



NICHOLAS INSTITUTE FOR ENVIRONMENTAL POLICY SOLUTIONS  
DUKE UNIVERSITY

## **Memorandum**

To: The Honorable Pricey Harrison, Co-Chairman  
Mr. John Garrou, Co-Chairman  
Members of the Legislative Commission on Global Climate Change

From: Bill Holman, Director of State Policy  
Nicholas Institute for Environmental Policy Solutions

Re: Options for Planning and Adapting to Impacts of Global Climate Change  
in North Carolina

Date: January 27, 2009

I am writing to respond to your request to update my 2008 memorandum on options for state and local policy makers to consider regarding planning for and adapting to the impacts of global climate change.

### **Background**

Concentrations of carbon dioxide in the atmosphere have increased from 277 parts per million at the dawn of the industrial revolution to 385 parts per million today and will likely rise to at least 450 parts per million by 2050. According to the scientists on the Intergovernmental Panel on Climate Change (IPCC) the global climate will continue to warm for a minimum of 90 more years even if the US, China and India join the rest of the developed world in capping, reducing, and offsetting emissions of greenhouse gases.

National, State and local policies to cap, reduce, and offset emissions of greenhouse gases and to stabilize the global climate should be adopted and implemented as soon as possible. However, national, State and local policies to plan for and adapt to the impacts of global climate change should also be developed, adopted and implemented as soon as possible. Unfortunately the US Department of Homeland Security's National Infrastructure Protection Plan currently ignores global climate change. State and local governments must begin planning for global climate change as a new Administration recognizes the problem and begins to provide leadership and technical and financial assistance.

Many federal, state, and local agencies, including US Department of Homeland Security, Federal Emergency Management Agency (FEMA), US Army Corps of Engineers, US Department of Agriculture, US Environmental Protection Agency, NC Department of Crime Control and Public Safety (DCCPS), NC Department of Environment & Natural

Resources (DENR), are “adapting” to global climate change without principles or a comprehensive plan in place.

### **Impacts of Climate Change in the Southeastern United States**

Global climate change has and will continue to have significant public health, environmental, and economic impacts on North Carolina. “Adaptation” to global climate change is occurring right now. The citizens of North Carolina are currently paying for beach nourishment projects, for major increases in wind and flood insurance, for bulkheads on the estuarine shoreline, and other costs. A separate legislative study committee debated and will likely continue to debate policies and rate increases to maintain the financial viability of the BEACH insurance plan.

Global climate monitoring and modeling have substantially improved over the last twenty years. Regional, State and local monitoring and modeling lag behind. The NC State Climate Center at NC State University operates 30 ECONet climate monitoring stations in NC.

In general scientists predict more extreme weather, including longer and more severe droughts and larger storms and floods for the Southeastern United States. Warmer air should produce more rain in the Southeast, but the rain may be delivered in more intense storms that produce more flooding and stormwater pollution, less infiltration and groundwater recharge, and more sewage spills. Water supply models, stormwater controls, wastewater effluent standards, floodplain maps, etc are all based on historical weather data and will have to be reevaluated.

“Stationarity is Dead: Whither Water Management” in the February 1, 2008 issue of *Science* reports that a fundamental aspect of water resource management has been that natural systems fluctuate within certain unchanging boundaries (stationarity). The assumption of stationarity must be replaced as global warming changes the means and extremes of precipitation, evapotranspiration, and rates of discharge of rivers. *Science* reports “Rapid flow of climate-change information from the scientific realm to water managers will be critical for planning, because the information base is likely to change rapidly...”

Hotter weather increases evaporation from water supplies and stresses both crops and landscaping. It increases demands for electricity while at the same time decreases the ability of (warmer) water to cool coal and nuclear-fired power plants. Hotter weather and warmer waters could increase nuisance algae blooms and fish kills. Hotter summers could increase unhealthy levels of ozone pollution. Habitats for plants and animals will change. Many species will be unable to migrate and may be lost.

Over 1.2 million acres of coastal NC are below one meter (approximately 3 feet) in elevation and are particularly vulnerable to sea level rise and storm surges. Scientists estimate that sea level will rise ½ meter (1 ½ feet) or more in the next 100 years. A recent study by economists at Appalachian State, Duke, East Carolina, and University of North

Carolina at Wilmington estimated that the value of property at risk to sea-level rise in just four NC coastal counties to be \$6,900,000,000.

Rising sea level will increase coastal flooding, erosion, property damage, and salt water intrusion. Rising sea level and rising water tables could complicate on-site treatment and disposal of wastewater in septic tanks in wet coastal soils. Saltwater will move further upstream in coastal rivers and further inland into coastal aquifers. The saltwater wedge may threaten existing freshwater intakes and supplies and may make some agricultural and forest lands unproductive.

Wetlands provide many ecological services such as water quality, flood storage, habitat, and storm protection. Wetlands may also be able to migrate with rising sea level if they are not blocked by a hardened estuarine shoreline.

### **Options for North Carolina Policy Makers**

#### Review, Inventory and Share Existing Federal, State and Local Programs & Data

- Inventory existing federal, state, and local disaster planning and response programs, environmental planning and management programs, and economic development planning programs, including their budgets.
- Review the US Environmental Protection Agency's 2008 National Water Programs Strategy: Response to Climate Change ([www.epa.gov/water/climatechange/index.html](http://www.epa.gov/water/climatechange/index.html)) and share it with public and private water systems.
- Review the US Environmental Protection Agency's "Coastal Sensitivity to Sea Level Rise: A Focus on the Mid-Atlantic Region (includes NC)" ([www.epa.gov/climatechange/effects/coastal/spa4-1.html](http://www.epa.gov/climatechange/effects/coastal/spa4-1.html)) prepared with US Geological Survey and National Oceanic and Atmospheric Association as part of the US Climate Change Science Program (The study was released on January 16, 2009.) Share it with local appointed and elected officials.
- Identify conflicting policies between programs and barriers to adaptation.

#### Develop and Adopt Climate Adaptation Goals and Principles and Start Planning

- Create a NC Climate Adaptation Advisory Committee to advise the Governor, General Assembly, State agencies, local governments, utilities, and others to lead the State's efforts to plan for and adapt to climate change.
- Develop and adopt climate adaptation goals and principles to guide public and private decision makers.
- Integrate adaptation to climate change in state and local planning for water, transportation, energy, and other infrastructure.
- Utilize the consistency provisions of the Coastal Area Management Act and federal Coastal Zone Management Act to help resolve conflicts between existing policies and programs.

- Amend GS 113A-1, State Environmental Policy Act (SEPA) to add consideration of emission of greenhouse gases, climate change, and sea level rise to issues that must be addressed in environmental documents.

#### Improve Climate Data and Research

- Increase the ability of State and local governments to predict impacts of climate change, drought, floods, and weather by appropriating \$800,000 per year to NC State University to expand and maintain NC State Climate Monitoring Network (ECONet) from 30 sites to sites in all 100 counties.
- Make NC a national center for both climate research, adaptation, and the emerging carbon market by establishing a public-private university climate research consortium (like the successful Water Resources Research Institute (WRI)) and by appropriating \$4,000,000 to University of North Carolina system. Capitalize on existing institutions including but not limited to National Oceanic & Atmospheric Administration's (NOAA) National Climatic Data Center in Asheville, Asheville's Centers for Environmental & Climatic Interaction, UNC-CH's atmospheric modeling program, Duke University's expertise in climate/energy policy and the emerging carbon market, and the new multi-university Center for Natural Disasters, Coastal Infrastructure and Emergency Management based at UNC-CH. NC funded climate research should be focused on understanding the impacts of climate change on the State and on developing models, best practices and decision support tools to assist water managers, utilities, farmers, emergency response managers and other decision makers.
- Improve the Division of Water Resource's river basin based water modeling, planning and budgeting to include impacts from climate change. Water models and budgets are currently based on historical data and are not forward looking.

#### Plan for Droughts and Extreme Weather

- Direct DENR and the State Water Infrastructure Commission (SWIC) to work with NC League of Municipalities, NC American Water Works Association/Water Environment Federation, the engineering community and others to provide technical and financial assistance to public water, wastewater and stormwater systems to plan for hotter temperatures, droughts, intense storms and extreme weather and appropriate \$500,000 for this purpose.
- Amend GS 143-355, the Water Planning Act of 1989, and GS 130A-311, the NC Drinking Water Act, to require public and private water supplies to disclose the safe yield or risk (and assumptions made to determine risk) of running out of water. This will ensure that public and private water suppliers plan for global climate change, and to enable Division of Environmental Health to consider safe yield or risk when reviewing plans for public and private drinking water systems. The NC Utilities Commission should also consider safe yield or risk in its review of private water systems.
- Build upon DCCPS's "Storm Ready" communities program and establish a "Climate Ready" communities program. Provide incentives to Climate Ready

communities such as insurance premium discounts and favorable consideration for state financial and technical assistance.

### Plan for Sea Level Rise and Intense Storms

- Amend GS 113A-100, Coastal Area Management Act (CAMA) to require Coastal Resources Commission (CRC), Division of Coastal Management (DCM), and local governments to consider sea level rise and storm surges when approving land use plans and major CAMA permits. Authorize use of coastal management grants to local government to plan for and adapt to sea level rise and storm surges.
- Increase protection of coastal wetlands and their ability to migrate inland by directing the Coastal Resources Commission (CRC) to prohibit new bulkheads and hard structures in “critical wetland protection areas” or “areas of environmental concern.” Require DCM to report to the ERC annually on the loss of coastal wetlands due to estuarine shoreline hardening and other uses. Require applicants for permits to harden the estuarine shoreline outside of areas of environmental concern to mitigate their impacts on wetlands. Direct Coastal Habitat Protection Plan (CHPP) to plan for and adapt to global climate change and sea level rise. Increase funding for Clean Water Management Trust Fund (CWMTF) in order to protect and restore coastal wetlands.
- Retain NC’s model law, GS 113A-115.1, (CAMA) that recognizes that sea level is rising, beaches are moving and that prohibits new seawalls, jetties, and groins on the oceanfront.
- Support the NC Albemarle/Pamlico National Estuary Program participation in the US Environmental Protection Agency’s “Climate Ready Estuaries” program to help local governments and state agencies plan for and adapt to global climate change and sea level rise in its work.
- Provide maps of sea level rise and storm surges to local governments, Realtors, conservation organizations, and the public via NC One Map.
- Improve coordination or consolidate and integrate State natural hazard planning & regulatory programs in DENR and/or the Department of Crime Control & Public Safety. Review effectiveness of existing technical assistance, financial assistance, mapping, and regulatory programs in DENR and DCCPS. For example floodplain management in DCCPS and stormwater management in DENR should be complimentary. Sea level rise planning and coastal management should be complimentary. DCCPS should retain primary authority for emergency response.

### Mitigate Hazards

- Establish a NC Adaptation and Hazard Mitigation Fund: 1) to acquire either conservation easements or fee simple properties in floodplains and other high risk areas and prevent inappropriate development, 2) to relocate homes in floodplains and other high risk areas, 3) to protect and restore wetlands and floodplains, 4) to restore oyster reefs, and 5) help local and state agencies plan for and adapt to global climate change and other natural hazards to protect the public, prevent property damage and lower risks before sea level rises and storms occur. Fund

with the approximately \$25,000,000/year interest generated by the BEACH plan, appropriations from the General Fund, a surcharge on property insurance, a surcharge on high risk properties, and/or fee for filling or building in high risk areas such as 100-year floodplains. Insurance costs rise or insurance becomes unavailable after storms. The 2009 General Assembly could consider funding for adaptation and hazard mitigation as it debates policies to improve the financial stability of the NC BEACH insurance plan. The unsuccessful US Climate Security Act of 2008 proposed funds to States for adaptation from the auction of some carbon allowances. It will be reintroduced in 2009.

- Ask Congress to reinstate former Congressman Walter Jones, Sr.'s program to allow federal flood insurance to pay for relocation of threatened structures in the flood plain before they are damaged.

Thank you for your consideration.

Please contact me at Box 90328, Durham, NC 27708 or [www.nicholas.duke.edu](http://www.nicholas.duke.edu) if you have questions or need more information.