



Be Water Wise!

A Booklet on Conservation of Water

A NOTE FOR TEACHERS

We have created this booklet on conservation of water for Teachers to use activities and worksheets to inculcate the importance of water conservation in students that can lead to a behavioural change in them and they can influence their family and community to become water wise. This booklet is an ensemble of concepts, activities and worksheets which will help teachers in easily communicating the importance of water conservation to students. Due to various factors like excessive usage, climate change, concrete infrastructures, pollution and population India is becoming a water stressed country. Major cities like Delhi, Bangalore are facing the problem of water crisis as the ground water level is going down at a fast pace. It has become imperative for us to seriously think towards conserving this elixir of life.

We at Climate Reality India believe individuals, students, community groups and schools can greatly contribute towards bringing a change to make people think and act towards conserving water.

Last updated: June 2018

WATER

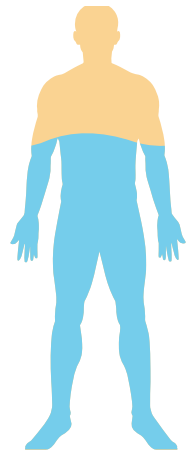


This is the picture of Earth from Space. Do you know what makes our Earth appear blue? Yes, the presence of water on the surface of earth makes it appear blue. The three fourth surface of our earth is covered with water present in the sea, oceans, rivers, lakes, glaciers, ice caps.



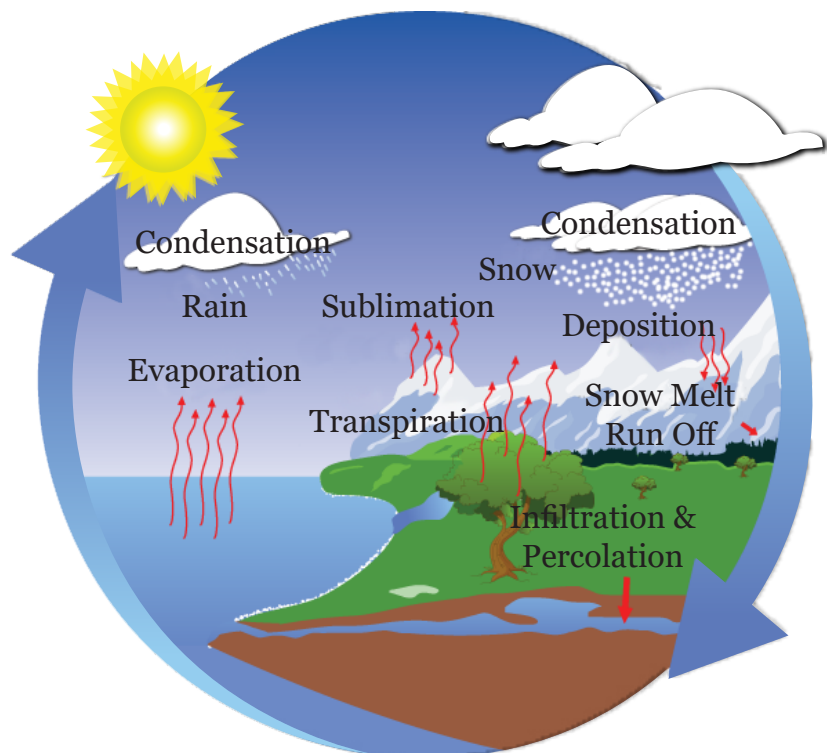
Riddle: If water is a colourless liquid so what makes the water bodies appear blue?

Water is a necessity for all living beings. Its importance can be deduced from the fact that the life first originated in water and more than 60% of our bodies are made up of water only. A human being can go without food for weeks but cannot survive for more than a week without water. Water is indispensable for all living beings.



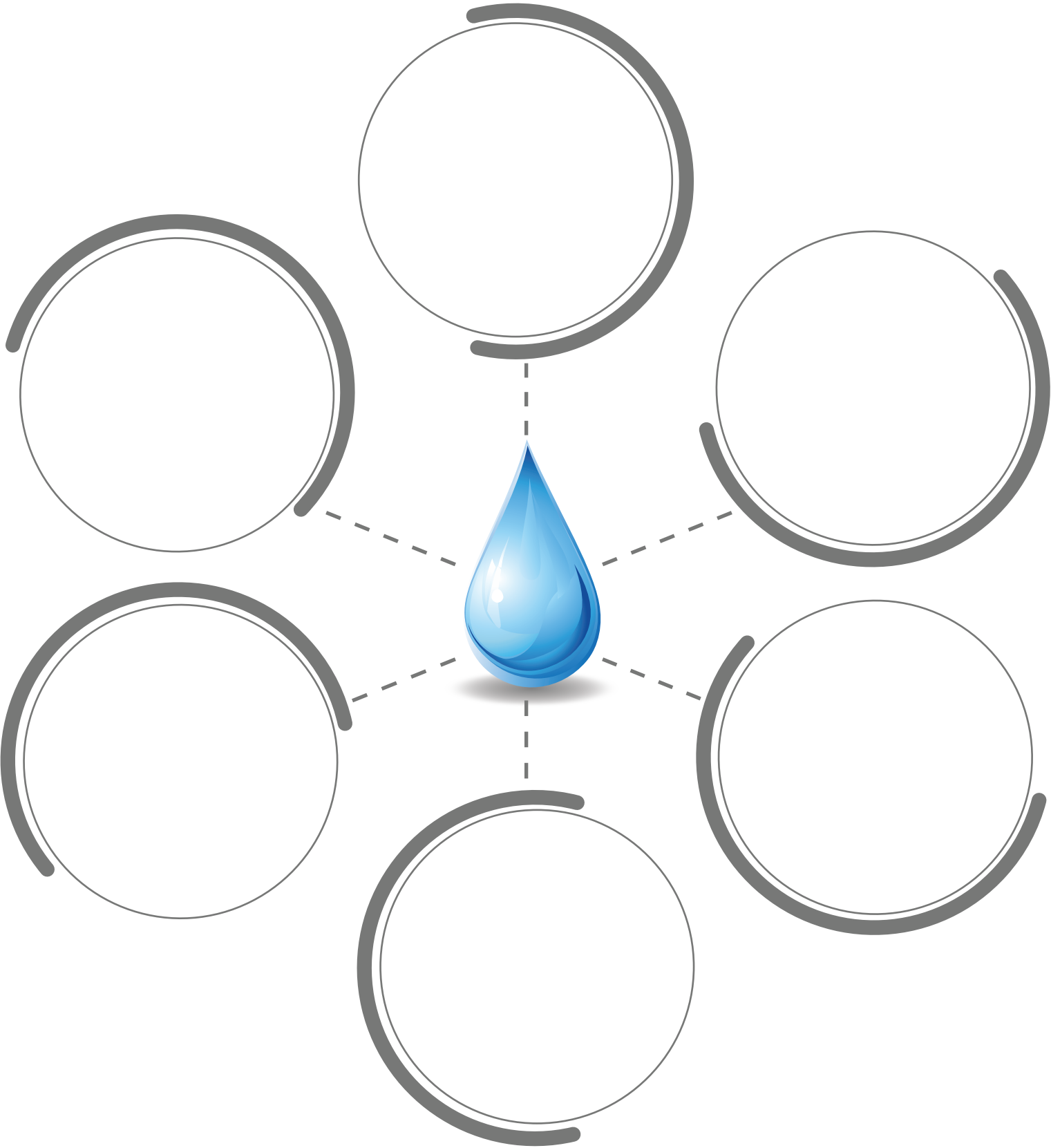
You must have heard that camels can go without water in the hot deserts for days but they do not hold water in their body. Find out how camels go without water for days in the deserts?

It is water only that balances the climate and weather by the help of hydrological cycle and ensures the continuous availability of water on earth and makes it a renewable resource. We produce electricity with the help of water and our agriculture depends totally on the availability of water. One of the factors that makes earth conducive for living is the presence of water and that is why there is no other Earth!



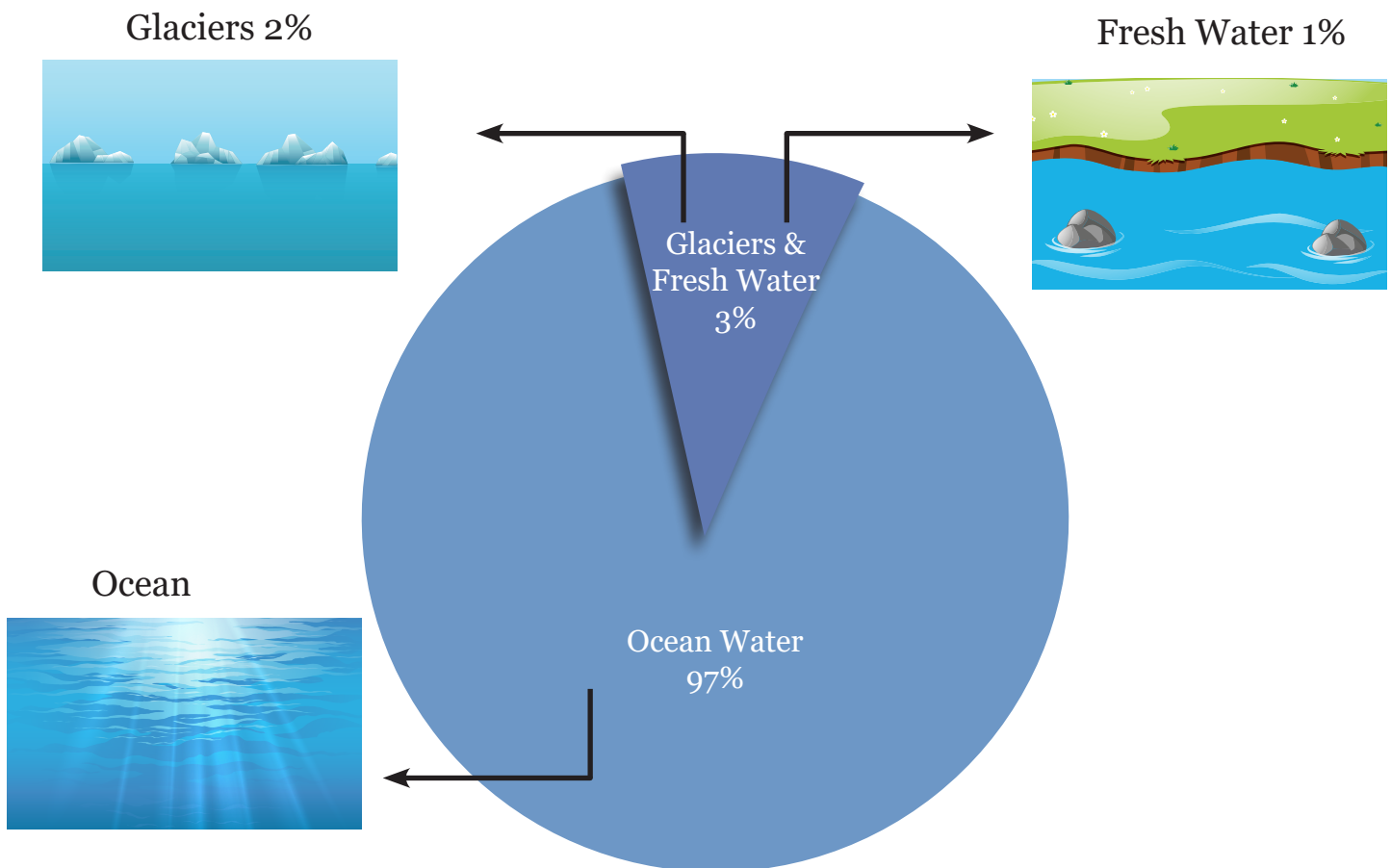
WORKSHEET

List six things for which you use water



NEED FOR CONSERVATION

It is true that three fourth the part of our Earth is covered by water but 97% of this water is found in oceans, 2% is trapped in polar ice caps and glaciers and the rest 1% is fresh water available for us to use as ground water and surface water. The ocean water is salty and cannot be used by us. So, that leaves us with just 1% of fresh water for the consumption of more than 7 billion residents of Earth.



Availability of water on Earth

In India, we have 17% of the world's population but only 4% of the world's water. Moreover, the important rivers like Yamuna and Ganga comes under the world's most polluted rivers. The improper disposal of industrial, agricultural and household waste water has polluted not only these surface water bodies but also the ground water. The excessive usage of ground water and construction of cemented structures that stops the rain water from percolating down the soil which prevents the recharge of the ground water, is depleting the ground water level at a very fast pace. Various other factors like climate change, wastage of water, lack of awareness etc further aggravates the situation.

WATER POLLUTION

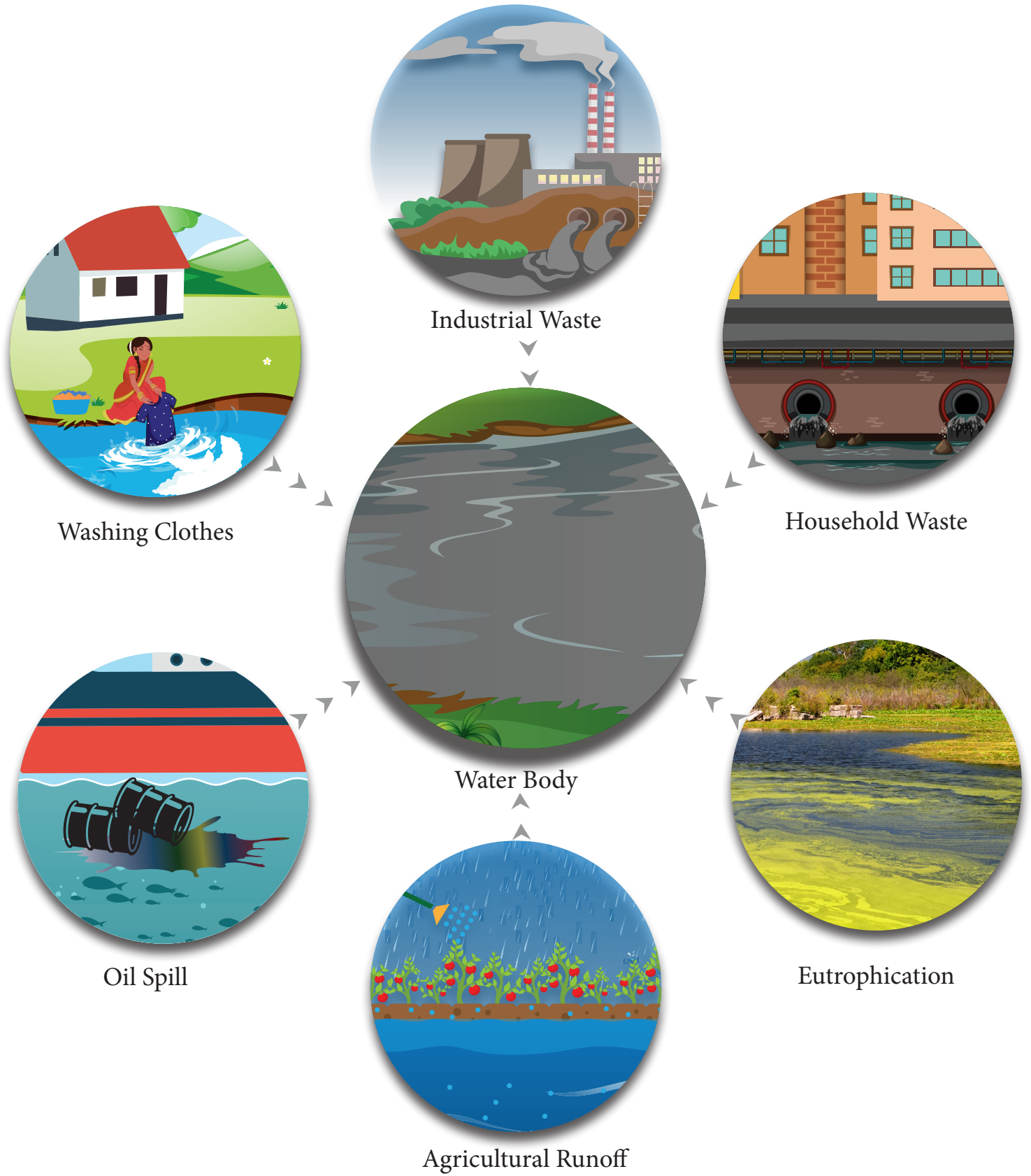
When pollutants like particles, chemicals and solid waste is added to the water making it unfit for use or for living of animals, it is called water pollution.

How the water bodies get polluted?

The main source of pollution is the discharge of untreated domestic waste or sewage that pollutes the surface and ground water. On an average we use 135 litres of water per day per person in our homes for washing, cooking, cooling, and bathing. 70-80% of this water gets discharged into the drains from our homes and are drained out in the rivers and lakes, polluting the surface water.

Industrial waste, agricultural runoff and human activities near the river banks like washing clothes, bathing and open defecation also leads to water pollution.

Sometimes, huge ships carrying oil, accidentally spills the oil into the ocean. This oil is sticky and poisonous and can even kill the birds, turtles and other ocean dwellers.



Various ways by which a water body gets polluted

WHAT IS A WATER CYCLE

Water is the only natural substance that exists in all the three states of matter, it is usually found in liquid form but it can get converted into vapour (gas) and ice (solid).



Water



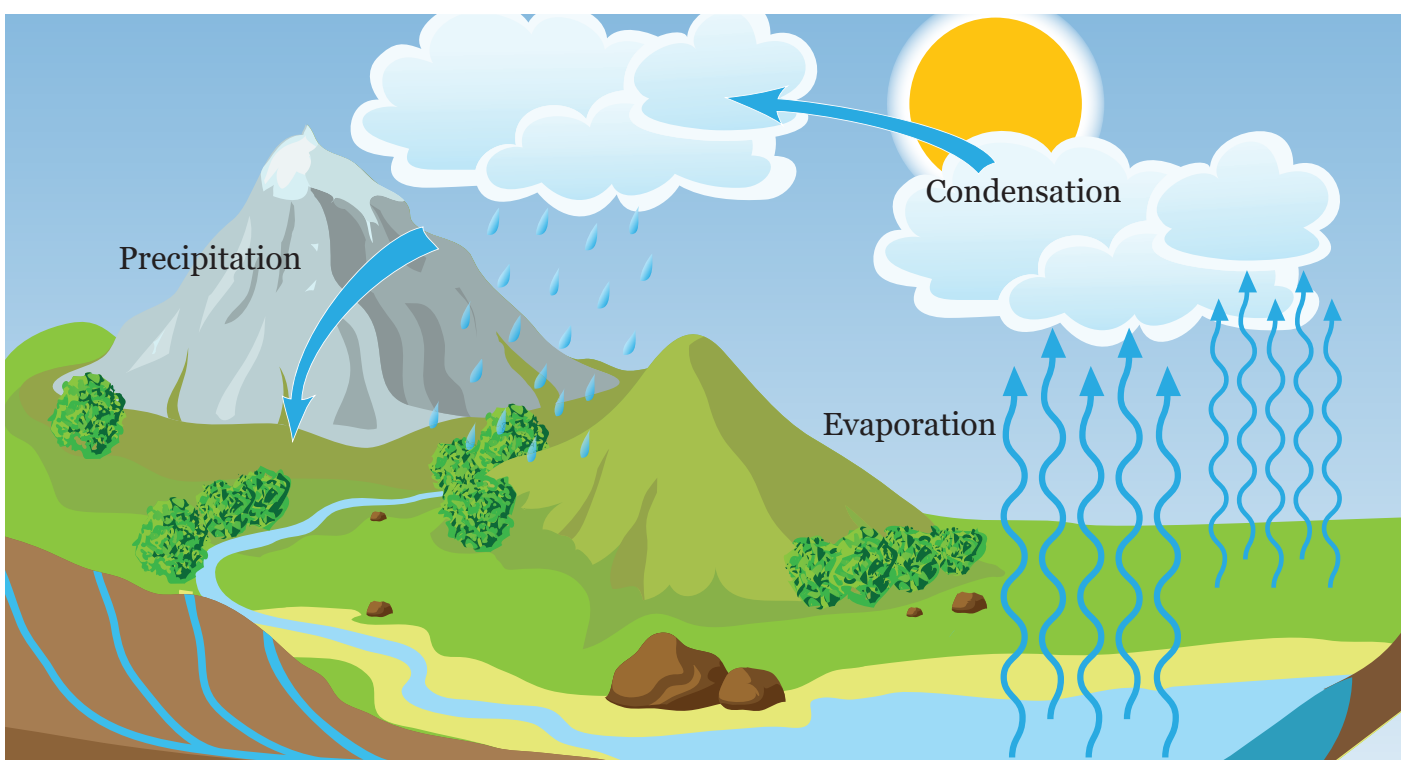
Ice



Gas Form

Hydrological cycle or Water Cycle

When the sun heats up the surface of the oceans, lakes and rivers, the water gets converted into 'vapours' and rise high up in the sky. There these water vapours get condensed and turn back into liquid and form clouds. When a lot of water gets collected by the cloud and it is too heavy for it to hold, the water falls back on earth as precipitation in the form of rain or snow. The rain water gets collected again by the oceans, lakes and rivers to again get evaporated and this cycle continues. This is called water cycle. So the water that we use can be as much as 4 billion years old!



Water Cycle Diagram

ACTIVITY

You can see the process of condensation, evaporation and precipitation at your home!

You will need: Two plastic cups, ice and hot water

Steps:

1. Take some hot water in one of the plastic cups.



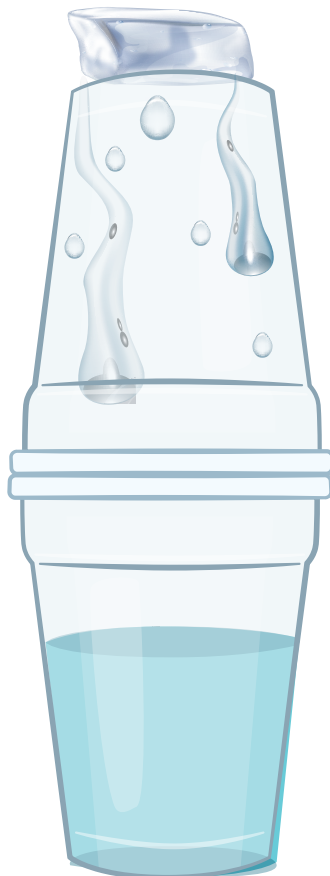
2. Put the other empty plastic cup over the first one, upside down.



3. Place some ice on the top of flipped plastic cup.



4. Now observe the empty plastic cup.



What did you find? You can see the vapours rising from the hot water and there are some drops of water on the walls of the empty plastic cup which are coming back into the cup with water. The hot water is releasing vapours that are getting condensed due to ice and forming water droplets which are then falling back into the plastic cup again.

This process of water getting converted into vapours is called evaporation. The process of vapours getting converted into water is called condensation and when the condensed water vapours fall back on earth in the form of rain it is called precipitation.

“Water distribution is not equal everywhere on Earth”. Discuss it with your peers and elders and write about it.

What form of precipitation (rain, snow) is seen in your city? Find out the amount of precipitation received in your area in a year.

When we bring out a water bottle out of fridge and keep it at room temperature, after sometime you can see water droplets on the bottle. What do you think from where those droplets come?

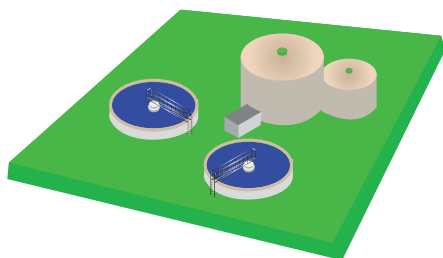
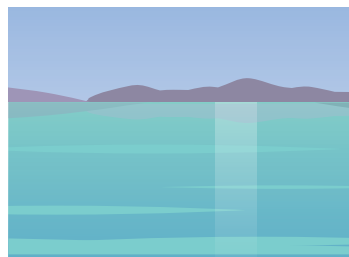
Find out what are wetlands and how do they contribute in recharging ground water level?

JOURNEY OF WATER

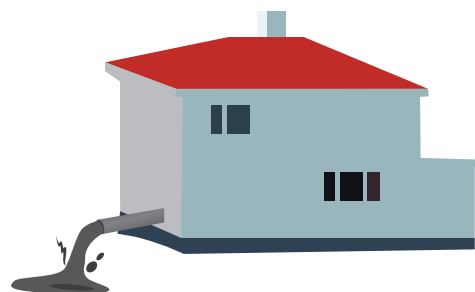
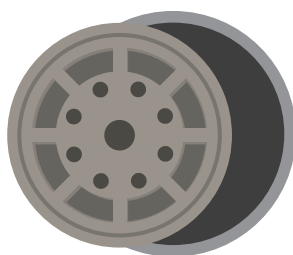
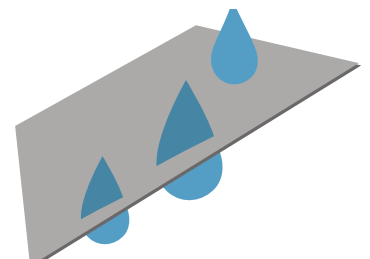
Have you ever thought how we get the water that we use for our daily chores? For most of us living in the urban areas it is very easy, we just turn our taps on and there we have the water! But how does water reach our homes to our taps?

The main source of water for any place is precipitation. Water falls on earth in the form of rain and snow and fills the rivers, lakes, ponds and recharges the ground water. In rural areas, people use water directly from the rivers and lakes while in urban areas the water is extracted from the ground.

The journey of water starts from a source like a river or ground water. This water is treated and made fit for drinking purposes then through various pipes, it is sent to our homes. After the usage, the waste water goes into the sewers and from there to sewage treatment plants. The sewage treatment plants treat the water and releases back into the river.



Journey
of
Water



CLIMATE CHANGE & WATER CYCLE

Deforestation and releasing greenhouse gases like Carbon dioxide, methane, nitrous oxide into the atmosphere is having drastic impact on the global climate. Our earth is warming up at its fastest rate. This change has directly affected things like water vapor concentrations, clouds, and precipitation and stream flow patterns.

Change in climate causes both the occurrence of flash floods and extreme droughts

Climate change causing the heavy rains:

The rate of evaporation from the ocean is increasing as the world warms. Think about heating a large pot of water on your stove – the higher you turn the dial, the faster the water evaporates. Pretty much the same thing happens with the planet, and globally, this higher rate of evaporation contributes to more extreme rain and snow events. In India, we have been witnessing such flash floods and heavy downpours in various parts of the country.

Climate change causing the extreme droughts: Climate change causing the extreme droughts:

As temperatures rise, evaporation increases, and soils dry out. When rain does come, it often falls as a violent downpour that doesn't do much to help crops or other plants. Instead of gently soaking into the soil, the water hits very hard ground and runs off, often causing disastrous flooding before draining into rivers and being carried back to the sea. The soil remains mostly dry, and the increased global temperature results in still more evaporation and further increased risk of drought.

HOW CLIMATE CHANGE IMPACTS WEATHER

THE SCIENCE

CHANGES IN THE WATER CYCLE ARE INCREASING THE RISK OF DROUGHTS AND FLOODS.



Higher temperatures mean there is more evaporation from the land and sea into the atmosphere.



As air gets warmer, it can hold more water vapor. This can lead to more intense rainstorms.



Intense rainstorms increase the risk of flooding. Much of the water runs off into rivers and streams, doing little to dampen soil.



This, combined with increased temperatures, increases the risk of drought.

EVAPORATION

PRECIPITATION

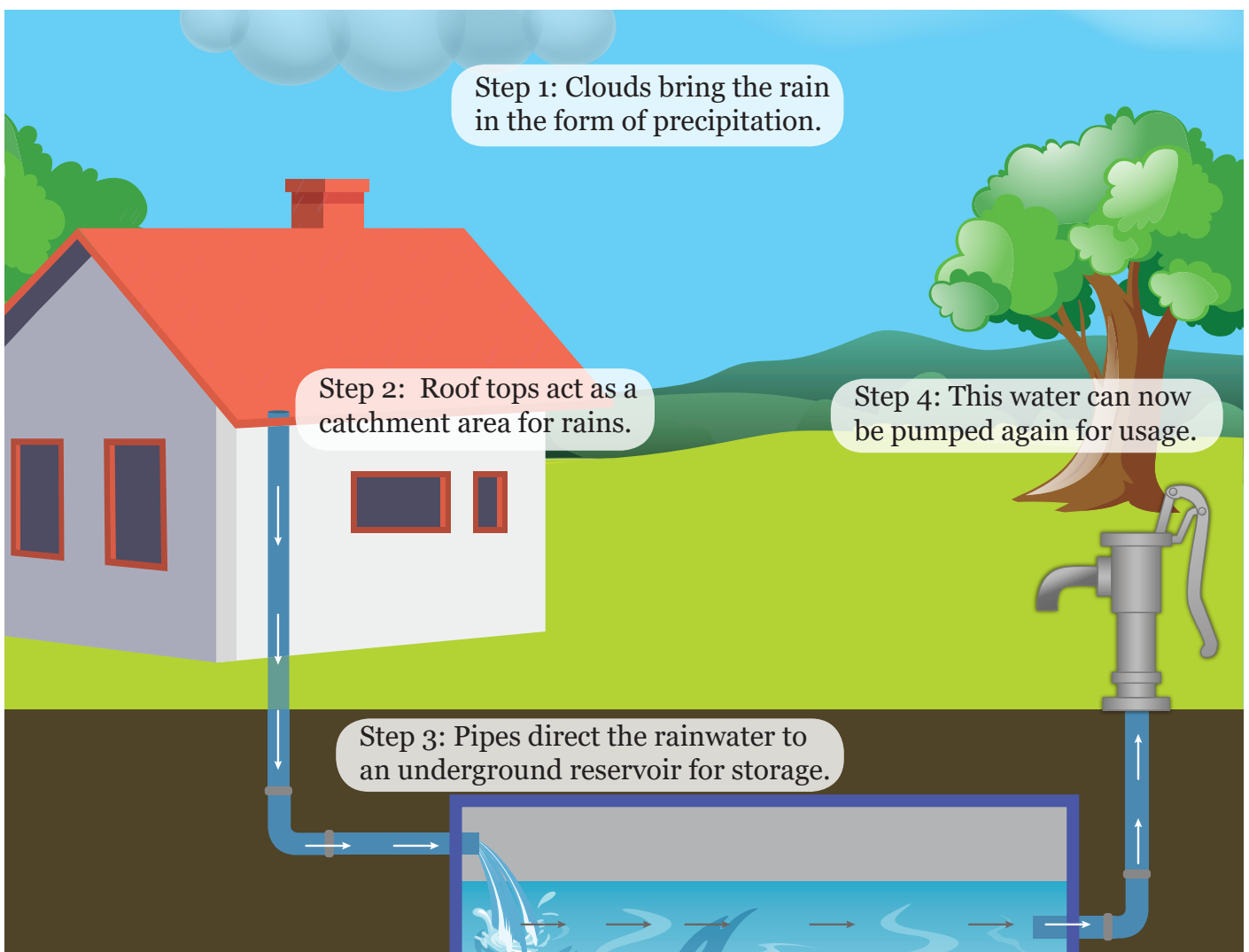
WATER
CYCLE

RUNOFF

RAIN WATER HARVESTING

Rain water harvesting is a technique used for collecting and storing rainwater by using various means for the future use like irrigation, household use or for livestock. In the rooftop rain water harvesting system, the roof of a building or house acts as a catchment area where the rain water gets accumulated. This water is then directed to a reservoir with the help of pipes and gutters. Rain water can be collected into the natural reservoirs or artificial tanks. The water in the natural reservoirs recharges the ground water by percolating down the soil. The water can be treated and even use for drinking purposes.

Rooftop rain water harvesting is of big importance to the people living in the areas with lesser rainfall. They can continue seasonal crop harvesting using collected rain water in the lack of regular water supply. Even in urban areas now, the rain water harvesting is being promoted as the ground water is depleting at a fast rate and it is getting hard to meet the requirements of the population.



Rain Water Harvesting

1. Why do you think it is important for us to replenish the ground water?

2. Do you have rain water harvesting system in your school or home? If not, discuss the reason with your teachers and elders.

3. Do you feel the infrastructure around your house or school can stop the rain water from percolating into the soil? If yes click and share the picture in the box or make a drawing explaining how the infrastructure stops the rain from percolating into the soil.



WORKSHEET

1. Fill in the blanks with the correct word from the Box given below.

1. Process of conversion of surface water into vapours is called _____.
2. Falling back of water on earth in the form of rain or snow is called _____.
3. _____ provide the most amount of water through evaporation to water cycle.
4. Process of conversion of water vapours into liquid is called _____.
5. Water is found in _____ states of matter.
6. Water found beneath the ground, between the rocks, is called _____.
7. A land saturated with water which acts as a sponge holding a lot of water and helps in recharging Ground water _____.
8. _____ provides the energy that drives the water cycle.
9. The evaporation of water from the plant leaves is called _____.
10. Most of the fresh water is locked up in the _____.

Clues:

Aquifers, Evaporation, Wetland, transpiration, Sun, Condensation, Polar ice caps, Oceans, Precipitation, Three

WATER AUDIT:

How much water we consume in a day?

Water is a necessity for life but still everyday we waste a lot of water and do not consume it wisely. Leaving tap open while brushing, taking long showers, using faucets for washing cars or gardening, leaking taps waste a lot of water every day. In many parts of India, people struggle to arrange water for their daily needs.

Did you hear about the water crisis in Cape Town? The people in Cape Town were facing water scarcity so much so that the government started water rationing and people were allowed only 50 litres per day in February 2018. India also may soon become a water stressed country and Bangalore will be the first city to run out of water according to sources if serious measures are not taken towards saving water.

Carry out this water audit to calculate the amount of water usage in a day-

Sr. No.	Activities	Amount (in litres)	No. of Times (in a day)	Total Litre
1.	Brushing Teth (Tap on/Tap off)	5/1	X _____	=
2.	Washing Hands and Face	5	X _____	=
3.	Shower per minute	20	X _____	=
4.	Bath (A bucket)	10	X _____	=
5.	Flushing	12	X _____	=
6.	Drinking	.25	X _____	=
7.	Cooking	10	X _____	=
8.	Total			

Total Consumption- _____ Litres

List the things that you think can be done to reduce the amount of water used by you in a day.

WORKSHEET

Every year, during summers you must have heard or experienced the shortage of water. In the urban areas, we just turn our taps on and we have water for our daily consumption, but do you know in areas like Rajasthan, women walk miles to get water for their daily needs? Due to Climate change the rainfall pattern has become uneven and due to excessive consumption and poor percolation of rain water, the level of ground water has been decreasing. Earlier, ground water could be reached at 20 feet and now it cannot be reached even at 200 feet.

This makes the conservation of water very essential for all of us.

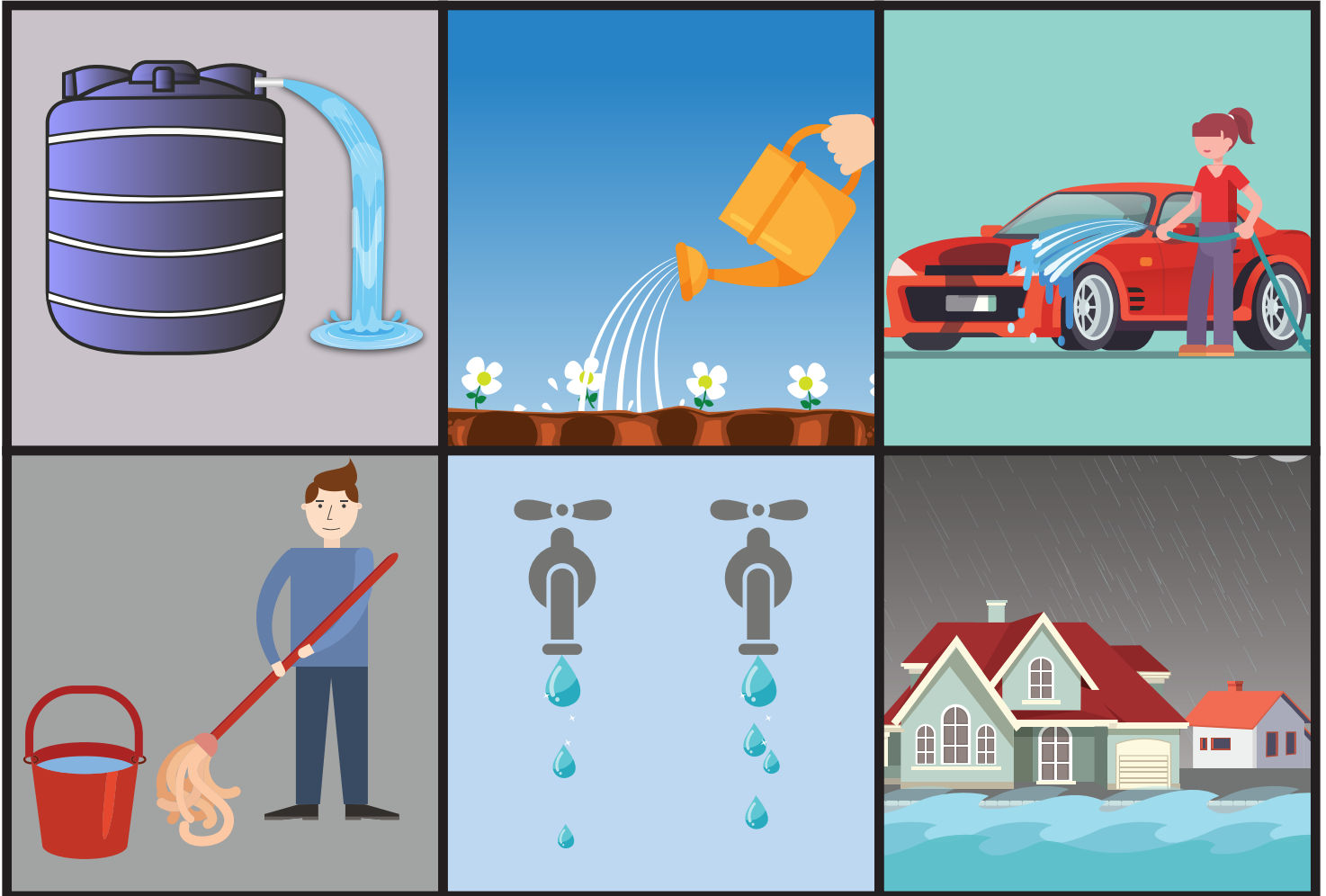
Do you know with a single leaking tap getting one drop of water wasted per second, how much water gets wasted in a day ?

**Leakage of one drop of water per second in a day is equal to 21
Litres
(1 litre = 4000 drops)**

21 litres! That is a lot of water.

You can calculate the wastage of water in a day at your home:

Circle the activities that involves wastage of water and advise the correct usage.

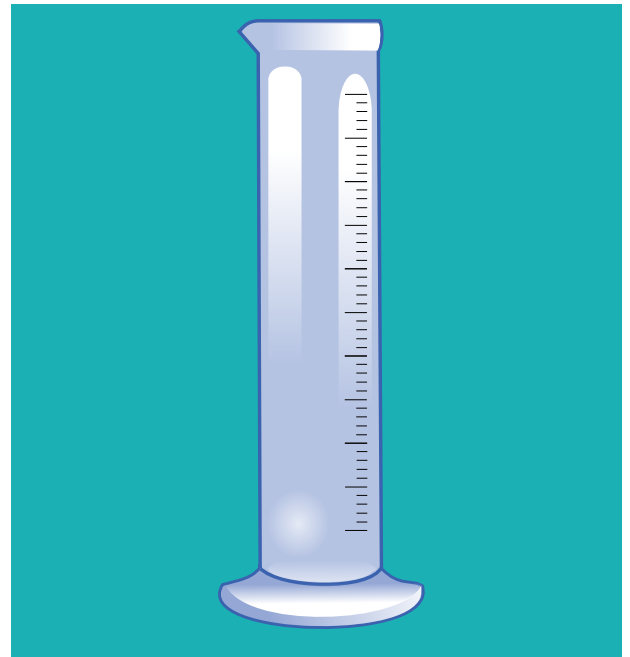


Imagine a day without a drop of water and write down the problems that you think you will face.

ACTIVITY: COUNT THE DROPS

Do you want to see how much water gets wasted from a leaking tap in your home?

You will need: A measuring cylinder and a stop watch.



1. Take a measuring cylinder and make sure there is no moisture in it.
2. Now start the stop watch and start filling the cylinder.
3. Stop the watch after one minute and observe the level of water.

Calculation:

Amount of water measured in one minute ml (Say y ml)

Now, multiply this amount with $y/1000 \times 1440 =$ Litres

This is the amount of water wasted by one leaking tap in a day at your home. Now repeat this process with other leaking taps (if any) and add the amount of water wasted by different taps to calculate the total amount of wastage of water at your home.

Now you know how much water can be wasted from a leaking tap so if you

ever see a leaking tap in your home or school ask your parents or school authority to fix the leaking taps and always tightly close the tap to avoid dripping.

1. What is the situation of availability of water in your area?

2. Discuss with your parents if they have ever faced water crisis and how they dealt with it and write about it?

3. Do you have a submersible/handpump/borewell in your home/Society? If yes, ask your elders what was the groundwater level in their age and how it has changed over the years?

TIPS TO BECOME WATER WISE:



1. Use bucket to bath instead of showering or shower for less than 5 minutes to save thousands of litres of water in a month.
2. Use bucket of water to wash the car instead of the hose pipe.
3. Do not leave tap open while brushing or shaving.
4. Use sprinklers to water the garden instead of the hose pipe.
5. Water the garden in the morning or evening when the evaporation rate is low.
6. Get a water alarm installed in water tanks situated at the roof tops to avoid water wastage from over flowing tanks.
7. Collect the water you use for washing fruits and vegetables and use it to water house plants.
8. Check the leaking faucets and toilets and get it fixed to save litres.
9. You can also upgrade your toilets with newer water saving models, it reduces the water amount used for every flush.
10. Use the dual flush toilets that half flush for liquid waste and full flush for solid waste.
11. Use a broom instead of a hose to clean patios, sidewalks and drive-ways, and save water every time.
12. Empty your water bottles in plants outside or inside your homes.

WATER QUIZ

Take this Quiz to see what you have learnt

1. Earth has a lot of water and we do not need to conserve it.
 - a. True
 - b. False
2. Which of these contribute the most to polluting surface and ground water?
 - a. Industrial waste
 - b. Agricultural run off
 - c. Untreated domestic sewage
 - d. Washing clothes in rivers
3. It is a good idea to water the plants early morning or late evening as during this time the rate of evaporation is slow.
 - a. True
 - b. False
4. A leaky tap with a drop leaking per second can waste as much as _____ litres of water.
 - a. 32
 - b. 21
 - c. 49
 - d. 7
5. Which of these activities waste a lot of water?
 - a. Open taps while brushing
 - b. Using hose pipes to clean cars
 - c. Taking long showers
 - d. All the above

6. Rain Water Harvesting helps us in recharging the-
- Surface water
 - Oceans
 - Ground water
 - None of these
7. Water cycle involves evaporation, condensation and _____
- Precipitation
 - Conduction
 - Transpiration
 - Convection
8. Climate Change effects the Water cycle by causing the excessive evaporation of moisture from the soil and surface water, leading to floods and drought.
- True
 - False
9. Grey water can be used to water the garden or flushing the toilets. What is grey water?
- Relatively clean water from bathroom, kitchen and laundry
 - Water in the drains
 - Water that has been coloured grey
 - None of these
10. A smart way to conserve water per flush is to put a brick or a bottle full of sand in the flush tank.
- True
 - False

NOTES