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Educating the Community about Global Warming and Sea Level Rise through Earth Day

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Objectives

I teach in a health science and business magnet school and my students frequently question why science is a necessary subject when many of them are business majors. As if these two subjects have no relationship and an individual in the business world will not benefit from a strong foundation in science. I am not sure where this misconception stems from. It is a statement that I have been posed year after year and it is a constant effort to clarify their misunderstanding of these parallel subjects. After all the main exports of the United States is knowledge and technology. Our present economy thrives on the discoveries of science. Our economy is generating billions in the sales of scientific products. When one thinks about it is quite obvious that a career can be quite lucrative in the marriage of business and science. Problems arise in our society when there is a lack of a strong science education background. Uninformed individuals in political and business sectors are responsible for making decisions that have impacts on our environment and well being. Well educated students will be well educated adults. It is for these reasons that I take on the task of enlightening these young adults who will have an influence on policy in the near future.

This unit is intended as a cross disciplinary approach to the science of global warming. It is meant to educate the high school community as a whole on the effects of sea level rise, a forecasted phenomenon with the onset of global warming, to our environment and economy. By educating our schools' population I hope that students will understand that an immediate decrease in CO₂ emissions will positively affect our economy and environmental health. My idea is that they will relay this understanding to family members creating a larger consciousness for the importance of environmental health and biodiversity. In a world of diverse opinions people are often swayed to follow what popular belief the media provide. In a recent study Dr. Orekes at the University of San Diego noticed that 53 % of popular press articles discredited the idea that humans were contributing to global warming. When looking at the number of peer-reviewed scientific articles on climate change, 0 % was in doubt that humans had an influence in global warming. With this being said I ask why would not people discredit the stance on global warming? It is for this reason that this unit is designed to educate our community so that they will understand what is occurring in our world. It is my way to create an understanding in the community that I live in, enabling my neighbors to think for themselves in making conscious decisions about their lifestyle which has an effect on us all.

My goal is that math, science, language arts and business teachers will integrate into a lesson how the science of global warming is related to their subject. The topics covered in each class will then be used in the school wide Earth Day event in which all students will have a role in participating. The Earth Day event is designed to introduce the science of global warming while highlighting sea level rise as the main theme. By incorporating each student and teacher in this task, there will be more of an impact and appreciation for the event and for their future impact on the Earth.

Introduction

The topic of Global Warming is one that is both important and controversial to our society. Not only does it have the potential to cause catastrophic environmental change, it will also require social sacrifices and economic burdens to remediate the situation. It is not an issue that can be instantly regulated with a vote. We cannot just stop using hydrocarbons as an energy source. Our society and economy have deep roots in generating energy by burning fossil fuels. Sadly as we continue to feed our energy addiction, the Earth's atmosphere is in distress as anthropogenic concentrations of CO₂ continue to increase.

Two actions by the human race must be taken to alleviate the possible effects of global warming and the steady increase in CO₂ concentrations. First, we must develop more efficient energy using machines. Already there are green technologies that are being used by many conscious people, such as energy efficient light bulbs and household instruments, but often this equipment is more expensive than their more wasteful competitors. Secondly, we must develop technology that maximizes the energy obtained from sources other than fossil fuels. These sources are renewable and plentiful. Energy obtained from wind, water and the sun can be harnessed, but once these energies are converted to electrical power, they are not stored easily and cannot be transported without it dissipating. For humans to really be able to utilize these energies we must develop superconductors which can transport energy over long distances at normal temperatures. Some may argue that nuclear power is the answer. Nuclear power in fact gives off less radiation than burning coal, and produces no CO₂. However the problem lies in the disposal of the nuclear waste, which can only be buried within the Earth creating an environmental hazard of its own.

Often it is confusing to make a sound decision of one's own when there are powerful interests on both sides of the controversy which have sought purposely to introduce confusion in their dialogue in order to advance their interests. Oil company spokespeople try to debunk the idea of global warming by hiring their own scientists who make claims that have no real scientific evidence. They have made claims that more water would evaporate creating more dense cloud coverage causing a cooling of the Earth. Some suggest that oceans can dissolve excess CO₂ in the atmosphere, or by planting more trees CO₂ can be extracted from the atmosphere during photosynthesis. Environmentalists use fear to portray their message that we will be in serious danger if we allow it to happen. There are many models that predict what will happen to these problems when the concentration of CO₂ continues to increase, but due to the lack of understanding of the diverse variables associated with climate change these models cannot be accepted as certain. The truth is that scientists do not have concrete models to predict precisely what will happen in the future as the rise in CO₂ continues. What we do know is that CO₂ is increasing and so is the average temperature of the Earth.

The Scientific Method in Everyone

What is Science? The answer to this fundamental question is imperative to be answered by all members of our society. Scientific conclusions are all around us. People make conclusion about the world they live in with their background in science. Most may not know it, but the scientific method is responsible for ideas of all facets of our society.

It all begins with observations in our world. Everyone is able to see, hear, feel, taste and smell differences in our environment. A difference from the norm creates curiosity in everyone. This curiosity drives a desire to determine the cause of the situation. One can make a conclusion by utilizing work done by other scientists and/or conducting their own research. When Isaac Newton came up with his Theory of Motion, he based his hypothesis on the work of Copernicus, Kepler, and Galileo, as well as his own observations. Charles Darwin not only made systematic observations during his voyages, but he also studied the practice of artificial selection and read the works of other naturalists to form his Theory of Evolution.

Darwin and Newton have made their mark in history because their conclusions were able to be tested by other members of society. If the conclusions were able to be disproved, then the validity of the original conclusion would be questioned. With this type of mechanics scientific thought is not proven it can only be disproved. Whatever is in the text books of our school has survived tremendous scrutiny.

The Greenhouse Effect and the Albedo

We all know what a greenhouse is. It is a structure with the roof and sides made of glass. It is permeable to light energy and retains heat. This warming of the air contained in it allows plants to grow and flourish. Much like a greenhouse the Earth's atmosphere acts in a similar fashion. Instead of a layer of glass, it is a layer of gas that is permeable to light waves and opaque to UV and infrared waves. Naturally occurring greenhouse gases include ozone, nitrous oxide, methane, carbon dioxide, and water vapor.

The greenhouse effect is an important phenomenon to our existence. Solar light waves pass through the atmosphere and are reflected or absorbed by the Earth's surface. Reflected light is scattered back to space but the absorbed energy is reradiated as infrared energy. This infrared energy again does not easily pass through the atmosphere. This energy remains trapped within the atmosphere causing an increase of the Earth's average temperature. This warming is important because it normally keeps the mean temperature of the Earth at a temperate 15°C. Without the atmosphere and the greenhouse effect, our Earth would be an average -25°C, an environment perfect for great big ball of ice, void of any multicellular life forms. This is not the case. Currently our Earth is experiencing a decrease in the ice outcrops around the world, while temperatures are on the rise.

As a child I can remember that my mother would suggest wearing white shirts during the summer if I wanted to remain cool. I rebelled and had a collection of black shirts with laminated pictures of my childhood Heavy Metal heros. I sweated those summers out until the onset of glam rock and it was no longer cool. At this point I was old enough to accept my mother's advice. She was right, but I did not know why? Was it a freak of nature or could a strong foundation in science answer this question? Later on in my high school physics class I

learned that the color white is a combination of all the colors of the light spectrum reflecting off a surface at once. The opposite occurs with the color black. When the eye sees the color black, it actually sees the absence of light. The light waves are absorbed by the surface. This simple concept relates to the reflective and absorptive capabilities of our Earth. The albedo is a reflection coefficient that describes the reflectivity of an object. An albedo value of 1.00 describes 100% reflection of light. An albedo of 0.00 describes complete absorption of light. My concert tee's had an albedo of 0.00. Currently, the Earth has an albedo value of 0.39, perfect for a temperate greenhouse effect. (Kaufmann, 1991).

Ice, when seen from space, is the color of white. It therefore has an albedo which reflects most of the light hitting it. The ocean and land are darker and have lower albedos, which means they absorb more of the light hitting them. The albedo of the Earth is a factor in the current temperature of the planet. If the albedo changes, then the temperature of the Earth also changes. Increasing the amount of ice on the surface would decrease the temperature of the Earth because more light would be reflected from the surface. However if the percentage of ice is decreased, then the albedo would decrease and more light energy would be absorbed. This unfortunately is happening throughout the globe. Many examples such as the glaciers on Mount Kilimanjaro, Glacier National Park and the Columbia Glacier in Alaska have all receded in recent times. This recess may be correlated to the rise in average temperature that has been observed since the dawn of the industrial revolution. If this recession continues the albedo will also be affected and the increased level of the greenhouse effect may ignite a warming of our globe. (Gore 2006).

Global Warming

Recently climate scientists have linked the continuous rise in the Earth's temperature to the buildup of greenhouse emissions from the burning of fossil fuels. The problem occurs when the natural balance of the atmosphere is altered drastically. Since the industrial revolution the atmosphere has seen an increased concentration of greenhouse gases. In 1750 the average concentration of CO₂ was 280 ppm. In 2005 the average CO₂ concentration was measured at 376 ppm. This is a 34% increase. Naturally CO₂ is emitted into the atmosphere in large quantities when forests burn. Anthropogenic CO₂ is emitted into the atmosphere when fossil fuels are burned to produce energy. Emissions from fossil fuel combustion account for about 65 % of the extra carbon dioxide now found in our atmosphere. Predicted consequences of global warming include a rise in sea level, increased intensity of storms, increased rainfall along the coasts and drying inland, a decline in species diversity and abundance and changes in species habitats.

What Has Been Studied and We Are Certain About

There are several ways scientists have decided that there is a warming effect on the Earth. This evidence is accurate and can be used to provide certainty that we are experiencing a rise in average temperature due to increased CO₂ concentrations in the atmosphere. They include; data on CO₂ concentrations in the atmosphere over the past 400,000 years, trends in average surface temperatures since 1860, correlations of temperature and CO₂ concentration in the atmosphere, precipitation changes from 1900 to the present, and sea level rise over the last century.

Trends in Average Surface Temperatures Since 1860

Currently it has been observed that the mean global surface temperature has been on the rise since the 1860's, when instrumental records became sufficiently accurate. The temperature has increased consistently since the beginning of the 20th century. In the last 40 years the temperature has increased by 0.3 °C (<http://www.unep.org>).

CO₂ Concentrations in the Atmosphere over the Past 400,000 Years

In 1958 a professor by the name Roger Revelle began taking measurements of CO₂ concentrations in the atmosphere on top of the peak of Mauna Loa in Hawaii. These values have shown an increase in CO₂ from a mean concentration of 316 ppmv to 369 ppmv in 1998. Further data taken from ice cores suggest that average CO₂ concentrations from the pre-industrial era measured in at 280 ppmv (<http://www.unep.org>).

Correlations of Temperature and CO₂ Concentration in the Atmosphere

Research that initiated the idea of global warming was the comparison of temperature and CO₂ concentrations in the atmosphere over the past 400,000 years. It is clear that the Earth's climate is unstable. There have been periods of extreme variation, from ice ages to warm periods, within a matter of decades. This instability suggests that there may be internal and external forces that cause unpredicted changes. When looking at these graphs it is quite apparent that there may be a correlation with temperature and CO₂. When the temperature increased, there was also an observed increase in CO₂ concentration. The same relationship resulted when there was a decrease (<http://www.unep.org>). It should be stated that there is a more precise correlation of temperature and CO₂ over the last century. This is when scientists began taking data with modern equipment. The data from the last 400,000 years is isolated data taken from ice cores, which is still valuable for local readings, but is not accurate for mean global readings.

Precipitation Changes from 1900 to the Present

Scientists then noticed changes in precipitation in the data. It was observed that precipitation has increased over high latitude regions of the northern hemisphere. This was more prevalent during the winter months. There was also an apparent decrease over the subtropics and tropics from Africa to Indonesia. By 1980 there were constant decreases of precipitation over the Earth's land surface. (<http://www.unep.org>).

Sea Level Rise during the last Century

Global sea level rise is caused by natural factors that are explained with a basic foundation of our physical world. It is all about phase changes from a solid to a liquid to a gas. As a substance changes phase, there is a change in density of the atoms and molecules that make it up. The first is a solid to a liquid. It is quite simple. As the temperature of the Earth has increased the warmer environment has caused ice on the Earth to change from a solid to a liquid. The movement of water from the ice travels directly and indirectly to the oceans hence, providing the ocean with more water. The more water in, the higher the sea level. The second deals with the density differences between cold water and warm water. Within colder water the water molecules move slowly and take up very little space. As water becomes warmer the molecules move around more rapidly and thermal expansion occurs. The water molecules are now more spread out and take up more space hence, causing a rise in sea level. Therefore sea level rise occurs by melting of land ice and thermal expansion of warmer water.

It has been difficult to measure sea level change due to the isostatic effects, and sedimentation of the Earth. The Earth's shorelines are ever changing. However, improved models which include these vertical land movements have given scientists greater confidence that there has been indeed an increase in the volume of water within the oceans causing a rise in sea level over the last 100 years. This rise is consistent with the rise in temperature also seen over the 20th century. With the current model it has been estimated that there has been a net input of 2-7 cm from thermal expansion and 2-5 cm from the retreat of glaciers and ice caps. There is still some uncertainty on the influence of the retreating ice sheets from Antarctica and Greenland. This is due to insufficient data about these ice sheets (<http://www.unep.org>).

What Has Been Predicted but We Are Not Certain About

Sea Level Rising.

As the temperature of the Earth increases the amount of ice and snow at the poles will decrease due to melting. This melting will cause mean sea levels to increase. When combined with thermal expansion, sea levels have been predicted to reach up to 80 ft above the level today. This rise will affect coastal areas around the world. Coastal wetlands in low lying areas will be flooded. A worst case scenario suggests that the U.S. will completely lose East Coast cities such as New York, Boston, Washington and almost all of Florida. Other places around the world would have even more grave responses with predictions of up to a billion displaced people.

Some may think that this rise will be gradual; however current research reveals examples in which sea level rose 1.1 meter every twenty years, for several centuries. At this pace the costs would be too high to estimate. Destruction from the rising sea levels will result in fierce local storms which will cause repeated retreats from transitory shorelines and redepositing of the sediment and debris in other places (Hansen 2006).

Changes in Ecosystems

Models that have been implemented suggested that warming trends will cause alterations in the distribution of plants and changes in animal habitats. Scientists warn that there will be a northward retreat of temperate tree species and a northward advancement of tropical and subtropical species. Predictions are difficult to make about what will happen precisely. Animals will not follow their normal climate range. With changes comes extinction. Loss of species will disrupt food webs that have been established for centuries. Loss of species will also provide environments for other more resilient species to establish a home. Human barriers that have caused fragmentation in ecosystems will also play a role in changes in ecosystem. Plants that cannot migrate across road systems may perish allowing the spread and dominance of weedy and exotic plants.

Already there are reports that species decline is occurring. There are many reasons for this. Changes in disease dynamics and pathogen outbreaks have caused massive extinction particularly in amphibian ecosystems. Climate change is also influencing breeding patterns of amphibians and birds. These changes may lead to significant declines in population. As CO₂ increases the ocean pH is changing from a mild basic solution to a more neutral environment. Marine organisms whose life depends on a constant pH are becoming stressed due to the change.

Rainfall Patterns

Models have also predicted that changes in rainfall patterns will cause wetter coastal regions and drier inland areas. Drier conditions will lead to increased wildfires and wetter conditions could cause better condition for

insect metamorphosis and bacteria growth. Some of these organisms are responsible for diseases in humans and other organisms.

Recently an article published in Nature suggests that the first sign that warming caused by human activity was disrupting ecology due to changes in rainfall patterns. Observations were originally made during the 1980's that 110 species of genus *Atelopus* frogs once lived near streams in the tropics of the Western Hemisphere. Today one third of them have vanished. The culprit is a fungus that thrives best in cooler conditions. Because warming increases evaporation, more clouds are created causing cooler days by blocking sunlight and making nights warmer by trapping in heat. These conditions are favorable for the spread of the fungus. This research is now being scrutinized by other expert on amphibian disease and ecology. That is the beauty of science.

Climate Variability

In 2001 the United Nations Intergovernmental Panel on Climate Change (IPCC) reported that from 1990 to 2100 the world's temperature is projected to climb an additional 1.4°C - 5.8°C (IPCC 2001). This increase of temperature will bring about changes in climate. Some scientists suggest that this rise in CO₂ will cause unknown events that will result in the onset of an ice age. Others fear that temperatures will continue to raise causing shifts in ocean currents and weather patterns throughout the world. It has been suggested that the North Atlantic Oscillation could be shut down with increasing temperature. This could cause the temperatures in Western Europe that have been quite mild to switch to a more common trend seen in other areas with the same latitude which are extremely cold winters and mild summers, a pattern which is not seen today.

Land warming of the Northern Hemisphere is well documented. There have been analyses of seasonal temperatures which reveal that warming is greater in the winter and spring months. This evidence points to the lengthening of the growing season by 10-20 day in the last few decades. This warming could result in long term increases in carbon storage and changes in vegetation cover which will lead to changes in climate systems. (Schwartz 2006).

Activities for Interdisciplinary Instruction of Sea Level Rise and the Earth Day Celebration

Science Classes: Loss of Biodiversity due to Sea Level Rise

Science Classes will be teaching the importance of biodiversity for environmental health. Species diversity and abundance presently are a result of long term climate patterns. As global temperatures continue to increase changes will be seen in local, regional and global weather patterns. Past data suggests that plants and animals change environments as climates change. However, if changes in these climates occur too quickly plants and animals will not be able to reestablish themselves quickly enough, and extinction may occur (Gao et al. 2006). As species become extinct changes will occur in food webs causing even more extinctions and loss of biodiversity.

Biodiversity is essential for the stability of an ecosystem and the sustainability of populations. Healthy ecosystems create healthy biospheres that are balanced cycles of energy and nutrients. These cycles are made up of species interacting with one another. When studying a particular species it is obvious that they are

dependent on or dependent upon another species. If there is a loss of any species then one system within a food web will be altered. As sea levels are altered balanced marine ecosystems become threatened.

In this activity the science teacher will introduce to class the concept of energy flow in a habitat. Students will be taking a food chain from a habitat which has been predicted to be altered by global warming and sea level rise. Students will be matched up into each food chain represented. Each group will be required to provide a visual representation of the producers and consumers within the system. Each member of the group will select one organism from the food chain and represent that organism in their own artistic mode that they choose. I will provide water colors and clay. Ecosystems that will be affected by sea level rise are;

Estuaries

Salt Marshes

Open Ocean

Mangroves Swamps

Rocky and Sandy Shores

Coral Reefs

Arctic and Antarctic Ecosystem

At the end of this lesson students will describe how energy is transferred from the sun to producers and then to consumers. They will be able to describe how consumers depend on producers.

Math Classes: Loss of Coastal Area due to Sea Level Rise

One of the most certain consequences of global warming is the continuation and acceleration of sea level rise. Since the end of the last ice age sea levels have risen by over 120 meters. Within the last 100 years tide gauge data indicates that the global rate of sea level rise is 1 to 2 mm per year. Current models project that by the end of the 21st century sea level is projected to rise by over 50 cm due to global warming. If the continued increase in greenhouse gases is causing global warming then it is possible that both the Greenland and Antarctic ice sheets could completely melt and raise the average sea level to 70m. (Alley et.al. 2005). With 100 million people living within one meter from mean sea level we could see in the near future millions of displaced refugees. Additional threat is to the destruction of highly valued real estate along the shorelines. Already along the Atlantic coast erosion is narrowing beaches and washing out vacation homes. As sea levels rises and coastal communities pump water from aquifers, salt water intrusions into ground water will become an even greater problem (Douglas 2004).

In the math activity students will investigate the changes that may occur on a shoreline city if sea level were to rise significantly. Students will begin by examining a topographic map published by the US Geological Survey. I will briefly describe that the area can be calculated by using the conversion that 1 inch equals 100 feet therefore a one inch by one inch square would equal 10,000 ft². Student will trace the shoreline with a blue marker at the mean high water mark. I will have students determine the area of the map by drawing up a graph of 1 inch by 1 inch squares on a clear laminate sheet. The laminate graph will be placed over the topographic map. Students will then determine the area of the map by counting the number of squares located over the regions of land. The number of squares will be multiplied by the area of one square (10,000ft

2) and the area of land will be determined. Students will then trace a new coastline after a 1 meter increase in sea level rise occurs. Students will then calculate the area of lost land from rise of sea level. Students will then trace a new coastline after a 50 meter increase in sea level rise occurs. Students will then calculate the area of lost land from rise of sea level. Students will then determine populations of people living at each area and determine how many people will be displaced from the rise in sea level. One place to purchase topographic maps of a desired area is through www.terraser.com.

Language Arts Classes Persuasive Letter

When making a change in our society it is important to remember the first constitutional amendment. Personal actions are important in the initial steps in reducing greenhouse gases in the United States and the World. The best way to make a change is to put pressure on an elected representative to support measures that have a positive impact on our climate crisis. Connecticut is a coastal state that relies on its thriving coastal economy. The state generates much of its revenue from aquaculture, recreation and real estate. With so much revenue locked in our bustling shoreline, there would be devastating impacts to our local economy and ecosystems if sea level and coastal erosion continues.

The language art class will research, discuss and compose letters to a politician in the form of a persuasive writing activity. Students will write their politicians to educate them on the current research on global warming, its effect on sea level rise and how our nation's economy can be altered. Students will be provided with a statement about sea level rise, which states: *As the mean global sea level continues to rise it has been proposed that global warming will increase its extent with the melting of ice caps and the onset of thermal expansion of the ocean. Currently signs are apparent that coastal erosion is happening throughout the globe. As heavily populated communities are vulnerable the onset of economic decline is inevitable. Eroding landscapes will alter ecosystems and affect ground water salinity. Some people feel that there should be stricter energy policies established by the current administration to alleviate U.S. oil consumption.*

The main concept of persuasive writing is the author's position. This is their opinion or point of view about the issue being discussed. When beginning to prepare oneself for a persuasive piece, it is important to first research the issue. A good place to start would be the U.S. Department of Energy, The National Resource Defense Council, and The National Commission on Energy Policy. Students will find out what the governments policies are concerning fossil fuel consumption. Students will then research what other countries are doing as members of the Kyoto Protocol. From this initial task students will generate a view on what else can be done by our state in response to global warming and sea level rise. Students will develop a thesis statement that considers the audience and their purpose. They will then need to support their view. Effective support requires an organized argument and details that clarify and strengthen the point that are made.

Business Classes

Due to the heavy population of people living within fifty miles from the coasts even a small amount of sea level rise would have substantial economical and societal impacts due to coastal erosion, increased susceptibility to storm surges, ground water contamination by salt water intrusion, loss of tax revenue from real estate and loss of revenue from coastal recreation areas.

Currently, debates of the impacts of global warming are centered on how reliable computer models are for predicted outcomes. These debates have neglected to consider the economic effect of reducing CO₂ emissions. It is necessary to attempt a cost benefit analysis to arrive at effective policies for lowering human

induced CO₂ into the atmosphere. Estimates of costs of reducing greenhouse gases must also include possible benefits. These models should include the consequences of global warming over time and geographic space. That is why the costs of not attempting to ameliorate our current CO₂ emissions must be included in policy considerations. It is also important to recognize that economic and environmental goals should be compatible. If economic models are included in decision making then policies for reducing CO₂ emissions will help populations and their economies.

Because we live in an economically, rather than environmentally, driven society, business classes will relay how short term economic growth through the continued use of fossil fuels could result in future declines in our economy with the onset of sea level rise. These business students must have a strong environmental background in order to make sound business decisions in the future otherwise the only thing with a green hue will be the color of money. Students in the business classes will conduct a cost benefit analysis on the loss of U.S. tax revenue from real estate and revenue from coastal recreation due to sea level rise with the cost of cooperating with the Kyoto Protocol.

Organizing the Earth Day Event

Earth Day is a powerful catalyst that will involve the schools community in making a difference toward a healthy, prosperous and sustainable future. On April 22nd most Earth Day events take place. It is also the day when the President and Vice President of the United States deliver Earth Day speeches and make their environmental policy announcements. One key feature of an Earth Day event is that it is effective for educating on many environmental issues, however it is important to tie in a theme which the event will center around. The theme for this Earth Day event is Sea Level Rise and Global Warming.

It will be important to be organized for a successful event. It is important to start by holding an Earth Day organizing meeting at a certain time and place after school and be sure to invite all teachers and students. At the meeting present and solicit ideas on what to do for Earth Day. Have a recorder write them all down on large pieces of paper and tape them to the wall. Next, have the group discuss and rank the ideas and add new ones. Pick the top one, two or three and devise plans to make them happen. If you are just beginning an Earth Day event it may emerge that you wish to focus on one event or service project. For any idea to become a reality, it must have a team of people who are committed to make it happen. Each project should establish its purpose and determine its next meeting time and location. This is the first key sign of a functioning team. If there are many projects you will need a "Communications" person to coordinate a calendar.

Encourage everyone who attends to bring friends with them next time. Try to have the place for the second meeting committed ahead of time so you don't have to waste time wondering where you can meet next.

"Never doubt that a small group of committed people can change the world. Indeed, it's the only thing that ever has." Margaret Mead

A team of teachers will be necessary for a successful event. I will begin by organizing teachers within the different subjects in our school. For this event we will need a group of science, math, English, and business teachers. Each teacher will agree to incorporate a week to teaching their subjects in the context of Sea Level Rise and Global Warming. I have provided examples of possible activities that each teacher can do prior to the

event so that when the day arrives there will be plenty of student driven performances and material for display at the earth day event.

The food chain art projects that the students designed in their science classes will go on display throughout the events location. This will give the school a sense of the vast display of the Earth's biodiversity. Under each exhibit there will be an informational plate which describes how the food chain is important to the health of the ecosystem and to humans. There will be a contest for the most creative food web team. This contest will be voted upon by the whole school during the event.

During the event there will be a Global Warming Earth Day poetry contest and rap off. These will be two separate events and again it will be contest driven and students will vote on the most creative poem and rap.

In a central location topographical maps that each math class calculated for different levels of sea rise will be on display. Within this area the business class's cost-benefit analysis of sea level rise will correlate with the loss of area of coastlines and both subjects will be correlated to give students a real life example of how science, math and business are used in society to determine environmental and economic health.

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