Coastal Ecosystem Effects of Climate Change (CEECC)

Issue:

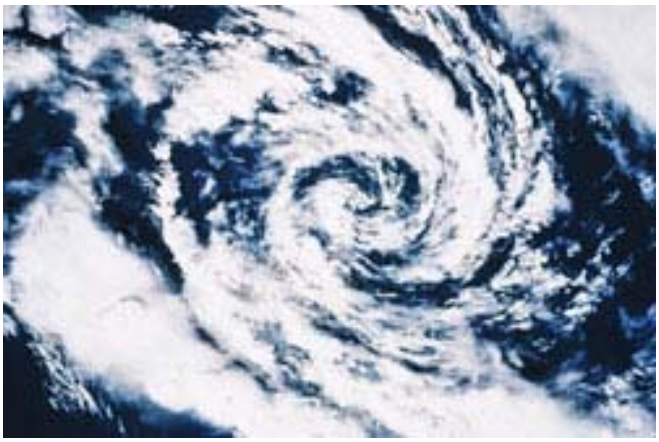
Coastal and marine ecosystems are intimately linked to climate. Thus, climate change will exacerbate the problems already occurring in these vulnerable ecosystems due to increasing coastal populations, habitat loss, nutrient pollution and invasive species. Climate induced environmental changes on estuarine and marine ecosystems include:

- Temperature changes that alter ecological processes and species interactions;
- Increase in frequency of extreme ocean warming events, with implications for coral reef bleaching;
- Changes in precipitation that alter freshwater run-off of nutrients, sediment, and contaminants;
- Accelerated rates of sea level rise;
- Alteration of oceanic wind and water circulation patterns;
- Continued losses of sea ice over large areas of the Arctic basin;
- Ocean acidification caused by reaction of increasing CO_2 with seawater.

Failure to proactively plan for and respond to climate change impacts will have ecological as well as economic implications.

NOAA CEECC Programs

- EESLR
- GLOBEC
- Intertidal Impacts



Approach:

Through a suite of programs under the Coastal Ecosystem Effects of Climate Change Program (CEECC), CSCOR supports interdisciplinary, multi-year research programs investigating how oceanic and coastal ecosystems respond to climate variability and change. CSCOR's goal is to provide managers with the scientific knowledge and tools, including ecological models, to prepare for climate change impacts with more certainty in scale, timing and local detail. CSCOR sponsors research on climate change in three focus areas; fisheries, protected resource impacts and sea level rise.

Description of Programs

Sea Level Rise

The Ecological Effects of Sea Level Rise (EESLR) project, currently underway in the Pamlico Sound area of North Carolina, teams University researchers with NOAA scientists. Specialists in biology, geomorphology and coastal modeling are joining forces to integrate storm surge models with ecological models for more precise predictions of how future sea level will affect coastal wetlands, submerged aquatic vegetation, sub tidal habitat and oyster reefs. Completion of the North Carolina project is projected in 2008, and we are currently planning expansion of EESLR to the Florida/Alabama Panhandle.

GLOBEC

CSCOR partners with the National Science Foundation to support the Global Ocean Ecosystems Dynamics program (GLOBEC), a component of the US Global Change Research Program. GLOBEC addresses the question of how global climate change may affect the abundance, distribution and production of animals in the sea. GLOBEC strives to understand the population dynamics of important species in the Northwest Atlantic and Northeast Pacific oceans, and to develop models to provide new, ecosystem–based estimates of abundances and distribution for improved fishery forecasts.

Intertidal Impacts

This project is using National Estuarine Research Reserve sites to evaluate the impacts of climate change on intertidal communities on the East and West Coasts. Models of temperature changes are used to predict thermal impacts on coastal species and ecosystems and provide tools for relevant state management agencies to predict those impacts.

Management/Policy Issues:

With 70% of the earth's surface covered by ocean and the majority of the world's populations living near the coast, proper management of our coastal resources is vitally important. Through the Marine Protection, Research and Sanctuaries Act, the Coastal Zone Management Act, and the Coral Reef Conservation Act, NOAA is mandated to protect and conserve the Nation’s suite of National Estuarine Research Reserve and National Marine Sanctuary sites. NOAA is also mandated to protect and manage living marine resources through the Magnuson-Stevens Act. Coastal decision makers need the best scientific information to appropriately manage coastal ecosystems impacted by climate change, so it is imperative for NOAA to understand and mitigate potential impacts.

Accomplishments:

These interdisciplinary research studies are helping to advance the state of the science and also lead to results with direct application to needs of state coastal resource and resource managers. For sea level rise CSCOR and partners within NOAA have developed a hydrodynamic tide and storm surge model of Pamlico, Albemarle, Core, and Bogue Sounds as well as adjacent estuarine and coastal waters. GLOBEC fisheries results have been used by fishery managers in debating closed areas on Georges Bank in the Northwest Atlantic Ocean, and most recently the salmon fishery off the coast of Oregon. Recent discoveries in the Northeast Pacific Ocean show the importance of oceanic variability in influencing zooplankton species distributions, salmon growth and survival, and episodic events such as coastal hypoxia.

FOR MORE INFORMATION :
http://www.cop.noaa.gov/stressors/climatechange/welcome.html