



Beach in a Box

Objectives: Participants will learn about many of the interesting natural artifacts that can be found on beaches of the northern Gulf of Mexico. This has many possibilities for building on different concepts.

Time needed: 10-20minutes

Target age: General Public

Materials needed: - tub of local beach sand with assortment of representative natural artifacts
(Examples include shells from clams, snails, oysters, egg cases of snails and skates, crab exoskeleton parts, sand dollars, sea stars, sargassum, bryozoans, driftwood, barnacles, bones, etc. It is useful to have juvenile snails extracted from the egg cases and glued into a Petri dish along with older snails of the same species; lightning whelks are a good example. Bones might include different classes, i.e. birds, turtles, dolphins, fish.)

- key to artifacts
- magnifying glass/hand lens

Description: Participants should be encouraged to pick/sift through the sand to find different items, make associations with them, identify them, and ask questions about them. Discussion might revolve around the nature of shells: mineral composition, relationship to animal, growth, re-use by hermit crabs. It is not widely understood that mollusks' shells are an integral part of their bodies. Participants can be asked to observe different legs (walking, swimming, claws) from a crab and consider their different forms and functions. Animal artifacts from several different phyla can be compared and contrasted, noting characteristics of each phylum. Sand can be examined and discussed – composition, origin, erosion, etc. The beach habitat can be discussed – definition of a beach, challenges and advantages of beach living, animals and adaptations.

Extensions: Because of the variety of possible discussions, and because the depth of those discussions can vary from an observation or two to a couple of facts per item to a more in-depth discussion of complex concepts, the extent of this activity is limited mainly by the amount of time for interaction and the age/experience of the participant. Examples of discussion that would go beyond the basic activity might include beaches as a resource, legal, political, societal issues related to beaches, the relationship between form and function and evolution.

Standards:

National Science Education Standards:

Unifying Concepts and Processes – Systems, order, and organization; Evidence, models, and explanation; Form and function

K-4

Science as Inquiry – Abilities necessary to do scientific inquiry

Physical Science – Properties of objects and materials; Position and motion of objects

Life Science – Characteristics of organisms; Life cycles of organisms; Organisms and environments

Earth and Space Science – Properties of earth materials

5-8

Science as Inquiry – Abilities necessary to do scientific inquiry

Physical Science – Properties and changes of properties in matter; Motions and forces

Life Science – Structure and function in living systems; Populations and ecosystems, Diversity and adaptations of organisms

Science in Personal and Social Perspectives – Populations, resources, and environments

9-12

Science as Inquiry – Abilities necessary to do scientific inquiry

Physical Science – Structure and properties of matter; Motions and forces; Interactions of energy and matter

Life Science – Interdependence of organisms; Behavior of organisms

Earth and Space Science – Energy in the earth system; Geochemical cycles

Science in Personal and Social Perspectives – Natural resources; Natural and human-induced hazards

Ocean Literacy: Essential Principles and Fundamental Concepts:

1. *The Earth has one big ocean with many features.* – g. The ocean is connected to major lakes, watersheds and waterways because all major watersheds on Earth drain to the ocean. Rivers and streams transport nutrients, salts, sediments and pollutants from watersheds to estuaries and to the ocean.
2. *The ocean and life in the ocean shape the features of the Earth.* – c. Erosion – the wearing away of rock, soil and other biotic and abiotic earth materials – occurs in coastal areas as wind, waves, and currents in rivers and the ocean move sediments.; d. Sand consists of tiny bits of animals, plants, rocks, and minerals. Most beach sand is eroded from land sources and carried to the coast by rivers, but sand is also eroded from coastal sources by surf. Sand is redistributed by waves and coastal currents seasonally.
5. *The ocean supports a great diversity of life and ecosystems.* – d. Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms (symbiosis, predator-prey dynamics and energy transfer) that do not occur on land.; f. Ocean habitats are defined by environmental factors. Due to interactions of abiotic factors such as salinity, temperature, oxygen, pH, light, nutrients, pressure, substrate and circulation, ocean life is not evenly distributed temporally or spatially, i.e., it is “patchy”. Some regions of the ocean support more diverse and abundant life than anywhere on Earth, while much of the ocean is considered a desert.

Extensions Standards:

NSES:

Unifying Concepts and Processes – Change, constancy, and measurement; Evolution and equilibrium

K-4

Science as Inquiry – Understandings about scientific inquiry

Earth and Space Science – Changes in earth and sky

Science and Technology – Abilities of technological design

Science in Personal and Social Perspectives – Types of resources; Changes in environments; Science and technology in local challenges

History and Nature of Science – Science as a human endeavor

5-8

Physical Science – Transfer of energy

Life Science – Reproduction and heredity; Regulation and behavior

Science and Technology – Abilities of technological design

Science in Personal and Social Perspectives – Natural hazards, Risks and benefits, Science and technology in society

History and Nature of Science – Science as a human endeavor

9-12

Physical Science – Chemical reactions

Life Science – Biological evolution; Matter, energy, and organization in living systems

Science in Personal and Social Perspectives – Personal and community health; Environmental quality; Science and technology in local, national, and global challenges

History and Nature of Science – Science as a human endeavor; Historical perspectives

Ocean Literacy:

2. *The ocean and life in the ocean shape the features of the Earth.* – a. Many earth materials and geochemical cycles originate in the ocean. . . . Ocean life laid down the vast volume of siliceous and carbonate rocks.

5. *The ocean supports a great diversity of life and ecosystems.* – c. Some major groups are found exclusively in the ocean. The diversity of major groups of organisms is much greater in the ocean than on land.
6. *The ocean and humans are inextricably interconnected.* – b. From the ocean we get foods, medicines, mineral and energy resources. In addition, it provides jobs, supports our nation's economy, serves as a highway for transportation of goods . . . ; c. The ocean is a source of inspiration, recreation, rejuvenation, and discovery. It is also an important element in the heritage of many cultures.; e. Humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean. Human development and activity leads to pollutions (point source, non-point source . . .) and physical modifications (changes to beaches, shores and rivers) . . . ; f. Coastal regions are susceptible to natural hazards (tsunamis, hurricanes, cyclones, sea level change, and storm surges). g. Everyone is responsible for caring for the ocean. The ocean sustains life on Earth and humans must live in ways that sustain the ocean. Individual and collective actions are needed to effectively manage ocean resources for all.
7. *The ocean is largely unexplored.* – b. Understanding the ocean is more than a matter of curiosity. Exploration, inquiry and study are required to better understand ocean systems and processes.; c. Over the last 40 years, use of ocean resources has increased significantly; therefore, the future sustainability of ocean resources depends on our understanding of those resources and their potential and limitations.