Grade: 8th

Program Title: Climate Change: A Whole New World

Related Iowa Core Performance Expectations:

MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. [Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]

Future Considerations: Blend this program with the unit storyline developed by the classroom teacher.

Program alignment with the Iowa Core Science Standards:

Disciplinary Core Ideas (DCIs)	**Investigative Question**	**Investigative Phenomena**	**Practices (SEPs) Students will:**	**Cross Cutting Concepts (CCCs) Students will identify:**
ESS3.D: Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities.	How do scientists explain the various changes that are occurring with climate/weather around the world?	Video/clips of arctic explorer showing the changes he's witnessed. Videos/pictures of glaciers changes, forest fires, etc.	**Analyze and interpret data** as students distinguish between correlational and causal relationships and provide evidence for the phenomena. **Construct explanations** based on valid and reliable evidence obtained from sources when preparing presentation **Obtain, evaluate and communicate information** about climate change phenomenon to larger class through presentations and reports. **Engage in argument from evidence** by respectfully	**Patterns** to determine **cause and effect** relationships with climate change and human actions. Impacts of climate change on global and local **scale**. **Stability** may be disturbed by gradual **changes** that accumulate over time as the result of global warming

			receiving and providing critiques about their own and other student presentations and arguments.	

Program components: The presenter will have students use the CCCs, the SEPs and the phenomena to figure out how to answer the investigative question and to grasp the disciplinary core ideas.

PART I: INTRODUCTION

Introduce general idea of climate change with phenomenon video, etc. Try to have it include at least a brief image of the different phenomena (from below) your groups will be researching.

Create a spectrum on the board (local -> global). Assign small groups a climate change phenomenon (sea level rises, polar ice, flooding in the Midwest, animal behavior patterns, etc.). Each group receives an "effect" card (their phenomenon) and a "cause" card (blank). They must predict what the cause of their phenomenon is and write on their blank card. Then place both cards on the local -> global spectrum, where they think each falls. Record this somehow (take a picture, graph) if it cannot stay up throughout the unit.

Give each group a more detailed phenomenon video/pictures to help generate questions relating specifically to their topic. They should develop a research question related to their phenomenon (with guidance) for a class presentation. Students spend some time brainstorming and dividing up tasks.

Come back together and lead students in a discussion of two primary components of research. Utilize an off-topic, easy-to-understand subject as illustration if necessary.

a. As needed, explain and clarify causal and correlational relationships, and the role that causational relationships can play in predicting phenomena. (There are lots of interesting examples available online if you Google correlation/causation examples.)
b. Discuss how students can evaluate the quality of the evidence they find in their research, and how to incorporate that evidence into their eventual answer.

c. Give to each student a “Resource Evaluation Worksheet” (attached) that they will use to help evaluate sources and ensure that they are finding enough sources. Modify it as needed to meet your needs.

Explain the other general requirements (presentation length and due date, grading rubric, etc.). Ideally, the students will have at least a week to conduct their research and create their presentation. You will need to sort these things out with the teacher ahead of time.

PART II: PRESENTATIONS

Each group presents their findings to the larger group, answering their guiding question. After each presentation, they should take and respond to questions from the remainder of the class.

Students in the audience should be respectfully critiquing, evaluating, and challenging each presentation, the evidence provided, and the conclusions drawn or claims made. Naturalists and teachers can play devil’s advocate and offer additional challenges as needed, and should also work to ensure that the conversation stays evidence-centered, not opinion-centered.

Once all presentations are made, have groups place another set of cause/effect cards for their phenomenon on the spectrum. Discuss with the class any shifts in where the class trended on the spectrum and the implications.

Wrap-up the unit with a brainstorm session of how we as individuals can help mitigate or adapt to climate change. There is also possibility here for students to delve deeper into designing possible solutions to the problem of mitigating/adapting to climate change as another project extension.

Climate Change Research Worksheet

You are each responsible for finding at least three valid, quality sources for your research. This must be in addition to any sources included in your data packet. Use this chart to track those sources, evaluate their quality, and plan for how you will include them in your final presentation.

SOURCE	PROOF OF SOURCE QUALITY	EVIDENCE to INCLUDE FROM THIS SOURCE	ADDITIONAL NOTES