

GLOBAL HEARTBEAT



Monitoring the world's coasts through science and education partnerships

**An exciting worldwide crab heartbeat
monitoring project for students and scientists!**



A Crab with Heart



The "E" tag in this photo labels the heart, and the gills are also visible as the brown feathery structures on either side of it.

Photo courtesy of Dr. Shaw Bamber.





Introduction

A unique project that brings together young people and scientists through a partnering of research institutions, schools and marine aquariums.

An exciting hands-on study of crabs' heartbeats combined with online interactive dialogue among scientists and students and a rich set of curriculum resources.

Monitoring crab's heartbeats helps demonstrate the interrelationship between ocean health and the health of living organisms.





Why the heart rate?

- Research has shown there is a correlation (not cause and effect relationship) between heart rates and water pollution levels
- Very slow heart rate can indicate chronic stress, and fast heart rate can indicate acute stress





Partners

Global Heartbeat is a hands-on environmental science and educational program involving a number of partnering organizations.



The **College of Exploration** - responsibility for overall project management program development, coordination and implementation.



NOAA's USC Sea Grant - provided year one funding for the pilot project, year two funding for training, curriculum development and summer program, and year three funding for teacher training, curriculum development and video production.



Plymouth (U.K.) Environmental Research Centre Developed CAPMON procedures, taught training in Plymouth and Bermuda, provides original scientific expertise and original protocols and research (Dr. Mike DePledge and Dr. Shaw Bamber)








Partners cont.

- **Connecticut - Supported by Project Oceanology and Pfizer** Support for CT High School participation and teacher training.
- **University of Maryland Biotech Institute and the Center of Marine Biotechnology and Maryland Sea Grant.** Hosted training in Maryland for teachers and scientists (2002) and conducts research on aquaculture.
- **Bermuda Biological Center for Research - Center for Ocean and Human Health.** Development of connections between oceans and human health. Hosted training program Summer 2002. Scientist support.
- **Thomas Jefferson High School-Virginia:** Independent research study project completed by a student in 2003





Project Summary

-  Global Heartbeat brings together students, teachers, and research scientists, in a marine pollution monitoring network that involves recording the heartbeats of crabs and other organisms.
-  Global Heartbeat engages students in authentic research working with real data, develops inquiry-based learning skills and an understanding of biomarkers
-  Global Heartbeat is envisioned as a program that will lead to increased awareness of marine health, biodiversity, and water toxin issues.



Goals



TO BUILD AWARENESS OF OCEAN HEALTH, COASTAL ENVIRONMENTAL ISSUES AND HUMAN HEALTH IMPLICATIONS. Students use scientific inquiry to understand the connections between ocean health and human health and issues of biodiversity, and water toxins as part of a global system.









TO USE NEW SCIENTIFIC TECHNOLOGY TO ASSESS HEALTH OF ANIMALS IN AQUATIC ENVIRONMENTS by offering additional data collection points for the study of the health of the ocean.



TO ENGAGE STUDENTS, EDUCATORS and SCIENTISTS in COOPERATIVE RESEARCH and COLLABORATIVE LEARNING ON THE WEB.



Through this program middle and high school students will be involved in a wide range of activities developing their skills in science and in the use of technology.

-  Hands-on monitoring of crabs' heartbeats in the lab.
-  Researching the water quality of local waters
-  Developing scientific research skills and inquiry-based learning skills
-  Contributing to an online database of scientific data
-  Interacting with students and scientists worldwide via the Web
-  Using curriculum materials especially created for this program



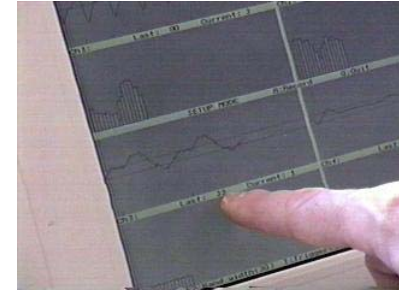
Procedure



1. A small infrared device is attached to the shell of the crab or mussel



2. The crab(s) are kept in a tank with the infrared device hooked up



3. The leads from the infrared devices on the crabs are hooked to the digital signal processing unit, feeding signals to a computer running special monitoring and recording software



4. The heartbeats are displayed on the screen and are recorded in a database



5. A variety of tests are completed to understand the health of the crab. One of these involves putting the crabs on a shake table for "crab aerobics"





Pilot Project

The PILOT PROJECT took place at Wrigley Marine Science Center, Catalina Island, CA from August 6-10, 2001. More than 40 high school students, from USC High School Girls' Science Camp and from the Sea Education Association program took part.

Catching the crabs!



"I actually felt the heartbeat."
Yumin, program participant





Pilot Project Successes

The scientists, educators, and students reflected on the program's benefits:

"It ties in the fact that all living species are alike in many ways."

Tessa, program participant

"Provides an intro to experimental methods and an awareness of environmental contamination."

Shaw Bamber, University of Plymouth

"It teaches kids to use real data and to solve real problems...teaching them to ask questions"

Phyllis Grifman, Sea Grant

Check out our website for further program details and for some great video clips from the Pilot Project!

www.globalheartbeat.org
The College of Exploration



- Curriculum Development
- Continuing program development
- GIS potential
- Human Health connections
- Partnerships in development
 - Gulf of Mexico :Dr. Harriet Perry and Dr. Sharon Walker
 - International outreach: Italy, UK, Ireland, Bermuda
- Funding; sustainability



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More
information

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