4myplanet

UNSS
Union Nationale
du Sport Scolaire

The Water Cycle & Sport

illustrations by
MöPi

INTRODUCTION

In its National School Sport Development Plan, the UNSS aims to develop:

- **Accessibility**, school sports for all,
- **Innovation**, new types of sports to match expectations,
- **Responsibility**, towards a more ethical, united, and democratic generation
- and **Education**, sports as an educational tool for the success of all

In terms of accountability, the UNSS is involved in **the topic of eco-responsibility** and is committed to taking into account the **UN's 17 sustainable development goals**.

From an early age, all young graduates like you are invited to learn as much as possible about this topic and can elect eco-delegates who will work with their class **to develop an environmentally-friendly approach to sports.**

With this in mind, the UNSS chose skipper Alexia Barrier as its ambassador. This high-level athlete, committed since 2009 to preserving the world's oceans, is an example for young graduates to follow. She specifically made it possible for us to initiate this project about water.

> Video: about of Alexia and the non-profit 4myplanet

1. Water resources

A. Water, a precious commodity

Total water resources – in other words, the hydrosphere – represent 1400 million cubic meters and cover three-quarters of the Earth's surface (nicknamed "the Blue Planet"). You're probably thinking, "That's a lot!" Yes, however 97.17% of the Earth's water is salt water. Great for surfing, but drinking is another matter, unless you want to end up completely dehydrated! The 2.83% remaining is fresh water[1] . And even then… Only a small portion (that we estimate to be less than 1%) can be used by humans to drink, wash, and grow crops. The rest is either frozen or too deep in the ground and therefore unusable for human consumption.

So why not desalinate the seawater, like we do on boats?

Good idea…

But when you see the amount of energy it takes to work a manual desalinator[2] , you quickly understand that on a large scale, it would be far too costly.

This means that only fresh water that is found in natural or artificial reservoirs (lakes, dams, etc.) and in low-water bodies can be used at affordable costs.

Did you know that? The world's largest natural body of freshwater is Lake Baikal in Siberia with 23 trillion cubic meters of water! It is listed as a UNESCO World Heritage Site. Unfortunately, this exceptional site is threatened due to its popularity with tourists, since wastewater treatment infrastructure is non-existent...

1. Freshwater contains less than one gram per liter of dissolved solids (salts, metals, trace elements), while seawater contains nearly 35 g of dissolved salts and brackish water contains between 1 and 10g.

2. Desalinator = a system of pumps and membranes that removes seawater and filters it into fresh water, suitable for consumption.

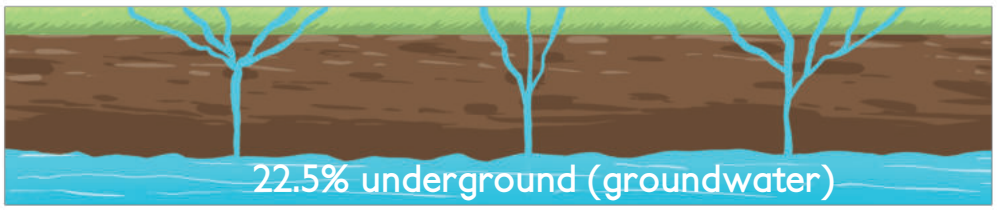
1. Water resources

B. Fresh water

Freshwater comes mainly from precipitation. But it can come in different forms depending on the altitude or latitude at which it is observed…
In other words, it depends on its temperature!!!

If you studied atmospheric conditions when learning to paraglide or have already wandered through the fog during an orienteering race, you surely know that air contains a certain amount of moisture (water). Sometimes your clothes even soak up humidity. Water floating in the air comes in the form of clouds, steam, mist…

When you windsurf, kitesurf, or fish, you "play" in water. But where did it come from? The world's oceans, lakes, and ponds fill up through precipitation, groundwater, and streams (creeks, rivers, etc.).

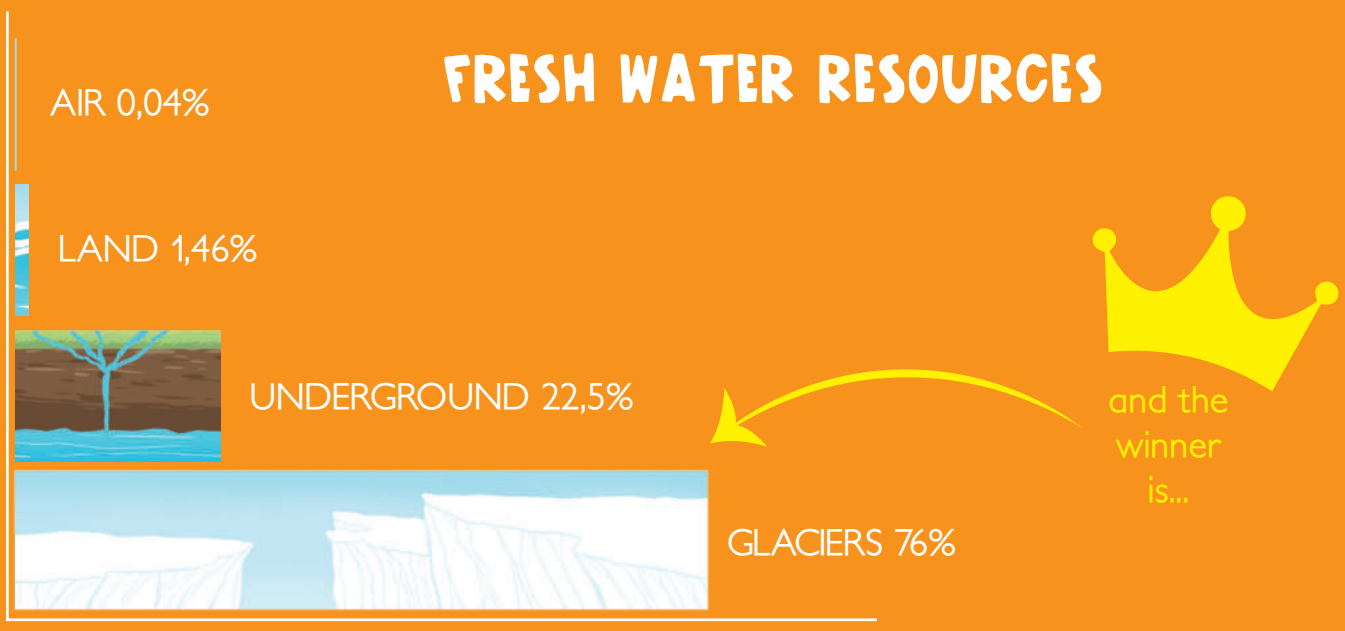


There's nothing like going canyoning to see how the water flows from the surface to the ground! What you don't see is the seepage of this water through the pores and cracks in the soil and—by gravity— it flows deep into the empty spaces until it forms an aquifer, which is water-saturated rock or unconsolidated soil. Aquifers can be several hundred meters deep (deep aquifers) but only the aquifers close enough to the surface are accessible to for human use (aquifers).

1. Water resources

The skippers in the Vendee Globe are familiar with the "Antarctic Exclusion Zone" (ZEA) set by race organizers to avoid icebergs. These mountains of fresh-water ice – or giant ice cubes if you like – calve off the front of a continental glacier. Continental glaciers, found at both poles (especially in Antarctica and Greenland), represent the largest freshwater reserve on the planet. These are the remains of the immense ice caps that covered much of our planet during ice ages.

Also, have you ever had the opportunity ski on a mountain glacier? Glaciers that form in the mountains come from the unmelted snowpack turning into ice. Yet another water supply.



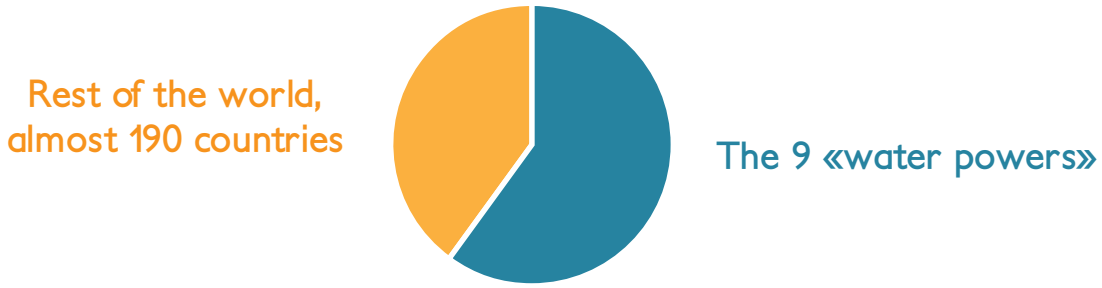
1. Water resources

c. Water resources unevenly distributed around the planet

As we previously explained, most of the planet's water is salt water. Fresh water accounts for only 2.8% of the total volume and only 0.7% is available for drinking water and human use. Although this volume of freshwater remains stable over time, it is unevenly distributed around the planet.

One-third of the world's population does not have access to safe drinking water. This represents 1.1 billion people in 80 countries. The countries most affected by the shortage of drinking water are Kuwait, Bahrain, the United Arab Emirates, Jordan, Libya, Cyprus, Singapore, Malta, and Israel.
In some countries with desert and arid zones, such as Ethiopia, Cambodia, Mauritania, and Afghanistan, less than 40% of the population has access to drinking water.

At the opposite extreme, 9 countries are described as "water powers" by the United Nations: Brazil, the Russian Federation, Indonesia, China, Canada, the United States, Colombia, Peru, and India. They alone have nearly 60% of the world's natural freshwater resources.



According to the WHO, **water stress** is defined as:

- if a human being has less than 1700 m^3 of water per year
- in case of shortage, with a population that has less than 1000 m^3 of water per year

1. Water resources

D. Human use of water

The first thing that comes to mind is probably drinking water… Yet it represents only a tiny amount compared to the water used for irrigation, industry, and domestic use.

Our water resources are mainly used in agriculture (to feed us). **70% of the resources are used for irrigation**. Producing a tomato requires 13 liters of water, 14 liters for lettuce, and 22 liters for broccoli… And that does not include corn: it takes **450 liters of water to grow 10 ears of corn**! Similarly, it is estimated that producing one kilogram of beef costs the world 15,000 liters of water… Our food choices have a real impact on water resources.

Then there is **industry, which consumes about 22% of our water resources**. For example, it takes 10 liters of water to make a sheet of A4 paper, 2,700 liters for a cotton T-shirt and between 7,000 and 10,000 liters to produce a pair of jeans! For a car, you need 35,000 liters of water.

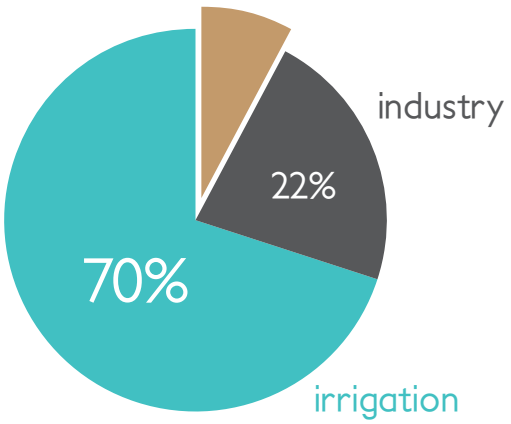
This is why we should all sew, repair, recycle, and use all these water-based materials as long as possible.

Did you know? It takes 1 cubic meter of water to produce 2 cubic meters of artificial snow, or 4,000 m3 of water for 1 hectare of snow at a depth of 60 cm. This translates to 28 million cubic meters of water used for snowmaking in France alone per year. In addition, production methods use bacteria that can pollute groundwater…

1. Water resources

Third is domestic use, with 8% of water resources used.
A bath uses 200 liters of water (the same for washing a car). One flush, 10 to 12 liters. One load of laundry, 120 liters. A load of dishes, 20 to 40 liters. The water needed to cook a meal is estimated at 5 to 8 liters per person. Last but not least, drinking water, which barely represents 1% of the domestic water use!

Water uses



Then why drink water?
The water we drink:

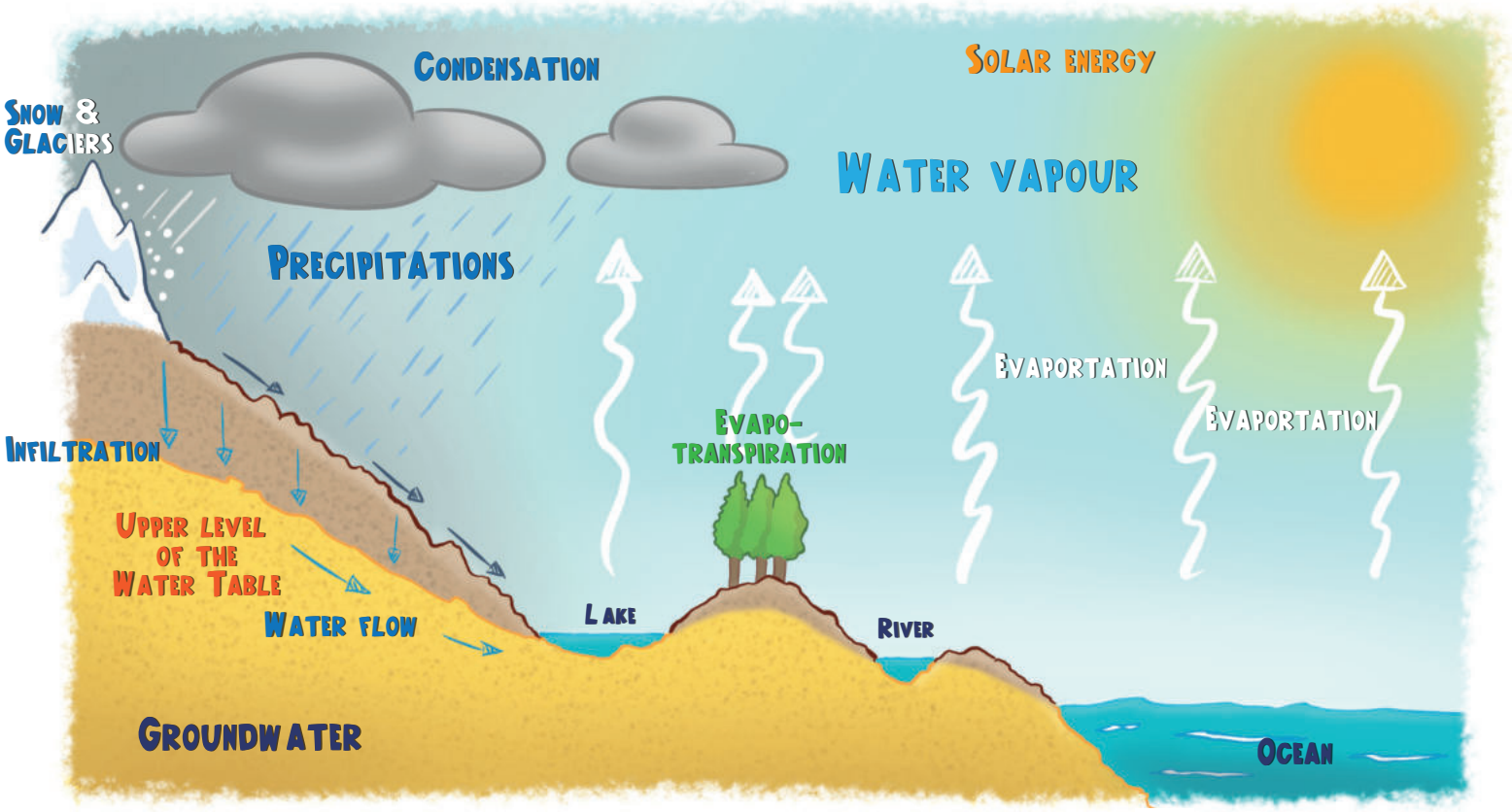
- moisturizes the skin, oxygenates the cells, and increases elasticity
- regulates body temperature
- helps fight infections
- boosts energy
- helps to lose weight
- improves concentration and memory
- facilitates digestion and intestinal transit
- regulates blood sugar levels
- lubricates articulations and eyes

What about when we play sports? Exercise makes the muscles work. However, work requires energy and we lose energy in the form of heat. Sweating is a natural mechanism that allows the body to regulate its temperature. On average, we lose 0.5 to 2.5 liters of water per hour. [However, it has been proven that dehydration - even minimal - has immediate consequences on the performance and health of an athlete (muscle tears, strains, contractures, etc.).] In practice, it is important to hydrate before (during the days preceding the activity), during exercise at regular intervals (100 to 200 ml of water every 15 to 20 minutes) and of course after physical activity.

cf. article How important is hydratation to sports performance?

2. The Water Cycle

Fresh water is constantly renewed by the water cycle. It passes from the sea to the atmosphere, then from the land to the sea, following a cycle that is repeated indefinitely over several stages:



A. Evaporation / Evapotranspiration

Through solar energy, water in the seas and oceans evaporates into the atmosphere, getting rid of its salt and impurities.

Evaporation can also come from the earth, this is evapotranspiration. It is a phenomenon transforms the water in rivers, lakes, soils, animals, humans, and vegetation in water vapor. As your wet clothes dry in the sun after a workout, the water turns into vapor.

All this water vapor then accumulates in the clouds. This is called the…

2. The Water Cycle

b. Condensation

In contact with the atmosphere, the steam cools and turns into droplets that form clouds, mist or fog. And that can completely ruin your outing... Besides, how do you react when you see the clouds forming?
On her boat, when Alexia sees white, medium-sized clouds, she is enthusiastic since they are often mean wind that will make the boat move forward… However, if the clouds are big and dark, she does the best she can to avoid them because they mean that a thunderstorm is coming or …

c. Precipitations

Through wind, the clouds move about in the atmosphere. When the weather changes and through gravity, clouds become heavier and fall to the ground in the form of rainwater, hail ,or snow.
79% of precipitation falls on the oceans, the remaining 21% falls on land and then adds to the groundwater, either by infiltration or by runoff. When it starts to rain while playing rugby we all end up muddy!
Yet the next day (unless it rains all night again) the ground is dry again.
This is partly because of the…

d. Infiltration

Some rainwater enters the ground and replenishes the groundwater.
Note: Some soils are less permeable than others… That is, water seeps less well into them. You can imagine that for high-level football, rugby or golf competition matches, you need an impeccable field (not muddy from the day before).
To avoid excess water, artificial drainage methods are used.

2. The Water Cycle

How does a water table work?

The water seeping into the soil passes through the topsoil in a matter of hours.
Then it will continue its descent through the spaces left free in the porous and permeable rock.
There is both air and water in these voids, we are talking about **unsaturated areas**.
When the water meets an impermeable layer, it cannot continue down. It will then accumulate and form a formidable underground reservoir called an **aquifer**. In fact, it is a bit like a giant sponge lodged underground and which is saturated with water.
This is the source of water for human consumption. So we keep a close eye on them.
Every month, the "Bureau des Recherches Géologiques et Minières" – BRGM (Office of Geological and Mining Research) - publishes a **hydrological status bulletin showing an overview of the state and level of the aquifers in France**.

e. Runoff and Return to sea

Some rainwater does not manage to seep into the soil and so flows down slope and flow into a lake, a stream, or a river (and then continues its course until it reaches a sea or an ocean).
On this type of surface water you can have fun canoeing or kayaking.
The rest of the precipitation, almost half of the total volume, evaporates and returns to the atmosphere.
And so on (this is the water cycle).

Whether it flows or seeps in, water carries everything in its path. Pesticides, heavy metals, drugs, bacteria, hydrocarbons, waste… are all likely to pollute rivers and groundwater.
So we have to be very careful before we get rid of something and not throw it on the ground, in the toilet or in the wild without thinking.
Besides, when leaving a stadium, the beach, or a playground, why not take a few minutes with your team to pick up any litter or garbage?

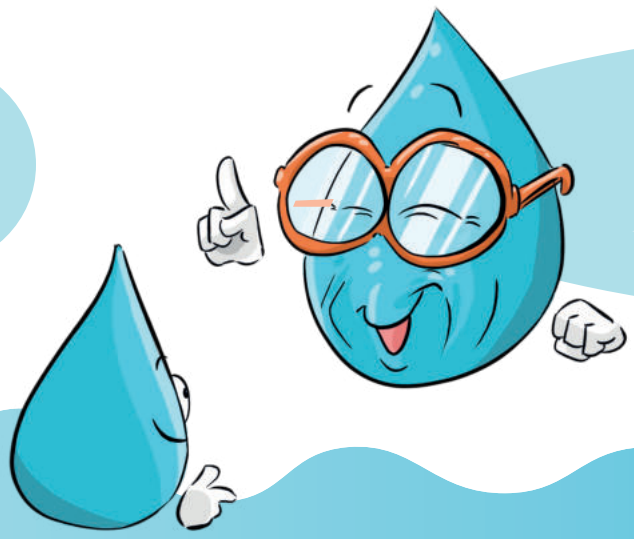
2. The Water Cycle

f. Stagnation

During its cycle, water passes through different natural reservoirs, staying in place for more or less time before resuming its journey to the seas and oceans. This period of stagnation is referred to as the **residence time of water**. It varies according to the type of reservoir:

- Atmosphere : 8 days
- Rivers : a few days
- Lakes : 17 years
- Groundwaters : from a few days to several thousand years
- Oceans : 2 500 years
- Glaciers : several thousand years

Depending on the activity you are involved in, you will be surrounded by a water reserve that is more or less "old". For example, in paragliding, you touch very young water droplets while Alexia's boat floats on very old liquid surfaces and if we talk about skiers, they will glide on water (solid) thousands of years old. Amazing, isn't it?



3. What about drinking water?

A. From a natural tank to your tap

When you walk, run or cycle, you pass over a gigantic network of pipes (several tens of kilometers long) that brings water from a natural reservoir to your tap.

The water is first withdrawn by a system of pumps and/or drilling in a natural reservoir (spring, water table, dam, etc.).

It is then sent to a water treatment plant where it is filtered several times and goes through several antibacterial treatments (including chlorine, which sometimes gives tap water a weird taste). Then it is sent to your town's water tower or tank to be stored before being distributed through pipes to everyone's home or business.

When you think about how far a drop of water has to travel, the mere act of turning on your faucet seems much less commonplace, doesn't it?

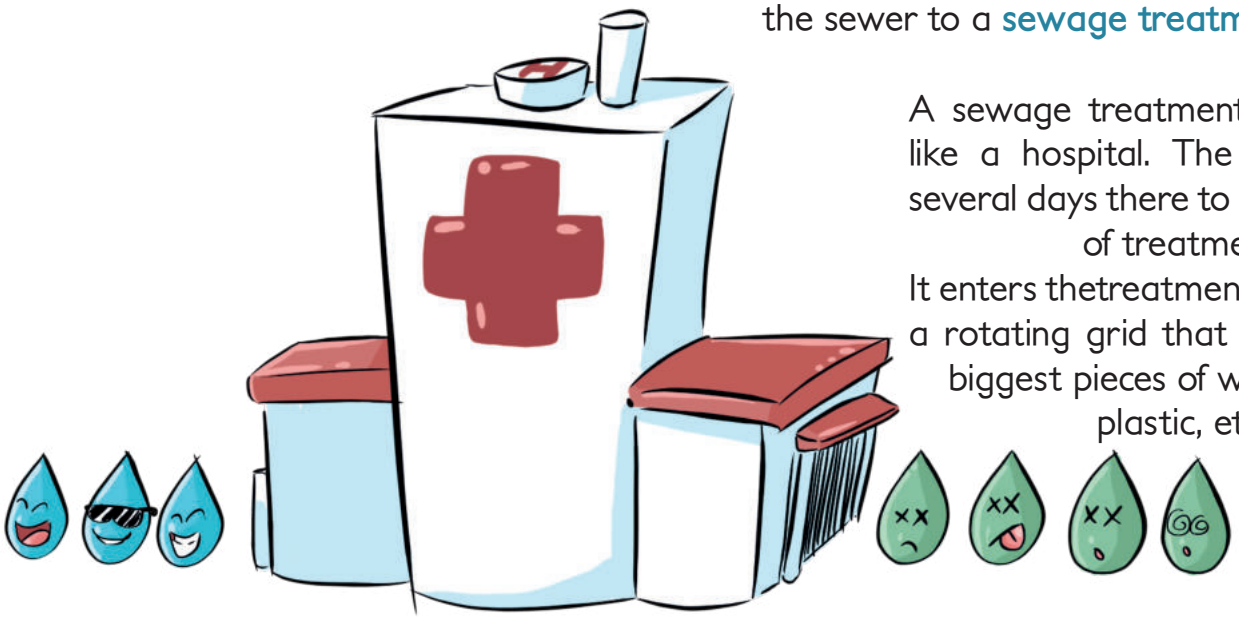
You now understand why it is so important to turn off any faucets before leaving for work or school for the day.

What's the next?

3. What about drinking water?

B. The sewage system

Wastewater or sewage leaves your home through pipes, travailing several kilometers through the sewer to a **sewage treatment plant.**



A sewage treatment plant is a bit like a hospital. The water spends several days there to receive a series of treatments.
It enters thetreatment plant through a rotating grid that gets rid of the biggest pieces of waste (paper, plastic, etc.).

Then the water will stay for several hours in a tank to remove any suspended matter like sand, oil, and grease. The water molecules undergo shock treatment in aeration tanks where millions of bacteria absorb all the organic matter (carbon, nitrogen, phosphorus).
After passing through the last tank (the final clarifier), the water is tested in the treatment facility's laboratory before being released into a river or stream on its way to the ocean.
The cycle can then start again.

Worldwide, 80% of wastewater is discharged into the environment without treatment. Yet it could be useful in:

- energy production,
- agricultural irrigation,
- cleaning the streets,
- watering green spaces,
- firefighting,
- for industrial purposes

We hope that you enjoyed this Sustainable Development presentation. Join us in the field with your sports club water bottle, convenient for drinking and eliminating plastic waste.

3. Because these bacteria need oxygen to live, air is injected into the pool.