HOW UNDERSTANDING THE COASTAL ZONE IS IMPORTANT TO EVERYDAY LIFE

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A profound lack of understanding pervades the U.S. population about the role oceans play in everyone's lives. Even among the millions who live along our coasts, people have difficulty connecting ocean and coastal issues with the things they care about the most. NOAA's Ocean Service (NOS), which is charged with sustaining the prosperity of the nation's oceans and coasts through responsible management of our coastal resources, is working to help people understand that oceanography influences many aspects of our lives, including our economy, our quality of life, and our safety and security.

Currently more than half of the world's population lives along coastal areas, and with good reason. The coasts are the most productive and resource-rich areas on the planet. More than 25 percent of the world's energy is produced here, 90 percent of the world's fish is caught here, and 25 percent of global primary productivity takes place here.

Economically, the sea is perhaps our most important mode of transportation. Ninety percent of international trade is carried by sea (NOAA NOS Trends and Future Challenges for U.S. National Ocean and Coastal Policy Workshop Proceedings, 1999).
Not surprisingly, a large percentage of Americans make their living and spend their leisure time along the coasts, and that number is increasing. The United Nations predicts that by 2025, 75 percent of the world's population will live in coastal areas. Such a growth in population is leading to increased pressure on our coastal resources, many of which are already experiencing significant stress-related conditions and are in decline.

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These stresses, which cause ecological and economic damage, include:

- *Point and nonpoint source pollution*—80 percent of marine pollution is produced by land-based sources and carried to the ocean by rivers and estuaries (Pollution from the Land: The Threat to our Seas, 2003). More than 5,000 square miles of the Gulf of Mexico becomes hypoxic during summer months (Heinz Center report). Such "dead zones" number nearly 150 worldwide.
- *Overfishing*—It is estimated that 25 to 30 percent of the world's major fish stocks are overexploited (State of the World's Fisheries and Aquaculture, 2002). Approximately 25 percent of the major fish stocks in U.S. waters are overfished (Annual Report to Congress on the Status of U.S. Fisheries, 2002).
- *Invasive species*—as international shipping has increased, the introduction of exotic marine species has increased exponentially over the past 200 years. More than 500 invasive species are now established in North American coastal habitats (written testimony before the House Subcommittee Environment, Technology, and Standards, 2002).
- *Harmful algal blooms*—HABs cost the U.S. an average of $49 million each year because they lead to fisheries closures, loss of tourism and recreational opportunities, and increased health care and monitoring expenses (Estimated Annual Economic Impacts from HABs in the United States, 2000).

NOS, through applied research, products and services, helps coastal communities address economic, quality of life, and safety and security issues.

Economics

NOS conducts research and provides products and services that are integral to our economy. For instance, the shipping and routing industry depends on tide and current data for safe and secure shipping passage. Ships have increased in size tremendously to allow for additional cargo. However, such large ships must navigate through narrow and shallow shipping lanes and through gauntlet-like conditions. To ensure safe passage, NOS provides systematic and continual observations through 100 operational observing systems, composed of nearly 30,000 deployed platforms or stations. These platforms measure more than 500 different environmental, meteorological, oceanographic and related parameters.

NOS also manages the nation's National Water Level Observation Program (NWLON)—a network of tide gages that provides basic tidal information and supports climate monitoring activities, tsunami and storm surge warning systems, coastal processes and tectonic research. NWLON consists of 175 continuously operating water level measurement stations along the U.S. coastline and the Great Lakes region. Many of these stations have been in operation and transmitting data in near real-time for 19 years.

Quality of Life

NOS develops new technologies or methods to enhance our knowledge of the marine environment and parlays that knowledge into practical applications. For instance, NOS scientists have conducted extensive research on harmful algal blooms—their possible causes, their potential effects, and methods for managing their impacts. As a result, NOS has developed an operational HAB forecast system for Florida and the Gulf of Mexico. The system provides federal, state and local resource and public health managers with daily information and bi-weekly forecasts on HABs. This information is used to determine the current and future location and intensity of blooms and their likely impacts. By knowing in advance if an HAB is to affect Florida or the Gulf states, coastal communities can better prepare for possible economic and ecological impacts.

In addition, in response to a recommendation from the U.S. Commission on Ocean Policy (USCOP), NOS is contributing to the development and implementation of an integrated ocean observing system (IOOS). NOS is organizing a series of outreach meetings with the user community to ensure that their needs are incorporated into the planning process, and that the data collected by the IOOS are translated into practical information products and forecasts that will benefit the entire nation.

Safety and Security

NOS provides services and products that are integral to ensuring the nation's safety and security, especially within our ports and harbors. For example, NOS developed and sustains the Physical Oceanographic Real-Time System (PORTS), which provides practical tidal, current and other oceanographic information in nine U.S. ports on all four of the nation's coasts. NOS provides technical expertise in the design, installation and maintenance of PORTS stations. NOS also provides continuous (24/7) quality control of real-time data, and disseminates this information via the Web, through voice modem, through local means, and other methods. We also archive the historical data and conduct research to develop new sensor types and related system equipment. Once a port city signs on to a PORTS installation, it is responsible for costs of installation and ongoing maintenance.

PORTS provides information critical to environmental protection. It helps ships avoid marine accidents that can involve hazardous material spills. In fact, the first PORTS installation—in Tampa Bay—was the result of a marine accident in which Tampa's Sunshine Skyway Bridge was rammed by a ship trying to pass underneath. The accident resulted in 35 deaths and damage to the marine environment.

Through these products and services that aim to improve and maintain our economy, quality of life, and safety and security, NOS strives to be the global leader in the integrated management of the ocean.

Education and Outreach Campaign
NOS is implementing another recommendation by the USCOP—an ambitious education and outreach campaign to increase people's knowledge and understanding of our coastal areas. We are developing and disseminating formal, standards-based educational products like science tutorials and lesson plans, available both online and on CD-ROM. NOAA's Office of Ocean Exploration offers hundreds of formal lesson plans for science teachers through the award-winning Ocean Explorer Web site (http://oceanexplorer.noaa.gov). The lesson plans add value to the research expeditions that are chronicled on the Web site, complete with video, images, background essays and daily logs from expedition participants.

We are also bringing field-based observations and technology into the classrooms via the Web through several projects. For example, the National Estuarine Research Reserve has launched an interactive Internet field trip through the nation's estuaries called EstuaryLive. Each year, the free interactive event teaches students about our estuarine ecosystems and provides teachers with formal teaching materials.

Partnerships are also being leveraged to facilitate ocean and coastal literacy. For example, we are partnering with professional educational societies such as the National Science Teachers Association (NSTA) to develop educational products and to ensure product quality. Our work with NSTA will also help us disseminate our products to students and teachers nationwide. NOAA is also working with NASA to developed OceanAGE, a Web site featuring ocean explorers designed to inspire students to pursue math and science subjects in school and perhaps one day become oceanographers. NOAA's National Marine Sanctuaries Program is working with the JASON Foundation to link telepresence activities in our nation's 13 sanctuaries with system-wide oceanographic monitoring systems. And NOAA is working with the Maury Project to network with teachers and provide materials and information on NOAA products and educational opportunities. Finally, NOAA is also working directly with the Smithsonian Institution's National Museum of Natural History to plan and develop a new 22,000-square-foot Ocean Hall, scheduled to open in 2008. NOAA science and research will be instrumental in the concepts conveyed by this remarkable exhibit.