

Scientific Modeling

Duration:

½ - 1 hour

Objectives:

Students will:

- Learn how modeling is used to answer scientific questions
- Discuss the type of information that could be used in a climate change model
- Develop a specific question about future impacts of climate change and decide what variables should be included in a model

Vocabulary:

Scientific Modeling

A process that incorporates information and generates a representation of the collected data

British Columbia PLO's:

Science 6, 7, 8

Social Science 6, 7, 8

Background:

This is a good activity to do near the end of a climate change unit. Students will need to be familiar with the different factors that contribute to climate change and how they are related to the impacts of a dramatically shifting climate. It is a short activity that can be done alone or coupled with another activity that looks at factors affecting climate change.

Scientific models help researchers examine patterns and come up with predictions for the future.

The first step in modeling is deciding what information is important to include in your model. For some models, this may only be a small number of factors. For larger models, like the ones used to model climate change, the number of variables can be quite large.

The data is then entered into a program that will incorporate the information and make predictions based on the inputs received. In research labs across the world, models are computed and run on specialized computer programs. Some programs may run for days or weeks before answering the question it was programmed to work on.

Modeling can be complex and involves very specific skills and knowledge. Depending on the question being posed, the information that gets used in a model can vary widely. We will discuss modeling in the context of information that could be used in a climate change model.

Materials:

- Class set of *Ocean News* article *Looking to the past for future answers*
- List of possible variables for a climate change model
- Notebooks

Procedure:

1. As a class read the *Ocean News* article *Looking to the past for future answers* either out loud or individually.
2. Have the students Think-Pair-Share ideas about what types of information they would want to include in a climate change model to predict what the world may look like in several decades. You can use a few examples from the accompanying sample list to help the students think about the exercise.

3. In small groups or individually, ask the students to come up with a specific question regarding climate change and future climatic conditions. Some examples include: what will average temperatures on Vancouver Island be like in 50 years? How will rainfall change in the Rockies? How high will sea levels rise near the city of Prince Rupert? Use these to demonstrate the types of questions you are looking for.
4. Using the list of questions developed by the class, get the students to brainstorm a list of factors that they would incorporate into a model to answer their specific question(s).
5. When they have completed the list of factors to be included in their model, get them to write in their notebooks the reasons why they selected each factor. They will need to defend their choice of factors and explain how each one helps answer their question(s). They will also need to explain that they have enough factors to reach a plausible solution.
6. Have them add any other variables they may have come up with thinking about their specific questions to the master list on the board.
7. End the lesson with a discussion of other areas of interest that models could be applied to.

Discussion:

- How are scientific models helping us improve our understanding of climate change?
- Why do model programs need to run for long periods of time in order to produce their results?
- Why are scientific models used instead of determining what will actually happen? (i.e. why don't we just build a biome with the same properties as earth in order to address some of our current climate change concerns)
- What could some of the consequences be of not including enough factors into a model?

Extension and Resources:

- After the students have developed their questions, ask them to research how their factors will affect their topic(s).
- The students can research a number of different climate change models that are being used. Ask the students to investigate models different research groups have used to answer questions in relation to climate change.
- If you have a class you want to challenge, ask them to read the article *Uncertainty in Climate Change* by Andrew Weaver and FW Zwiers that appeared in *Nature* in 2000, issue 407. You can read the article together and then discuss its message.