Climate Data Jam
Communicating Data to Non-Scientists

Description
Students are introduced to the phenomenon under investigation in the water module. By identifying trends in predicted temperature and precipitation changes in six New Mexico counties and designing creative projects (infographics or poems) to communicate the data trends to nonscientists, students will see evidence of increased temperature and increased variability in precipitation patterns across New Mexico.

Phenomenon
In New Mexico, temperatures are expected to rise, and precipitation patterns are expected to increase in variability.

Objectives
Students will:
- Analyze New Mexico temperature and precipitation data
- Identify and explain a data trend
- Develop a creative project to portray a data trend and communicate scientific data to nonscientist audiences
- Identify the phenomenon under investigation for this unit

Grade Level
5 – 8

Time
1 Hour

Materials
- *Climate Data Jam* handout [1 per student]
- PowerPoint presentation
- Computer and projector for the educator*
- An assortment of drawing materials* to be used for creative projects (infographics and poems) such as blank paper, markers and/or crayons.

Not included in kit

Background
Climate change has different effects on temperature and precipitation in different parts of the world. Even here in New Mexico, the changes in temperature and precipitation vary by region. Students will examine historic and predicted temperature and precipitation from six counties throughout New Mexico. A careful examination of these data will allow students to understand expected changes in New Mexico climate. This activity aims to introduce students to the changing temperature and precipitation patterns in New Mexico that will further serve as the phenomenon under investigation for this unit. Global climate change is mentioned in this section for your reference; however, students do not need to identify climate change as a cause of these changing climate patterns at this point. Climate Data Jam is intended to be exploratory and introductory. The mechanisms of climate change are discussed in detail in later activities.

As the climate changes, changes in temperature and precipitation will impact humans and ecosystems. Temperatures are predicted to increase throughout the United States. Some areas will receive less

precipitation than historic levels, and some will receive more. However, *how* and *when* these changes in precipitation affect people and ecosystems may be complex. For example, in many counties, total annual precipitation is predicted to increase slightly, although higher temperatures in all counties will lead to increased evaporation. Seasonal predictions show that much of the precipitation may occur at different times of the year than it historically fell. Seasonal changes in precipitation may have significant effects on local ecosystems and human residential, commercial, and agricultural water supplies.

Interactions between precipitation and temperature in our global climate are complex. Predicting how climate change will affect water supplies for humans and ecosystems is an essential first step to developing adaptation and mitigation strategies. This phenomenon is the focus of the water module: to understand why temperature and precipitation patterns are expected to change and develop solutions that address the effect on humans and ecosystems.

Tips from Teachers
- *The Great Yellowstone Thaw (PBS)* documents how animals adapt to seasonal changes and can provide additional background during this unit.

Tips for Entire Class Participation
- Group sizes can vary to encourage each student to play a role. We recommend groups of 1 – 3 students.
- Each group can create either an infographic/drawing or a poem for their project. Encourage students to follow their interests for the creative project and, if they are working in groups, suggest they work with someone who wants to do a similar type of project.

Preparation
1. Prepare the paper, markers, crayons, etc., for student use.
2. Set up a computer and projector and display the PowerPoint presentation.

Teaching Guide
Introduction to New Mexico Climate Champions (~5 minutes)
1. Give students a brief introduction to New Mexico Climate Champions (NMCC), explaining the format and purpose of the program.
2. Slide 2: Tell students that they will have an opportunity to learn about climate change: what is causing it, the impacts, and what they can do to help.
3. NMCC has two parts: making sense of a phenomenon related to climate change and designing solutions to issues that result from climate change.
   a. These two parts are divided evenly. The first half focuses on making sense of a phenomenon related to climate change. The second focuses on engineering solutions to problems associated with climate change through action projects.
   b. Explain that during the first half, students will participate in hands-on activities that will help them better understand climate change and offer motivation and ideas for their projects as they learn more about how climate change impacts water processes.
   c. Students will work in groups during the engineering project to plan and implement a New Mexico Climate Champion project in their school or community.
4. At the end of NMCC, students will present their projects to their community in some capacity to help others learn more about climate change and how they can take action against it.

Introduction to the Project and the Data (~10 minutes)
1. Pass out a Climate Data Jam handout to each student.

2. <u>Slide 3:</u> Give an introduction to the Climate Data Jam using the PowerPoint presentation.
3. <u>Slide 4:</u> Students will be creating a Climate Data Jam project in the next hour. The goal is to design a creative project (infographic or poem) that explains New Mexico climate data to an audience not familiar with this information. Students will observe the phenomenon under investigation in this unit through the climate data presented in this activity: expected increase in temperatures and variability in precipitation patterns in New Mexico.
4. <u>Slide 5:</u> The following three slides have example creative projects <u>using a different dataset than the students will use for their projects.</u> This slide shows a poem (in this case, an acrostic poem where the first letters of each stanza spell out water in different languages). The data trend represented is: <u>In a sample of countries around the world, per person water use varies widely, with some countries using 14 times as much water per person as other countries</u>. Point out to students that this creative project uses the actual data rather than just being a general poem about water use.
5. <u>Slide 6:</u> In the infographic, the per capita daily water use is compared to annual precipitation for each country. The trend depicted here is: <u>In general, countries with lower amounts of annual precipitation use less water per person than countries with higher amounts of annual precipitation. The United States is an exception to this trend</u>. Again, have students notice how the trend aligns with the creative representation. Also, point out the scale in the infographic that demonstrates an accurate representation of the quantitative data.
6. <u>Slide 7:</u> This creative project is both a poem and an infographic. The trend represented by the poem is: <u>The United States uses 22 times as much water per person daily as Nigeria</u>. This trend can be seen in the poem, with each word representing 50 gallons of per capita water use. Have students notice how the trend is visible in the creative project. Students should aim for similar alignment between their trend and creative project. Also, have students notice the scale that assists in accurately representing the quantitative data.
7. <u>Slide 8:</u> Students may work individually or in teams of up to three students. Students should develop a creative project to represent the data and appeal to nonscientists. The project should not be a graph or table. Instruct students to use their imaginations to design a project that will be attention-grabbing and appealing. Explain that students can create either an infographic/drawing or a poem that represents a trend in the data. For infographics, students must accurately scale representations of the data trend(s); for poems, they must include references to specific data.
8. <u>Slide 9:</u> Ensure that students understand the word <u>trend</u> by asking for a volunteer to define it [answer: a general direction, or pattern, found in the data, something that is happening in the data.]
9. <u>Slide 10:</u> Students will see data from six New Mexico counties throughout New Mexico.
10. <u>Slide 11:</u> Students will have two datasets; both are on the student handout. The first is New Mexico predicted maximum temperature changes by county. The data compares historic data (1971-2000) with future predictions (2040-2069) based on the mean of 20 general circulation models.
    a. A data trend can be an answer to a question. Here are some questions to ask to help students find data trends:
        i. Are most counties getting warmer or colder? [Answer: All counties are predicted to have warmer annual temperatures.]
        ii. Which season is predicted to have the most significant increase in temperature? [Answer: Spring is expected to have the most significant increase in temperature in most of the counties.]
        iii. In Bernalillo County, which seasons are predicted to have the greatest increase in temperature? [Answer: In Bernalillo County, spring is predicted to have the greatest temperature increase, followed by summer and fall.]
    b. Have students examine data and ask students to identify some trends in the dataset.

11. <u>Slide 12</u>: The second data set shows New Mexico predicted precipitation changes by county. The data also compares historic data (1971-2000) with future predictions (2040-2069).
    a. Here are some questions to ask to help students identify data trends:
        i. Are most counties getting wetter or drier overall? [Answer: Five of the six counties are predicted to receive slightly more annual precipitation.]
        ii. What pattern do you notice with spring precipitation? Why is this important? [Answer: All counties are predicted to get less precipitation in spring, an important season for growing crops and native plants. Spring will also be warmer, so there will be more evaporation.]
        iii. What county is expected to see the most significant change in precipitation? [Answer: Union County in the northeast corner of New Mexico is expected to see the most significant decrease in precipitation, with most of the change expected in the summer.]
    b. Have students examine data and ask students to identify some trends in the dataset.
12. <u>Slide 13</u>: Direct students to look at the top of their handout. A good Data Jam project is clear in that it accurately represents the data in an understandable way to nonscientists. For an infographic, the data must be scaled correctly, and a legend explaining how the data are represented must be included. If writing a poem, be sure to include specific data in the poem. The project should also be creative. Think of an imaginative way to get the attention of non-scientists. Finally, the project should be concise. Focus on one trend and explain it well.

Project Development (~30 minutes)
1. <u>Slide 14:</u> Direct students to look at the project directions on page 1 of their handout.
    a. Students should decide if they would like to work alone or with one or two other students to complete their Climate Data Jam project.
    b. Complete the Planning and Brainstorming Notes on page 1 of the handout. Students will list the trend they might like to represent with their project and choose whether they will make an infographic or poem.
    c. Create the Climate Data Jam project (infographic or poem) and prepare it for the gallery walk by answering questions 3, 4, and 5 on the handout.
2. As soon as they have a plan, help students get started and circulate through the room to help as needed. Thirty minutes goes very quickly, so encourage students to stay on task to complete their project!

Gallery Walk and Discussion (~15 minutes)
1. <u>Slide 15</u>: Have students display their creative projects around the room. Each creative project should include the students' names, a title, and a description of the data trend represented through the infographic or poem.
2. Once student projects are on display, have students move freely among the creative projects to see what trends other groups highlighted and how they chose to represent their trends creatively. Tell students that there will be a class discussion after the gallery walk about the Climate Data Jam trends seen in the creative projects.
3. <u>Slide 16:</u> Following the gallery walk, lead a discussion about the Climate Data Jam trends. Ask students how they would summarize the trend of the entire dataset. Support students in recognizing the larger trend presented in the Climate Data Jam (<u>click forward</u>): in New Mexico, temperatures are expected to rise, and precipitation patterns are expected to increase in variability.
4. This broad trend encapsulates the phenomenon that students will make sense of in upcoming activities. Have students record this phenomenon at the end of the Climate Data Jam handout.

You may also want to post this phenomenon somewhere in your classroom for students to reference throughout the unit.

Extensions
1. Challenge students to showcase their Climate Data Jam project in a public setting.