

Lesson-5

The Oceans and Seas



Learning outcomes :

Students will–

- ✦ know what are oceans and seas.
- ✦ understand about the origin of the ocean current, tides and waves.
- ✦ understand about sea plants and animals.
- ✦ know the importance of the oceans and seas in relation to fishing as an occupation, water transport, extraction of mineral resources, etc.

In your Social Science Book of Class-VI you have studied something about Lithosphere, Atmosphere, Biosphere and Hydrosphere in the lesson titled 'Major Spheres of the Earth'. Almost 71% of the earth's surface is covered with water. Our earth is also called the "Blue planet" for having such a huge water cover. The hydrosphere includes the water available at various sources like oceans, rivers, lakes, glaciers, atmosphere and under the ground, etc. Of course, 97% water of the hydrosphere is found in the seas and oceans. Therefore the term Hydrosphere is mainly used to mean the oceans and the seas. We always feel the need of fresh water despite our planet being filled with plenty of waters. The saline water of the ocean is the main reason behind it.

Let us know :

- ✦ The water of the ocean is saline because various minerals are dissolved in it. Average 1000 unit of ocean water has mineral salts of 35 unit. The ocean of tropical region is more saline. On the other hand oceans of equatorial and polar regions are less saline.
- ✦ Recently the world famous map maker 'National Geographic' has included the fifth ocean i.e. the Southern Ocean in the map of the world. The Southern Ocean surrounds Antarctica. The Southern ocean is located at a southern longitude of 60 degrees.

The huge water bodies of the earth is being divided into five divisions each division indicates one ocean. These five oceans are mainly the Pacific, the Atlantic, the Indian Ocean, North seas and South seas.

If we go through an Atlas we will find each of the five continents looking like Islands. Because continents are surrounded by the oceans. The seas are nothing but only parts of the ocean which are near to the continent. On the other hand any part of the ocean surrounded by land from all three sides is known as the Bay. The Bay of Bengal is one such bay which is touching the borders of India. All the seas and bays are the parts of the vast oceans. Actually no visual boundary is available in between seas, bays and oceans. You can find out in a map of the world that the oceans are connected with each other.

Write Answer :

- ✦ Why is earth called the “Blue planet”?
- ✦ What is the name of the Bay that touches the borders of India?



Fig. 5.1 The continents and oceans of the world

The earth has passed almost 454 million years since its origin. In this long passage of time various changes have been taking place. The earth was originally a hot and gaseous body and remained so for a long period of time. The earth was gradually becoming cold due to its rotation. In course of time the gaseous matter got condensed and transformed into liquid as well as solid state. High and low features are formed on the surface as a result of contraction. The hard and solid land forms remained comparatively high creating the Lithosphere and the low lands are covered with water creating the oceans. These oceans are playing vital role as one of the major elements of the environment. Therefore every one should know about the common characteristics of the ocean, quality of water, etc. in detail.

Activity :

- ✦ Write about the condition of the earth at the time of its origin.
- ✦ Write how high and low land on the earth's surface were formed?

Ocean currents :

Despite its vastness and depths the ocean water is not stable. There are some reasons behind the movements of the ocean water from one direction to another besides its natural waves. This movement of the ocean water is called ocean current. Though ocean currents have their extension, direction, and speed they do not have a definite course like a river. The rotation of the force of the earth, wind, water temperature, salinity, differences of pressure of the coastline etc. are the factors responsible for ocean currents. You have already learned in your textbook of class VII, there are some high and low pressure belts extended from North Pole to South Pole. Due to these differences of pressure various types of winds blow over the earth. These winds help in creating ocean currents. On the other hand equatorial region receives direct sunrays. That is why the temperature of the ocean is comparatively high here. The evaporation is also high but density is low in this part. In the temperature and polar regions ocean water is cold and hence evaporation is low but density of water and air pressure is high. The amount of salinity in water of the oceans also vary from place to place. These are the causes behind the movement of the ocean currents. The direction of ocean stream changes as a result of the earth's revolutionary motion. The polar-facing stream flows eastward and equatorial stream flows almost westward due to this.

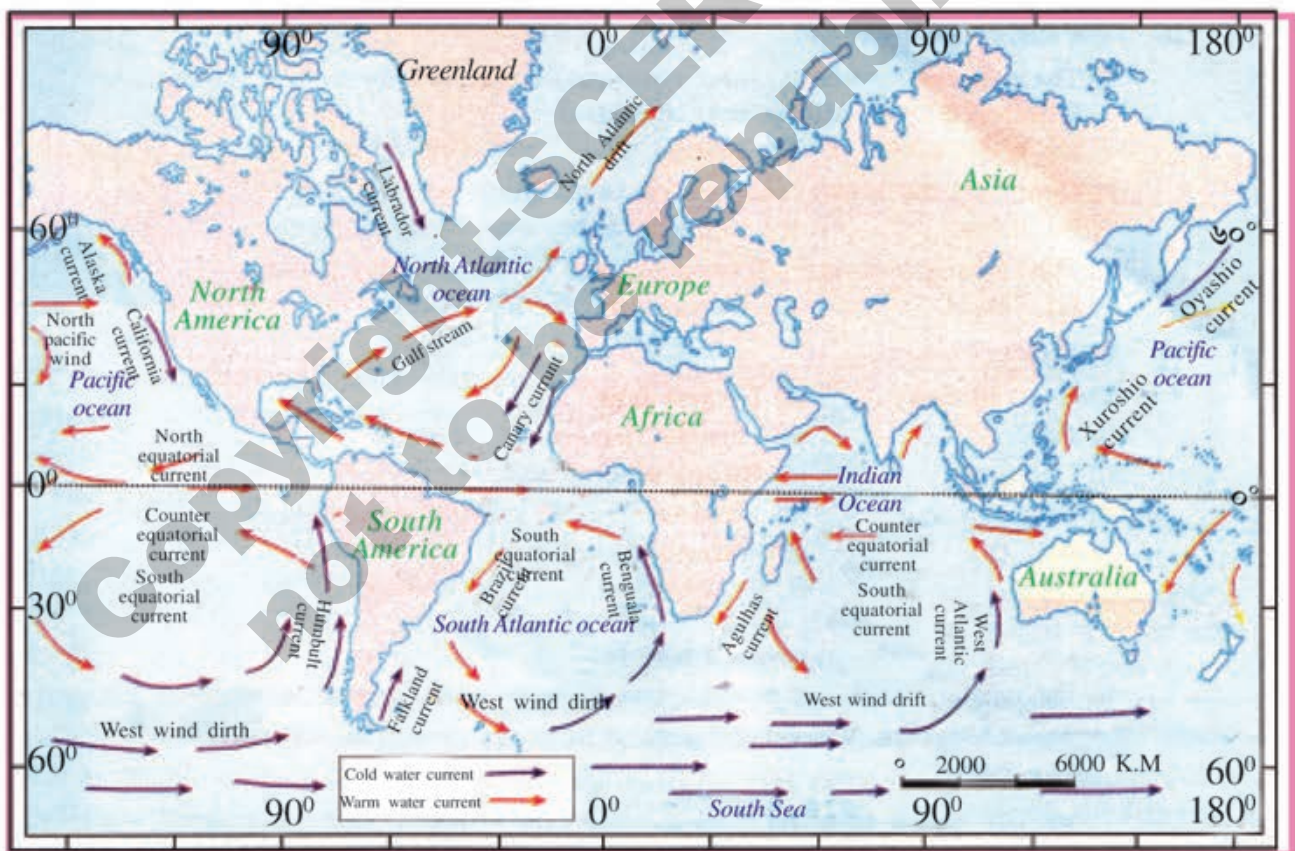


Fig 5.2 Ocean current

The water of equatorial region gets heated easily and expands. On the other hand water of the cold region becomes cold and heavy and get condensed. So warm ocean water flows to the colder region as surface current. This is the warm water current. On the other hand cold and

condensed ocean water flows to the warm equatorial regions as under current. This is the cold water current. Thus the warm and cold currents flow in the oceans incessantly. The warm water flows downwards after getting cold while they move towards northern and southern cold regions. On the other hand the cold streams of the polar regions rise up to the surface while flowing towards the oceans equatorial region and goes down in some parts of the oceans of polar region.

The cold current coming from the polar areas become warm in the tropical region. The icebergs flowing with the cold water begin to melt because the cold and warm current meet here. The pebbles and sediments inside the iceberg fall down to the sea bed. The depth of the sea in these part decreases due to this deposition. Such places are full of plankton which are very suitable for fishes. These places are considered as valuable fishing grounds. The seas around Japan and the east coast of North America are the examples of important fishing grounds of the world. Dense fogs and sometimes heavy storms are seen in these places of meeting of warm and cold currents. This can, of course, adversely affect the movement of ships.

Activity :

- ★ Why does the ocean water of equatorial regions gets heated easily?
- ★ The meeting point of two different streams of different temperatures gradually becomes shallow –explain.

Sea waves :

Some of you might have seen the ocean although not all of you. Many of you must watched the oceans on Television. The ocean water always maintains an upward and downward motion. The waves are created as a result of the wind flowing over the surface of the ocean water. The more the speed of the wind, larger are the waves. Besides, waves are created due to earthquake, volcanoes under the sea and tides.

The waves of the ocean water caused by the earthquake is called “Tsunami” which is a Japanese word. The term ‘tsu’ means harbour and ‘nami’ means wave. The entire Japan is situated in the Ring of Fire belt of the pacific. This is one of the most earthquake prone areas of the world. Hence Japan is experiencing frequent earthquake and Tsunami. In a tsunami the ocean wave can rise up to a height of about 15 metre and can move with a speed of about 700 km per hour or more than that.

Let us know :

- ★ The Tsunami which occurred on 26 December, 2004 caused great destruction on the Eastern Central region of India and was the result of a devastating earthquake of 9.0 magnitude on richter scale. The epicentre was western part of Sumatra Island. The speed of that Tsunami was about 800km per hour which destroyed properties and millions of lives residing at the central areas of Tamil Nadu, Andaman and Nicobar Island, Sri Lanka, Indonesia, etc.

Write Answer :

- ✦ What are the causes of the sea waves?
- ✦ What do you mean by Ring of Fire?
- ✦ What are the common height and speed of tsunami ?

The Tides :

In addition to the waves and currents tides are also another movement of the ocean water. The rise and fall of ocean water occurring twice daily is known as the tides. The main factors behind the occurrence of tide are the gravitational force of the moon and the sun over the earth and the centrifugal force coming out from the earth's rotation. Although the moon is smaller than the earth, yet the gravitational pull of the moon on the earth is more because it is nearer to the earth. The effect of attraction is more on the part which face the moon during its rotation. But the effect is not seen on the hard and solid landforms except the water body. Thus the tides are seen in the ocean water. This rising up of water due to the gravitational force of the moon is known as Primary tide. On the other hand tides also occur at the opposite side of the earth but the gravitational force of the moon is not so strong here. This kind of weak tide is called the Secondary tide.

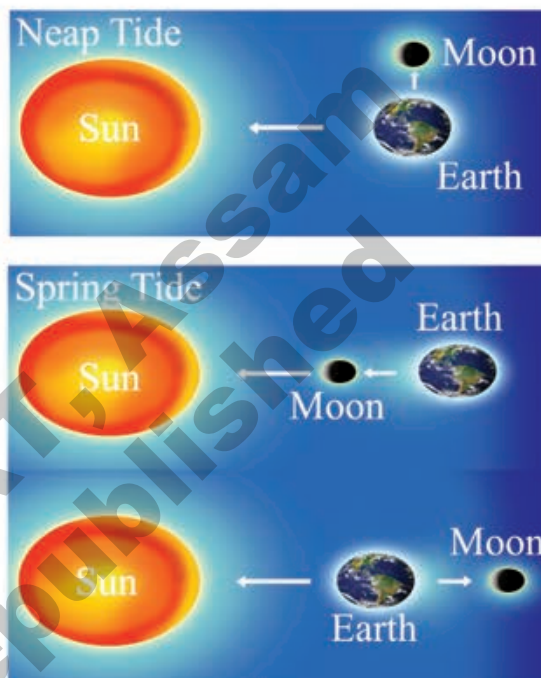


Fig : 5.3 Spring tide and Neap tide

Let us know :

- ✦ In 1687, Sir Isaac Newton explained that the tides are created due to the gravitational force of the Sun and the Moon over the sea-ocean.

The sun, the earth and the moon are aligned on full moon and new moon. The waves of tide rise high on these two days. This is known as Spring Tide. When the sun and the moon are in quadrature i.e. both of them lie at rectangular position, the attraction of the moon as well as the sun is reduced. The tides produced in it are lower than that of ordinary tides. This is known as Neap Tides. Do you know why although the size of the sun is bigger than that of the earth and the moon, the gravitational force of the sun is quite less than the two? The size of the sun is 27 million times more than the moon; and the distance of the moon from the earth is 38,44,400km. On the other hand, the distance of the earth from the sun is 14,96,00,000. That is why the sun's tidal power is half of the moon.

The coastal areas and the estuaries are affected by the tides. The waves of the tide wash away the sediments deposited in the estuaries enabling the transportation of ships. The rising up of water at this time helps easy entrance of the ships to the ports situated at the shallow coastal

areas. Fishes are found in large quantity here. Electricity is also produced from tidal energy in Japan, French, Canada, etc.

Activity

- ✦ The gravitational pull of the moon is higher on earth– Give reasons.
- ✦ What are the causes of prime tide ?
- ✦ Find out the relationship between tide and estuaries of the river.

Plants and animals :

You have already studied something about ocean current and tide. These oceans are the habitats of variety of lives ranging from micro organisms to big animals. Sea plants and animals are divided into three categories depending on their movement and habitats. These are plankton, benthos and nekton. Plankton cannot move itself. These are drifted by ocean currents most of which are unicellular and microscopic. Planktons are divided into two types : Plant Plankton and animal plankton (zoo plankton). Most of the plant planktons are of diatom and algae types, which are favourite food for the fishes. These are generally found in the shallow water where Sun's rays and foods are available for them. Like wise the benthos also live in shallow waters. Various sea weeds and sponge, coral, oyester, do not move or rarely move. On the other hand, various types of corals, shells, etc. falls under the category of creatures that moves in the water. The nekton includes the advanced species i.e. whale, dolphin, fishes etc. They generally eat animal planktons. The animals belonging to necktons are more advanced than the planktons and the benthos. Dolphins belonging to this class are very intelligent creature. They are sometimes trained to engage in various works. Generally the plants available in the ocean are the mosses having chlorophyll for extraction of food through photosynthesis.



Fig. 5.4 Sea Animals



Fig. 5.5 Sea Plants

Fishing :

Fishes are mostly available in the sea amongst all the biotic resources. Fish is a nutritional favourite food for man. From prehistoric period people have been using fish as food. Sea fish like herring, sardine, cod, meckerel, salmon, etc. are fished for food. Besides, fishes like cod is fished for its oil which is rich in vitamins and Hangor for its skin for making shoes, bags etc. Now a days fishing is becoming a developed industry. Different fishing techniques are used for catching different

kinds of fishes. The world's famous fishing grounds are developing at the places where sea weeds like planktons are abundant. Now a days computerised technology have been used in the ships for finding out the location of fishing grounds, fishing activities, conservation of fishes, packaging and supplying etc. Now fishes packed in tins are available everywhere.

Activity :

- ✦ What are the characteristics of benthos ?
- ✦ Find out the relationship between plankton and fishing grounds.
- ✦ Write the names of some sea fishes.

Mineral Resource :

The oceans are also the source of various mineral resources. The mineral salts dissolved in the ocean water are common salt, magnesium and bromine. Other minerals found in the ocean are manganese, sulphur, titanium, monozite, gold, platinum, diamond, iron, etc. The rivers and winds also carry some minerals which are deposited in the ocean bed. The quantity of chemical molecules in the ocean water are less and hence extraction of these are very difficult. The crude oil and natural gas are the most important minerals in the ocean for which today's Geologists are paying more interest on it. In our country oil and natural gas have been extracted in the coastal regions of Mumbai and Orissa.

Water Transport :

The transportation facilities have been provided to the people by ocean through the ages. This is known as water transportation. This is an easy and cheap transportation system. Since the waterways are natural, no expenditure is spent for it and the ships and cargos can easily carry huge quantity of goods, passengers. The cost of fuel is comparatively less here. The water transport is very suitable regarding international trade also. Because there are some limitations in Air, Road and Railway transportation. Although water ways do not have much barriers in its approaches yet sometimes fogs, storms, icebergs etc. can cause problems in the plying of ships. Hence ships always travel through certain ways only.

The seas and oceans have great influence on the natural environment of the world. You have already learnt that the oceans have benefitted human society by providing enormous facilities. But the increasing population is becoming a threat to the existing resources on the earth. So people are looking towards the resources of the oceans. By dint of advanced technology man will be able to acquire resources from the sea. The coastal areas of some parts of the world and some other islands are attracting people for their enchanting beauty. Thus the relationship between man and ocean will be more and more in near future.

Let us remember :

- ✦ 71% of the earth is covered with water. Hence the earth is called the **Blue planet**.
- ✦ The huge water bodies of the earth is divided into five divisions. Each division is an ocean.
- ✦ The seas and the bays are the parts of the oceans.
- ✦ The lower portion of the solid crust of the earth's surface gradually transformed to the oceans as well as the upper portion became the lithosphere.
- ✦ The ocean currents are created by the rotation of the earth, wind, salinity, temperature, and pressure of the water.
- ✦ The warm water of less density flows from hot regions as surface current to the cold regions. This is warm current.
- ✦ The cold and heavy water flows from cold region to hot region as under current which is known as cold current.
- ✦ The shallow areas of the ocean are world's suitable fishing grounds due to availability of plankton in large amount which is favourable for fishes.
- ✦ The waves created by earthquake in the ocean is known as Tsunami
- ✦ Tide is the result of the gravitational pull of the moon, the sun, and the centrifugal forces of the earth's rotation.
- ✦ Sea plants and animals are divided into three types—plankton, nekton and benthos.
- ✦ Crude oil and natural gas are two main minerals found in the ocean.
- ✦ Ship transportation is the reliable system for international trade.

Exercise

1. **Write answers-**
 - a) What are the causes of ocean current?
 - b) What do you mean by warm water current?
 - c) What are the types of sea lives? On what basis are they classified?
 - d) Which are the suitable places for developing fishing grounds near the oceans?
2. **Give reasons—**
 - a) The neap tide is not stronger than spring tide.
 - b) Now sea fishes are available everywhere for purchase.
 - c) Japan has experiences of frequent Tsunami.
 - d) Ship transportation is the best system for international trade.
 - e) The tidal power of the sun is less though it is bigger in size.

3. (i) Choose the correct one—

- a) polar region b) equatorial region c) none.

(ii) The rising and falling of ocean water twice daily is known as —

- a) ocean current b) tide c) wave

(iii) Tsunami means—

- a) earthquake b) waves c) ports.

(iv) The creatures of the ocean which can swim are—

- a) nekton b) benthos c) plankton.

4. Match the following left side items with the right side—

a) Diatom is	a) develop where planktons are available
b) In the equatorial region	b) neap tides occur.
c) Common salt is	c) a kind of plant plankton
d) In quadrature	d) dissolved in ocean water
e) Fishing grounds	e) density of water is less.

