Find Your Watershed

Digital Toolkit – Clean Creek Campus Extension Activity

Activity Summary:
Using online databases and maps, identify what watershed you live in and investigate its health. Follow-up this activity by using materials to run your own water quality test of a nearby waterway.

UNIT: Clean Creek Campus

GRADES: 3rd grade and up

MATERIALS:
- Computer access
- Optional: Chemical Water Testing Kit from Keep Austin Beautiful: https://keepaustinbeautiful.org/activity-kit-request-form/
- If doing water quality testing, site to test, or samples to test in-classroom
- Gloves and goggles for chemical water testing

OBJECTIVES:
Students will be able to:
- Identify their local watershed.
- Use online databases to investigate the characteristics of their watershed.
- Understand the importance of water quality and parameters for identifying a healthy aquatic ecosystem.

TEKS CORE CONCEPTS:
- Coming Summer 2019!

Introduction – review of watershed concept:
What is a watershed? LAND! Water sheds off of land and flows into our creeks and rivers. We name our watershed based on the name of whatever body of water the surface and groundwater is collecting into. Link to video that reviews and illustrates what a watershed is

Part 1: Find Your Watershed (in-class activity)
Does anyone know what watershed we live in – or where we go to school? There can be more than one answer! In the Austin area we're part of the Colorado River Watershed, but we are also part of unique smaller watersheds within the larger watershed, that fit together like pieces of a puzzle. We're going to use some cool online maps provided by the City of Austin to learn more about our watershed.

1. Students may work in teams or individually, using computers. Have them go the City of Austin's Watershed Protection Department watershed map: https://www.atxwatersheds.com/findyourwatershed/
2. From there, they can use the search tool (magnifying glass) in the upper right corner of the map to search for a location by address or name. Begin by searching the school to identify what watershed they are currently in.
3. Using the dropdown arrow on the watershed's name, students are able to look at different parameters defining the overall grade that the watershed receives. Go through these parameters as a class and define them – See definitions at end of lesson plan for reference. (***Note: not all watersheds may have grades for all of the listed parameters**):

Overall Quality: average of all the other assessments
Aesthetics: appearance of the water, algae, plant growth
Aquatic life: determined through sampling of macroinvertebrate and diatomaceous life
Eutrophication: measure of algal biomass
Habitat quality: assessment of bank stability, epifaunal substrate, embeddedness, velocity/depth regimes, channel alteration, sediment deposition, frequency of riffles, channel flow status, bank vegetation protection, riparian zone width
Sediment Quality: lab analysis of sediment to include metals, PAHs, PCBs, organochlorine pesticides, and grain size
Recreation: suitability for contact is based on e.coli presence in water
Vegetation: evaluated by percentage of lake area which contains vegetation, vegetative taxa richness, percentage of vegetation classified as exotic species

Water chemistry: evaluated using a chemical water test, including parameters of ammonia nitrogen, specific conductivity, e. coli bacteria, nitrate-nitrogen, orthophosphorus, total suspended solids

4. Have students record the grades for each category in the attached spreadsheet.
5. Compare another watershed to your school's watershed. Can choose a home address, or a well-known public building for reference (for example, the Capitol). Record this information as well.
6. Discuss as a group. Have students interpret graphs. *Which Watershed is the healthiest? Did anything surprise you? Were you expecting the watershed to be better or worse than it was ranked? What are some characteristics of the area in the watershed that may contribute to its health? (i.e. downtown, roads, buildings, green space) What can we do to help improve our watershed health?*

Part 2: How Healthy is Your Watershed?
Note: before going through with this section of the lesson, either collect samples from a nearby waterway to test in the classroom, or plan ahead to take students to sample water quality at a site nearby. For the activity, refer to Keep Austin Beautiful's Water Chemistry Testing Activity Kit and Lesson Plan

Introduction: *We can also be scientists and use different tools to look at the health of our waterways! What kinds of things can we measure to test for water quality?* Macroinvertebrate life, temperature, pH, acidity, turbidity, nitrates, bacteria (e. coli). We're going to test the water quality of a waterway close to us!

For the activity, students may do chemical tests and look for macroinvertebrates. Have students record results and bring data back to the classroom to draw conclusions.

Conclusion: Some other resources where water quality data has been collected and can be used for comparison:

- The Austin Youth River Watch reports: https://riverwatchers.org/results/water-quality-data
- City of Austin Data (difficult to use – search for creek name in search bar and scroll through data points): https://data.austintexas.gov/Environment/Water-Quality-Sampling-Data/5tye-7ray/data

What kinds of conditions do you think might affect the data we collected today? Rainfall, temperature, activity around the area. *One thing scientists will do is collect data over time to see how weather and climate, as well as human activity, may affect water quality. By sharing data, we can all better understand the health of our water all across the planet!*

As citizen scientists, we can also share our data for big projects such as World Water Monitoring Day, which encourages people to take leadership over our water's health! We can upload our data and collaborate with many others who are doing the same:
http://www.worldwatermonitoringday.org/about

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Terms used

- **Macroinvertebrates:** organisms without backbones that are visible to the naked eye.
- **Diatoms**: major group of single-celled algae with a silica-based cell wall.
- **Eutrophication**: overabundance of nutrient richness in a body of water, which can lead to plant and algal overgrowth and depleted dissolved oxygen.
- **Biomass**: total mass of organisms in a given space or volume.
- **Bank Stability**: susceptibility of the bank of a body of water to erosion.
- **Epifaunal substrate**: structures within the waterbody that provide surfaces/habitat for animals to live.
- **Embeddedness**: extent to which rocks are buried in silt and sediment in the waterway (increase in embeddedness is an indicator of poorer habitat).
- **Velocity and depth regimes**: variability in velocity and depth of the channel.
- **Channel alteration**: extent to which stream/creek/river channel has been obstructed, altered, or modified.
- **Sediment deposition**: measurement of deposited sediment.
- **Riffles:** a rocky or shallow part of a creek or river, makes for good habitat for aquatic fauna.
- **Channelization**: degree of alteration of the channel to deepen or increase the flow rate.
- **Riparian Zone Width**: width of vegetative buffer alongside the waterway, assists with filtration and reduces erosion.
- **Vegetation**: plant growth.
- **Biodiversity richness**: measure of number of distinct species and their relative abundance within sampled area.
- **Exotic and invasive species**: flora or fauna that have been introduced to the region and may be a threat to the native wildlife.
- **Ammonia and nitrogen**: nutrient which assists in plant growth – ammonia is the more accessible form of nitrogen.
- **Specific Conductivity**: measure of the water's ability to conduct electricity, increases with the presence of dissolved salts in the water.
- **Orthophosphorus**: form of phosphorus that is readily available to plants and algae for growth.
- **Total suspended solids**: dry-weight of suspended solids (not dissolved) in the water column.