Stream Side Science SEEd modification of What's in the Water? Combined with Who's in the Water?

Standard 6.4.1 Phenomenon	
Title: What and Who is in the Water?	**Overview:** Students look closely at water samples and water body pictures to identify the living and nonliving factors that exist within a water ecosystem.
Overarching Performance Expectations (Standard 6.4.1): Analyze data to provide evidence for the effects of resource availability on organisms and populations in an ecosystem. Ask questions to predict how changes in resource availability affects organisms in those ecosystems. Examples could include water, food, and living space in Utah environments.	
Lesson Performance Expectations: Students identify and categorize, by living and nonliving, the factors that are in and near water systems. Students predict how factors will influence one another within a water ecosystem. **CCC**: Cause and Effect **SEP:** Asking Questions; Engage in Argument	

GATHER	
Student Purpose	**Teacher Guidance**
1. In their journals students create a table with two columns. The first column labeled "Near Water", the second column labeled, "In Water". Students observe a water picture and write down the things they see that are "near the water" and the things they see or think are "in the water". (If water samples have been collected for each group, continue to the next steps). 2. Student groups look closely at their table's water sample to further identify what is "In Water". They add these observations to the their "in the water" column. (If microscopes or magnifying glasses are available have students complete step 3.) 3. Students look through a microscope	1. Teacher introduces lesson showcasing pictures of water bodies. Teacher asks students what types of things are "near" and "in" the water. 2. To help students organize their observations, model the creation of a 2-column table for students to copy into their journals. Label columns, "Near Water" and "In Water". 3. Pass out prepared water ecosystem pictures, one to each group. Ask students to list the things they see that are either "near the water" or "in the water". Set a timer for 5 minutes. 4. Reset timer for another 5-10 minutes for steps 3,4, &5. 5. Pass out samples of water in glass jars. Students will observe and record what they can see "in the water". (If available, give students petri dishes, droppers, and magnifying glasses.) **6.** While groups are observing water samples, have students alternate

at prepared microscope slides taken from the water samples. Students continue to add what they see in the microscope to their "In Water" column. Students can also look at water samples in petri dishes with magnifying glasses. 4. Selected students add their ideas to the class list on the teacher's board.	looking at microscope slides of water samples set up around the room. This will help to further identify things "in the water". **7.** Walk around the room directing students to add their unique ideas to a class list being generated at the front of the class. **8.** It is helpful to stop after 5 minutes, share a few answers, and ask if students need more time. Students can indicate how many more minutes they need with a show of fingers.

Teacher Preparation

1. Set up classroom so students are arranged in groups, ideally 4-5 in a group.
2. If possible, collect water samples in glass jars representative of nearby water sources. Make sure the samples include sediment and organic materials found in the water source.
3. Take a picture of the place where the water is collected. Print and laminate or sheet protect photographs. Each student group will need one photograph to share.
4. If microscopes are available, prepare a microscope slide from each water source. Set microscopes up around the room.

*If it is not possible to get water samples and/or photographs crop photos from USU water quality extension site.
https://extension.usu.edu/waterquality/learnaboutsurfacewater/watersheds/

REASON

Student Purpose	**Teacher Guidance**
Students will notice that many of the same things are listed both in and near the water. They will notice plants are in the river and out along the river. They will notice sediment is in as well as beside the river. It becomes apparent that in and near the river are not an effective scheme for classification. 1. Students work together with their groups to choose a more effective way to classify the data. The objective is to separate all factors by a property that creates two distinct groups. 2. Students will be discussing how to reclassify the items on their list. Students will have to be prepared to	Students will notice many of the same things have been listed on both sides of their charts. Have students determine an improved system to categorize factors where there is minimal to no overlap when factors are separated into groups. 1. Give groups 2-3 minutes to brainstorm new ideas to improve the classification of the factors listed on their charts. 2. Teacher will list category ideas on the board, leading the students towards the idea of living/nonliving as the target response.

defend the reasons for their choice. 3. After a 2-3-minute discussion, a group representative will write down the group's choice on the board for the class to see. 4. The class will vote on choices. 5. Students will turn and talk with a partner to explain why they did not choose a choice to provide evidence for choices to be eliminated. 6. Students share discussed elimination evidence to remove choices that lack supporting evidence. Students form class consensus for the strongest relevant choice. 7. Students re-organize factors in their notebooks based on the new category choice (living and nonliving).	3. Ask students to review ideas listed. Direct students to try using ideas listed to determine if the new classification idea works to eliminate overlap. For example, if students choose the descriptors floats, does not float, they would recognize insects can float on the surface, swim in the water or hide in the sediment so overlap exists. Guide students to the categories of nonliving/ living to see if they can find overlap using this classification system. 4. Give the students time to turn and talk to express their thoughts. 5. Have all students vote, individually or as a group. 6. If the class is split between choices, ask students or group representative to explain their reasons for eliminating a choice. For example, if a student group chose slimy/not slimy, this category could be shown as ineffective because a rock could have both a rough (not slimy side) and a slimy side. 7. Write down evidence by choices to help students form consensus. 8. Re-vote with the outcome leading toward nonliving/living. 9. Teacher models the rewriting of the chart with the headings Non-Living and Living. Model the reclassification of the factors originally listed under the new category headings.

COMMUNICATE	
Student Purpose	**Teacher Guidance**
1. When students finish creating their new charts, students circle the nonliving factors that they think affect living factors in the water body. 2. Underneath their charts, students write	To connect to what water quality means and how it is measured, direct students to look at the charts they created. Have students circle the nonliving factors that they think could affect living factors.

2-3 sentences explaining how or why they think these nonliving factors will affect the living factors in these water ecosystems.	Ask students to write and explain 1 or 2 of the choices they circled. In their explanations, have them focus on a prediction that explains why they think these nonliving factors impact the living factors. Have students share some of their ideas with the class. This will prepare students for the next lesson where they will be learning how to measure the nonliving and living that help determine if water is clean enough to sustain life.

Notes for setting up this unit

Sources waterbody for photos: https://goo.gl/photos/GTqsvqqYHea5eA7L9 or for other watershed resources, http://streamsidescience.usu.edu/stream-side-science-in-your-watershed/index

The best-case scenario is for the teacher to collect water samples from different nearby water sources, i.e., lakes, rivers, wetlands. Take one or two pictures of the area surrounding the water sample location. Print pictures to 8 1/2x 11 size and laminate or place in a sheet protector so pictures can be reused.

Assessment of Student Learning

Have students write down two factors, in or near the water, that they have discovered. In this explanation students will decide if these factors are living or nonliving. Lastly, students will predict how these factors may interact or influence one another within the river system.

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What and Who are in The Water?

Near Water	In Water

What and Who are in The Water?

_____	_____

Predict the affect 2 nonliving things will have on 2 living things. Be sure to explain why you think this.

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What and Who are in The Water?

Near Water	In Water
Rocks, dirt, stones, sticks, trees, birds, dock, branches, mud, grass, car, person, bacteria, atoms, molecules, leaves, bushes, plants, branches, pinecones, air, stream bank, roots	Oxygen, bugs, fish, mayfly egg, algae, plants, sticks, stones, dirt, atoms, molecules, fertilizer (nitrogen), leeches, water strider, feather, pebbles, pine cone, branches, plants, leaves

Add student work here scan or photo..