



Outcomes:

- Define ocean currents
- Describe the general pattern of wind-driven and thermohaline currents
- Describe the effects of currents

Materials and Equipment:

Tap water	Salt	Blow Dryer	Fish Tank or similar
Food Colouring	Heat lamp	Soup Plates	2 PET drink bottles
Tubing	Silicon Sealant	Large ice block, dyed blue	
Stop watch or clock	Cardboard or plastic square appx 6 cm x 6 cm	Rock	

Activities:

A. Density Current

- Use a soup plate with a wide, flat rim
- Fill with water until the rim is covered. The plate simulates deeper waters and the rim, the continental shelf.
- Drop a few drops of food colouring into the water at the edge of the plate.
- Mix food colouring with a pre-prepared saline solution and drip it on another area at the edge of the plate.
- Note the time and observe what happens.

Draw a diagram to show your results. Note the time taken from beginning to end of changes. Did the water temperature change to account for your observations?

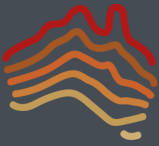
B. Wind Driven Current

- Set up the soup bowl full of water again.
- Drop a few drops of food colouring into the water at the edge of the plate.
- Turn on a blow dryer on the lowest/no heat setting and blow this across the surface of the water.
- Observe what happens.

Draw a diagram to show your results. Explain what you observed.

C. Convection Current

- Completely fill one PET bottle with cold water, dyed blue.
- Completely fill the other bottle with hot water, dyed red. Do NOT use boiling water. Water that feels very warm is adequate.
- Place a square of cardboard or plastic on top of the cold water bottle and invert it onto the warm water bottle.
- Carefully line up the bottle mouths and then, while steadying the whole structure, pull out the cardboard from in between. You may want to do this in a sink.
- Observe what happens.
- Option – repeat with bottles the other way around.



Draw a diagram to show your results. Explain what you observed.

D. Thermohaline Current

- Fill a fish tank with tap water
- Place a large ice block (dyed blue) in one corner of the tank. With a rock on top of the block to hold it to the bottom.
- Place a heat lamp above the opposite side of the tank and turn it on.
- Mix a solution of 200 mL water, salt and red dye.
- Add the salt solution to the side of the tank with the ice
- Observe what happens.

Draw a diagram to show your results. Explain what you observed.

Discussion

1. Explain how different factors affect the movement of water. Relate this to ocean currents.
2. Describe the interrelationship between the four experiments and explain how they model ocean currents.
3. Identify one other factor that you think might affect ocean currents and explain why this is important.

Extension Activities – What causes the currents?

Additional Materials and Equipment:

Baking dish

Sand

Drinking straws

6 beakers or glasses

Which Force?

- In a baking dish place enough sand to construct a beach at one end
- Fill the baking dish with water to a depth of about 5 cm
- Place a fan or hair dryer on one side of the container so that the fan can blow onto the surface of the water. It should be aimed down the tank along the surface of the water at about a 45-degree angle.
- Allow 2 minutes for observations
- Now change something about your set-up and observe its impact



Which Variable?

- Fill a clear baking dish with warm/hot water coloured red, to represent the warm water near the equator
- Place 1 to 2 blue ice cubes at each end of the baking dish, representing the cold water near the poles
- Blow through straws, on to the surface of the water, to simulate wind currents
- Make observations
- Repeat this experiment but change the direction or strength of the winds, observe

Which Factor?

Create 5 different concentrations of salt water

- Beaker 1 – 100 ml water + 5 g salt + red food colouring
- Beaker 2 – 100 ml water + 40 g salt + yellow food colouring
- Beaker 3 – 100 ml water + 80 g salt + green food colouring
- Beaker 4 – 100 ml water + 140 g salt + blue food colouring
- Beaker 5 – 100 ml water + 220 g salt + purple food colouring
- Beaker 6 should be tilted so you can add the solutions from above, starting with the purple and ending with the red
- Observe what happens
- Discuss with your peers

Discussion

1. What drives the numerous conveyor belts in the hydrosphere?
2. How do the variables interact to maintain the motion?
3. What are the dominate factors and forces?
4. What have you learnt during this exercise?
5. How could this experiment be improved?