



## Water: A Precious Resource

"Jal Hai, To Kal Hai"

"If you have water, you can think of the future"

You are perhaps aware that 22 March is celebrated as the **world water day**! A school celebrated 'water day' and invited posters from the children of your age group. Some of the posters presented on that day are shown in Fig. 16.1.



Fig. 16.1 Collage of posters

What is the message you get from these posters? Write your observations in your notebook and discuss them in the class.

Have you ever felt a shortage of water at home or at school? Your parents or

teachers must very often be advising you not to waste water. No wonder we celebrate **water day** every year to attract the attention of everybody towards the importance of conserving water.

The amount of water recommended by the United Nations for drinking, washing, cooking and maintaining proper hygiene is a minimum of 50 litres per person per day. This amount is about two and a half buckets of water per person per day. Is your family getting at least this much of water? If yes, you should consider yourself fortunate because millions of people in our country do not get enough water. What about your friends and their families? Share your experience with them.

In some places there is an acute shortage of water. Taps running dry, long queues for water (Fig. 16.2), fights, marches and protests for demand of water have become a common sight, especially during summers. Some of the newspaper clippings shown in Fig. 16.3 clearly indicate this message. Is it not true that we face acute shortage of water?



**Fig. 16.2** Long queue for water

## Activity 16.1

Collect clippings from newspapers and magazines on the news items, articles and pictures related to water shortage. Paste them in your scrapbook and share it with your friends. List some problems faced by the people and discuss them in the class.


Water shortage has become a matter of concern throughout the world. It is estimated that in a few years from now



**Fig. 16.4** Earth appears blue from space



**Fig. 16.3** Newspaper clippings

 Year 2003 was observed as the International Year of Freshwater to make people aware of this dwindling natural resource.

more than one third of the people in the world could face water scarcity.

Before we discuss why water is getting scarce we must know how much water is available for use on our planet.

## 16.1 HOW MUCH WATER IS AVAILABLE





Look at the picture of the earth taken from space. Why does it appear blue? Surely, you can guess!

You are aware that about 71% of the earth's surface is covered with water. Almost all the water on the earth is contained in the seas and oceans, rivers, lakes, ice caps, as groundwater and in the atmosphere. However, most of this water is not fit for human consumption. The water that is fit for use is freshwater.

Perform the following activity to estimate roughly the relative amount of water available in some of these sources.

## Activity 16.2

Most of us assume water to be a limitless resource. From this activity can you

Steps	Figure	Remark
Take a medium-sized bucket and fill it up with water. It contains about twenty litres of water.		Assume that this water represents all the water present on the earth.
Take a tea spoon of about 5 mL capacity and transfer 100 spoons of water from the bucket to a small container, like a bath mug.		This represents total freshwater on the earth.
From the bath mug transfer thirty spoons of water to a glass tumbler.		This gives a measure of usable water present as groundwater.
Finally take out a quarter ( $1/4^{\text{th}}$ ) spoonfull of water from the mug.		It represents all the water present in all the lakes and rivers of the world.
<ul style="list-style-type: none"> <li>■ The water left in the bucket represents the saline water present in the seas, oceans and partly as groundwater. This water is not fit for human use.</li> <li>■ The water left in the bath mug represents the water, which is present in the frozen form in glaciers, ice caps and permanent snow; again not available readily.</li> </ul>		



Pragyan wondered about the alarmingly small quantity of water available for our use.



Prahelika quickly calculated and found that this amount is roughly 0.006% of all water found on the earth.



appreciate the actual amount of water available for human use? Does the finding worry you? Discuss this in your class.

## 16.2 FORMS OF WATER

Are you afraid that continuous use will some day exhaust all the water available for use? You know that water on the earth has been maintained for millions of years by various processes which make the **water cycle**. You have studied the water cycle in Class VI. Write in your own words what you know about the water cycle.

You know that when water circulates through the water cycle it can be found in all the three forms, i.e., solid, liquid and gas—at any given time somewhere on the earth. 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 even when the whole world is using it. Does it give you any relief?

Can you recall the processes involved in water cycle? The following activity will help you.

### Activity 16.3

Fig. 16.5 shows the processes involved in the water cycle. They are labelled by numbers. Match these numbers with the processes given in the jumbled form.

Most towns and cities have water supply system maintained by the civic bodies. The water is drawn from nearby lakes, rivers, ponds or wells. The water is

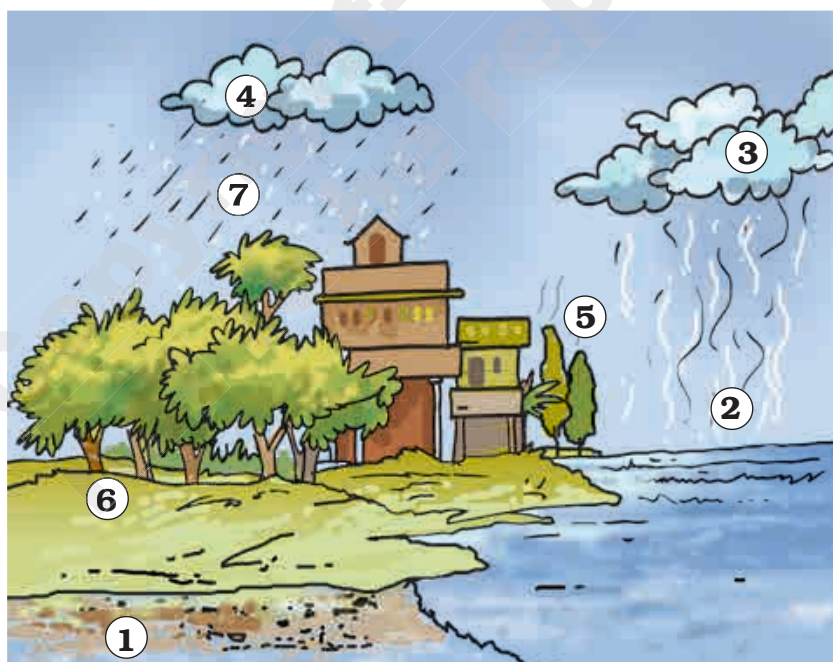


Fig. 16.5 Water cycle

1. rudgon rawet
2. atooniaervp
3. acestoonnnid
4. duclos
5. tspratniaoinr
6. aitfinlronit
7. ntciepirtaipo

supplied through a network of pipes. Many villages do not have such a water supply system. There people fetch water directly from the sources. Often women and children have to walk several kilometres to fetch water (Fig. 16.6). The children suffer a lot. They cannot attend school regularly since they spend hours in fetching water.



**Fig. 16.6** Women fetching water

Women have to perform a number of household chores. If they have also to spend time to fetch water it adds to their burden.

A large number of people draw water from wells, tube wells or hand pumps. From where do these sources get water?

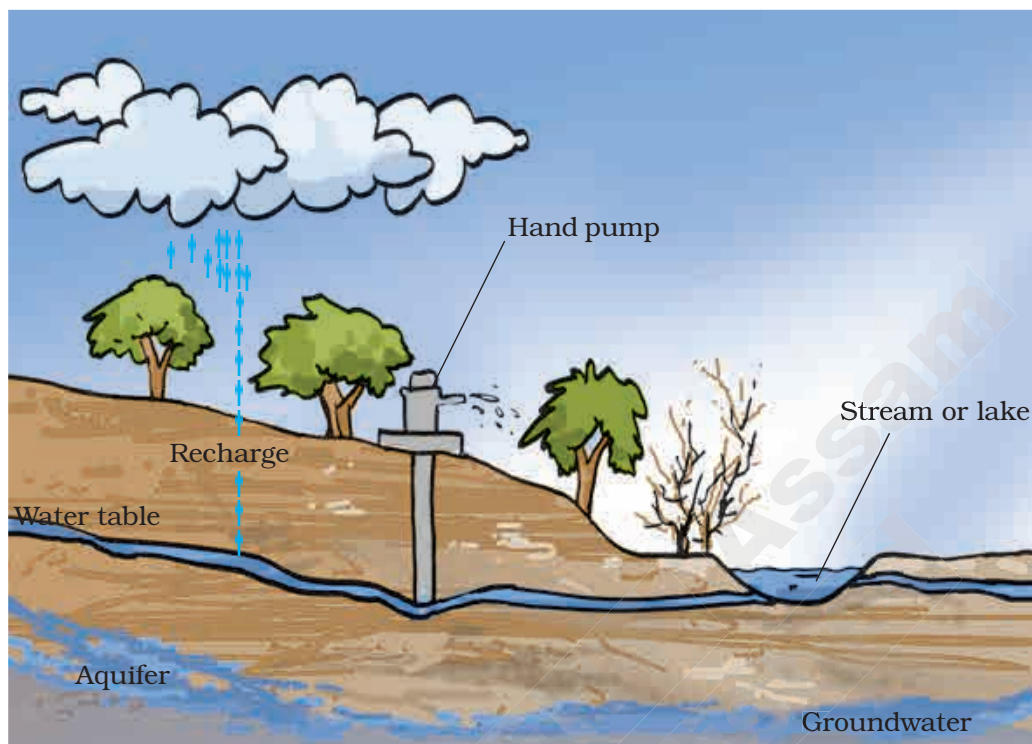
### 16.3 GROUNDWATER AS AN IMPORTANT SOURCE OF WATER

If we dig a hole in the ground near a water body we may find that the soil is moist. The moisture in the soil indicates the presence of water underground. If we dig deeper and deeper, we would reach a level where all the space between particles of soil and gaps between rocks are filled with water (Fig. 16.7). The upper limit of this layer is called the **water table**. The water table varies from place to place, and it

may even change at a given place. The water table may be at a depth of less than a metre or may be several metres below the ground. The water found below the water table is called groundwater. What is the source of this groundwater?

The rainwater and water from other sources such as rivers and ponds seeps through the soil and fills the empty spaces and cracks deep below the ground. The process of seeping of water into the ground is called **infiltration**. The groundwater thus gets recharged by this process. At places the groundwater is stored between layers of hard rock below the water table. This is known as an **aquifer**. Water in the aquifers can be usually pumped out with the help of tube wells or handpumps.

Have you ever been to a site where construction work is going on? From where do the workers get water for construction? May be you have seen



**Fig. 16.7** Groundwater and water table

boring being done at such sites to reach the water table. Enquire from the people working there how deep they have to dig.

Can we keep on drawing water from under the ground? How will it affect the water table?

#### 16.4 DEPLETION OF WATER TABLE

Water drawn from under the ground gets replenished by seepage of rainwater. The water table does not get affected as long as we draw as much water as is replenished by natural processes. However, water table may go down if the water is not sufficiently replenished. This may happen due to many reasons. Increase in population, industrial and agricultural activities are some common factors affecting water table. Scanty

rainfall is another factor that may deplete the water table. Yet another factor affecting water table could be deforestation and decrease in the effective area for seepage of water.

#### Increasing population

Increasing population creates demand for construction of houses, shops, offices, roads and pavements. This decreases the open areas like parks, and playgrounds. This, in turn, decreases the seepage of rainwater into the ground. What could be the consequence? Recall that a *pukka* floor does not allow water to seep in easily, while in a grass lawn water seeps through in no time.

Moreover a huge amount of water is required for construction work. Often groundwater is used for this purpose.

So, on the one hand we are consuming more groundwater, and on the other we are allowing lesser water to seep into the ground. This results in depletion of water table. In fact, the water table in some parts of many cities has gone down to alarmingly low levels.

### Increasing industries

Water is used by all the industries. Almost everything that we use needs water somewhere in its production process. The number of industries is increasing continuously. Water used by most of the industries is drawn from the ground.

#### Activity 16.4

Name some industries familiar to you. Make a list of the products obtained from these and used in our daily life. Discuss with your teacher and parents how the growing industrial activity is responsible for the depletion of water table.

### Agricultural activities

A majority of farmers in India depend upon rains for irrigating their crops. Irrigation systems such as canals are there only in a few places. Even these systems may suffer from lack of water due to erratic rainfall. Therefore, farmers have to use groundwater for irrigation. Population pressure on agriculture forces increasing use of

groundwater day by day. This results in depletion of water table.

## 16.5 DISTRIBUTION OF WATER

The distribution of water over the globe is quite uneven due to a number of factors.

Some places have good amount of rain and are water-rich. On the other hand, there are deserts which have scanty rainfall.

India is a vast country and the rainfall is not the same everywhere. Some regions have excessive rains while some others have very little rainfall. Excessive rains cause floods, whereas the absence of rains results in droughts. Therefore, some regions in our country may have floods while others may suffer from droughts at the same time.

#### Activity 16.5

Given here is the rainfall map of India (Fig. 16.8). It gives the average annual rainfall in different regions of our country.

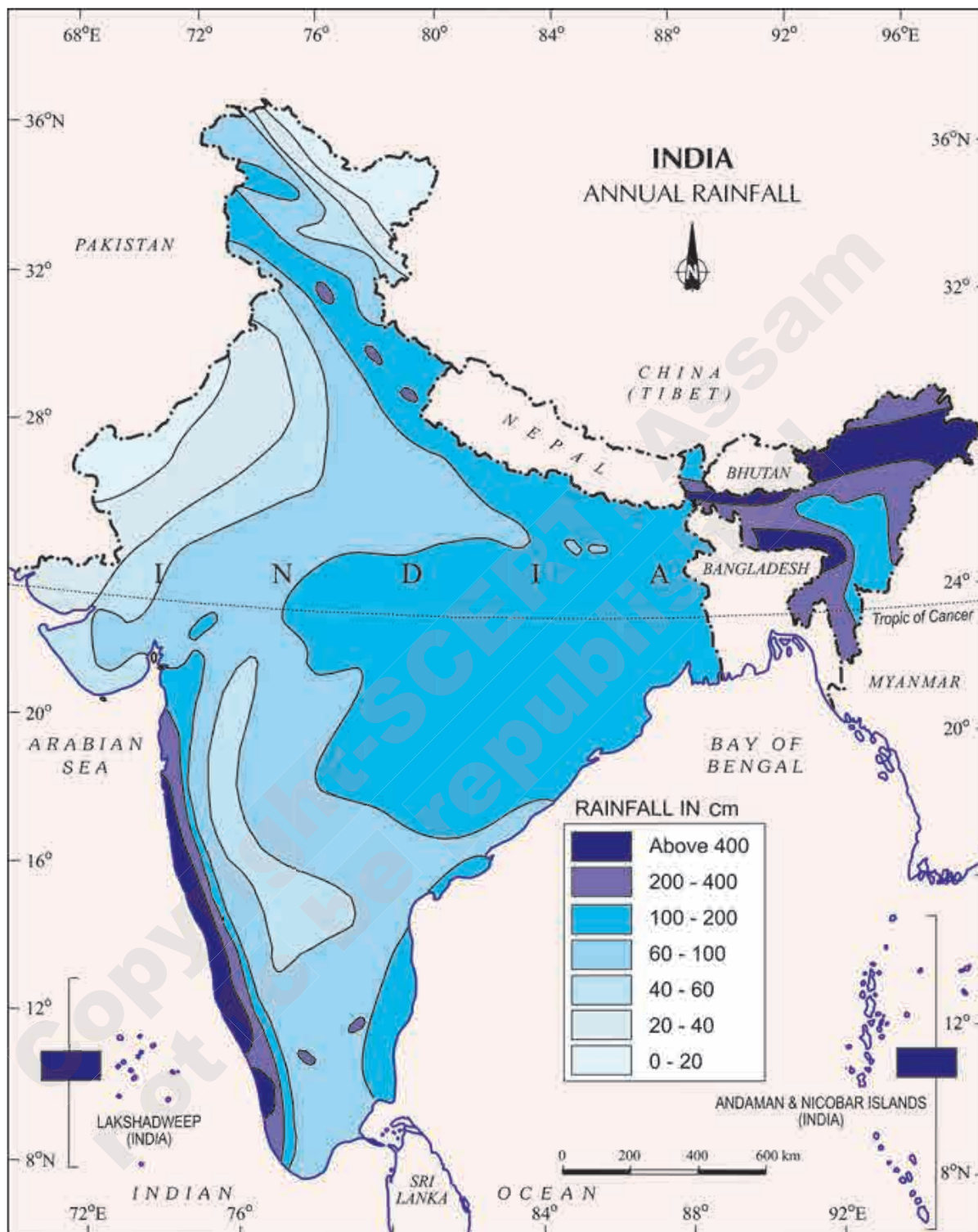
- Locate on the map the place you live in.
- Are you blessed with sufficient rainfall?
- Is there sufficient water available in your area throughout the year?

It may be possible that we are living in an area where there is sufficient rainfall yet there is shortage of water. Can we attribute this to mismanagement of water resources?

## 16.6 Water Management

You have read in Class VI that in many places a regular supply of water is provided





**Fig. 16.8** Rain map of India

1. Government of India, Copyright 2007.
2. Based upon Survey of India map with the permission of the Surveyor General of India.
3. The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate baseline.
4. The external boundaries and coastlines of India agree with the Record/Master Copy certified by Survey of India.



by a well-planned pipe system. When the civic authorities supply water through pipes not all of it may reach the destination. You might have seen water supply pipes leaking and a lot of water gushing out of the pipes. It is the responsibility of the civic authorities to prevent such wastage of precious water.

Mismanagement or wastage may take place at the level of individuals also. All of us, knowingly or unknowingly, waste water while brushing teeth, shaving, bathing, washing and during many other activities. Leaking taps is another source of huge water wastage. We waste water as though we do not need water the next time!

We have seen that most of the water that we get as rainfall just flows away. This is a waste of precious natural resource. The rainwater can be used to recharge the groundwater. This is referred to as **water harvesting** or **rainwater harvesting**, about which you have learnt in Class VI.

Find out if the buildings in your neighbourhood have water harvesting systems installed.

We have at many places in India an age old practice of water storage and water recharge like the **bawris**. *Bawri was the traditional way of collecting water.* With time the *bawris* fell into disuse and garbage started piling in these reservoirs. However, because of the acute water shortage, people in these areas have had to rethink. The *bawris* are being revived. Today the situation is that inspite of scanty rains these places are managing their water needs well.

A farmer using water in the field can also use water economically. Maybe you have heard of **drip irrigation** (Fig. 16.9). Drip irrigation is a technique of watering plants by making use of narrow tubings which deliver water directly at the base of the plant.

### A case study

Bhujpur in the Kutch area of Gujarat has a very erratic rainfall. The only source of freshwater lies underground because rivers in this area do not have water throughout the year. Over the years, demand for water has grown. The withdrawal of groundwater has far exceeded recharge. As a result the water table has gone down alarmingly.

In 1989, the villagers along with a non-governmental organisation, decided to harvest rainwater. Eighteen check-dams were built on the Rukmavati river and its many tributaries. The water so collected increased percolation through the soil and recharged the aquifers.

According to farmers, the wells have water now and the water that flowed into the sea and was wasted has become available for irrigation.



**Fig. 16.9** Drip irrigation in a field

### 16.7 WHAT ROLE YOU CAN PLAY

Have you ever shown concern if you saw a tap leaking in your house, school or any other place? Leaking taps waste a lot of water. You must make efforts to stop this leakage.

There are a number of ways you can adopt to minimise the wastage of water. Let us begin. We have given a few examples. Add on!

### Water-wise habits

1. Turn off taps while brushing
2. Mop the floor instead of washing

### 16.8 EFFECT OF WATER SCARCITY ON PLANTS

You must have seen potted plants wilting and ultimately drying up if they did not get water even for a few days. You have already learnt in Chapter 1 that plants need water to get nutrients from the soil to prepare their food. Just imagine the consequences if water is not available to plants!

The green character of the planet shall be lost. This may mean the end of all life, for a world without plants shall mean no food, no oxygen, not enough rain, and innumerable other problems.

### A successful initiative

Rajasthan is a hot and dry place. The challenge of natural scarcity of water was met by a successful experiment. A band of social workers has transformed a dry area in the Alwar district into a green place. They have revived five dried-up rivers — Arveri, Ruparel, Sarsa, Bhagani and Jahazwali by constructing water-harvesting structures.

### Keywords

Aquifer

Depletion

Drip irrigation

Groundwater

Infiltration

Recharge

Water harvesting

Water table

## What you have learnt

- Water is essential for all living beings. There can be no life without it.
- Water exists in three forms: solid, liquid and vapour.
- Though water is maintained by the water cycle, yet there is an acute scarcity of water in many parts of the globe.
- There is an uneven distribution of water. Much of it has resulted from human activities.
- Rapid growth of industries, increasing population, growing irrigation requirements and mismanagement are some of the causes for water shortage.
- We need to be worried about the wastage during the supply of water through pipes, the leaking taps in buildings and other places. Unnecessary use of water and overdrawing from groundwater should be avoided. Recharge of water to the ground should be increased.
- The need of the hour is that every individual uses water economically.
- Plants wilt and ultimately dry-up if they are not watered for a few days.

## Exercises

1. Mark 'T' if the statement is true and 'F' if it is false:
  - (a) The freshwater stored in the ground is much more than that present in the rivers and lakes of the world. (T/F)
  - (b) Water shortage is a problem faced only by people living in rural areas. (T/F)
  - (c) Water from rivers is the only source for irrigation in the fields. (T/F)
  - (d) Rain is the ultimate source of water. (T/F)
2. Explain how groundwater is recharged?
3. There are ten tubewells in a lane of fifty houses. What could be the long term impact on the water table?
4. You have been asked to maintain a garden. How will you minimise the use of water?
5. Explain the factors responsible for the depletion of water table.
6. Fill in the blanks with the appropriate answers:
  - (a) People obtain groundwater through \_\_\_\_\_ and \_\_\_\_\_.



- (b) Three forms of water are \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
- (c) The water bearing layer of the earth is \_\_\_\_\_.
- (d) The process of water seepage into the ground is called \_\_\_\_\_.
7. Which one of the following is **not** responsible for water shortage?
- (i) Rapid growth of industries
  - (ii) Increasing population
  - (iii) Heavy rainfall
  - (iv) Mismanagement of water resources
8. Choose the correct option. The total water
- (i) in the lakes and rivers of the world remains constant.
  - (ii) under the ground remains constant.
  - (iii) in the seas and oceans of the world remains constant.
  - (iv) of the world remains constant.
9. Make a sketch showing groundwater and water table. Label it.

## Extended Learning - Activities and Projects

### 1. Role play

You are a water detective in your school. You have a team of \_\_\_\_\_ six members. Survey the campus and make a note of the following:

- (a) Total number of taps    (b) Number of taps leaking
- (c) Amount of water wasted due to leakage
- (d) Reasons of leakage    (e) Corrective measures taken

### 2. Groundwater pumped out

Try to find out if there are any hand pumps in your neighbourhood. Go to the owner or the users of a few of these and find out the depth at which they struck water? If there are any differences, think of the probable reason. Write a brief report and discuss it in your class. If possible, visit a place where boring is going on to install a hand pump. Watch the process carefully and find out the depth of the water table at that place.

### 3. Catching rainwater - Traditional methods

Form groups of 4 to 5 students in the class and prepare a report on the various traditional ways of water harvesting. If possible, use the following web link:

[www.rainwaterharvesting.org](http://www.rainwaterharvesting.org).

#### **4. Conservation of water**

Carry out a campaign to conserve water at home and in the school. Design posters to remind others of the importance of water resources.

#### **5. Create a logo**

Hold a competition to create a logo or a symbol depicting water scarcity.

#### **Did you know?**

The importance of water management has been highlighted by a watershed management project near the village of Kothapally. The project has yielded dramatic results. Groundwater levels have risen, green cover has increased, and productivity and incomes in this semi-arid region have dramatically improved.