



Flying over Watersheds

LESSON

GRADE LEVEL 6-9

CATEGORY Water, Wetlands and Watersheds

TOPIC Watersheds, GIS, mapping, systems

LENGTH

One 60 minute period

MATERIALS

- Maps of your local area/watershed
- at least one computer with internet access
- Flying over Watersheds - Worksheet (copy page)
- World Watersheds Fact sheet

SETTING

Classroom

GROUP SIZE

Individually, in pairs or as a class

SKILLS

Mapping, analyzing

SUBJECTS

Social Studies

KEYWORDS

Satellite, contours, topographic map, watersheds, stream order

Overview

Students will use "Google Earth" on a computer to explore features of their watershed by virtually flying over it and completing a scavenger hunt.

Objectives

The students will be able to:

- use Google Earth to locate their own watershed from satellite photographs
- use Google Earth to compare their watershed to watersheds in other parts of the world
- demonstrate awareness that watersheds may cross political borders

Background

Google Earth is a computer program that uses satellite and aerial photography and GIS (Geographic Information System) to create a virtual representation of the earth.

Student understanding of the size of the watershed they live in is useful to aid them to move conceptually from one scale to the next and back again with ease. This visual understanding makes links to other scales and concepts possible for students to apply in a variety of situations.

Some watersheds cross local, provincial, and even international borders. Watersheds come in all shapes and sizes. Some are millions of square kilometers, others are just a few acres. All watersheds are defined by their landscape, geology, size, scale and type of outflow or stream patterns. In addition to exploring maps on Google Earth, consider looking at your watershed on a topographic map, which illustrates the natural physical features of an area. A topographic map uses information gathered from accurate land based surveys and aerial photography and satellite remote sensing. This information is interpreted to create contour lines on a two dimensional map. Contours on a map tell us the topography of the area we are looking at: is it steep or flat? Where do the valleys form and where are the tops of the mountains? This information can help us determine the outline (delineation) of a watershed.

To familiarize yourself with Google Earth before doing the activity with your class, on a computer with internet access go to URL: <http://earth.google.com>. From there follow the instructions to download a free version of "Google Earth". It is a simple program to use, simply click on the "Fly To" tab in the upper left hand corner if it is not already selected and type in any location, your school address, your city, someplace in the world you'd like to visit and then enter or click on the search icon (a magnifying glass). The program will "fly" you to where you want to go. You can then use your mouse or the "+/-" buttons within the screen to adjust how close or far away you want to get. Familiarize yourself with the direction icons in the upper right hand corner of the screen, these will help you get to the exact spot you want. Spend some more time just playing with the program, so you'll be able to answer questions and support students while they are exploring.

Homes, farms, ranches, forests, small towns, big cities and more are all in watersheds. Some watersheds cross local, provincial, and even international borders. Watersheds come in all shapes and sizes. Some are millions of square kilometres, others are just a few acres. All watersheds are defined by their landscape, geology, size, scale, and type of outflow or stream patterns.

All large or complex watersheds are made up of a series of "nested" or sub-watersheds. A simple watershed is usually small and short, made up of a simple stream system. It is then nested into a larger watershed. Complex watersheds are usually large and are made up of a number of simple watersheds. Geographers and others that work with watershed systems often classify stream order to better understand complex watershed systems. First order streams are small headwater creeks that are the sources of a river system. Second order streams are when two first order streams join together. These streams are generally larger with higher volumes of water and often with wider channels. Third order streams are when two, second order streams unite. Many such streams or rivers can have large volume, wide channels with some slower moving sections where sediment gathered upstream is deposited in gravel and sand bars. This order continues until eventually, the highest order water-course (river or stream) enters into a lake or ocean. Stream order information can be useful to understand complex watershed systems.

Watershed geography and the impact of that geography have far reaching consequences. The large watersheds in the world often encompass more than one country. This fact has critical impact on world politics and can at times be the key to whether neighbouring countries are at peace or war. For example, in the countries of Turkey, Syria, and Iraq the

Euphrates River flows through a dry desert landscape. Turkey has dammed the river, thereby controlling its flow. Syria, Turkey's downstream neighbour is not happy about the limited flow they now receive in the Euphrates. Closer to home, the Columbia River watershed encompasses both Canada, with the headwaters of the Columbia, and the United States, where this very large watershed eventually empties into the Pacific Ocean. In this case, the Columbia River has an international committee working together on the intricacies of cross border flow.

Procedure

1. Locate one or two different maps that show streams and contours and other natural features in your watershed. For example, you can use a topographic map and a street map of the same area. Whatever maps you use should allow students to identify natural features such as heights of land, streams, rivers, oceans, wetlands and lakes and their own watershed boundaries.
2. Watersheds, also known as catchments or drainage basins, are defined as all the land in an area that drains water into one outlet. They vary in size and often support a variety of ecosystems and human developments. With your class, locate your watershed on a map.
3. Depending on how many computers you have access to, students can explore "Google Earth" in pairs or small groups. To begin, students go to the Google Earth home page <<http://earth.google.com/>> and type in their home or school address to see how the program works.
4. Ask students to find the borders of their own watershed, other natural features they previously identified on the paper maps, or the nearest water body. Give them some time to "fly" over their watershed and the surrounding area, just exploring this technology and the maps.
5. Hand out the Activity 3 Worksheets and World Watershed Facts sheets. The activity sheet will guide students through a sort of Google Earth scavenger hunt.

Assessment

- Collect and assess the worksheets to see if students have followed and understood the instructions and activity.
- Have students be the teacher. They have to come up with five questions they would ask students about Google Earth, then answer these questions.



- Students write a postcard to a friend about the watershed they visited through Google Earth. The postcard must include references to location, distinguishing natural features, nearby communities, and any details about human use of the watershed (eg. housing, industry etc.). Make sure students mail the postcards (either through email or the postal service) after you've reviewed them.

Extensions

Students create their own watershed scavenger hunts, related to a watershed or river system that they have discovered or are interested in. Research some interesting facts similar to the ones from the World Watershed Fact sheet.

