What in the World Did I Do?
Understanding Global Warming, Climate Change, and Our Impact on Our Earth

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Introduction

Day to day, I am concerned with making sure that I meet all my obligations and make all my appointments. Daily I am caught up with the hustle and bustle of life and all require transportation from one location to the next. As I am sitting in my car in traffic, a news minute comes on the radio and the topic is human impact and climate change. For the moment, I wonder how much have I contributed to climate change and the negative impact I have had.

The Common Core Standards are designed to ensure students are receiving a high quality education from school to school and state to state and prepare students for the future, which will allow them to be more successful in competing in a global society. Common Core standards encourage real world applications with emphasis on reading and writing, which are universal skills needed by all students in all subjects areas. Global warming/climate change globally and locally is an essential standard of the ecology unit and sustainability for biology.

Student Background:

I teach at a school that has a very diverse population of students and various academic levels. During my 16 years of teaching, I have taught various subjects, but mostly biology, in which I am certified. I have had the opportunity to teach all levels. I have taught Standard, Inclusion (students with special needs that are main streamed in a regular class), Honors, MYP/IB (Middle Years International Baccalaureate Program), and Advance Placement Biology.

A standard biology class should consist of students taking biology for the first time. These students will mostly be ninth and tenth graders or students coming from another state or school district. There may be a few students that are repeating biology, which are usually eleventh or twelfth graders. Students in my standard class are more "hands on". They want to learn, but you have to keep them interested by engaging them in many activities. Once they are "turned off" with any unit or concept, it is hard to get them back to learning.

The IB/MYP (International Baccalaureate Middle Years Program) is very similar to an honors biology class. The MYP/IB program however is designed to facilitate learning by inquiry. I believe this unit is an easy topic for students to practice inquiry based learning; for students to "think outside the box" and develop critical thinking and

problem solving skills. There is a separate MYP component that should be used with the biology curriculum. For example, students have to know and be able to apply the areas of interactions (middle years curriculum) to the biological concept. The areas of interaction are like the principles of the IB program. The students are required to do a personal project and community service hours. Students in the middle years program begin this program in middle schools. The middle years program consists of ninth graders and a few tenth graders. I teach the same units at the same time with standard biology and MYP/IB, but the assignments and tasks are different at times based on academic levels.

The AP Biology 2 class is college level course, in which students will take a test and may qualify to place out of the course in college. Students in AP Biology are mostly twelfth graders. These students should be independent learners and possess good critical thinking skills. All students will be able to benefit from all activities within the curriculum unit. For example, all students and academic levels can debate solutions or make posters about the importance of water conservation, but criteria for evaluation can be created to meet the needs of various academic levels, such as a rubric.

In addition to the diverse population academically, our school is economically diverse. We are a title 1 school. This means that we receive federal funding for education. Sixty-seven percent of our students receive free or reduced lunch. Fifty-two percent of our students are African American, Twenty-six white, sixteen percent Hispanics, six percent Asian, and less than one percent Native American.

Rationale

Many students have misconceptions about global warming and climate change. Some students think they are the same thing. I know that students are aware of global warming and climate change and they want to know more. For example, a student asked me if the unpredictable weather is a result of global warming. Students are more familiar with global warming than climate change. Students can tell you what global warming is, but they do not know how or understand its relation to climate change. My purpose for creating this unit is to teach global warming and climate change in the simplest form and more importantly raise awareness of their impact. I want to be more effective in teaching global warming and climate change, which is a portion of the essential standards of the ecology unit. Through designing this curriculum with global warming and climate change as the focal point, it will allow me to connect many ecological concepts of human impact. For example, climate change affects biodiversity and ecosystems. When there is a disruption within biodiversity, it affects us (humans). In a society where a lot of our concern is about how we will be affected or benefit by a societal situation, students maybe more likely to want to know what they are doing in a positive or negative way that contributes to global warming and climate change.

Increased awareness by our students of our impact on our environment in relation to global warming and climate change is just as important as learning the concepts in

order to pass a state exam. Awareness and making a positive difference will be a lasting lesson learned for students. When we know better, we try to do better. I want students to be able to understand the effects they may be experiencing now from global warming and climate change by creating activities, community involvement, and exercising problem solving abilities to reduce global warming and maintain a sustainable environment. I am looking forward to learning more about my impact in relation to global warming and climate change with the students. I want to be transparent in regards to my activities that have negatively affected our environment and lead by example. It is important to relate these concepts more specifically locally. I believe focusing the unit locally, or at least regionally in North Carolina will heighten the level of awareness and impact than globally.

Objectives

Before the unit, students will have covered ecosystems and species interactions. They will know essential vocabulary and how ecosystems work when all is in order and working well. In addition to knowing ecosystems, students will also know what biodiversity is and factors that affect biodiversity, which includes global warming. I decided to have four main objectives. Too many objectives may cause students to lose interest in the unit. I believe this unit can be effectively carried out in five-90 minute blocks. All items can be used from the unit or you can compact some of the activities within the unit if time does not allow a week to be spent on this topic.

Objective One

Students will learn about the gases that cause global warming and its affect on the environment in general. Although global warming and climate change are used interchangeably, students will learn the differences between both and their relation to each other.

Background Information:

Global warming is an overall warming of the planet, based on average temperatures over the entire surface.[1] The earth's warming trend is based largely on natural warming and cooling cycles, and human contribution to greenhouse gases, which are boosting the atmosphere's ability to trap heat in the biosphere called "enhanced" global warming. Climate change are changes in regional and global climate characteristics, including temperature, humidity, rainfall, wind, and severe weather events.[1] Weather patterns are predicted to change in response to enhanced global warming. Many chemical compounds found in the Earth's atmosphere act as "greenhouse gases".[2]The greenhouse gases are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. These gases absorb heat (thermal energy) from the earth and warm the atmosphere. The burning of fossil fuels produces carbon dioxide gas that enters the atmosphere. Plants remove

carbon dioxide from the atmosphere. Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by decaying organic waste in municipal solid waste landfills.[3] Nitrous oxide (N_2O) is emitted during agricultural and industrial activities as well as during combustion of fossil fuels and solid waste.[3] Fluorinated gases, such as hydrofluorocarbons are man-made. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances.[3]These gases are potent and are sometimes referred to as High Global Warming Potential Gases.[3]Earth's weather and climate is created by energy from the sun. Greenhouse gases absorb some of the energy radiated from the earth and trap it in the atmosphere, which makes the Earth's surface warmer. This unit will focus on carbon dioxide.

Activities for Objective One

Day One-Global Warming and Climate Change 101

The students will be placed in four to five groups of 3-5 students depending on class size. Each group will be provided with a sheet of poster board or large paper. The students will answer the following questions: What is global warming? What causes global warming? What is the difference between global warming and climate change? How do we (humans) contribute to this issue? The students will have ten minutes to discuss and ten minutes to write their answers to the questions on their poster board/large paper. A representative from each group will share their responses to the questions and place their poster/paper on the wall in the room. After a short discussion of global warming and climate change from the students' perspective, students will watch a five minute video. This video gives a brief overview of greenhouse gases (carbon dioxide and methane), how global warming occurs and affects climate change, the results of climate chance, human impact and possible solutions. The voice is Bill Nye, but it is narrated by someone else. Go to YOU TUBE, type in "Climate change 101 with Bill Nye the Science Guy". I would watch the video and record points/facts from the video prior to this activity. This will allow me to focus on concepts I feel are important based on the Common Core Standards that I want them to know. A general graphic organizer/chart is provided below. I chose not to make a video sheet with specific questions because the video is only 5 minutes and I find that students seem to focus less on the actual contents of the video and focus on just hearing or finding the answers to the questions. If I allow them to list facts that were fascinating to them, I believe it will result in a better discussion that is student led instead of teacher directed. I will serve more as a facilitator for the discussion. After the video, I will lead the students in a ten to fifteen minute discussion about what they viewed in the video. I will use some of their responses from the questions to pull out key points and use those points to teach biological content the students need to know.

Global Warming & Climate Change

Class Discussion Questions: Discuss these questions within your group. Summarize the group's answers on the paper provided. You will have 10 minutes to discuss and 10 minutes to write the answers on the poster board/paper.

What is global warming?

What causes global warming?

What is the difference between global warming and climate change?

How do we (humans) contribute to this issue?

Video: Climate Change 101 with Bill Nye the Science Guy-30 minutes

Make a list of interesting facts/statements about the video. A statement could be something that you learned, a question you may have based on what you seen or heard in the video.

What I Learned…….	What I Want To Know…..	Teacher's Notes

Choose one of your statements/facts and be ready to share it with the class.

Activity Two (Fill in the Blank Notes/FIB Notes on Global Warming)

Students will be provided with fill in the blank notes on global warming, the gases involved, and how global warming leads to climate change. My notes will be created based on the academic levels. Notes/lectures are more effective when you create them based on the students' academic needs. From past experiences with using notes created by others, it is sometimes difficult to explain the content from another teacher's point of view. For example, I tried to teach a concept for AP Biology, using notes from another teacher. Although, the notes were very thorough, I had difficulties answering questions the students had about the notes because I was not the one that created them. My notes for standard classes will include five statements about the greenhouse gases and how they cause global warming. The written portion (five statements) of the notes will be filled in and the students will have to illustrate each statement by the drawings I show them on the smart board. For advanced classes, they will make a flip book using simple drawings to show the effects of greenhouse gases. They will have to explain each picture in their flip book. A general handout about greenhouse gases and their effects will be provided. I will briefly summarize the information.

Activity Three (Gallery Wall)

After the FIB notes/lecture, each group will be given a specific color marker, rotate around the room to the different posters, and add a statement, comment, or question to each poster created during Activity One.

Assessment for Day One Activities

I will briefly assess individual students with a participation points grade by walking through the rows to make sure they have written something down on the video sheet. I will assess the groups by looking at their original poster and comments that they may have written on other posters. This should not take long because each group has a specific color. For example, everything that is written in blue should be from group 1 and so on.

Day Two-Greenhouse Gases Lab

Students will be able to participate in an experiment by completing the greenhouse gases activity from the USGS website. The "hands-on" activity will be the production of the types of gases using household products and the change of the temperature within the environment (the bottle).This lab allows students to simulate greenhouse gases and global warming. It gives background information about greenhouse gases, global warming, and

climate change, and includes a lab analysis worksheet. I anticipate this activity will take an entire class period or more as written, but it can be modified to meet diverse academic levels, student needs, and time. The website is www.education.usgs.gov/lessons/gases.pdf.

An example of differentiation based on academic levels is my standard and inclusion bio classes will have one part of the lab at each station with specific instructions to complete. I will assign a group to complete that portion of the lab only. They will report their results to the rest of the class and I will clear up any misconceptions or information that was not reported correctly. My AP Biology class will be required to create their own experiment based on the scripted lab. Experimental design is part of the AP Biology curriculum. The lab states to divide the class into four groups, so that every student is engaged in data collection. Having a low performing or standard class try to complete all parts at one time of the lab may be overwhelming for the students as well as the teacher. Having one group focus on one part and then sharing their data and what they learned with the rest of the class will benefit the students in reaching the goal of understanding the concept. I would give my AP Biology class the lab ahead of time and have them read it, give them a lab quiz the next day, and they would design their own lab based on what they learned from the original.

Assessment for Day Two Activity: Group Presentations

The classes would meet in the computer lab or media center. The first half of the 90-minute block, the students will get in their groups from the previous day and prepare to give an oral presentation based on the part of the lab they were responsible for. The students will prepare a brief power point or smart board interactive presentation. Use of technology in the classroom is encouraged and most students are better with technology than teachers. It is a world they know well. The second half of the class period, the groups will share their presentations. Students will be provided with a "notes" sheet. They should jot some things down from the presentations to assist them in their individual assessment. For an individual assessment, the students will be required to write a personal reflection about what they learned for homework. My AP Biology class will complete a formal lab write up based on their labs. They will work in the computer lab or media center. Although each student will turn in their own lab report, students will be allow to collaborate among their group members and I can assist them if they had any questions or misconceptions. They will turn in their typed lab reports including graphs and other visuals, and a personal reflection at the end of the period.

Objective Two

Students will be able to identify and summarize specific effects of global warming.
Background Information:

Global warming leads to climate change. Climate change is the change that happens to our environment, atmosphere, and weather over time and it impacts all aspects of our planet. Rising sea levels, heat waves, unpredictable weather and seasons, and loss of biodiversity are just a few of the ways climate change impact our planet.

The top 10 worst effects of global warming is an article written by Maria Trimarchi on discovery.com and it gives a good explanation for the effects. There is a visual with an explanation for each effect listed. I chose to use this article because I like how they count down the effects. One and two of the top 10 are biodiversity and destruction of the ecosystem and it provides a great connection to my third objective. I will cut and paste the article into a smart board format so I can highlight, add side notes, or anything that I may include for my students.

After the notes, I will show National Geographic's *Six Degrees Could Change the World.* It is 90 minutes and I am aware of being conscience of the pacing guide, but there are some instances where a video is valuable in the content that you are presenting to the students. I can tell them about the effects of climate change, but giving them an opportunity to get a "real world" view of the effects of climate change and possibly making an impact on the students makes it worth showing. You can purchase this documentary on amazon.com or watch the entire documentary for free online if you do not mind the ads. Segments of it are posted on YOU TUBE (free). This is a good option if you do not have time to show the entire documentary.

Activity One: Notes and Lecture: Effects of Climate Change
The students will use a notes sheet to write things that I highlight or indicate as important from each effect.

The top 10 worst effects of global warming

Write at least three statements about each effect of global warming below.

10. Rising Sea Levels
9. Shrinking Glaciers
8. Heat Waves

7. Storms & Floods
6. Drought
5. Disease
4. Economic Consequences
3. Conflicts & War
2. Biodiversity
1.Destruction of Ecosystems

Activity Two: *National Geographic: Six Degrees Could Change the World*

After the notes, the students will watch the documentary by National Geographic: Six Degrees Could Change the World. You can show the entire documentary by clicking on the following site: www.channel.nationalgeographic.com An updated version of Adobe Flash is required.

National Geographic Documentary: Six Degrees Could Change the World

List the events that occur in result of the temperature changes by increase of degrees.

One Degree

Two Degrees
Three Degrees
Four Degrees
Five Degrees
Six Degrees

Objective Three

Students will be able to summarize climate change and its impact on biodiversity. Students will be able to research the impact climate change has on plant and animal species of North Carolina. Students will be able to apply what they have learned about climate change in North Carolina.

Background Information:

Biodiversity includes all organisms, species, and populations, the genetic variations and interactions among organisms. It also refers to the interrelatedness of genes, species, and ecosystems and their interactions with the environment.[4] Biodiversity is important on so many levels. It allows organisms to benefit from other organisms. For example, a tree provides a habitat for insects, fungi and microbes, and others.[4]We (humans) depends on biodiversity for food, shelter, and health. One of the threats to biodiversity is global climate change. Global climate change can alter environmental conditions.[4] Species and populations may be lost if they are unable to adapt to new conditions or relocate. Climate change has already produced significant and measurable impacts on almost all ecosystems, taxa and ecological processes, including changes in species distributions, timing of biological behaviors, ecological interactions, and community dynamics.[5]Some examples of the impact of climate change on biodiversity are shifts in average temperatures, which may cause plants and vegetation to move towards higher latitudes and altitudes. Invasive species may become established in new areas because the change in climate is suitable for them and they may affect the native species in a negative way, such as eating them, introducing new diseases, and competing for resources. Rapid changes in adaptation can lead to localized extinction of species. Shifting seasons result in changes in timing and behavior of species, such as birdsongs, mating, and spring flowers blooming earlier.

Activity One-Documentary Discussion

Students will finish watching the documentary and I will facilitate a short discussion about what they learned or answer questions they may have from the documentary. I will conclude the discussion with Biodiversity which will lead into the Activities for Biodiversity.

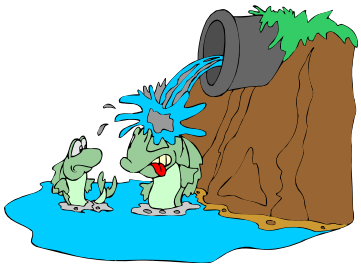
Activity Two: Notes and Lecture on Biodiversity

Students will fill in notes by way of a short lecture on the effect of climate change within Biodiversity. I will facilitate a discussion with my AP biology class.

Activity Three: NC Biodiversity Posters

The students will make a poster of an example of climate change and its affect on biodiversity (plants or animals) in North Carolina. If students want to research something else, they may only if approved by me. I may assign species based on the academic level of the class. For example, my standard/inclusion biology needs more teacher directed guidance. I will have a list of different types of plant and animal species available, which are specific to North Carolina. The preparation for this activity will take some time and will have to be "tailor made" by the teacher. The best resource for this activity is a report called, *Understanding the Impacts of Climate Change on Fish and Wildlife in North Carolina.* The easiest way to access this article is to Google the title. If you go to

www.defender.org or www.georgetownclimate.org you will have to search for the article within the website. It we will be listed as a pdf. File and allow you to save and print. It explains climate change, the type of effect, such as sea level rise, temperature, and precipitation and the impact it has on species. The report is broken down based on different regions in North Carolina. I will cut them in strips and place them in the bowl and have them to choose. It is the fair way to handle assigning species. The students cannot "accuse" me of giving them a difficult one or an easy one to a student they think you favor over another. I would also take the students to the media center so I can help them in research and entertain any questions they may have. The students will complete their posters for homework. When they turn them in (the next day) they will have their student ID number on the poster instead of their name. I will select posters from the various classes and set up a rotation station. Students will rotate around the lab stations and complete a chart by collecting information from the posters.



Climate Change & Biodiversity in North Carolina Poster

Criteria & Evaluation Sheet

Species: (Circle One) **PLANT** **ANIMAL** **OTHER**

Name/Type/Topic of Species: _____

Your Poster must include the following:

- **Title** **/5points**
- **Description of Biodiversity & Climate Change** **/5points**
- **Explanation of how climate change affects the species** **/10 points**
  - **Be Specific**
  - **Provide good examples**
- **Explanation of how humans are affected** **/10 points**
- **Visuals-Pictures (internet, magazines, hand drawn, other)** **/10points**

Overall Neatness, Organization, & Attractiveness of Poster /10points

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Total /50points

Comments

_____
_____
_____
_____
_____

CLIMATE CHANGE & BIODIVERSITY

Species	Affect on Species	Affect on Humans	Examples

After the rotations stations, students will watch a three minute You Tube video: Learning to Protect Biodiversity by UNESCO.

Objective Three

Students will be able to calculate their individual carbon footprint and their contribution (positive or negative) to global warming and how it leads to climate change.

Background Information

Humans are the most successful species on the planet. But we are using more resources than the Earth can provide. [6]Humanity's ecological footprint has grown 80 percent over the last four decades. The greater the gap between human demand and nature's regenerative capacity, the more pressure there will be on the resources other species need to survive, and the more perilously biodiversity will be under threat.[6]Carbon dioxide is the most significant of the greenhouse gases. Human activities, such as burning fossil fuels increase the amount of carbon dioxide, which results in increasing the temperature of the earth's surface contributing to global climate change. There are many different ecological footprint calculators, but I decided to use one that was based on carbon

dioxide footprint for this unit. The students' homework assignment prior to the day of activities will be to collect some family data and have it ready for the human foot print activities. This is a good way to get parents/guardians involved. I will explain to the students what footprint calculators are. I will share the results of my carbon footprint with the students. My carbon foot print was 32, which is above average of the CO_2 footprint of the US. The average is 27

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Activity One: Human Impact Introduction

I will briefly review the greenhouse gases with emphasis on carbon dioxide. I will have list of behaviors that humans do to produce carbon dioxide (burning fossil fuels-coal, oil, and natural gas, deforestation, and industrial practices). The students as a class will discuss and rate them based on which makes the least to the most carbon dioxide.

Carbon Footprint Data Collection Worksheet

Home & Energy

1. What type of home do you live in? (single home, apartment, duplex, other)
2. How many people live in your home? _____
3. How do you heat and cool your home efficiently?

   _____

4. Do you use energy saving lighting in the home? _____
5. Do you use energy star appliances and unplug items not in use? _____
6. Do you use cold water when you can rather than hot water? _____

Driving & Flying

7. What type of car(s) does your parents/guardian drive? How many miles do you travel per year?

   _____

8. How many flight have you taken in the past year? _____ How many were long distance flights? _____

Food & Diet

9. How often is meat eaten with your meals?

   _____

10. Do you eat organic foods? _____ How often? _____

Recycling & Waste

11. How often do you recycle? _____ List all items you recycle.

    _____

12. How often do you compost food scraps and yard trimmings?

    _____

Activity Two: Carbon Footprint (30 minutes)

I will have the website on the promethean /smart board and peruse through it so students can see and have an idea of what they should do when they get to the computer lab. The students will go to the computer lab and complete their carbon footprint. The website for this calculator is listed below. I have made a worksheet for the students to use with the website. If students finish the carbon footprints before the thirty minute time lapse, they are encouraged to peruse other sections of the website. There is a lot of valuable information on the website.

Climate Change Calculator Worksheet
www.nature.org/initiatives/climatechange/calculator

1. Scroll down to the bottom of the page
2. Click on carbon calculator under the take action column

You will complete the carbon footprint twice. The first time will be your individual footprint. The second will be your house hold footprint.

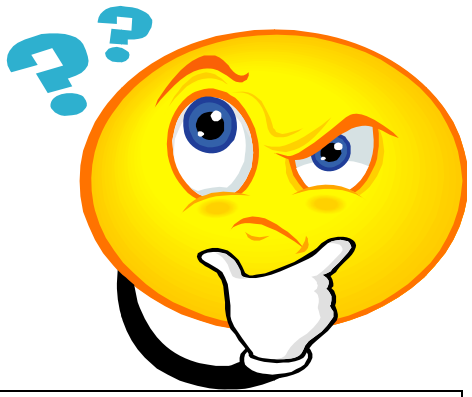
Your Footprint	Estimated Impact		Your Household	Estimated Impact	The Class Estimated Impact
Home Energy			Home energy		
Driving & Flying			Driving & Flying		
Food & Diet			Food & Diet		
Recycling & Waste			Recycling & Waste		
Results Total Greenhouse Gas Emissions			Results Total Greenhouse Gas Emissions		

Activity Three: Footprint Discussion (30 minutes)

Once the students complete the carbon footprint calculator, the students will return to the classroom and get into groups of 4 and they will total the estimated impact for each category and total CO_2 emissions for everyone within the group. I will have the chart on the promethean board and have all the students complete the last column based on class data. We will discuss the results of the carbon footprints.

Objective Four-Culminating Activity

Students will be able to share what they have learned by a non-traditional assessment. There will be a choice board of a variety of assessments they can choose from. Each assessment should have a rubric to guide the student to place emphasis on the concepts they should have learned, such as human impact, biodiversity, global warming and climate change. There will be some required pieces such as, community service or involvement and personal reflection. The types of choices will include types of assessments for all student types. For example, students that are artistic will have choices based on that ability. The student that is kinesthetic will have those choices and so on. I believe giving students some options will lead to better assessments projects turned in and genuine effort from the students. I believe that a student shows they really understand a concept or have learned when they can teach someone else. All classes will participate in some form of community involvement. Other academic levels will emphasize more on awareness and making the community aware of climate change and offer solutions to help reduce greenhouse gases and other things to contribute in a positive manner. An example of this would be having a class/group of students put together a video about global warming/climate change and impact. Students are all about technology and media. The best one can be shown during the morning announcements on homeroom day. I want to also include think like a scientist in the curriculum. Think like a scientist is when students observe the world around them and report their findings to organizations. Listed below is a sample of a choice board. I will make different choice boards based on academic levels and highlight or indicate boxes that are required. There will be an evaluation and reflection sheet for each category. A documentation sheet will be provided for some categories, such as community service and policy making.



CLIMATE CHANGE & BIODIVERSITY
CHOICE BOARD

ART	MUSIC	COMPUTER GEEK
Community Service	**YOUR CHOICE!** 	DRAMA
Make it a Combo	Policy Making	Teacher's Pick

Description of the Choice Boards:

These are just some ideas for the types of assessments for each category.

ART-Students may use their artistic abilities to create a piece of art, such as a poster hand drawn that advertises solutions for reducing activities that cause climate change. Students may create/design a model of effects of climate change.

MUSIC-Students may write a song, a rap, musical poetry, or make a music video discussing the problem of climate change and solutions to reduce it.

COMPUTER GEEK-Students may create a power point with all the "bells and whistles". They may make a SIMS video game. Create a website or blog.

COMMUNITY SERVICE-Students may do a presentation at an elementary or middle school after school program or make a brochure and pass them out to different business, such as car dealerships, auto repair shops, etc.

YOUR CHOICE-The student may have a great idea, but it must be reviewed and approved by the teacher.

DRAMA-The student may write a short skit about climate change and solutions to reduce it. They may decide to write a monologue and recite it in class.

MAKE IT A COMBO-The student chooses a combination of categories. There must be a connection/organization of the information on climate change provided with all the categories chosen.

POLICY MAKING-Students research policies already in place for global warming and climate change, and/or climate change and biodiversity and create their own.

TEACHER'S PICK-The student allows the teacher to pick one of their categories.

This unit will assist students in learning the basics of global warming, climate change, and their effects on our planet by experimentation and research. The title of my unit "What in the World did I Do?" is to focus on students becoming personally aware of their impact and invested in providing possible solutions for reducing our activities that leads to the production of CO_2, which increases the global temperature. This unit will allow opportunities for students to make others aware of the issues of human impact and climate change, which will result in making a difference for the better in our society.

Annotated List of Resources

"www.grinningplanet.com" Global Warming VS Climate Change (January 2, 2007)

This website explains the important differences between global warming and climate change. The website is user friendly.

"www.eia.gov" Greenhouse gases, Climate Change, and Energy

This website is a good teacher resource and resource that advanced students, such as an AP Class can use.

"www.epa.gov/climatechange"

An excellent, valid resource containing a lot of information on climate change and is user friendly for teachers and students.

"www.esa.org"

An organization that provides a lot of information on a variety of ecological topics. I used it for some of their information on Biodiversity.

"www.earthwatch.org" Climate Change : The Impact on Biodiversity

A good student friendly website that contains information in short paragraphs, which should make it an easy read for students. Beautiful photos and illustrations.

"www.footprintnetwork.org" Human Impact at a Glance

A website includes lots information on human impact on our environment. There are interactive activities including many types of ecological footprint calculators.

"www.channel.nationalgeographic.com" Six Degrees that could Change the World

DVD-documentary that shows the impact of climate change from one degree to six degrees. This is DVD gives students a fairly "realistic" visual of the impact of climate change and lead to some good class discussions or projects.

"www.nature.org" Initiatives/climatchange/calculator

This website has a variety of different interactive activities. It is not the easiest one to manipulate and some of the material is advance, but I used for the calculation of the carbon footprint and will assist students with using this footprint calculator.

AmielleDeWan, Ph.D; Natalie Dubois, Ph.D;Kathleen Theoharides, Judith Boshoven, "Understanding Impact of Climate Change on Fish and Wildlife in North Carolina". Defenders of Wildlife (2009)

A very informative report on species in North Carolina and the impact of sea level rising, temperature, and precipitation, which are some of the effects of climate change, on those species.

NOTES

[1]www.grinningplanet.com

[2]www.eia.gov

[3]www.epa.gov/climate change

[4]www.esa.org

[5]www.earthwatch.org

[6]www.footprintnetwork.org

Appendix: Implementing Common Core and Essential Standards

Essential Standard: Biology 2.2

Students will understand the impact of human activities on the environment (one generation affects the next)

Objectives

Biology 2.2.1*Students will infer how human activities (including population growth, pollution, global warming, burning of the fossil fuels, habitat destruction, and non-native species) may impact the environment.*