



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
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The Ocean: A Watery World

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Water is a very common substance on earth. It covers nearly three fourths of the earth's surface. The oceans of the world are really one large body of water in which the continents stand as islands. This large body of water is subdivided into the Pacific, the Atlantic, the Indian, the Arctic, and the Southern Oceans.

Man has always been intrigued by the oceans. Myths, fears, and superstitions of sea monsters, and "gods" who ruled the waters conspired to keep man a prisoner of land. During the time of the wooden sea vessels, supposed sea serpents, in the form of snakes and of phenomenal proportions were credited with the destruction and disappearance of numerous vessels. Still today, the reputed Loch Ness monster, reputedly living in a lake, continues to mystify and intrigue the curiosity seeker. Scientific evidence has been unable to substantiate the theories of sea monsters and most reports of sightings have been proven to be grossly exaggerated descriptions of sea creatures and even floating masses of sea weeds.

The purpose of this curriculum unit is to introduce the child of kindergarten age to the fascinating world of the water. It is to provide the child with the basic information which will enable and encourage further study of this wonderful world. Through hands on activities, the child will learn about the physical world which exists under water and will be introduced to some of the inhabitants of that world. The oceans of the world will be understood as a necessary element for the existence of all life forms and will also be studied as source of continual recreation and pleasure. It is the recreational aspect, which makes it necessary for the young child to be introduced to some of the basic rules of water safety, which all, both young and old, should know and employ. As the children learn the importance of the ocean and its influence on everyday life, it will be a catalyst to the introduction of the social aspects of the school curriculum, that of individual responsibility for the welfare of the oceans and also the vital and basic skill of sharing. This includes not only sharing the responsibility of insuring a healthy oceanic environment but also the responsibility to share this concern for each other and all living things.

People and Weather

People are always interested in weather. The conditions of the weather and the variations which may occur within a short period of time, are influential in the planning of our daily activities. We listen to the weather forecast to determine what type of clothing is appropriate, if we will carry out our travel plans or if they will have to be delayed, or if the weather will disrupt our favorite sports or recreational pursuits. An unexpected decrease in the temperature can be responsible for the destruction of the farmers crops, while the lack of precipitation can bring drought and famine to some regions of the earth while torrential rains can produce floods.

Weather is the condition of the air over a short period. The temperature of the air, the wind, and the amount of moisture in the air are the most important components of weather. The type of weather we will experience is determined by these and other factors. Meteorology is the scientific study of the earth's atmosphere. It includes the physical and synoptic study of weather conditions. Physical meteorology involves the study of the visual, electrical, and other physical conditions of the atmosphere while synoptic meteorology is concerned with the daily changes in weather conditions. Meteorologists are the scientists who study weather. Through the use of satellites and radar, they endeavor to provide the public with an accurate forecast of current and future weather conditions. Forecasting accuracy has been reliable out to about five days relative to certain weather patterns.

Climate relates to the annual or long term weather conditions in an area. Precipitation and temperature are two factors which help to determine the climate of an area. The climate of a region affects the lives of people, and determines what type plants and animals inhabit a region. Climate is measured by statistical data while weather is measured using various instruments such as the barometer, thermometer, rain gauges, and so on. Climatologists study the interaction of the climate with the lives of individuals and endeavor to determine what future changes will occur in the climate and what impact certain factors, such as human activity, will have on the climates of the world.

Activity #1

Weather & the Seasons

Objective: 1. To discuss the proper clothing for the season

Materials: 1. Book: *Arnold's Apple Tree*

Procedure:

1. Display the cover of the book and let the children predict what they think the story will be about. You may wish to record their predictions
2. Share the story with the children, pausing periodically to allow the children to predict what may be happening on the next page. If the children's original prediction of the story content was inaccurate, you may wish to redirect the original question at some point during the story to see if a more accurate prediction can be made
3. Discuss with the story with the children focusing on the changes in Arnold's apple tree but also be sure that the children notice the changes in Arnold's attire during each of the seasons.

4. Assist the children in applying the names for each season. You may wish to identify the present season, what the air feels like, appropriate clothing for the weather conditions, and how the plants and animals are reacting to this particular season. (For example, In the fall, the leaves on deciduous trees and bushes turn colors and fall to the ground, squirrels are busy gathering nuts, etc.)
5. Trace the outline of the human form on construction paper and make enough copies for each child to receive one. Allow the children to cut out this form. Then using various materials such as paper, fabric, buttons, glue, scissors, etc., allow the children to add the physical features and to “dress” the figure in clothing appropriate for the current season and weather conditions..

The Atmosphere

The earth is surrounded by an ocean of air called the atmosphere. People dwell on the floor of that ocean. It is hundred of miles deep and becomes thinner the farther away from the earth’s surface. It consists of nearly five quadrillion tons of air. The composition of air is seventy eight percent nitrogen, twenty one percent oxygen, and almost one percent argon. Other elements which are found in earth’s atmosphere in tiny amounts are helium, krypton, hydrogen, ozone, carbon dioxide, nitrous oxide, methane, neon and xenon.

Earth’s atmosphere is divided into four layers. The troposphere is closest to the earth and stretches for about eighteen kilometers above the equator to approximately eight kilometers over the poles. It is here that most weather occurs. The stratosphere lies right above the troposphere. The ozone layer is housed in the stratosphere. The ozone is a thin layer of gas which blocks out the ultraviolet rays of the sun, which have been associated with cancer. During the 1970’s, scientists discovered that fluorocarbons, a chemical used in refrigeration and aerosol sprays, were capable of doing possible damage to the ozone layer. This resulted in much concern from both the scientific and general communities. This concern eventually led to a ban on the use of fluorocarbons in the United States and the 1985 Un-sponsored Vienna Convention for the Protection of the Ozone Layer on a global scale. The ionosphere continues above the stratosphere for eighty five to five hundred kilometers while the exosphere extends to the border of space. The atmosphere wraps around the earth like a protective garment blocking out a portion of the radiant energy of the sun. This garment of air also acts like a well regulated blanket, retaining enough of the earth’s warmth to preserve life.

Gravity, like a giant hand, is a force which pulls air towards the earth, making it denser nearer the surface. The push of air towards the earth is called air pressure. People, plants and animals dwell on the floor of this ocean of air but because the pressure of the air is equally distributed around them, they do not feel its weight.

The earth itself, is constantly in rotation, causing winds to blow and thereby keeping the air circulating and fresh. This air is heated by the radiation of the sun and the heat is absorbed by the earth and water. As this heat rises from these two sources, it warms the air above. Air over the land is heated quicker than that over the oceans because the land absorbs heat and warms quicker than the oceans. When this air over the land is warmed it rises allowing the cooler air from the water to blow in. As the night settles in, the air over the land cools and flows out towards the ocean. This moving air is called wind.

The French physicist Gaspard de Coriolis noted that the earth’s rotation on its axis, caused the winds to deflect in relation to the direction of the earth’s rotation. This movement became an important factor in the attempt to determine prevailing winds and currents. It also was a factor to be considered in the launching of missiles and rockets. This effect is called the Coriolis effect. Coriolis determined mathematically, that trade winds, easterlies, and westerlies do not blow north to south but deflect from the earth’s rotation and flow in

the opposite direction. In the northern hemisphere the winds deflect to the right, while in the southern hemisphere the winds deflect to the left.

Activity #2

Wind chimes

Objectives: 1. To make wind chimes to use as an indicator of movement of the air

Materials: 1. Empty toilet Paper roll
2. Heavy string or twine
3. Small sea shells or shell macaroni
4. Ziti macaroni
5. Optional: Small beads

Procedure: 1. Let the children paint the two types of macaroni various colors
2. Punch two holes at the top of the toilet paper roll, directly across from each other and several holes around the bottom of the roll at fairly even intervals, you'll need to make at least four holes on the bottom
3. Cut a ten inch piece of string and tie it to make a hanger
4. Once dried, allow the children to decorate the roll with the shells
5. Cut enough string of ten inch lengths equal to the number of holes on the bottom of the roll
6. Help the children to string the ziti macaroni and tie it to the roll. Be sure to knot one end so that the ziti doesn't fall off. Beads can be substituted for the ziti.
7. Allow the children to hang their wind chimes so that they can observe the movement of the air

Biota

The atmosphere of earth has been polluted by the activities of man. Our air, water, and soil are contaminated with deadly chemicals which have been spewed from factories, automobiles, and the soil, pesticides. These pollutants are absorbed in the soil and find their way into the underground estuaries, rivers, and streams, where they become an insidious liquid poison. This poison is harmful to wildlife, plants, and man. Plants which are found on both land and in water, have the capacity to absorb some pollutants. As man and animals exhale carbon dioxide, which by itself is harmful to man, they release new oxygen into the air and use the carbon dioxide for food. Such plants as azalea, aloe vera and the philodendrons remove formaldehyde, which is found in plastics and insulation, from the air. Benzene, a chemical used in the production of dyes for carpets, draperies, and upholstery, is captured in the leaves of chrysanthemum, corn plants and the peace lily. The English ivy and dracena plants take in trichloroethylene, a solvent used in industry and holds it captive in their leaves.

Peat is found in bogs. Bogs are waterlogged areas that accumulates layers of partly decayed, densely packed plants. Not all types of plant life can exist in a bog because of the lack of air created by the density of the plant life found there. Sphagnum moss is one plant which grows in a bog. As this plant mixes with other plant life, dies, and decays, it eventually becomes what is know as "peat moss". Peat moss was used by the

American Indian, a wise user and preserver of nature, as diapers because of its absorbency. In the past, peat moss has also been used for its healing properties. During World War I, it was applied to wounds for it seemed to retard infections. Peat is also used as a fuel. Stoves are sold which use peat pellets instead of wood. The peat ignites easily and burns for a long time. Peat fires which are ignited in the wild, are difficult to extinguish because of the long burning nature of peat.

Winds and Climate

The term wind refers to air which is moving horizontally across the earth. Temperature is the major contributor to the creation of wind. The temperature of the air produces the various atmospheric pressures which are associated with the production of winds. The uneven distribution of the sun's heat over land and sea is the major cause of these variations in the temperature and pressure of the air. The area surrounding the equator receives most of the light and heat of the sun, while the poles receive very little. This in return causes the heat from the warmer latitudes to shift towards the poles resulting in a complex circulation of air in earth's atmosphere. Highs and low pressure areas are the result of the difference in the thermal properties of land and air. As the temperature of a region becomes unstable, warmer air will rise and flow over colder, heavier air. The Coriolis affect can modify these winds immensely.

There are four major types of winds, the prevailing winds, local winds, seasonal winds, and cyclonic or anti-cyclonic winds. These winds are associated with seven major wind belts. Three of these belts are located in northern hemisphere, another three are located in the southern hemisphere, and seventh belt is the area surrounding the equator which is known as the doldrums. The zonal winds in each hemisphere are referred to as the westerlies, the horse latitudes, and the easterlies (or the trade winds.)

The Prevailing, Cyclonic & Anti cyclonic Winds

The doldrums belt is a low pressure area which lies on both sides of the equator to about ten degrees latitude. This area receives most of the light and heat of the sun and so the air around the doldrums is hot and humid. This region is typically known as the tropics. The horse latitudes are at about thirty degrees to the north and south of the equator. The light variable surface winds of this belt are associated with high pressure. The deflection of these winds is towards the west due to the Coriolis effect or the rotation of the earth and so in the northern hemisphere these winds move towards the equator from a northeasterly direction and from a southeasterly direction in the southern hemisphere. These winds are known as the trade winds. As the trade winds move from the north and south towards the low pressure area of the equator, they rise, expand and cool. This causes the moisture in the air to condense and accounts for the frequent rainfalls of the tropics.

Poleward of the horse latitudes are the westerlies. Since the identification of a wind is determined by the direction from which it blows, these winds are known as the prevailing westerlies. The direction of the westerlies are greatly influenced by the effects of the migratory cyclonic and anti cyclonic disturbances. Cyclones, which result from the interaction of the air masses, are the typical storms of the northern hemisphere. Most of the changes we see in the weather are the result of the westerlies for they move the air masses. About eight to twelve miles above the surface of the earth, the speed of the westerlies increases rapidly. Here you will find the wind velocity reaching in excess of one hundred miles per hour. The highest recorded speed of this area was three hundred forty miles per hour. This area of concentrated westerlies is known as the jet stream.

In the polar regions of both hemispheres are high pressure areas which deflect towards the west in the direction of the equator.

Seasonal Winds

Temperature is the biggest influence of the seasonal winds. Land, in contrast with the water, absorbs the heat of the sun much quicker during the summer months than do the oceans. This creates a low pressure area over the land with the colder air of the ocean blowing inward towards the land. During the winter, the opposite occurs. The air over the land cools creating a high pressure area. This cool air moves out towards the warmer ocean. Monsoons found in the China Sea and the Indian Ocean are associated with these seasonal winds.

Local Winds

The effects of the temperature on the local winds is diurnal. During the day, the air over the land is warmer than that over the ocean while at night the air over the land is cooler than that of the ocean. The variations in the breezes caused by these temperature changes are associated with other winds such as whirlwinds and those accompanying thunderstorms.

Water & the Atmosphere

Humidity

Humidity is caused by water which evaporates from the oceans, rivers, and lakes and turns into an invisible vapor which is added to the blanket of air surrounding earth. High and low humidity is determined by the quantity of water in the air on a given day. The humidity is said to be at one hundred percent when the air is holding as much water as it can for the temperature. It is the water in the air that makes a person feel “sticky”.

Dew Point

The dew point is reached when the air is holding as much water as it can.

The water vapor found in the atmosphere condenses and forms drops of water which settle on the grass, trees, and flowers. The temperature that the air must meet before it squeezes out the water is the dew point.

Frost

Frost is tiny bits of ice formed when the temperature of the air is below freezing. The objects upon which frost forms must also have a temperature at or below the freezing point.

Clouds

When warm air rises and cools and is holding all the moisture it can, the dew point has been met and the air must squeeze out the excess water.

These water vapors condense on dust found in air and the two combine to form droplets. Millions of these water droplets unite to form clouds.

The most common types of clouds are the cirrus, cumulus, nimbus, and stratus.

Cirrus Clouds

Cirrus clouds are thin clouds which curl up at one end. The word, cirrus, means to “curl”. These clouds, the highest in the sky, are formed from ice crystals. These clouds are the highest in the sky, sometimes obtaining a height of four to ten miles above the surface of the earth. The height may give the clouds the appearance of being very slow moving when in actuality they move very swiftly across the sky. Cirrus clouds in the sky may be an indicator of an oncoming storm.

Cumulus Clouds

The “heap” or “piles” of clouds most frequently seen in the sky are the cumulus clouds. These clouds form as the result of warm moist air cooling as it rises high into the air, creating the white, puffy heaps associated with this cloud. As the sun sets, the cumulus clouds disappear for they no longer have the warm air rising from the ground to sustain the cloud. Rain showers frequently fall from cumulus clouds.

Nimbus Clouds

Nimbus clouds are thick and shapeless and their appearance in the sky are considered to be the forebearers of rain or snow.

Stratus Clouds

The stratus cloud hovers close to the ground and are actually white sheets of high fog. As the sun’s warmth reaches the earth these clouds usually disappear to display a clear, blue sky.

Activity #3

Clouds

Objective: 1. Children will observe and identify the various cloud formations

Procedure: 1. Show the children pictures of the most common cloud formations, the cirrus, cumulus, nimbus, and stratus. Discuss the characteristics of these clouds.

2. Take the children out of doors to observe the various cloud formations.

3. Look for movement of the clouds or any descriptive shapes. If the clouds are moving, discuss the directions they are taking and whether or not they are moving in the same or different directions.

4. The children will enjoy listening to the story, *It Looked Like Spilt Milk*, a story about the descriptive shapes the clouds can resemble.

5. Allow the children to create descriptive shapes, such as bumblebee, rabbits, etc., from “clouds” using black construction paper and cotton balls. Let the children add a caption and combine all pictures to make a class book.

Storms

Rain and Floods

When the droplets which form clouds become large enough they fall to the ground as rain. As the soil and plant life reach the maximum amount of water they can absorb, the remaining water runs off the land in such huge amounts that the streams, ponds, and reservoirs can no longer hold this excess water. This runoff is sometimes increased by melting snow. As this excess water fills the rivers, a flood can be the result. When a flood is the result of an excessive amount of rainfall, a “flash flood” may occur. Flash floods can strike with little or no warning.

Coastal floods can be the result of high tides induced by strong winds which move over the ocean surface or by tsunamis.

Snow and Avalanches

Snow is not frozen rain but is made of water vapor which forms ice crystals in the shape of flakes. These flakes are very small but when combined together they can cause problems for the land and air travelers.

Blizzards, which are most common in the western parts of the United States but not totally unknown to other areas, are the combination of heavy snowfalls accompanied by strong winds and extreme cold. The snowfall and winds last for a period of at least three hours and some may last for days. The winds during a blizzard can reach speeds of over forty miles per hour and reduce the visibility to near zero. People and livestock have been killed during blizzards and buildings, burdened with the weight of the snow, may collapse. Blizzards can essentially paralyze an entire area like the great blizzard of March 1888, which lasted for three days and brought the eastern portion of the United States to a stand still.

Avalanches occur when a large amount of snow slides down a mountainside. Avalanches are responsible for the deaths of nearly two hundred people per year. They are quick, powerful snow slides, which can be triggered by a sudden movement or loud noise. Due to the swiftness and surety of the results of an avalanche, they have been given the notorious nickname of “white death”.

Winds & Tornadoes

Tornadoes are most likely to form as cold air moving towards the south meets warm moist air moving north. As these two air masses meet, the colder air pushes under the warmer air, which begins to spin as it rises.

Thunder, lightning, rain, and hail accompany this storm. The high winds create a terrific noise which mimics the sound made by a jet engine or freight train. As this air continues to spin, the result may be a funnel shaped cloud which whirls at high speeds. The center of a tornado can reach a speed of more than two or three hundred miles per hour. Tornadoes are powerful enough to lift buildings off their foundation and to cause much loss of property and life. Tornadoes are the fastest wind storms on earth.

The vast plain areas from Texas to the Canadian border have been nicknamed “tornado alley” by meteorologists, for this is where most tornadoes strike in the United States. The high period for the formation of tornadoes is during the months of April, May, and June.

Hurricanes

Hurricanes form over the ocean, creating huge waves, which pile up along the shore. Hurricanes are wind storms, with a large spiral pattern, which creates giant whirlwinds. These whirling winds move around a calm center called the eye. These tropical cyclones, can be as wide as fifty miles across and can pack winds of more than seventy-five miles per hour. The direction of the storm on the other side of the eye, will be in the opposite direction of its original approach.

Hurricanes are all given names which have generally been feminine in gender. Only recently have hurricanes been named after males as well.

Thunderstorms & Lightning

When moist, warm air is quickly cooled the result may be a thunderstorm. A thunderstorm forms as winds push upward into the center of a cumulus cloud thereby forcing cold air to the outside of the cloud. As this happens, raindrops form and fall but are quickly pushed back into the center of the cloud by these strong, upward winds. Electricity which is produced by this movement, builds up and produces lightning. Lightning has been known to strike trees, buildings, and people. Fires, serious injury, or death can be the result of an encounter with lightning. Finding shelter from the rain and lightning is the best way to stay safe during a thunderstorm.

Activity #3

A Shelter In the Time of Storm

Objective: 1. To learn the basic rules of storm safety.

Materials 1. Big Book: Stormy Weather

Procedure: 1. Display the story cover to the children and allow them to predict what they think the story will be about.
2. Share the story with the children
3 Talk about the different types of storms presented in the book and the procedure to be followed during each storm
4. Make a list of storm safety tips, such as stay out of the water, don't stand under a tree, seek shelter in a building, etc. and post it in the classroom where it can be reviewed periodically

Activity #4

What Do We Do After The Storm??

Objective: 1. To discuss what the children should do *after a storm*
2. To list some of the agencies available to assistance those in need after a destructive storm

Materials: 1. Red Cross Booklet: After A Storm

Procedure: 1. Read the booklet to the children
2. Discuss what the children should do after a destructive storm.

3. Using your school library or resource center, make a list of local agencies which offer assistance to those in need after a destructive storm. This list may include the Red Cross, United Way, churches, and other civic organizations

Extension: 1. Read the book, *Where Do All The Animals Go In A Storm* . Discuss what animals go during a storm.

Land Sculpturing

Erosion is the natural and chemical process by which the surface of the earth is constantly being carved and shaped by water, wind, heat, cold, gases and plants.

Geological forces account for the erosion of the surface layers of rocks.

As these surfaces come in contact with rain and wind, or expand from the heat of the sun, fragmented pieces break away. These pieces of fragmented rocks are carried away by rain or wind. Rivers are carved out of rock as rain water meanders down the face of a mountain, searching for the path of least resistance. Rain dissolves some minerals and can destroy others. When water seeps into the cracks of rocks and freezes, this expansion can cause the rock to crack. Roots of plants, such as trees, can also split a rock.

The waves and currents of the ocean are instrumental in sculpturing the cliffs and beaches of the coastal areas. During severe weather coastal erosion may cause some serious damage.

The erosion of soil has been accelerated by the activities of humans. Lumbering, agriculture, and housing developments have removed much of the vegetation which would have protected the soil from the effects of erosion. With this mantle of greenery in place, the effects of erosion would have been greatly impeded as plants would have acted as windbreakers preventing the wind from carrying away the soil, while the roots would prevent the soil from being carried away by the water.

Ocean Currents & Waves

Ocean currents are like rivers flowing through the ocean. Unlike true rivers, which meander over the land, and are bound by mud, stone, or sand, the ocean currents are bound by other currents or the boundaries of the continents. The major cold water currents flow towards the equator. Warm water currents, which are found mainly at the surface of the ocean as a result of solar heating, begin near the equator and move northward towards the Arctic Circle

The Gulf Stream

The Gulf Stream is a river whose path flows through the ocean. The path of the Gulf Stream is longer than that of the Amazon River and the currents produced are stronger than those of the Mississippi River.

Like any river, the Gulf Stream has its tributaries. These tributaries flow through the Gulf of Mexico, the Caribbean Sea, and around the coast of Cuba. The current continues southeastward along the coast of the United States and then carouses northeast across the Atlantic Ocean up to the British Isles where it then moves toward the Arctic Circle.

Winds blowing across the surface of the ocean currents are called the westerlies or trade winds. these winds blow towards Europe and are warmed by the waters of the Gulf Stream. This warm air helps to temper the

climate of western Europe.

Currents can run swift and deep and can be virtually undetected by the human eye. This is why it is important to observe the rules of water safety when boating, fishing, or swimming. Each year rapidly moving currents are responsible for the drowning deaths of many individuals.

Tides & Waves

Gravity pulls at the ocean waters causing them to bulge towards the moon. As the moon travels around the earth, this watery bulge strains to follow its path, resulting in high and low tides. Extremes in tides occur when the sun and the moon are aligned and the gravitational pull of the sun reinforces that of the moon.

Waves are formed as the wind rushes over the water. The increased velocity of the wind creates larger and larger waves. Tidal waves are not powered by the wind but instead are the result of underwater volcanic activity, avalanches, or earthquakes. Tidal waves can strike the coast with a terrifying force causing much destruction of property and loss of life.

Activity #5

Safety in the Water

Objective: 1. The children will learn the basic rules of water safety
2. To create a class big book on water safety

Materials: 1. Any book on water safety

Procedure: 1. Read the story to the children or if a book is not available, discuss the water safety tips found in this paper with the children
2. Have the children choose a tip or assign a safety tip to a group of children and have them illustrate the safety tip.
3. Let the children dictate a caption for their picture.
4. Combine these pictures into a class big book.

Safety Tips for the Pool & Beach

1. LEARN TO SWIM!!!
2. Stay away out of and away from unclean or unknown waters
3. Don't dive in unknown waters. It may be too shallow or rocks may lie under the surface
4. Never swim alone. Always take along a buddy.
5. Never go swimming during a lightning storm. Water is a conductor of electricity.
6. Rest when you're cold or tired
7. Only swim within the limits of your ability
8. Obey the lifeguard and other posted rules at the beach or pool
9. Never shove or dunk
10. Don't run around the edge of the pool. It could be wet!
11. Never enter a neighbor's pool uninvited

12. When entering or exiting from a pool, hold onto the railing
13. Wear a life jacket

Life In the Sea

Tiny plants are the smallest form of sea life. These plants are found near the surface of the ocean. Like all plants they need the sun's light and warmth in order to reproduce. Minute animals feed on these tiny plants. Plankton is the combination of these plants and animals. Plankton becomes the main source of food in the ocean food chain for all creatures who live in the sea either eat plankton or consume plankton eating animals.

Fish

Fish are animals who live in both fresh or salt water. They can be found in rivers, lakes, swamps, streams, or the ocean. Fish can live in warm or cold water.

Fish have gills through which they breathe the air which is contained in the water. They have backbones and most have scaly skin. The majority are cold blooded and hatch their young from eggs. Fish come in a variety of sizes ranging from being very small, like the smallest of the seahorse, to being quite large like the blue shark.

The Gulf Stream acts as an international highway for marine life. As the warm, blue waters of the Gulf Stream continues its pathway towards the Arctic Circle many fish traverse its waters. Many fish have names which are descriptive of some land dwelling animals, like the tiger fish.

The Portuguese Man of War

The Portuguese man of war is a kind of jellyfish with a sail. This disc shaped animals has a barrel shaped body which floats on the surface of the water while its long tentacles or feelers hang below the surface of the water. These tentacles are the "weapons" of the man of war. As a fish comes into contact with these "weapons", a poison is released thus paralyzing the fish. The fish is then drawn up into the disc like shaped barrel of the animal and digested.

The Seahorse

The sea horse has a face which resembles that of a horse and a long, curving tail like a monkey. The male fish is equipped with a pouch like that of the kangaroos because it is the male seahorse who carries and delivers the babies. Seahorses like to hang onto things like coral, weeds, or even other seahorses. They use their tails as hands to curl around the object and hold on. This helps them to anchor themselves as they search the surrounding waters for pieces of food. The long straw like snout is useful in drawing food into the mouth of the seahorse.

There are many different kinds of sea horses. They range in size from two inches to more than eight inches long. They are the slowest moving fish known, traveling a mere foot per minute. The ability of the seahorse to change its color helps to protect it from predators.

Sharks

Sharks are also fish. They come in many different shapes and sizes. The largest of the sharks is the whale shark reaching a length of more than fifty feet while the smallest shark known is only been six inches in length.

Sharks live in all the waters of the world, but certain species have their preference in water temperatures. The hammerhead shark prefers the warm waters of the tropics, while the dogfish shark prefers colder waters. The blue shark has a preference for a more temperate climate which is neither too warm nor too cold.

Sharks find their food by using their highly developed senses. A shark can feel vibrations in the water though the source of those vibrations be very far away. It can also detect the slightest trace of an odor. Sharks also have very good eyesight, quite contrary to the past belief that their eyesight was poor and they hear very well.

Deep Ocean Fish

Some fish live deep down in the ocean where it is always as dark as night. These fish are strange looking creatures with many having large jaws and long sharp teeth. Lights located on appendixes of their bodies, may act as a lure to attract prey.

Gulper Fish

One deep water fish is the gulper fish. This fish has a huge mouth similar to that of a pelican. Its tail is long and whip-like with a light on the end. When other fish see the light and come to investigate, Gulp!

It's all over for the curious!

Grasshopper Fish

Another strange fish which resides in the is the grasshopper fish. This fish has long stiff fins, which hang downward from its body. These fins give it the appearance of having legs thus helping this fish to obtain its peculiar name.

Activity #5

- Objective**
1. The children will learn about some of the unique creatures that live in the sea
 2. The children will recognize the descriptive features of some sea creatures and associate them with the land creatures after whom they have been named
- Materials:**
1. Pictures or a picture book of various marine animals with descriptive names
 2. Pictures of land animals which can be associated with the marine animals because of certain physical features
 3. Art supplies to create feature creatures such as scissors, glue, construction paper, pipe cleaners, etc.
- Procedure:**
1. Discuss the pictures of the different marine animals with descriptive names and ask the children how they think this animal got its name
 2. Share any information concerning the habitat and feed habits of the animal that you have with the children
 3. Allow the children to create their own “feature creatures” using the art materials supplied by combining the features of a land creature with the tail of a fish. For example, the lion fish could have the face of a lion and the body of a fish.
 4. Make a mural of the ocean and add these “feature creatures” to your ocean scene.

Nature's Balance

All nature would be in harmony with itself if it weren't for the interference of man. Pollution, destruction of habitats, overkill, and development threatens the existence of many animals today. Humans, plants, and animals are all dependent upon one another for survival. Plants are used for food and beauty, while also producing new oxygen while consuming carbon dioxide from the air. Animals are used as a source of food, in certain types of recreation such as horseback riding, for entertainment purposes, the circus, not to mention companionship.

We must all learn to care for the environment in which we live and realize that what we do affects the all. We have to take an active part in the preservation of that environment not only for ourselves but for other living organisms as well. At a very early age the young child can be taught to value the things of nature and to respect the home in which he or she may live and that of other living things.

We now realize that we don't live in a glass bubble but that every action has a reaction. As we seek to understand the global changes affecting earth, let's us do our part to ensure that the direction of those changes is a positive one.

Activity #6

The Art of Sharing

- Objective:**
1. The children will learn the importance of sharing

Materials: 1. Story: *The Rainbow Fish*

2. Fish scales of many colors made from felt

3. Velcro dots

Procedure: 1. Discuss with the children the importance of sharing

2. List the reasons why the children think it is important or not important to share responsibilities and things in the home and the classroom.

3. Display the book and allow the children to discuss what they see on the cover

4. Read the story and discuss the story details with the children

5. Let the children role play the story as presented in the book, *The Rainbow Fish*

Students Bibliography

Simon, Seymour, *Weather* , Morrow Junior Books, New York, 1993.

This book explores the patterns of weather and how weather forms.

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Branley, Franklyn M, *Tornado Alert* , Harper & Row Publishers, New York, 1988. This book explains where, when, and how a tornado forms and what to do to stay safe if a tornado strikes.

Gibbons, Gail, *Weather Words* , Holiday House, New York 1990.

Fradin, Dennis B., *Disaster ! Blizzards and Winter Weather* , Children's Press, Chicago, 1983

Silver Burdett Color Library, *Weather and Climate* , Macmillian Children's Books, London, 1984. This book examines past climatic changes and the ways human activities may alter the climate.

Pfister, Marcus; *The Rainbow Fish* , North-South Books, New York, 1992

The bright, colorful scales of the rainbow fish make him the most beautiful fish in the ocean but he's been asked to share ...

Author Unknown, *Arnold's Apple Tree* , Scholastic

Scholastic, *Stormy Weather* , Scholastic, Inc., 1992

Maestro, Betsy, *A Sea Full of Sharks* , Scholastic, Inc., 1990, An up to date informative book about sharks in their natural water home.

Teacher's Bibliography

Gallant, Roy A., *Earth's Changing Climate* , Four Winds Press, New York, 1979. The author examines what causes changes in climate including both natural and man-made factors.

Turekian, Karl K., *Global Environmental Change* , Prentice Hall, New Jersey, 1996. This book aims to address the issues of natural and

human induced or accelerated environmental change on the global scale.

Grady, Sean M., *Plate Tectonics: Earth's Shifting Crust*, Lucent Books, Inc., San Diego, CA., 1991

The Betsy Ross Arts Magnet School Team

Lisa Alter	Science
Mary-Alice Howley	Reading & Writing Enrichment
Linda MacNaughton	/Study Skills Enrichment
Yel Brayton	Theater & Creative Dramatics

All eighth graders are presented with an Oceanography unit each year. Last year, Ms. Alter, Ms. Howley, Ms. MacNaughton and I worked collaboratively in order to offer support to students on their Oceanography report projects. This year, thanks to the Yale-New Haven Teachers Institute—to Luis Recalde, our seminar coordinator, and our fellow participants; most especially to Lisa Alter for dreaming up the idea for this interdisciplinary project, and with much gratitude to Dr. Turekian, our esteemed professor and seminar leader—we were afforded the time and guidance necessary to do some substantive planning for this coming year. Therefore, our units presented in this volume have been designed to offer our students a more interdisciplinary approach to the subject of Oceanography with respect to the global environment, adding emphasis to the research process and expository writing, as well as introducing elements of drama. In so doing, we hope to promote the kind of visceral awareness students will need so that they can wield what they have learned in order to engender critical thought and creativity. While the following curriculum units are distinct from one another in their discipline-specific approach to the topic of the world's oceans and the global environment, the culminating activity of an eighth grade town meeting addressing the preservation of Long Island Sound will be shared by all. Because Long Island Sound is “real” to students, any information that they cull in the course of researching, study, and creative dramatics can more easily be reflected back to their oceanography unit curriculum, hence, reinforcing their scholarly pursuits. What follows below is our production schedule for this event.

An Eighth Grade Town Meeting on Long Island Sound

PRESENTATION SCHEDULE

The Eighth Grade Town Meeting on Long Island Sound is intended to be an all-day affair that will involve the eighth grade class in various ways. Eighth graders will participate as audience members and each student will also have at least one additional role in the production, such as: making a presentation, acting, or participating in some aspect of technical production. Our auditorium will be set up for sound, lighting and screen projection (35mm slides and video). The stage will be set with two speaker's podiums, movable set pieces to accompany theatrical presentations, and visual aid accouterments for speakers. Offstage (to the left or right of the proscenium) we will have a 4' X 16' platform displaying a life-size diorama of a section of the beach and sound. Additionally, wall space and flats will run along the eastern and western walls of the auditorium and will be used to display poster projects, charts, photography, and information—all of which will have been gathered from student research and field trips.

Below is a summary of the presentations we envision for our town meeting. The text used for the following presentations will largely be taken directly from *The Soundbook*, which was published by The Long Island Soundkeeper Fund, Inc., Norwalk, CT. (page numbers respective to topic areas have been indicated.)

PRESENTATION ONE:

Introduction and the Geologic History of Long Island Sound [5-7 minutes]

This will be a slide presentation with narration by two to four narrators. The slides will be determined by students and should include their drawings and photographs, as well as existing slides culled from various sources—all of which will be reproduced in 35mm slide format by a photo studio. Key points to be represented by slides follow (from *The Soundbook* text, “Long Island Sound . . . Beginning of the Story,” p. 9-11).

PRESENTATION TWO:

Long Island Sound, A Living Time Line [5-7 minutes]

The narration for the living time line will be taken from “History Along the Sound” from *The Soundbook* (pp. 11-14). There will be five main periods of Long Island Sound history presented: Native Americans, English and Dutch Settlers, Maritime Development, Transportation, and Industrial Development. For each major section of this text, a small group of theater students in period costuming will enter to a specified section of the stage where they will pantomime various activities as their group’s portion of the text is being narrated. At the end of their section of the narration, they will strike a tableau and remain “frozen in time” as subsequent groups enter. At the end of this presentation, we will have a blackout and students will exit the stage.

PRESENTATION THREE:

Sound Ecology, Profile of a Tidal Wetland [10 minutes]

The background portion of a life-size diorama will appear on a platform—4’ x 16’—off stage, either to the left or right of the proscenium. The narrator will stand in front of the platform and will introduce “The Sound Today” from page 16 of *The Soundbook*. As she or he continues with the narration, stage hands will assemble preset foreground pieces, such as grasses, dunes, animal life, etc. In order to do this, the diorama will be constructed as a puzzle so that foreground pieces can be disassembled and reassembled. After this introduction, slides will again be used to represent various aspects of tidal wetlands.

INTERMISSION: [15 minutes]

Students will be given a 15-minute intermission and will be invited to peruse the exhibits along the eastern and western walls of the auditorium.

PRESENTATION FOUR:

Protecting The Environment [3 minutes]

This presentation is basically a review of Chapter Nine, “Protecting the Environment” from the Eighth grade Social Studies text, *Exploring American History* (p. 664-667). Speakers will draft this speech to introduce the Town Meeting.

PRESENTATION FIVE:

What is a Town Meeting? [5 minutes]

An overview of the legislative process is narrated, accompanied by actors in pantomime; followed by instructions for the form of our town meeting. Additionally, all audience participants will have a rubric to critique the issues presented.

PRESENTATION SIX:

The Ecological Viability of Long Island Sound [3 minutes per presentation followed by 3 minutes for Q&A; average time with breaks—45-60 minutes]

The following topics will be offered by individual student presenters. There are six main areas of presentation, however, more than one presenter may be involved per area. (page numbers that refer to information in *The Soundbook* are indicated.) Presenters should use visual aids, such as large charts, video or slides:

LUNCH BREAK [60 minutes]

This will be an extended lunch period in order for students to organize their notes, discuss the presentations, and make mental notes or actual lists, if they so chose, of their main concerns, comments or questions, which they will have the opportunity to present during the panel discussion that follows.

PRESENTATION SEVEN:

What We Can Do, a panel discussion [45 minutes]

The panel will consist of the presenters (from “Presentation Six,” science teachers, an administrator, a city official (to be determined) and a resident expert on the Sound. They will be seated on stage. A discussion leader will stand at the podium and will have the responsibility of introducing topics and fielding questions from the audience. A microphone will be set up mid-center aisle in the audience for audience members who wish to address the panel. Topics for discussion (from *The Soundbook*) will include: *How a Home Helps Pollute Long Island Sound* (p. 47); *What you [and/or others] can do— in your own backyard* (pp. 46-48); *about household hazardous waste* (pp. 48-49); *about your septic system* (pp. 50-52); *to conserve water* (pp. 52-54); *on your farm* (pp. 54-56); *on your boat* (pp. 56-58); *as a citizen* (pp. 58-60).

FOLLOW UP, NEXT DAY:

Science and Social Studies collaborative assignment

[two to four two-period class sessions]

Social Studies and Science classes will collaborate on an interdisciplinary assignment that will involve Eighth graders in critiquing the introductory presentations, town meeting presentations and panel discussion that they had attended (or been a part of). Students will also be involved in discussions concerning the relevance of the information presented with respect to their individual lives; to their responsibility as members of the Long Island Sound community as well as members of the global community. This will be followed by students brainstorming suggestions for safeguarding the Sound and drafting letters to local and state representatives.

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