

The Academy of Natural Sciences – Bicentennial in Google Earth

Day 4: Research Over Time

The activity for day 4 is a study of the work of two ichthyologists at the Academy of Natural Sciences of Drexel University. This activity will highlight the importance of conducting research that can be compared to existing research from the same area, as well as generating a comprehensive catalogue of specimens for future scientific study.

ABCD Objective Summary:

Using information from the Google Earth file as a guide, students will discuss and explore two specific expeditions from the Academy of Natural Sciences and complete the attached worksheet.

Earth Science Literacy Initiative “Big Ideas”

1. Earth scientists use repeatable observations and testable ideas to understand and explain our planet.
3. Earth is a complex system of interacting rock, water, air, and life.
4. Earth is continuously changing.
5. Earth is the water planet.
6. Life evolves on a dynamic Earth and continuously modifies Earth.
9. Humans significantly alter the Earth.

Materials needed:

- computer lab with 1 computer per student (each computer must have Google Earth already downloaded)
- Google Earth file: “Bicentennial”
- Student worksheet

First 15 minutes of class:

Start by:

- giving a brief overview of what the class period’s assignment will entail
- having students read through the expeditions of Dr. Katriina Ilves and Dr. Mark Sabaj Perez in the Google Earth file

Next 5-10 minutes of class:

Begin a discussion about the two major themes in this research: comparing current data to historic research and comprehensive catalogue of specimens

Example prompting questions:

Dr. Ilves

- What is Dr. Ilves trying to do in her research?

- Why is it important to make a comparison of current data to historical data?
- What will a historical comparison show scientists who analyze the research?
- Why would results be different now compared to 50 years ago? (Quality of water, land, population increase in species & humans, different/more accurate equipment, how do animal populations affect plant populations and vice versa, etc.)

Dr. Sabaj Perez

- What project is Dr. Sabaj Perez a part of?
- What is the goal of the project?
- Why is it important to catalogue as many catfish specimens as the scientists can find? (Comparing species differences/similarities in the future, comparing differences/similarities in the habitats in the future, etc.)
- What kind of research can these specimens be used for in the future?

Next 20-25 minutes of class:

Hand out worksheets and allow students time to complete as much of the worksheet as they can.

Pennsylvania State Education Standards

Standard Area - 3.1: Biological Sciences Organizing Category - 3.1.C: Evolution

Grade Level - 3.1.6.C: Grade 6

- Standard - 3.1.6.C1: Differentiate between instinctive and learned animal behaviors that relate to survival.
 - Assessment Anchor - S6.B.2: Continuity of Life
 - Anchor Descriptor - S6.B.2.1: Explain how certain inherited traits and/or behaviors allow some organisms to survive and reproduce more successfully than others.
 - Assessment Anchor - S6.B.3: Ecological Behavior and Systems
 - Anchor Descriptor - S6.B.3.1: Identify evidence of change to infer and explain the ways different variables may affect change in natural or human-made systems.

Grade Level - 3.1.7.C: Grade 7

- Standard - 3.1.7.C2: Explain why the extinction of a species may occur when the environment changes. Explain that mutations can alter a gene and are the original source of new variations in a population.
 - Assessment Anchor - S7.B.2: Continuity of Life
 - Anchor Descriptor - S7.B.2.1: Explain natural selection and its role in evolution.

- Standard - 3.1.7.C3: CONSTANCY AND CHANGE Identify evidence drawn from geology, fossils, and comparative anatomy that provides the basis for the theory of evolution.
 - Assessment Anchor - S7.B.2: Continuity of Life
 - Anchor Descriptor - S7.B.2.1: Explain natural selection and its role in evolution.

- Standard - 3.1.7.C4: Understand how theories are developed. Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions. Design and conduct a scientific investigation and understand that current scientific knowledge guides scientific investigations. Describe relationships using inference and prediction. Use appropriate tools and technologies to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze quantity results of investigations. Develop descriptions, explanations, and models using evidence and understand that these emphasize evidence, have logically consistent arguments, and are based on scientific principles, models, and theories. Analyze alternative explanations and understanding that science advances through legitimate skepticism. Use mathematics in all aspects of scientific inquiry. Understand that scientific investigations may result in new ideas for study, new methods, or procedures for an investigation or new technologies to improve data collections.
 - Assessment Anchor - S7.B.2: Continuity of Life
 - Anchor Descriptor - S7.B.2.1: Explain natural selection and its role in evolution.

Organizing Category - 3.1.A: Organisms and Cells

Grade Level - 3.1.8.A: Grade 8

- Assessment Anchor - S8.B.3: Ecological Behavior and Systems
 - Anchor Descriptor - S8.B.3.2: Identify evidence of change to infer and explain the ways different variables may affect change in natural or human-made systems.