

Reading the River 2003

We got sludged: Are our streams recovering?

Grade 7

Integrated Science

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Context of Curriculum Product:

On October 11, 2000 Martin County Coal Corporation released 250 million gallons of coal slurry (sludge) into local streams. The sludge spill is one of the worst environmental disasters since the Exxon Valdez oil tanker spill off the coast of Alaska. About half of the students at Warfield Middle School live next to Wolf Creek which was one of the two streams impacted by the sludge. This project in conjunction with P.R.I.D.E’s Project Clean Stream will be used to determine the long term effects of an environmental disaster on a local ecosystem.

Title of Curriculum:

We got sludged, Are our streams recovering?

Objectives:

- Students will research the October 11, coal slurry spill.
- Students will identify the Big Sandy River watershed.
- Students will be able to measure pH, conductivity, and dissolved oxygen levels of a stream.
- Students will be able to conduct habitat and macro invertebrate assessments.
- Students will collect water samples for P.R.I.D.E. to measure fecal coliform and compare results from previous P.R.I.D.E. studies.
- Students will evaluate data and decide on current status of Wolf Creek.

Program of Studies:

- 2.1 Scientific ways of working and thinking.
- 2.2 – 2.6 Patterns, systems, scale and models, Constancy and change over time.

Core Content:

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| SC-M-#.#.#1A | <i>Students will</i> refine and refocus questions that can be answered through scientific investigation combined with scientific information. |
| SC-M-#.#.#2A | <i>Students will</i> use appropriate equipment, tools, techniques, technology, and mathematics to gather, analyze, and interpret scientific data. |

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| SC-M-#.#.#0A | <i>Students will use evidence (e.g., computer models), logic, and scientific knowledge to develop scientific explanations.</i> |
| SC-M-#.#.#12 | <i>Students will describe the individual's roles and responsibilities in the following areas: changes in populations, resources and environments including ecological crises and environmental issues, natural hazards, science and technology in society, and personal and societal issues about risks and benefits.</i> |
| SC-M-3.2.1 | <i>All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.</i> |

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| SC-M-3.2.2 | Regulation of an organism's internal environment involves sensing the internal environment and changing physiological activities to keep within the range required to survive. Maintaining a stable internal environment is essential for an organism's survival. |
| SC-M-2.1.5 | Water, which covers the majority of the Earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the water cycle. |
| | Water dissolves minerals and gases and carries them to the oceans. |

Materials:

- Internet connection
- Lamott's pH test kits
- Lamott's dissolved oxygen test kits
- Conductivity meters
- Habitat assessment keys
- Topographic maps of Big Sandy River Watershed
- Kick nets, pans, and macro invertebrate keys.
- Field guides to stream life.
- Fecal coliform sample bottles (cooler with ice)
- School bus
- Aquarium

Activity Procedure

Day 1

Students will observe a sample of water from the Tug Fork of the Big Sandy River from Oct. 11, 2000.

Students will be divided into cooperative groups.

Student groups will use the Internet to research the October 11, 2000 slurry spill. Answer key questions.

Possible web resources:

<http://www.martin.k12.ky.us/hillsweb/articles/sludged.htm>

<http://www.kyeqc.net/news/eqcinthenews/martin.pdf>

http://www.coalage.com/ar/coal_martin_county_coal/

http://www.enquirer.com/editions/2000/12/04/loc_samples_god_blamed.html

http://www.enquirer.com/editions/2000/10/26/loc_coal_sludge_damage.html

http://www.coalage.com/ar/coal_osm_releases_ky/

<http://www.osmre.gov/martincounty030402.htm>

<http://www.uscg.mil/hq/nsfweb/nsfcc/ops/Response/archive/InezCoalSlurry/photo.html>

- What is coal slurry?
- What streams were affected by the sludge spill?
- How much sludge was spilled?
- How did the spill affect wildlife and people?
- What has been since the slurry spill?
- How has the coal company been affected by the spill?

Students will participate in table and a classroom discussion about the slurry spill and how it has impacted their life.

Day 2

Possible Web resources:

<http://kywater.org/watch/bsr.htm>

http://kywatersheds.org/Big_Little_Sandy/BSbasin.htm

Use PowerPoint presentation to introduce watersheds.

Students will use topographic maps to outline the Big Sandy River watershed, identify Wolf Creek, Bucks Creek and Martin County Coal Corporation.

Days 3-5

Students will use water from classroom aquarium to practice using the Lamott's pH and dissolved oxygen test kits and the conductivity meters.

Students will practice habitat assessment and macro invertebrate assessment on small stream next to the school.

Day 6

Web Resources

<http://www.kypride.org/>

Students will participate in P.R.I.D.E.s project Clean Streams (Oct. 22 & 23) and conduct field test at 3 locations. (Wolf Creek (impacted by sludge), Tug Fork of Big Sandy River (impacted by sludge) and Buck's Creek (not impacted by sludge))

Day 7-8

Students will use a spreadsheet and produce graphs of data collected at all three sites.

Students will access previous data collected at Bucks Creek and Tug Fork of the Big Sandy to compare their results. (Previous testing at Wolf Creek is not available)

Data Locations:

<http://kywater.org/watch/b01-data-fecalfocus.htm>

<http://www.water.ky.gov/dow/BLS.htm>

<http://pride.state.ky.us/report.idc>

Students will participate in class discussion on current status of Wolf Creek, Tug Fork of the Big Sandy and Bucks Creek.

Definitions/Skills

Watersheds

Dissolved Oxygen

pH

Conductivity

Habitat Assessment

Coal Slurry

Macro Invertebrate

Assessment

Rubrics should be designed for each day's activities.