NOAA/NSTA Symposium: Coral Ecosystems
Thursday, March 27, 2008

1:30 PM – 1:55 PM
Welcome, Introductions, Goals for the Symposium

Al Byers, Assistant Executive Director of Government Partnerships and e-Learning, NSTA
Flavio Mendez, Symposia and Web Seminars Director, NSTA
- About NSTA Symposia
- Agenda/Goals/Forms/Credit Info/Logistics/Introductions

Tanya Radford, Programs Assistant, NSTA
Tyler Christensen, National Oceanic and Atmospheric Administration (NOAA) Coral Reef Watch
Patty Miller, Hawaiian Islands Humpback Whale National Marine Sanctuary, NOAA
Paulo Maurin, NOAA Coral Reef Conservation Program
Bruce Moravchik, NOAA Ocean Service
Britt Parker, NOAA Coral Reef Watch
Marci Wulff, NOAA Coral Reef Conservation Program

1:55 PM – 2:10 PM
Reef Shuffle

Patty Miller

Learning Outcomes:

After participating in the presentation,
- Participants will describe how coral reef relationships work.

2:10 PM – 2:40 PM
Introduction to Corals and Coral Reef Ecosystems

Marci Wulff

Learning Outcomes:

After participating in the presentation,
- Participants will draw and label the parts of a coral.
- Participants will explain how such tiny organisms can build some of the largest natural structures on earth.
- Participants will explain why symbiosis is important to corals and coral reefs.
- Participants will explain the relationship between a coral polyp and zooxanthelle.

2:40 PM – 3:10 PM
Activity 1: Corals Up Close

Patty Miller, Marci Wulff, Tyler Christensen, Britt Parker, Bruce Moravchik, and Paulo Maurin

Learning Outcomes:

After participating in the activity,
- Participants will describe the structure of a coral polyp.
- Participants will name two feeding strategies of a coral polyp.

3:10 PM – 3:30 PM
Break

3:30 PM – 3:50 PM

Using Real-time Data: How Satellites and Other Tools are Used to Measure Impacts on Coral Reefs

Tyler Christensen

Learning Outcomes:

After participating in the presentation,

- Participants will describe how satellites measure ocean temperatures.
- Participants will describe why we use both satellites and sensors in the water to measure environmental changes.
- Participants will explain the terms: "coral bleaching".

3:50 PM – 4:40 PM

Activity 2: Using NOAA Real-time Data: "Keeping Watch on Coral Reefs"

Tyler Christensen, Britt Parker, Marci Wulff, Patty Miller, Bruce Moravchik, and Paulo Maurin

Learning Outcomes:

After participating in the activity,

- Participants will list three NOAA websites to get near-real-time data on corals.
- Participants will describe two tools used to measure stress that leads to coral bleaching.
- Participants will list two factors that lead to coral bleaching.

4:40 PM – 5:20 PM

Activity 3: Coral Constructors

Patty Miller, Marci Wulff, Tyler Christensen, Britt Parker, Bruce Moravchik, and Paulo Maurin

Learning Outcomes:

After participating in the activity,

- Participants will list two factors that influence coral shapes.
- Participants will explain how different coral shapes are adapted for survival.

5:20 PM – 5:35 PM

Introducing NOAA SciGuides and SciPack

Bruce Moravchik

Learning Outcomes:

After participating in the presentation,

- Participants will list two places to look for resources, such as educational or content materials, on coral reefs.

5:35 PM – 6:00 PM

Final Words

- Post-assessment form
- Evaluation form/Survey
- NSTA Web Seminars
- Drawing of door prizes

National Science Education Standards Addressed:
Content Standards, 5-8

Content Standard A:
Abilities Necessary to do Scientific Inquiry

- Develop descriptions, explanations, predictions and models using evidence.

Understanding about Scientific Inquiry

- Different kinds of questions suggest different kinds of scientific investigations. Some investigations involve observing and describing objects, organisms, or events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models.

Content Standard C:
Life Science
As a result of their activities in grades 5-8, all students should develop an understanding of

- Structure and Function in Living Systems
  - Living systems at all levels of organization demonstrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, organs, tissues, organ systems, whole organisms, and ecosystems.
  - Cells carry on the many functions needed to sustain life. They grow and divide, thereby producing more cells. This requires that they take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or organism needs.
  - Specialized cells perform specialized functions in multicellular organisms. Groups of specialized cells cooperate to form a tissue, such as a muscle. Different tissues are in turn grouped together to form larger functional units, called organs. Each type of cell, tissue, and organ has a distinct structure and set of functions that serve the organism as a whole.
  - Disease is a breakdown in structures or functions of an organism. Some diseases are the result of intrinsic failures of the system. Others are the result of damage by infection by other organisms.
- Reproduction and Heredity
  - Reproduction is a characteristic of all living systems; because no individual organism lives forever, reproduction is essential to the continuation of every species. Some organisms reproduce asexually. Other organisms reproduce sexually.
  - The characteristics of an organism can be described in terms of a combination of traits. Some traits are inherited and others result from interactions with the environment.
- Regulation and Behavior
  - All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.
  - An organism's behavior evolves through adaptation to its environment. How a species moves, obtains food, reproduces, and responds to danger is based in the species' evolutionary history.
- Populations and Ecosystems
  - A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.
  - Populations of organisms can be categorized by the function they serve in an ecosystem. Plants and some micro-organisms are producers--they make their own food. All animals,

including humans, are consumers, which obtain food by eating other organisms. Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food. Food webs identify the relationships among producers, consumers, and decomposers in an ecosystem.

- For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.
- The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.

- Diversity and Adaptations of Organisms
  - Millions of species of animals, plants, and microorganisms are alive today. Although different species might look dissimilar, the unity among organisms becomes apparent from an analysis of internal structures, the similarity of their chemical processes, and the evidence of a common ancestry.
  - Biological evolution accounts for the diversity of species developed through gradual processes over many generations. Species acquire many of their unique characteristics through biological adaptation, which involves the selection of naturally occurring variations in populations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.

Content Standard D:
Earth and Space Science
As a result of their activities in grades 5-8, all students should develop understanding of

- Structure of the Earth System
  - Living organisms have played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks, and contributing to the weathering of rocks.

Content Standard E:
Abilities of Technological Design
As a result of their activities in grades 5-8, all students should develop understanding of

- Design a solution or product
- Implement a proposed design

Content Standard F:
Science in Personal and Social Perspectives
As a result of their activities in grades 5-8, all students should develop understanding of

- Populations, Resources, and Environments
  - When an area becomes overpopulated, the environment will become degraded due to the increased use of resources.
- Natural Hazards

- Human activities also can induce hazards through resource acquisition, urban growth, land-use decisions, and waste disposal. Such activities can accelerate many natural changes.

Content Standard G:
History and Nature of Science
As a result of their activities in grades 5-8, all students should develop understanding of

- Science as a Human Endeavor
  - Women and men of various social and ethnic backgrounds--and with diverse interests, talents, qualities, and motivations--engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.

Content Standards, 9-12

Content Standard C:
Life Science
As a result of their activities in grades 9-12, all students should develop understanding of

- The Interdependence of Organisms
  - Organisms both cooperate and compete in ecosystems. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.
  - Human beings live within the world's ecosystems. Increasingly, humans modify ecosystems as a result of population growth, technology, and consumption. Human destruction of habitats through direct harvesting, pollution, atmospheric changes, and other factors is threatening current global stability, and if not addressed, ecosystems will be irreversibly affected.

Content Standard F:
Science in Personal and Social Perspectives
As a result of their activities in grades 9-12, all students should develop understanding of

- Natural an Human-Induced Hazards
  - Human activities can enhance potential for hazards. Acquisition of resources, urban growth, and waste disposal can accelerate rates of natural change.