Activity 3: Comparing the density of sea water, brackish water and fresh water

Fresh water has very low concentrations of dissolved solids/minerals (salts), usually less than 0.05%. Rivers, streams, lakes, ponds, groundwater and aquifers contain fresh water. Brackish water is saltier than fresh water and contains up to 3% of dissolved salts. (Brackish water is found where fresh water meets the sea, for example in estuaries, coastal lagoons and sea lochs) Sea water (saline water or brine) contains a high concentration of salt/minerals. The water in the seas and oceans varies in salinity but the content of dissolved salts is generally more than 3.5%. This activity demonstrates the physical properties of sea water, brackish water and fresh water.

Equipment:
Narrow, clear tank (e.g. fish tank)
Funnel
Tap water (to fill the tank by about a quarter)
2 Large beakers/jugs (Each containing about half the amount of water in the tank)
Table salt
Food colouring (2 colours)
Long handled spoon
Camera/camcorder (optional)

Preparation:
Make up a 10% and a 25% saline solution in the beakers/jugs as follows (quantities will depend on the size of the tank being used) as follows:

- 10% solution: use 1 part salt to 9 parts tap water, then colour with one of the food dyes
- 25% solution: use 1 part salt to 3 parts tap water, then colour with the other food dye

Method:
Optional – set up a camera or camcorder to film the results of this activity.

1. Fix the funnel so that its tip will be below the level of the water in the tank.
2. Use the funnel and add the 10% salt solution to the tank. Observe and record what happens and/or photograph the result.
3. Watch the surface of the dye. (It should show internal waves, but the surface of the water in the tank does not move)
4. Add the 25% salt solution in the same way. Observe and record what happens and/or photograph the result.
5. Simulate the effects of storms by carefully mixing the top layers with the long handled spoon. Observe what happens to the dense (25%) salty layer. Record what happens and/or photograph the result