



*As previously published in Wetland News, August 2011*

## **State Wetland Climate Change Adaptation Summaries (2010)**

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### **CLIMATE CHANGE RESPONSE – ADAPTATION VERSUS MITIGATION**

Since the term ‘global warming’ first appeared in scientific literature in 1975, human understanding of our role in the greater ecological system has rapidly evolved. The scientific consensus is that the planet is warming, and that human activity is (at least) partially to blame. This consensus also holds that the warming trend will have profound adverse impacts on many species, habitats and human systems. What silver linings are presented by current projections, such as increased opportunity for agriculture in presently colder climate zones, will likely be realized at the cost of many natural resources, already strained.

There are a number of efforts underway to lessen the extent to which human activity contributes to climate change. Many states have sought ways to reduce greenhouse gases, implementing things such as emissions standards, energy portfolios, and carbon reduction targets.

Climate change impacts occur over the long term. It took decades for heavy emissions to produce the global shifts in the atmosphere observed today, for example: holes in the ozone layer. It will take decades of reduced emissions to halt those impacts. This is not to say that efforts to reduce greenhouse gas emissions, a form of climate change mitigation, are faulty; they are very important. Mitigation efforts will simply not prevent all climate change impacts, which will occur within the next century as these ‘short run’ impacts are induced by “emissions build-up” over the past century.

These unavoidable, short-run effects will place new strains on ecological systems, human health and community well-being. Existing natural resource management and conservation programs will need to incorporate new strategies and adjustments in order to respond to the changing ecological conditions. For example, in coastal states, a six-inch rise in sea level would result in a significant impact to coastal wetlands and the wildlife that depended upon them. Over the next five decades, such a rise is considered well within the realm of possibility.

<http://www.epa.gov/climatechange/science/futureslc.html> Programs that manage and protect these areas and wildlife would need to adjust to these new conditions, over time.

Therefore it follows that such planning and adjustments to the coastal management programs should be evaluated and implemented. Such changes are known as adaptation. Changes in temperature and precipitation as well as the timing and intensity of flooding and drought will also require adaptive measures in the interior of the United States. Collectively these changes can be expected to have a significant impact on wetland resources. The Association of State Wetland Managers maintains a series of continuously updated webpages on Wetlands and Climate Change including separate sections on sea level rise, carbon sequestration and

adaptation, which can be accessed at <http://www.aswm.org/wetland-science/climate-change/wetlands-and-climate-change> In August 2011, it added the State Climate Change Adaptation Summaries to the website under Wetland Science – Climate Change Adaptation.

### **State Wetland Programs and Climate Change Adaptation**

State wetland managers face new challenges in an era of climate change. Following ASWM's Wetlands 2008 conference, *Wetlands and Global Climate Change*, ASWM published a discussion paper with recommendations intended to help states better adapt their wetland programs to climate change. [http://aswm.org/pdf/lib/recommendations\\_2008\\_112008.pdf](http://aswm.org/pdf/lib/recommendations_2008_112008.pdf) ASWM identified a need to:

1. Inventory wetlands and climate change efforts including policies and programs, publications, web pages, and research underway in states; and
2. Create and update a national wetlands and climate change website.

In order to put those two recommendations into practice, ASWM gathered information from each state about existing climate change adaptation plans and related activities as of December 2010. In all, thirty nine (39) states responded to ASWM's requests for information; 11 did not respond. Nearly half of the states were engaged in some kind of climate change adaptation activity that related to wetlands. As of December 2010, nineteen states have either completed adaptation plans or are in the planning process. Other states have not yet adopted a comprehensive strategy for climate change adaptation.

ASWM has compiled a series of webpages summarizing its findings. In order to provide a comparable framework for reviewing state wetland adaptation activities ASWM identified possible threats such as sea level rise or increased drought that are likely to occur and require future adaptation actions. Many states will be required to address multiple threats. ASWM also identified a range of actions states can take to prepare which included various stages of planning as well as case studies and monitoring.

These threats and actions were assigned unique icons shown on the main webpage along with links to the individual state profiles. In addition, a color-coded map of the United States indicates whether the state responded to ASWM's request for information and whether the state was engaged in adaptation activities as of December 2010.

Both the map and the lists of states associated with each icon link to state-specific profiles with a brief summary of the climate change adaptation efforts underway in that state. State agencies that are developing climate change adaptation plans may find these profiles useful as many states face common threats.

Although all states face potential impacts from climate change, at this time only twenty-four states reported any kind of adaptation effort. Of those, only eighteen are planning or have

planned to adapt existing programs and regulations for climate change. Political climate was the most common reason given for a lack of action, while a lack of staff resources and financial shortfalls also commonly inhibit adaptation activity.

## **CLIMATE CHANGE ADAPTATION EFFORTS**

Global climate change is just that: global. Every state in the union will experience impacts from climate change. Despite this, few states were actually engaged in adaptation planning at the time of this project. The reasons why most states were not engaged in adaptation planning are varied but primarily break down into three basic areas: resource limitations, information limitations, and political will.

**Resources** – Many departments and agencies simply do not have the time, staff, or money to conduct a planning process while still meeting all of their other objectives to protect natural resources

**Information** – Agency staff were concerned that critical information and data were lacking. Specific kinds of information needed to be collected in order to identify the magnitude of threats and appropriate adaptation actions.

**Political** – Climate change remains politically controversial in a number of states. Many elected officials and agency personnel alike remain skeptical of climate change science and oppose providing resources to undertake planning and adaptation activities.

**Note** – Regarding NGO, academic and nonprofit contributions to climate change adaptation: this project focused exclusively on *state* actions that were being undertaken to enable states to adapt to climate change. Even in states where no adaptation activities are underway there are numerous non-governmental organizations, universities and nonprofit entities making progress in this area. Some of those resources can be found at the end of this document and on ASWM's climate change webpages. Even within the states that are not pursuing climate change adaptation planning, work in other program areas may be useful in the future in the event the state decides to address climate change. For example many states are trying to address invasive species management in freshwater resources. Others are planning to address the increased incidence and intensity of storms, hurricanes and other natural hazards.

## ***DIFFERENT APPROACHES TO ADAPTATION***

There are numerous approaches to climate change adaptation. ASWM identified five categories for adverse impacts of climate change that states face, and seven categories for state-driven activities, e.g. adaptation planning.

## Threats –



*Sea Level Rise* – The most iconic threat of climate change is also the most easily verified by direct observation. Twenty two states have coastline that will be affected by sea level rise.



*Increased Drought* – Increases in average temperatures will contribute to the drying of water resources in some areas. Twenty one states mostly in the Midwest and Southwest, are likely to face challenges related to drought frequency and intensity.



*Water Supply and/or Quality* – Hand-in-hand with drought conditions is shock to water supply. Flooding and storm activity can introduce cross-contamination just as surely as droughts can cause shortages. Almost every state in the union (41) has been identified as at-risk from this threat. Damage to water supplies is one of the more direct forms of harm climate change can have upon human health and well-being.



*Increased Weather Intensity* – As Katrina has recently shown us, the sheer, devastating power of wind, wave and water during storm activity must be respected. As average global temperatures rise, more and more energy is added to the systems that form damaging storms. Thirty-three states were identified as at-risk from some form of intensified storm activity be it from blizzards, ice storms, tornadoes, hurricanes, or other hazards.



*Threat to Habitat or Species* – While storm damage and shrinking water supplies are frighteningly harmful to human health, humans are not the only species affected. In all fifty states, endangered or threatened species, already under strain, will find their situations aggravated by climate change. To make matters worse, many of the detrimental effects from climate change are mitigated by wild spaces such as wetlands which serve to keep waters clean and provide valuable buffers against storm activity. It is important to remember that human health and ecological health are linked.

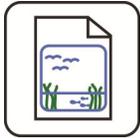
## State Actions –



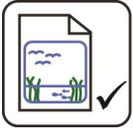
*Adaptation Planning* – All state government adaptation efforts must be in the form of education, policy changes, regulation or management. All such efforts include a plan. An adaptation plan is the cornerstone of adaptation efforts and is often the first step taken by a state that is aware of and responding to these threats. Fourteen states were in the process of forming an adaptation plan as of December 2010.



*Adaptation Plan Complete* – Five states have already finished the planning process. With a completed plan, they are now prepared to move forward with other types of action.



*Adaptation Planning Includes Wetlands* – ASWM paid particular attention to those states whose plans included information about wetlands and what role wetlands play in the future of climate change planning and adaptation. Six of the fourteen states engaged in planning were explicitly including wetlands in their strategy.



*Completed Plan Includes Wetlands* – Of the five early adopters of adaptation planning, four states' plans make explicit mention of wetlands and what role they play in adaptation efforts.



*Engaged in Case Studies* – As planning processes move forward, many planning bodies encounter questions. Efforts to answer those questions typically take the form of studies commissioned or conducted by state agencies. Eleven states were engaged in studying climate change effects and how adaptation efforts might be directed.



*Case Studies Completed* – Delaware has already completed studies of this type. ASWM looks forward to expanding this list as the other ten states conclude their studies.



*Ongoing Monitoring* - Unlike a case study, which is intended to answer a specific question, monitoring programs work to provide a constant stream of data and keep officials abreast of changes in ecological systems, species populations, and other important indicators of environmental health. Six states had such programs in place as of December 2010.

### *ENSURING VALUE OVER TIME – A LIVING DOCUMENT*

ASWM intends to periodically update the information on its website and invites states and other interested parties to bring new programs and efforts to our attention. This website will persist as a constant and current source for information about state adaptation efforts.

### **ADDITIONAL CLIMATE CHANGE ADAPTATION RESOURCES**

<http://www.pewclimate.org/states-regions> - A recently updated website by the Pew Center on Global Climate Change

<http://www.state.gov/g/oes/climate/> - State Department climate change website.

<http://www.epa.gov/climatechange/science/stateofknowledge.html> - EPA "State of Knowledge"

[http://www.ipcc.ch/publications\\_and\\_data/ar4/wg2/en/contents.html](http://www.ipcc.ch/publications_and_data/ar4/wg2/en/contents.html) - IPCC AR4 (2007) Impacts/Adaptation Report

<http://www.gao.gov/products/GAO-11-876T> - GAO Report on aligning funding for climate change adaptation projects

For additional information, visit ASWM's climate change & adaptation webpages at:

<http://aswm.org/wetland-science/climate-change/climate-change-adaptation>

To find this document on ASWM's website: <http://aswm.org/wetland-science/climate-change/climate-change-adaptation/1200-climate-change-adaptation-summaries>