



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 show further global temperature increases from 2.5°F to 10.4°F by 2100, while warming in the United States is expected to be even higher. This warming will have significant consequences for the United States, causing sea-level rise 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 appearing. Several U.S. legislative committees are analyzing proposed federal greenhouse gas (GHG) emission reduction policies, and dozens of states are taking action to reduce GHG emissions. While these actions are vital to reducing the impacts of climate change, we have already committed to warming that will have ramifications for public health, the economy, and the environment.

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 span entire communities and regions. As such, adaptation is dependent on numerous stakeholders from federal, state and local government, science and academia, the private sector, and community residents to develop solutions to complex problems for which prior solutions may not exist. Adaptation will require creativity, compromise, and collaboration across agencies, sectors and traditional geographic boundaries.

This paper focuses on adaptation plans and actions in progress by state and local governments. Many of these efforts are in their earliest stages. Some states are including adaptation planning within the scope of their state Climate Action Plans to address 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 impact to climate change. Regardless of the basis for the adaptive response, states have much they can learn from each other, and from localities where adaptation is already occurring. While comprehensive and proactive adaptation planning is still in the early stages, as states complete their GHG mitigation plans, adaptation planning is gaining greater attention and resources from states and localities.

State Level Adaptation Planning

At present, states have focused on GHG mitigation plans to avoid or reduce climate change, and have not yet focused on adaptation planning. For many states, the impacts of climate change do not yet seem as imminent or as threatening as in Alaska, or Bangladesh, while others may not attribute these impacts to climate change. A few exceptions are Arizona, California, Maryland, North Carolina, Oregon, and Washington, all of which have adaptation plans in progress [*Table 1 – State Adaptation Plans*]. These plans will help to define federal and state roles in climate impact response, where decisive and coordinated planning, funding and action are needed to reduce economic and human impacts.

State Climate Action Plans

The number of mainland states both with climate change commissions and with mitigation plans complete or in-progress has grown rapidly in the last two years (*Figure 1 – States with Climate Action Plans*). Thirty-five (35) states have created, or are in the process of creating, climate action plans; with fourteen new plans (14) due later in 2007 or 2008. These plans typically explain the impacts to the state as a result of climate change, provide state GHG emission inventory data, and make GHG emission reduction recommendations to avoid or reduce these impacts by sector. General emphasis is placed on the economic and environmental value to reducing GHG emissions, with little or no recommendations for adaptation. However, Arizona, Maryland and North Carolina have included adaptation within the scope of their climate action plans [*Table 2 – State Climate Action Plans*].

In the late 1990s, the EPA offered funding to states to create plans which evaluated strategies to reduce the effects of global climate change. Our research (shown in Table 2) indicates that these were the last plans created by many states such as Alabama, Hawaii, Kentucky, and Missouri. Eight states are now in the process of revising their plans to supersede or supplement a previous plan: Colorado, Iowa, Illinois, Maryland, Minnesota, New Jersey, Utah and Vermont; while Montana and North Carolina just completed their revised plans. The Center for Climate Strategies (CCS) is currently involved with numerous states to create GHG mitigation plans, which they also refer to as Climate Action Plans. These are primarily mitigation plans, structured and defined specifically to reduce GHG emissions based on evaluations of reduction opportunities in sectors with high GHG emissions. These plans generally do not indicate what is being implemented at the state level to adapt to climate change. Fifteen (15) states have not created a climate change commission / advisory group or a climate action plan: Georgia, Indiana, Kansas, Louisiana, Michigan, Mississippi, North Dakota, Nebraska, Ohio, Oklahoma, South Dakota, Texas, Virginia, West Virginia, and Wyoming.

Figure 1 – States with Climate Action Plans (GHG Mitigation Plans)

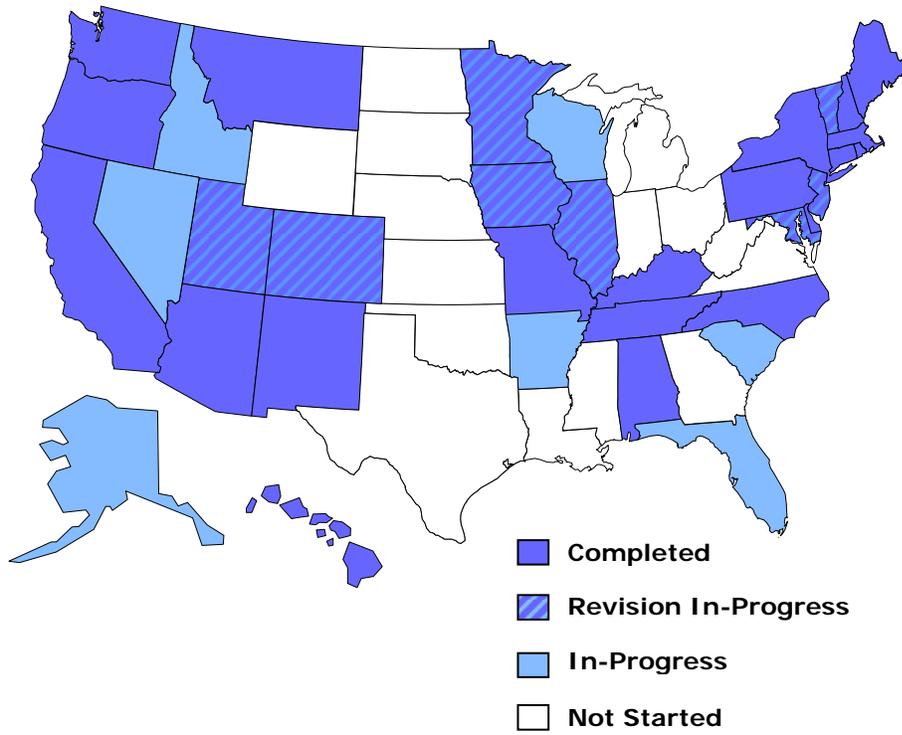


Table 1: State Adaptation Plans is a list of states that have or are creating Adaptation Plans

Table 1: State Adaptation Plans

State	Adaptation Planning or Measures	Responsible Organization
Alaska	The legislative commission is currently tackling adaptation issues, specifically associated with the protection or relocation of villages in the state at risk from coastal erosion and wave surges or flooding. A rural relocation report is due by the end of 2007.	Climate Impact Assessment Commission (2006)- http://www.dec.state.ak.us/air/cc.htm
Communities	Early assessment and development of an action plan addressing climate change impacts on coastal and other vulnerable communities in Alaska. Effective means of informing, and generating a dialogue with, the public regarding climate change in Alaska.	
Infrastructure	Policies and measures to reduce the likelihood or magnitude of damage to infrastructure in Alaska from the effects of climate change.	
Fish, Wildlife, Forests, Agriculture	Policies and measures addressing anticipated changes to the marine environment, the quantity, quality and location of fish and game in Alaska, and the productivity of forests and agricultural lands in Alaska due to climate change.	
Disease & Pests	Evaluation and response to the risks of new, or an increase in the frequency or severity of, disease and pests.	
Financing	Identification of federal and state mechanisms for financing climate change activities in Alaska, including research and adaptation projects.	

State	Adaptation Planning or Measures	Responsible Organization
Arizona	A Climate Change Adaptation Strategy is called for in their Climate Action Plan. An appendix to the Climate 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)."	Governor's Office
California (1)	Climate Change Impacts and Adaptation in California, 2005 http://www.energy.ca.gov/2005publications/CEC-500-2005-103/CEC-500-2005-103-SD.PDF is a precursor to the in-depth impact and adaptation studies that have ensued, particularly around climate projections, development of higher resolution modeling, and forecasting by the Energy Commission's Public Interest Energy Research (PIER) program.	California Energy Commission
California (2)	On-going impact and adaptation studies are available at: http://www.climatechange.ca.gov/research/impact.html These studies are organized into 3 primary sectors: Agriculture & Forestry, Water Resources and Public Health. A brief description of these areas of focus are provided by PIER below.	California Climate Change Center (CCCC)
CA: Agriculture & Forestry	Research is being conducted to identify vulnerable species and early signs of stress, predict their response under a range of expected climate scenarios, and determine ways that farmers and natural resource managers can best prepare for these changes.	
CA: Water Resources	Identifying and preparing for impacts to water resources is also a key objective of PIER research. A reliable water supply is critical to agriculture, electric power, industry, households, and natural systems in the state. With the additional stresses of a growing population and ongoing development, a better understanding is needed of how hydrological processes will be impacted under all of these changing conditions, which regions or sectors of the economy will be most affected, and what steps can be taken to adapt to these impending challenges.	

State	Adaptation Planning or Measures	Responsible Organization
CA: Public Health	PIER also seeks to identify potential effects on the health and welfare of Californians. The historical range of mosquito- and vector-borne diseases may shift with a changing climate. More intense extreme weather events such as heat waves, flooding, landslides and wildfires, will directly affect human health. Successful research in this area will identify the increasing risks to human health, which segments of the population are most vulnerable, and how risks to their health can be reduced.	
California (3)	"Proposed Early Actions To Mitigate Climate Change In California" contains a number of adaptation action items. Available at: (http://www.climatechange.ca.gov/climate_action_team/reports/2007-04-20_CAT_REPORT.PDF)	CAL EPA: Climate Action Team
CA: Water Resources	<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.	
CA: Agriculture	<u>Drainage Water Source Reduction, Reuse and Salt Utilization Program</u> : 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.	
CA: Forestry	<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.	
Illinois	IL's original Climate Change Action Plan (1994) http://dnr.state.il.us/orep/inrin/eq/iccp/issue4.htm Included an adaptation section to confront droughts, flooding, and infrastructure concerns, with recommendations including:	
IL: Water Resources	Identifies the need for a single authority to settle water conflict and rights disputes. Identifies the need to update water use laws to deal with issues (e.g. allocation, quality) under shortage scenarios.	
IL: Planning	Recommends a state group to research and report on adaptation measures appropriate to Illinois	

State	Adaptation Planning or Measures	Responsible Organization
IL: Funding	Funding of adaptation projects: state funding of planning, and federal funding of state-based adaptation studies.	
Maryland (1)	Adaptation and Response Working Group will recommend strategies for reducing the vulnerability of the State's coastal, natural and cultural resources and communities to the impacts of climate change. http://www.mde.state.md.us/air/mccc/	Maryland Commission on Climate Change (2007)
Maryland (2)	GHG Emission Reductions in MD, Volume 1 - Current State Government Activities (2004) - http://www.epa.gov/climatechange/wycd/stateandlocalgov/downloads/GHG%20Volume%20I%20Final.pdf	
MD: Agriculture	Soil Conservation and Water Quality Plan: Submittals of properties for easement sale are required to identify existing erosion and water quality problems; to recommend best management practices or other conservation measures necessary to address them; and to set up a schedule for implementation.	
MD: Agriculture	Conservation Reserve Enhancement Program (CREP) : is a federal-state initiative that pays farmers and landowners a sign-up bonus and annual rental payments to remove environmentally sensitive cropland from production for 10 to 15 years, and to create and retain streamside buffers or wetlands.	
MD: Agriculture	Cover Crop Program: Available to farmers on the Eastern Shore, Maryland's Cover Crop program is an important tool in efforts to control soil erosion and protect water quality from nutrients. Planted as ground cover in the fall and winter, crops such as rye, wheat, barley, triticale and oats, hold the soil in place and soak up residual fertilizer.	
MD: Forestry	Riparian Forest Buffer Initiative and Stream Re-Leaf Program: works to enhance riparian stewardship and conserve and restore riparian forest buffers. The capacity for stream bank stabilization and temperature moderation are key buffer functions that address the impacts of climate change. In the face of more severe weather and higher air temperatures, buffer functions will become increasingly important in helping mitigate the erosive effects of storm waters and maintain cooler stream temperatures.	

State	Adaptation Planning or Measures	Responsible Organization
North Carolina	Draft Climate Action Plan - Cross-Cutting Issues (CC5-Adaptation) - State Climate Change Adaptation Strategy 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	Climate Action Plan Advisory Group
NC: All	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	
Oregon	Climate Change Integration Group - The most immediate responsibility assigned to the group is to make a preliminary assessment of the how the state should prepare for adaptation to the impacts of climate change, and deliver a report to the Governor with initial recommendations by the end of the year 2007. http://www.oregon.gov/ENERGY/GBLWRM/CCIG.shtml	Climate Change Integration Group
Washington	Preparation / Adaptation Working Groups (PAWG) have been formed to develop recommendations for the Governor on how Washington can prepare and adapt to the impacts of climate change, including 5 sectors: Agriculture, Forestry Resources, Human Health, Water Resources & Quality, and Coastal Infrastructure. The working groups will identify issues and vulnerabilities, and make recommendations for adaptive strategies and areas requiring additional research. http://www.ecy.wa.gov/climatechange/cat_pawg_overview.htm	Governor’s Office - Preparation / Adaptation Working Groups (PAWG)

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, who calls for an Adaptation Plan to be created as a recommendation in their mitigation plan, 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	The commission is tasked with: "developing a comprehensive overview of the likely impacts of climate change affecting Alaska, and steps we can take to mitigate that impact. It will also consider facilities and infrastructure, identify financial implications of climate change, and help our local communities with planning activities."	In progress due 2008	Climate Impact Assessment Commission (2006)- http://www.dec.state.ak.us/air/cc.htm	tbd
AL	Policy Planning to Reduce Greenhouse Gas Emissions in Alabama. There is no mention of adaptation.	1997	University of Alabama for the State of Alabama	http://www.epa.gov/climatechange/wycd/stateandlocalgov/downloads/Alabama_action_plan.pdf
AR	Governor's Commission on Global Warming (2007) 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.	In progress due Nov 2008	Governor's Commission on Global Warming (2007)	http://www.arkleg.state.ar.us/ftp/root/bills/2007/public/HB2460.pdf
AZ	Climate Change Action Plan - The Climate Change Action Plan recommended a comprehensive set of forty-nine (49) policy options, one of which is to establish a commission to develop a State Climate Change Adaptation Strategy (CC-5).	2006	Climate Change Action Group (2005) - http://www.azclimatechange.us/	http://www.azclimatechange.us/webeditpro/items/O40F9347.pdf
CA	"Proposed Early Actions To Mitigate Climate Change In California" contains a number of adaptation action items. See Table 1, <i>State Adaptation Plans</i> .	2007	CAL EPA: Climate Action Team	http://www.climatechange.ca.gov/climate_action_team/reports/2007-04-20_CAT_REPORT.PDF

State	Climate Action Plans and Mention of Adaptation	CAP? /Date	Resp. Org / Agency	CAP Link
CO	Colorado Climate Project - The Climate Action Panel is charged to develop recommendations for actions that can be taken in Colorado to reduce the state's contribution and vulnerability to a changed climate. Those recommendations are to include: statewide greenhouse gas reduction goals, actions that can be taken that would achieve those goals, and actions that can be taken to prepare for and reduce the possible adverse impacts of climate change in Colorado. Climate Change and Colorado – A Technical Assessment (1998) , is CO's prior climate action plan. Adaptation strategies are included in the 1998 plan, particularly around agriculture and forestry.	In progress due end of 2007	Rocky Mountain Climate Organization, Climate Action Panel (2007) - http://www.coloradoclimate.org/g/ewebeditpro/items/O14F10166.pdf	http://www.coloradoclimate.org/ 1998 Plan: http://www.cdphe.state.co.us/ap/duwn/climatechange.pdf
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
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/deccap/fullreport.pdf
FL	A report by the Florida Energy Commission must include "recommended steps and a schedule for the development of a comprehensive state climate action plan ..." There is no mention of adaptation, although the commission is looking into adaptation.	In-Progress Due end of 2007	Florida Energy Commission (2006)	http://www.floridaenergycommission.gov/
HI	Hawaii Climate Change Action Plan (1998) - This first iteration did not contain specific goals. The Hawaii Energy Strategy 2000 calls for "Further work is needed to set specific goals for greenhouse gas reductions; for implementing emission reductions; and to identify future effects of climate change on Hawaii's people, environment, ecosystems, and economy in order to identify the changes to which the State must adapt."	1998	State of Hawaii: Department of Business, Economic Development & Tourism – Energy Resources and Technology Division - and the Dept. of Health	http://www.hawaii.gov/dbedt/info/energy/publications/ccap.pdf

State	Climate Action Plans and Mention of Adaptation	CAP? /Date	Resp. Org / Agency	CAP Link
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. (press release: http://www.governor.iowa.gov/news/2007/04/27_1.php) The Iowa Greenhouse Gas Action Plan (1996) is the state's prior climate action plan.	In progress due Jan 2008	Iowa Climate Change Advisory Council (2007)	1996 plan: http://atmos.cgrer.uiowa.edu/research/reports/iggap/FinalReport.pdf
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.	In-progress	Dept. of Environmental Quality	http://gov.idaho.gov/mediacenter/execorders/eo07/eo_2007_05.html
IL	The scope of the CCAG is to "create a plan to reduce statewide greenhouse gas emissions." The 1994 Climate Action Plan for IL was the prior climate action plan.	In progress due June 30 2007	Illinois Climate Change Advisory Group (2006)	http://www.epa.state.il.us/air/climatechange/index.html 1994 Plan: http://dnr.state.il.us/orep/inrin/eq/icc/toc.htm
KY	Climate Change Mitigation Strategies – There is no mention of adaptation actions	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	Massachusetts Climate Protection Plan contains minor language on adaptation (see state adaptation plans). This plan is no longer on the state website. It is unclear if this plan is still actionable under the new Governor.	2004	Massachusetts Department of Environmental Protection http://www.mass.gov/dep/air/climate/index.htm#dep	http://masstech.org/renewableenergy/public_policy/climatechange/links.htm

State	Climate Action Plans and Mention of Adaptation	CAP? /Date	Resp. Org / Agency	CAP Link
MD	<p>Current Plan of Action includes: Impact Assessment, Greenhouse Gas & Carbon Footprint Reduction Strategy & the Adaptation Strategy. See Table 1, <i>State Adaptation Plans</i>.</p> <p>Maryland produced a two-part report in 2004: GHG Emission Reductions in Maryland I - Current State Government Activities, was “for use as an evaluation tool in establishing statewide policy” and II – Voluntary Strategies is a list of “voluntary initiatives that should be considered...” Adaptation was not addressed.</p>	In progress	Maryland Commission on Climate Change (MCCC) (2007)	<p>http://www.mde.state.md.us/air/mccc/</p> <p>2004 Recommendations: http://www.epa.gov/climatechange/wycd/stateandlocalgov/downloads/GHG%20Volume%20II%20Final.pdf</p>
ME	<p>2004 Maine Climate Action Plan – There is no mention of adaptation.</p> <p>The State of Maine Climate Change Action Plan (2000) was the prior climate action plan.</p>	2004	Maine Dept of Environmental Protection	<p>2004 plan: http://www.maine.gov/dep/air/greenhouse/</p> <p>2000 Plan: http://www.maine.gov/spo/pubs/origpdf/pdf/ClimateReport.pdf</p>
MN	<p>Minnesota Climate Mitigation Action Plan is the climate action plan.</p> <p>Minnesota Climate Change Action Plan : A Framework for Climate Change Action (2003) “provides a framework for a climate action plan.” Impacts and adaptation options are discussed for Water Resources (flooding and warming impacts on humans and fish habitat), Ecosystems (warming and drought impacts on forestry, wildlife, wetlands) and Recreation (snowmobiling, skiing, icefishing)</p>	In progress due Feb 2008	Minnesota Climate Change Advisory Group (MCCAG).	<p>http://www.mnclimatechange.us/index.cfm</p> <p>2003 Report: http://www.pca.state.mn.us/publications/reports/mnclimate-action-plan.pdf</p>
MO	<p>Missouri Action Options for Reducing GHG Emissions – There is no mention of adaptation</p>	2002	Missouri Department of Natural Resources	http://www.dnr.mo.gov/pubs/pub1447.pdf

State	Climate Action Plans and Mention of Adaptation	CAP? /Date	Resp. Org / Agency	CAP Link
MT	<p>The Climate Change Advisory Committee (CCAC) is responsible for: recommending specific actions to reduce or sequester GHG emissions, and to “identify opportunities to promote energy efficient technologies and clean, renewable energy resources that will enhance economic growth.”</p> <p>The Montana Greenhouse Gas Project report (1999) is the state’s prior climate action plan.</p>	2007	Climate Change Advisory Committee, under the MT Dept of Environmental Quality (2006)	<p>http://www.mtclimatechange.us/</p> <p>1999 Plan: http://www.epa.gov/climatechange/wycd/stateandlocalgov/downloads/montana_ghg_project.pdf</p>
NC	<p>Climate Action Plan - contains a section CC5-Adaptation. See Table 1, <i>State Adaptation Plans</i>.</p> <p>The State Action Plan for Reducing Greenhouse Gas Emissions for North Carolina (2000) is a prior climate action plan. It does not address adaptation.</p>	2007	Climate Action Plan Advisory Group (2005)	<p>http://www.ncclimatechange.us/</p> <p>2000 Plan: http://www.p2pays.org/ref/05/04493.htm</p>
NH	<p>The Climate Change Challenge action plan. A paragraph dedicated to adaptation states: "...it is also prudent for local government to undertake adaptive measures to mitigate the potential impacts of climate change. Adaptive measures may include adjusting building codes, infrastructure rehabilitation (particularly in coastal areas), and measures to address potential shifts in agriculture and forestry. For example, designing and building any new infrastructure should consider potential sea level changes and increased storm severity and events.”</p>	2001	NH Dept. of Environmental Services	<p>http://www.des.state.nh.us/ard/climatechange/challenge.pdf</p>
NM	<p>New Mexico Climate Change Advisory Group report (2006). Adaptation was not in scope for this plan.</p> <p>The New Mexico Greenhouse Gas Action Plan (2002) was the prior climate action plan. It did not address adaptation.</p>	2006	New Mexico Climate Change Advisory Group (NMCCAG)	<p>http://www.nmclimatechange.us/</p> <p>2002 Plan: http://www.werc.net/outreach/greenhouse_gas.htm). Neither plan mentions adaptation.</p>
NJ	<p>The New Jersey Climate Action Project is underway to develop recommendations for the state to reduce its GHG emissions.</p> <p>A prior NJ Climate Change Action Plan was created, however, it is no longer available on the state website.</p>	In progress due Aug 2007	NJ Dept. of Environmental Protection	<p>http://www.state.nj.us/globalwarming/public/</p>

State	Climate Action Plans and Mention of Adaptation	CAP? /Date	Resp. Org / Agency	CAP Link
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. The committee was provided the Minnesota Climate Mitigation Action Plan as a guideline.	In Progress due May 2008	Nevada Climate Change Advisory Committee (2007)	http://gov.state.nv.us/climate/
NY	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 mentioned in plan.	2003	GHG Taskforce (2001) - Center for Clean Air Policy	http://www.ccap.org/pdf/04-2003_NYGHG_Recommendations.pdf .
OR	Oregon Strategy for Greenhouse Gas Reduction. Adaptation was outside the scope for this report, however the Climate Change Integration Group was formed, in part, to address adaptation. See Table 1, <i>State Adaptation Plans</i> .	2004	The Governor's Advisory Group on Global Warming	http://www.oregon.gov/ENERGY/GBLWRM/docs/GWReport-Final.pdf
PA	Climate Change Roadmap for Pennsylvania. Adaptation is not addressed.	2007	Pennsylvania Environmental Council	http://www.pecpa.org/
RI	Rhode Island Greenhouse Gas Action Plan - 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	In progress due May 2008	South Carolina Climate, Energy & Commerce Advisory Committee (CECAC)	http://www.sccimatechange.us/
TN	TN Greenhouse Gas Emissions Mitigation Strategies - Adaptation is not addressed.	1999	TN Dept. of Economic and Community Development	http://www.state.tn.us/ecd/energy_init.htm

State	Climate Action Plans and Mention of Adaptation	CAP? /Date	Resp. Org / Agency	CAP Link
UT	The Climate Change Work Group reports to the BRAC and is responsible for developing specific policy and program options to document and reduce greenhouse gas emissions in Utah. The Greenhouse Gas Reduction Strategies in Utah report (1999) , was the prior climate action plan for Utah. It did not address adaptation.	In progress due Fall 2007	UT Blue Ribbon Advisory Council (BRAC) on Climate Change	http://www.deq.utah.gov/BRAC_Climate/index.htm 1999 report: http://www.epa.gov/climatechange/wycd/stateandlocalgov/downloads/UtahActionPlan.pdf
VT	The Governor's commission is charged with examining "the real and potential effects of climate change on Vermont, including, but not limited to the impact of climate change on public health, natural resources and the economy; ..." Fueling Vermont's Future: Comprehensive Energy Plan and Greenhouse Gas Action Plan (1998) is the state's prior climate action plan. Adaptation is not addressed.	In progress	Governor's Commission on Climate Change (GCCC); Dept of Environmental Conservation	http://www.vtclimatechange.us/ ; http://www.anr.state.vt.us/dec/dec.htm 1998 Plan: http://publicservice.vermont.gov/pub/state-plans/cepov.pdf
WA	Washington Climate Change Challenge to complete the remaining 40% of actions needed to meet GHG emission reductions. First 60% of actions in progress from 05/06 plans. Adaptation plan is in scope for the 2007/2008 plan. See Table 1, <i>State Adaptation Plans</i> .	2005/2006 and new plan in progress	WA Department of Ecology and Department of Community, Trade and Economic Development	http://www.governor.wa.gov/execorders/eo_07-02.pdf
WI	The Governor created a Task Force in April to create a climate action plan by year end.	In progress due Dec 2007	WI Governor's Task Force on Global Warming (2007)	Tbd

City / County Adaptation Planning

Cities Take the Lead

Communities across the U.S are feeling the impact of climate change. With support from federal and state governments, adaptive responses must occur at the local level. Actions are already taking place on specific issues such as desalinating ground water, protecting infrastructure and communities from flooding and more severe hurricanes, and preparing for water shortages. These initiatives may be privately funded or managed, or the responsibility of a municipal agency, public health agency or the like, and may currently be operating outside the scope of a state’s climate change commission.

One county in particular, King County, Washington is a leader in the United States for adaptation planning. In 2006, King County formed an inter-departmental climate change adaptation team, building scientific expertise within their county departments to ensure climate change factors were considered in policy, planning and capital investment decisions. Partnering with the Climate Impacts Group,¹ 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 (6) “Strategic Focus Areas” for adaptation efforts going forward. A sample of these measures is provided in Table 4. The full climate plan is available at:

<http://www.metrokc.gov/exec/news/2007/pdf/ClimatePlan.pdf>

Table 4: King County’s Adaptation Strategic Focus Areas²

Impact Area	Sample Adaptation Measures
Climate Science	Expand Water and Land Resources 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.

¹ 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.

² Excerpts from the 2007 King County Climate Plan, available at: <http://www.metrokc.gov/exec/news/2007/pdf/ClimatePlan.pdf>

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	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.

Another resource for city or local adaptation planning is ICLEI’s Climate Resilient Communities program. This program launched in late 2005 to help local governments prepare for global warming impacts. Their services include helping local governments 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.³

Cities participating in ICLEI’s new Climate Resilient Communities program include:

- Homer, AK
- Ft. Collins, CO
- Miami-Dade County, FL
- Keene, NH

³ ICLEI Governments for Sustainability, Climate Resilient Communities Program information available at <https://www.iclei.org/index.php?id=6687>

These cities will be the first to complete the program from which ICLEI hopes to compile adaptation protocols that can be shared with other cities around the nation. 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.

Tip of the iceberg

Hundreds of cities have created climate action plans, with more cities completing their plans every week. Like states, these plans are almost exclusively mitigation plans focused on GHG emission reductions. As impacts are being realized in coastal cities, southeast farming communities, and the like, more localities are calling for adaptation plans. Below are examples of two cities’ climate action plans that specifically call for an adaptation plan to be created: Seattle and New York City.

New York City - 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 NYC 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 conduct adaptation planning to address critical infrastructure, specific communities at high-risk from climate change, and an overall adaptation planning process. The full report is available at: http://www.nyc.gov/html/planyc2030/downloads/pdf/report_climate_change.pdf

Table 5: New York City’s PLANNYC for Climate Change Adaptation

Impact Area	Adaptation Plan / Measure
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.

The mayor notes in *PLAN NYC*, that adaptation measures are already underway through the creation of a Climate Change Task Force in 2004 under NYC's Department of Environmental Protection (DEP) to protect the city's water supply, sewer and waste water treatment systems (e.g., climate modeling is used to determine facility siting and future investments).⁴

Seattle, WA – Like New York City, the city of Seattle also recognized the need to go further in addressing adaptation. Seattle's climate action plan (available at http://www.4cleanair.org/Documents/SeaCAP_plan.pdf) calls for an inter-departmental team to prioritize climate change related issues and make recommendations on adaptive measures and timing. Areas the plan specifies for evaluation include:

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

This adaptation plan is due by the end of 2007.⁵

Two efforts are already underway in Seattle to plan for climate variability of its water supply. The first is a partnership between Seattle Public Utilities (SPU) and the University of Washington's Climate Impacts Group to a) downscale climate models to a regional level; and b) create specific water supply impact projections for two of the city's watersheds: Tolt and Cedar rivers. The second is a project with Seattle City Light and the University of Washington's Atmospheric Sciences Department to model the effects of climate change on the Skagit watershed. The project plans to integrate modeling results into future resource planning and operational requirements, as well as potentially reducing the city's dependence on hydroelectricity. By incorporating climate models into their planning, the city will be able to allocate resources wisely and in a timely manner and to ensure adequate water demand needs are met.

⁴ NYC.Gov, A Greener, Greater New York PLAN NYC, available at: http://www.nyc.gov/html/planyc2030/downloads/pdf/report_climate_change.pdf

⁵ City of Seattle, Climate Action Plan, September 2006, available at: http://www.4cleanair.org/Documents/SeaCAP_plan.pdf

Impact-Specific Adaptation Measures and Planning

Adaptation is occurring on a state and local level to address specific impacts. Although the responses are often not comprehensive nor attributed directly to climate change, they are illustrative of efforts necessary for adaptation. Just as Alaska is currently contending with infrastructure loss and community retreat or migrations from erosion, Louisiana is dealing with the hurricane-induced flooding, and North Carolina and Florida are addressing salination of fresh water supplies from sea-level rise and storm surges. As a result, impact-specific plans or actions do exist. For instance, the state of Florida has created a Drought Action Plan not aimed to address or acknowledge climate change, but to address current and long-term realities of drought.

Florida Drought Action Plan⁶

The purpose of the plan 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."

Although not specifically linked to climate change in its purpose, adaptation measures are included such as:

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

Although there is not currently a comprehensive list of these activities by state or city, *Table 6 - State and Local Adaptation Planning for Specific Impacts* provides some examples of other state and city adaptation studies, plans or information sharing taking place on individual local impacts.

⁶ http://www.dep.state.fl.us/drought/news/2007/files/florida_drought_action_plan.pdf

Table 6: State and Local Adaptation Planning for Specific Impacts

Location / Agency	Impact	Adaptation Measure
Portland, OR Portland Water Bureau	Drought; Water Supply	Incorporating climate change, in addition to population growth, in demand models to create options for groundwater and dam management. ⁷
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. ⁸
California Dept. Of Water Resources	Drought; Salination of Groundwater, Seawater and Estuaries	Proposal for the development of desalination plants to address water shortage and quality issues where low-cost energy is available. ⁹
Maine	Forest fires	Understanding the impacts to Maine’s forests and key factors for adaptation. ¹⁰ Sharing adaptation recommendations such as: inventory planning, preemptive salvage cutting, thinning, selective harvesting, un-even aged management. ¹¹
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. ¹²

⁷ 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>

⁸ 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>

⁹ California Dept. of Water Resources, Water Desalination Task Force, available at: <http://www.owue.water.ca.gov/recycle/desal/desal.cfm>

¹⁰ Climate Change Institute, Maine’s Forests, available at: <http://www.climatechange.umaine.edu/Research/MaineClimate/Forests.html>

¹¹ 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>

¹² 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>