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ABSTRACT

This unit is designed to introduce the marine environment to those with little or no previous related background. Students define the marine environment, participate in group discussions, view movies, investigate oil spills, and write environmental impact statements. The first three sessions are designed to take three hours with the composition of the remainder of the unit left to the needs of the individual instructors. Included are activities and suggested alternatives, selected references, vocabulary, and suggestions for further study. This unit is especially intended for the instruction of future and practicing teachers. (Author)

AN INTRODUCTION TO THE MARINE ENVIRONMENT:

A MINI-UNIT

Richard M. Schlenker

Abstract

The unit is designed to introduce to the marine environment, those with little or no previous background. Students define the marine environment, participate in group discussions, view movies, investigate oil spills and write environmental impact statements. The first three sessions are designed to take about three hours with the composition of the remainder of the unit left to the needs of the individual instructors. Included, are activities and suggested alternates, selected references, vocabulary and suggestions for further study. The unit is especially intended for the instruction of future and practicing teachers.

An Introduction to the Marine Environment: a Mini- Unit

by

Richard M. Schlenker

The marine environment is a complete and dynamic system which embraces all of the sciences. This environment enjoys some of the deepest and darkest areas on the earth's surface as well as some of the earth's most populated areas. Some of this environment's inhabitants are among the most prolific known to man and some are among those soon to become extinct unless drastic conservation measures are quickly undertaken. The elements of the marine environment exist in a very delicate balance, which is quite easily upset. Finally, the effects of this environment often manifest themselves many hundreds of miles from the source.

The purpose of this unit is to introduce the student to the marine environment, especially those teachers and future teachers who have had little or no experience with this environment. Our purpose is not to define the limits of this environment but to introduce one and all to its' vastness. It is intended that this introductory unit should be a point of departure from which the various aspects of the environment can be studied; it is only through exhaustive study that the true limits of the marine environment can be realized.

While humanistic concerns are not specifically spelled

out in the objectives or the goals sections, participation in the oil spill investigation as well as the writing of environmental impact statements should cause the student to develop concerns of this nature. The student is encouraged to consult the, "Suggestions For Further Study" section if he wishes to gain a better understanding of the oil spill and some of the currently available methods for cleaning up oil spills.

The first three sessions of the unit are designed to take about three hours; however, better results might be obtained from the aquarium-eggbeater investigation if the aquarium were allowed to sit for several days following the initial agitation with the eggbeater. The fourth and following sessions should be constructed to fit the needs of the individual group.

The OBIS activity mentioned in session three is available from;

Outdoor Biology Instructional Strategies
Lawrence Hall of Science
University of California
Berkeley, California 94720

This activity requires the use of either a pond or salt water. OBIS uses either popcorn, sawdust, leaves or wood chips which are thrown into the water and then allowed to disperse. OBIS assumes that every object which is touched by one of the floating items, would, if the situation were an actual oil spill, be covered with oil.

The films required for session two are available from:

Film Rental Library
Shibles Hall
University of Maine
Orono, Maine 04473

The current rental fee is available upon request from that address. A bibliography of other films which might be used to complement marine science instruction, is available upon request from the, Film Rental Library.

Activity Discussion and Conduct.

Cookie Sheet Activity

In this activity, the student builds piers, small islands and other structures with small pebbles and stones. Pieces of wood may also be placed at various locations to simulate boats. Once the marine scene has been constructed, the cookie sheet should be filled to about the half way point with water. In order to create a wind effect, a small fan should be set up some distance from the cookie sheet. Now introduce a few teaspoons of oil to the surface of the water at a point closest to the fan and observe the results. In order to observe the results under different environmental conditions, the activity can be rerun with the oil being introduced at the same location as in the first run but the fan located in a different position. Like the OBIS activity, this activity could be conducted using sawdust, popcorn

etc. instead of oil.

Aquarium Activity

Stones, shells and other objects, which might be expected to be found on the ocean floor, are placed on the bottom of the aquarium. The aquarium should then be filled, with salt water, until the objects on the bottom are well covered. If sea water is not available for this operation, a powdered salt mix may be obtained from a biological supply house. When this powder is mixed with fresh water, a solution will be obtained which is identical to the standard ocean. To simulate wave action and agitation, an eggbeater or other household implement is used. The water should be agitated for several minutes after which the aquarium should be allowed to sit for a period of time. After the period of sitting, the objects on the bottom of the aquarium should be removed and examined (see previous note concerning time).

Since it is known that the agitating effects of salt water emulsify oil, which then sinks, one would expect that after a period of time the oil from the surface would be introduced to the bottom communities.

Objectives

1. To introduce teachers and future teachers to the marine environment.
2. To introduce one cause of upset of the marine environmental balance.
3. To introduce students to the magnitude of a pollution problem which upon superficial examination appears to exist only at the sea surface, air interface.
4. To introduce the students to sources of literature in the marine science areas.
5. To introduce students to existing curriculum guides and programs in the precollege marine sciences.
6. To give the students experience in development of a marine science unit for infusion in their already existing science program.
7. To give students some experience building materials which can used in teaching marine sciences.

Goals

1. As a result of careful attention to this unit, the student will;
   A. Have knowledge of the vastness of the marine environment.
   B. Be aware of many of the parameters which must be considered when one undertakes a study of any of the environments multitude of component parts.
   C. Be able to locate marine science and marine science education information in the literature.

D. Be able to describe the differences which exist in the intertidal zone between high and low tides.

E. Be able to demonstrate and discuss some of the effects which oil pollution has on the marine environment.

F. Be able to design activities for inclusion in a marine science unit.

G. Be able to design a unit for infusion in an already existent science curriculum.

H. Be able to conduct meaningful field experiences in the intertidal zone.

Materials

1. Large cookie sheets-quantity required is determined by class size.
2. Two or three aquaria or as a substitute;
   A. Several wide mouth jars; the gallon size will work well.
   B. Several high sided pans, 24.8cm x 24.8cm or larger.
   C. Several high sided dishes, clear if possible, same size as pans.
3. Two or more eggbeaters.
4. A quantity of small stones.
5. A quantity of small pieces of wood.
6. If they are available, a quantity of seashells (genus species not important) and other intertidal items e.g. barnacle covered rocks.
7. One can of motor oil or a quantity of number 2 black oil.
8. Film, Walt Disney's, "The Restless Sea."
9. Film, "Between the Tides."
10. Optional, the activity, "Oil Spill" by OBIS.
11. One air pump, capacity sufficient tc accomodate several gallons.
12. One or more buckets.
13. Ice cube supply, quantity dependent upon the desires and needs of the class.
14. Sea water or powdered sea water mix.

Session One

Procedure

1. Mineograph paragraph one of the introduction of this unit (quantity, one copy for each class member).
2. Arrange seating such that a group discussion can be conducted.
3. Distribute one copy of the mimeographed paragraph to each of the students.
4. Allow 15 to 20 minutes for the students to write their own definition of the marine environment (students should be encouraged but not required to work in pairs during this period).
5. Conduct a group discussion concerning the definition of the marine environment; the instructor acts as the discussion leader
6. A class member acts as recorder during the group discussion.
7. During the group discussion, the group synthesizes a class definition of the marine environment.

Assignment

1. In preparation for the viewing of films about the marine environment, skim a text which treats the marine environment in general.

Session Two

Procedure

1. Procure necessary films.

A. The Restless Sea by Walt Disney

B. Between the Tides

2. Preview films.

3. Show the films to the students (The Restless Sea should be shown first).

Assignment

1. Compare and contrast the definition of the marine environment, which was synthesized during the group discussion with that abstracted from the films.

2. Be prepared to discuss ways in which the balance of the marine environment can be upset.

Session Three.

Procedure

1. Conduct a group discussion concerning ways in which the balance of the marine environment can be upset. Oil and thermal as well as chemical pollution should be included. About one quarter of the alloted time should be devoted to this discussion.

2. Divide the group into pairs or threes.

3. If you are near a freshwater or saltwater body, the OBIS activity should be run. If the activities are to be run in the classroom or laboratory, the students should obtain the equipment they are going to use. If the OBIS activity is to be run, it should be remembered that materials other than those

listed in the materials section of this unit are required. A list of those materials will be found by consulting the OBIS activity card.

4. Approximately half of the group should conduct the cookie sheet activity while the other half conducts the aquarium activity.
5. Upon completion of the activities, the students should write environmental impact statements.

Assignment

1. Students should be prepared to compare and contrast environmental impact statements.

Fourth and Following Sessions.

Procedure

1. Compare and contrast environmental impact statements.
2. Compare and contrast the marine science programs which are included in the bibliography.
3. Take a field trip to an ocean area preferably an area which has beaches, mud flats, and rocky cliff areas. Observe these areas at both high and low tide and compare and contrast at each tide extreme. For central Maine students, the Mt. Desert area is an excellent location.
4. Locate and identify at least five journals which publish marine science information. Scan a recent issue of each and generally describe the categories

of information contained therein.

5. Using the descriptor, marine biology or a narrower descriptor e.g. tides, estuaries etc., search Education Index and or Current Index to Journals in Education and locate at least five articles which contain information applicable to the teaching of precollege marine sciences.
6. Using information from the articles listed in the selected references section, build a marine aquarium which would be suitable for use in your classroom.
7. Based on the experience gained from this unit, design a unit of marine science instruction which could be infused into your current science program.

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Programs

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Partial Vocabulary

The following is a partial list of words and phrases which the student will become familiar with through careful attention to the films.

Algae
Anemone
Antarctic
Aquaculture
Barnacles
Barrier
Bathyscaphe
Challanger Expedition
Competition
Continental Shelf
Copepod
Crust
Crustacean
Current
Current Meter
Decomposer
Density
Diatom
Egg
Food Chain
Grazer
Gulf Stream
Heat Storage Capacity
Hermit Crab
High Tide
Holdfast
Hurricane
Hydroid
Layers of Water
Long Shore Current
Long Shore Transport
Mantle
Marine Chemist
Marine Geologist
Moho
Moon Snale
Mud Flat
Mussel
Nudibranch
Ocean Basin
Oceanography
Octopus
On Shore Wind
Oyster

Photosynthesis

Plankton

Predation

Razor Clam

Rip Current

Sand

Sand Dollar

Scientific Method

Sea Mount

Sea Urchin

Sea Star

Sperm

Table Mount

Thermocline

Thermoprobe

Tidal Bore

Tidal Front

Tide

Trade Winds

Tube Feet

Tube Worm

Turbidity Current

Upwelling

Variety

Wave

Wave Crest

Wave Trough

Wind System

Suggestions For Further Study

If the instructor of student elects further investigation of oil spills, he should carefully read Rillo (1974). In his paper, Rillo not only presents several schemes by which oil spills and pollution can be investigated, but discusses contemporary cleanup methods and their shortcomings. He also discusses what happens to oil as the time between spill and cleanup increases.