CHAPTER 2

Oceans and Continents

The ocean is everything. It covers seven-tenths of the terrestrial globe. Its breath is pure and healthy. It is an immense desert, where man is never lonely, for he feels life stirring all around. ... The ocean is the vast reservoir of Nature. The globe began with the ocean, so to speak, and who knows if it will not end with it. ...

— Jules Verne (1870)

Fig. 2.1 The Earth seen from space (photograph by the Lunar Reconnaissance Orbiter). The view is centred on the Pacific Ocean, with Africa to the left, India and part of Asia at the top, Australia to the right, and Antarctica at the bottom.

The Big Questions

1. *What are oceans and continents? What are their names and their distribution?*
2. *In what ways do oceans and continents impact life on Earth, including human life?*

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Let us return to our globe and rotate it gently. Or look at the picture of the Earth seen from the Moon. What is the most widespread colour you see? Blue, obviously, but what does it represent? You must have guessed the answer — it is 'water'. This means that most of the Earth's surface is actually covered with water — almost three-fourths of the surface, in fact. That is why, when seen from outer space, the Earth appears mostly blue. Indeed, early astronauts lovingly called the Earth the 'blue planet'.

The largest water bodies we see on the globe are called '**oceans**'.

But in the picture of the Earth (Fig. 2.1), you can see at least one other colour, brown. This colour is that of land, which covers a little over one-fourth of the globe. A large body of land is called a '**landmass**', and a large continuous expanse of land is called a '**continent**'.

Both oceans and continents play a vital role in shaping the climate of the Earth. They affect all aspects of life, including all plants and animals, and therefore, human life too. We see their impact throughout our history and culture, and in our daily lives.

DON'T MISS OUT

The emblem of the Indian Navy contains the motto *Sam noh Varunah* (pronounced '*Śham no Varuṇah*'), which means, "Be auspicious to us, O Varuna." This is an invocation to Varuṇa, a Vedic deity associated with the oceans, the sky, and water in general.

The Distribution of Water and Land on the Earth

As it happens, oceans and continents are not distributed equally between the Northern and Southern Hemispheres.

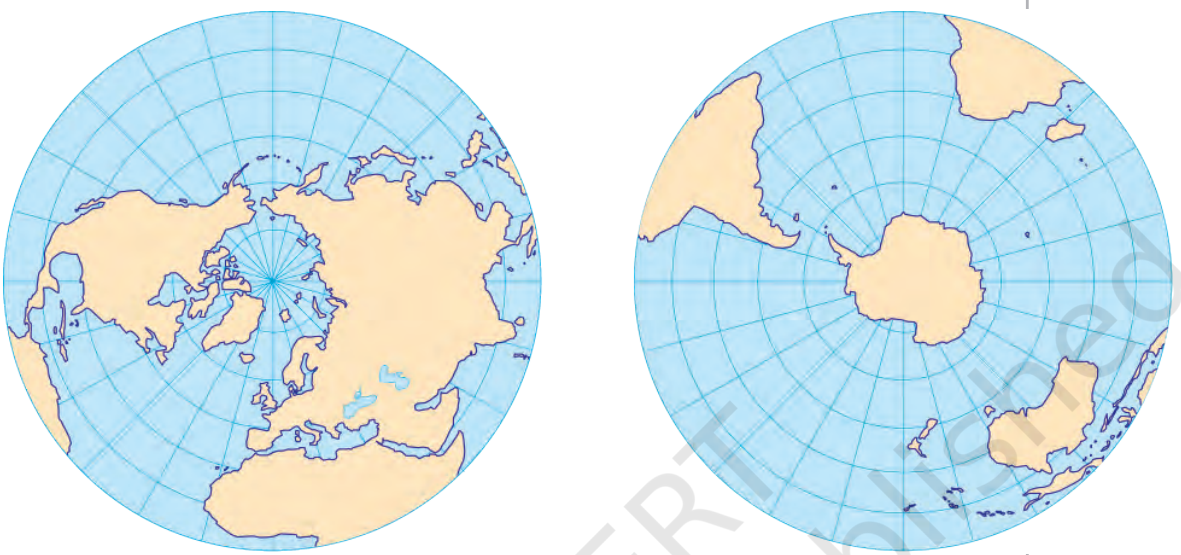


Fig. 2.2. Maps of the Earth as seen from above the North Pole (left) and above the South Pole (right).

Let us examine the two maps in Fig. 2.2. Here too, the blue areas consist of oceans, along with their smaller extensions, which have various names — 'sea', 'bay', 'gulf', etc.

Definitions for these terms are in the Glossary at the end of this textbook.

LET'S EXPLORE

- What are the circular lines in each map called? And do you know what the lines radiating out of the two poles are called? (*Hint: you studied them in the previous chapter, but here they are presented differently.*)
- Which hemisphere holds more water?
- What do you think could be the approximate proportion of water to land in the Northern Hemisphere? And in the Southern Hemisphere? Discuss in groups.
- Are all the oceans connected with one another, or are there separations between them?

Ocean Life

Coral reef

A star fish on a sea anemone

Shark

Sperm whale, mother and baby

Dolphins

Shallow coral reef with colourful tropical fish

Algae

Emperor penguins

Bonaire sea turtle

The oceans together hold most of the water available on the planet. But this seawater is salty and unfit for consumption by most land animals, including humans. On the other hand, freshwater makes up a very small proportion of the planet's water resources; it is found in glaciers, rivers, lakes, in the atmosphere and also underground (the last is called 'groundwater').

THINK ABOUT IT

- If there is such abundance of water on the planet, why is there so much talk of 'water scarcity' or a 'water crisis'?
- What ways of saving water are you aware of? Which ones have you seen practised at home, at your school, and in your village, town or city?

Oceans

On the world map in Fig. 2.3 on page 32, we can observe five oceans — the Pacific Ocean, the Atlantic Ocean, the Indian Ocean, the Arctic Ocean and the Southern (or Antarctic) Ocean.

Although we have listed five oceans, it is clear from the map that they are not really separate. The lines that divide them on the map are no more than conventions — the natural world does not follow such boundaries. Seawater, for example, constantly flows across different oceans, sustaining a rich diversity of **marine** life. Many plant and animal species can be found across multiple oceans.

The marine **flora** includes tiny plants called algae and all kinds of seaweeds; the marine **fauna** consists of thousands of species of colourful fish, dolphins, whales, and countless mysterious deep-sea creatures. Each part of the ocean, from the sun-lit surface to the dark depths, has its own diverse life forms.

Marine: Related to or found in the oceans and seas.

Flora: The plant life of a particular region or period of time.

Fauna: The animal life of a particular region or period of time.

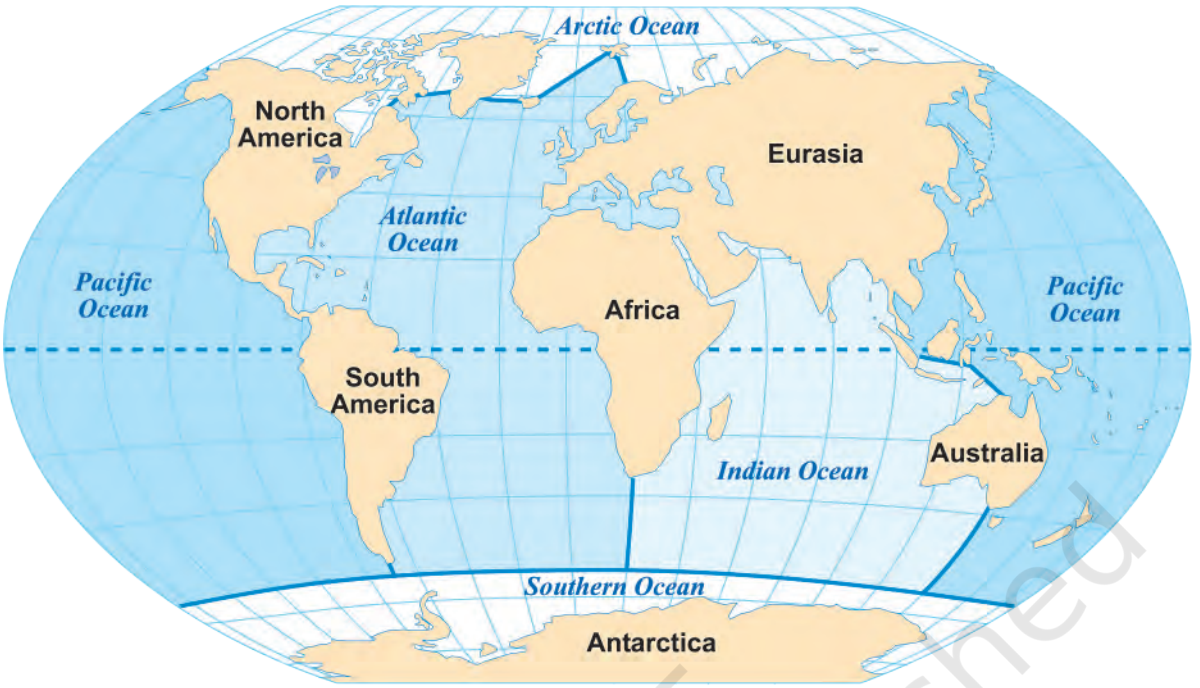


Fig. 2.3. A world map showing the five oceans, their conventional boundaries, and the continents

LET'S EXPLORE

Locate the five oceans and, in the table below, mark the hemisphere or hemispheres they belong to.

	Northern Hemisphere	Southern Hemisphere
Pacific Ocean		
Atlantic Ocean		
Indian Ocean		
Southern Ocean		
Arctic Ocean		

It is visible on the map that the Pacific Ocean is the largest of all, followed by the Atlantic Ocean. The Indian Ocean is the third largest, while the Southern Ocean is the fourth. The smallest one is the Arctic Ocean.

DON'T MISS OUT

- As the map of oceans makes clear, the main limits of the Indian Ocean are Asia to the north, Africa to the west and Australia to the east, apart from the Southern Ocean in the south.
- On either side of India, we find two parts of the Indian Ocean — the Arabian Sea to the west and the Bay of Bengal to the east.

Fig. 2.4 (on the right). This map of India is the same as Fig. 1.6, but with the addition of the Arabian Sea and the Bay of Bengal. Also marked are India's two major groups of islands (see subsection on 'Islands' further below).

Oceans and disasters

Returning to the picture of the Earth at the start of this chapter, you may have noticed white shapes across the globe. Did you guess what they are? They are large masses of clouds. Such clouds bring rain to the continents; for instance, the monsoon rains we in India expect every summer originate in the ocean — without such rains, our agriculture and all life will suffer. But oceans often also give rise to storms — violent events with extreme rainfall or very strong winds, such as cyclones, which can cause widespread damage to coastal regions of the world.

A tsunami is another natural disaster that originates in the ocean. It is a huge and powerful wave generally caused by a strong earthquake or a volcanic eruption at the bottom of the ocean. Tsunamis can travel thousands of kilometres and submerge coastal areas, causing widespread damage.

DON'T MISS OUT

- On 26 December 2004, India and another 13 countries around the Indian Ocean were struck by a powerful tsunami caused by an earthquake in Indonesia. More than two lakh people lost their lives. In India, the Andaman and Nicobar Islands (see Fig. 2.4 above, and also the subsection 'Islands' further below) and the coasts of Tamil Nadu and Kerala were severely affected and suffered much damage and loss of life.
- Such tsunamis are rare but very destructive. Luckily, they can often be detected before they hit a coast. Many countries collaborate in such 'early warning systems'. There is, in particular, an Indian Ocean Tsunami Warning System, to which many countries, including India, contribute. This helps to take measures to protect lives and property.
- Events that lead to loss of life and property are handled under **disaster management**. India has its own 'National Disaster Management Authority' to deal with all kinds of disasters (we will see more examples in the next chapter).

Continents

Continents are visible on the map of oceans (Fig. 2.3). How many can you count? The answer is not so simple, as they can be counted in several ways. Depending on our choice, we may list any number of continents between four and seven! Here is why:

- North America and South America are generally considered to be two continents; but if seen as a single landmass, they can also be considered as one.
- Europe and Asia are generally considered as two continents, although the map makes it clear that they form a single landmass. For historical and cultural reasons, Europe's evolution has been very different

from Asia's, which is why they can be seen as two continents. Geologists, however, often regard them as a single continent called 'Eurasia'.

- Africa and Eurasia are generally regarded as two continents, but sometimes as one.

Let us summarise the different counts in a table:

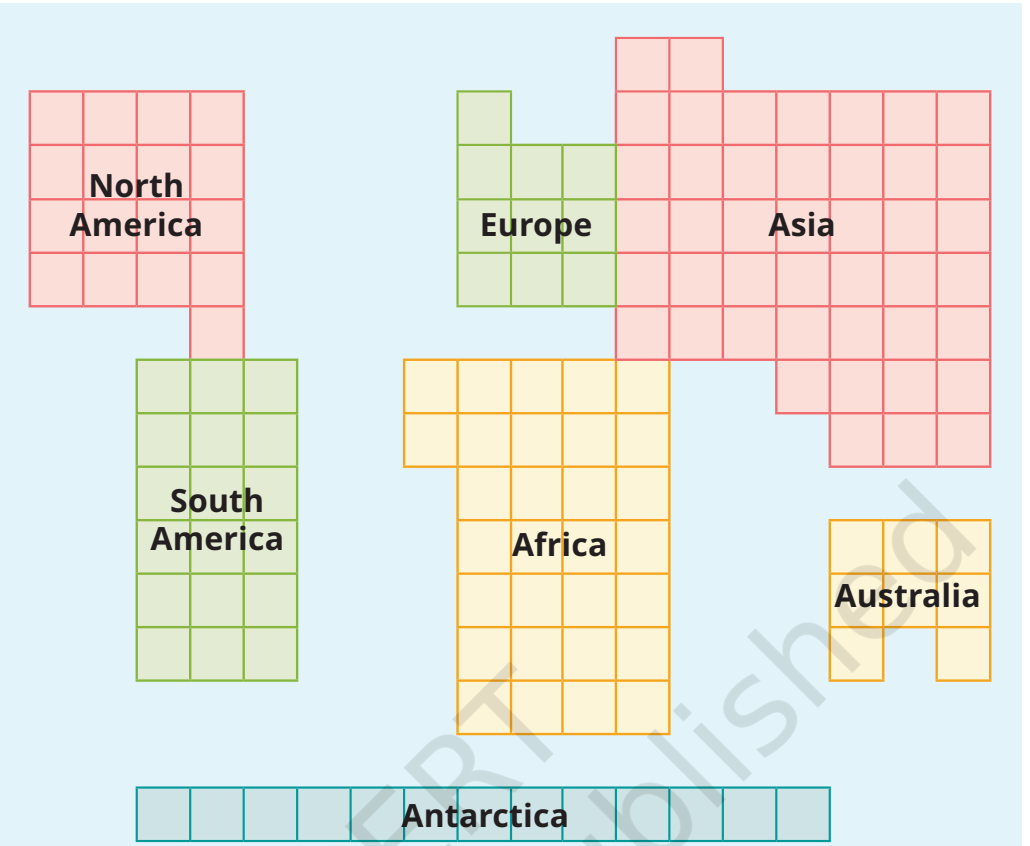
Count of continents (in alphabetical order)	
Four continents	Africa-Eurasia, America, Antarctica, Australia
Five continents	Africa, America, Antarctica, Australia, Eurasia
Six continents	Africa, Antarctica, Australia, Eurasia, North America, South America *(this is reflected in Fig. 2.3 on page 32)*
Seven continents	Africa, Antarctica, Asia, Australia, Europe, North America, South America

In practice, the last list of seven continents is the one most widely adopted and used.

DON'T MISS OUT

You may have seen the five Olympic rings, one of the symbols of the Olympic Games. They symbolise the gathering of sportspeople from all over the world. The rings were chosen to represent five inhabited continents — Africa, America, Asia, Australia and Europe.

Now let us look at the diagram on page 36, which is based on the list of seven continents. It does not show their actual shapes, but their relative sizes.



LET'S EXPLORE

- → Counting the numbers of squares, name the largest continent and the smallest.
- → Which one is larger — North America or South America? Africa or North America? Antarctica or Australia?
- → Re-colour the diagram by having a single colour for Europe and Asia and rename the result as 'Eurasia'. Compare its size with South America's.
- → Write down the list of continents from the smallest to the largest.

Islands

If you have carefully observed the two maps earlier in this chapter (Fig. 2.2 and 2.3), you may have noticed that

the continents do not include all landmass. Some smaller pieces of land are left out; surrounded by water on all sides, they are called **islands**. (Continents are also surrounded by water, but because they are so large, they are not considered islands.)

There are lakhs of islands on the planet, of very different sizes.

DON'T MISS OUT

- Greenland is the largest island in the world (locate it on a globe or a map). You would have to add the areas of the 10 largest states of India to reach its size.
- India has more than 1,300 small islands! Those include two major groups — Andaman and Nicobar Islands in the Bay of Bengal and Lakshadweep Islands in the Arabian Sea (see Fig. 2.4).
- Since 1981, the Indian Antarctica Programme has been exploring Antarctica, a continent with a very cold climate and harsh environment (see the white expanse at the bottom of Fig. 2.1, which is mostly ice). In 1983, India established its first scientific base station there, called 'Dakshin Gangotri' (two more bases were established later). About 40 teams of Indian scientists have conducted research in this faraway region, especially on the evolution of climate and environment. The settlement where the scientists live has a library and even a post office!

Oceans and Life

Oceans and continents are vital parts of the environment and affect most aspects of our lives, even if we do not notice it. We have mentioned that oceans send rain to the continents; this is part of the Earth's water cycle, which you will further study in Science. Without oceans, for

instance, there would be no rainfall! The Earth would be a desert. Moreover, more than half of the world's oxygen is produced by the oceans' flora, which is why they are called 'the planet's lungs'. The oceans, therefore, play a crucial role in regulating the climate and sustaining life on Earth.

Oceans have deeply impacted humanity in many other ways. From early times, people have used oceans and seas to migrate to other regions, to trade in all kinds of goods, to conduct military campaigns, and as a source of food through fishing. Oceans have also nourished the cultures of coastal people all over the world. Almost all of them have tales and legends about the sea, sea gods and goddesses, sea monsters and treasures from the sea — the oceans' dangers but also their blessings.

DON'T MISS OUT

The United Nations has designated June 8 as World Oceans Day to "remind us all of the major role the ocean plays in everyday life. It serves as the lungs of our planet, a major source of food and medicine and a critical part of the biosphere." Scientific studies have shown how the oceans are polluted by human activity — we throw several million tonnes of plastic waste into the oceans every year, choking marine life. There are several other forms of pollution. As a result, the marine environment is under threat. Overfishing (excessive fishing) is another cause for the decline of marine life. It is our collective responsibility to protect oceans for the future of the planet and of humanity.

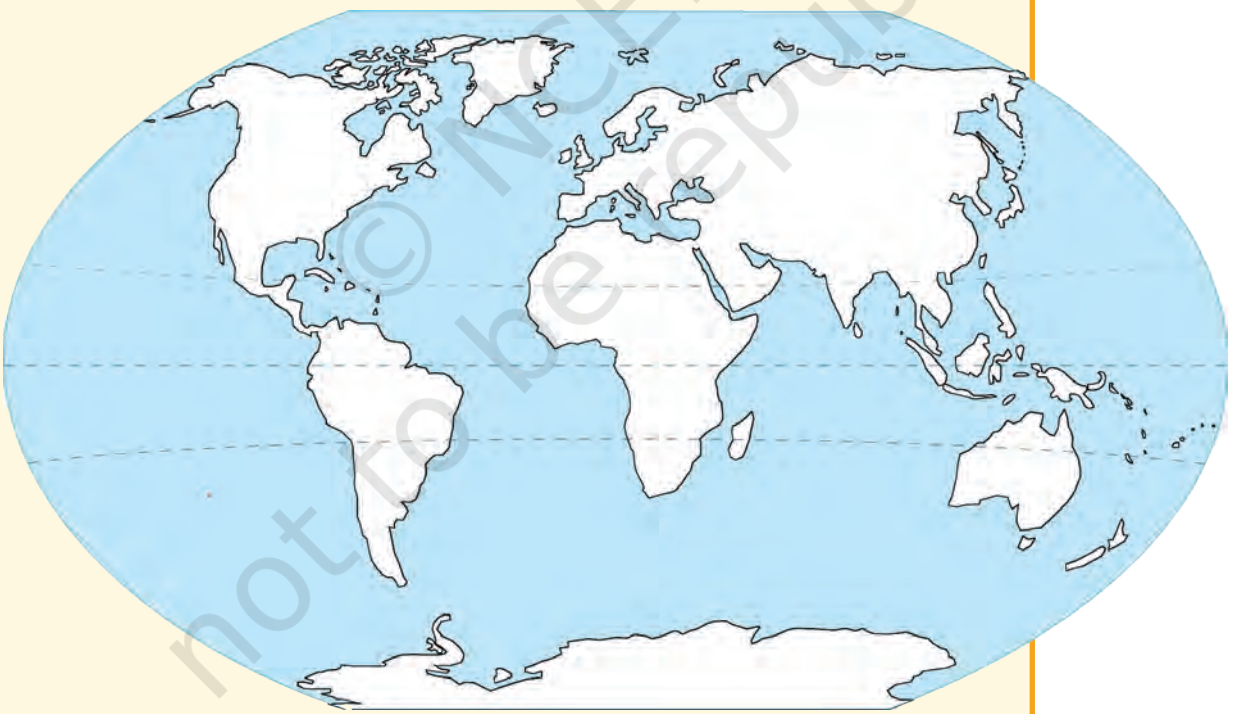
Before we move on ...

- The Earth's surface has vast water bodies called 'oceans' and large landmasses called 'continents'. Oceans are interconnected. Continents may be counted in various ways; the most common count is seven.
- The Northern Hemisphere has more land than the Southern Hemisphere.

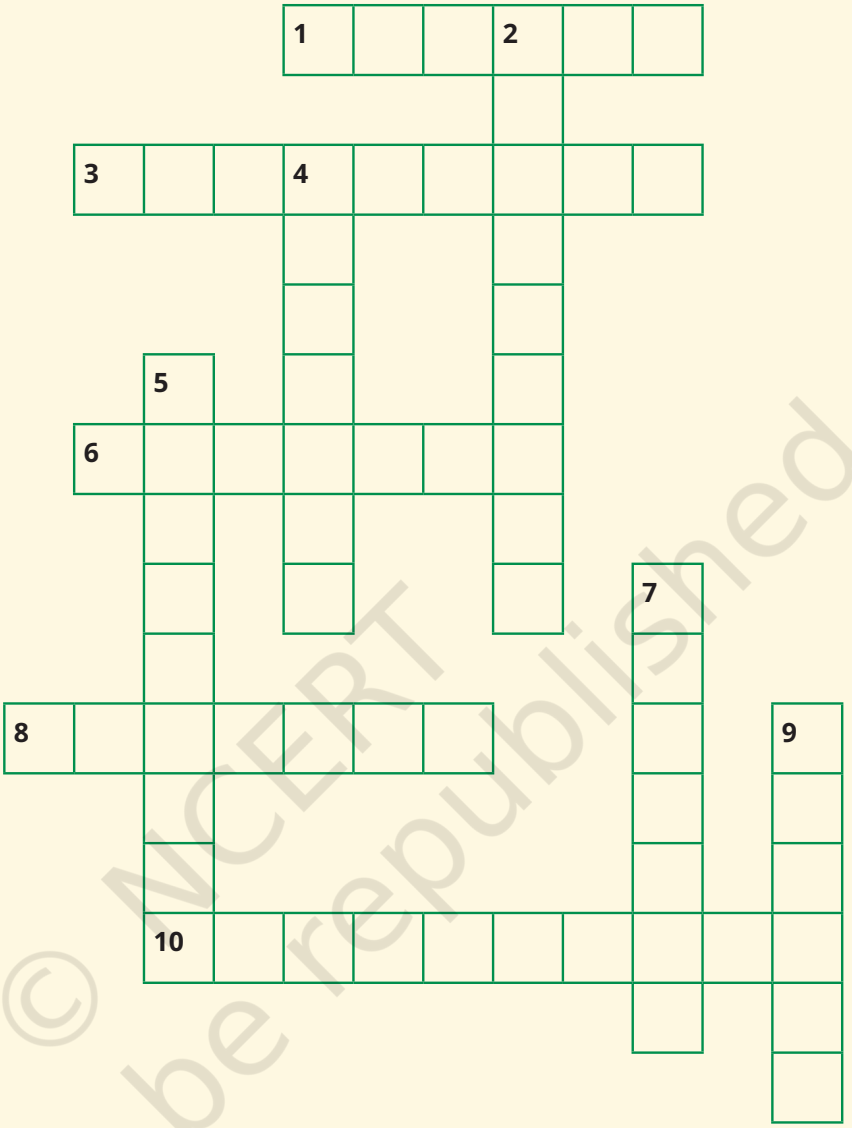
→ Oceans support all kinds of marine life and play a critical role in the world climate. They are now seriously affected by human activity and need our collective protection.

Questions, activities and projects

1. Explain the following terms:
   (a) Continent
   (b) Ocean
   (c) Island
2. Let us draw – Without looking at the maps in this chapter, draw the continents free hand on a sheet of paper and colour them. Then compare your drawing with the map of oceans and continents in the chapter.
3. Let us do – On the outline map of the world given below, label all the continents and oceans.



4. Solve this crossword



Across

1. Abundantly produced by the oceans
3. A large expanse of landmass
6. A large continent of which India is a part
8. A major source of pollution of the oceans
10. The coldest continent

Down

2. The largest island on Earth
4. A huge destructive wave from the ocean
5. The smallest continent
7. The largest body of water on the Earth
9. A landmass (but not a continent) surrounded by the sea or ocean