

Impacts of Climate Change on Northeast Waters: Long Island Sound through the Gulf of Maine

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Climate change is an unavoidable
fact of life – but our ability to
anticipate and cope with change has
not been predetermined...

Climate change, and in particular warming, is expected to affect coastal areas directly and indirectly



The major driver is warming and related changes in ocean circulation and relative sea-level



Likely Environmental Changes

- Rising ocean temperatures
- Rising sea levels, leading to coastal inundation
- Changing coastal circulation patterns
- Increased precipitation and/or storm events



Likely Ecological Outcomes

- Declines in cold tolerant species, increases in warm tolerant species
- Loss of coastal land (and infrastructure)
- Increased nearshore pollution
- Increased hypoxia and anoxia
- Faster spread of disease; emergent diseases in wildlife, food resources, and humans
- Loss of particularly vulnerable species



What Informs Us?

- Monitoring actual change
- Historical and anecdotal information, from this region and other areas
- Modeling

In the near term, global warming will be expected to lead to:

- Loss of coastal habitats and with it nursery and other ecosystem services they provide
- Negative impacts on resources, including increased hypoxia, heat stress, mortality of young, starvation
- Timing disparities (eg for migratory birds)
- Increased pollutant loading and disease
- Harmful algal blooms

Industries Potentially Affected

- Commercial & Subsistence Fisheries
- Recreational Fishing
- Aquaculture
- Whale Watching
- Coastal Tourism
- Boating and Shipping
- Insurance
- Waste Treatment
- Human Health



Human well-being in Northeastern coastal communities will thus likely be affected



However, we must remember that climate change will not be acting in isolation

- Many coastal/marine habitats already destroyed
- NE states had lost wetlands 9-74% (1987)
- Doubled nitrogen inputs have led to increased eutrophication and spreading hypoxia
- Freshwater diversion has led to catastrophic losses in water and sediment in estuaries
- Fisheries have approached overexploitation
- Toxics already undermine ecosystem health

Pollution already undermines ecosystem health

- Over-fertilization from sewage, ag waste, and run-off (77% of pollutant load reaching oceans comes from land-based sources)
- Toxics loading (pesticides, heavy metals, PCBs, etc.) is increasing, as is debris
- Alien species invasions have already altered many coastal ecosystems

Chronic, cumulative impacts
have stressed ecosystems
throughout the region

At the same time, global climate change is adding more stress to coastal systems



Luckily, adaptation by coastal states is possible

- Scientific understanding of these ecosystems is good
- Human, informational, and financial resources are plenty
- Alternative livelihoods exist
- Political will is growing...

...unlike many other places around the world



In addition, decision makers here are empowered to:

- Access good scientific understanding and utilize it to be able to anticipate changes
- Proactively plan new development and resource use
- Mitigate against impacts by maximizing ecosystem resilience
- Prepare for the severest impacts, in order to safeguard human life and livelihood

In sum, climate change is critical to understand because:

- Climate change can alter ecosystem functioning and productivity
- Stressed ecosystems are less resilient to environmental change, including climate
- Climate change exacerbates many declines in ecosystem health
- Climate change necessitates altered human responses

Future choices and trade-offs will best be made with climate changes in mind...



Thank you