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Water

Lesson Plan

Contents

- ▶ An overview of the hydrosphere on Earth
- ▶ To understand the hydrosphere, its types, and its spread

Objectives

- ▶ To understand the significance of water on Earth and the oceans
- ▶ To learn about fresh water and saline water and the hydrological cycle
- ▶ To know about salinity and its advantages and disadvantages
- ▶ To appreciate the methods for conservation of water

Teacher's Aids

- ▶ Globe
- ▶ Pictures, atlas, wall maps and charts
- ▶ Blackboard
- ▶ Internet

Tips for Teacher

- ▶ Explain the significance of water on Earth.
- ▶ Explain the difference between the uses of fresh water and saline water.
- ▶ Use the Internet to show them how Israel has turned its desert country green by transforming saline water into fresh water.
- ▶ Talk about water conservation – stepwells, baolis, tanks, lakes and wells, and about rainwater harvesting.
- ▶ Students should be encouraged to know places, locations and their placement on the maps.

Background and Reading

- ▶ Read the lesson aloud and explain, sharing the aids, etc., pausing to examine and explain the data in the boxes.

- ▶ Particularly focus on uses of fresh water, salinity, desalination, water conservation and rainwater harvesting.

Water's Importance

- ▶ Water found only on planet Earth in the Solar System – invaluable natural resource to sustain life – 71% of Earth's surface under water – 3% of which is fresh water.
- ▶ Hydrosphere – oceans, seas, bays, gulfs, rivers, lakes, ponds, etc. – total volume fixed approximately 1400 million cubic km. [1 cubic km has about 1000 million tonnes of water]

Hydrological Cycle

- ▶ Water changes form as liquid, solid and gas – the process by which it changes and circulates between the lithosphere, atmosphere and hydrosphere is called the hydrological cycle or water cycle – no beginning or end.
- ▶ Several processes involved: Evaporation, transpiration, air-mass movement, condensation, precipitation, run-off and groundwater movement. Heat and moisture essential. Sun main source of heat; oceans, of moisture.
 - (i) Water gets heated and evaporates
 - (ii) Converted into water vapour
 - (iii) Water vapour enters the atmosphere through vertical and horizontal movement of atmosphere
 - (iv) In the higher parts of atmosphere, water vapour condenses into droplets of water
 - (v) Droplets fall to Earth through precipitation [rainfall or snowfall]
 - (vi) This water reaches oceans through various routes.
- ▶ Water cycle responsible for fresh water – in ice-caps, glaciers, lakes, rivers, atmosphere, etc.

Salinity

- ▶ Water in seas and oceans saline – contains dissolved salts - every 100 ml [1 litre] contains about 35 g of dissolved salts. Salinity denotes the total contents of dissolved salts in ocean or sea water.
- ▶ Total amount of dissolved salts increasing because of salts brought from land by rivers, etc. Sodium chloride is the most important constituent in ocean water – brackish taste.
- ▶ Salinity levels vary in different parts of an ocean – on an average, salinity decreases from Equator to Poles.
- ▶ Depends on amount of evaporation, precipitation, flow of fresh water from rivers, ocean currents, sea waves, etc. – salinity increases density of water – Dead Sea has the highest salinity, swimmers can float because of density.

Water Conservation

- ▶ Essential for survival – shortage due to excessive usage and unequal access to water – increasing demand and large-scale pollution – need to conserve fresh water:
 - (i) Stop reckless and unscientific use
 - (ii) Encourage reuse through recycling

- (iii) Divert flood water to drought-prone areas
- (iv) Develop techniques to raise water levels underground
- (v) Store through rainwater harvesting.

The Oceans

- ▶ Main source of moisture in atmosphere – moderate temperature in summer and winter – connect continents – used for travel and trade.
- ▶ Four oceans and Antarctic or Southern Ocean around Antarctica:
 - (i) The Pacific – largest – about 35% of Earth’s surface – exceeds total land surface – average depth 4600 metres – many deeps and trenches, most on western side – deepest is Mariana Trench [11000 metres] – many marginal seas along coast of Asia: Sea of Okhotsk, Sea of Japan, Yellow Sea, East China Sea, South China Sea, Celebes Sea, Banda Sea, etc.
 - (ii) The Atlantic – roughly half the size of Pacific – North and South America on west and Europe and Africa on east – average depth about 3600 metres – no trenches – Mid-Atlantic Ridge: Average height 400 metres; marginal seas like Labrador Sea, Gulf of Mexico, Caribbean Sea, etc., on west and Norwegian Sea, North Sea, Bay of Biscay, Gulf of Guinea, etc., on east.
 - (iii) The Indian Ocean – smaller than others – closed in the north, hence half ocean – Africa on west, Asia in north, Australia in southeast – average depth about 4000 metres – few deeps and trenches – marginal seas: Arabian Sea, Bay of Bengal, Andaman Sea, Red Sea, Persian Gulf, etc.
 - (iv) The Arctic – around the North Pole – bounded by North America, Europe and Asia – permanently frozen – connected to Pacific by Bering Strait and to Atlantic by Greenland Channel – marginal seas: Lincoln Sea, Beaufort Sea, Chukchi Sea, East Siberian Sea, Laptev Sea, Kara Sea, Barents Sea, Greenland Sea, etc.

Assessment Corner

Oral Assignment

- A. Ask for answers at random from the students. Confirm the right answers. Let them write down the correct answers if they like in their books.

Written Assignment

- B–E. The teacher has two options – (i) Either do these exercises orally first and then ask the students to write them down. OR (ii) Ask the students to write the answers on their own. Then the teacher can announce the correct answers and students can ask their partners to cross-check them.

In either case, the answers can be written as homework and the teacher can check them in the class.

Think Tank

- G. **HOTS questions:** Discuss the questions in class and let the students write the answers to F and G as homework. Teacher should assess individual work.