SALTY CURRENTS

Ages 8-15

Learning Objectives

- Understand that salt and fresh water have different densities.

Summary: Many kinds of wetlands (including mangroves) are located where fresh water from the land meets salt water from the ocean. The most obvious characteristic of sea water is its saltiness, or salinity. But most kinds of wetlands, from salt ponds to estuaries, are less salty than the ocean, and organisms face a constant fluctuation in salinity as both tides and freshwater flow interact. Salt water is denser than fresh water and tends to sink to the bottom, so organisms often have to deal with "layers" of different salinities. Fresh water, being lighter than salt water, floats to the top of ocean water. Wind, waves, and tides can stir up the layers, so wetland animals must be prepared for quick changes in salinity. On a secondary- school level, this activity works with Chemistry and Physics classes as it demonstrates density through the movement of saltwater and freshwater currents.

Subject Areas: Science.

Time: 30 minutes

Structure: This activity can be done with a group of students or independently. See page 3 and 4 for activity steps.

Before the Lesson

- Ensure all necessary resources are available.
- Describe the process of the lesson and encourage students to come up with a hypothesis for the experiment.
- If this activity will be done in a group, assign roles to specific students. Example - one student to add the salt, one to add the food colouring, one student to place the bottle in the container, etc.

Materials

- Two 5 or 10 gallon aquariums or clear plastic containers of similar size and shape (if using aquariums, make sure the one that used for salt water will not be used later for freshwater fish)
- Two small (6 or 8 oz) glass bottles, such as soda or mineral-water bottles, with screw on caps
- Freshwater
- Salt (coarse or table salt)
- Food colouring
- Funnel for pouring salt (one can be made with a piece of paper)
- Easel paper, flip chart, white or chalk board
- Paper and pencil for recording results
- Labels, or permanent marker for labelling bottles

Assessment

- Assess students understanding of the term density.
- Assess students ability to identify characteristics of salt and fresh water and how they can be differentiated.

Discussion/Reflection

Culminate the activity with a discussion of wetlands and estuarine areas. Deep ocean water is always colder than the water in a shallow estuary. Water entering both the estuary and wetlands as run-off from streams and rivers is usually colder than the water already in the estuary and wetland areas, which has been warmed by the sun.

How do differences in water temperature influence the plants and animals that live there? Plant growth is faster in warm temperatures, and this is one reason that wet- lands and estuaries are so productive.

Dissemination

Students may draw or write about the experiments on paper or in a science log as a follow-up.

References

- Mangrove Action Project, Coastal Education Guide (2022)

Activity - Salty Currents

Procedure

1. Ask two students to half-fill both aquariums with cold fresh water. Also fill the two small bottles with fresh water. Cap and label one of the bottles “fresh water”. To the other one, have a student add enough salt to make a very salty mix (approximately two teaspoons). Cap the second bottle and have a student shake it up until the salt is completely dissolved. Label the bottle “salt water”.

2. Lead the class in a discussion to predict what will happen when the two bottles are placed at the bottom of the aquarium or basin and uncapped to let the water escape. Record students’ predictions on easel paper or a chalkboard and encourage them to give reasons for their predictions.

3. Ask students to suggest how we might observe what the water in each bottle will do when it comes into contact with the water in the aquarium or basin, if the waters all look the same. Teacher direction may be required to lead the students to think of adding food coloring to the water in the bottles as a solution to the problem.

4. Add food coloring to both small bottles of water. Have a student shake up each of the bottles to make sure the food coloring is completely dissolved.

5. (Note: If you do the saltwater demonstration first, the results are more surprising to the students, and usually give a clue to whether their predictions are correct for the second demonstration.) Have a student lay one bottle on its side on the bottom of one of the aquariums and then uncap it. Observe what happens as the bottled water leaks into the basin. Discuss the reasons for what happened. Compare the predictions to the actual event.

Procedure Continued

Leave the basin undisturbed to see what will happen to the water over time. Follow the same procedure with the second bottle of water.

6 (alternative). If you have only one aquarium or container, follow the same procedure, but use two different colors to distinguish the saltwater mix from the fresh water.