6. Importance of Oceans

In the previous standard, we have studied the lithosphere and hydrosphere of the earth, the proportion of land and water on earth, and also the major oceans. Note the area of each ocean given in the following table.

Ocean	Area in sq. km.
Pacific	166,240,977
Atlantic	86,557,402
Indian	73,426,163
Southern	20,327,000
Arctic	13,224,479

The hydrosphere includes all the water bodies that exist on the earth. This covers all the oceans, seas, rivers and their tributaries, lakes, reservoirs and also groundwater. Of the total global waters, 97.7 % is contained in oceans.

Do you know?

We always see the living world around us. There is considerable diversity in the living world on land. The living world in the hydrosphere is many times greater than the living world on land. And it has a much greater diversity. (Figure 6.1)

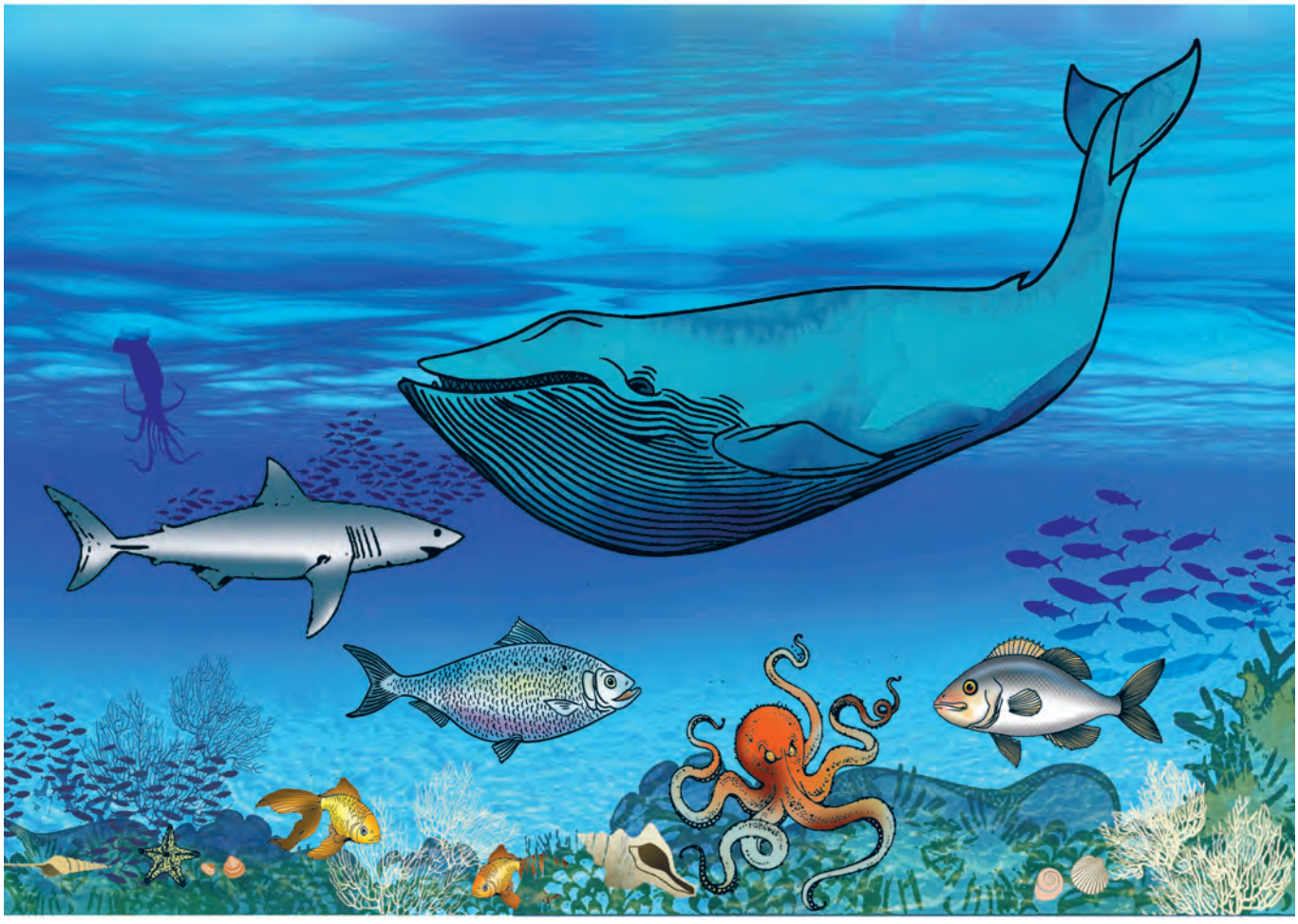

Figure 6.1 : Living Things in the Hydrosphere

Do it yourself !

Use the following ingredients: One bowl of rice flakes (*pohe*). One teaspoon oil. One tomato and a small onion : diced. Chilli powder to taste. Mix all the ingredients well. Give the mixture to all your friends and ask them to taste it. Now add some salt to the mixture and taste it again.

- What difference do you notice in the dish you tasted earlier and later?
- What do you think made the dish really tasty?
- For what other purposes do you use the last ingredient at home?
- Discuss the source of this ingredient.

Do it yourself !

Take some water in a steel dish (figure 6.2). It is better if the water is from a borewell. Keep the water in direct sunlight. Do not remove the dish until all the water gets evaporated. Observe the dish after the water has evaporated completely. What do you see? Taste the substance in the dish.

Figure 6.2

Explanation

You must have noticed that after the water evaporated completely, a whitish layer is left in the dish. If you taste it, you will find that it is salty. You will realize that these are the salts in the water. In drinking water, the proportion of salts is quite low. Water from oceans and seas has a greater amount of salt. Hence it tastes salty.

Think a little!

- Where does the water flowing through the rivers go in the end ?
- Are there volcanic eruptions in the seas?

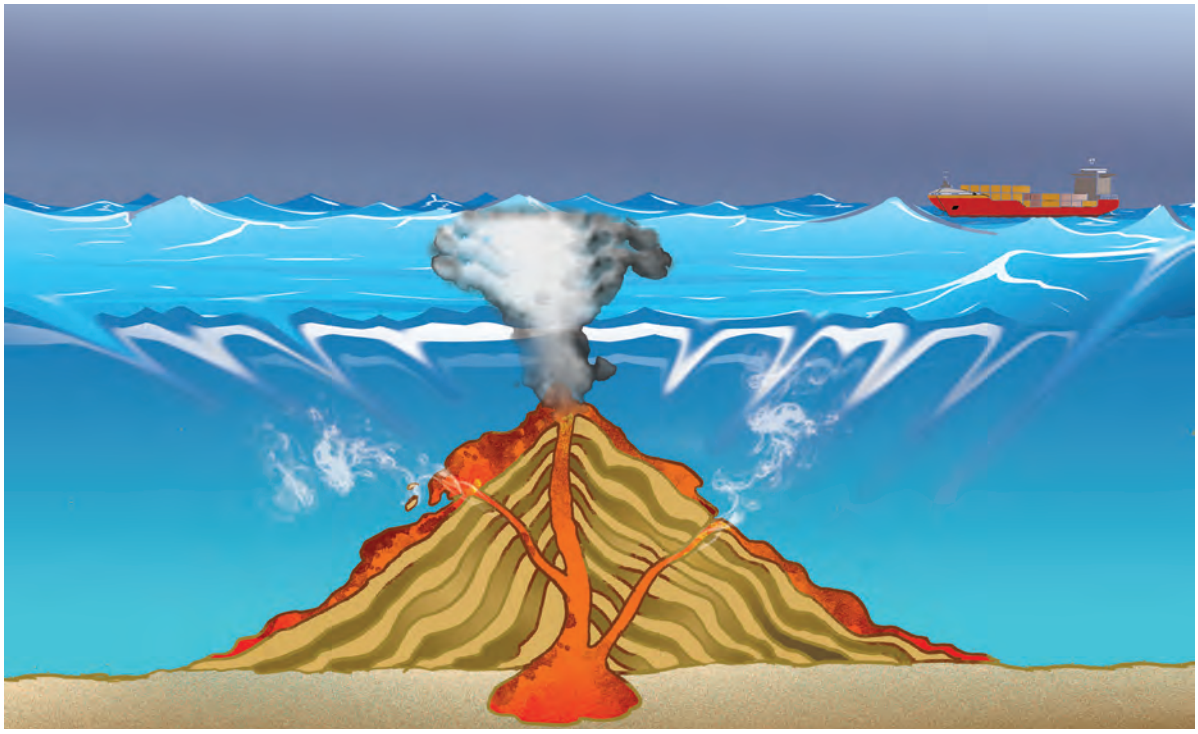

Figure 6.3 : Volcano under the Ocean

Explanation

There is abundant aquatic life in the oceans. From the microscopic planktons to huge whales, different types of living things are found in the oceans. Once they die, their remains accumulate in oceans.

All rivers flowing from mountains or hilly areas finally meet the oceans. Sediments from eroded lands, trees and bushes flowing with the water, dead remains, etc. enter the ocean with this river water.

In both the above processes, the dead remains decompose, releasing various minerals and salts in the ocean water.

Volcanic eruptions occur on land. Similar volcanic eruptions take place in the ocean as well. See figure 6.3. During volcanic eruptions different minerals, ashes, salts and gases are added to the water. This increases the level of salts and minerals in ocean water. Due to the continuous evaporation of oceanic waters, the proportion of salts increases. All these things make the ocean water salty. The salinity of ocean water is different at different places. Salinity is expressed in terms of mils (particles per thousand). The average salinity of oceanic waters is 35 ^{o}/oo. The Dead Sea is known to have the maximum salinity. Its salinity is 332 ^{o}/oo.

We obtain salt from the salty waters. Salt as a substance is obtained by constructing salt pans in the coastal areas. See figure 6.4. Salt is an item in our diet. Many minerals like phosphates, sulfates, iodine, etc. are also obtained from the sea. We depend on oceans to some extent for minerals.

Use your brain power!

Where did all this water on the earth come from?

Figure 6.4 : Salt Pans

Can you tell?

See figure 6.5 and answer the following questions.

- What items are included in our diet?
- Which items amongst those shown come under non-vegetarian food?
- Which of these are prepared from aquatic creatures?

Figure 6.5 : Various Food Items

Explanation

Many of us include fish in our diet. We get fish from rivers, lakes and seas. The proportion of fish in seas is much greater than of those in rivers and lakes. Catching marine animals is a large scale activity the world over. It is one of the ancient occupations of human beings. Though food is the major purpose of this activity, marine animals are also used for the production of fertilizers, pharmaceuticals and also in research. In India, people mainly consume prawns (*kolambi*), clams (*tisre*), crabs, seerfish (*surmai*), mackerel (*bangda*), pomfret (*paplet*), Indian shark (*mori*), Indian salmon (*ravas*), etc.

Many other types of marine animals are consumed in different parts of the world.

The life of people from countries that have a coastline largely depends on the sea, especially if there are few other occupations. Seychelles, Mauritius, Maldives, etc. are some of these.

Do it yourself !

Oceans and Climate

Place	Country	Mean Max. Temp. ^{0}C	Mean Min. Temp. ^{0}C	Range of Temperature
Beijing	China	18.4	08.4	
Istanbul	Turkey	18.0	10.0	
Madrid	Spain	19.0	09.0	
New York	United States	16.3	08.3	
Denver	United States	16.2	02.2	
Kabul	Afghanistan	14.7	05.2	
Baghdad	Iraq	30.4	14.7	

The above table records the maximum and minimum temperatures from some places located between 30° and 40° north parallels. Study the table and do as directed.

- Calculate the difference between the mean maximum and minimum temperatures and write it in the last column.

- Highlight the rows for the places having a range of temperature over 10°C with red colour.
- Colour other rows in blue.
- Find the locations of these places from an atlas.
- Which places are closer to the oceans? Tell whether the range of temperature at these places is less or more.
- What might be the main reason leading to differences in the temperature range of different places?
- In which thermal zone are all these places located?
- Which places are far away from the oceans? Do those places have a greater or smaller temperature range?
- Mention the places having the smallest and greatest temperature ranges.
- Draw a graph for the above data. Use a proper colour scheme.

Explanation

- You must have realized from the above activity that there are differences in the temperature of different places on the earth. Similarly, there is difference in the maximum and minimum temperatures. This difference is less in the coastal regions (nearness to the sea) while it is more in the regions far away from the sea (continentality).

This means that in regions close to the oceans, seas or large reservoirs, there is not much of a difference in the temperature throughout the day. The main reason for this is the mixing of vapour released through evaporation of water from these water bodies into air. This vapour in the air absorbs and stores the heat released from the land. Hence, the temperature in coastal areas remains equable.

- You have studied that the equatorial region receives near perpendicular sunrays. As a result, these areas get more heat whereas the polar regions receive highly slant rays. This differential heating creates imbalance in the temperature of air in different parts. This leads to formation of belts of high and low pressure on the earth. Winds blow due to pressure differences in these belts. These winds are called Planetary Winds. These winds move the oceanic water in the form of currents. These currents are warm currents or cold currents. Warm currents move towards cold regions and cold currents move towards warm regions. This means ocean currents move from the equatorial region to polar regions and from polar regions to the equatorial region. This leads to the redistribution of heat on the earth. The cold currents moving towards the equatorial region make the temperature of coastal areas in that zone milder whereas the warm currents coming in the colder regions cause temperatures in coastal areas to rise. We have seen this in figure 5.6.

The oceans act as the controller of global temperature in the two ways described above. The oceans have a vast expanse, therefore huge amounts of vapour get created. This process goes on continuously. From this vapour, the earth gets rainfall. Oceans are the source of rains. The rainwater flows through rivers and streams and finally flows back into oceans. This makes it clear that the beginning and end of the water cycle takes place in the oceans.

Do you know?

As the regions close to the sea have an equable climate, the density of population is high in these areas. The coastal regions have always attracted man due to its climate, abundance of food and various products obtained from the sea.

Do you know?

- In future, it will be possible to generate electricity with the help of oceanic waves and tides.
- It is possible to convert the saline ocean water into potable drinking water. This will reduce the scarcity of drinking water to some extent. The drinking water in the city of Dubai in United Arab Emirates is being made available through this method.

Figure 6.6 : Mangrove Forest

- In the swampy areas of sea coast, and in the areas of estuaries, the soils are saline and the climate, humid. In such areas, mangrove forests with *tivari* and *sundary* grow well. The wood of mangrove trees is light and oily. It lasts longer. It is used as fuel and also for ship-building. The mangrove forests protect coastal areas from huge waves. These forests also protect the biodiversity in the coastal areas. If these forests are located near coastal towns, they are called the lungs of these towns.

Find out.

Collect information about how a natural pearl is formed. Which oceanic organism develops it? In which sea is it found in India?

Oceans and Resources

We have seen earlier that we obtain salt, fish, shells and other products from the ocean. Besides these, we get minerals like iron, lead, cobalt, sodium, manganese, chromium, zinc, etc. from the ocean floor. We also get mineral oil and natural gas.

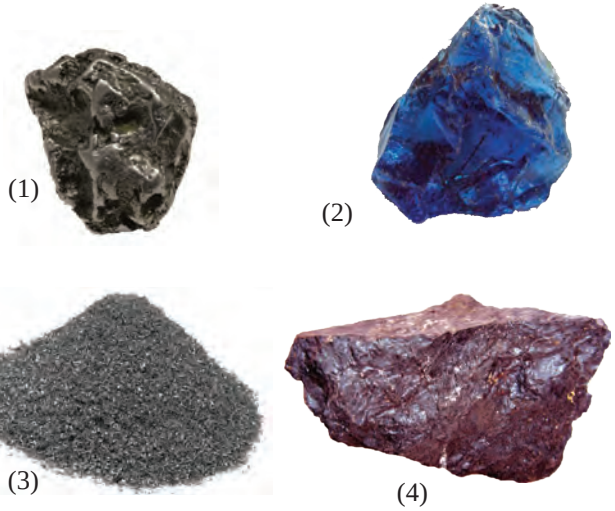

Figure 6.7 : 1. Lead 2. Cobalt 3. Manganese 4. Iron Ore

We get precious items like pearls, corals or ornamental items like shells, as also medicinal plants from the seas.

Oceanic Transport

Oceans have provided us the most economic option of transportation. Large scale transport of goods is carried out with the help of ships, trawlers, boats etc. (figure 6.8). International trade is carried out on a large scale using water-ways. Countries like Spain, Norway, Japan have a good coastline. Due to goods transport by ocean routes, these countries have gained importance.

Figure 6.8 : Water Transport

Ocean currents are quite important in water transport. As far as possible water transport is carried out along ocean currents. They accelerate the speed of ships and also save fuel to a considerable extent.

Water transport is conducted on a much higher scale as compared to other modes of transport. Hence, for transport of bulky materials like coal, crude oil, raw materials, metallic minerals, food grains, etc. water transport is given preference.

Figure 6.9 : Oil Spill

Issues Related to Oceans

About 70.8% of the surface of the earth is occupied by water. In order to fulfil his requirements, man undertakes many activities. These lead to the production of huge amounts of different types of waste. These waste materials cause pollution. Pollution of oceanic waters is a major and serious issue that has developed in recent times.

- Oil spills (fig 6.9).
- Releasing the waste produced in the coastal cities into the seas.
- Materials thrown out from ships.
- Exploitative fishing.
- Cutting of mangrove forests in coastal areas.
- Disasters caused by the water mines.
- Sewage released by industries and cities (figure 6.10).
- Excavations carried out in the seas.

All the things listed above lead to large scale pollution of oceanic waters. Some coastal regions are proving to be death traps for aquatic animals. As a result, many aquatic animals are under the threat of being extinct e.g. the blue whale, some types of sea turtles, dolphins, etc.

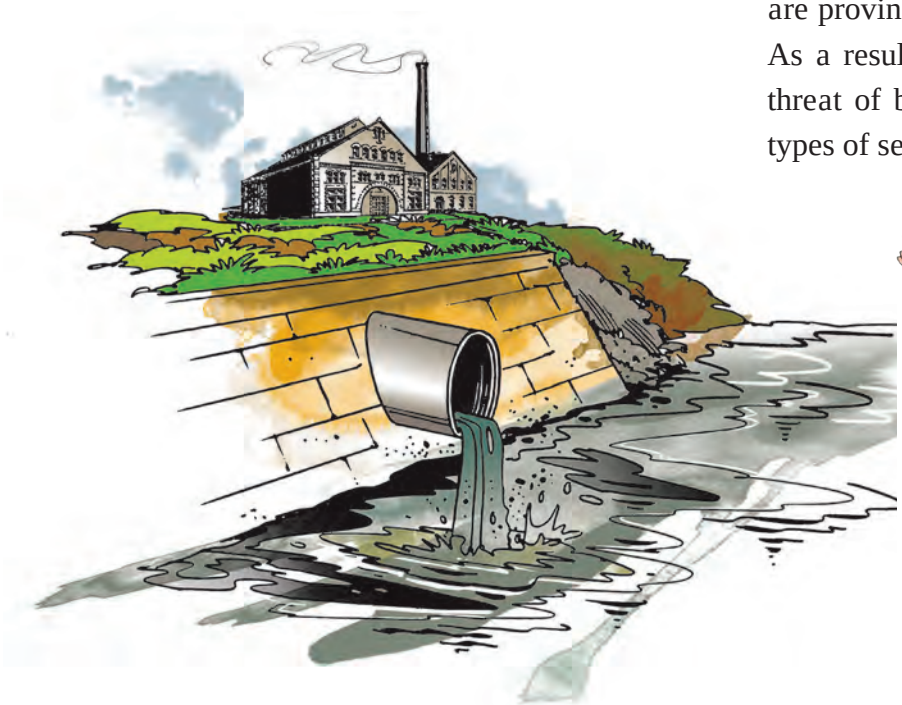

Figure 6.10 : Sewage being Released into the Sea

Always remember.

A larger proportion of the surface of the earth is occupied by water. Most of the water is salty. The living world in this salty water is suffering from the pollution caused by man. We must avoid this.

Can you do it?

Sameer and Sania are playing a game of showing the waterways on a map of the world. Their routes are going in opposite directions. One is following the eastern route while the other is taking a route that takes to the west.

- From Mumbai port some goods are to be taken to London in UK. On a map of the world, show at least two such routes with a pencil. Write down the names of the ports of different nations that fall on the route followed by each.

(1) Ports on the route followed by Sameer.

(2) Ports on the route followed by Sania.

- Which of the routes you feel is shorter? That of Sameer's or Sania's?
- Which oceans does one have to pass through if one follows Sameer's route or Sania's route?
- What are Panama and Suez? For what purpose were they constructed? Have these been used in Sameer's or Sania's routes?
- Find if there can be any route other than the ones that you have marked.

What will you do?

Different marine animals like the blue whale, turtle, starfish, etc. appear before you in your dream and complain to you. They say, "You humans are not allowing us to live properly. You throw the waste and chemicals that you do not want into our house. The youngsters in our house are falling ill due to this. Some are getting killed. You must think about this situation and remove the pollution from the seas." Now tell what you will do.

Think a little!

What would have happened if man had not discovered sea routes?

What will you do?

You live near Mumbai city. In your farm you have produced 1000 quintals of rice. There is a good demand for it in the overseas market than in the local market. A merchant from South Africa is ready to purchase this rice at a good price but he wants the import at Cape Town port within four months. Tell what you will do, as a good trader.

Always remember.

The proportion of water being greater than that of land, the earth is known as the water planet. Water in any form is a boon for the living world. Of all the planets known to man, the earth is the only one which has a living world.

Southern Ocean: The water body that extends from 60° S parallel to the coast of the Antarctic Continent is named as the Southern Ocean.

I can do this!

- *Tell about the items that can be obtained from the oceans.*
- *Tell the importance of oceans.*
- *Tell issues related to oceans.*

Exercises

(A) Find the odd man out.

(1) Shell, fish, crab, ship
(2) Arabian Sea, Mediterranean Sea, Dead Sea, Caspian Sea
(3) Sri Lanka, India, Norway, Peru
(4) Southern Ocean, Indian Ocean, Pacific Ocean, Bay of Bengal
(5) Natural gas, salt, gold, manganese

(B) Write the answers.

(1) Which items does man get from the oceans?
(2) Why is it economic to carry out transport by waterways?
(3) Why is there a difference in the climates of regions close to the oceans and regions far away from the oceans?
(4) Which continents are located along the coast of the Pacific Ocean?

Activity:
Colour the different oceans on an outline map of the world and prepare an index for the map. **(See inside front cover, figure B.)**

Project:
Group work: Make five groups. Each group should collect some information and pictures of one ocean. With the help of the information collected, each group should make a poster and make presentation.

Websites for reference

- http://en.wikipedia.org
- http://www.kidsgrog.com
- http://ocanservice.noaa.gov
- http://earthguid.ucsd.edu

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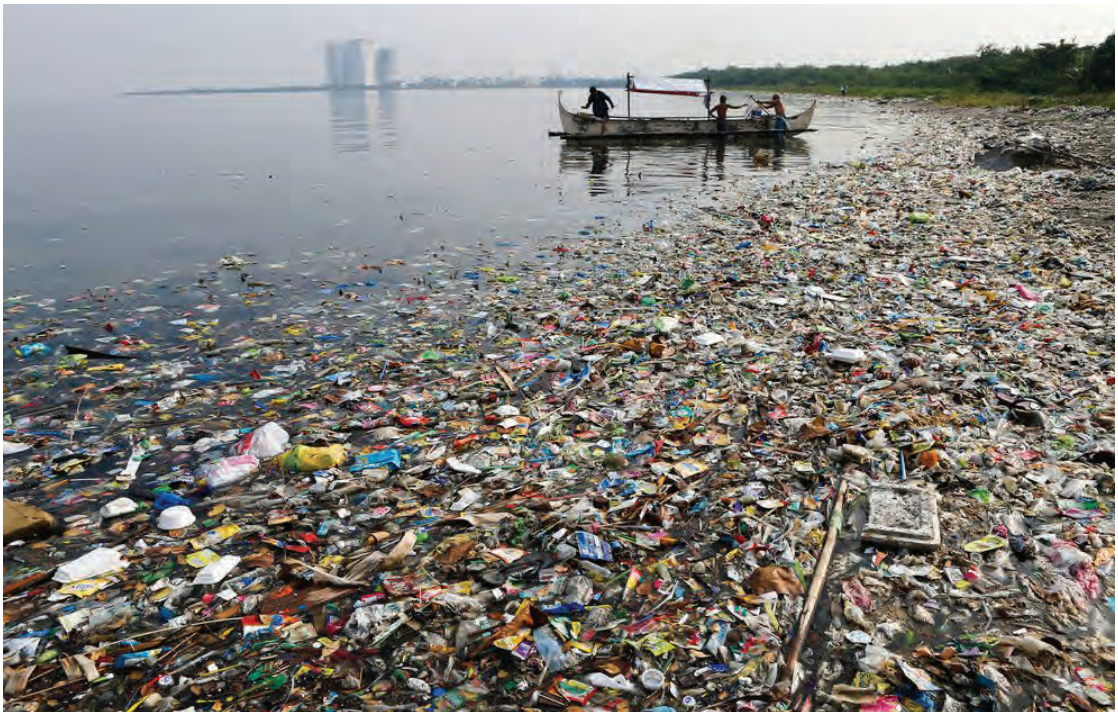

Which issue is indicated in this picture? What measures will you suggest to counter the issue?