

# Decline of World's Estuaries and Coastal Seas Has Accelerated in Last 150-300 Years

## New Study Tracks Human Impact on Coastal Marine Ecosystems From Roman Times to Present Day

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Washington, D.C. -- Human activity over the centuries has depleted 90% of marine species, eliminated 65% of seagrass and wetland habitat, degraded water quality 10-1,000 fold, and accelerated species invasions in 12 major estuaries and coastal seas around the world, according to a study published in Science Magazine on Friday, June 23d, and supported in part by the Lenfest Ocean Program. However, in areas where conservation efforts have been implemented in the 20th century, signs of recovery are apparent.

Entitled "Depletion, Degradation, and Recovery Potential of Estuaries and Coastal Seas," the study is the most comprehensive quantitative assessment of the state of estuaries and coastal ecosystems ever conducted. Initiated by the National Center for Ecological Analysis and Synthesis and co-authored by ten international experts, it shows that human impact on estuaries and coastal waters dates back to ancient times (e.g. Roman Empire in the Adriatic Sea). However, damage to marine ecosystems has accelerated over the past 150-300 years as populations have grown, demands for resources have increased, luxury markets have developed, and industrialization has expanded.

"Throughout history, estuaries and coastal seas have played a critical role in human development as a source of ocean life, habitat for most of our commercial fish catch, a resource for our economy, and a buffer against natural disasters," stated Dr. Heike K. Lotze, a marine biologist at Dalhousie University in Halifax, Canada and lead author of the study. "Yet, these once rich and diverse areas are a forgotten resource. Compared to other ocean ecosystems such as coral reefs, they have received little attention in the press and are not on the national policy agenda. Sadly, we have simply accepted their slow degradation."

Most mammals, birds and reptiles in estuaries were depleted by 1900 and declined further by 1950 as the demand for food, oil, and luxury items (such as furs, feathers and ivory) grew. Among fish, the highly desirable and easily accessible salmon and sturgeon were depleted first, followed by tuna and sharks, cod and halibut, and herring and sardines. Oysters were the first invertebrate resource to degrade because of their value and accessibility as well as destructive harvesting methods.

The primary cause of estuarine damage is human exploitation, which is responsible for 95% of species depletions and 96% of extinctions, often in combination with habitat destruction. In the coming years, however, invasive species and climate change may play a larger role in stressing estuarine resources.

According to the study, the fastest path to recovery has been through mitigating the cumulative impacts of human activity. Seventy-eight percent of recoveries have happened by reducing at least two human activities, including resource exploitation, habitat destruction, and pollution.

"Our study documents severe, long-term degradation of nearshore marine ecosystems worldwide which, as human impacts spread, may well forecast future changes in the entire ocean," said Hunter Lenihan, a marine ecologist at UC Santa Barbara's Bren School of Environmental Science and Management. "But we have also shown that the causes and consequences of this damage are common to all areas, and so we now have the necessary reference points and targets to develop effective management and restoration plans. Because over-exploitation and habitat destruction are responsible for the large majority of historical changes, reducing these destructive impacts should be a priority in these plans."

Despite severe degradation in these 12 very different estuarine and coastal water environments, there is good news. "Only 7% of species went regionally extinct, and some are rebounding (birds and seals in particular). Clearly, recovery is achievable. As we expand our conservation efforts, we will see more evidence of healthier, abundant marine ecosystems." said Roger Bradbury, a resource management scientist at Australian National University.

In developed countries, trends suggest that estuaries may have passed the low point and are on the path to recovery, according to the study. In developing countries, however, population growth, which puts pressure on coastal areas, may further increase degradation.

"The 2004 Asian Tsunami and 2005 Hurricane Katrina helped us recognize how important healthy estuaries are in our lives," stated Jeremy Jackson, a paleontologist at Scripps Institution of Oceanography. "Thanks to this study, we can now see much more clearly what coastal ecosystems looked like before humans interfered with them, which has given us a historical baseline and a vision for how to regenerate diverse, resilient ecosystems that can thrive in the centuries to come."

The study quantifies the magnitude and causes of ecological change in 12 estuaries and coastal seas in Europe, North America, and Australia from the onset of human settlement to the present day. They are Massachusetts Bay, Delaware Bay, Chesapeake Bay, Pamlico Sound, Galveston Bay, Francisco Bay, Western Baltic Sea, Wadden Sea, Northern Adriatic Sea, Southern Gulf of St. Lawrence, Outer Bay of Fundy, and Moreton Bay. The researchers combined palaeontological, archaeological, historical, and ecological records to trace changes in important species, habitats, water quality parameters and species invasions.

#### ***About Lenfest Ocean Program:***

This research was initiated and supported by the Lenfest Ocean Program. The Program was established in July 2004 by the Lenfest Foundation and is managed by The Pew Charitable Trusts. It brings the best scientific research to bear on identifying the causes, consequences and solutions to problems facing the global marine environment. The Program currently

supports research on the ecological, social and economic impacts of current and proposed fishing regimes, and options for sustainable fisheries management.

*Other funders:*

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