

## 6. Education and Outreach

**Research Need: Education and outreach products and programs that cultivate greater community awareness of HABs and a resurgence of stewardship of coastal ecosystems.**

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HARRNESS aims to enhance national education and outreach to promote societal awareness of HABs that will “aid the medical community in diagnosis, will aid the seafood safety community in conveying the importance of closures,” will promote adherence to warnings, and will contribute to collection of economic, public health, and sociocultural data on HAB impacts (such as the data needs identified in Section 1.1). These outcomes, in turn, will reduce vulnerability and promote effective mitigation of public health, socio-cultural, and economic impacts of HABs. The bottom line is that “an informed populace is a prepared one” (HARRNESS 2005, 75).

Achieving the goals of HARRNESS for the National HAB Educational Outreach Program requires sound scientific understanding and active participation of community audiences.

The success of education and outreach efforts for these outcomes relies on tailoring programs to deliver accessible information to, and harness the participation of, diverse sectors – including recurrently and potentially affected communities; the public health arena; and industries such as seafood, aquaculture, tourism, and recreational and commercial fishing. As HARRNESS affirms, “information should be developed in forms that are easily accessible and understandable and provided in formats that the community can use in meaningful ways.” Toward this end, it is important to utilize social science methods such as focus groups to “listen closely to the needs of small coastal communities to provide quality information and resources to their schools, local organizations, and businesses” (HARRNESS 2005, 65).

Social science research is critical to characterize these diverse sectors in order to focus programs to actively

involve them, effectively inform them, and ultimately facilitate beliefs and behaviors that reduce vulnerabilities and promote recovery from impacts. Sound scientific understanding of audiences, including characteristics such as the following, is critical to assess needs for educational and outreach programming.

- Demographics (e.g., age, ethnicity, and primary language of coastal residents and visitors);
- Knowledge (e.g., causes of HABs and symptoms of HAB illnesses);
- Attitudes (e.g., trust in resource management agencies);
- Beliefs (e.g., about the scientific predictability of HABs);
- Institutional characteristics (e.g., coordination across resource management, public health, tourism, and other sectors);
- Political setting (e.g., controversy over previous closures or reluctance of local businesses to communicate warnings);
- Information sources (e.g., primary use of television, radio, newspaper or other sources for information on closures or public health warnings); and
- Technological requirements (e.g., technologies accessible to and used by target audiences).

In addition to audience profiles describing characteristics such as these, evaluation of products and services is an essential contribution of social science research. Formative evaluation (i.e., assessment of effectiveness throughout an educational or outreach process) enables outreach program staff to adaptively improve or discontinue efforts based on lessons learned, changes in social or natural environment such as a shellfish bed closure, or changes in audience profile such as emerging distrust of resource management agencies. In contrast, summative evaluation provides information

on the efficacy of a product or service for achieving established goals such as promoting active participation of coastal communities in volunteer phytoplankton monitoring networks, reassuring consumers of the quality of seafood products marketed in a local or regional area, or facilitating access to information about environmental impacts and health risks associated with HABs.

Achieving the goals of HARRNESS for the National HAB Educational Outreach Program requires sound scientific understanding and active participation of community audiences, as well as evaluation of program effectiveness (Fig. 12). The following discussion elaborates on these goals, focusing on the need to develop projects appropriate to specific audiences (Fig. 13).

## Research Objectives

1. *Identify audiences integral to the goals established by HARRNESS for the National HAB Educational Outreach Program.* Assess audience characteristics to inform programmatic development and implementation. Facilitate the active participation of, and integrate the experience of, regulatory agencies, affected publics, and other groups. Outreach and education are critical to “maintain and disseminate information about HABs to ensure accurate knowledge, attitudes, and perceptions” – an outcome that is fundamental to facilitating public trust in regulatory agencies and risk-wise behavior (HARRNESS 2005, 65). Information must be provided to a wide variety of audiences that may be affected by HAB events or play an integral role in preventing and responding to impacts (Fig. 13). For example, walk-in medical clinics treat coastal visitors suffering from impaired breathing.

### HARRNESS Goals for the National Educational and Outreach Program

- Develop and distribute easily accessible information about HABs environmental impacts and health risks.
- Develop communications focused on unusually susceptible populations such as different age groups, health status, and geographic distribution.
- Implement special language or culturally sensitive educational procedures for delivering health messages to underserved, culturally, or socio-economically isolated communities.
- Listen closely to the needs of small coastal communities to provide quality information and resources to their schools, local organizations, and businesses.
- Promote active participation of community and school groups in volunteer phytoplankton monitoring projects and ocean education stewardship programs.
- Provide multiple layers of communication on these subjects spanning local to global communities.
- Provide resources and monitoring programs to communities subsistent on local resources where other options may not be readily available.
- Work with industry representatives and regulatory agencies to enhance public awareness of health benefits that foster accurate perceptions of seafood/shellfish safety to reassure consumers of the quality of the seafood products being marketed.
- Work with medical schools and associations to improve physician education in the diagnosis, management, and reporting of HAB related illness.
- Work with teachers to better understand public school curricula at different grade levels to develop teaching sourcebooks and activities that promote understanding of algae, toxins, food webs, and health.

Figure 10. HARRNESS Goals for the National Educational Outreach Program (HARRNESS 2005, 65)

Education and outreach targeted at administrative and professional staff of these clinics should not only inform staff about HAB variability and predictions, but also explain the need for data collection and help to ensure their cooperation in the process. Although the primary goal is to educate audiences working on the “front lines” of the HAB-people gradient, education can also be beneficial for building new partnerships and facilitating the cooperation of public health workers and others in gathering research data.

2. *Identify, develop, and deliver decision support tools that are accessible to and used by decision makers and affected communities to prevent and respond to HAB impacts.* It is important to move research technology into general use as efficiently and effectively as possible. Tools need to be developed to assist scientists, health officials and local decision makers in conducting their work quickly and precisely. Matching their needs with the current technology development and commercial companies requires communication and investigation. Agencies such as the National Oceanic and Atmospheric Administration have developed partnerships such as ACT, the Alli-

ance for Coastal Technologies, to assist in the identification and testing of sensors. Academic departments devoted to technology transfer assist University staff. Transferring tools for use by constituents requires understanding their knowledge, perceptions and skills as well as the institutional and political barriers they face.

3. *Identify and develop outreach and education programs and projects that facilitate stakeholder understanding and risk-wise response to HAB predictions, forecasts, and potential policy changes.* Although many sectors and segments of communities have a stake in the prediction and forecasts of HABs, they can be classified into audiences such as groups dependent upon seafood for subsistence; tourists; public health workers; industries such as seafood, aquaculture, tourism, and recreational and commercial fishing; local businesses; and civic leaders. It is important that each group receive appropriately-targeted and accurate information in order to facilitate behaviors (e.g., adherence to warnings) that reduce risks and promote recovery from impacts.

Example Audiences for HAB Education and Outreach	
<i>Bloom Ecology and Dynamics</i>	<i>Public Health and Socioeconomic Impacts</i>
Fishery Managers	Lifeguards
Agricultural Sector	Subsistence Resource Users
Educators and Students (K-Higher Education)	Recreational Resource Users
Taxonomy Graduate Students	Coastal Property Owners
	Hotel Operators
<i>Toxins and their Effects</i>	Seafood Industry
Physicians	Restaurant Industry
Medical Students	Charter Boat Operators
Public Health Officials	Tourists
Emergency Medical Personnel	Social Service Providers
Wildlife Managers	Public Officials
	Chambers of Commerce
<i>Food Webs and Fisheries</i>	Social Scientists
Marine Mammal Stranding Networks	Land Use Planners and Managers
Fish Merchants	Media
Aquaculturists	Seafood Consumers
State Monitoring Programs	Water Utility Managers

Figure 11. Example Audiences for HAB Education and Outreach Initiatives

4. *Develop educational and outreach projects appropriate for interested public audiences.* Public audiences are diverse, including highly susceptible populations characterized by socioeconomic status, physiological traits such as pre-existing respiratory conditions, and cultural practices such as species harvested and food preparation techniques (see Section 2.4, *Identifying Susceptible Populations*). This diverse public, especially highly susceptible groups, must be aware of anthropogenic affects on HABs, and impacts to public health and communities, resulting from potential HAB blooms. To prevent and recover from impacts, it is important that the public be prepared for blooms and that additional projects be developed and made ready to implement during a bloom. The planning must include competent, flexible information to cover different bloom types and effects.

5. *Within the context of existing programs, identify and develop projects for K-12 education and teacher professional development.* K-12 audiences have specific academic requirements rooted in their state standard of study. These are often based on national standards or benchmarks, but are influenced on the local level. When designing programs for this group, it is important that curriculum writers become thoroughly familiar with a particular state's curriculum in biological or health sciences in order to design material that fits in and targets particular grades of interest. Ongoing K-12 volunteer monitoring programs such as NOAA's Southeast Phytoplankton Monitoring Network conduct work in some states and adapt programs as necessary to match the curriculum to the students, while retaining monitoring quality (<http://www.chbr.noaa.gov/pmn/>). Other programs such as the American Lung Association's Open Airways for Schools program target students at risk for asthma and therefore with risk of suffering effects of HABs ([www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=44142](http://www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=44142)). Fully developing these programs is as important as developing additional programs. Social science needs include information related to the local education process, the socioeconomic status of the area, and the specific needs of the students, e.g., whether their recreational and other activities put them at high risk of exposure.

### Example Project 1

#### **HAB Information and Needs Assessment Workshop for a Regional Public Health Community**

Facilitating Objective 2 above, this project serves two purposes. The first is a goal of HARRNESS for education and outreach – distributing easily accessible information about HAB environmental impacts and health risks to relevant sectors such as the public health community (HARRNESS 2005, 65). To accomplish this goal, the project would convene a workshop for a regional public health community that includes an intensive educational component led by appropriate environmental, epidemiological, and social scientists. The second purpose is to assess information and tools needed by the regional public health community to diagnose HAB illnesses (see Section 2.1, *Developing Diagnostic Tools*), report HAB-related illnesses to improve surveillance (see Section 2.2, *Improving Surveillance*), and promote public education of HAB-related health risks. A variation on this approach could integrate information objectives and needs assessment across multiple sectors in a region, e.g., by involving key informants from tourism, seafood, recreational and commercial fishing, community and other groups. Workshops could be repeated and compared across regions.

#### **Methods:**

- Workshop facilitation
- Needs assessment
- Effective training techniques and technologies
- Group decision making and collaborative processes
- Workshop evaluation: Pre- and post-test to assess changes in knowledge and attitudes. Evaluation of workshop relevance to public health decisions. Track changes in effectiveness of diagnosis and monitoring of HAB-related illnesses, and communication strategies.

#### **Outcomes:**

- Assessment of information and tools needed by the regional public health community to diagnose HAB illnesses, report HAB-related illnesses to improve surveillance, and promote public education of HAB-related health risks. Multiple regional workshops could yield a comparison across regions with recurring, occasional, and rare HABs.
- Informed public health community

**Challenges:**

- Attendance and participation of regional health community.

**Expertise Needed:**

- Education component: HAB biophysical, social science, and epidemiological researchers. Education specialists.
- Workshop Facilitators

**Timeline:** A timeline for development and implementation of one regional workshop focusing on the public health community might be as follows:

1. Planning	4 months
2. Implementation	2 months
3. Evaluation	1 month
4. Assess information and tools needed, facilitate development by partners	4 months

Evaluation of workshop effectiveness would also be ongoing, informed by development and use of tools identified as needed by the public health community, dissemination of tools and lessons learned to other regions, and continued feedback of participants.

**Estimated Cost:** Approximately \$150,00 to develop and implement two to three regional workshops. Cost depends on number of participants and number of regional workshops held, and the technologies used to complete them. The predominant expense is travel and associated needs of workshop participants.

**Potential Partners:**

- State and local health departments
- Hospitals and community health clinics
- Medical schools
- American Red Cross
- Lung health organizations
- NOAA Coastal Services Center (workshop planning, development and delivery of information, services and products identified by the public health community as needed).

**Example Project 2****HABs Information for At-Risk K-12 Students and Teachers**

**Description:** Facilitating Objective 5 above, the purpose of this project is to develop a lesson module on HABs targeted to at-risk students, particularly those with breathing impairments such as asthma, and promote its incorporation into an ongoing and effective K-12 education program such as the American Lung Association's Open Airways for Schools program. To inform development of the module and facilitate its use, the project would involve partnership with local community groups and schools in areas affected by HABs (<http://www.lungusa.org/site/pp.asp?c=dvLUK900E&b=44142>). The curriculum should include sourcebooks and activities that promote understanding of algae, toxins, and food webs as well as impacts of HABs on coastal environments, public health, socio-cultural dimensions of communities, and local and regional economies.

**Methods:**

- Curriculum development – write and test a module on HABs
- Partnership development – e.g., American Lung Association's Open Airways for Schools program, community groups, and schools
- Train educators for delivery and evaluation.
- Collect and analyze evaluation data

**Outcomes:**

- K-12 citizenry and educators well-informed about the ecology and impacts of HABs
- American Lung Association (National and State organizations) informed of health risks associated with HABs, especially for individuals with asthma, and committed to related educational programming

**Challenges:**

- Developing partnership with American Lung Association

**Expertise Needed:**

- Demographic research capacity. For example, it will be necessary to identify locations with high numbers of K-12 students, particularly those with high rates of asthma (such as poverty areas)

or other attributes that make them particularly susceptible to health impacts, where there is a high or moderate risk of HABs.

- Education program and lesson plan development
- Training
- Evaluation, e.g., pre- and -post tests, follow-up evaluation at 1 year, oral questions of students.

**Timeline:** 2 years. Partnership development and curriculum development are predominant.

**Estimated Costs:**

- Demographic work, contracted at \$12,000
- Educator, contracted at \$50,000
- Travel for partnership development and training, \$15,000
- Total \$77,000
- Could be completed by Education graduate student, \$45,000 stipend and travel per year

**Potential Partners:**

- American Lung Association and state organizations such as the American Lung Association of Florida
- Community foundations
- Local civic organizations such as rotary
- Environmental Protection Agency
- Centers for Disease Control and Prevention

Alternatively, a K-12 health curriculum for coastal communities could be developed that includes many coastal hazards such as microbiological contamination, hurricanes, and climate change. Such a curriculum should be compatible with state health standards, state and National Science Education Standards and Benchmarks for biology, single cell organisms and environmental science, habitat and pollution. Activities could be developed for each appropriate grade level and disseminated through professional teachers' meetings for health and science.