



Lesson 15: Supplement

Additional Information for Educators about the use of Hydrologic Information System (HIS) in your classroom

The Hydrologic Information System (HIS) was developed by the Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI) and is an internet-based system that allows for the for storage, discovery, analysis, and publication of hydrologic data. The goal is to provide an online learning environment to access this data and allow students, teachers, and content experts from throughout Idaho to communicate and collaborate in meaningful ways around this data using the latest in low cost, high tech instrumentation. This communication and collaboration can help bring communities together around water-resource issues. HIS is hosted by the Adventure Learning @: Water Expeditions (AL@) website: adventurelearningat.com.

How you can Utilize HIS in your classroom

HIS makes multiple years of hydrological data available online that have been collected from sites located all over Idaho. Data from many different variables has been collected including: temperature, dissolved oxygen, turbidity, electrical conductivity, pH, streamflow, fecal Coliform, BOD5, and nitrogen/nitrate (NO₃). Here are some examples how you can use available data from HIS in your own classroom.

- The scientific method: have your students develop a scientific inquiry project around an available data set from HIS using the scientific method. Identify a question and form a hypothesis based on the available hydrologic characteristics. Analyze the data and draw conclusions concerning your question and hypotheses and reflect upon these conclusions.
- Changes over time: Compare a variable(s) at a site over time to determine if any changes have occurred between years. Take it one step further and have your students hypothesize as to what might have caused these changes and then relate your findings to rules and regulations regarding local water quality standards and standards for the entire state of Idaho
- Compare multiple sites: Explore the available data for two or more different sites. Compare this data and identify similarities and differences in hydrological conditions between the locations. Incorporate critical thinking by having students hypothesize as to what might have caused these similarities and differences.



- Ideal habitat: Research hydrological conditions for ideal trout habitat or the habitat of an aquatic organism of your choosing. Analyze the available data on HIS to determine site across Idaho that are adequate for you're the growth, development, reproduction, and survival of your aquatic species.
- Do it yourself: set up your own site and compare the data you collect with data acquired from HIS. Identify the similarities and differences between your data and data from HIS. What is the source of these similarities and differences. If the data you collect indicates poor water quality, then brainstorm what can we do to help improve the water quality at our site. If the data indicates good water quality, then brainstorm what we can do to protect the water from future contamination and decline.
- Check out the additional resources below to access information about water in Idaho and to learn more about other water quality monitoring programs that your students can participate with to enhance your HIS experience.

Possible Discussion Questions

- Why is collecting water quality data important?
- How do scientists and professionals use this data?
- Define different water quality measurements: pH, dissolved oxygen, turbidity, nitrates, temperature, and conductivity.
- Compare and contrast two or more different monitoring sites?
- Brainstorm how we negatively and positively impact a watershed based on data available in HIS.
- Describe how we can use technology to be better scientists.
- Summarize the importance of sharing scientific data with the world.
- etc. ...

Resources for Further Understanding

- Here is the web address for the Adventure Learning @ Water Expeditions (AL@) website to access data on HIS. <http://adventurelearningat.com>
- Department of Environmental Quality Idaho: here you can access water quality standards for a variety of water sources across Idaho and up to date news about water issues in our communities. This website also has data sets available for possible comparisons with data stored in HIS. <http://www.deq.idaho.gov/water-quality/surface-water/water-quality-criteria/common-measures.aspx>



- Idaho Department of Water Resources: this site provides information about water rights and water quality standards in Idaho. This is also an excellent resource for information on groundwater resources and dams.
<http://www.idwr.idaho.gov/WaterInformation/default.htm>
- The Kimberly Research and Extension Center – University of Idaho: here, information and resources are available about current hydrological projects and research being conducted in Idaho as well as links to interesting publications and websites. The Kimberly R & E Center also hosts the REF-ET Program where you can calculate evapotranspiration. This concept is a little complex so it is recommended to either incorporate this information into your curriculum for older students or simplify the information for younger students. <http://www.kimberly.uidaho.edu/water/>

The following resources can be used in partnership with the analysis/comparison of HIS data:

- Adopt-A-Watershed Curriculum units are organized by grade level online. Each curriculum unit features projects, field study projects and community action materials. Call 1-530-628-5334 or visit www.adopt-a-watershed.org Contact Karla Eitel at the McCall Outdoor Science School to register for an HIS login so that you can make the data from your watershed available on HIS.
- Rivers of Life, Center for Global Environmental Education A full model for contextual learning; a flood of projects, adventures, and resources to help K-12 teachers and students learn about and from their watershed. Use discussion questions to incorporate HIS data into the available models from the Rivers of Life, Center for Global Environmental Education.
<http://cgee.hamline.edu/rivers/>
- Online Classroom Projects, The Center for Improved Engineering and Science Education The CIESE has several collaborative online classroom projects that allow students from around the world to compare the quality of their local waters. Projects include: Global Water Sampling Project, Down the Drain, Bucket Buddies, Take A Dip, etc. <http://k12science.stevens-tech.edu/collabprojs.html> Compare data from around the world to data available from Idaho in HIS on the AL@ website.
- Freshwater Wetlands Teaching Guide, Environmental Media Corp./Snyder Productions, Ltd Freshwater Wetlands Teaching Guide contains six-programs, each 10 minutes long. Wetlands topics addressed include lakes, ponds, pools, marshes, forested wetlands, rivers, streams, floodplain communities and water use. Compare data collected from wetlands with available lake and stream data on HIS
www.envmedia.com/guides/freshwater_wetlands.pdf



- Office of Wetlands, Oceans and Watersheds, Environmental Protection Agency Activities, projects, information magazines and curricula on wetlands, water resources, ecosystems, watersheds, wildlife and more. Links to educational resources produced by other organizations are also provided. www.epa.gov/owow/wetlands/education

How to get involved and register for a user login...

If you would like to set up your own data collection/stream monitoring site, contact the McCall Outdoor Science School for information on acquiring your own username and login for the Hydrologic Information System (HIS) on the Adventure Learning @ website.

Coming soon: you can also access the “CollaborationZone” on the Adventure Learning @ website to discuss water resources and issues in our changing climate with teachers, students, and scientists from around the world.

Contact Information

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Next Generation Standards:

Standards to keep in mind when using data from HIS and additional resources:

BOX 3-1

PRACTICES FOR K-12 SCIENCE CLASSROOMS

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information