

Post Visit 1
IN the River
9-12



Rewrite the Program

Purpose/Objective

Students will reevaluate the program they participated in at Crystal Springs Preserve. Students will rewrite the program, imagining that it would be a trip they would do more than once and that they needed to collect good scientific data

Materials

Pencil
Paper

Procedure

1. As a class, discuss the importance of the information that was gathered at Crystal Springs Preserve. How is relevant to wetland health? How could it be applied in the real world?
2. From this discussion, have students pair up and rewrite the program imagining that it would be a trip they would take more than once a year.
 - a. How would they keep the data consistent through out the year?
 - b. How would the sampling have to change to reduce variables?
 - c. How would they modify the stream flow experiment so it could be repeated with accuracy?
3. Once they have reworked the program, they should design a data sheet that would compare their data through the year

Post Visit 2
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Bio-diversity and Careers

Purpose/Objective

Students will identify careers where bio-diversity is an important factor

Materials

Computer with internet access and secure email
Presentation materials and equipment

Procedure

1. Ask students to recall the importance of bio-diversity
2. Make a list of careers that may use bio-diversity studies as part of their day
 - a. Park Ranger
 - b. Department of Environmental Protection
 - c. Park Biologist
 - d. Fish and Wildlife commission
 - e. Game Wardens
 - f. Entomologists
3. From the list you have generated, have students (alone or in pairs) research the career of their choice and how bio-diversity plays a role in it.
4. As part of their research students should email or send a letter to a person in the field they are researching and incorporate their first hand knowledge into their presentation.

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Plant Profile

Purpose/Objective

Students will be able to mark off a transect

Students will collect data on the number and type of plants found in a transect

Materials

Flagging tape or twine

Tent stakes or sticks to hold the twine or flagging tape

Measuring tape

Rulers

Clipboards

Data charts

Pencil

Identification guides

Procedure

1. In a designated area of your school yard have students groups flag off 10ft X 10ft sections for their transect plot. The area should be a used, disturbed area. Trees can be used in the transect plots.
2. Each student group will identify each different type of plant growing in their transect. This can be done in the field with field guides, or in the classroom using other resources.
3. Each group will record the number of each plant species and the average height of each species.
4. Back in the classroom discuss:
 - a. How could this transect/plot analysis be useful?
 - b. Who might find this information important?
 - c. How could we use this information in a comparative study?
5. Students should repeat this activity on a natural, undisturbed piece of land. This can be done at your school if you have access or as homework.
6. The same data should be collected, types of plants, number of species, average height of species.
7. Students should compare their data from an undisturbed natural site, and the disturbed mowed site.
 - a. What did they have in common? What was different?
 - b. What conclusions if any can be drawn about the health of the site?

c. Where in the real world could they apply this procedure and data?

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Environmental Presentations

Purpose/Objective

Students will be able to define biodiversity

Students will be able to give a presentation on the importance of biodiversity world wide

Materials

Library
Computers with internet access
Poster board
Markers



Procedure

1. In groups students will choose one of the topics listed below.
2. They will research the topic and present it to the class in some way:
 - a. Television commercial
 - b. Debate
 - c. Speech
 - d. Posters
 - e. Webpage, ect.
3. The presentation must include specific real world issues and examples
4. Local issues should be encouraged but not mandatory, the environment is a global issue.

Topic 1

Biodiversity Soapbox

Sadly, not enough people in the world understand the concept of biodiversity. For example, a recent survey revealed that only about 20% of Americans know what biodiversity is. If you were invited to make a public presentation about biodiversity to the general public, how would you do it?

-  prepare an outline of your presentation, listing key points and examples
-  consider how you would emphasize the six points of “environmental reasoning” below for protecting biodiversity

Useful Guide to Environmental Reasoning

1. Environmental problems result from choices people make.
2. Incentives influence choices.

3. Efficient solutions to environmental problems are preferable to inefficient solutions.

4. Markets can contribute positive solutions to environmental problems.

5. Private property ownership can contribute to environmental solutions.

6. You can't do just one thing.

Adapted from *Capstone: The Nation's Economic Course*, Reinke et al. (1989)

Topic 2

Cost/Benefit Analysis

Economics tells us that we must carefully consider the costs and benefits of our choices and pick the one that has the best cost to benefit ratio. Some costs and benefits are subjective, based on how one values things; some are objective, such as dollar amounts. Explain how a cost to benefit analysis works. Then provide at least 4 real-world examples of companies dealing with this type of analysis for environmental decision making, including what factors would be under consideration. For example, what costs and benefits would a chemical company evaluate in its decision whether or not to further decrease air pollution at one of its sites?

Topic 3

Supply and Demand

Resources on Earth are limited and finite and environmental resources include things like clean water and air, productive soil, and plant and animal species. Explain how supply and demand works and provide at least 8 examples of how it can be detrimental to the environment. For example, we might choose to cut down trees in a virgin forest in order to have wood to build houses.

Topic 4

Rewards and Incentives

Rewards and incentives drive cost-benefit decisions. Because we value things differently, people may not consider the same thing to be a reward or incentive. Explain how rewards and incentives can be used to drive environmentally-friendly economic decisions, providing at least 8 environmental examples. For example, a coffee company selling products harvested by indigenous people in order to gain goodwill and/or a tax break.

Lesson adapted from [://www.actionbioscience.org/biodiversity/lessons/wilsonlessons](http://www.actionbioscience.org/biodiversity/lessons/wilsonlessons).

1.

Pre Visit 3
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Field guide

Purpose/Objective

Students will research what common macro vertebrates and invertebrates that live in the Hillsborough River

Students will create a field guide that identifies the vertebrates and invertebrates that live in the Hillsborough River

Materials

Computers with internet access

Printer

Paper

Procedure

1. In groups students should choose a type of animal they are interested in researching:
 - a. Fish
 - b. Insects
 - c. Snakes
 - d. Turtles
 - e. Birds, etc
2. Each group will do research and find out what species of that animal live on or in the Hillsborough River
3. The research should include:
 - a. Scientific name
 - b. Habitat
 - c. Importance in eco-system
 - d. Threats to existence (if any)
 - e. 1-2 'cool' or interesting facts that make this animal memorable.
4. All the research should be compiled into a useable feildguide. This can be done on publishing software or by hand cutting and pasting pictures. Students should use real published field guides and formats before deciding how to organize theirs.

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Data Analysis

Purpose/Objective

Students will explore the USGS website and answer questions using the data found there

Materials

Question sheets
Computers with internet access

Procedure

1. Orient students on the USGS website ([.usgs.](http://usgs.gov)), what USGS is and what they do
 - a. USGS: Your source for science you can use
 - b. As an unbiased, multi-disciplinary science organization that focuses on biology, geography, geology, geospatial information, and water, we are dedicated to the timely, relevant, and impartial study of the landscape, our natural resources, and the natural hazards that threaten us. Learn more about our goals and priorities for the coming decade in our Science Strategy.
2. On the home page ([.usgs.](http://usgs.gov)) click on 'water' under Science Areas
3. Click 'real-time data' under Water Data on the left hand side.
4. Click on Florida on the map
5. From this page you can chose Statewide Stream flow, Groundwater, Precipitation, and Water-quality. From here students should be able to navigate around the site and answer questions. They can also click on the map itself to navigate to specific water body.

Questions

1. What does it mean if a daily stream flow rating for a river is between the 25 and 75 percentile? **a percentile between 25 and 75 is considered normal**
2. Over the last 68 years, what has been the median cubic feet per second (cfs) discharge for USGS 02303000 HILLSBOROUGH RIVER NEAR ZEPHYRHILLS FL? **298**
3. In the last 18 years, what year had the maximum CFS for USGS 02301990 HILLSBOROUGH R AB CRYSTAL SPR NEAR ZEPHYRHILLS FL? **2003**

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Vocabulary

Purpose/Objective

Students will use internet searches to find vocabulary terms used in context on reputable websites

Materials

Vocabulary list
Computers with internet access

Procedure

1. Discuss what makes a website a reputable or trust worthy website. This activity should be completed using sites that end in org, edu, or gov. Dictionary sites are not acceptable for this activity
2. Have students in groups or individually search for the terms on the vocabulary list
3. Students will write down the sentence in which the word appears and the website they found it on.
4. List all the different sites that the students found this information on
5. Mark any trends that you see (EPA, water department, education, research)

Rolling in the River Vocabulary

Ecosystem - The interaction between organisms and their environment.

Wetland - a lowland area, such as a marsh or swamp that is saturated with moisture,

Aquifer - any geologic formation of sand, soil and gravel where groundwater is stored.

Macroinvertebrate -

Biodiversity - A term that describes the number of different species that live within a particular ecosystem.

Amphibian - An animal capable of living both on land and in water.

Reptile - any cold-blooded vertebrate comprising the turtles/ tortoises, snakes, lizards, crocodilians, tuatara, and various extinct members including the dinosaurs that lay eggs and has scales.

Habitat - Any native and non-native species that heavily take over an area.

Invasive - Any native and non-native species that heavily take over an area.

Native - originating naturally in a particular country or region.

Exotic - Something not found in the area naturally; may have originated from another country.

Aquatic – Living or growing in the water.

Predator – Any animal that preys upon other animals.

Prey – An animal that is hunted by another animal.

Environment – the air, water, minerals, organisms, and all other external factors surrounding and affecting a given organism at any time.

Niche - the position or function of an organism in a community of plants and animals.

Karst topography - an area of limestone terrain characterized by sinks, ravines, and underground streams.

Topography – The surface features of a place or region. Ex: mountains, rivers, valleys.

Tannins - pigments in plants responsible for brown colors

Confluent – place where different waters mix or merge.

Detritus – newly dead or decaying organic matter covered in bacteria.

Natural resources – Any material produced by nature that can be used to produce goods or provide services

Watershed – an area of land that is drained by a river or river system.

Point source pollution –Pollutants discharged from any identifiable point, including pipes, ditches, channels, sewers, tunnels, etc.

Non-point source pollution - pollution that occurs when rainfall, snowmelt, or irrigation runs over land or through the ground, picks up pollutants, and deposits them into rivers, lakes, and coastal waters or introduces them into ground water.

Mitigation – a form of compensation for destruction of natural areas; often it means rebuilding or providing new habitat for the organisms displaced.