WHY SHOULD I Save Water?

A smart kid's guide to a green world

Terrapin

Shweta Sinha

From the Desk of Dr Ajay Mathur

"Water is the driving force of all nature" – *Leonardo da Vinci*.

Flora and fauna flourish because of the generosity of water. It is the home for innumerable species of underwater plants and animals, and elixir for the ones living on the ground. Life without water is hard to imagine. For humans, water is not only used for drinking, washing, and cooking, but it is also a source of livelihood, mode of transport, source to generate electricity, livestock rearing, and the list is endless. It isn't surprising to know that water has been considered sacred since time immemorial.

Water is the essence of life. Sounds cliché, doesn't it? But, the existence of human beings and life in general is dependent on freshwater and its availability. About 70 per cent of the earth's surface is covered with water. Of this 70 per cent, only 2.5 per cent is freshwater, meaning safe for human consumption because the rest is saline, ocean water. However, the actual amount that is accessible for human consumption and use is a minuscule 0.007 per cent.

It is amazing to see how this small fraction of freshwater is meeting the needs of the entire human population. The population of the world is increasing at a rapid rate, reaching a whopping 7.4 billion from 5.7 billion in only a decade. This has intensified the demand on the available freshwater, where quality is also deteriorating since we dump our sewage into our freshwater resources as well. One way of enhancing our potable water resources is through desalination of sea water. Desalination is not a modern science, but the available technology is still expensive and inaccessible to the majority of the arid regions.

The need for freshwater has never been as desperate as now. With the limited water supply, we now face the uphill task of effectively conserving, managing, and distributing the available freshwater. While, conversion (desalination) is an option, conservation is the need of the hour. Conservation efforts are being made at the urban, rural, social, and personal levels. Some examples of our collective efforts are urban green buildings, johars in rural community, rain water harvesting, and an increased level of awareness at a personal level. These measures could be useful if used globally, but we do not have a moment to spare and relax. We have to strive continuously for sustainability if we are to survive.

Why Should I Save Water? throws light on remarkable facts about water with fun-to-do activities. I hope this book will inspire young readers to shoulder the responsibility of saving the environment by using water wisely and avoiding wastage of this important natural resource! A young TERI researcher received a global prize from UNESCO because her slogan on water scarcity was found to be the most appealing. She had coined the phrase, "Water water everywhere, only if we share".

Dr Ajay Mathur
Director-General, TERI

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Water – The Essence of Life

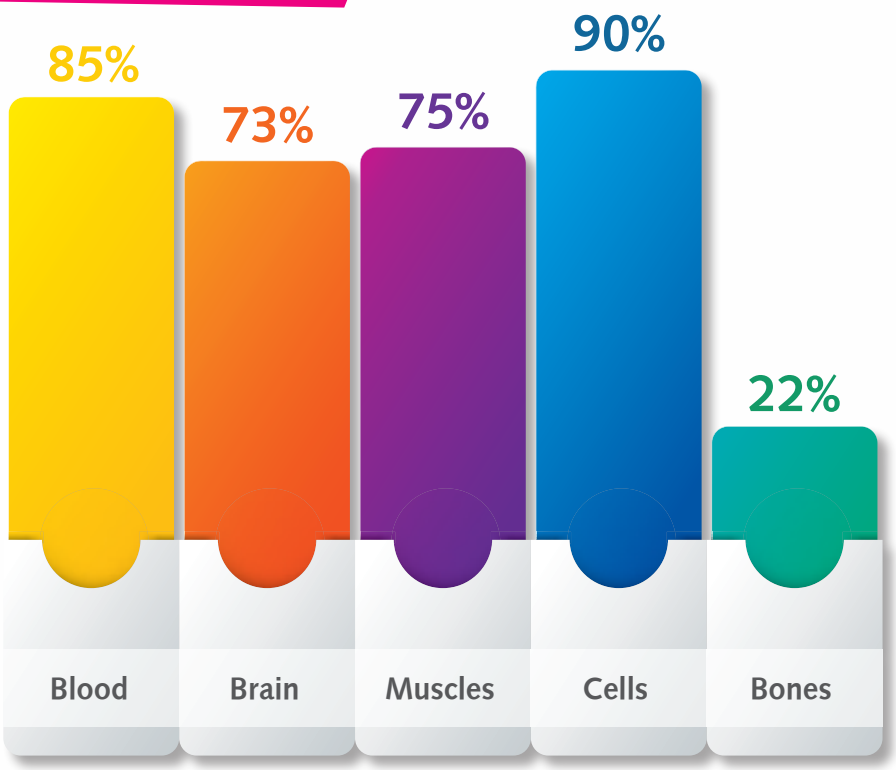
Open the tap and there it is. Sparkling and colourless, splashing all over your hands. Water is the most familiar substance around you ... from inside your homes to the neighbourhood swimming pool ... in the lakes, rivers, and seas. Water is present everywhere – even in the air you breathe – blow against a window pane and you will notice tiny water droplets collect on its surface.

WATER IS UNIQUE

Water is one of the most common things available on Earth, but it certainly isn't ordinary. It climbs up narrow tubes against the force of gravity. Water allowed the creation of life on Earth. Also, the first life forms evolved in the seas and oceans. Water sustains life – whether plant, fish, birds, animals, or even microbes. Even a cactus growing in the dry desert stores water in its fleshy leaves to survive. Water is so important that any search for life on other planets begins with a search for water. No water, no life!

While other things shrink when they cool, water expands as it freezes into ice.

HUMAN BODY AND WATER



Water-wise Unlike most of the liquids, which sink in their solid state, ice floats as it

Hindu pilgrims taking holy bath on the banks of river Ganges in Haridwar.

WATER IS PRECIOUS

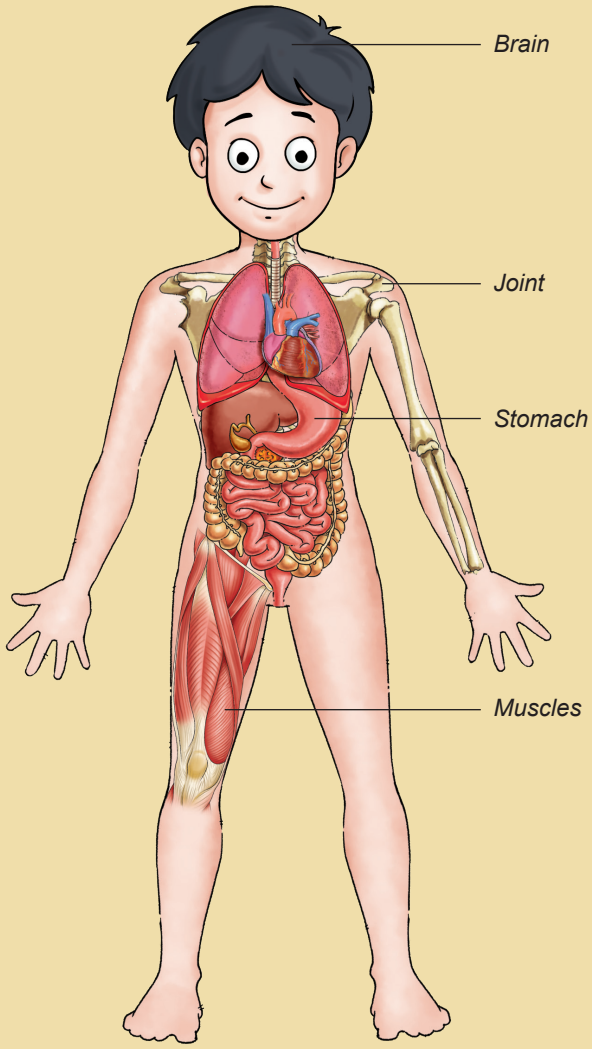
Water is worshipped in many cultures. Water is taken to be pure that can make objects appear as good as new by washing away the dirt. Christians believe in Holy water – water that is blessed and is used in various rituals. To Hindus, rivers like the Ganges and Yamuna, are sacred. Taking a bath or cleansing oneself before offering prayers to God is common practice in several religions. The Aztecs revered their water goddess, Chalchiuhtlicue, as both a life-giver and a destroyer. For Ancient Egyptians, the river Nile was equated with prosperity. She was worshipped and offered gifts of coins, jewellery, and gold.

And yet, we have stopped respecting water. We waste water and pollute it without caring.

Long ago, people in India and China used water power to turn waterwheels and watermills.

weighs less than it does when it's liquid.

WHY IT'S ESSENTIAL FOR THE HUMAN BODY



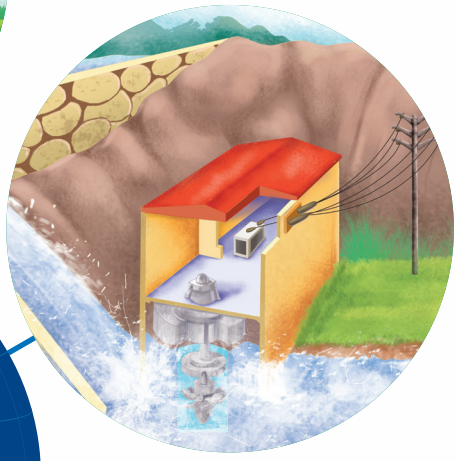
- Almost three-fourth of a human body is water, though we can't hear it sloshing inside us.
- Dehydration affects our memory and ability to do mental mathematics.
- Water maintains our body temperature.
- The water in our blood helps carry nutrients around and flushes out waste.
- Water helps in digesting the food.
- Water cushions our joints so we can move around with ease.
- Water is a major component of most of our body parts, including blood, bones, and muscles.

USES OF WATER ACROSS THE WORLD

Farmers use water to grow the food we eat

We use water for amusement at water parks, swimming pools, and beaches

Running water drives the turbines at power plants to make electricity



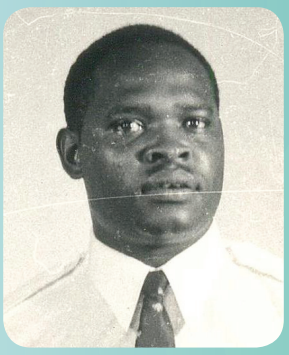
Even the household kitchen cannot function in the absence of water

Large volumes of water is used to absorb the roar a rocket makes when launched

Water is vital to firefighters to do their job

Water-wise Earth is the only planet in the Solar System that sustains water in the liquid

THE MPEMBA EFFECT



Erasto Mpemba was the first person to have discovered the behaviour of "hot water freezing faster than cold water"

When a 13-year-old Tanzanian school student, Erasto Mpemba, hurriedly put his still-hot ice-cream mix inside the freezer during a cookery class, little did he imagine he was about to make a new discovery. When the freezer was opened a while later, Mpemba found his ice-cream already frozen, while those of others that had cooled down before being put inside were still in the process of solidifying. This behaviour of "*hot water freezing faster than cold water*" was still unknown in 1963. So, when Mpemba reported his observations, he was ridiculed by his classmates and teachers. Later, Dr Denis G Osborne from the University College in Dar es Salaam, experimented on the behaviour and confirmed Mpemba's findings.

In September 2015, NASA's *Mars Reconnaissance Orbiter* (MRO) discovered intermittent traces of liquid water, although salty, trickling down the surface of the red planet, Mars.

form in such abundance.

QUIRKY WATER FACTS

Koala bears don't drink water, but get their moisture from their food.

A cow must drink three litres of water to produce one litre (four glasses) of milk.

Ten inches of snow melts to give one inch of water.

Drinking water is good, but drinking too much water too fast can be harmful.

The Super Powers of Water

We know water is important. We cannot live without water. But what makes water irreplaceable? Water has unique chemical properties that make it behave differently from other liquids. Water is the only substance existing naturally in all three states. In its liquid state, water gushes out of your shower and gurgles at sea shores. The ice cubes in your freezer and the hail that fall out of the sky with rain are water in the solid state. The steam rising out of a pan of boiling water and the clouds above our heads are, of course, the gaseous state of water, also known as water vapour.

WATER, THE SUPER SOLVENT

Water dissolves more stuff than any other liquid. Scientists call water "*the universal solvent*". This property allows water in our blood to carry nutrients to different parts of the body. In the same manner, it ferries waste out of our body as well. Dissolved electrolytes in our nervous system enable electric signals to and from our brain to pass through.

The Dead Sea is so thick with salt that it is difficult to push your feet to the bottom.

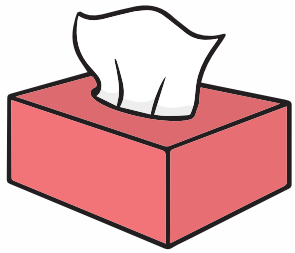
SUPER SATURATED

Water dissolves salt, but only up to a limit. Take half a glass of water and stir in a spoonful of salt. Keep adding more salt and continue to stir until grains of salt begin to settle at the bottom. You will notice that no more salt dissolves after this stage. Place the glass in the Sun and let all the water evaporate. What do you find left behind? Fill in the blank spaces to know the answer. S __ __ T

White carnations take the colour mixed in water, in which they are kept, as water moves up their stems.

WATER STICKS

Water molecules stick to each other and other substances. This is what makes things wet. This is what makes water flow smoothly through our blood vessels. And through plant stems, upwards from the roots to the leaves. The ability of water to move upwards against Earth's gravity is called "*the capillary action*".



If you roll a piece of tissue paper and dip its lower end into a glass of water, you will notice water travelling up towards your fingertips, working against gravity.

Water-wise When sunlight enters raindrops, light splits into seven different colours and

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