & Quality Coastal Infrastructure <p>The working groups were chartered to identify issues and vulnerabilities, and to make recommendations for adaptive strategies and areas requiring additional research. The state's Climate Advisory Team report "Leading the Way on Climate Change: The Challenge of Our Time," was released in February 2008. Chapter 3, "Preparing for the Impacts of Climate Change in Washington," contains issues and recommendations for each of the five sectors identified above. Next Steps for 2008 for each of the Working Groups is also listed.</p>	<p>Washington State Department of Ecology - Preparation / Adaptation Working Groups (PAWG)</p> <p>http://www.ecy.wa.gov/climatechange/index.htm</p> <p>2008 Interim CAT Report: http://www.ecy.wa.gov/climatechange/interimreport.htm</p>
	<p>The Climate Action Team's 2008 final report, "Leading the Way – Implementing Practical Solutions to the Climate Change Challenge," released in November 2008, furthers the work of the CAT's mitigation working groups, but does not include adaptation specifically. However, they recommend in their report that Adaptation and the 2007 work of the PAWGs be "renewed" by the state in 2009. They also do incorporate adaptation into their recommendations for the State Environmental Policy Act (SEPA) to consider climate change, in terms of evaluating the vulnerabilities to climate change associated with projects and required adaptations (See SEPA Recommendation #8).</p>	<p>2008 Final CAT Report: http://www.ecy.wa.gov/climatechange/2008CATdocs/ltw_app_v2.pdf</p>

Local Adaptation Planning

Cities Taking the Lead

Just as many states and regions are moving forward with GHG mitigation strategies in lieu of federal action, cities and counties in the U.S. are initiating adaptation planning and adaptive measures in lieu of state or federal policy or planning efforts. The often localized nature of climate change impacts helps to explain this early leadership, but further attention will be required from all levels of government, as well as from the private sector, to support adaptation planning, a solution development, and implementation.

King County, Washington - An early local leader for adaptation planning and implementation is King County, Washington. In 2006, King County formed an interdepartmental climate change adaptation team, building scientific expertise within their county departments to ensure climate change was considered in future policy, planning, and capital investment decisions. Partnering with the Climate Impacts Group at the University of Washington,³ the county has already begun many adaptation efforts, including the development of water quality and quantity models and monitoring programs. The 2007 King County Climate Plan laid out detailed goals and actions for six “Strategic Focus Areas” for future adaptation efforts. A sample of these measures is provided in Table 2.

Table 2: King County’s 2007 Climate Plan, Adaptation Strategic Focus Areas⁴

Focus Area	Sample Adaptation Goals
Climate Science	Expand Water and Land Resources Division’s climate change impact analysis and impacts research areas (e.g. groundwater resources, precipitation patterns, etc). Build awareness of climate change impacts and adaptation measures (e.g., create a climate change outreach database; invest in education/outreach, etc.).
Public Health, Safety & Emergency Preparedness	Collaborate in research and share information with the public health community, in areas such as thermal stress, infectious disease, food quality and supply, and social justice issues. Update emergency and hazard mitigation plans and activities to address projected changes.
Surface Water Mgmt, Freshwater Quality & Water Supply	Conduct technical analysis of projected impacts to stream flows to large rivers and tributaries. Produce and promote the use of reclaimed water for industrial and irrigation purposes, as well as consideration for other future uses. Incorporate climate change impacts into water supply planning processes and wastewater treatment investment plans.

³ Climate Impacts Group (CIG) is a research group at the University of Washington studying the impacts of natural climate variability and global climate change on the U.S. Pacific Northwest in the areas of forestry, water, coastal lands and salmon. As one of nine federal Regional Integrated Sciences and Assessments (RISA) teams in the U.S., CIG works with regional planners, natural resource managers and decision makers to guide their research priorities and inform decision-relevant climate science and public policy for their region. <http://cse.washington.edu/cig/>

⁴ King County Washington, Sims Global Warming Initiative, 2007 King County Climate Plan, available at: <http://www.kingcounty.gov/exec/globalwarming/>

Land Use, Buildings and Transportation	Review all county plans, policies and investments for consideration or inclusion of climate change impacts (e.g., Regional Hazard Mitigation Plan, Shoreline Master Plan, River and Floodplain Management Program, transportation infrastructure plans, etc.). Numerous actions are included to address flooding and sea-level rise projections.
Financial & Economic Impacts (<i>now Economic, Agriculture & Forestry</i>)	Examine climate change impacts on key industries for the state including government, forestry, and agriculture (the county has already identified a number of actions to protect the health of these industries).
Biodiversity & Ecosystems	Collaborate with climate impact organizations and fishery agencies to support the resilience of salmon, wildlife, and biodiversity against climate change impacts. Evaluate the need for additional biodiversity monitoring. Incorporate climate change projections into salmon recovery planning efforts.

Each year, the Executive Action Group on Climate Change produces a Climate Report, as required under Executive Orders PUT 7-5 through 7-8 for Global Warming Preparedness, providing updates in progress against the 2007 Plan.⁵ Examples of some of the projects that were initiated or completed in 2008 include:

- creation of a training program for coastal managers and planners on how to prepare for climate change;
- completion of a Reclaimed Water Feasibility Study and initiation of a reclaimed water plan;
- development of a Vulnerable Facilities Inventory to the impacts of sea-level rise on wastewater treatment infrastructure; and
- completion of a King County Biodiversity Report on the status of biodiversity in the county.

Like King County, hundreds of other cities and counties have created Climate Action Plans (CAP), with more completing their plans each year. However, like state plans, these CAPs focus almost exclusively on GHG emission reductions. As impacts continue to occur in coastal cities, southeast farming communities, and other areas, more localities are calling for adaptation planning. Below are examples of three cities: New York City, Seattle, and Portland, whose climate action plans specifically call for adaptation planning.

New York City (NYC) - In April 2007, Mayor Bloomberg released his PLANYC: A Greener, Greater New York. In this plan, the Mayor addresses adaptation, recognizing that the results of climate modeling indicate that the city faces tremendous economic and human health risks from storm surges, hurricanes and flooding, in addition to heat waves, wind storms and water contamination. In PLANYC, the Mayor calls for the city to address three adaptation-specific initiatives: an inter-governmental task force to address critical infrastructure, a plan to protect specific communities at high risk from climate

⁵ King County Washington, Sims Global Warming Initiative, 2008 King County Climate Report, January 2009, <http://www.kingcounty.gov/exec/globalwarming.aspx>

change impacts, and an overall adaptation planning process for the city.⁶ Table 3 outlines these three adaptation initiatives.

Table 3: New York City’s PLANNYC for Climate Change Adaptation⁴

Impact Area	Adaptation Initiatives
Infrastructure	Create an Inter-Governmental Task Force (New York City Climate Change Task Force) to protect vital infrastructure and build climate change into long-term capital planning processes. The Task Force will create an inventory of existing at-risk infrastructure (tunnels, airports, subway, power plants, etc), analyze and prioritize the components of each system, develop adaptation strategies, and design guidelines for new infrastructure.
Public & Community Health	Work with key community stakeholders and vulnerable neighborhoods to develop site-specific plans to address climate change impacts such as: heat waves, flooding, and windstorms, with a primary focus on waterfront communities.
Planning & Policy	Create a city-wide strategic adaptation planning process which comprehensively assesses the risks, costs, and potential solutions for adapting to climate change. <ul style="list-style-type: none"> • Create a strategic planning process to adapt to climate change impacts. • Ensure that New York’s Federal Emergency Management Administration (FEMA) 100-year floodplain maps are updated. • Document the City’s floodplain management strategies to secure discounted flood insurance for New Yorkers. • Amend the building code to address the impacts of climate change.

On August 12, 2008, Mayor Bloomberg announced the formation of the Climate Change Adaptation Task Force, and the New York City Panel on Climate Change (NPCC). The Task Force is responsible for identifying the city’s assets at risk from projected climate change impacts, and developing integrated strategies to secure these assets which include: airports, roads, bridges, and tunnels; mass-transit; telecommunications systems; and water and sewer systems.⁷ Their report is due out in the fall of 2009. The NPCC is a Technical Advisory Committee tasked in part with developing city-specific climate change projections, tools to help the Task Force and other decision makers to identify the at-risk assets for inclusion in the plan, and drafting new protection levels for any new infrastructure designs. With funding support from the Rockefeller Foundation, the Panel released its first of three reports, “Climate Risk Information,” (Feb 2009), focused on providing local climate projections and high-level risks to the city’s infrastructure due to increases in temperatures, precipitation and sea-level rise.⁸ Subsequent reports are intended to provide city resource managers and planners with more detail and guidance for action.

⁶ New York City, PLANNYC – The Plan, 2007 is available at: <http://www.nyc.gov/html/planyc2030/html/downloads/the-plan.shtml>

⁷ In May 2008, the NYC Department of Environmental Protection released “Climate Change Assessment and Action Plan” which outlines potential impacts to the city’s water and sewer systems and steps the DEP is taking to mitigate those impacts. The report is available at: http://www.nyc.gov/html/dep/html/news/climate_change_report_05-08.shtml

⁸ New York City Panel on Climate Change (NPCC), Climate Risk Information, February 2009, http://www.nyc.gov/html/om/pdf/2009/NPCC_CRI.pdf

On May 6, 2008 the NY city council passed law Int. No. 395-A allowing the Mayor to establish a permanent Office of Long-Term Planning and Sustainability to “coordinate and implement policies, programs, and actions to meet the long term needs of the city with respect to infrastructure, environment and overall sustainability,” including climate change.⁹ The authority of the Office extends to city agencies, as well as to businesses, institutions and the public. Additionally, the law requires annual performance reports (due April of each year) against established indicators (also required by the law) and an updated plan every four years. The city has released two annual Progress Reports to the 2007 PlaNYC to date. Although specific progress updates are not provided in the 2009 report for the climate change adaptation initiatives specified in the 2007 plan, the report does include detailed updates on adaptive actions in the areas of water quality (which includes discussions regarding the protection of infrastructure and natural areas), water supply, and wetland protection and management.¹⁰

Seattle, WA – Like New York City, the City of Seattle also recognized the need to go further in their climate plan to address climate change impacts. Seattle’s 2006 Climate Action Plan called for an inter-departmental team to prioritize climate change related issues and to make recommendations on adaptive measures and timing. Areas the plan specified for evaluation included the following:

- sea-level rise,
- storm water management,
- urban forestry,
- building codes, and
- heat waves.¹¹

In 2008, 18 governmental departments, including Transportation, Land Use and Planning, and Fleets and Facilities (e.g. police, fire, libraries, etc.) were asked to begin analyzing potential vulnerabilities to climatic changes including temperature increase, sea-level rise, and precipitation changes. The departments were tasked with creating this assessment against public assets, programs, and services; and to identify current strategies as well as planned strategies to cope with and reduce vulnerabilities. The results of this assessment are currently being compiled and reviewed by the Office of Sustainability and Environment. Although the city is not planning on creating an Adaptation plan, the Office has indicated that adaptive actions will continue. Additionally, the Office is focused on providing City staff with tools to evaluate potential impacts of climate change on their projects and to assist them with developing adaptation strategies. An on-line toolkit is being developed with sea-level rise maps, decision matrices, and climate adaptation checklists to help staff mitigate the risk associated with climate change impacts. Other resources on the site will include downscaled science on climate change impacts to the Pacific Northwest created by the Climate Impacts Group (CIG), best practices, and adaptation planning strategies.¹²

⁹ <http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=446181&GUID=D94C5227-81E3-44C5-8386-DBE4B23A6E79&Search=office+of+long-term+planning+and+sustainability&Options=ID%7cText%7c>

¹⁰ The City of New York, PlaNYC Progress Report 2009, is available at:
http://www.nyc.gov/html/planyc2030/downloads/pdf/planyc_progress_report_2009.pdf

¹¹ City of Seattle, 2006 Climate Action Plan, http://www.4cleanair.org/Documents/SeaCAP_plan.pdf.

¹² Personal conversations with the Office of Sustainability and Environment, City of Seattle Washington, September 2, 2008 and July 22, 2009.

Portland, OR – The City of Portland released a Draft Climate Action Plan (CAP) in 2009 for public comment.¹³ The Plan is primarily focused on mitigation; however it recognizes the need for a city-wide vulnerability assessment and implementation plan that includes a broad range of sectors including biodiversity, energy, infrastructure, public health and emergency preparedness, transportation, water, and so on, as well as to incorporate climate change into city and county planning. The CAP sets the following first priority goals for completion by 2012:

- complete a vulnerability assessment for food, water and energy supplies, infrastructure and public health sectors;
- conduct a cost / benefit analysis of recommendations to address identified impacts and vulnerabilities; and
- approve a plan for bureaus and agencies to take action.¹³

Non-Governmental Organizations are Gaining Momentum

Over the last three years, non-profit organizations with support from foundations, governments, and private donors have begun developing adaptation programs as a resource for local communities around the world. These programs are being introduced through pilot cities and counties in the United States and abroad to help develop planning tools, methodologies (or frameworks), as well as expert networks and platforms for knowledge sharing. As a result of this support, many cities have committed to creating an adaptation plan, or are further along in completing vulnerability assessments, options analysis, and recommendations. Examples of these leading organizations and U.S. pilot sites include:

Center for Clean Air Policy (CCAP): Urban Leaders Adaptation Initiative

<http://www.ccap.org/index.php?component=issues&id=5>

In 2006, CCAP launched the Urban Leaders Adaptation Initiative with “partner” government leaders from several U.S. cities and counties. Their focus is on mainstreaming climate change into infrastructure and land use decisions that can affect local adaptation efforts. Leaders with whom CCAP is partnering include representatives from:

- Chicago, IL
- King County, WA
- Los Angeles, CA
- Miami-Dade County, FL
- Milwaukee, WI
- Nassau County, NY
- New York City, NY
- Phoenix, AZ
- San Francisco, CA

Building on the work of other organizations around the world that have developed methodologies or frameworks for adaptation, CCAP is hoping to “operationalize steps of the adaptation process” with

¹³City of Portland, Draft Climate Action Plan, July 2009, <http://www.portlandonline.com/bps/index.cfm?c=49989>

their partner sites as a model for legislation and overall adaptation programs that other communities can use to enhance their own resiliency.¹⁴ In June 2009, CCAP Urban Leaders Adaptation Initiative released a guidance report for urban cities, “Ask the Climate Question: Adapting to Climate Change Impacts in Urban Regions”. The report provides an overview of common impacts to urban centers, such as heat waves, flooding and extreme precipitation, an update on adaptation planning and actions by each of their partner cities, as well as lessons learned from the Initiative.

ICLEI-US: Climate Resilient Communities (CRC) Program
www.icleiusa.org/adaptation

ICLEI U.S.A.’s Climate Program assists over 575 member cities in 49 states in their efforts to reduce greenhouse gas emissions and protect the climate from further human impacts. In 2006, ICLEI collaborated with the University of Washington’s Climate Impacts Group and King County, Washington, to develop a guidebook for state and local governments to approach adaptation. *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments* describes ICLEI’s Five Milestones for Adaptation methodology.¹⁵ Over the last three years, some ICLEI USA member cities completed climate resiliency or adaptation plans, leveraging the ICLEI methodology, including Keene, New Hampshire; Homer, Alaska; and Miami-Dade County, Florida.^{16,17,18}

ICLEI has recently refocused its Climate Resilient Communities (CRC) program, which was initiated in 2005, to better serve its member cities that understand the need to take on adaptation in addition to mitigation. The CRC program is striving to improve local governments’ access to and understanding of relevant climate science and impacts data; support better integration of parallel mitigation and adaptation planning efforts; and tools and methods to guide its members through an adaptation planning process that includes analyzing likely climate impacts at the local government level, setting priorities, selecting appropriate options, and implementing effective adaptation actions.¹⁹ An Advisory Group of 22 member cities has been working with the CRC Program since March 2009 to provide it with deeper insight into the adaptation needs of local governments across the U.S., which guides the Program’s agenda and efforts. These 22 members include cities that have completed their initial adaptation plans and are focused on implementing their recommendations, such as King County Washington and Keene NH, as well as cities that are in-progress (e.g. New York City), and some that are highly motivated and trying to get started. The 22 member cities or representatives for the city include:

¹⁴ Center for Clean Air Policy, Urban Leaders Adaptation Initiative, <http://www.ccap.org/index.php?component=programs&id=6>

¹⁵ Climate Impacts Group and King County, WA, *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments*, updated Sept 2007, <http://cses.washington.edu/cig/fpt/guidebook.shtml>

¹⁶ City of Keene, NH, *Adapting to Climate Change: Planning a Climate Resilient Community*, Nov 2007, http://www.ci.keene.nh.us/planning/Keene_Report_Combined_FINAL.pdf

¹⁷ City of Homer, *Climate Action Plan*, Dec 2007, <http://www.ci.homer.ak.us/CLPL.pdf>.

¹⁸ Miami-Dade County, *Climate Change Advisory Task Force, Climate Change Advisory Task Force Initial Recommendations*, Apr. 2008, http://www.miamidade.gov/derm/library/08-10-04_CCATF_BCC_Package.pdf

¹⁹ ICLEI Governments for Sustainability, *Climate Resilient Communities Program*, http://www.icleiusa.org/programs/climate/Climate_Adaptation/adaptation

- Albany, NY
- Alexandria, VA
- Amherst, MA
- Asheville, NC
- Austin, TX
- Dubuque, IA
- El Cerrito, CA
- Fairbanks, AZ (North Star Borough Assembly)
- Fort Wayne, IN
- Grand Forks, ND
- Hayward, CA
- Irvine, CA
- Keene, NH
- New York City, NY (Office of Long-Term Planning and Sustainability)
- Newark, CA
- Salinas, CA
- San Jose, CA
- Savannah, GA
- Tucson, AZ
- King County, WA
- San Francisco, CA (City, County and Bay Conservation and Development Commission (BCDC))

Impact-Specific Adaptation Planning

Communities across the United States are feeling the impacts of climate change. State and local governments, businesses, and communities are taking action on specific issues such as desalinating ground water, protecting infrastructure and property from flooding and erosion, and planning for more severe drought. These initiatives may be privately funded or managed, or the responsibility of a municipal agency or public health agency, and can occur without a state-based climate change commission or adaptation task force. Although the responses are often not comprehensive nor attributed directly to climate change, they are illustrative of efforts necessary for adaptation. While Alaska is contending with infrastructure loss and community retreat from coastal erosion, Louisiana is dealing with hurricane-induced flooding, and North Carolina and Florida are addressing saltwater intrusion of freshwater supplies from sea-level rise and storm surges. Below are some examples of impact-specific adaptive planning and action at state and local levels that are not resulting from a statewide adaptation planning initiative.

Drought – According to the National Drought Mitigation Center, 38 states in the U.S. have created or are in the process of creating a Drought Plan.²⁰ Of these 38 states, 22 states updated or created their drought plan since 2000. In most cases, however, these plans are not aimed at addressing, nor do they acknowledge, climate change, while addressing current mid-term, or long-term realities of drought. For example, Florida’s 2007 Drought Action Plan’s stated purpose is:

“to improve coordination and communication among key participating agencies, facilitate outreach to concerned parties, and express the basic short- and mid-term action steps now thought necessary to address the drought. “

²⁰ National Drought Mitigation Center, State Drought Plans, <http://drought.unl.edu/plan/stateplans.htm>

The plan never mentions climate change or adaptation; however adaptation measures are included in the plan such as:

- re-use of reclaimed water,
- capture and re-use of agricultural irrigation water,
- seawater desalination, and
- groundwater demineralization²¹

For these types of plans climate change projections for drought are usually not considered in the planning and regulatory process. An exception is New Mexico's Drought Plan completed in 2005, and updated in 2006, by the Governor's Drought Task Force. Members of the Drought Task Force integrated with the state's climate working group to assess the impacts of climate change on water supplies for the state's climate action plan, while also incorporating climate change projections for snowpack, precipitation, and temperature changes into the Drought Plan.²²

Sea Level Rise – Sea level rise is a relatively slow, but consistent reality which is heightened during times of extreme precipitation and storm surges. It is caused by the thermal expansion of global waters (warming of oceans) and from increases in global water volumes due to land ice melt (e.g. Greenland ice sheet). Recent global projections suggest sea level rise of 3-4 feet this century,²³ however, studies also indicate that the U.S. coasts have and will experience significantly more sea level rise than the global average.^{24,25} Maps of locations around the world are now available online, showing the results of different sea level rise scenarios based on available scientific models.^{26,27} Countries, states and cities are also responding by creating their own maps and scenarios using sea level rise projections for their particular location.^{28,29} Adaptive actions on a local level have already started in areas where the impacts of sea-level rise are already apparent such as eastern seaboard states, Gulf Coast states, the San Francisco Bay, and some Alaskan coastal villages. Table 5 provides some examples of adaptation planning in the United States specifically for sea level rise that are not part of a more comprehensive adaptation planning effort. For states currently underway with statewide adaptation planning efforts of which addressing the impacts of sea-level rise is a part, refer to Table 1 above.

²¹ Florida Drought Action Plan, http://www.dep.state.fl.us/drought/news/2007/files/florida_drought_action_plan.pdf

²² New Mexico Drought Task Force, (2006), New Mexico Drought Plan, <http://www.ose.state.nm.us/DroughtTaskForce/2006-NM-Drought-Plan.pdf>

²³ Global Climate Change Impacts in the United States, Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, (eds.). Cambridge University Press, 2009.

²⁴ Bamber, J., et.al., Reassessment of the Potential Sea-Level Rise from a Collapse of the Western Antarctic Ice Sheet, *Science*, May 2009, Vol. 324, no 5929, pp. 901-903,

²⁵ Yin, J., Sea Level Rise Due to Global Warming Poses Threat to New York, Science Daily, Mar 16, 2009, <http://www.sciencedaily.com/releases/2009/03/090315155112.htm>

²⁶ Environmental Protection Agency, Climate Change, Health and Environmental Effects, Sea-Level Rise Maps, <http://www.epa.gov/climatechange/effects/coastal/slrmaps.html>

²⁷ Weiss and Overpeck, University of Arizona, Department of Geosciences Environmental Studies Lab, North America Dynamic Map, http://www.geo.arizona.edu/dgesl/research/other/climate_change_and_sea_level/sea_level_rise/sea_level_rise.htm

²⁸ Pacific Institute, Sea-Level Rise Maps for California Coastlines, http://www.pacinst.org/reports/sea_level_rise/maps/

²⁹ San Francisco Bay Conservation and Development Commission (BCDC), Scenarios for sea level rise, http://www.bcdc.ca.gov/planning/climate_change/index_map.shtml

Table 5: U.S State and Local Sea Level Rise Planning Initiatives

Location	Planning Initiatives
<p>California – Sacramento / San Joaquin Delta</p>	<p>Delta Vision Blue Ribbon Task Force is responsible for proposing solutions to Delta threats such as sea level rise, flooding, and saltwater intrusion. The Task Force released their Strategic Plan in October 2008, making recommendations to address sea level rise, in addition to other threats such as drought.</p> <p>http://www.deltavision.ca.gov/StrategicPlanningProcess/StaffDraft/Delta_Vision_Strategic_Plan_standard_resolution.pdf</p>
<p>California – San Francisco Bay</p>	<p>In 2007, the San Francisco Bay Conservation and Development Commission (BCDC) issued the report, “A Climate Change Strategy for the San Francisco Bay Region.” BCDC reports on the partnership of four local agencies, all needing to play a coordinated role to address the impacts of sea level rise, including land use planning, transportation, flood protection, and ecosystem protection and development as part of an 8 year plan. State policy recommendations are provided.</p> <p>http://www.bcdc.gov/planning/climate_change/strategy_SF_bay_region.shtml</p> <p>BCDC continues to refine sea-level rise maps for the Bay Area, with maps now available for vulnerable areas due to 16” of sea level rise by mid-century and 55” by the end of century. A recent background report of vulnerabilities to the Bay Area due to sea level rise is also available.³⁰</p>
<p>Delaware</p>	<p>Working with, and sponsored in part by, NOAA, the state is undergoing a two year project to identify those areas in the state most vulnerable to sea level rise, flooding and erosion, using high-tech mapping and modeling for state and local level projections, including LiDAR digital photography. The goal is to use the information as part of a Sea-Level Rise Adaptation Plan for the state.³¹</p>
<p>Maine</p>	<p>With support from the U.S. EPA, the state of Maine published “Anticipatory Planning for Sea-Level Rise Along the Coast of Maine” (1995). This report provides a cost benefit analysis of adaptive strategies and analysis of state and federal policies to support adaptive responses. It is available on the State Planning Office site along with other flood risk and erosion resources.</p> <p>http://www.maine.gov/spo/coastal/projects/weatheringstorms.htm</p> <p>In 2007 the Dept. of Conservation Maine Geological Survey published “Impacts of Future Sea-Level Rise on the Coastal Floodplain,” making a number of recommendations for vulnerable locations. http://www.maine.gov/doc/nrimc/mgs/explore/marine/sea-level/contents.htm</p>
<p>North Carolina</p>	<p>Using NOAA resources and a Coastal Flooding Model, researchers initiated a pilot study in parts of North Carolina’s coastal areas to model different scenarios of sea level rise and inundation from storms. These scenarios accounted for static sea-level rise, tidal changes, winds (e.g., northeasters), and hurricane storm surging, and also modeled ecological impacts. This is part of a number of research efforts noted by NCCOS to assess vulnerability in the state of North Carolina to sea level rise.</p> <p>http://www.cop.noaa.gov/stressors/climatechange/current/slr/welcome.html</p>

³⁰ BCDC, Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline, April 7, 2009.

³¹ Murray, M, “State monitors sea-level rise for future risks,” The News Journal, August 18, 2008 available at: <http://lidarbb.cr.usgs.gov/index.php?showtopic=4572>.

New York	<p>In 2007, the New York State Legislature created the Sea Level Risk Task Force to assess potential impacts and provide recommendations for adaptive measures to protect remaining coastal ecosystems and habitats, and to increase the resiliency of coastal communities. The report is due by the end of the year 2009.</p> <p>http://www.dec.ny.gov/energy/45202.html</p>
Rhode Island	<p>In January 2008, Rhode Island’s Coastal Resources Management Program adopted new policies to address Sea Level Rise in the state, including integrating climate change and sea level rise scenarios into operations.</p> <p>http://www.crmc.ri.gov/climatechange/CRMP_145_Draft_May09.pdf</p> <p>By July 2008, the state’s Bays, Rivers, and Watersheds Coordination Team (BRWCT) published their “System Level Plan: 2009-2013,” to define how they will address the challenges of climate change, including sea level rise, to their aquatic and coastal resources.</p> <p>http://www.dem.ri.gov/bayteam/documents/slpfinal.pdf</p>

Summary

Impacts of climate change are being felt around the world. States and localities in the United States are beginning to take action to protect their economies, natural resources and communities. These actions include proactive, comprehensive planning across multiple sectors and projected impacts, as well as efforts focused on those sectors or systems being hit the hardest today. As a result, more organizations are becoming involved with adaptation planning and implementations, including information networks, NGOs and private consulting firms, academia, and private sector companies. This field will undoubtedly continue to grow over the coming years, particularly in the United States as policy and funding develops at federal, state and local levels to support adaptation efforts.