**Weather & Climate**

**Lesson # 3:** **Water, Water Everywhere, But Not a Drop to Drink!**

**Essential Question:  How does weather affect our lives?**

**Standards:**

**3-5-ETS1-2.** Generate several possible solutions to a design problem. Compare each solution based on how well each is likely to meet the criteria and constraints of the design problem.

**Objectives**

**Student will be able to:**

1)  Gain an understanding of the uses of water to human life.

2)  Understand the far-reaching effects of water pollution and explore design solutions to make dirty water clean

**Vocabulary** :

Water Pollution: is anything that gets in water that can make it unclean.  Ask students to give examples of pollution.

Once students have a conceptual understanding of the vocabulary word they should create a 4-Square (Frayer Method from Key Vocabulary Routine) for the above word(s).

**Assessment:** Science notebook responses to the following questions:

How can humans **prevent** pollution before it is a problem?

Is it possible that we could run out of clean water?

What materials would you like to try next to clean up the water?

**Resources and Materials:**

|  |  |
| --- | --- |
| **Item** | **Amount** |
| Science notebooks |  |
| Globe (not provided) |  |
| Plastic globe ball of the earth | 1 (in bin) |
| Ziti in bags (with 2 red and 1 green ziti) | 10 bags (in bin) |
| Clean Water Preservation Tools (spoon, coffee filter, pipette, comb, fork, etc.) | 5 bags (in bin) |
| Containers for Water | 5 |
| Food Coloring | 1 (in bin) |
| Salt (optional) |  |
| Poppy Seeds | 1 bag |

**Activator:**Ask the students to answer the following prompt in their science notebooks or in a class discussion:  List all the ways you use fresh water every day.  If students would like an example, ideas may include drinking, bathing, washing clothes and dishes, and watering plants and lawns.

**Introduction:**Show students the globe of the earth that is in their classroom.  Ask a student to identify where they live on the globe.  Then, play a game throwing the plastic globe ball around the room between the students.  Students must catch the ball with both hands and then tell where their right thumb lands.  If it lands on water, draw a tally for water on the board, and if it lands on land, draw a tally for land on the board.  Do this enough times so that you can demonstrate the large proportion of water to land. To ensure that every student gets a chance to participate, ask students to sit after they have caught the ball once.

Tell students that today they will explore how humans can interact with the water all around us.

**Activity:**

1. Ask students if water is found in places other than on the surface of the globe.  Students should remember from the water cycle that some water is underground and some is in the atmosphere.  Explain that there is such a tiny amount of water in the air compared to other places that it will not be included in the following activity.
2. Break students up into small groups.  Give each group a bag with ziti, and have them sort by color.  Explain that there are 100 pieces of ziti and that they represent all of the water in the world (100%).  If you would like to introduce percentages to your class, tell the class that each ziti is 1%. Explain that a percentage is a part (or fraction) out of a 100.  If you would not like to introduce percentages, make sure to emphasize that one ziti is a very small part out of the whole bag.

3.      Each bag will contain two red ziti and one green ziti. Discuss that the uncolored ziti represents all of the water that is in the oceans (97%).  Show the students the globe again and refer to the ice caps on each pole and the mountains with snow.  Explain that the red ziti represent all of the water in the ice found at the -poles and in glaciers.  Ask students what the final one green ziti represents.  It represents all of the freshwater that is available for all of the plants, animals, and people on earth.  Emphasize that even though the Earth is covered with water, there is very little water on Earth that humans and other animals can use to drink. You may show students the difference between freshwater and salt water by adding salt and sand to freshwater and asking them which one they would rather drink.

4. After your students are done observing the ziti model, take the ziti and then, to show a more concrete example of the scarcity of water, take a liter of water and pour out 10 milliliters in a separate container and tell the students that this is the amount of freshwater that is available to consume from all the water in the world.

5. Give each group a container filled with water, as well as the bag of supplies labeled “Clean Water Preservation Tools”. Classroom teacher add different items to the bag. Add two drops of food coloring to each container and allow the color to spread.  Now add a few poppy seeds into the water. Ask the class what the color might represent (toxins). Ask them what the seeds might represent (trash).  Write the word **pollution** on the Vocabulary Wall.  Tell your class that water pollution is anything that gets in water that can make it unclean.

Ask students to give examples of pollution.

6.      Ask students to use the tools provided in the bag to get the food coloring out of the water to make the water clean enough to drink again.  Tell them that as groups, their **task** is to brainstorm ideas to get the food coloring out.

7.      Give students some time to try to experiment. Have them record what tools they use on the water and have them write down the results on the worksheet. After a few minutes, ask the groups to stop.  Ask them if any of them came up with useful strategies to clean the water.  Ask each group to explain their strategies and indicate why they thought it worked or did not work.  Groups should discover that they could not get the food coloring out of the water.  Ask students what that might mean about pollution.

*Teacher Explanation:  Pollution, including water pollution, can be irreversible.  That means that once water gets polluted, it will remain polluted.  Water that is polluted is not safe for humans or other animals to drink.  Remember that as water goes through the water cycle, it can remain polluted, which causes phenomena such as acid rain.*

8.      Lead a discussion about pollution with the class.  How can humans **prevent** pollution before it is a problem?  Is it possible that we could run out of clean water?  What are some things you can do to help save water (only use what is needed)?  How can we **reduce** the amount of water we use?  What other types of living things besides people need fresh water to survive?

9.      Refill water containers with clean water and add seeds to represent reversible pollution, such as floating debris.  Students should be able to clean the water in this activity.  Using the same materials from the Clean Water Preservation Tools bag, challenge students to try to clean the water by taking out all of the pollution.

**Closure:** Discuss the following questions as a class.  What happens if a river or a lake becomes polluted?  Can it still be used as a source of freshwater?  Why is it important to keep our sources of freshwater clean?  Why is it important to conserve freshwater? (Tell students that they may be learning about tsunamis in their ELA sections, and will learn how tsunamis and other extreme weather may lead to pollution).

*(Reminder: Classroom teacher should have students complete vocabulary four square for pollution prior to next science lesson).*

**Exit Ticket:** Have students answer in their science journals, if polluted water can always be cleaned. Have them use evidence from their experiments and data from their recording sheets. Keeping in mind the many ways people use water in their life, also have students write a few sentences on why to is important to keep water clean.

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Pollution Recording Sheet

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| Tool Used | Result |
| Spoon |  |
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