

# CHAPTER-24

## HYDROSPHERE



**After studying this chapter you learn :**

- know the different kinds of water bodies.
- understand the structure of the ocean bed.
- know the ocean currents, their types and conservation of oceans.
- know how to mark oceans, gulf, bay and strait on Indian map.

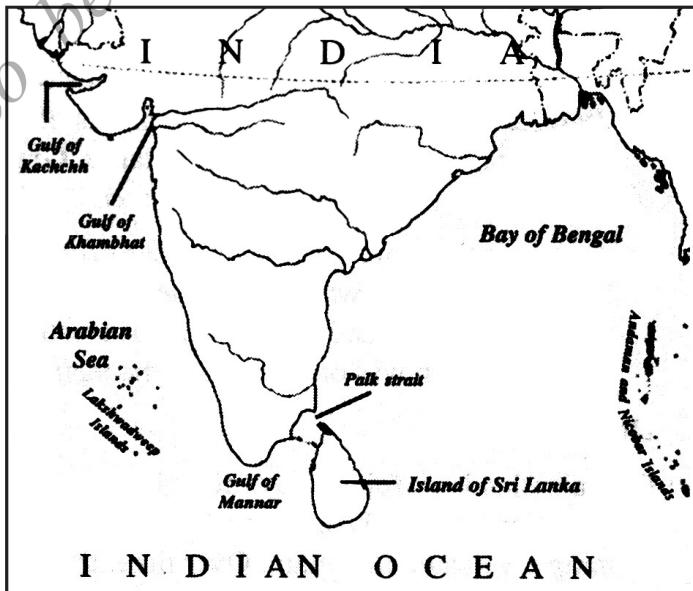
*Water- The source for marine life and maritime climate*

### Distribution of Water bodies

The Earth is popularly called 'Blue planet' or 'Watery planet' because about 71% of the total area of the earth or 361 million sq. km is covered by water. The major water bodies of the world are the Pacific ocean, the Atlantic ocean, the Indian ocean and the Arctic ocean.

**Oceans:** Oceans are deep and large expanse of water found between the continents. The Indian ocean between Asia, Africa and Australia. The Atlantic ocean between North America and Europe and so on.

**Sea:** A sea is a part of the ocean extended or projected far inland. Seas are smaller compared to oceans, e.g., the Arabian sea, the Caspian sea, the Red sea.



**Gulf:** Gulf is a part of an ocean or sea that penetrated into the land. It is smaller than a sea. The size, shape and depth of a gulf varies from one to another, e.g., the Gulf of Mannar, the Persian Gulf, the Gulf of Mexico.

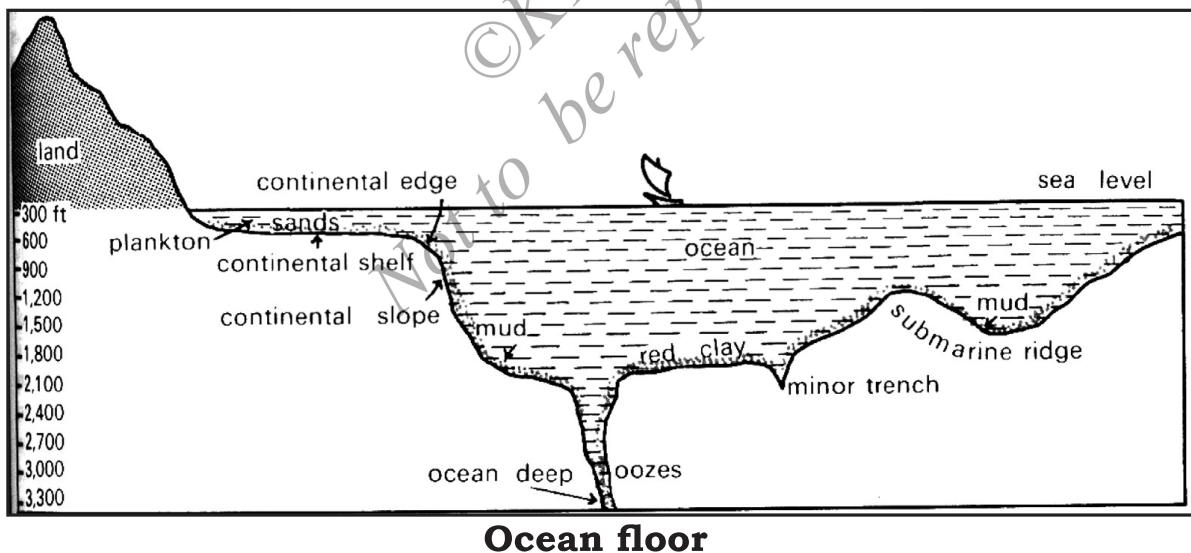
**Bay:** Bays are small semi-circular water bodies partially surrounded by land. The depth, extent and size of bays vary from one to another, e.g. the Bay of Bengal, the Bay of Biscay, the Bay of Fundy, Hudson Bay.

**Strait:** A strait is a narrow strip of water body joining two large water bodies, eg., Palk strait, Strait of Gibraltar, Bering strait.

**Isthmus:** Isthmus is a narrow stretch of land mass joining two large land masses. Isthmus is the most important location for constructing ocean canals eg., a) Suez canal between the Mediterranean sea and the Red sea b) Panama canal between the Atlantic ocean and the Pacific ocean.

## RELIEF OF THE OCEAN FLOOR

The sea or ocean floor also has various features like the relief features of the earth's surface. The knowledge of relief features of the ocean floor is very necessary to know the importance of ocean. On the basis of the characteristic features, the ocean floor is divided into four major parts. They are : a) The continental shelf b) The continental slope c) The deep sea plain d) The ocean deeps



**1. Continental Slope :** This is the shallow area along the sea coast. This part is bordered by the sea coast on one side and continental slope on the other side. The average depth of the continental shelf is 100 fathoms (1 fathom is equal to 6 ft). The depth of the sea in this region gradually increase towards the continental slope. The continental shelf is very important for fishing, aquaculture, navigation and extraction of minerals.

**2. Continental slope:** This is the second part of the ocean floor and it is very steep. It is a link between the continental shelf and the deep sea plain. Sub-marine canyons are a special feature in this region.

**3. The Deep sea plain:** This is the vast plain found at the bottom of the sea floor. The deep sea plain is also known as 'abyssal plain' and it covers the largest area of the ocean floor. In this region Sea mounts and Guyots are found.

**4. The Ocean deep:** The ocean deeps are also called 'Ocean trenches'. These are the deepest part of the ocean floor, e.g. The Challenger deep of Mariana trench in the Pacific ocean near Philippine islands is around 11,033 meters deep and is the deepest point of the oceans. The other trenches are Tonga trench, Kurile trench in the Pacific ocean.

### Temperature and salinity of the ocean water

**Temperature:** Sea or ocean water temperature varies according to latitudes and the depth of the ocean floor. The temperature of the ocean water near the equator is more than that of the temperature near the Arctic and the Antarctic circles. With the increasing depth the temperature of the ocean water decreases. It is because the sunlight can penetrate into the ocean only up to a depth of 200 meters. Within this depth various marine organisms are found in large numbers.

**Salinity:** Salinity is the percentage of salts dissolved in the sea or ocean water. The average salinity of the ocean water is 35 PPT (Parts per thousand) or 35 grams/<sup>1000</sup> grams). The salinity of ocean water is very high near the tropics and it is very low near the poles. At the equatorial region the salinity is average due to high evaporation and precipitation.

#### Why is sea water salty?

*The water flowing from the land to the sea (river) carries many kinds of salts and deposits them in the sea or ocean. Due to high temperature, water is evaporated continuously and the salts remain in the sea or ocean. This continuous process over a long period of time has resulted in the accumulation of salts in the sea water.*

#### Facts file

#### Saline water bodies of the world

- |                              |   |                         |
|------------------------------|---|-------------------------|
| 1. Lake Van (Turkey)         | - | 330/ <sup>000</sup> ppt |
| 2. Dead Sea (Asia)           | - | 300/ <sup>000</sup> ppt |
| 3. Lake Sambar (India)       | - | 265/ <sup>000</sup> ppt |
| 4. Red Sea (Asia and Africa) | - | 240/ <sup>000</sup> ppt |

## OCEAN CURRENTS

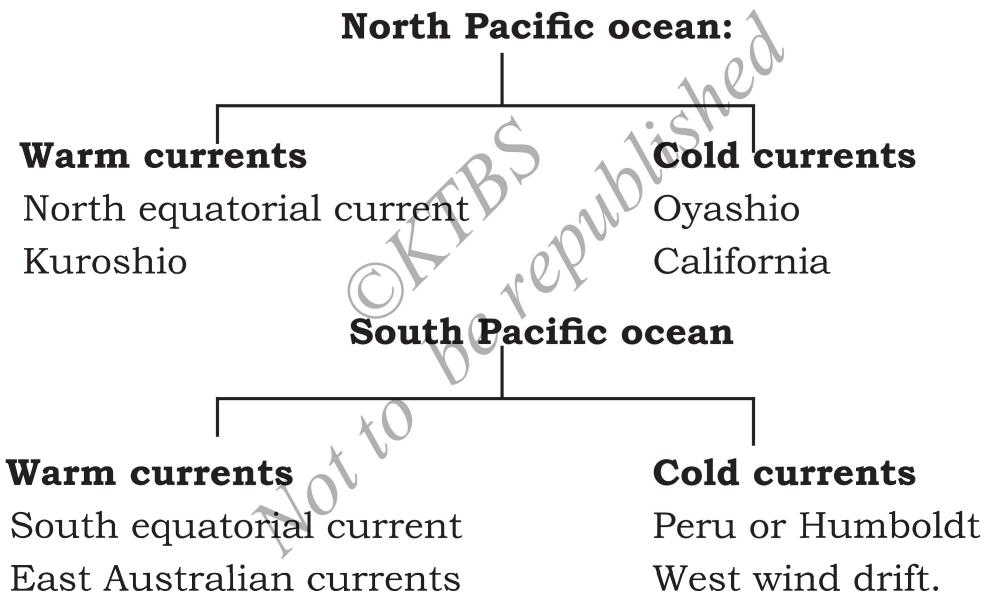
The ocean water has three types of movements. They are Waves, Currents and Tides. Ocean currents are the regular movement of ocean water from one region to another. Ocean currents are of two types.

**Warm currents:** These currents originate and flow from the equatorial regions to sub-polar regions.

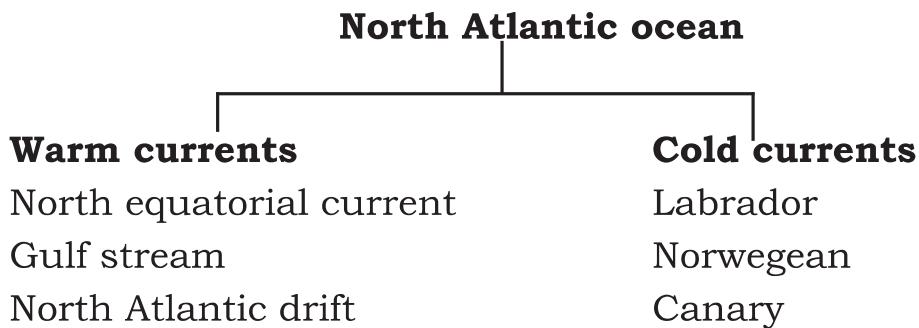
**Cold currents:** These currents originate in the polar regions and flow towards the equatorial region.

Factors that influence ocean currents are Rotation of the Earth, Temperature, Wind, Salinity, Shape of the landmasses, etc.

**Currents of the Pacific Ocean are:**



**Currents of the Atlantic ocean are:**



## South Atlantic ocean

### **Warm currents**

South equatorial current  
Brazilian current

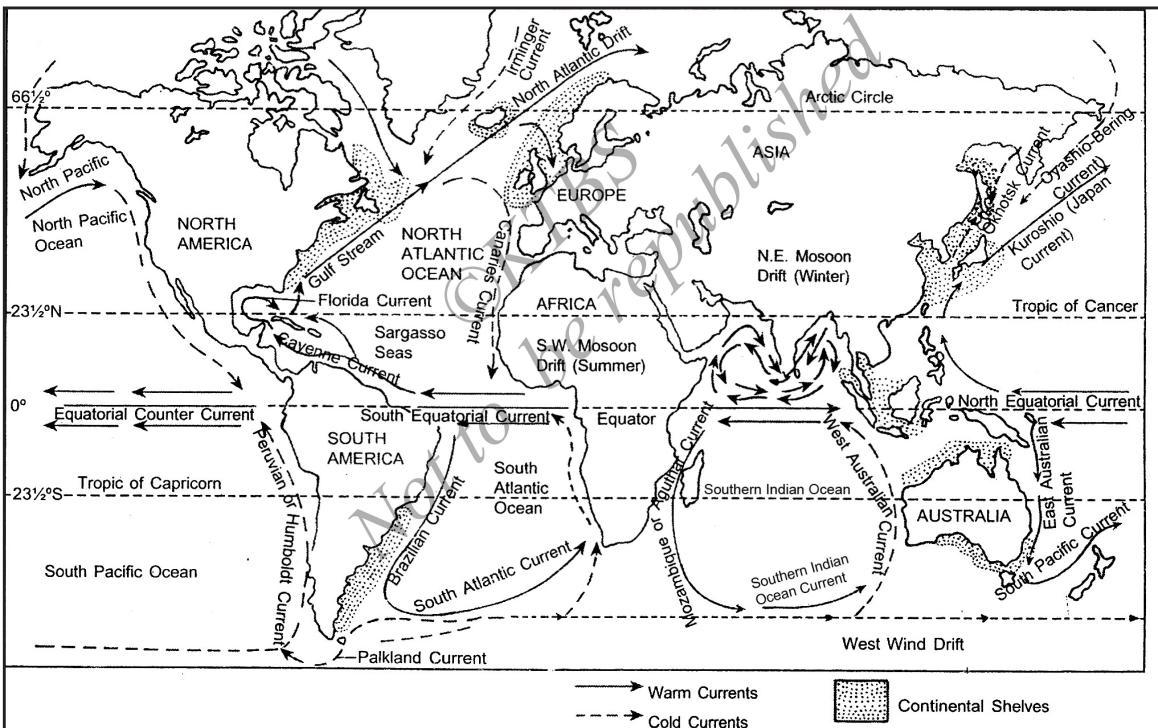
### **Cold currents**

Falkland  
Benguela

### **Current of the Indian ocean:**

The north Indian ocean currents change their direction seasonally following the monsoons. During the south west monsoon the currents flow in a south west to north east direction and during the north east monsoon they flow in a north east to south west direction.

The south Indian ocean currents are Mozambique, Madagascar, Agulhas as warm currents and West Australian as cold current.



### **Major ocean currents of the world**

#### **Facts file : Major fishing grounds**

- 1) Honshu Hokkaido fishing grounds – meeting place of Kuroshio warm current and Oyashio cold currents(Japan).
2. Grand bank – meeting place of Gulf stream warm current and Labrador cold currents (New Foundland USA).
- 3) Dogger bank – North sea region of Europe.

## TIDES: types, causes and uses:

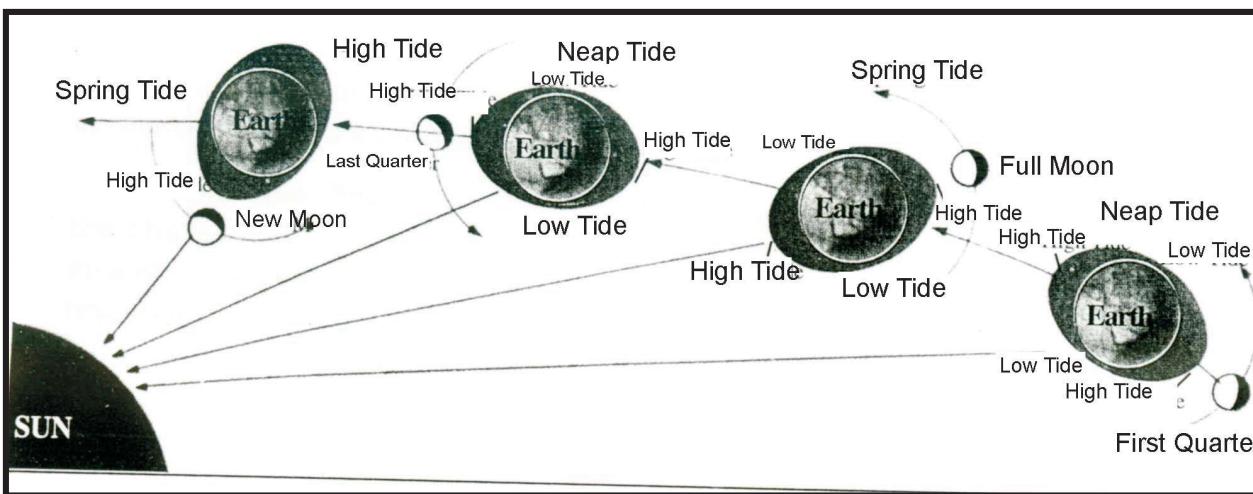
Tides are the periodic rise and fall in the sea or ocean level. They occur due to, gravitational attraction by the moon, gravitational force by the sun, rotation of the earth and, centrifugal force of the earth.

**Types:** Tides are of two types. High tide, also known as Flood tide and Low tide, also known as Ebb tide. On the water bodies of the earth there are alternate high tides and low tides. Between one high tide and a low tide the time is 6 hrs, 13 minutes. Between one high tide and another, the timegap is 12 hrs, 26 minutes. In 24 hrs, 52 minutes there are 2 high tides and 2 low tides.

There are two types of tides on the basis of the positions of the Moon and the Sun.

**Spring tide:** Spring tides take place when the earth, the moon and the sun are in the same straight line, eg., New moon and Full moon. When the spring tides take place, high tides are the highest and low tides are the lowest.

**Neap Tide:** Neap tides occur on the first quarter and last quarter days in the phase of the Moon. During neap tides the sun and the earth are in the same straight line and moon is in right angle to the earth. In this type of tides the high tides are not very high and low tides are not very low.



**Spring Tides and Neap Tides**

**Uses :** Tides are directly and indirectly useful to mankind in following ways.

1. It helps navigation.
2. Helps in the location of ports and harbours.
3. Tides help to keep the harbours clean.
4. They help fishing.
5. They also help to generate energy in the form of tidal energy.

**Conservation of Oceans:** Conservation of oceans is very important. Oceans help us in many ways and they are the habitat of millions of marine organisms. Considering the rate at which the oceans are being contaminated, they may not remain what they should be in the future.

The following are the important methods of conservation of oceans.

1. Oil transportation should be done through pipelines.
2. Nuclear waste should not be dumped into the sea or ocean.
3. Petro-chemical industries in the coastal regions must avoid dumping effluents into the sea or ocean.
4. Dumping of any waste near the ports and harbours must be controlled.
5. Ore deposition and mineral exploitation along the coast must be controlled.
6. Exploitation and destruction of beaches must be controlled.

### **EXERCISES**

#### **I Fill in the blanks with suitable words :**

1. The average depth of the continental shelf is \_\_\_\_\_.
2. One fathom is equal to \_\_\_\_\_ ft.
3. The deepest place in the Pacific ocean is \_\_\_\_\_.
4. The average salinity of the ocean water is \_\_\_\_\_.
5. \_\_\_\_\_ tides occur during full moon.

**II Answer the following questions :**

6. What is hydrosphere?
7. Mention the four major parts of the ocean floor.
8. State the difference between ocean currents and tides.
9. Distinguish between spring tide and neap tide.
10. How can we conserve the oceans?

**III Match the following :****A**

11. fathom
12. oyashio
13. gulf stream
14. sea mounts
15. agulhas current

**B**

- a) deep sea plain
- b) eastern coast of USA
- c) cold current
- d) Indian ocean current
- e) depth of ocean

**IV Define the following :**

16. continental shelf
17. salinity
18. warm and Cold currents
19. high tide and Low tide
20. benguela current
21. tides

**V Terms to remember :**

22. gulf stream
23. salinity
24. warm currents
25. kuroshio current
26. flood tides
27. tidal energy

**VI Activity :**

28. List out the cold and warm currents in Atlantic ocean.

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