5 Water

Glossary

Terrarium: It is an artificial enclosure for keeping small house plants.

Activity

Make your own Terrarium

A Terrarium

Fill one-fourth of a big jar with soil and press it well. Put a thin layer of humus on top of it. Plant the largest plants first and then arrange the smaller area around them. Spray the arrangement with water and close the jar. The water that evaporates from the leaves and soil condenses and falls back as forms of water drops.

When you think of water, what images come to your mind? You think of rivers, the waterfalls, the pitter patter of raindrops, water in your taps... Children love to float paper boats in rain puddles. By noon the puddles vanish. Where does the water go?

The sun's heat causes evaporation of water vapour. When the water vapour cools down, it condenses and forms clouds. From there it may fall on the land or sea in the form of rain, snow or sleet.

The process by which water continually changes its form and circulates between oceans, atmosphere and land is known as the water cycle (Fig 5.1).

Our earth is like a terrarium. The same water that existed centuries ago still exists today. The water used to irrigate a field in Haryana may have flowed down the Amazon River a hundred years ago.

The major sources of fresh water are the rivers, ponds, springs and glaciers. The ocean bodies and the seas contain salty water. The water of the oceans is salty or saline as it contains large

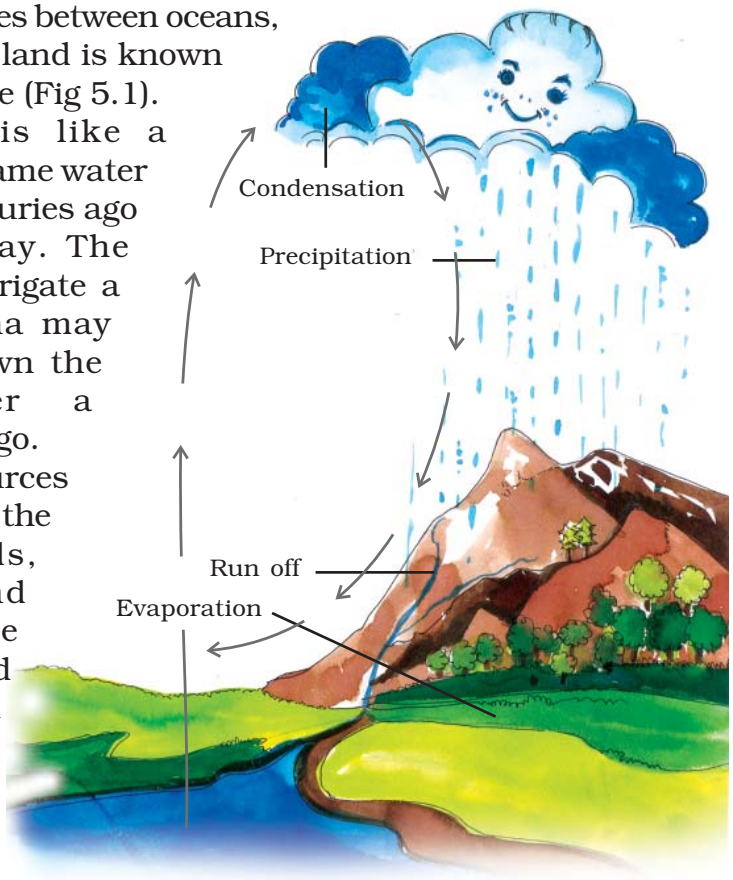


Fig. 5.1: Water Cycle

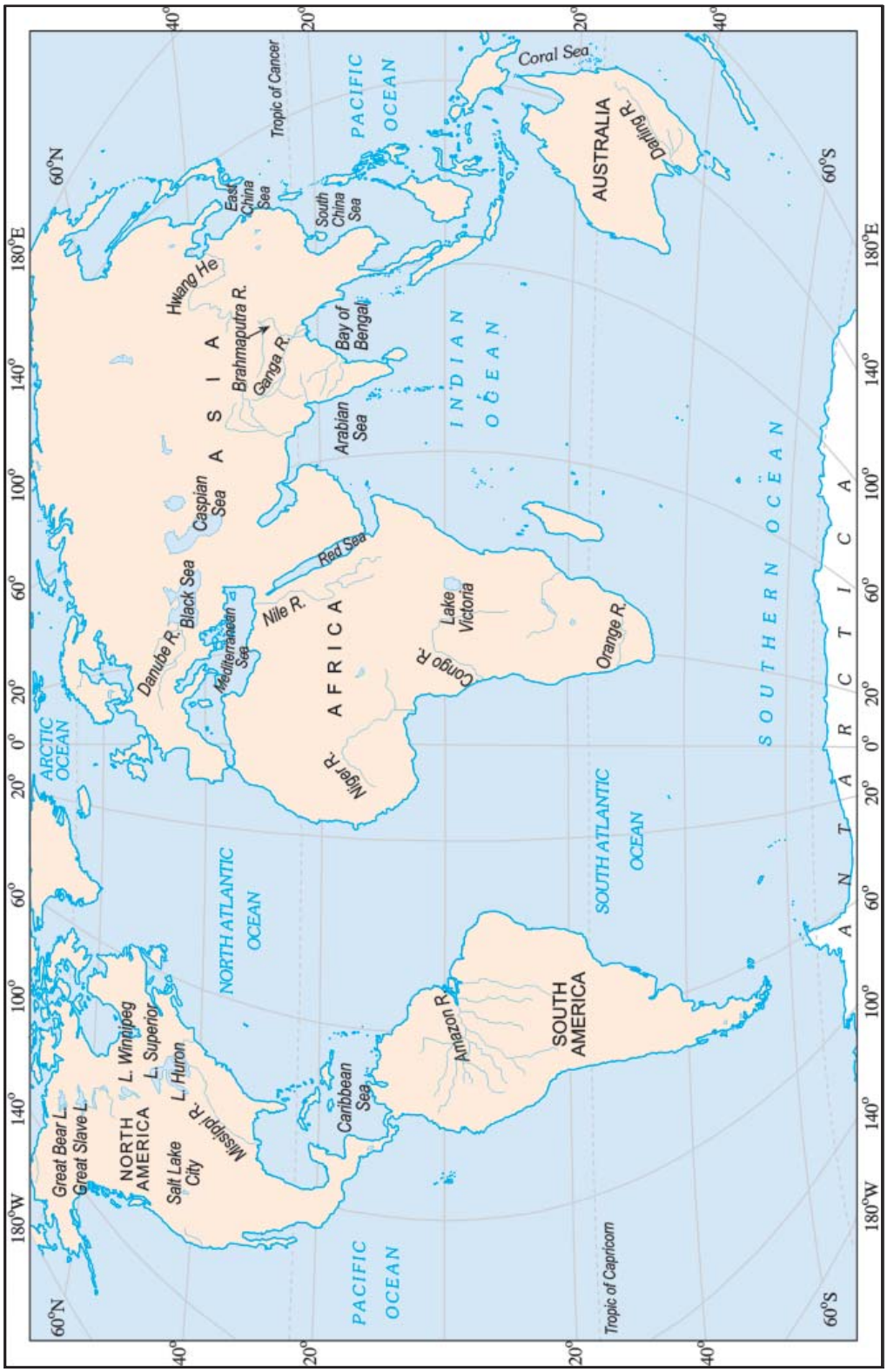


Fig. 5.2: World – Major Seas, Lakes and Rivers

amount of dissolved salts. Most of the salt is sodium chloride or the common table salt that you eat.

Salinity is the amount of salt in grams present in 1000 grams of water. The average salinity of the oceans is 35 parts per thousand.

Dead sea in Israel has salinity of 45 parts per thousand. Swimmers can float in it because the increased salt content make it dense.

Distribution of Water Bodies

We all know that three-fourth of the earth surface is covered by water. If there is more water than land on this earth, why do so many countries face water scarcity?

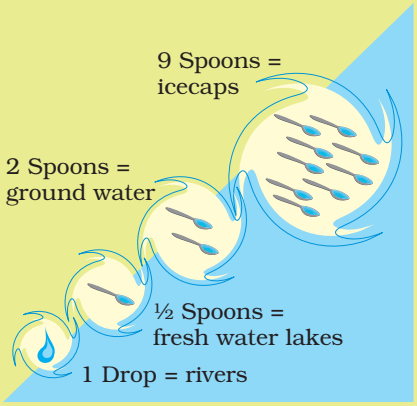
Is all the water on earth available to us? The following table gives the distribution of water in percentage.

Oceans	:	97.3	Saline Water
Ice-caps	:	02.0	Fresh Water
Ground water Fresh Water	:	0.68	
Fresh water lakes Inland seas &	:	0.009	
Salt lakes	:	0.009	
Atmosphere	:	0.0019	
Rivers	:	0.0001	
		100.00	

Water distribution can be demonstrated by a simple activity (see activity box).

Take 2 litres of water. Let it represent the total water on the surface of the earth. Measure out 12 spoons of water from this vessel into another bowl. The water that is left behind in the vessel represents the salty water found in oceans and seas. This water is obviously not fit for consuming. It is saline (contains salts).

The 12 spoons of water that was taken in a bowl is the total amount of fresh water on earth. The figure shows us the distribution of this fresh water. See for yourself how much water can actually be used by you.



Distribution of fresh water

Water is absolutely essential for survival. Water alone can quench our thirst when we are thirsty. Now don't you think we are wasting a precious resource when we use water carelessly?

- Why water is important for us?
- Suggest some ways in which water can be conserved in your home and in your school

Ocean Circulation

There is something magical about walking bare feet on the seashore. The wet sand on the beach, the cool breeze, the seabirds, the smell of the salt in the air and music of the waves; everything is so fascinating. Unlike the calm waters of ponds and lakes, ocean water keeps moving continuously. It is never still. The movements that occur in oceans can be broadly categorised as: waves, tides and currents.

Do you know?

March 22 is celebrated as World Water Day when the need to conserve water is reinforced in different ways.

Fig. 5.3: Pacific Ocean

Do you know?

Waves are formed when gentle winds scrape across the ocean surface. The stronger the wind blows, the bigger the wave becomes.

Waves

When you are playing throw ball on the beach and the ball falls into the water, what happens? It is fun to watch how the ball gets washed back to the shore by the waves. When the water on the surface of the ocean rises and falls alternately, they are called waves.

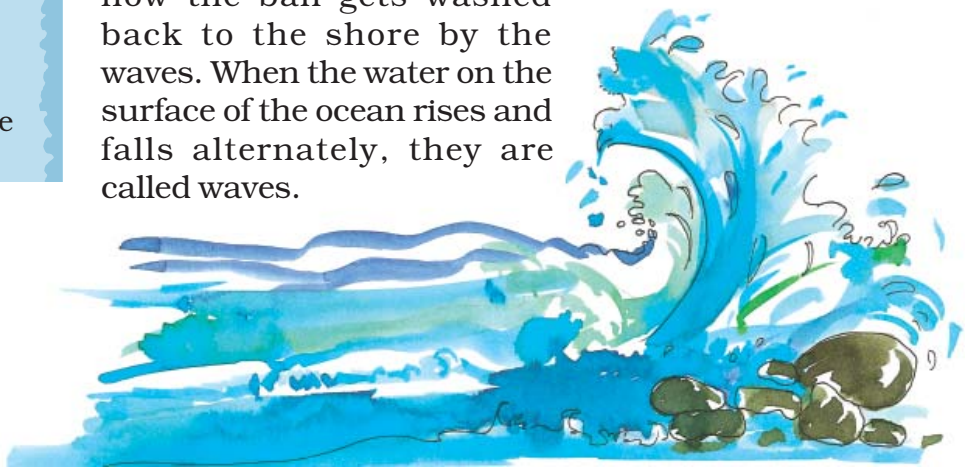


Fig. 5.4: Waves

Do you know?

Tsunami is a Japanese word that means "Harbour waves" as the harbours get destroyed whenever there is tsunami.

During a storm, the winds blowing at very high speed form huge waves. These may cause tremendous destruction. An earthquake, a volcanic eruption or underwater landslides can shift large amounts of ocean water. As a result a huge tidal wave called **tsunami**, that may be as high as 15m., is formed. The largest tsunami ever measured was 150m. high. These waves travel at a speed of more than 700 km. per hour. The tsunami of 2004 caused wide spread damage in the coastal areas of India. The Indira point in the Andaman and Nicobar islands got submerged after the tsunami.

TSUNAMI – THE EARTH'S PANDEMONIUM

Tsunami or the harbour wave struck havoc in the Indian Ocean on the 26 December 2004. The wave was the result of the earthquake that had its epicenter close to the western boundary of Sumatra. The magnitude of the earthquake was 9.0 on the Richter scale. As the Indian plate went under the Burma plate, there was a sudden movement of the sea floor, causing the earthquake. The ocean floor was displaced by about 10 – 20m and tilted in a downwardly direction. A huge mass of ocean water flowed to fill in the gap that was being created by the displacement. This marked the withdrawal of the water mass from the coastlines of the landmasses in the south and southeast Asia. After thrusting of the Indian plate below the Burma plate, the water mass rushed back towards the coastline. Tsunami travelled at a speed of about 800km. per hour, comparable to speed of commercial aircraft and completely washed away

some of the islands in the Indian ocean. The Indira point in the Andaman and Nicobar islands that marked the southernmost point of India got completely submerged. As the wave moved from earthquake epicenter from Sumatra towards the Andaman islands and Sri Lanka the wave length decreased with decreasing depth of water. The travel speed also declined from 700-900km. per hour to less than 70km. per hour. Tsunami waves travelled upto a depth of 3 km. from the coast killing more than 10,000 people and affected more than lakh of houses. In India, the worst affected were the coastal areas of Andhra Pradesh, Tamil Nadu, Kerala, Pondicherry and the Andaman and Nicobar Islands.

While the earthquake cannot be predicted in advance, it is possible to give a three-hour notice of a potential tsunami. Such early warning systems are in place across the Pacific ocean, but not in the Indian Ocean. Tsunamis are rare in the Indian Ocean as the seismic activity is less as compared to the Pacific.

Destruction caused by tsunami on Tamil Nadu Coast

The tsunami that ravaged the South and South east Asian coasts in December 2004, is the most devastating tsunami in the last several hundred years. The large damage caused to life and property was primarily a result of lack of monitoring, the early warning systems and knowledge among the coast dwellers of Indian ocean.

The first indication that tsunami is approaching is the rapid withdrawal of water from the coastal region, followed by destructive wave. When this happened on the coast, instead of people going to high ground, they started assembling at the coast to view the miracle. As a consequence there was a large casualty of curious onlookers when the gigantic wave (tsunami) struck.

Tides

The rhythmic rise and fall of ocean water twice in a day is called a tide. It is high tide when water covers much of the shore by rising to its highest level. It is low tide when water falls to its lowest level and recedes from the shore.

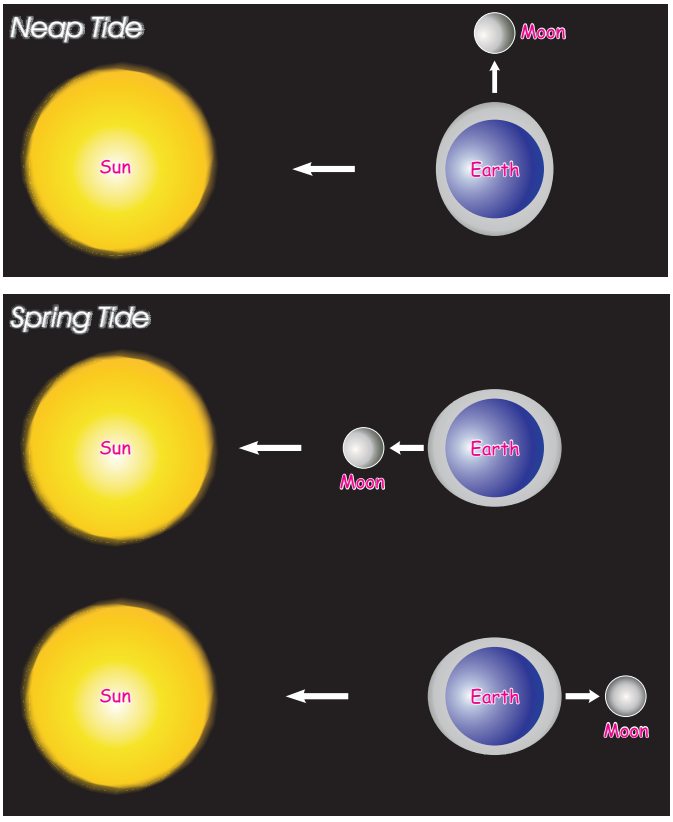


Fig. 5.5: Spring Tides and Neap Tide

The strong gravitational pull exerted by the sun and the moon on the earth's surface causes the tides. The water of the earth closer to the moon gets pulled under the influence of the moon's gravitational force and causes high tide. During the full moon and new moon days, the sun, the moon and the earth are in the same line and the tides are highest. These tides are called spring tides. But when the moon is in its first and last quarter, the ocean waters get drawn in diagonally opposite directions by the gravitational pull of sun and earth resulting in low tides. These tides are called neap tides (Fig. 5.5).

High tides help in navigation. They raise the water level close to the shores. This helps the ships to arrive at the harbour more easily. The high tides also help in fishing. Many more fish come closer to the shore during the high tide. This enables fishermen to get a plentiful catch. The rise and fall of water due to tides is being used to generate electricity in some places.

Fill three-fourths of a bucket with tap water. Heat the water by putting an immersion road on one side of the bucket. On the other side introduce an ice tray just removed from the freezer. Add a drop of red ink to observe the path of current by the process of convection.

Ocean Currents

Ocean currents are streams of water flowing constantly on the ocean surface in definite directions. The ocean currents may be warm or cold (Fig. 5.6). Generally, the warm ocean currents originate near the equator and move towards the poles. The cold currents carry water from polar or higher latitudes to tropical or lower latitudes. The Labrador Ocean current is cold current while the Gulf Stream is a warm current. The ocean current influence the temperature conditions of the area. Warm currents bring about warm temperature over land surface. The areas where the warm and cold currents meet provide the best fishing grounds of the

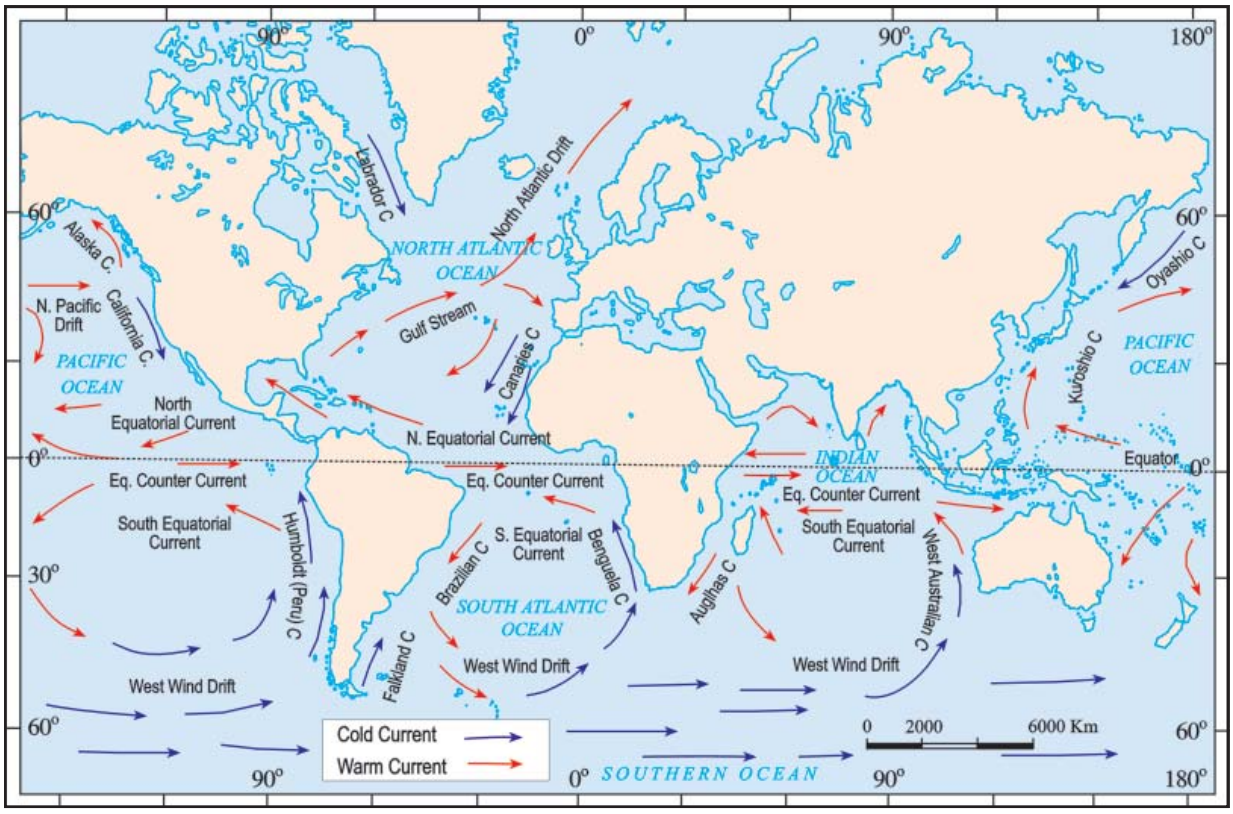


Fig. 5.6: Ocean Currents

world. Seas around Japan and the eastern coast of North America are such examples. The areas where a warm and cold current meet also experience foggy weather making it difficult for navigation.

1. Answer the following questions.

(i) What is precipitation?
(ii) What is water cycle?
(iii) What are the factors affecting the height of the waves?
(iv) Which factors affect the movement of ocean water?
(v) What are tides and how are they caused?
(vi) What are ocean currents?

2. Give reasons.

(i) Ocean water is salty.
(ii) The quality of water is deterioting.

3. Tick the correct answer.

(i) The process by which water continually changes its form and circulates between oceans, atmosphere and land

(a) Water cycle (b) Tides (c) Ocean currents

(ii) Generally the warm ocean currents originate near

(a) Poles (b) Equator (c) None of these

(iii) The rythmic rise and fall of ocean water twice in a day is called

(a) Tide (b) Ocean current (c) Wave

4. Match the following.

(i) Caspian Sea	Largest lake
(ii) Tide	Periodic rise and fall of water
(iii) Tsunami	Strong seismic waves.
(iv) Ocean currents	Streams of water moving in definite paths.

5. For fun.

Be a Detective

(i) The name of one river is hidden in each of the sentences below. Spot it.

Example: Mand**ra**, **Vi**jayalakshmi and Surinder are my best friends

Answer: Ravi

(a) The snake charmer's bustee, stables where horses are housed, and the piles of wood, all caught fire accidentally. (Hint: Another name for River Brahmputra)

(b) The conference manager put pad, material for reading and a pencil for each participant. (Hint: A distributary on the Ganga-Brahmputra delta)

(c) Either jealousy or anger cause a person's fall (Hint: Name of a juicy fruit!)

(d) Bhavani germinated the seeds in a pot (Hint: Look for her in West Africa)

(e) "I am a zonal champion now" declared the excited atheletic. (Hint: The river that has he biggest basin in the world)

(f) The tiffin box rolled down and all the food fell in dusty potholes. (Hint: Rises in India and journeys through Pakistan)

(g) Malini leaned against the pole when she felt that she was going to faint. (Hint: Her delta in Egypt is famous)

(h) Samantha mesmerised everybody with her magic tricks. (Hint: London is situated on her estuary)

(i) "In this neighbourhood, please don't yell! Owners of these houses like to have peace". Warned my father when we moved into our new flat". (Hint: colour!)

(j) 'Write the following words, Marc!' "On", "go", "in"…… said the teacher to the little boy in KG Class. (Hint: Rhymes with 'bongo')

Now make some more on your own and ask your classmates to spot the hidden name. You can do this with any name: that of a lake, mountains, trees, fruits, school items etc.

Carry on Detective

(ii) With the help of an atlas, draw each river which you discoverd in For fun (i), on an outline map of the world.