

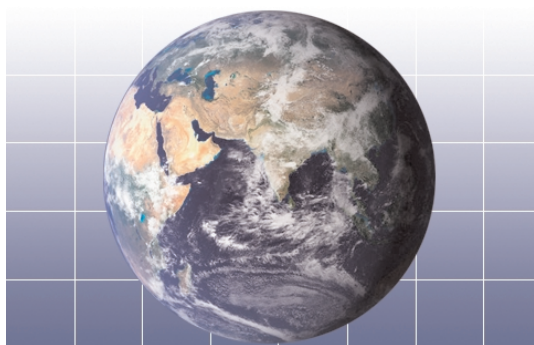
# 05. Fresh water and salt water

The Raphaëla Le Gouvello education pack - Windsurfing solo across the Indian Ocean

<http://www.respectocean.com>

26°C

## Earth, water, and climate



### Questions

- ▶ Does ocean salinity change over time? Explain why.
- ▶ Salinity is higher in some parts of the world than in others. Do you know why? What are some examples?

### Activity

Design and carry out a simple experiment to demonstrate the presence of salt in seawater. To help you, you can “manufacture” seawater by dissolving some salt in water (30 g of salt per liter – approximately one quart – of water). Don’t forget: heat accelerates evaporation!



### Did you know?

Each liter of seawater contains 27.2 g of sodium chloride (common table salt), 3.8 g of magnesium chloride, calcium, potassium, and traces of metals such as zinc, aluminum, copper, silver, and even gold! On average, the salinity (salt content) of ocean water is about 34 - 35 g per liter of water.

In the beginning, 4 billion years ago, the seas contained fresh water. But rainwater picked up **mineral salt particles** as it trickled across the land and deposited them in the nascent oceans, a process that continues today.



### Fresh water is precious

It needs to be cared for.

Did you know that the human body is made up mostly of water? 70% of water. If you weigh 30 kg. (about 66 lbs.), that means 21 kg. (roughly 46 lbs.) of water! By perspiring, urinating, and breathing, you expend 2 liters (roughly half a gallon) of water each day. That water is replaced through eating and drinking. Fresh water is useful in many other ways: to wash, grow food, make electricity, etc.

But fresh water is rare on our planet; most of the Earth's water (more than 99%) cannot be used because it is either salty or frozen. It makes up the oceans, glaciers or the polar ice caps.

Less than 1% remains as fresh water: in rivers, lakes and in underground aquifers. Some countries are rich in water, like Brazil and Canada. Others, however, are poor in water, like desert countries.

In France, there is enough water for human needs. The French consume 137 liters (about 36 gallons) of fresh water a day. In the U.S., the figure is 300 liters (roughly 79 gallons) per day! But on Earth, one person out of five has less than 20 liters/day (just over 5 gallons) to lead a normal life. In 20 years, there will be 2 billion more people on this planet, and they will all need pure, fresh water. That is why fresh water is precious, and why it must be safeguarded from pollution and waste.

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## Activity

- ▶ Calculate how much water you use per day and per week (don't forget the water you drink!). You may also calculate the amount used by your entire family.
- ▶ Look for ways to consume water more responsibly.
- ▶ Our need for water increases at certain times. Try to come up with a few examples.

## How much water do we use?

Here are a few examples of daily water use:

- Flushing the toilet: approximately 10 liters.
- Taking a shower: 20 liters per minute; a bath: 150 liters.
- Brushing teeth while leaving water running: 7.5 liters of water.
- Running the dishwasher or the washing machine: 50 liters.

## Desalinator

Raphaëla's windsurfing board is equipped with a desalinator that runs on electricity generated by solar panels. Nothing is simpler than a desalinator: a water intake and pump for gathering in sea-water; a filter to remove impurities; a membrane through which the water flows; transforming it into approximately 5% fresh water and 95% saltier water; a water outlet; and pipes linking all of these components together. This apparatus requires careful calibrations.

## Activity

In this experiment, you will transform salt water into fresh water.

### Materials needed

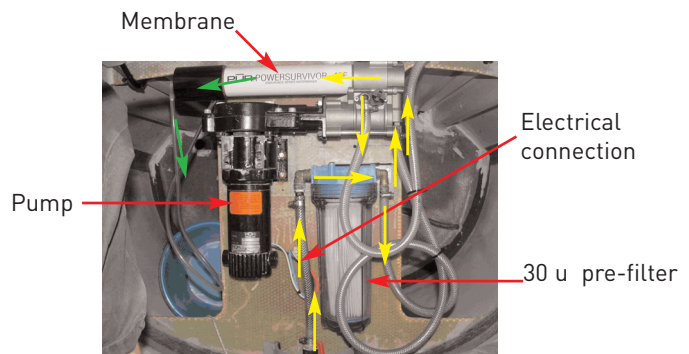
- a clear glass salad bowl
- a cup or glass that is shorter than the height of the bowl
- a pebble
- 1 liter of seawater (or 1 liter of water containing 30 g of salt)
- salt
- adhesive tape
- plastic wrap
- the sun

### Preparation

- Place the cup or glass in the center of the bowl, then fill the bowl with water (to approximately half the height of the glass).
- Cover the bowl tightly with plastic wrap, sealing it in place with the adhesive tape.
- Place a pebble in the center of the plastic wrap, just above the cup or glass (the wrap must not touch the glass).
- Place the bowl under a desk lamp (standing in for the sun) for at least 24 hours.

▶ What do you think is going to happen? Write down your hypotheses.

▶ Then write down your observations and try to explain what happened.



The desalinator Raphaëla has taken with her.



Water desalination plant at Fujaira (UAE – United Arab Emirates)

