

Teacher's Guide

Water: A Precious Resource

Period 1

Based on the NCERT curriculum for Standard VII



JANAAGRAHA CENTRE FOR CITIZENSHIP & DEMOCRACY

Janaagraha's initiative to improve citizen engagement in India's democracy through their civic learning program

Developed in collaboration with Young Leaders for Active Citizenship (YLAC)

Water: A Precious Resource | Teacher's Guide (1/3) Period 1

Class VII
Board – CBSE
Subject – Science
Textbook – Science Textbook for Class VII (NCERT)
Chapter 16 – Water: A Precious Resource
Number of periods – 03
Length – 80 minutes

Section I – What are we going to learn and why is it important?

Learning objectives

Students will:

- Understand that all the natural resources are scarce and therefore need to be conserved.
- Learn that there is shortage of water on earth, which is fit for human consumption.
- Understand why there is a gap between supply and demand of water.
- Appreciate that over consumption of resources by some people leads to problems for others.
- Gain knowledge of the different forms of water and the water cycle.



Learning outcomes

Students will:

- Appreciate that all resources need to be used judiciously.
- Become introspective about their individual water consumption.
- Become conscious about their role in conservation of resources and become advocates of judicious consumption in their families.
- Create awareness that over consumption of a resource negatively impacts lives of others.

Key Terms

Water Cycle	Solid	Liquid	Gaseous	Water Scarcity
Evaporation	Perspiration	Condensation	Transpiration	Water Conservation

Section II – How are we going to learn?

Discussion on scarcity of resources

Time: 10 minutes

Facilitation notes:

Have the following discussion with the students to introduce them to scarcity of resources:

- Have you ever played the musical chairs? What happens in that game?
- *Take a couple of responses from the students, let them explain the game.*
- The number of chairs is one less than the people going around them. And when the music stops, generally there is a rush to take the available chairs. Sometimes fights also break out on who took the chair first!
- Mankind also plays a kind of musical chairs when it comes to resources. There is never enough for all of us- whether it is water, energy or the environment (forests, green spaces, etc.) and everyone is trying to get the most of them.
- There is always a scarcity of resources in the world.
- Most of the wars in history are also therefore are fought by mankind on division of these resources- you must have heard in the news that states within India fight over water, countries fight over control of oil, etc. When things get out of control, it leads to large scale wars.
- However, we need not fight against each other, if we all use the resources that we have judiciously. You must have heard of this phrase. *Write the following phrase on the board.* What does this mean?

“Nature has given enough for our need, but not enough for our greed”

- *Take a couple of responses from the students and ask them to explain what it means.*
- As responsible citizens we need to do our best to conserve resources, use them judiciously and avoid wastage wherever possible.
- Today we will learn about the scarcity of water and how as responsible citizens we can take steps in our daily lives to conserve water.

How much water is available?

Time: 20 minutes

Note to the teacher: Show the video shared below and initiate the discussion



Video: Where we get our fresh water?

The video explains about the how much water on earth is fit for consumption

Link: [Youtube](#)

Facilitation Notes

- Ask students what they observed in the video.
- *After taking few responses, state-*
 - Water is important for the existence of life on Earth
 - Human bodies are made up to 75% of water.
 - 71% of Earth's surface is covered with water.
 - This water is contained in sea, oceans, rivers, lakes, ice-caps, as groundwater and in the atmosphere.
 - Not all water is fit for consumption, only fresh water which is 3% is fit for human consumption.
 - Fresh water is present in rivers, lakes, groundwater and atmosphere out of which water available in rivers, lakes and groundwater is available for consumption which amounts for only 0.006% of the total available water.

- Ask students to look at the following picture.

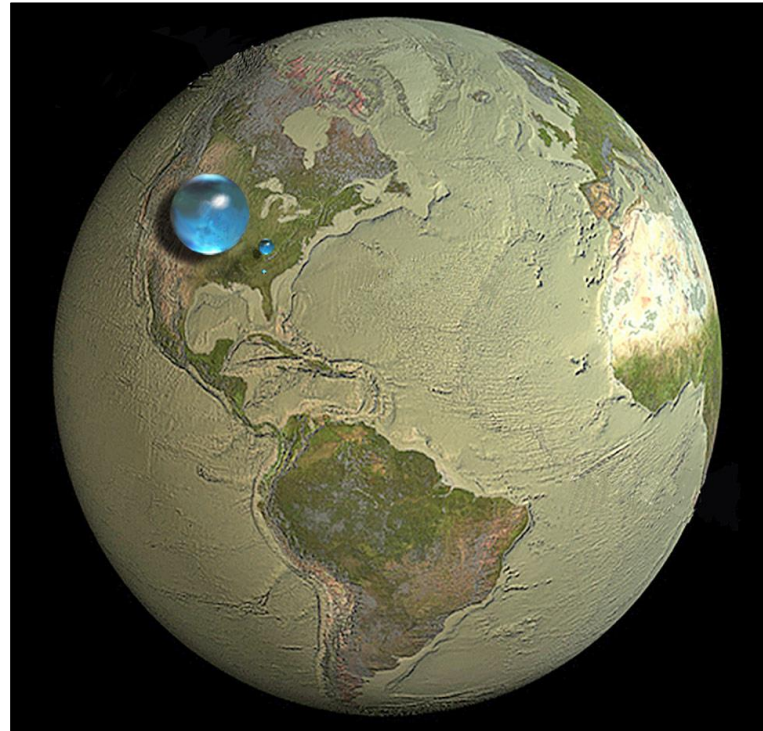
Note to the teacher: Each picture has a source mentioned below it. Please visit the source to download the higher resolution picture for projection



Source: [NASA](#)

Ask a question to seek responses on why does it appear blue? What does that tell about the Earth?

- Now show the following image and explain it:



Source: [NASA](https://www.nasa.gov)

- The three water spheres show the relative presence of water on the earth as compared to the size of Earth.
- The big sphere represents all of Earth's water, including water in the oceans, ice caps, lakes, rivers, groundwater, atmospheric water, water present inside a human body and all forms of animals, the vegetables and the plants.
- The medium sphere represents the world's liquid fresh water which includes ground water and water in lakes, swamps and rivers.
- The small sphere represents all the freshwater in lakes and rivers. The water in that bubble has the huge responsibility of meeting most of the needs of humans and animals.
- Therefore, we face water shortages all the time. Can you recollect a time when you read about water shortage in the news or experienced it at home?

- In the summer of 2018, the residents of the hill town of Shimla had to plead with tourists to stop visiting the town as they were facing acute water shortage.
- Because of the water shortage, the tourism industry was hit badly affecting the livelihood of people. Fights broke out in an otherwise peaceful town leading to law and order problems.
- Shortage of water therefore impacts all aspects of human life and we need to do our best to conserve it.

Show the following video to the students:



Video: Shimla water crisis

Video highlights the ongoing water crisis in Shimla, capital city of Himachal Pradesh and a popular summer destination for tourists. The residents are appealing to the tourists to not visit Shimla for a few weeks till the time water supply is restored.

Link: [The Quint](#)

How much water do you actually need?

Time: 20 minutes

Facilitation Notes:

- Given that we know about shortage of water on earth now, let's do an activity to reflect on our own water usage.
- Handover the following worksheet to all the students:

Water Consumption Worksheet

Name:

Roll Number:

Activity	Quantity of Water (in number of buckets)	How can I reduce my water usage for this task?

Calculations

50 Glasses = 1 Bucket, 25 Glasses = Half bucket

Total direct consumption in a day = Total number of buckets

- Ask the students to make a list of all the activities for which their family uses water (at home, at school, at park outside) in Column A
- For each activity also mention, how much quantity of water is required in measures of glasses and buckets in Column B
- Ask students to think and mention in Column C on how they can save water for each of the listed activities
- Ask students to do the calculations at the end of the worksheet
- *Debrief the activity by asking key questions:*
 - What is the highest amount of water usage in the class?
 - Which activities require most amount of water?
 - Check students if they have covered all the activities:
 - Watering Plants
 - Washing Cars
 - Bathing
 - Cooking
 - Flushing toilets
 - The products that they use may use water while getting manufactured such as food, clothes, etc.
 - How can you reduce water consumption for each of the mentioned activity?
- *Next, share the following **interesting facts and figures** with the students (either as a printed handout or you could read out the following).*
 - An average person drinks at least five litres of water daily. [Source](#)
 - The water consumed to produce our food amounts to 3,496 litres a day per person. [Source](#)
 - The water consumed for production of the items that we use every day such as cotton, paper, clothes, etc. amounts to 167 litres daily. [Source](#)
 - 70 % of all water consumed is for agriculture, 20% for industry and 10% for domestic usage. [Source](#)
 - It is estimated to take around three litres of water to create one litre of bottled water. [Source](#)
 - About 75% of the water is used for bathing, gardening, washing utensils, clothes and flushing down the toilet. Usage of water can be significantly used in these activities.
 - The US, Estonia, New Zealand, Canada and Italy use the most water per capita annually than any other country in the world. [Source](#)
 - In contrast, in Africa, people spend 40 billion hours every year walking to get water, most of them are women and children. [Source](#)
 - Across India as a whole, it is estimated that women spend 150 million work days every year fetching and carrying, equivalent to a national loss of income of INR 10 billion/ 160 million USD. [Source](#)

- Play the following video.

Video: 13,500 villages in Rajasthan run out of drinking water as crises deepens
The video talks about the extreme draught condition in the villages of Rajasthan.

Link: [Youtube](#)

- Ask students to reflect on these facts through the following discussion:
 - The excess water that we waste has a huge bearing on other people's lives.
 - Many people struggle for the things like water that we take for granted.
 - How would your life be different if you were born in a place like this, where you had to walk hours to fetch water?
 - It is our responsibility therefore to conserve resources like water, so that they are available to everyone.
 - You should go home and speak to your parents also about this issue.



Forms of water (water cycle)

Time: 15 minutes

Note to the teacher:

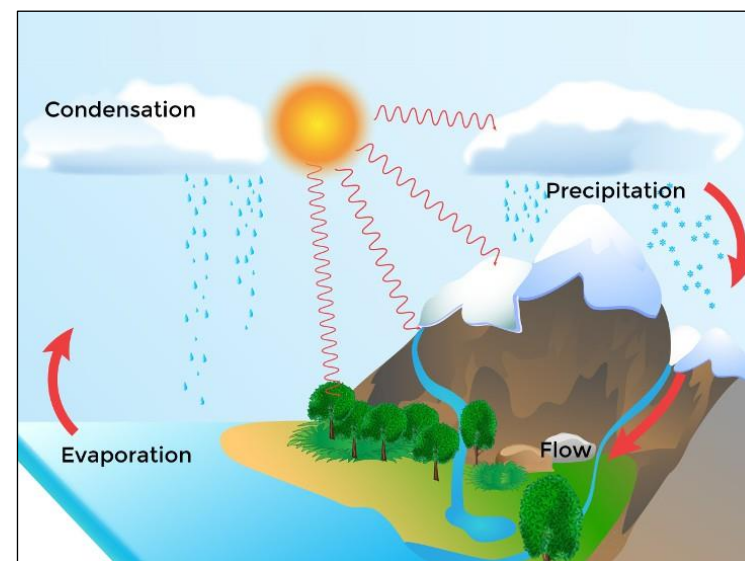
Students have done a basic water cycle in class VI. We will further their knowledge and understanding of water cycle by discussing which forms the water exist on Earth. (Image available on page 196 of NCERT VII Science Book)

Show the following video to the students:

Video: The Water Cycle

The video illustrates and explains the water cycle and all the processes it is composed off.

Link: [Youtube](#)



Facilitation Notes:

- If we have limited water available on earth, so why has water not been exhausted yet? How is water still available for use?
 - *Take 3-4 responses and then further the points missed*
 - Water on the earth has been maintained for millions of years by various natural processes that makes the water cycle

- *Next, the teacher will explain the students in detail about **water cycle**:*
 - The water cycle explains how the water **evaporates** from the surface of the earth, rises into the atmosphere, cools and condenses into rain or snow in the clouds and falls again on the earth’s surface as **precipitation**.
 - When water circulates through the water cycle, it can be found in all the three forms, i.e., **solid, liquid and gas**
 - The solid form, snow and ice, is present as ice caps at the poles of the earth, snow- covered mountains and glaciers.
 - Liquid water is present in oceans, lakes, rivers, and even underground
 - The **gaseous** form is the water vapour present in the air around us.
 - The continuous cycling of water among its three forms keeps the total amount of water on the earth constant.
 - Read out the **definitions of key terms** to the students:

Evaporation	Evaporation is the process by which water changes from a liquid to a gas or vapour. Evaporation is the primary pathway through which water moves from the liquid state back into the water cycle as atmospheric water vapour . Source
Precipitation	Precipitation is water released from the clouds in form of rain, freezing rain, sleet, snow, or hail. It is the primary connection in the water cycle that provides for delivery of atmospheric water to the Earth. Most precipitation falls as rain. Source
Condensation	Condensation is the process by which water vapour in the air is changed into liquid water . Condensation is crucial to the water cycle because it is responsible for the formation of clouds. Condensation is the opposite of evaporation. Source
Transpiration	Transpiration is the process by which moisture is carried through plants from roots to small pores on the underside of leaves, where it changes to vapour and is released to the atmosphere. Transpiration is essentially evaporation of water from the plant leaves. Source

Lab Activity

Time: 20 mins

Note to teacher: This is an optional activity to be conducted outside classrooms, at Science Labs

- Take students to the chemistry lab.
- Show how evaporation happens through boiling water.
- Show perspiration through collecting water droplets that have been formed on the lab tissues.
- Show water in condensed form as ice by freezing water and then reverse process by melting the ice.
- Debrief on note how water takes all shapes and forms (solid liquid, gaseous).
- Extend the learning to how water exists on Earth in these forms.
- Re-emphasise that the continuous recycling of water among its three forms keeps the total amount of water on the earth constant even when the whole world is using it.



Section III –Assessment

Quiz

Time: 10 minutes

Materials needed: Blackboard and chalk

Facilitation notes:

- Split class in two groups. The idea of these statements is to spark a conversation around some of the beliefs that people have with respect to conservation of water
- Mark each group one for the correct answer and zero for the incorrect, no question will get passed onto the other group
 - Mark 'T' if the statement is True and 'F' if the statement is false
 - A person requires minimum 3 litres per day for cooking, washing and maintain proper hygiene
 - Countries and states often have disputes over using water of rivers that flow through them
 - We don't need to worry about availability water, as it gets regenerated by the water cycle
 - Lack of availability of water affects women's lives disproportionately

- The problem of water is huge, that individual efforts do not make a difference

Homework

- Split the class into 5 groups. Each group has to make a poster on how irresponsible consumption of resources by one person leads to problems of others.
- Interview your parents on the following questions and transcribe the interview in a question and answer format:
 - Find out what local agency or authority is responsible for the water supply in your city?
 - How much is the average water bill of our house every month?
 - During which months do we have the highest water consumption in our house? Why?
 - If everyone knows that water is a scarce commodity, why do adults also waste water?
 - What can be done to increase awareness of water scarcity?

Section IV – Closure

Time: 5 minutes

Summary by students

Select a student at random to summarize the key points and learnings of the session.

Time: 2 minutes

Recap by the teacher

Time: 3 minutes

- All resources when compared to the human desires are limited in quantity. Scarcity of resources impacts people negatively and often leads to conflict. Therefore, we need to be careful about how we use our resources.
- One of the scarcest resources on this face of earth is water, which we take for granted. Water is important for existence of all life on Earth. Human bodies are made up of 75% water.
- 71% of Earth's surface is covered with water. However out of all the water available on Earth, only 0.006% is safe for consumption.
- Because of scarcity of water, people suffer around the world- they have to walk miles and miles every day to fetch drinking water. We should therefore check our water consumption habits to conserve it.

- Water available on Earth exists in three forms- Solid, Gas and Liquid.
- Water Cycle is a process through which water is maintained on Earth, the key steps to this process are- Evaporation, Condensation, Precipitation and Transpiration.
- Even though water is maintained in some form or the other on the face Earth, it is increasingly getting polluted and unusable for human consumption. We will learn about this in the next session.

Section V: Additional Resources

Resources for students:

1. Reading: India has world's highest number of people without clean water
[Link: NDTV.com](http://www.ndtv.com)

Resources for teachers:

1. Reading: Water Crisis in India
[Link: Waterproject.org](http://www.waterproject.org)

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