

NC DENR Climate Change Initiative Strategy Framework (June 8, 2010)

GOAL: Address climate change in a comprehensive way, using mitigation and adaptation strategies to increase resilience of North Carolina’s resources to these complex changes.

Develop a focused approach to address climate change policy actions at state, regional and federal levels.

- Identify short-term, mid-term, and long-term potential impacts.
- Identify implementation mechanisms for addressing these impacts.
- Coordinate strategies with other local, state, federal and nongovernmental partners.

System for status updates:
 U = Underway
 TBI/date = To Be Implemented / with projected starting date
 C = Completed

Climate Change MITIGATION Strategies

- Reduce human-induced contributions to climate change, such as greenhouse gas emissions, as recommended by the Climate Action Plan Advisory Group (CAPAG).
- Become an environmental leader in energy and water efficiency and carbon management.

	MITIGATION GOALS & OBJECTIVES	STATUS	RESPONSIBILITY	SOURCE
1.	Greenhouse Gas Emission Regulations and Tracking		DAQ	
1-A:	Monitor Federal Regulations Related to Climate Change and Assess Their Impact		Sushma Masemore	
	1-A-1: Mandatory Greenhouse Gas Reporting Rule	U		CAPAG–CC-2; EPA
	1-A-2: National Cap & Trade system	U		CAPAG–ES-4; Kerry Boxer Senate bill
	1-A-3: Modified CAFÉ standard	U		CAPAG–TLU-5;
	1-A-4: CO ² Endangerment Finding	C		EPA
	1-A-5: Implement final regulations that are under DAQ’s jurisdiction.	U		EPA
1-B:	Provide Technical Support to Legislative Commission on Global Climate Change.		Sushma Masemore	LCGCC
	1-B-1: Implement appropriate mitigation and adaptation recommendations of CAPAG and continue to engage with the Legislative Commission on Global Climate Change.	U		DENR Strategic Plan
	1-B-2: Analysis of policy measures and impacts on state emission levels as requested by the Commission.			LCGCC
1-C:	Develop Greenhouse Gas Inventory Emission Characterization Model for the State.		Sushma Masemore; DOT	CAPAG–CC-1
	1-C-1: Quantify annual emission rate using facility level data submitted through the State Reporting Rule voluntarily and/or through the EPA Reporting Rule.	U		
	1-C-2: Develop models to project future emissions profiles.			
	1-D-3: Identify potential short-term, mid-term, and long-term greenhouse gas (GHG) emission levels and impacts to North Carolina.			
	1-C-4: Assess reduction potential of different policy measures and develop a Smoke Management Plan with database.	U	DFR	
	1-C-5: Identify and assess co-benefits of GHG reductions from existing and future standards (vehicle idling rule, REPS).			

	MITIGATION GOALS & OBJECTIVES	STATUS	RESPONSIBILITY	SOURCE
2.	Greenhouse Gas Emission Reduction	DENR Energy & Carbon Reduction Working Group	DAQ	CAPAG–RCI-11
2-A:	Report DENR’s Carbon Footprint to The Climate Registry.		Sushma Masemore	CAPAG–CC-3
	2-A-1: Collect data on DENR’s direct and indirect emission sources, from all DENR divisions.	C		
	2-A-2: Review, calculate and report to The Climate Registry.	C		
	2-A-3: Obtain 3rd Party verification of emissions data.	U		
	2-A-4: Lead by example and become a model for other state agencies.			
2-B:	Develop and Implement DENR Strategic Energy Plan.		Janine Nicholson for Asst. Sec. for Natural Resources	CAPAG–RCI-3 + Senate Bill 668 + DENR Strategic Plan
	2-B-1: Develop strategy to reduce energy and water consumption by 20% by 2010.	U		
	2-B-2: Develop 5-year plan to reduce energy and water consumption by 30% by 2015.			
	2-B-3: Develop strategy to continue reducing petroleum consumption.			
	2-B-4: Maintain accurate records and submit annual updates.	U		
2-C:	Promote Reduction of Greenhouse Gas Emissions.		Gary Hunt, Pat Harris	
	2-C-1: Provide technical assistance to business, industries and government agencies on ways to reduce their energy use and carbon footprint.	U - webinars	DPPEA, with State Energy Office	
	2-C-2: Promote residential greenhouse gas emissions reduction through energy efficiency technical assistance in partnership with N.C. State Energy Office.	U – Waste Reduction Partners	DPPEA, with State Energy Office	
	2-C-3: Increase the efficiency of local government recycling efforts and expand the markets for recycled materials.	U- grant programs	DPPEA, with Department of Commerce	Kerry Boxer Senate bill
	2-C-4: Encourage energy reduction on agricultural lands.		DSWC	
	2-C-4-a: Recycle agricultural by-products (e.g. nutrients for crop production).	U		
	2-C-4-b: Reduce inorganic fertilizer use.	U- as production cost savings		
	2-C-4-c: Increase no-till farming.	U- through ACSP		
	2-C-5: Incorporate reduction of Greenhouse Gas Emissions into environmental education and outreach activities.		DENR agencies	
2-D:	Promote Reductions through Transportation Planning and Efficiency Improvements, as defined in the Senate Climate Bill.	TBI/pending Federal legislation	DAQ with DOT, MPOs	Kerry Boxer Senate bill

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3.	Green Energy Development	Green Energy Development Working Group	Secretary's Office with Commerce, Agriculture	
3-A:	Renewable Energy Technologies			CAPAG – ES1 + Senate Bill 3
	3-A-1: Work with the General Assembly and regulatory commissions to develop new environmental protection requirements and guidelines for renewable energy projects that enhance stewardship and promote economic growth.	U – EMC, ERC	Secretary's Office + DAQ, DFR	DENR Strategic Plan
	3-A-2: Partner with state universities, RTP and others to develop solar, biomass, wind, alternative fuels and other technologies needed to grow a green economy.		Deputy Secretary + Asst. Secretary for Environment	DENR Strategic Plan
3B:	Biomass Development with Natural Resource Protection			
	3-B-1: Develop biomass policies that support sustainable biomass production while protecting significant natural resource functions of our forests.	U	Secretary's Office + DFR	DENR Strategic Plan
	3-B-2: Expand use of forest biomass and better forest management, without compromising other forest ecosystem services.	U	DFR	CAPAG – AFW-9&10
	3-B-3: Partner with the North Carolina Biofuels Center in developing woody biomass as a key fuel development source, while protecting natural resources.	U	DFR, DAQ, NRPC	DENR Strategic Plan
	3-B-4: Expand use of agricultural biomass feedstocks for electricity or steam production.	TBI-animal waste	DSWC	CAPAG – AFW-5
3C:	Waste Management Strategies			CAPAG – AFW-1
	3-C-1: Focus efforts on state's livestock and poultry operations to promote stewardship and conversion to improved innovative waste management technologies and potential energy production.	U-NCUC swine methane RFP + Coop. Conservation Partnership Initiative	DWQ, DSWC Vernon Cox	DENR Strategic Plan
3D:	Wind Permitting Policies to ensure responsible siting of wind facilities		Secretary's Office	
	3-D-1: Work with the legislature to enact a statewide wind permitting regulatory process for large scale wind projects.			
	3-D-2: Work with regulatory commissions, including the Coastal Resources Commission and the Environmental Management Commission, to facilitate necessary rule changes for the development of responsibly sited wind facilities.			
	3-D-3: Partner with other state agencies, Department of Agriculture, Department of Insurance and Utilities Commission to remove regulatory barriers to the development of small scale wind projects on private lands.			

	MITIGATION GOALS & OBJECTIVES	STATUS	RESPONSIBILITY	SOURCE
4.	Carbon Sequestration		DSWC, DFR, DLR	
4-A:	Assess the potential for carbon reduction through changes to land management policies (including enhancement or protection of forest carbon sinks).	U		ACES Act - state climate adaptation plan requirement
4-B:	Carbon Sequestration in Forest Lands	U	Wib Owen - DFR	CAPAG – AFW-8, 9&10, 13
	4-B-1: Evaluate contributions of forest establishment, forest management, forest soils and urban forests, as part of Statewide Forest Resources Assessment.	U	DFR	
4-C:	Soil Carbon Management		Pat Harris - DSWC	CAPAG – AFW-3
	4-C-1: Conservation Tillage/Soil Carbon Management	U- through ACSP	DSWC	
	4-C-2: Cropland Conversion to Perennial Vegetation	U- through ACSP	DSWC	
	4-C-3: Preservation of Working Land – Agricultural and Forest Land		OCCA; NCADFP Trust Fund	CAPAG – AFW-4a/b
	4-C-3-1: Work with Forest Legacy Program and partners to develop working forest easements.	U	DFR	CAPAG – AFW-4a/b
	4-C-4: Explore role for local conservation districts to verify carbon credits.	TBI	DSWC	
4-D:	Geological Sequestration		Ken Taylor – DLR-NC Geological Survey+ DEH-PWS-aquifer injection	Kerry Boxer Senate bill
	4-D-1: Continue research to characterize the extent of oil and natural gas fields in the Mesozoic basins in North Carolina and corresponding carbon storage potential.	U	DLR-NC Geological Survey	
	4-D-2: Continue research to document the locations of the dunite deposits (containing the mineral olivine) and update published research on a method of carbon capture in a carbonate rock generated by the reaction of carbon-dioxide and the mineral olivine.	U	DLR-NC Geological Survey	

Climate Change ADAPTATION Strategies

- Proactively prepare for and adapt to changes we can't prevent.
- Develop a comprehensive adaptation strategy across DENR programs, to effectively identify and address potential impacts to the environment and natural resources that DENR is charged with protecting.

	ADAPTATION GOALS & OBJECTIVES	STATUS	RESPONSIBILITY	SOURCE
				CAPAG – CC-5
5.	Sea Level Rise Adaptation	Sea Level Rise Working Group	Jim Gregson- DCM	
5-A	Coastal Habitat Protection Plan		Jimmy Johnson OCCA; DMF, DCM, DWQ, WRC; DEH-Shellfish	
	5-A-1: Update Coastal Habitat Protection Plan to address Climate Change Impacts on each habitat type.	U		
	5-A-2: Work with CHPP Steering Committee to integrate changes into Commission Implementation Plans and other agency's habitat programs.	TBI/May 2010		
	5-A-3: Seek approval of CHPP update from 4 commissions (Marine Fisheries, Coastal Resources, Environmental Management, and Wildlife Resources commissions).			
	5-A-4: Implement recommended actions.			
5-B	Coastal Management		Jim Gregson- DCM	
	5-B-1: Conduct a public survey to assess state residents' perceptions about sea level rise, its threats to the NC coast, and what action respondents think should be taken to prepare and adapt.	C		
	5-B-2: Hold a public science forum to present the Coastal Resources Commission report on current and projected rates of sea level rise in North Carolina that may be used by the CRC for adaptation planning, and to begin discussing how other DENR agencies might use those metrics in their own adaptation planning (e.g. Beach and Inlet Management Plan).	U		DENR Strategic Plan
	5-B-3: Hold a sea level rise policy summit meeting to present and gain stakeholder input on a CRC policy for sea level rise adaptation, and to conduct scoping for Departmental and Executive Branch recommendations.	TBI/Fall 2010		
	5-B-4: Provide mitigation and adaptation recommendations to the Executive Branch.	TBI/Winter 2010		
	5-B-5: Make amendments to the CRC's Regulations, including policies, land use planning guidelines and other relevant regulations.			
	5-B-6: Provide technical assistance to State agencies and local governments for incorporating sea level rise adaptation measures into their operations and local land use plans.			
	5-B-7: Develop a public education and outreach campaign.	U	DCM; NOAA, Sea Grant	Science Forum

	ADAPTATION GOALS & OBJECTIVES	STATUS	RESPONSIBILITY	SOURCE
	5-B-8: Monitor and assess variable rates of sea level rise at sentinel sites on representative coastal ecosystems in different regions of NC coast and inform resource management decisions at reserve sites and in NC coastal communities.	U-Sentinel Sites Initiative	NC Coastal Reserve	National Estuarine Research Reserve System
5-C	Climate Ready Estuaries		Bill Crowell- APNEP	DENR Strategic Plan
	5-C-1: Assess general public and public officials' awareness and concern about climate change, sea-level rise and possible actions.	U		
	5-C-2: Develop a communications strategy for outreach and engagement in the targeted counties.	U		
	5-C-3: Create Blueprint to build a climate ready estuary system with steps to improve the area's resilience and adaptation capacity	U		
	5-C-4: Recommend priority actions for Comprehensive Conservation and Management Plan to APNEP Policy Board.	U		
	5-C-5: Coordinate strategies with other coastal programs (e.g. CHPP, DCM).	U		
	5-C-6: Work with regional and federal partners on climate change adaptation actions (NCCF, TNC, EPA, NOAA).	U		

	ADAPTATION GOALS & OBJECTIVES	STATUS	RESPONSIBILITY	SOURCE
6.	Climate-Sensitive Ecosystems	Climate-Sensitive Ecosystems Working Group	Linda Pearsall-NRPC	Kerry Boxer Senate bill
6-A	Biodiversity / Wildlife Habitat and Natural Ecosystems		NRPC; DFR, DPR; WRC	
	6-A-1: Develop detailed ecosystem risk assessment model at a scale to support local decision making.			
	6-A-2: Identify high-risk species and ecosystems; work toward predicting changes in habitat types and extent.	U		
	6-A-3: Develop best management practices to enhance resilience of ecological systems and priority habitats and species; including response in mitigation properties.			
	6-A-4: Identify priority conservation areas and critical migration corridors.			
	6-A-5: Reduce potential adverse effects on biodiversity from human responses to climate change (e.g. biomass production, carbon offset sites, wind farms).	U		
6-B	Forestry		Wib Owen –DFR with external partners	
	6-B-1: Identify potential impacts of increased wildfire hazards in the forest / urban interface.			
	6-B-2: Manage forest ecosystems in low elevation areas in advance of sea level rise (e.g. production of appropriate tree species, new management strategies, changing markets for forest products).			
	6-B-3: Manage forest ecosystems across the state for changes in response to increased temperature (e.g. shifts in plant hardiness zones, drought, invasive species, insects and diseases).			
	6-B-5: Assess the role urban forests play in urban heat island mitigation and the impact of climate change on composition and health of urban forest ecosystems.			
	6-B-6: Integrate climate change issues into N.C. Forest Resource Assessment and Strategies prioritization.	U		

	ADAPTATION GOALS & OBJECTIVES	STATUS	RESPONSIBILITY	SOURCE
6-C	Agriculture		Pat Harris- DSWC; OCCA; with Agriculture & Consumer Services	
	6-C-1: Expand collaboration between government (federal, state, local) and NGOs to maximize protection and preservation of agricultural land.			
	6-C-2: Utilize Cost share programs and best management practices for agriculture sustainability to buffer against negative impacts of climate change.	U		
	6-C-2-a: Promote best management practices to enhance soil quality, conserve soil moisture and protect from erosion.	U-state Ag water strategy work group		
	6-C-2-b: Promote strategies to store drainage water for subsequent cropland irrigation.	U		
	6-C-2-c: Restore and protect riparian buffers and wetlands.	U- via CREP		
	6-C-3: Assess effect of climate change and sea level rise on existing easement-protected lands, to determine appropriate actions.	TBI	Not DSWC role	
6-D	Invasive Species		NRPC; EEP, DWR, DFR, DPR, DEH-Pest, with Ag & Consumer Services and WRC	
	6-D-1: Partner with the N.C. Department of Agriculture & Consumer Services to limit and control invasive species on high-priority natural areas, farms, forests and park lands.	U	DFR	
	6-D-2: Work with federal partners to prioritize restoration techniques and locations.	U	DFR	
6-E	Marine Fisheries and Fish Habitats		Louis Daniel- DMF; DEH-Shellfish; WRC	
	6-E-1: Update Fishery Management Plans to address potential impacts of Sea Level Rise on species (e.g. shift in distribution, changes in foraging or spawning behavior) and habitat (e.g. ability of habitat to withstand salinity changes, ability of habitat to shift inland).	U		
	6-E-2: Coordinate with CHPP to implement regulatory changes that protect and enhance all fish habitat.			

	ADAPTATION GOALS & OBJECTIVES	STATUS	RESPONSIBILITY	SOURCE
7.	Water Management		Tom Reeder-DWR, DPPEA, DSWC, DWQ, DLR	
7-A	Maintain Natural Hydrologic / Ecosystem Ensure that the state considers and undertakes initiatives that protect or enhance natural ecosystem functions, including protection, maintenance, or restoration of natural infrastructure (such as wetlands, reefs or barrier islands to buffer to buffer communities from floodwaters or storms, watershed protection to maintain water quality and ground water recharge, or floodplain restoration to improve natural flood control capacity; or use non-structural approaches including practices that utilize, enhance, or mimic the natural hydrologic cycle processes of infiltration, and reuse).	U		ACES Act state climate adaptation plan requirement + Kerry-Boxer Senate climate bill
	7-A-1: Develop a methodology to help establish the minimum “ecological flows” that must be maintained in North Carolina’s water bodies to protect the aquatic life and habitat that is present in these waters.	C - online	Jim Mead-DWR	
	7-A-2: Incorporate site-specific ecological flows into basinwide hydrologic models to determine how existing and future withdrawals will affect the waters ability to sustain aquatic life.	U		
7-B	Effective Long-term Use of Water Resources		Tom Fransen-DWR, DPPEA; DSWC; DEH-PWS/OWP	
	7-B-1: Evaluate need to adjust water resources forecast models to reflect changing patterns of rainfall and temperature.	U (Neuse)		
	7-B-2: Develop a statewide water resources policy that includes implementing provisions of the 2008 drought legislation and evaluating the need for a statewide water withdrawal permitting program.	U		DENR Strategic Plan
	7-B-3: Develop strategies to deal with salt water intrusion into aquifers; particularly in Central Coastal Plain Capacity Use Area Program.	U		
	7-B-4: Promote water efficiency.	U- in SRF		
	7-B-4-a: Provide technical assistance to business, industries and government agencies on water efficiency techniques and technologies.	U – Webinars + videos	DPPEA	
	7-B-4-b: Provide local water systems with education and training on water efficiency techniques, technologies and outreach strategies.	U – Webinars + videos	DPPEA; DEH- PWS and Onsite Water Protection;	

	ADAPTATION GOALS & OBJECTIVES	STATUS	RESPONSIBILITY	SOURCE
	7-B-4-c: Implement water efficiency practices for agriculture and forestry.	U- via ACSP	DSWC; DFR; DEH-Pest	
	7-B-4-c-1: Promote best management practices to enhance soil quality, conserve soil moisture and protect from erosion.	U-state Ag water strategy work group		
	7-B-4-c-2: Promote strategies to store drainage water for subsequent cropland irrigation.			
	7-B-4-c-3: Promote sound pasture management to improve drought resilience.	U		
	7-B-4-c-4: Promote use of resilient water sources.			
	7-B-4-c-5: Promote irrigation best management practices to increase water use efficiency.			
	7-B-4-c-6: Increase on-site water storage capacity (e.g. ponds, cisterns).			
	7-B-4-c-7: develop a public communication strategy to promote efficient use of water across all sectors (public and private.)			
7-C	Flood Prevention		DLR-Disaster Response ,DSWC, DWQ, EEP; Emergency Management	
	7-C-1: Work with federal and local governments to better protect against flooding.			
	7-C-2: Remove confined animal operations from the 100-year floodplain.	U-floodplain buyout for swine operations		
	7-C-3: Promote best management practices to increase storm water infiltration, storage, treatment and use.	U-ACSP, CCAP		
	7-C-4: Reduce and/or retrofit impervious surfaces.	U- CCAP		
7-D	Protect Water and Wastewater Infrastructure from Inundation		DEH-PWS/OWP; DWQ; SEPA review	
	7-D-1: Assess impact of sea level rise and increased storminess on water and wastewater infrastructure in coastal areas.	TBI		
	7-D-2: Develop strategies to reduce risk of flooding and water pollution caused by size and location of infrastructure.	TBI		

	ADAPTATION GOALS & OBJECTIVES	STATUS	RESPONSIBILITY	SOURCE
8	Public Health Impacts		Terry Pierce- DEH- Pest Mgmt; External lead: Health & Human Services; Center for Disease Control	Kerry-Boxer Senate bill
8-A	Insect, tick and rodent borne diseases	U	DEH- Pest Mgmt.; External lead: Dept. of Health & Human Services; Center for Disease Control; USDA	
	8-A-1: Develop protocols to address increased spread of pathogenic species due to flooding and increased heat.	U- quarterly review	Vector-Borne Task Force	
	8-A-2: Consider disease control impacts on conservation lands managed by DENR divisions.			
8-B	Heat-related illness and death		External lead: DHHS Div Public Health	
	8-B-1: Assess communities for heat island impacts.			
	8-B-1: Develop plans to provide support to residents during heat waves			
8-C	Water and food borne illnesses		DEH- Rec. Water Quality; Shellfish;; DHHS-DPH , Env, Health Svc., Agriculture	
	8-C-1: Develop protocols to address increased spread of pathogenic species due to flooding and increased heat.			
	8-C-2: Develop protocols to protect and remediate wells from inundation by flooding.		DEH-Onsite Wastewater	
	8-C-3: Develop protocols to respond to water shortage/drought situations	U	PWS; DWR	
	8-C-4: Develop protocols to protect the public from pathogens in contaminated water supplies.	C	DPH; DEH-OWP/ PWS)	
	8-C-5: Develop protocols to remediate food handling facilities affected by flood waters.		DEH-Food Protection Branch	

	ADAPTATION GOALS & OBJECTIVES	STATUS	RESPONSIBILITY	SOURCE
9	Emergency Management Preparedness		Ken Taylor	
9-A	Partner with local, state and federal agencies to address emergency management preparedness and response due to natural events and changes in climate.	U	Secretary's Office, with Crime Control & Public Safety; DFR Incident team	DENR Strategic Plan
	9-A-1: Participate in State Emergency Management Division's annual review of the State Hazard Mitigation Plan, regarding wildfires, dams, earthquakes, landslides, sinkholes, storm surge, inlet migration, and shoreline erosion.	U- 2/2010	DFR, DLR, DCM; NCDACS	
9-B	Address wildfire property damage prevention through Firewise Program.	U	DFR	
9-C	Consider expansion of FEMA designated floodplains.		DLR-Disaster Response	
9-D	Plan for increased storm intensity and landslide hazards.		DLR-NC Geological Survey	
9-E	Plan for drought impacts.		Lead: DWR	
9-F	Assist local governments to modify plans for debris management sites to manage natural disaster debris resulting from climate change.		DWM – Solid Waste	

	ADAPTATION GOALS & OBJECTIVES	STATUS	RESPONSIBILITY	SOURCE
10	Land Use Planning and Development	WORKING GROUP	Lisa Riegel, Judy Francis; DCM	CAPAG – TLU-1a/b
10-A	Promote land planning and development that supports conservation of high quality natural resources, protects and enhances the resilience of natural ecosystems, and supports more compact development, reducing growth in driving and emissions.	U	Interagency effort; DOT	CAPAG – TLU-1a/b
	10-A-1: Promote broader knowledge of climate change impacts and how they can be addressed through land use planning techniques that prevent development in hazard/risk areas such as floodplains and slopes to protect public safety, minimize property damage, and preserve ecosystem functions.	TBI/March 2010	DCM, DLR, NHTF, OCCA, DAQ, DWQ	
	10-A-2: Encourage urban form that concentrates growth in appropriate areas, increases transportation options, promotes efficient use of water, incorporates green infrastructure and discourages development in inappropriate locations.	U	DENR, NCDOT, Commerce/Energy; existing groups	
10-B	Work with local governments to incorporate specific policies, mitigation and adaptation tools into local land use plans.	U		DENR Strategic Plan
	10-B-1: Incorporate sea level rise concerns into CAMA 7-B Land Use Planning Guidelines.	U (by Spring 2011)	DCM, CRC, CRAC	
	10-B-2: Address climate change issues in land use permitting programs.	TBI/March 2010	DCM, DWR, DWQ, DLR-Land Quality; Emergency Mgmt.; DOT	
	10-B-3: Identify potential climate change impacts and develop adaptation strategies to protect working lands.		DENR Working Lands Group	