Unit IV Brooker Creek Preserve

Information contained in this packet is taken from a website developed by Conrod Associates for the Pinellas County Board of County Commissioners. For additional information concerning the water cycle and watersheds, please refer to the Project Oceanography Fall 2000 Neighborhood Water Quality packet.

Brooker Creek Preserve was established by the Pinellas County Board of County Commissioners for the preservation of the region's great diversity of natural communities and the Brooker Creek watershed. The county's Environmental Management Department is working to develop land management, research, and educational programs. They are on the cutting edge of science by using "real-time" data to teach environmental concepts to Pinellas County students. The Environmental Distance Learning program uses an Internet-based learning solution to deliver constant, real-time environmental data coordinated with science curriculum standards.

The Brooker Creek Watershed Learning Project

Lesson Objectives: Students will be able to do the following:

- Describe a watershed
- Name three ways a watershed can be influenced by urbanization
- Explain one way a watershed effects water quality

Key concepts: watershed, controlled burn, ecosystem, environmental distance learning (EDL)

Brooker Creek Overview

The Brooker Creek Preserve, located in northeast Pinellas County, Florida is an example of one of the many important **watersheds** found throughout the United States. This area is of particular interest because it includes more than 8000 acres of wilderness located in one of the most populated areas in Florida. This situation offers a unique opportunity to study the effects of urbanization on **habitat** diversity and water quality along with land management practices and restoration efforts.

Brooker Creek Preserve is an ecologically diverse area encompassing a wide variety of habitats including pine flatwoods, freshwater marshes, palmetto prairies, sandhills, and cypress

swamps. Environmentalists have found over 500 plant species living in this area, including some rare and threatened ones, such as the Catesby's Lily, Dahoon Holly, and Royal Fern. In addition, the preserve is home to a wide variety of animals including the Southern Bald Eagle, the American Alligator, and the Gopher Frog. As a watershed, the Brooker Creek basin prevents flooding by storing excess water. It also is important in recharging the groundwater supplies used by many communities for drinking water, and it protects the watersheds of surrounding areas by decreasing the flow of polluted waters over these basins.

Historically, Brooker Creek has been affected by increased pressures from urbanization, as have many other watershed areas. Beginning in the 1800's as lands were settled, agricultural operations expanded into the watershed. Cattle farming resulted in channelization of the creek and some habitat destruction from grazing practices. Later utility corridors were cut through the watershed to satisfy the demand from customers. This caused some disruption in sheetflow characteristics and also disturbed floodplain vegetation. Vehicular traffic was also a concern as off road vehicles destroyed habitat, including vegetation. Today restoration efforts are underway. Land management techniques focusing on limiting vehicular traffic, removing exotics, and implementing **controlled burns** are being used to try to restore the watershed.

Importance of the Preserve in Maintaining Water Quality

Water is a limited natural resource that is affected by virtually every aspect of the environment as it is cycled through the system. Thus, water quality can be a good indicator of the health of an **ecosystem**. Rainwater is absorbed by the ground or filtered into larger bodies of water and ultimately flows into the ocean. It is heated by the sun, evaporates back into the atmosphere, and condenses into clouds, being released as rainfall again. During this process it can pick up **pollutants** from areas as it flows over the ground and streets, around buildings and homes, and through yards and drainage systems.

If scientists measured the chemical characteristics of this water, they would find that it is not pure H_2O but a solution made of several chemicals with distinguishing characteristics. By studying the relationships between these characteristics, scientists can make predictions about how this water will affect plants and animals. For instance,

nutrient levels may be high if there is fertilizer run off from nearby areas. This in turn can cause a change in **pH** level and stimulate algal growth. Algal growth rates can affect the amount of oxygen available to aquatic organisms.

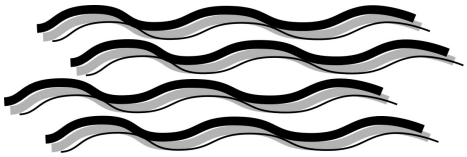
The Brooker Creek watershed provides an opportunity to study the effects of water quality on the health of the surrounding environment. Scientists have installed fiber-optic sensors called **"spectrometers"** to measure the water quality in the Brooker Creek drainage system. They have also set up **"Web Cams"** to monitor activity in this area. This information is then recorded and used by scientists to study watershed impact and effective restoration practices. It is also accessed in Pinellas county classrooms, so students can study the effects of urbanization on this local watershed and become involved in real world science investigations..

How and Why the EDL Program was Developed

The Pinellas County Environmental Distance Learning project was conceived as a result of a collective vision for enhanced Internet-based distance learning. This vision is shared by Pinellas County, Florida, the University of South Florida, area Junior Colleges, Middle School educators, and Conrod Associates Communications. It is supported by the Pinellas County Environmental Foundation (PCEF) and the Pinellas County Board of County Commissioners.

The EDL project approaches the study of environmental issues from a societal viewpoint. By combining the resources available in Pinellas County, Florida with real-time data collection, students using the latest technology become classroom scientists. They gather and analyze data as it becomes available in "real time". This Internet based program, aligned with the district science curriculum, also provides educators with lesson plans formatted to teach skill sets necessary to fulfill district requirements.

Activity: Watershed Comparisons



Watersheds provide natural areas for water runoff. In these areas, water is cleaned as it flows through the system before it drains into a nearby water body. The natural contour of the land and the vegetation help direct the water on its path. As it percolates through the soil, it is cleaned and stored in underground aquifers. Humans can impact the natural balance of this system, as population growth requires construction of more buildings. Watersheds around the United States can be compared and studied to help resolve some of the problems associated with this increased urbanization.

Objectives: Students will be able to do the following:
1. Use the Internet to acquire information.
2. Identify the factors that contribute to watershed health.
3. Use maps to make physical comparisons of watersheds.
4. Use data to evaluate watershed health.

Materials:
- Internet access to the following websites:
  EDL website sponsored by the Pinellas County Board of County Commissioners (Please watch the Project Oceanography programs for the website address.)
  The U.S. Geological Survey's Water Education website at http://www.epa.gov/surf
- Questions from the activity page
- Paper and pencil

Procedure:
1. Discuss the types of information available about watersheds on the Internet.
2. Explain that in this activity students will be accessing information from two websites.
3. Have students access the EDL website. (Be sure to take time to study the map of Brooker Creek Preserve.)
4. Have students answer the following questions using information from the site:
   Where is Brooker Creek Preserve located?
   How big is Brooker Creek Preserve?
   Name two types of ecosystems found in the preserve.
   What does "pyroclimatic" mean?
5. Have students access the U.S. Geological Survey's website.
6. Have students use the locator map to find a watershed in their area, and use the information to determine the health of that watershed.
7. Have students use the locator map to find the Brooker Creek Preserve watershed (It will be located in Pinellas County, Florida near the cities of

Clearwater, St. Petersburg, and Tampa.), and use the information to determine the health of the watershed.

8. Compare the health of the two watersheds. Include information such as the criteria used to determine watershed health and the factors that influence these criteria.

Possible Extensions:

1. Have students draw and label maps of the watersheds they are comparing.
2. Have students use these maps to make visual comparisons of the watersheds.
3. Have students research several watersheds to see if they can draw correlations between watershed health and population density.

Student Information: The Brooker Creek Watershed

Brooker Creek Preserve is a natural **watershed** area covering over 8000 acres. In its natural state it provides **habitat** for an abundance of plants and animals. It is also important for providing rainwater storage to prevent flooding in this large basin. Water is filtered through the porous soil to be cleaned and stored in underwater **aquifers** to replenish groundwater supplies used by many communities as a source of drinking water.

Humans have affected this watershed because it lies within one of the most urbanized areas in Florida. As humans began to build structures, lay down pipes, construct power lines, and destroy the habitat with recreational vehicles, the effectiveness of the watershed has changed. Now the water is not as clean as it has been in the past and aquatic animals are no longer able to live in some of these areas.

Today this watershed is being restored through management techniques including **controlled burns**, habitat restoration, and **exotic** species removal as well as by limiting construction and vehicular traffic. Scientists are recording the changes in water quality as this restoration takes place using the newest electronic **sensors**, which measure water quality indicators. These measurements called **data** are recorded and stored in a **database**, providing a sort of history of water quality. The database can be used to study changes in the watershed and to learn how best to manage it.

Students can then use this information to understand how informed citizens make decisions that effect their environment.