



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

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 State 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 sea-level rises that will gradually inundate coastal areas and increase 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. Early impacts of climate change are already occurring. Several U.S. legislative committees are considering federal greenhouse gas (GHG) emission reduction policies, and dozens of states are taking action to reduce their own GHG emissions. While these actions are vital to mitigating the impacts of future climate change, we are already committed to further warming for decades to come. As a result, strategies for adapting to the impacts of climate change are needed to work in parallel with strategies for mitigating greenhouse gas emissions.

While governments act to mitigate future climate change, they must also plan and act to address the impacts. This preparation includes risk 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, 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.

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.

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 Level 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, Oregon, and Washington, all of which have adaptation planning efforts in progress [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. [Table 1 – State Adaptation Planning Efforts]

Figure 1 – State Adaptation Planning Efforts

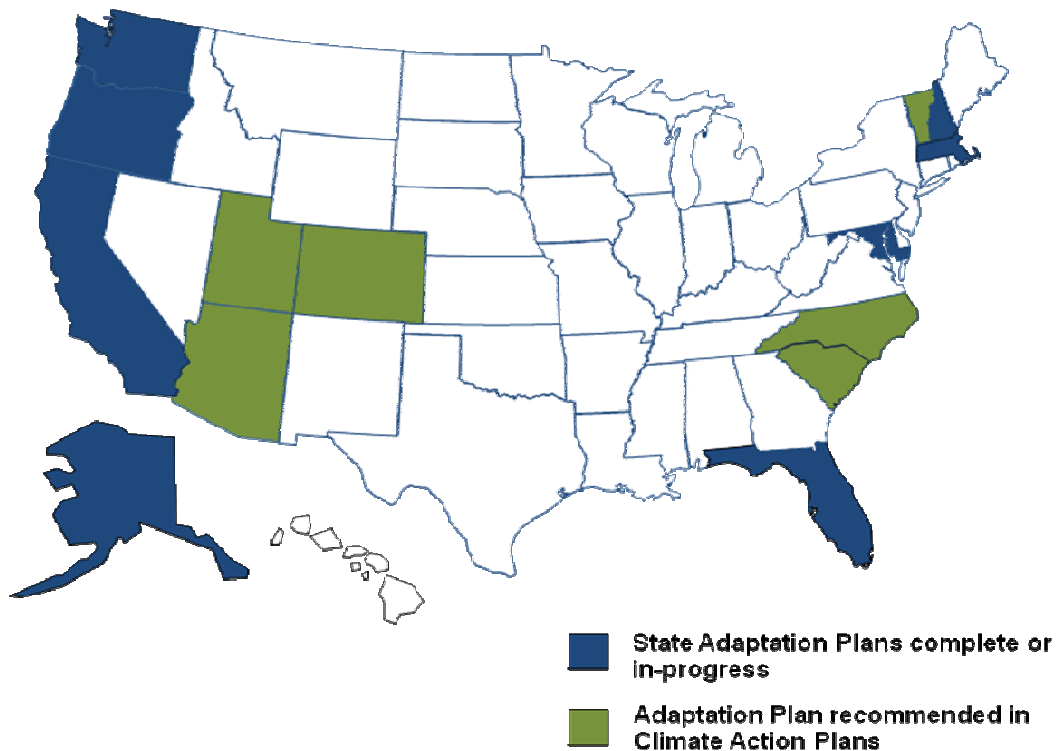


Table 1: State Adaptation Planning Efforts is a list of states with adaptation plans or efforts underway by the state government.

Table 1: State Adaptation Planning Efforts

State	Adaptation Planning or Measures	Responsible Organization
<p>Alaska</p>	<p>The Alaska Climate Impact Assessment Commission, established in 2006, 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 is responsible for developing 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 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 are facilitated by the Center for Climate Strategies (CCS) and are open to the public. “Catalogs” of potential policy options are available for all four TWGs as they work through their planning process.</p>	<p>Climate Impact Assessment Commission (2006) http://www.dec.state.ak.us/air/cc.htm</p> <p>Alaska Climate Change Sub-Cabinet (2007) http://www.climatechange.alaska.gov/</p> <p>Alaska Climate Change Adaptation Advisory Group http://www.akclimatechange.us/Adaptation.cfm</p>
<p>Public Infrastructure</p>	<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.akclimatechange.us/Infrastructure_Transportation.cfm</p>
<p>Health & Culture</p>	<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.akclimatechange.us/Health_Culture.cfm</p>

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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.akclimatechange.us/Natural_Systems.cfm
Economic Activities	This team is addressing the impacts of climate change on the state’s economy through the examination of vital sectors such as: oil and gas, mining, ocean transportation and financial services, such as the insurance industry.	http://www.akclimatechange.us/Economic_Activities.cfm
Alaska (2)	<p>The Immediate Action Workgroup (IAW) of the Governor’s Sub-cabinet on Climate Change was established in 2007 to address known threats to communities caused by coastal erosion, thawing permafrost, flooding, and fires. These communities include Newtok, Shishmaref, Kivalina, Koyukuk, Unalakleet and Shaktoolik. Their 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>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>	http://www.climatechange.alaska.gov/iaw.htm
California (1)	<p>The California Resources Agency, working in collaboration with the Climate Action Teams under the direction of Cal EPA, the Business, Transportation and Housing Agency, and the Dept. of Health and Human Services, as well as other stakeholders, plans to develop a California Adaptation Strategy (CAS) for the state by April 2009.</p> <p>There are six Working Groups organized by the following sectors:</p> <ul style="list-style-type: none"> Biodiversity & Habitat Infrastructure Public Health Oceans and Coastal Resources Water Working Landscapes <p>On November 14, 2008, Governor Schwarzenegger issued Executive Order S-13-08 directing state agencies to plan for sea-level rise and climate impacts.</p>	http://www.climatechange.ca.gov/adaptation/

State	Adaptation Planning or Measures	Responsible Organization
California (2)	<p>"Proposed Early Actions To Mitigate Climate Change In California" is a report created by the state's Climate Action Teams to supplement the Air Resources Board's report on early actions. It contains the adaptation recommendations listed below. The full report is available at: http://www.climatechange.ca.gov/climate_action_team/reports/2007-04-20_CAT_REPORT.PDF</p>	CAL EPA: Climate Action Team
Water Resources	<p><u>Water-Energy Nexus</u>: The California Department of Water Resources will consider options that would compel local agencies to incorporate climate change adaptation into regional water planning. Such options would ensure that local agencies consider the water-energy nexus in Integrated Regional Water Management Plans and in facility construction and operation.</p>	
Agriculture	<p><u>Drainage Water Source Reduction, Reuse and Salt Utilization Program</u>: The program will improve water use efficiency, produce salt-tolerant energy crops and recapture salt from drainage as a possible energy source. This program is funded through 2011 and is also pursuing options for growing salt-tolerant bio-energy crops.</p>	
Forestry	<p><u>Wildfire Control Program</u>: CalFire has developed a comprehensive program to control wildfires with the objective of controlling 95 percent of fires to ten acres or less through firefighting and forest management.</p>	
California (3)	<p>"Climate Change Impacts and Adaptation in California" (2005) is a precursor to in-depth impact and adaptation studies that have ensued, particularly around climate projections and the development of higher resolution modeling by the Energy Commission's Public Interest Energy Research (PIER) program. Available online at: http://www.energy.ca.gov/2005publications/CEC-500-2005-103/CEC-500-2005-103-SD.PDF.</p>	California Energy Commission http://www.energy.ca.gov/
California (4)	<p>On-going Impact and Adaptation Research is available at: http://www.climatechange.ca.gov/research/impact.html These studies are organized into 3 primary sectors: Agriculture & Forestry Water Resources Public Health.</p> <p>A January 2008 report "More Than Information: What California's Coastal managers Need to Plan for Climate Change" studies the information needs of California's coastal managers, who are confronted with the growing risks of climate change. The study addresses the "broader context of how science can best support policy makers and resource managers". http://www.energy.ca.gov/publications/displayOneReport.php?pubNum=CEC-500-2007-046</p>	California Climate Change Portal(CCCC) http://www.climatechange.ca.gov/index.php

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Florida (1)	<p>A July 2007 Executive Order (07-128) tasks the Action Team on Energy and Climate Change with creating “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 October 2008, and includes a basic adaptation “framework” or list for state consideration that includes:</p> <ul style="list-style-type: none"> Climate adaptation science Public sector planning (local, regional and state) Ecosystems and Biodiversity Water Resources Management Built Environment and Community Protection Transportation and other Infrastructure Economic Development: tourism, industries, construction Insurance: property and casualty Emergency Preparedness & Response Human Health: health care, air quality, waste water, disaster response, medical treatment Social Effects Organizing State Government State Funding and Financing Coordination: federal government, professional societies Public Education & Outreach <p>Some specific recommendations are made for Research, Planning, Protection of Ecosystems and Biodiversity, the Built Environment, and Public Education and Outreach, however, there is no plan for any of these specific areas.</p>	<p>Action Team on Energy and Climate Change</p> <p>http://www.dep.state.fl.us/climatechange/actionplan_08.htm</p> <p>http://www.flclimatechange.us/Adaptation.cfm</p>
Florida (2)	<p>“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>Florida Climate and Energy Commission (Oct 2007)</p> <p>http://www.floridaenergycommission.gov/</p>

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Maryland	<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).</p> <p>There are 4 Technical Working Groups (TWGs): Existing Built Environment and Infrastructure Future Built Environment and Infrastructure Resources and Resource-Based Industries Human Health, Safety & Welfare</p> <p>Working group meetings are open to the public and facilitated by the Center for Climate Strategies (CCS).</p> <p>The state released its Climate Action Plan in August 2008. Chapter 5 – Comprehensive Strategy for Reducing Maryland’s Vulnerability to Climate Change is focused on Sea-Level Rise and Coastal Storms (noted as Phase 1). 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.</p>	<p>Maryland Commission on Climate Change (2007)</p> <p>http://www.mdclimatechange.us/</p>
Massachusetts	<p>On August 7, 2008, Massachusetts Governor Deval Patrick signed the Global Warming Solutions Act, which in addition to GHG reduction mandates, also calls 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 committee shall file a report of its findings and recommendations regarding strategies for adapting to climate change not later than December 31, 2009.</p>	<p>Secretary of Energy and Environmental Affairs</p>
New Hampshire	<p>In November 2007, Governor Lynch issued EO 2007-3 creating the Climate Change Policy Task Force. The Task Force is comprised of 6 working groups, with one dedicated to Adaptation. The Final report is due to the Governor in December 2008. A working draft of the Adaptation Plan is available at: http://www.carboncoalition.org/documents/NH%20Climate%20Action%20and%20Adaptation%20and%20Readiness.pdf.</p>	<p>Climate Change Policy Task Force</p>

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Oregon (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 mitigation and adaptation / preparation.	Global Warming Commission http://egov.oregon.gov/ENERGY/GBLWRM/GWC/index.shtml
Oregon (2)	The Climate Change Integration Group was formed in 2006, in part to create a preparation / adaptation strategy for the state. Goals included developing specific recommendations for climate change adaptation strategies, processes, and policies for government agencies, private industry, and the general public. In January 2008, CCIG completed their report “ A Framework for Addressing Rapid Climate Change, ” proposing that the state take steps toward developing a framework to assist individuals, businesses, and governments to incorporate climate change into their planning processes. The report is organized into 4 parts: 1) Preparation and Adaptation, 2) Mitigation, 3) Education and Outreach, and 4) Research, and is available at: http://www.oregon.gov/ENERGY/GBLWRM/docs/CCIGReport08Web.pdf . This report incorporates input from the Climate Leadership Initiative report (see below).	Climate Change Integration Group http://www.oregon.gov/ENERGY/GBLWRM/CCIG.shtml
Oregon (3)	The Climate Leadership Initiative, Institute for a Sustainable Environment, at the University of Oregon completed a report titled “ Preparing the Pacific Northwest for Climate Change: A Framework for Integrative Preparation Planning for Natural, Human, Built and Economic Systems ” (2008). The report is available at: http://climlead.uoregon.edu/programs/scenariosplanning.html	http://climlead.uoregon.edu/
Washington	In 2007, Preparation / Adaptation Working Groups (PAWGs) were formed, as part of the state’s overall Climate Action 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: Agriculture Forestry Resources Human Health Water Resources & Quality Coastal Infrastructure. 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 Action Team report “ Leading the Way on Climate Change: The Challenge of Our Time, ” was released in February 2008, revised in March, and is available at: http://www.ecy.wa.gov/climatechange/interimreport.htm . Section C, “ Preparing for the Impacts of Climate Change in Washington, ” contains the work of the PAWGs.	Washington State Department of Ecology - Preparation / Adaptation Working Groups (PAWG) http://www.ecy.wa.gov/climatechange/index.htm

State Climate Action Plans

The number of states with both a climate change commission and mitigation plan complete or in progress has grown rapidly in the last two years [*Figure 2 – States with Climate Action Plans*]. Thirty-four states have created, or are in the process of creating Climate Action Plans, with 15 new or revised plans due later in 2008 or 2009. These plans typically explain the impacts to the state as a result of climate change, provide state GHG emission inventory data, and make GHG emissions reduction recommendations by sector to avoid or reduce these impacts. General emphasis is placed on the economic and environmental value of reducing GHG emissions, with little or no recommendations for adaptation. However, eight states - Arizona, Colorado, North Carolina, Oregon, South Carolina, Utah, Vermont, and Washington - made adaptation planning a recommendation in their final Climate Action Plan. Three states with plans in progress, Massachusetts, Michigan, and New Hampshire, are indicating that measures for addressing both mitigation and adaptation will be included in the scope of their Climate Action Plans, similar to Maryland's final plan which actually includes both [*Table 2 – State Climate Action Plans*].

In the late 1990s, the United States Environmental Protection Agency (EPA) offered funding to states to create plans that evaluated strategies to reduce the effects of global climate change. These were the last plans created by Alabama, Kentucky, and Tennessee, and are no longer in use by these states. Seven states - California, Iowa, Hawaii, Massachusetts, New Hampshire, and Virginia - are in the process of creating a new plan to supersede or supplement their previous plan. Ten others - Colorado, Illinois, Maryland, Minnesota, Montana, North Carolina, Utah, Vermont and Washington - recently completed plans that superseded an older one. To date, 12 states have not created a climate change commission or advisory group and do not have a climate action plan completed or in progress; these states include: Georgia, Indiana, Louisiana, Mississippi, North Dakota, Nebraska, Ohio, Oklahoma, South Dakota, Texas, West Virginia, and Wyoming.

Table 2: State Climate Action Plans is a list of all states with a state agency or advisory group that has completed or is tasked with setting GHG reduction targets and a plan to accomplish those targets within a state. Where there is any mention of adaptation within these plans, such as Arizona and North Carolina that call for an Adaptation Plan to be created, notes are provided.

Table 2: State Climate Action Plans (CAP)

State	Climate Action Plans and Mention of Adaptation	CAP? /Date	Resp. Org / Agency	CAP Link
AK	<p>In September 2007, Governor Palin signed Administrative Order 238 creating the Climate Change Sub-Cabinet, with the goal of an Alaska Climate Change Strategy addressing both mitigation and adaptation in 2008.</p> <p>Two Advisory Groups were formed, one for Adaptation (<i>See Table 1- State Adaptation Planning Efforts</i>) and one for Mitigation, both of which are supported by Technical Working Groups organized by sector.</p>	In progress due 2008	Climate Change Sub-Cabinet	http://www.climatechange.alaska.gov/
AL	<p>Policy Planning to Reduce Greenhouse Gas Emissions in Alabama. This plan is only available via the EPA and is not actionable by the state of AL. There is no mention of adaptation in the plan.</p>	1997	University of Alabama for the State of Alabama	http://www.epa.gov/climatechange/wycd/stateandlocalgov/downloads/Alabama_action_plan.pdf
AR	<p>Governor's Commission on Global Warming (2007) was tasked under Act 696 with setting a global warming pollution reduction goal and a strategic plan to implement the goal. The Act also indicates the Commission shall evaluate "potential impacts of global warming on the state, its citizens, its natural resources, and its economy, including without limitation, agriculture, travel and tourism, recreation, insurance, and economic growth and development." A cost benefit analysis of addressing effects of these impacts, including immediate action versus delayed action shall be included.</p> <p>The Arkansas Governor's Commission on Global Warming Final Report was released October 2008. Cross-Cutting Issue 9 – Adaptation and Vulnerability calls for a state adaptation plan.</p>	2008	Governor's Commission on Global Warming (2007)	http://www.arclimatechange.us/

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AZ	An appendix to the state's Climate Change Action Plan (CC-5) recommends 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)."	2006	Climate Change Action Group (2005)	http://www.azclimatechange.gov/index.html
CA	The Global Warming Solutions Act of 2006 (AB 32) requires ARB to prepare a Scoping Plan to achieve reductions in greenhouse gas (GHG) emissions in California. The initial draft was completed in June 2008 and is under review by the Board. An Adaptation Strategy is currently underway in parallel to mitigation planning. <i>See Table 1 – State Adaptation Planning Efforts.</i>	New Plan In Progress – Due Dec 2008	California Air Resources Board (ARB)	Scoping Plan: http://www.arb.ca.gov/cc/scopingplan/document/draftscopingplan.htm CA EPA CAT Report: http://www.climatechange.ca.gov/climate_action_team/reports/2007-04-20_CAT_REPORT.PDF
CO	Colorado Climate Project - 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).	2007	Rocky Mountain Climate Organization, Climate Action Panel (2007)	http://www.coloradoclimate.org/
CT	Connecticut Climate Action Plan – There is no mention of adaptation.	2005	Governor's Steering Committee on Climate Change	http://www.ctclimatechange.com/StateActionPlan.html

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DE	Delaware Climate Change Action Plan (DCCAP) – There is no mention of adaptation	2000	Delaware Climate Change Consortium	http://ceep.udel.edu/publications/globalenvironments/reports/dccap/fullreport.pdf
FL	Executive Order 07-128 signed in July 2007, created the Action Team on Energy and Climate Change. The team is tasked to create a climate action plan in 2 phases, with GHG emission reduction recommendations supporting Exec Order 07-127 the priority for Phase 1, and adaptation, carbon sequestration, and others in Phase 2. <i>(See Table 1: State Adaptation Planning Efforts)</i> Phase 2 – Florida’s Energy and Climate Change Action Plan was complete Oct 2008. Chapter 8 provides a “framework” for adaptation and goals. <i>See Table 1 - State Adaptation Planning Efforts.</i>	2007 (mitigation) 2008 (adaptation)	Action Team on Energy and Climate Change	http://www.dep.state.fl.us/climatechange/actionplan_08.htm
HI	Global Warming Solutions Act (HB 226) signed in June 2007 established a 10-member Greenhouse Gas Emissions Reduction Task Force to draft “practical, technically feasible and cost-effective” ways to achieve reductions targets at or below 1990 levels by 2020. Adaptation is not part of the scope of the Task Force.	In progress due December 2009	Greenhouse Gas Reduction Task Force	http://hawaii.gov/dbedt/info/energy/greenhouse/
IA	SF 485 signed 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.	In progress due December 2008	Iowa Climate Change Advisory Council (2007)	Interim Report: http://www.iacclimatechange.us/
ID	Governor Otter's Executive Order in May 2007 calls for the DEQ to create a GHG emissions inventory and a plan to reduce GHG emissions. The DEQ is phasing the plan with a focus on state agencies in 2008 and the statewide reduction plan targeted for completion in 2009. A statewide inventory and projection report was completed (2008).	In progress 2008: State agency plan 2009: Statewide plan	Dept. of Environmental Quality	http://www.deq.idaho.gov/air/pr og_issues/climate_change/ghg_s tate_government.cfm

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IL	The scope of the CCAG is to "create a plan to reduce statewide greenhouse gas emissions." Recommendations were completed in 2007, however they are not as detailed as other states' climate action plans. Adaptation was not in scope.	Recommendations complete 2007	Illinois Climate Change Advisory Group (2006)	http://www.epa.state.il.us/air/climatechange/index.html
KS	On March 21, 2008, Governor Kathleen Sebelius signed Executive Order 08-03, which establishes the Kansas Energy and Environmental Policy Advisory Group to recommend steps the state can take to reduce its greenhouse gas emissions. The group is to examine the actions of federal and regional entities regarding climate change mitigation and adaptation. Although adaptation is not in the required scope, the Cross-Cutting Working Group has added the need for comprehensive adaptation planning to its proposed list of policy recommendations [Note: this is an early draft].	In Progress Prelim report due by end of 2008. Final Report due by end of 2009.	Kansas Energy and Environmental Policy Advisory Group (2008)	http://www.ksclimatechange.us/
KY	Climate Change Mitigation Strategies – This plan is only available via the EPA and is not actionable by the state of KY.	1998	The Kentucky Natural Resources and Environmental Protection Cabinet – Division of Energy	http://www.epa.gov/climatechange/wycd/stateandlocalgov/downloads/ky_2_fin.pdf
MA	The 2004 Massachusetts Climate Protection Plan contained minor language on adaptation. This plan is no longer on the state website. However, on August 7, 2008, Massachusetts Governor Deval Patrick signed the Global Warming Solutions Act, requiring GHG reduction regulations by January 1, 2009 and an "implementing plan." The Act also calls for the secretary to "convene an advisory committee to analyze strategies for adapting to the predicted impacts of climate change." <i>See Table 1 - State Adaptation Planning Efforts</i>	2004 New Plan In-Progress - Due January 1, 2009	Massachusetts Department of Environmental Protection	http://masstech.org/renewableenergy/public_policy/climatechange/links.htm 2008 Act: http://www.mass.gov/legis/laws/seslaw08/sl080298.htm DEP: http://www.mass.gov/dep/air/climate/index.htm

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MD	On April 20, 2007, Governor Martin O’Malley signed an Executive Order establishing the Maryland Commission on Climate Change. The Commission is comprised of 3 working groups: Scientific and Technical, Greenhouse Gas and Carbon Mitigation, and Adaptation and Response. The Commission’s Climate Action Plan incorporates recommendations from the Interim Report including adaptation early action items, such as recommendations for Shoreline Management, Freeboard Standards, a state response mechanism for Sea-Level Rise, and a Forest Carbon Sequestration Pilot Program. <i>See Table 1 – State Adaptation Planning Efforts.</i>	2008	Maryland Commission on Climate Change (MCCC) (2007)	http://www.mdclimatechange.us /
ME	2004 Maine Climate Action Plan – There is no mention of adaptation.	2004	Maine Dept of Environmental Protection	http://www.maine.gov/dep/air/greenhouse/
MI	Established in November of 2007 (2007-42), the Michigan Climate Action Council completed an interim report with a list of policy recommendations on reducing greenhouse gas emissions to meet short-, mid-and long term goals or targets by April 30, 2008. By December 31, 2008, the Council is scheduled to issue a comprehensive Climate Change Plan for Michigan, to include mitigation measures as well as “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.”. There are 6 Technical Working Groups (TWG) in progress; however Adaptation and Vulnerability is currently only listed as a “policy option” under the “Cross Cutting” TWG.	Interim Report Complete April 30, 2008 Final Report – In Progress - Due December 31, 2008	Michigan Climate Action Council (2007)	DEQ: http://www.miclimatechange.us/index.cfm Interim Report: http://www.miclimatechange.us/ewebeditpro/items/O46F17159.pdf

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MN	In 2007, Governor Tim Pawlenty signed the Next Generation Energy Act into law; calling for a Climate Mitigation Action Plan. The Minnesota Climate Change Advisory Group Final Report was completed in April 2008 and is open for public review and comment. Adaptation is not included in the plan.	2008	Minnesota Climate Change Advisory Group (MCCAG).	http://www.mnclimatechange.us/index.cfm
MO	Missouri Action Options for Reducing GHG Emissions – This plan is not as comprehensive as most climate action plans and does not appear to be actionable by the state, although it is available as a “Climate Fact Sheet” under the state DNR site. Adaptation is not mentioned in this plan.	2002	Missouri Department of Natural Resources	http://www.dnr.mo.gov/pubs/pub1447.pdf
MT	The Climate Change Advisory Committee’s (CCAC) Final Report was made available November 2007. Adaptation was dropped as a cross cutting issue from the final analysis.	2007	Climate Change Advisory Committee, under the MT Dept of Environmental Quality (2006)	DEQ: http://deq.mt.gov/climatechange/ / CCAC: http://www.mtclimatechange.us/
NC	The state’s Climate Action Plan includes Cross-Cutting Issues 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 Adaptation Issues Matrix under CC5. This 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. http://www.ncclimatechange.us/ewebeditpro/items/O120F10922.pdf	2007	Climate Action Plan Advisory Group (2005) under the Division of Air Quality	DAQ-DENR: http://www.ncair.org/monitor/eminv/gcc/ CAPAG: http://www.ncclimatechange.us/

State	Climate Action Plans and Mention of Adaptation	CAP? /Date	Resp. Org / Agency	CAP Link
NH	In December 2007, Governor Lynch issued Executive Order 2007-3, which established a Climate Change Policy Task Force and charged the task force with developing a Climate Change Action Plan . There are 6 working groups – 4 for mitigation, 1 for adaptation and 1 for Government Leadership and Action. A draft of the Adaptation Plan is available. <i>See Table 1 – State Adaptation Planning Efforts.</i>	2001 New Plan In Progress – Due Dec 2008	NH Dept. of Environmental Services	2008: http://www.des.state.nh.us/ard/climatechange/ActionPlan/index.html
NM	New Mexico Climate Change Advisory Group Report. Adaptation was not in scope for this plan.	2006	New Mexico Climate Change Advisory Group (NMCCAG)	http://www.nmclimatechange.us/
NJ	The New Jersey Climate Action Project began in 2007 to develop recommendations for the state to reduce its GHG emissions. However the project appears to have halted. The websites for the New Jersey Department of Environmental Planning and for CCS no longer mention the project. A draft Energy Master Plan that addresses only electricity and heating fuel is available, with a transportation plan to follow. A prior NJ Climate Change Action Plan was created; however, it is no longer available on the state website.	Unknown	NJ Dept. of Environmental Protection	http://www.state.nj.us/globalwarming/public/
NV	An April 2007 Executive Order from Governor Gibbons created the Nevada Climate Change Advisory Committee and calls for the commission to identify ways the state can reduce GHG emissions. In July 2008, the committee finished their 3-part report which identifies potential impacts, highlights current accomplishments, and offers recommendations to address climate change in Nevada. One key recommendation in the report is to create a statewide Climate Action Plan “to identify emission reduction targets, implement action plans, and prepare mitigation strategies.”	Not started	2008 Report: Nevada Climate Change Advisory Committee (2007)	NCCAC: http://gov.state.nv.us/climate/

State	Climate Action Plans and Mention of Adaptation	CAP? /Date	Resp. Org / Agency	CAP Link
NY	<p>As of June 2008 a number of bills in the New York state Assembly and Senate propose a Climate Change Task Force that would develop a Climate Action Plan.</p> <p>2003 - Recommendations to Governor Pataki for Reducing NY State GHG Emissions - Reducing the cost and need for adaptation measures is mentioned in terms of the rationale to adopt mitigation policies. No actions for adaptation are mentioned in the plan.</p>	2003	GHG Taskforce (2001) - Center for Clean Air Policy	2003: http://www.ccap.org/pdf/04-2003_NYGHG_Recommendations.pdf .
OR	<p>Oregon Strategy for Greenhouse Gas Reduction. Adaptation was outside the scope for this report, however in 2006, Governor Kulongoski formed the Climate Change Integration Group (CCIG) in large part, to address adaptation. <i>See Table 1 - State Adaptation Planning Efforts.</i></p> <p>CCIG was chartered to continue and expand on the work of the 2004 Climate Action Plan, by developing a climate change strategy “that provides long-term sustainability for the environment, protect public health, consider social equity, create economic opportunity, and expand public awareness.” This new report, “A Framework for Addressing Rapid Climate Change,” was completed in January 2008, is organized around 3 themes: adaptation, mitigation, and education and outreach.</p>	2004 Supplemental Report 2008	The Governor’s Advisory Group on Global Warming Climate Change Integration Group (2006)	http://www.oregon.gov/ENERGY/GBLWRM/CCIG.shtml
PA	<p>In July of 2008, SB 266 Pennsylvania Climate Change Act passed; requiring an annual GHG emission inventory, creating a voluntary registry, and charging DEP with creating a climate action plan to reduce GHG emissions by July 2009 and every 3 years thereafter.</p>	In progress – Due July 2009	Department of Environmental Protection	DEP: http://www.depweb.state.pa.us/dep/site/default.asp

State	Climate Action Plans and Mention of Adaptation	CAP? /Date	Resp. Org / Agency	CAP Link
RI	Rhode Island Greenhouse Gas Action Plan - The Action Plan outlines programs and policies the state could undertake to meet its commitment under the New England Governors' and Eastern Canadian Provincial Premiers' (NEG/ECPP) Climate Change Action Plan, August. This plan is still actionable by the state. Adaptation is not addressed.	2002	Dept. of Environmental Management (DEM), the RI State Energy Office (SEO), and the Governor's office.	http://www.dem.ri.gov/programs/bpoladm/stratpp/greenhos.htm
SC	Climate, Energy and Commerce Action Plan –Established in February 2007 by Governor Sanford (EO 2007-04), CECAC recently completed their Final Report, which contains a policy recommendation for Adaptation and Vulnerability (CC-5). This recommendation calls for the creation of a “Blue Ribbon Commission to develop a state Climate Change Adaptation Plan within one year of establishing the commission, to identify and address potential climate change impacts on South Carolina’s citizens, public health, and natural and wildlife resources.”	2008	South Carolina Climate, Energy & Commerce Advisory Committee (CECAC)	http://www.scclimatechange.us/plenarygroup.cfm
TN	TN Greenhouse Gas Emissions Mitigation Strategies provides recommendations for reducing GHG emissions, though it does not appear to be a plan under which the state is operating. Adaptation is not addressed.	1999	TN Dept. of Economic and Community Development, Energy Division	http://www.state.tn.us/ecd/energy_init.htm
UT	The governor’s Blue Ribbon Advisory Council Report does mention 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.	2007	UT Blue Ribbon Advisory Council (BRAC) on Climate Change	http://www.deq.utah.gov/BRAC_Climate/index.htm
VA	In December 2007 Governor Kaine issued Exec Order 59 establishing the Commission on Climate Change to leverage prior work completed under the Virginia Energy Plan (2007), in creating a comprehensive Climate Change Action Plan for the state. The Commission is tasked (in part) to “identify what Virginia needs to do to prepare for the likely consequences of climate change.”	In Progress – Due December 2008	Virginia Department of Environmental Quality	http://www.deq.virginia.gov/info/climatechange.html

State	Climate Action Plans and Mention of Adaptation	CAP? /Date	Resp. Org / Agency	CAP Link
VT	The Governor's Commission on Climate Change Report addresses adaptation in Appendix I- Cross Cutting Issues CC-5. The commission recommends the government partner with VT academic institutions for research and policy recommendations. As well, the commission recommends the immediate formation of a Commission on Adaptation to Climate Change to create a Climate Change Adaptation Plan. The plan recognizes the potential need to integrate with the state's Emergency Response Plan and associated stakeholders.	2007	Governor's Commission on Climate Change (GCCC); Dept of Environmental Conservation	http://www.anr.state.vt.us/air/Planning/htm/ClimateChange.htm
WA	Washington's Climate Change Challenge Climate Action Team completed their report: " Leading the Way: A Comprehensive Approach to Reducing Greenhouse Gases in Washington State. " Adaptation is mentioned in this climate action plan, however it is being addressed separately by the Preparation and Adaptation Working Groups (PAWGs). <i>See Table 1- State Adaptation Planning Efforts.</i>	2008	WA Department of Ecology and Department of Community, Trade and Economic Development	http://www.ecy.wa.gov/climatechange/cat_overview.htm
WI	The Governor created a Task Force in April 2007 (EO 191) to create a climate action plan by year end. The final report is complete and undergoing review by the Governor. The plan recommends funding adaptation programs with revenues from allowance auctions.	Interim Report Complete / 2008	WI Governor's Task Force on Global Warming (2007) / Department of Natural Resources	http://dnr.wi.gov/environmentprotect/gtfgw/

Local Adaptation Planning

Cities and Counties 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 both adaptation planning, as well as to support solution development and implementation.

One local leader for adaptation planning 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,² 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 lays out detailed goals and actions for six “Strategic Focus Areas” for future adaptation efforts. A sample of these measures is provided in Table 3. In February 2008, the county released a progress report on the 2007 Climate Plan, with details about the accomplishments made in 2007 and the goals set for 2008.³

Table 3: King County’s Adaptation Strategic Focus Areas³

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.

² Climate Impacts Group (CIG) is a research group 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. They work with regional planners, natural resource managers and decision makers to inform climate science and public policy.

³ The 2007 King County Climate Plan and 2008 King County Climate Report are available at: <http://www.kingcounty.gov/exec/globalwarming/>

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.
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.

Others Getting on Board

Hundreds of cities have created Climate Action Plans, with more completing their plans each year. Like states, these plans 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 two cities, Seattle and New York City, 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: critical infrastructure, specific communities at high risk from climate change, and an overall adaptation planning process.⁴ Table 4 outlines these three adaptation initiatives.

⁴ PLANYC is available at: http://www.nyc.gov/html/planyc2030/downloads/pdf/report_climate_change.pdf

Table 4: 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 a new Climate Change Adaptation Task Force, as well as a Technical Advisory Committee, the New York City Panel on Climate Change. 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.⁵ The Panel on Climate Change is tasked in part with developing city-specific climate change projections, tools to help the Task Force identify the at-risk assets for inclusion in the plan, and drafting new protection levels for any new infrastructure designs. The city is maintaining its status on each of the three adaptation initiatives on their PLANYC site.⁶

Seattle, WA – Like New York City, the City of Seattle also recognized the need to go further in addressing climate change impacts. Seattle's 2006 Climate Action Plan⁷ calls for an inter-departmental team to prioritize climate change related issues and to make

⁵ 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

⁶ planYC Climate Change website: <http://www.nyc.gov/html/planyc2030/html/plan/climate.shtml>.

⁷ Seattle's 2006 Climate Action Plan is available at http://www.4cleanair.org/Documents/SeaCAP_plan.pdf.

recommendations on adaptive measures and timing. Areas the plan specifies for evaluation include the following:

- Sea-level rise
- Storm water management
- Urban forestry
- Building codes
- Heat waves

This summer, 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 climate changes including temperature increase, sea level rise, and precipitation changes. The departments are tasked with creating this assessment against public assets, programs, and services; identifying strategies to cope and reduce vulnerabilities. Although the city does not plan to publish a formal adaptation plan, the annual progress report will document their progress. As well, key city plans such as the Shoreline Master Plan, will be modified with new projected impacts and policies based on this analysis phase.⁸

Non-Governmental Organizations are Gaining Momentum

Over the last two 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:

- King County, WA
- Los Angeles, CA

⁸ Personal conversation, Jill Simmons, Office of Sustainability and Environment, City of Seattle, WA, September 2, 2008.

- Miami-Dade County, FL
- Milwaukee, WI
- Nassau County, 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 their partner sites as a model for legislation and overall adaptation programs that other communities can use to enhance their own resiliency.⁹

ICLEI-US: Climate Resilient Communities (CRC) Program

<http://www.iclei.org/index.php?id=6687>

The CRC program launched in late 2005 to help local governments prepare for the impacts of climate change. This program is intended to provide local governments with the ability to:

- “develop their capacity to identify and reduce vulnerabilities, and thus improve their resilience;
- learn to use tools and develop strategies that reduce hazards and manage risks related to regulations, planning, urban design, and investments;
- determine how to integrate climate preparedness strategies into existing hazard mitigation plans;
- reduce costs associated with disaster relief; and
- prioritize vulnerabilities such as infrastructure, zoning, and water capacity.”¹⁰

ICLEI helped develop a guidebook for state and local governments to approach adaptation as a part of this program. *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments* is co-authored by the University of Washington’s Climate Impacts Group and King County, Washington, based on ICLEI’s methodology.¹¹ Over the last three years, five U.S. cities have put the ICLEI program or methodology to the test. Keene, NH is the first of the pilot cities to complete an adaptation plan (step 3 in ICLEI’s 5-milestone process, where implementation and monitoring are the final steps). Table 5 provides a list of the ICLEI pilot cities and the status of their adaptation planning.

⁹ Center for Clean Air Policy, Urban Leaders Adaptation Initiative information is available at: <http://www.ccap.org/index.php?component=issues&id=5>

¹⁰ ICLEI Governments for Sustainability, Climate Resilient Communities Program information available at <https://www.iclei.org/index.php?id=6687>

¹¹ *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments* is available at <http://cses.washington.edu/cig/fpt/guidebook.shtml>

Table 5: ICLEI Climate Resilient Communities Pilot Cities

City, State	Status of Climate Action Plan (to include adaptation measures)	Link to Plan
Homer, AK	The city completed its Climate Action Plan for GHG mitigation in December 2007, including some high-level adaptation recommendations in areas of economic resiliency, infrastructure, emergency preparedness and new development.	http://www.ci.homer.ak.us/CLPL.pdf
Ft Collins, CO	The 2007 Fort Collins Climate Task Force was charged with updating the <i>“Fort Collins Local Action Plan to Reduce Greenhouse Gas Emissions,”</i> and to make recommendations on how the city should develop a future direction for climate protection after 2010. Although the recommendations are complete (June 2008) and under review, adaptation measures did not end up in the scope of the final report.	http://fcgov.com/climateprotection/ctf.php
Miami-Dade, FL	The Miami-Dade Climate Change Advisory Task Force (CCATF), comprised of 6 committees tasked with recommending both mitigation and adaptation measures, completed their initial set of recommendations (April 2008). Adaptation recommendations are included for: Built Environment; Natural Systems; and Economic, Social and Health.	http://www.miamidade.gov/derm/climate_change.asp
Keene, New NH	In November 2007, the city completed the report: <i>Adapting to Climate Change: Planning a Climate Resilient Community</i> . The city’s plan details adaptation goals for three primary sectors: <u>Built Environment</u> - Building and Development, Transportation Infrastructure, Stormwater Systems, Energy Systems <u>Natural Environment</u> - Wetlands and Sub-surface Waters, Fauna and Flora, Agriculture <u>Social Environment</u> - Economy, Public Health, Emergency Services	http://www.ci.keene.nh.us/planning/Keene_Report_Combined_FINAL.pdf

Based on the planning and implementation efforts of these cities and counties, ICLEI hopes to compile adaptation protocols that can be shared with other cities across the country. ICLEI indicates they have also worked closely with Denver, CO and King County (Seattle), WA, in addition to Anchorage, AK on adaptation activities to date, and therefore may be a good resource for impact-specific adaptation recommendations and other resources.

RMIT Global Cities Institute: Global Climate Change Adaptation Program

<http://gc.nautilus.org/gci>

Similar to CCAP, the Global Cities Institute adaptation program strives to create an urban infrastructure adaptation framework by helping pilot cities with their vulnerability assessments and associated adaptive responses, and leveraging this experience with urban cities around the world. Although the initial target cities are in Australia (RMIT's home-base) and Asia, research, publications and network of experts are already available and useful for planning. Additionally, the program's international partners include organizations such as ICLEI (discussed above), and the Tyndall Centre for Climate Change Research (Cities and Coasts programs),¹² as well as cities including San Francisco, CA, Seattle, WA, and Vancouver, BC.

World Bank

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

In collaboration with the Global Facility for Disaster Reduction and Recovery and International Strategy for Disaster Reduction (ISDR), the World Bank has completed a report focused on helping cities reduce their vulnerabilities to climate change impacts, with a parallel focus on strengthening their disaster risk management capacity. Although this World Bank report, or "Primer,"¹³ is geared toward East Asian cities, its self assessment tools and methodology are applicable to any urban city looking to develop an adaptation plan. Additionally, their "Profile" section lists cities that have implemented good adaptation practices with a focus on urban centers of all sizes, including these U.S. cities:

- Albuquerque, NM
- King County / Seattle, WA
- Rockville, MD
- New York City, NY

¹² Tyndall Centre for Climate Change Research is based in the UK and has a dedicated Adaptation Program, as well, their Cities and Coasts programs each address adaptation. <http://www.tyndall.ac.uk/>

¹³ World Bank, (2008) "Climate Resilient Cities: A Primer on Reducing Vulnerabilities to Climate Change Impacts and Strengthening Disaster Risk Management in East Asian Cities," is available at: http://siteresources.worldbank.org/EASTASIAPACIFICEXT/Resources/climatecities_fullreport.pdf.

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 are likely operating outside the scope of the state's climate change commission. 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.

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.¹⁴ In most cases these plans are not aimed at addressing, nor even 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.

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 demineralization¹⁵

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

¹⁴ National Drought Mitigation Center, State Drought Plans, <http://drought.unl.edu/plan/stateplans.htm>

¹⁵ Florida Drought Action Plan, http://www.dep.state.fl.us/drought/news/2007/files/florida_drought_action_plan.pdf

change projections for snowpack, precipitation, and temperature changes into the Drought Plan.¹⁶

Sea-Level Rise – Sea-level rise is a relatively slow, but a consistent reality which is heightened during times of extreme precipitation and storm surges. Maps of locations around the world are now available online, showing the results of different sea-level rise scenarios (e.g. 1 meter rise) based on available scientific models.¹⁷ Countries, states and cities are responding by creating their own maps and scenarios using sea-level rise projections for their particular location. Additionally, action on a local level has 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 villages. Table 6 provides some examples of adaptation planning in the United States specifically for sea-level rise that is 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.

Table 6: U.S State and Local Sea-Level Rise Planning Initiatives

Location	Planning Initiatives
California – Sacramento / San Joaquin Delta	Delta Vision Blue Ribbon Task Force is responsible for proposing solutions to Delta threats such as sea level rise, flooding, and saltwater intrusion. A report to the Governor with recommendations to address sea-level rise is due October 2008. Initial recommendations from the Task Force indicate they are recommending the Delta plan for a rise of 55 inches in all future projects. http://www.deltavision.ca.gov/AboutDeltaVision.shtml
California – San Francisco Bay	The San Francisco Bay Conservation and Development Commission (BCDC) recently 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. http://www.bcdc.gov/planning/climate_change/strategy_SF_bay_region.shtml .
Delaware	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. ¹⁸

¹⁶ New Mexico Drought Task Force, (2006), New Mexico Drought Plan, <http://www.ose.state.nm.us/DroughtTaskForce/2006-NM-Drought-Plan.pdf>

¹⁷ Google Maps, Sea level Rise, <http://maps.google.com/ig/directory?synd=mpl&cat=featured>

¹⁸ 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>.

Maine	<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. 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>
North Carolina	<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. http://www.cop.noaa.gov/stressors/climatechange/current/slr/welcome.html</p>
New York	<p>In 2007, the New York State Legislature created the Sea Level Risk Task Force (Chapter 613) 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. 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. http://www.crmc.ri.gov/regulations/proposedregs/2008-03-04_RICRMP_Section_145.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. http://www.dem.ri.gov/bayteam/documents/slpfinal.pdf</p>

Other Impacts - There is not currently a comprehensive list of adaptation planning efforts for major impacts by U.S. state or city. *Table 7 - State and Local Adaptation Planning for Specific Impacts* provides a few examples of some state and city adaptation measures to address other specific local impacts.

Table 7: State and Local Adaptation Planning for Specific Impacts

Location / Agency	Impact	Adaptation Measure
California Dept. Of Water Resources	Drought; Water Supply and Quality Issues including salination of Groundwater, Seawater and Estuaries	In addition to conservation and re-cycling programs, the state formed a De-Salination Task Force whose recommendations were published in 2004, passed subsequent legislation to support constructing and

		testing a desalination facility, and recently completed a “Handbook” to address proper planning, siting, uses, and environmental impacts of desalination. ¹⁹
Maine	Forest fires	Understanding the impacts to Maine’s forests and key factors for adaptation. ²⁰ Sharing adaptation recommendations such as: inventory planning, preemptive salvage cutting, thinning, selective harvesting, uneven aged management. ²¹
Boston, MA Massachusetts Water Resource Authority (MWRA)	Sea-Level Rise; Sewage Treatment Plant	Built the Deer Island sewage treatment plant on higher ground than originally planned to accommodate sea level rise projections. ²²
North Carolina State Climate Office	Agriculture	Developing Decision Support Tools for the agriculture community for crop management; using weather monitoring and modeling to protect crops. ²³
Portland, OR Portland Water Bureau	Drought; Water Supply shortage	Incorporating climate change, in addition to population growth, in demand models to create options for groundwater and dam management. ²⁴

¹⁹ California Dept. of Water Resources, Water Desalination Task Force, available at: <http://www.owue.water.ca.gov/recycle/desal/desal.cfm>

²⁰ Climate Change Institute, Maine’s Forests, available at: <http://www.climatechange.umaine.edu/Research/MaineClimate/Forests.html>

²¹ Davies, K., Precautionary Planning for the Effects of Climate Change on Forests in the Northeast, available at: <http://www.forestmeister.com/global-online-essays/Davies4.html>

²² Klein, R., et al, Technology to Understand and Manage Climate Risks, August 2005, p18, available at <http://ttclear.unfccc.int/ttclear/pdf/Workshops/tobago/BackgroundPaper.pdf>

²³ State Climate Office of North Carolina, “Decision Support Tools for Crop Management,” *North Carolina Climate*, Fall 2005, available at: <http://www.nc-climate.ncsu.edu/office/newsletters/2005Fall/#crop>

²⁴ Palmer, R., Hahn, M., The Impacts of Climate Change on Portland’s Water Supply, An Investigation of Potential Hydrologic and Management Impacts on the Bull Run System, Jan 2002, available at: <http://www.tag.washington.edu/papers/papers/PortlandClimateReportFinal.pdf>

Summary

Impacts of climate change are already being felt around the world. Although there is a decadal time lag between GHG emissions and the time that the impacts from those emissions will be felt, 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 simply focused efforts 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 months and years, particularly in the United States as policy and funding develops at federal, state and local levels to support adaptation efforts.