Implications of Changing Climate and Rising Seas for Coastal North Carolina

Testimony to the Legislative Commission on Global Climate Change

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Overview

- Primer on North Carolina coastal ecosystems vulnerable to global warming and rising seas
- Predicted impacts of warming and rising seas
- Recommendations
World-Class Treasures at Risk

Fisheries
Photo: WRC

Forests

Fauna
Photos: Rader
World-Class People

Photo: Rader

Rader Copy of Photo in Possession of Frances Inglis

CLIMATE CHANGE COMMISSION
Essential Habitats for the Entire Atlantic Region

Cool Waters
Source: NRDC

Warm Waters
Source: SAFMC
The Lowest and the Greatest: Albemarle and Pamlico Sounds

Source: WRC

Photo: WRC

Photo: USFWS

Photo: NCDMF
Heritage Fisheries: Freshwater Spawners

Striped Bass
Photo: WRC

Shads and Herrings
Photo: J.F. Scarola

Photo: Rader
Brackish Marshes

Primary Nursery Areas

Photo: Nurnberg
Saltwater Habitats

Saltmarsh w/Oysters
Photo: Rader

Submersed Plant Bed
Photo: DWQ
Globally-Important Bottomland Hardwood Swamps

Photo: WRC

Photo: Rader

Photo: Cornell
Pocosin Peatlands

Source: Heath (1975)
Threats: Direct Flooding

Source: Riggs (2006)

Source: Duke University
Threat: Dense Drainage

Source: Lurie (2006)

Photo: Riggs (2006)
Drainage Networks

- Oxidation of peats and subsidence
- Alteration of flows
- Salt waters “intrusion”
- Alteration of vegetation and habitat
- Alteration of human uses
Threat: Hurricanes and Extra-tropical Cyclones

Hurricane Isabel

Photo: NASA

Floyd/Dennis

Source: USGS
Storm Central!

~ 46 hurricanes hit the NC coast in last 150 years!

Source: Riggs (2006)
Old and New Inlets?

Source: Riggs and O’Conner (1974)
Collapsing Barrier Islands

Source: Riggs (2006)
Threat: Disruption of Biogeochemical Cycles

Nitrogen

Water

Carbon

Albemarle Sound?

Photo: DWQ
Ecological Cascades

- New Inlets
- Altered salinities
- Altered swamps and marshes
- Altered habitat values (e.g. migratory birds, fishes)
- Altered human usage (hunting, fishing, farming, forestry, etc.)
Threat: Altered Rainfall

• Altered flows (higher peaks, lower averages)
• Altered water availability (human and ecosystem needs)
• Altered assimilative capacity (wastes)
• Competition for water and waste assimilation!!!!
Threat: Changing Temperatures

- Altered vegetation (forests, crops and natural communities)
- Altered fisheries
- Human health

Gray triggerfish
Photo: Florida NH Museum
Deepwater Coral Reefs!?

Images: NOAA Ocean Exploration, UNCW
Threat: Invasive Species??

Pacific Red Lionfish

photo by Paula Whitfield (NOAA Beaufort Laboratory)
Recommendations

- NC Climate Action Plan
- Leverage ALL existing environmental plans:
  - Coastal Habitat Protection Plan
  - A/P Comprehensive Conservation and Management Plan
  - State Wildlife Action
  - South Atlantic Fishery Ecosystem Plan
  - Basinwide Management Plans
  - State Beach and Inlet Management Plan
  - State Water Plan
  - State Ocean Plan?
Recommendations (2)

- Flow targets for all rivers (remove or "reoperate" dams)
- Map and remediate drainage systems and drainage districts
- Prohibit new public and publicly licensed or permitted infrastructure in flood-prone and storm-surge-prone areas
Recommendations (3)

• Remediate existing vulnerable or damaging infrastructure as storms occur (“strategic opportunism”)

• “Balance” biogeochemical cycles

• Utilize existing and develop new markets for carbon, nitrogen, water and habitat

• Leverage current state investments (e.g. CWMTF)
Recommendations (4)

- Protect and restore oyster reefs and SAVs as energy absorbing structures
- Facilitate shoreline retreat and upslope wetland migration (sand, bulkheads, etc.)
- Invest in research and monitoring (e.g. water levels monitors, invasive species)
- Address inevitable “publicization” of newly submerged lands; ease that transition (e.g. rolling easements?)