

INSPIRE GK12 Lesson Plan



Lesson Title	Climate and human impact debate
Length of Lesson	1 Day or more
Created By	Henry Stauffenberg IV
Subject	Environmental Science
Grade Level	9-12 (Environmental)
State Standards	Environmental: 1 b, c, e, f, g; 2 e, f, g; 3 a, b, c Geology: 2 g
DOK Level	Environmental: 3; Geology: 3
DOK Application	Organize, discuss, compare, interpret, investigate, debate, connect, critique, explain, prove, draw conclusions
National Standards	9 – 12 A: Inquiry; C: Life Science; D: Earth and Space Science; F: Science in Personal and Social Perspectives
Graduate Research Element	Reading through scientific articles, gathering data, in order to discuss and debate a particular research topic or situation. My research of human impact with Hg contamination through the atmosphere will contribute to human impact discussion for the debate.

Student Learning Goal:

The purpose of this lesson is to facilitate a logical and insightful discussion about climate change and human impact. Student's will understand both perspectives to the global warming debate (earth cooling vs. earth warming) and issues that humans face today such as; humans should adapt to the changing ecosystems and or humans should change the ecosystems in order to survive the climate issues to come. Student's should be able to pick a side, gather proper research material, and logically compare and synthesize their findings in such a way to be presentable and open for scientific criticism and inquiry. The goal is to promote scientific inquiry about what climate change is really about and what impacts humans have; especially with respect to what humans can do in the future, to change and or adapt to the changing environments/climates.

Mississippi State Standards

Environmental: 1: (b) Formulate questions that can be answered through research and experimental design; (c) Apply the components of scientific processes and methods in classroom and laboratory investigations; (e) Analyze procedures, data, and conclusions to determine the scientific validity of research; (f) Recognize and analyze alternative explanations for experimental results and to make predictions based on observations and prior knowledge; (g) Communicate and defend a scientific argument in oral, written, and graphic form; 2: (e) Explain the causes and effects of changes in population dynamics to carrying capacity and limiting factors; (f) Research and explain how habitat destruction leads to the loss of biodiversity; (g) Compare and contrast the major biomes of the



world's ecosystems, including location, climate, adaptations and diversity; 3: (a) Summarize the effects of human activities on resources in the local environments; (b) Research and evaluate the impacts of human activity and technology on the lithosphere, hydrosphere and atmosphere and develop a logical argument to support how communities restore ecosystems; (c) Research and evaluate the use of renewable and nonrenewable resources and critique efforts to conserve natural resources and reduce global warming in the United States including (but not limited) to Mississippi.

Geology: 2: (g) Interpret how the Earth's geological time scale relates to geological history, landforms, and life forms.

A: Inquiry; C: Life Science; D: Earth and Space Science; F: Science in Personal and Social Perspectives

National Science Education Standards of Content 9 – 12

A: Inquiry: identify questions and concepts that guide scientific investigations

- Students should formulate a testable hypothesis and demonstrate the logical connections between the scientific concepts guiding the hypothesis and the design of an experiment. They should demonstrate appropriate procedures, a knowledge base, and a conceptual understanding of scientific investigations.

C: Life Science: Interdependence of organisms and organization in living systems

- Organisms both cooperate and compete in ecosystems. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.
- As matter and energy flows through different levels of organization of living systems-cells, organs, organisms, communities-and between living systems and the physical environment, chemical elements are recombined in different ways. Each recombination results in storage and dissipation of energy into the environment as heat. Matter and energy are conserved in each change.

D (Earth and Space Science): energy in the Earth system

- Global climate is determined by energy transfer from the sun at and near the earth's surface. This energy transfer is influenced by dynamic processes such as cloud cover and the earth's rotation, and static conditions such as the position of mountain ranges and ocean.

F (Science in Personal and Social Perspective): Population growth, natural resources, and environmental quality

- Humans use many natural systems as resources. Natural systems have the capacity to reuse waste, but the capacity is limited. Natural systems can change to an extent that exceeds the limits of organisms to adapt naturally or humans to adapt technologically.
- Natural ecosystems provide an array of natural processes that affect humans. Those processes include maintenance of the quality of the atmosphere, generation of the soils, control of the hydrologic cycle, disposal of wastes, and recycling of



nutrients. Humans are changing many of these basic processes, and the changes may be detrimental to humans.

Materials Needed (supplies, hand-outs, resources):

A large classroom or auditorium with a podium and or stage. A projection screen with the ability to project power points may also be helpful. Students will need access to computers and library materials before debate in the classroom begins. Overall, few materials are needed since the students will be using materials that they bring in to aid the debate for which ever side they defend/criticize. **A sheet asking what primary and secondary sources they used, something to record their progress with data acquisition. Maybe even some questions to get students thinking.**

Lesson Performance Task/Assessment:

- Organization of supportive articles, data, and references to be used in a inquiry based debate
- Ability to logically discuss and prove their arguments using available resources in a set amount of time
- Performance of proper debate etiquette and being able to demonstrate/explain each role which includes moderator
- Development of a logical and insightful discussion which includes asking and drawing out questions of intrigue and critical thought
- Showing mastery and strength in their subject knowledge to either defend or criticize with their peers
- Ability to explain what climate change is really about (the true science, not the political crap) and to discuss confidently the complexity of the global climate and human relationship/impacts

Lesson Relevance to Performance Task and Students:

- To promote proper debate etiquette and student mastery in the art of scientific communication
- To promote proper research, using peer reviewed articles and primary resources, and criticism of material/data
- To understand what global climate change is really about and what impacts humans have on the climate/environments
- To have the students inspired through their own inquiry and research to think about global climate issues critically and make informed decisions/discussions
- To separate climate politics from true science and have students leaving the debate with a more open mind understanding both sides of the climate issue and the complexity of climate/human impact issues

Anticipatory Set/Capture Interest:

All students love stories and controversies. Start out by talking about climate change with some positive and negative human impacts or controversies. Mention some ridiculous



notions on how some people want to launch mirrors into space to warm the planet. Make it clear that political global warming is a bunch of bull crap that only utilizes selective pieces of science rather than using all of the science to look at the big picture. This should get their attention by rocking their world view considering how affluent the media is these days. Present two sides of a climate based argument and inform them that they will be involved in a debate using what they know and what they will research.

Guided Practice:

Introduce what climate really means, climate is not another word for weather, and lecture just enough to give the students a direction for the debate. Be sure to include human impact discussion and concepts that students can look up on their own which may include; climate to human relationships, global warming, global cooling, geologic history, circulation of energy on a global scale, weather cycles, and more. The lecture component can be short or long as it will establish the base of their understanding and something they can refer back to help make comparisons, connections, and more critical inquiry into a complex topic such as global warming.

Be sure to introduce how a proper debate works and define the role/order of speakers such as the moderator. The instructor will likely serve the role of moderator. Also introduce the rules and how a group will want to designate tasks to particular individuals. Present two sides; 1) Global cooling and humans should adapt to a changing climate, 2) Global warming and humans should act to change the climate, not adapt. Student's will then be divided into two large groups or 4 smaller groups, if 4 groups have the global cooling vs. the global warming and human adapt vs. no human adapt. Either way the students may select a side or be chosen at random by the instructor.

Let loose the students in the classroom to discuss in groups and use available resources such as computers, notes, and textbooks to gather information about their chosen argument. First have the students spend time discussing who does what, walk around and make sure each group has a plan of attack. For example, a group of 4 students with one researching human activities, one for time periods of global cooling, one for historical/geological evidence, and one for counter arguments against global cooling to anticipate the opposition. Overall, make sure each group communicates and plans accordingly before the research begins. After group organization walk students through ebsco and other scholarly databases to attain proper peer reviewed articles and scientific data. Allow students to use google but make it known that primary sources need to make up the bulk of their research/evidence, you may have to define a primary source vs. secondary. Make it clear that a textbook is a secondary source. After giving time in the classroom send students to library and walk them through other resources. Then give students time both at school and as homework to prepare for debate.

Be creative and assign a worksheet that asks for a minimum listing of primary and secondary sources. Design a way to measure student progress and make sure they are on the right track. Assign some questions pertaining to their chosen side that they must answer and turn in. These questions should not be hard and should spark further intrigue and investigation; for example, what can glaciers tell us about climate change over the



span of the geologic time scale? What warms or cools the earth? Name a few human impacts that effect the environment/climate? What is the relationship between the earth and the climate? Where do humans come in?

After students have had some research time make sure they communicate as a group and share knowledge to organize their thoughts and make final connections for understanding before the debate takes place. Take your role as moderator and walk through the order of debate operations as the students argue their sides. Make sure the rules are followed, time is strictly enforced, and make sure each student has the opportunity to present, criticize, and discuss in the order the moderator has set up for the debate.

Follow the debate with a brief lecture to tie everything together and congratulate students on a job well done. If necessary assign a write up assignment asking about what they have learned and how their perception on climate change and human impact has changed.

Independent Practice:

Students work at home or in class to attain research data and material to aid in their climate debate. Any assigned worksheets, such as the source listing assignment, will have to be done by the individual. Otherwise most of the work is group focused and open ended.

Remediation and/or Enrichment:

Remediation: individual IEP, partner with helpful student, shorten assignment(s), make lesson more walk through intensive. Assign less complex subject to debate about.

Enrichment: Assign more complex topic to debate about. Ask for more primary sources with research and assign harder questions to promote critical thought. Set expectations higher for the debate and have students switch roles between moderator, chairperson, and ect. Ask for more proof to be brought up in group debates and increase the time for each speaker to present.

Check(s) for Understanding:

- A successful and logical debate
- Substantial list of primary sources
- Students able to confidently discuss climate change and human impact
- Ability to differentiation between political and scientific climate change
- Students having many questions after the debate that go beyond the textbook and basic concepts
- Ability to generally explain how a debate works and what climate change is really about in their own terms

Closure:

Follow the debate with a brief lecture to tie everything together and congratulate students on a job well done. Be sure to ask more critical and thought provoking questions such as what can be done to promote climate literacy? What are the other variables that we did



not take into account with regards to what we discussed about climate change? Should humanity bring out the best of nature under man's control or change nature for our benefit? If necessary assign a write up assignment asking about what they have learned and how their perception on climate change and human impact has changed.

Possible Alternate Subject Integrations:

Geology: Discuss climate and earth interaction, how geology impacts human activities.

Chemistry: Human impact on a more chemical focused level such as organic chemistry.

Any subject: Any controversial topic that serves well for a debate, especially if the climate of human impact activities on the chosen subject matter are involved.

Teacher notes:

- Be very clear with students and guide them 100%. Refresh yourself on what a moderator does and practice the speaking order before applying it to the class. Make sure room is set for a debate to save time.