

3 The hydrosphere: water on Earth

1 The hydrosphere

• Listen and read about the hydrosphere.

1.1 Sea water

The hydrosphere is the mass of water on the planet. It consists of sea and surface water.

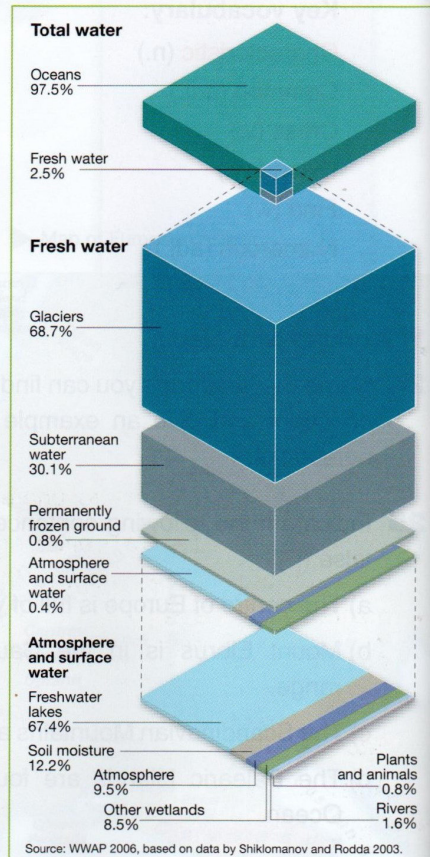
Sea water represents more than 97% of the total amount of water on Earth. It is made up of **oceans** and **seas**.

- **Oceans** are large masses of salt water. There are five oceans, from the largest to the smallest, they are: the Pacific, the Atlantic, the Indian, the Arctic and the Antarctic.
- **Seas** are areas of the ocean closest to the coast.

1.2 Surface waters

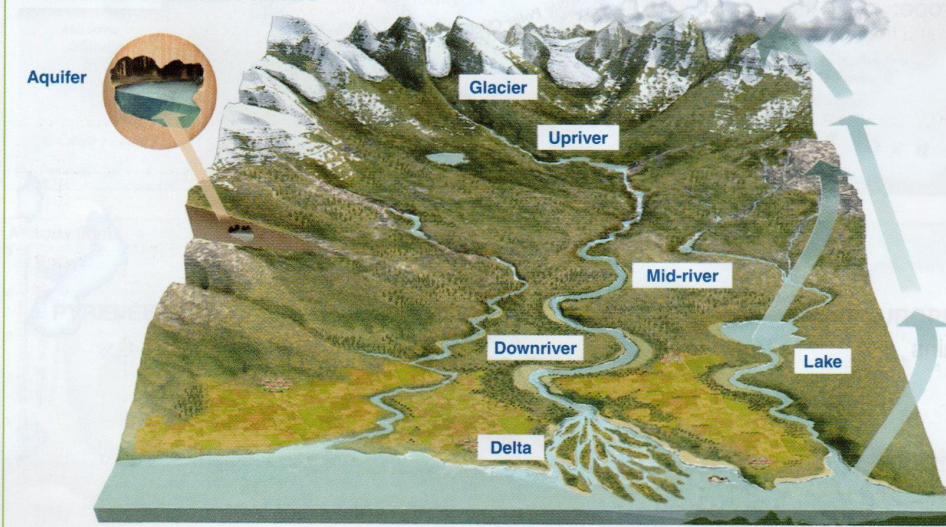
Surface waters are often fresh water and are found in rivers, glaciers, lakes and aquifers.

- **Rivers** are currents of fresh water that flow along the **river** course. **Upriver** (upper course), the rivers wear away, or erode, the land. At mid-river (middle course) they transport the eroded material and **downriver** (lower course) they deposit these materials.
- **Glaciers** are masses of ice that have accumulated at the poles or in high mountains.
- **Lakes** are masses of water that have accumulated in sunken, or depressed areas of the Earth's surface.
- **Aquifers** are accumulations of subterranean water below the surface of the Earth.



▶ World distribution of water.

Illustration of surface waters



▶ The amount of water on Earth remains constant thanks to the water cycle, however it is not equally distributed. The overexploitation and pollution of fresh waters could also cause more problems in the future.

Using your knowledge

Use the vocabulary

- 1 Learn and make a sentence with each of the following words.

Key vocabulary:

- Ocean (n.)
- Sea (n.)
- River (n.)
- Glacier (n.)
- Lake (n.)
- Aquifer (n.)
- Upriver (adv.)
- Downriver (adv.)

Giving information

- 2 Define the concept of hydrosphere.
- 3 Below is a list of the five oceans, order them from the biggest to the smallest and write the answers in your notebooks.

Atlantic
Indian
Pacific
Antarctic
Arctic

- 4 Give the terms that correspond to the following definitions.

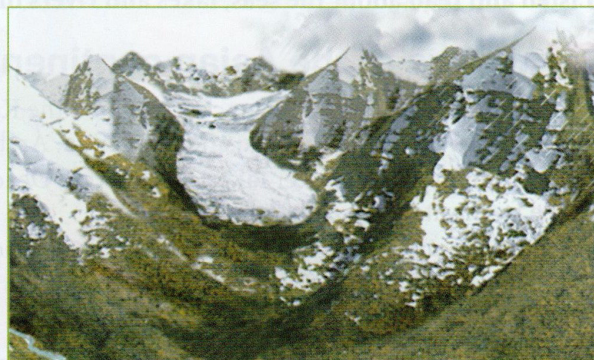
- a) Flow of water in continuous movement.
- b) Accumulation of water below the Earth's surface.
- c) Mass of accumulated ice.
- d) Mass of water found in sunken areas of the Earth's surface.
- e) Parts of an ocean.

Making connections

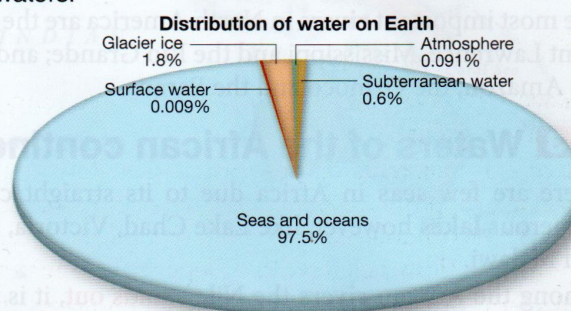
- 5 In your notebooks match the movement of a river's course with its action on the land.

Upriver	Transportation
Mid-river	Sedimentation
Downriver	Erosion

- 6 Point to, and name, the geographical feature you can see in the picture.

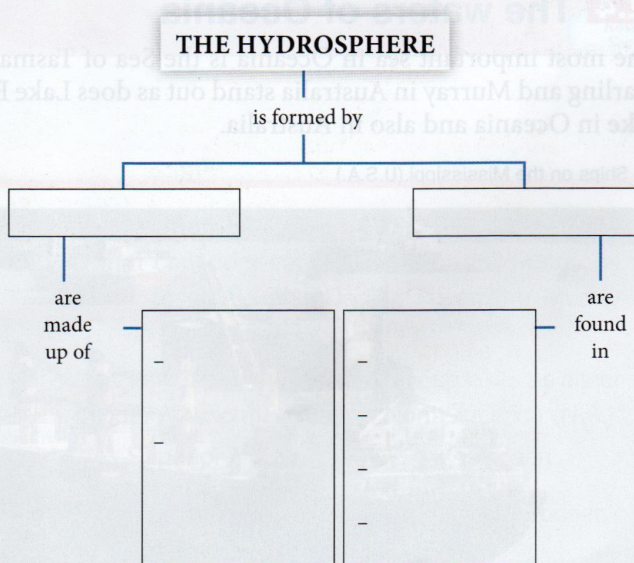


- 7 In the following pie chart indicate what percentage corresponds to seawater and which to surface waters.



Organising information

- 8 Copy and complete this flow chart:



2 Seas, lakes and rivers of the continents

• Listen and read about the seas, lakes and rivers of the continents.

2.1 Waters of the Asian continent

The main **seas** that **line** the Asian continent are the Kara and the Bering Sea; the Sea of Japan and Ojotsk; and the China, Arabian and Red Sea. The most important saltwater **lakes** are the Aral, Dead and Caspian Sea; and the freshwater lake called the Baikal Sea.

The most important **rivers** are the Yangtse (the longest on the continent), and the rivers Obi, or Ob, Yenisey, Lena, Amur, Huang He, Ganges and the Indus.

2.2 Waters of the American continent

In America the main **seas** are the Caribbean and the Labrador.

The main **lakes** in North America are the Great Lakes; and in South America, Lake Titicaca and Lake Maracaibo.

The most important **rivers** in North America are the Yukon, Mackenzie, Saint Lawrence, Mississippi and the Rio Grande; and in South America, the Amazon, the Orinoco and the Parana.

2.3 Waters of the African continent

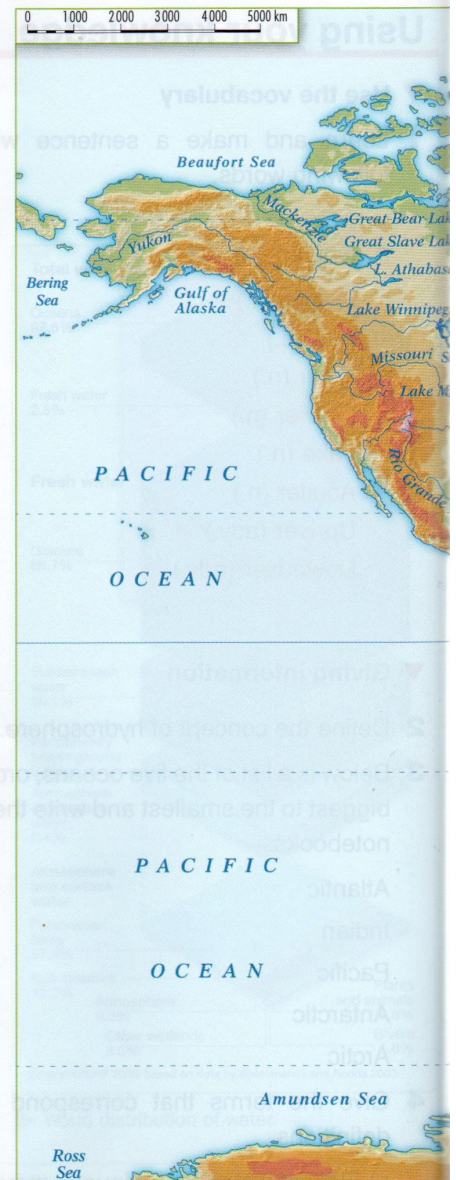
There are **few seas** in Africa due to its straight coastline. There are numerous **lakes** however, like Lake Chad, Victoria, Albert, Tanganyika and Malawi.

Among the African **rivers** the Nile **stands out**, it is the longest river in the world (6,670 km) and it flows into the Mediterranean Sea. Other important rivers are the Niger, Congo and Orange that **end** in the Atlantic Ocean; and the Zambezi which flows into the Indian Ocean. Desert rivers only **flow** when it rains.

2.4 The waters of Oceania

The most important sea in Oceania is the Sea of Tasmania. The **rivers** Darling and Murray in Australia stand out as does Lake Eyre, the largest **lake** in Oceania and also in Australia.

▶ Ships on the Mississippi (U.S.A.)



▶ World map of surface waters.

Using your knowledge

▼ Use the vocabulary

9 Learn and make a sentence with each of the following words.

Key vocabulary:

Line (v.)	Few (adj.)
Stand out (v.)	End (v.)
Straight (adj.)	Flow (v.)

▼ Identifying and commenting

10 Of the following Asian lakes,



indicate which are saltwater lakes: Aral, Dead, Caspian and Baikal.

11 Copy the table. From the map, classify the following rivers, seas and oceans of Asia:

Obi, Lena, Bering, Yangtse, Japan, Caspian, Baikal, Huang He, Dead, Kara, Red and Aral.

RIVERS	SEAS	OCEANS

▼ **Giving information**

12 In what continent can you find the following: the Sea of Tasmania, the Darling River, the Murray River and Lake Eyre?

13 With the help of a map, classify these lakes as either in South America (S.A.) or in North America (N.A.):
Superior Maracaibo Erie Titicaca

14 Nearly all the rivers in America flow into what ocean?

15 What is the longest river in the world?

3 Seas, lakes and rivers in Europe

• Listen and read about seas, lakes and rivers in Europe.

3.1 Waters of the European continent

In Europe, the **main seas** that line the continent are the Barents, Baltic, North, Cantabrian, Mediterranean, Tyrrhenian, Adriatic, Ionian, Aegean and Black Sea.

There are many **lakes** in the north and **centre** of the continent. The most important are Onega, Ladoga, Peipus, Geneva and Constance. European **rivers** are very numerous, they flow into the Arctic and Atlantic Ocean, and into the Mediterranean, Black and Caspian Sea; they are all **navigable**.

- The **Atlantic rivers** (Loire, Seine, Rhine, Elbe, Oder and Vistula) are long, **plentiful** and with constantly flowing water.
- The **Mediterranean rivers** (Rhône and Po) are **short** and **carry** little water.
- The rivers that flow into the **Black Sea** (Danube, Dniester, Dnieper and the Don) and the Caspian Sea (Volga and Ural) are long, plentiful and have quite a regular flow of water.

Using your knowledge

▼ Use the vocabulary

16 Learn and make a sentence with the following vocabulary.

Key vocabulary:

- Main (adj.)
- Centre (n.)
- Navigable (adj.)
- Plentiful (adj.)
- Short (adj.)
- Carry (v.)

▼ Classify

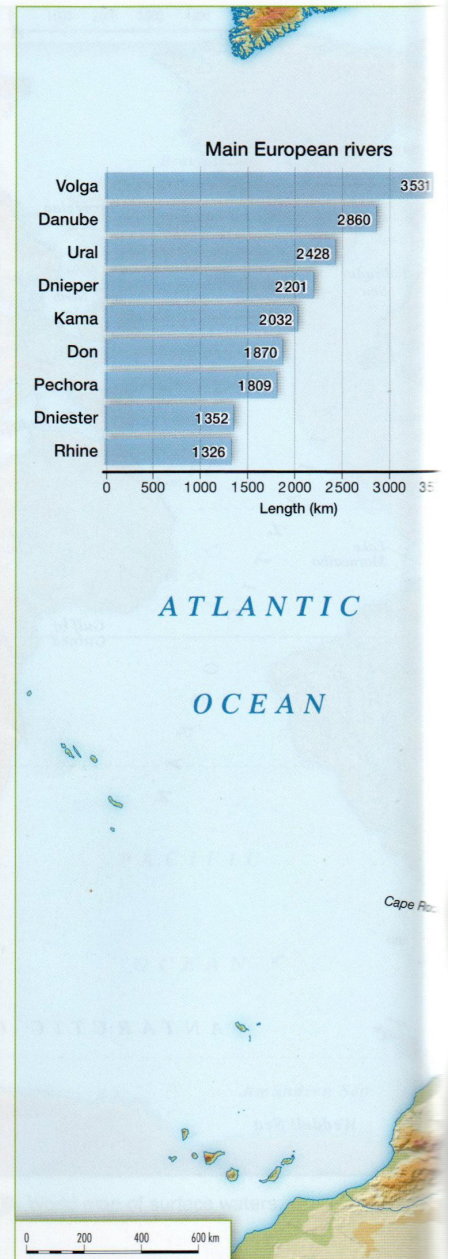
17 With the help of the text and the map, locate and classify these seas, lakes and rivers from the European continent:

Cantabrian Tyrrhenian Volga Onega Ladoga
 Danube North Adriatic Rhône Rhine

RIVERS	SEAS	LAKES

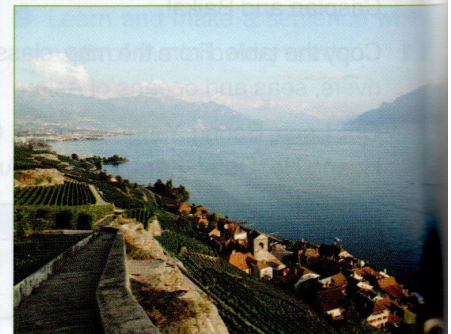
18 With the help of the text and the map, say what sea each of the following rivers flow into:

Rhine, Danube, Rhône and Volga.



► Above, map of the waters of Europe.

► Below, Lake Geneva, Switzerland.





Using your knowledge

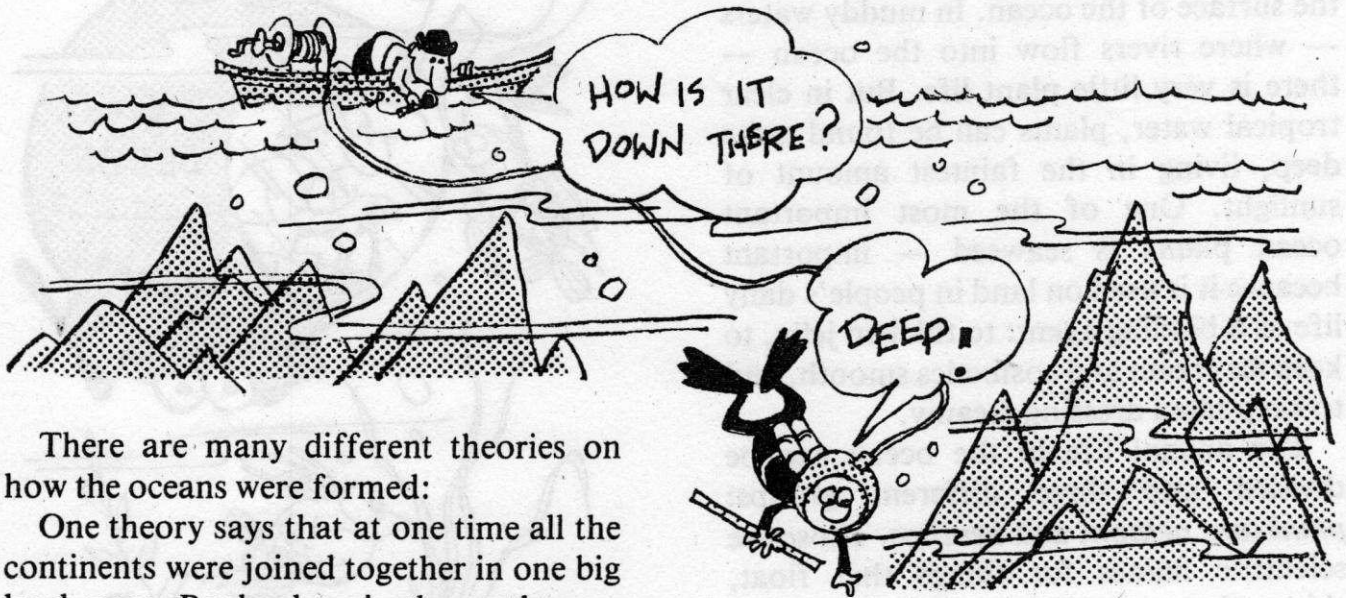
▼ Working with maps

19 Locate these European seas, lakes and rivers on the map.

North Sea	Loire River	Cantabrian Sea	Tyrrhenian Sea	Dniester River
Baltic Sea	Seine River	Lake Constance	Adriatic Sea	Dnieper River
Lake Onega	Rhine River	Lake Geneva	Ionian Sea	Don River
Lake Ladoga	Elbe River	Mediterranean Sea	Aegean Sea	Volga River
Lake Peipus	Oder River	Rhône River	Black Sea	Ural River
Pechora River	Vistula River	Po River	Danube River	N. Dvina River

Water, Water — Almost Everywhere

Imagine that you had a way to remove the water from all the oceans in the world. What do you think you would see?



There are many different theories on how the oceans were formed:

One theory says that at one time all the continents were joined together in one big land mass. Rocks deep in the earth were either mixed with a liquid or were part liquid, and this water eventually came to the surface, forming the oceans. The higher land shifted and broke apart, thus becoming the continents.

Another theory claims that the oceans' waters came from a thick layer of clouds that originally covered the earth. However, there is evidence that the oceans have been around for over 500 million years.

In order of size, the oceans are the Pacific, Atlantic, and Indian oceans. One other ocean, the Arctic Ocean, is considered by many scientists to be a sea of the Atlantic. Funny, though, should you see it, it would look more like land — and icy land at that — because of its location around the North Pole.

The deepest area of all the oceans is in the Pacific — off the island of Guam. It is

called the Challenger Deep, and it cuts a deep gash in the ocean floor 36,198 feet deep. The deepest area in the Atlantic — 28,374 feet — is off Puerto Rico. It is called the Puerto Rico Trench. The deepest point in the Indian Ocean — 25,344 feet — is the Java Trench, near the island of Java.

But what lies at the bottom of all these oceans?

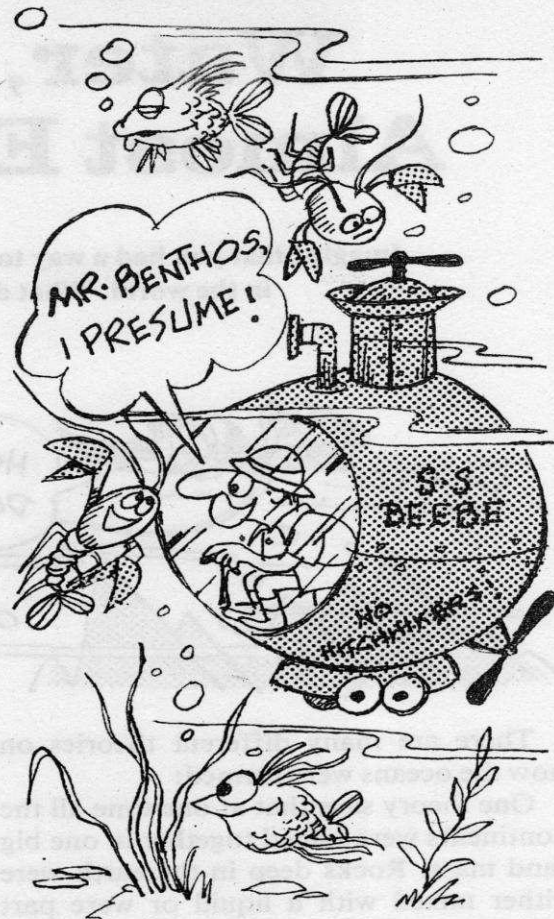
Years ago, people thought the ocean bottom was smooth, but now scientists know it is far from that! Whole mountain ranges lie under the oceans, with their tips forming islands on the surface. The islands of St. Helena and Ascension, in the South Atlantic Ocean, are examples of land sitting atop huge mountain ranges that begin on the ocean floor. So are the Hawaiian Islands in the Pacific, but in their case, the tips are volcanoes.

The first person to explore the ocean's deeper wonders was William Beebe, a naturalist — a person who studies animals and plants both on land as well as under the sea. Beebe descended to a depth of 3,208 feet in a *bathysphere*, a round-shaped pressurized unit, just to see what the ocean was like. It was a daring deed and a daring record for 1934.

Both plant and animal life exist in the oceans. Plants need some sunlight to grow and stay alive, so they are found only on the surface of the ocean. In muddy waters — where rivers flow into the ocean — there is very little plant life. But in clear tropical water, plants can be found quite deep, living in the faintest amount of sunlight. One of the most important ocean plants is seaweed — important because it is used on land in people's daily life as a binding agent: to thicken jelly, to keep ice cream and cosmetics smooth, and to keep salad dressing creamy.

The animal life in the ocean can be divided into three different groups: *plankton*, *nekton*, and *benthos*. Those are scientific names for things that float, things that swim freely, and things that live on the ocean bottom. The most important plankton are diatoms — tiny one-celled creatures that attach themselves to other diatoms, and are the food supply for fish. The nekton are the many fish in the ocean — 20,000 different kinds of them! Each kind lives at a different level and uses its bladder, filled with a kind of gas, to float at that level. Without that gas, the fish would sink to the bottom. The benthos are the lobsters, crabs, and clams that live in shallower areas and the sponges and starfish that may appear in slightly deeper water.

The different levels of land in the ocean can be divided three ways too. First is the *continental shelf*. It means just what it sounds like it should — a shelf or plateau attached to a continent and extending from sea level down to 600 feet. Beyond the continental shelf, the land slopes



downward — from a depth of 600 feet to measurable depths of many thousands of feet. This is called the *continental slope*. Its deep canyons and gorges crisscross through the continental shelf and the continental slope. The third, and deepest, level is the *abyss* — a vast chasm that at one time could not be measured. Even though no one has descended anywhere near its full depth, special electronic equipment can now measure these depths accurately. Other equipment can collect seawater, mud, and sand from these depths for scientists to study.

Water, water — almost everywhere. That's not far from the truth, for 70% of the earth is ocean. That's a lot of water, a lot of shelves, a lot of slopes, a lot of abysses, and a lot of hidden mountain ranges!

READING QUESTIONS

- What are the three biggest oceans in order of size?
- What can we find at the ocean bottom?
- What is seaweed used for?
- How can we measure the depths of the abyss?

VOCABULARY

UNIT 3

- Oceanic waters
- Continental waters
- Water cycle
- Wave
- Tides (high and low)
- Ocean currents
- Salinity
- River
- Freshwater / Seawater
- Glacier
- Lake
- Aquifer
- Climate change