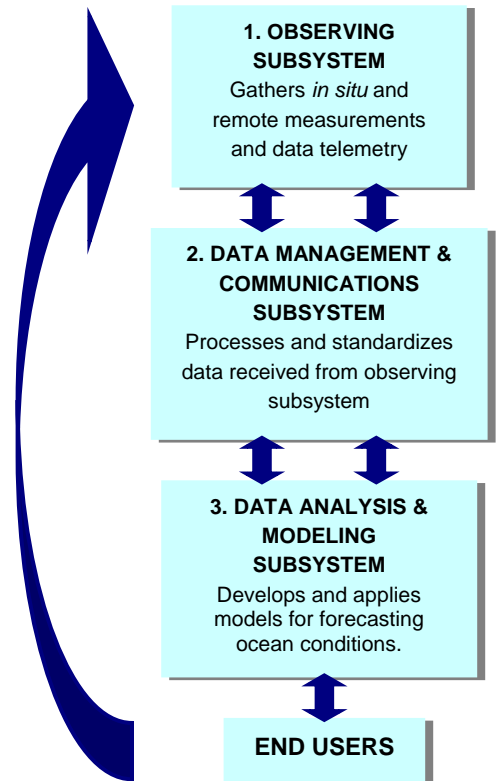


IOOS and Environmental Education in the Gulf of Mexico

What does IOOS do?

IOOS (Integrated Ocean Observing System) is a **multidisciplinary** system designed to provide ocean and coastal data in the formats, rates, and scales required for decision-making, based initially on the **integration** of existing private, federal, state, and local systems. In addition to decision-making, IOOS can be helpful in educating students and citizens about the environment in general and the Gulf of Mexico in particular, using real-time data and visualization systems to create interest in the Gulf's ecological and oceanographic processes and connections. For example, IOOS information on sea levels can help students learn about climate change and its impact on coastal habitats and communities. Consisting of three major subsystems (see figure at right), IOOS will constantly evolve according to user needs.

Currently, numerous ocean and weather data collection systems are maintained by scores of federal, state, and non-governmental agencies and organizations. IOOS is gathering these useful but disparate and isolated data sources into integrated systems, giving users ready access to all ocean-related data gathered by all possible sources. In addition, IOOS will allow any compilation of data specified by the user to be manipulated using myriad existing forecasting models, thereby turning raw numbers into actionable information relevant to the user's specific concerns. Finally, IOOS is seeking new research and enhancements to add to its already-extensive catalog of products. In this way, IOOS becomes a flexible, adaptable system capable of keeping up with new developments while maintaining the reliable delivery of data, analyses, and forecasting results. IOOS will focus initially on a series of high priorities.



How can IOOS Help Improve Environmental Education?

One of the most critical objectives for the Gulf of Mexico Alliance (GoMA) is environmental education, teaching not only the future resource managers and decision-makers about the Gulf of Mexico's ecological health, but also residents who may not understand how their activities may impact the Gulf or how the Gulf can affect their lives. GoMA hopes to **increase science literacy** and establish and foster a sense of environmental stewardship toward the Gulf. One of the most tangible benefits of **increasing awareness** of the Gulf coastal resources and processes lies in hurricane preparedness and a perhaps life-saving appreciation for the power and destructive ability of Gulf waters. GoMA believes that creating community-wide education opportunities and **instilling a stewardship ethic** in both Gulf Coast residents and those within the drainage basin will help create a present and future generation of informed leaders.

The very nature of IOOS makes it an ideal way for people to learn about the ecological nature of the Gulf as well as the ways in which seemingly disparate environmental aspects are really closely connected. Multiple IOOS groups have dedicated education missions. In 2006 the IOOS Education Caucus helped form the Education Data and Technology Protocols (EDATP) for education working group. This group promises to bridge the frequent gaps between scientific investigations and the information content that can be most useful in formal and informal education programs. Additionally, aquariums in both the United States (e.g., Texas Aquarium) and Mexico (e.g., Vera Cruz Aquarium) can be useful as parts of an effective network of active facilities that could become distribution or access points for new IOOS educational products and services.

One example of the contribution IOOS can have to environmental education is through the Centers for Ocean Sciences Education Excellence (COSEE), a network of centers focused on promoting ocean science education as a

conduit for increasing the scientific literacy of U.S. citizens. Although each Center has regional issues on which it focuses, the fundamental objectives of the COSEE network include **encouraging educators to incorporate ocean sciences into their curriculums**, providing guidance to scientists who are involved in the educational world, and facilitating the addition of high-quality research findings into educational materials and lessons. Since data and products will be accessible via the internet, IOOS will allow environmental and ocean educators to access actual, tangible data, allowing for **real-world, regional-specific scenarios** to be played out in the classroom or seminar. IOOS promotes an understanding of often-mysterious environmental and meteorological phenomena and, by exposure to these kinds of concepts, students will be encouraged to seek career paths they might not otherwise have followed. These new career options will put these students in the position of continuing and evolving the IOOS legacy through research, field work, and education. This self-fulfilling sequence is only one of the numerous advantages of incorporating IOOS into educational curricula.

"The COSEE network promotes a better understanding of the key role the ocean plays in global environmental cycles and processes. NSF is encouraging the ocean-science research community to become more involved in education at all levels."

*Larry Clark, acting director of
National Science Foundation's (NSF)
Division of Ocean Sciences
(NSF Press Release, January 3, 2006)*

In addition, a COSEE pilot program, COSEE-Ocean Systems (OS), is focused on reaching inland and rural audiences, endeavoring to represent oceans as integral parts of larger global systems. The program shows those who are not coastal inhabitants how they can impact the ocean and how ocean processes can affect inland communities. The program also makes evident the role played by these upstream areas, an objective that is shared by GoMA. IOOS can be indispensable in meeting some of the goals of COSEE-OS, including assisting with "**key message concept mapping**," which seeks to showcase the role of oceans in larger earth systems by using multimedia resources. User-friendly interfaces, mapping abilities, and real-time access to data from IOOS can put the sometimes abstract connection between upland areas and ocean processes and health in a **hands-on format**, where students can see for themselves (using IOOS modeling and analysis abilities) how large ecological processes are inextricably entwined.

IOOS developers are committed to making IOOS a user-driven system, by listening to the needs of key stakeholders, incorporating those needs into future products, and using these recommendations to guide future funding and development of IOOS.

What Can GoMA and Other Environmental Education Stakeholders Do?

The value added from the integrating and sustaining power of IOOS will only be realized with regional association **participation** and **data sharing**.

Participation: Stakeholders should get involved with an IOOS Regional Association (RA) (www.ocean.us/regional_associations). RAs are critical for engaging private and public user groups to identify regional data and information needs. Additionally, RAs can be high-value entry points for a user to get involved with specific IOOS pilot projects (many of which are happening right now) through which users help improve and refine IOOS. Pilot projects and RAs can facilitate data sharing, the cornerstone of IOOS, between previously unconnected parties. Even by sharing small amounts of data, users can reap significant benefits through invaluable forecasting results.

Data Sharing: Stakeholders should share data (e.g., weather information from vessel-based instruments or observations from offshore platforms) with federal, state, and local agencies. For instance, many universities have data collection programs and, in an effort to create student interest in environmental science, these data can be used via IOOS to demonstrate key concepts and create visualization tools.