

The Ecological Effects of Sea Level Rise Research Program

Issue:

Coastal communities worldwide are threatened by rising sea levels. Worldwide, sea levels have been rising for over 100 years and are expected to continue this upward trend. The rate of sea level rise during the twentieth century was about 2 mm per year, which is an order of magnitude higher than the average over the last several millennia and will inevitably be affected by climate change in the future. Rising sea level has worldwide consequences because its possibility to alter ecosystems and habitability of coastal regions. In the U.S., the mid Atlantic, South Atlantic and Gulf of Mexico coasts are particularly vulnerable.



Sea-Level Rise Impacts in the Coastal Zone Include:

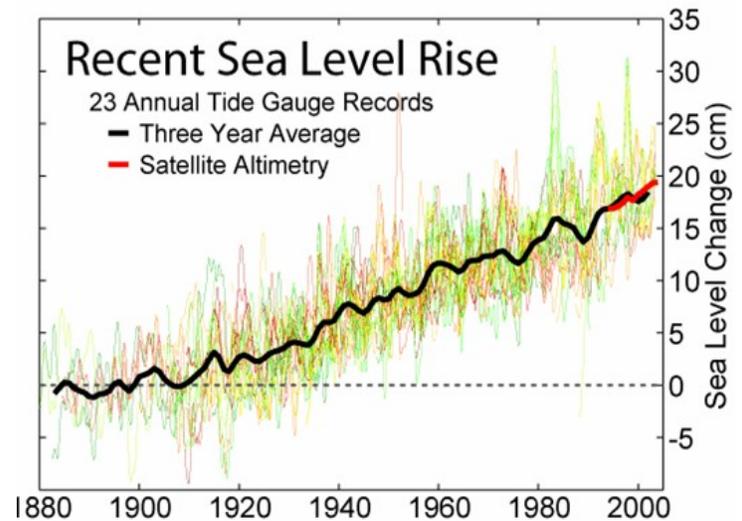
- ✓ Higher and more frequent flooding
- ✓ Shoreline erosion
- ✓ Loss of wetlands and near shore coastal habitats
- ✓ Upward and landward migration of beaches or loss of beaches
- ✓ Salt water intrusion in coastal freshwater aquifers
- ✓ Increased near-shore wave energy
- ✓ Damage to coastal infrastructure
- ✓ Economic impacts

Approach:

The Ecological Effects of Sea Level Rise (EESLR) Program brings together University and NOAA scientists to help coastal managers and planners better prepare for changes in coastal ecosystems due to sea level rise, coastal storms, land subsidence and erosion. Specialist in biology, geomorphology and modeling join forces to integrate numerical modeling with ecological models for more precise predictions of how future sea level rise will affect coastal wetlands, beaches, submerged aquatic vegetation, and oyster reefs.

Management Policy Issues:

Rising sea level has worldwide consequences because of its potential to alter ecosystems and habitability of coastal regions. The vulnerability of coastal areas varies with shoreline physical attributes such as tide range, wave height, coastal slope, shoreline change, geomorphology, and the historical rate of local sea level rise. Low lying areas in the developed areas in the Mid-Atlantic, Southeast, and Gulf of Mexico coasts are especially at risk. Damages and economic losses could be reduced if decision makers understand the potential impacts of sea level rise and use this information for planning. EESLR research will develop tools useful to coastal managers to mitigate ecological effects of sea level rise. In addition, our goal is a planning process made flexible enough to incorporate future scientific understanding, both of climate change and coastal processes.



Accomplishments:

Initiated in 2005, EESLR pilot program is in the State of North Carolina. Our partners within NOAA developed a topographic-bathymetric digital elevation model, combined with the hydrodynamic model to integrate recent airborne LIDAR data. CSCOR competitively funded three research proposals that will integrate ecological models and the hydrodynamic model into a broad based landscape model to incorporate spatial structure effects on the behavior and functioning of the landscape as a whole. Final products are now being developed.

Expansion of EESLR to the Gulf Coast was funded in 2010. The Northern Gulf of Mexico was chosen due to multiple protected areas in the region including three National Estuarine Research Reserves (NERRS), low elevation making it vulnerable to sea level rise and the exacerbating effects of storm surge erosion and hurricanes. Research is underway with intimate involvement of local coastal managers and planners.