WOW: WATERSHEDS

POST-ACTION AUDIT, GRADES 6-8

Students will be once again use the online watershed mapping tool to collect some of their data. As a reminder, the WikiWatershed instructions are found on the WOW-Audits landing page.

Did the class/team work with any resource experts and/or volunteers? ◯ Yes ◯ No

Please list if applicable: _____

Using the same sample group as your baseline survey, conduct the survey again post-action. Insert the average student response. On a scale from 1-10, 10 being the most important and 1 being the lease important,

- How important is a healthy watershed to wildlife? _____
- How important is a healthy watershed to the local community? _____

TABLE 1. GEOGRAPHIC INFORMATION

1. Confirm the GPS coordinates for the study site, by comparing them to the baseline audit coordinates. Use you smartphone's GPS or go to: https://www.whatsmygps.com to find the coordinates.	Latitude N _____ Longitude W _____

TABLE 2. WATERSHED CHARACTERISTICS AND BENEFITS

1. What percentage of students can identify elements of a watershed? • Geography • Topography • Water quality • Land use • Vegetation • Soil	A. _____ 0 elements B. _____ 1-2 elements C. _____ 3-4 elements D. _____ 5-6 elements
2. A watershed is a system. What percentage of students can identify one or more system benefits associated with a healthy watershed? • Ecosystem benefits and services • Economic benefits • Physical and mental health benefits	_____ %

Think about the following question as you summarize the data in Table 2.

1. How has student understanding changed from the baseline audit to the post-action audit or between audit years? Are students/team members better able to communicate about the watershed system and its benefits in a meaningful way?

TABLE 3. TEMPERATURE AND PRECIPITATION

1. For today's date, collect the weather data listed to the right. Use your local weather website, application or use the following: • http://www.weatherbase.com/weather/state.php3?c=US • www.weather.com	_____ | _____ Temperature in degrees Fahrenheit and Celsius _____ | _____ Precipitation in inches and centimeters

2. Change Over Time and Patterns
You have been collecting temperature and precipitation data throughout the schoolyear or over an extended period of time. **Calculate the averages for temperature and precipitation.** For months where students are not in school, collect the historical data from one of the two sites listed.
   - http://www.weatherbase.com/weather/state.php3?c=US
   - www.weather.com

January	_____°F | _____°C	_____ inches | _____millimeters
February	_____°F | _____°C	_____ inches | _____millimeters
March	_____°F | _____°C	_____ inches | _____millimeters
April	_____°F | _____°C	_____ inches | _____millimeters
May	_____°F | _____°C	_____ inches | _____millimeters
June	_____°F | _____°C	_____ inches | _____millimeters
July	_____°F | _____°C	_____ inches | _____millimeters
August	_____°F | _____°C	_____ inches | _____millimeters
September	_____°F | _____°C	_____ inches | _____millimeters
October	_____°F | _____°C	_____ inches | _____millimeters
November	_____°F | _____°C	_____ inches | _____millimeters
December	_____°F | _____°C	_____ inches | _____millimeters
Yearly Average	_____°F | _____°C	_____ inches | _____millimeters

Think about the following questions as you summarize the data in Table 3.

1. How are temperature and precipitation averages different from 30-50 years ago?
2. How has temperature and precipitation changed over the course of the school year?
3. What role does this data play in informing what is being observed at your study site? With the entire watershed?
4. Did students witness weather impacts on wildlife at the study site? If unable to observe impacts, speak with a resource specialist about the impacts – what wildlife are struggling?
5. What actions did the team/class take to help wildlife deal with weather impacts, such as extreme weather events, development and/or pollution?

Optional: Attach a graph using your temperature and precipitation data.

TABLES 4, 5 and 6. Consider contacting a watershed outreach coordinator (city water department) college or university, or local watershed non-profit. Their involvement is a great way to connect to the community, inspire students, demonstrate career possibilities and share resource expertise. If you cannot conduct a study within your watershed please determine the best way to gather the data, i.e. a phone call, an email or ideally a SKYPE, Zoom or Google Hangout with someone who works as a biologist, ecologist, volunteer, etc. at your nearest water quality or soil quality monitoring station. Contact your city's water department for resources specialists or recommendations.

Remember the water within the watershed is a network of connected systems. Water quality and/or pollutants upstream impact water quality downstream. Whether or not you are physically able to go to a nearby creek, stream, river, lake, etc., students can still collect water and soil data from samples you bring to the classroom for investigation.

Invite parents and community members to participate in the auditing process. Students can take on the role of educator by working with volunteers on citizen science. This experience is a great way to build community.

TABLE 4. LANDSCAPE

1. Take a second panoramic or set of images of your study area and insert them in the summary for Table 4. Be prepared to explain how the study site has changed from the first set(s) of photos to the post-action set of photos.

   If you are unable to be at your study site, use Google Earth or Google Maps, locating your study site using the GPS coordinates from Table 1. As a reminder, take screen shots of the features listed below.

   In the photo you want to see the following features.
   - Banks of the waterbody
   - Waterbody
   - Riparian areas if applicable
   - Surrounding terrain/development

2. From your study site what types of land do you see?

☐	Forested-private land	☐	Forested-public land	☐	Open green space
☐	Open space-rocky or little vegetation	☐	Housing or businesses	☐	Farm/ranch (crops or animals)

3. According to WikiWatershed what percentage (column 3) of your watershed is categorized as:

   _____ % Developed, High Intensity _____ % Developed, Open Space

   _____% Cultivated Crop _____ % Open Water

Continued on the next page.

Insert photos here. Compare and contrast photos from the baseline to the photos you have now (if this site has been studied over multiple years, review all images).

Think about the following questions as you summarize the information in Table 4.

1. Has the study site changed from the last time the team/class made observations? Has land cover data changed in WikiWatershed? Explain.
2. Why is it important to understand the features, topography and/or geography within a watershed?

TABLE 5. SOIL QUALTIY

1. Soil Temperature Test 1 _____ °F _____ °C Test 2 _____ °F _____ °C Test 3 _____ °F _____ °C	2. Soil pH Test 1_____ pH level Test 2 _____ pH level Test 3 _____ pH level ( ) Acidic ( ) Neutral ( ) Basic	3. Iron Test 1 _____ Fe ppm (parts/million) Test 2 _____ Fe ppm (parts/million) Test 3 _____ Fe ppm (parts/million)
4. Nitrogen Test 1 ◯ low ◯ medium ◯ high Test 2 ◯ low ◯ medium ◯ high Test 3 ◯ low ◯ medium ◯ high	5. Phosphorus Test 1 ◯ low ◯ medium ◯ high Test 2 ◯ low ◯ medium ◯ high Test 3 ◯ low ◯ medium ◯ high	6. Potassium Test 1 ◯ low ◯ medium ◯ high Test 2 ◯ low ◯ medium ◯ high Test 3 ◯ low ◯ medium ◯ high
7. According to WikiWatershed, what percentage of your watershed is categorized as: (For support, use the soil infiltration guide found on the Watersheds Audit landing page.) _____ % A-High Infiltration _____ % B-Moderate Infiltration _____ % C-Slow Infiltration _____ % D-Very Slow Infiltration		

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TABLE 6. WATER QUALITY

1. Water Temperature Test 1 _____ °F _____ °C Test 2 _____ °F _____ °C Test 3 _____ °F _____ °C	2. Water pH Test 1_____ pH level Test 2 _____ pH level Test 3 _____ pH level ◯ Acidic ◯ Neutral ◯ Basic	3. Salinity Test 1 _____ ppt (parts/thousand) Test 2 _____ ppt (parts/thousand) Test 3 _____ ppt (parts/thousand)
4. Dissolved Oxygen Test 1 _____ ppm (parts/million) Test 2 _____ ppm (parts/million) Test 3 _____ ppm (parts/million)	5. Nitrates Test 1 _____ ppm (NO_3 parts/million) Test 2 _____ ppm (NO_3 parts/million) Test 3 _____ ppm (NO_3 parts/million)	
6. Transparency Test 1 _____ cm Test 2 _____ cm Test 3 _____ cm ☐ greater than depth of transparency tube		
7. Is it raining or has it rained in the last 24 hours? Stormwater runoff from surrounding areas can impact watershed quality and appearance, including temperature and pH.	◯ Yes ◯ No	
8. List the potential point sources of pollution.		
9. List the potential non-point sources of pollution.		

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Think about the following questions as you summarize the data in Tables 5 and 6.

1. Review why it's important to observe and test soil and water throughout a watershed?
2. Review the impacts water upstream can have on water downstream?
3. Have infiltration rates changed? Review the role infiltration plays in a watershed?
4. What did students do to determine potential sources of point and non-point source pollution?
5. Describe one action the class/team take took to be better watershed stewards?

TABLE 7. WILDLIFE

1. Collectively, how many different plants and animals are observed on this day?	_____ amphibians _____ birds _____ fish _____ insects _____ mammals _____ reptiles _____ aquatic plants _____ terrestrial plants
2. Calculate the biodiversity index. the number of species in the area (numerator) _____ = biodiversity index the total number of individuals in the area (denominator) For example, a 4 X 4 meter square area in a carrot patch has 300 carrot plants, all the same species. It has a very low biodiversity index of 1/300, or 0.003. A 4 X 4 meter square area in the forest has 1 pine tree, 1 fern, 1 conifer tree, 1 moss, and 1 lichen, for a total of 5 different species and 5 individuals. The biodiversity index here is high, 5/5 = 1.	

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Volunteers needed for macroinvertebrate studies. Consider speaking to a resource expert before completing this section. They may have materials that you can borrow or they may be able to come assist you.

There are several macroinvertebrate resources, such as Stroud or GLOBE. Please use a resource that works best for your team.

Stroud - http://www.stroudcenter.org/macros/ GLOBE - https://goo.gl/p6niFW

To help you with identification and assessment please refer to the handout on the WOW-Audits page, titled Macroinvertebrate Studies Guide.

Reminder: Please attach photos or student work to the audit as evidence.

3. MACROINVERTEBRATE TYPE	OBSERVED AND CUMULATIVE INDEX VALUE (CIV)
Pollution Tolerant	_____ total # _____ points toward CIV
In Between	_____ total # _____ points toward CIV
Pollution Intolerant	_____ total # _____ points toward CIV
Total # macroinvertebrates identified	_____ total # _____ points toward CIV
Stream Assessment (check one)	◯ Excellent ◯ Good ◯ Fair ◯ Poor

Think about the following questions as you summarize the data in Table 7.

1. Has the biodiversity index changed? Explain why or why not.
2. How do macroinvertebrate numbers compare to previous collections? Based on this one variable has stream health changed? If it has changed, what could be potential reasons?
3. What does the wildlife at the study site tell the team/class about the health of this one point in the watershed?
4. Describe one of the actions the class/team took to improve or support current watershed programs/initiatives in the community.

Review of All Data

1. Based on what is known and has been learned, does the team/class think there is evidence to support the claim that the watershed is healthy? Has this one location improved or become unhealthy since last visiting? Explain.
2. What patterns has the team/class noticed? How have these patterns helped students draw conclusions?
3. Has the team/class been able to identify relationships between wildlife and watershed health? Explain.