The Biology and Conservation of Watersheds

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The Natural History of Tompkins County: A Story of Glaciers

About 2 million years ago there was an ice age known as the Pleistocene era. At this time, huge glaciers, which are giant sheets of ice, covered most of New York and Pennsylvania, an area known as the Inland Basin. Some of these glaciers were as much as two miles thick.

As time passed, about 19,000 years ago, the climate started to warm up, and the ice sheets began to melt and disappear, or, retreat.

Glaciers carved large holes and valleys in the ground when they retreated. Afterwards, Ithaca was covered with a giant lake called Great Ithaca Lake. Before it was drained, the lake was fed by many streams and waterfalls, forming the gorges we have today.

The activity of glaciers shaped the land to create watersheds. The city of Ithaca relies on the Sixmile Creek and Cayuga Lake watersheds. Sixmile Creek is Ithaca’s main watershed, which is divided into two sections, upper sixmile and lower sixmile because two ice valleys diverged.

Watersheds: What are they?

A watershed is an area of land where all of the water in that area flows and collects into one place. Imagine all of the terrain in an area as a funnel that leads into one body of water like a creek, lake, river, or ocean. The land that is part of watersheds contains farming land, forests, and developed land like houses.

Six Mile Creek covers about 50 square miles, containing a unique network of gorges, which help in water cycling. There are various tributaries, or, streams that feed into Sixmile Creek, which alter how the water is made up. Stream channels transport water and sediments from higher areas of land to lower ones.
In Six Mile creek, many of the stream channels are becoming weaker due to human activity increasing sediments. The amount of sediments that are carried affects aquatic species depending on their tolerance for certain minerals that are found in the sediments. Much of the soil surrounding Six Mile Creek is extremely fertile, allowing a large amount of crop, beef and dairy farms to function in the Six Mile Creek watershed area.

**Cayuga Lake** is 38.1 miles long (**633 football fields**) and 435 feet deep, containing about 2.5 trillion gallons of water (**3,787,878 olympic swimming pools**). The Cayuga Lake watershed covers 864 square miles, the largest watershed of all of the finger lakes. It is part of the Oswego River Basin, containing up to 140 streams which flows from upland streams to the finger lakes, into low-gradient rivers, then Lake Ontario. It is home to nearly 120,000 people and six counties.

Aspects that change how much water is collected into the watershed:

- The **shape** of the land; the steepness of the landscape will have change the amount and speed of water movement into the watershed area.
- The **size** of the watershed; bigger lakes and streams can hold more water than smaller ones.
- The way the **soil** is made up; some soils collect water more than others depending on how many pores they have inside of them that allow water to enter through the soil.
- How the **land** is being **used**; paved areas such as highways and sidewalks or land that is built upon with houses and buildings lead to more run-off and flooding problems.

**Who lives there?**

Watersheds provide habitats for many living things (**biota**).

**Fish:** Salmon, trout, and bass, carp, catfish, pikes, and many more live in bodies of water. Some ponds and lakes are fisheries, or, bodies of water that are stocked with fish so that they can be caught and sold for eating.

Salamanders are common in wet forested areas

http://www.google.com/imgres?um=1&hl=en&sa=N&biw=996&bih=432&tbnm=isch&tbclid=IwGbbilG0nFNeoM:&imgrefurl=http://animal.discovery.com/amphibians/salamander/index0QGr04CoDQ&zoom=1&iact=hc&vpx=562&vpy=121&dur=58&hovh=191&hovw=265&bav=on&bih=432&biw=996&ei=15s1TlXOB6j4twfW0bDwCg&tbm=isch&tbclid=IwGbbilG0nFNeoM&ved=0ahUKEwiwkevEy67hAhXH6gKJHVWZBD8Q9QxIAo&psq=amphibians&zoom=1&docid=109535615282665852183&pg=1&tbh=138&itbs=1
Amphibians: Salamanders and frogs are common to Ithaca’s watershed areas and are good indicators of watershed health. Reptiles like turtles and snakes find a home in streams, creeks, ponds and lakes.

Mammals: Deer, squirrels, mice, bats, rabbits, skunks, and chipmunks are easy to spot on land and around water bodies. Mammals use the streams and rivers to drink out of like humans can get water from the sink.

Birds: Hawks, owls, eagles, finches and other species rely on watersheds as a source of water. Birds make forests their homes that surround streams, creeks, ponds and lakes because of the large amount of food and shelter. Birds stop at watersheds on their migration route before heading south for the winter, to feed on the abundant earthworms and insects present.

Plants: Wildflowers like clover and daisies, moss, fungus and mushrooms, ferns, trees like cedar, spruce, pine, maple and more grow in watersheds. Aquatic plants like algae and flowers grow within bodies of water.

What Do Watersheds Do?

Watersheds are important not only for animal and plant but also for survival of humans as well.

Functions of watersheds:

⭐ Collect water from rainfall
⭐ Provide drinking water
⭐ Allow the water to cleanse itself
⭐ Store water
⭐ Release water
⭐ Give a home for plants and animals
⭐ Provide a place for recreational activities like boating, swimming and fishing

Watersheds are an integral part in the water cycle, which is the process of how water cycles between bodies of water, the atmosphere and land.
Water Cycle Steps:

A. **Evaporation**: The process in which the water on the Earth’s surface turns into vapor and enters the atmosphere, or, the gases that surround the planet.

B. **Condensation**: Water vapor condenses, or, groups together forming clouds.

C. **Precipitation**: The water turns back into a liquid or solid and rains, snows, sleets or hails back to the earth.

D. **Collection**: Water joins together in the form of lakes, streams, rivers and oceans.

Watersheds clean the impurities out of water, which allows humans to continue using it for purposes such as drinking, farming, recreation and management of human wastes. In Cayuga Lake, it can take water up to 10 years to cycle through.

**Threats to our Watersheds**

**Littering**: Trash that is not thrown away properly can enter lakes and streams and harm animals that live there. It can also contaminate the drinking supply.

**Pollution from farming, gardening and lawn care**: Chemicals are often used on crop land, lawns and gardens to make plants grow better or to kill insects that eat the plants. Those that are not managed properly can move into streams, creeks, ponds and lakes when it rains.

**Too much road paving**: When too much land is paved, precipitation runs off the asphalt and collects chemicals and other harmful agents which then enter streams and rivers.

**Hydraulic Fracturing**: Gas companies can drill for natural gas below ground using chemicals that can enter and ruin the drinkable water supply.

**Bacteria from sewage**: Human and animal feces can enter water sources and introduce unwanted diseases.

**Invasive Species**: An invasive species is one that is often dominant in an area where it is not originally from. These species can harm the equilibrium of the natural environment because they do not belong there.
**Climate Change**: This is the rise in the earth’s temperature due to certain gases in the atmosphere. As the temperature rises over time, living things in the watershed have to adapt, placing a difficult stress on their survival. Changes in precipitation will also affect the water cycle.

**Erosion**: This is a natural process in which lands are destroyed by wind, water or other natural processes. The ground that becomes eroded can enter the water and make it cloudy. A lake or pond that looks brown and mucky after it has rained is a sign of erosion. Erosion is accelerated through deforestation and changes in land use.

**WHAT YOU CAN DO!**

**Explore Mindfully**: Go out with an adult to take a walk around local creeks, streams, ponds and lakes. Take notice of what animals and plants you see and if there is garbage around. Stay on the marked trail to reduce human impact.

**Clean Up**: Ask your teachers or parents about you and your friends starting or joining a litter clean-up crew.

**Conserve water**: Take shorter showers, turn your faucet off when you brush your teeth, and look into using dishwashers and washing machines that use less water.

**Recycle**: Make sure you throw trash out in a trash bin instead of outside while placing recyclables in the proper containers. Show your friends how!

**Join a group**: Friends of the Six Mile Creek is an organization that is always hosting new opportunities for people to get involved in watershed protection. [http://sixmilecreek.org/](http://sixmilecreek.org/)

**Plant Trees**: Planting trees is fun! It will help reduce excessive erosion, absorb more water for cleansing, and create more habitats for animals.
Activity: Split the class into five groups. Each group will receive a die. Each round, the group will roll their die once for up to six to seven rounds (or just as many as time allows). Each number seen on the die corresponds to something happening pertaining to their area’s watershed. Read each group the consequence of the die roll. Tally up the points for each group. The team with the highest score has the healthiest watershed and wins. This opens up a discussion about the risks to a healthy watershed.

1- Community clean up day! All of the residents in your town clean up trash in the local area.
   **4 points**

2- Your neighbors dumped their bags of trash on the side of the road instead of the dumpster.
   **-2 point**

3- Your school sets up a big recycling initiative.
   **4 points**

4- Your friend’s land next door is going to be drilled for natural gas starting next week.
   **-4 point**

5- Your parents just bought fifteen trees to plant along the stream in your backyard
   **3 points**

6- A new super-mall is going to be built on a wetland area in your town that has sensitive species.
   **-3 point**

References:


This field guide is a wonderful resource including information on the natural environment of the Cayuga Lake Region. It provides photos, descriptions of organisms, and explanations to help understand the history of the area.


This guide is extremely user friendly and has quick, easy to access information about geologic history, rocks, glaciers, fossils, topography and more.

This is an informative and useful guide to issues in the Cayuga Lake watershed with all of the basic information necessary in understanding the watershed and is very helpful in acquiring information to give to students.


This is a great website that allows concerned citizens to get involved in monitoring water quality, attend community meetings, and learn more about watershed issues.