16.2.2 Management of forest

We need to consider if the goals of all the above stakeholders with regard to the management of the forests are the same. Forest resources are often made available for industrial use at rates far below the market value while these are denied to the local people. The *Chipko Andolan* ('Hug the Trees Movement') was the result of a grassroot level effort to end the alienation of people from their forests. The movement originated from an incident in a remote village called Reni in Garhwal, high-up in the Himalayas during the early 1970s. There was a dispute between the local villagers and a logging contractor who had been allowed to fell trees in a forest close to the village. On a particular day, the contractor's workers appeared in the forest to cut the trees while the men folk were absent. Undeterred, the women of the village reached the forest quickly and clasped the tree trunks thus preventing the workers from felling the trees. Thus thwarted, the contractor had to withdraw.

Inherent in such a competition to control a natural resource is the co fically the method of use wa or would have felled the tre ties traditionally lop the br source to replenish over tir cross communities and m forest belongs, to rethink th rience has taught people th the availability of forest pr the sources of water. Pa d lead to the efficient m

Ar Management of Forests

In ecognised its failures in re -western districts of the st d policing had led to a 'complete alienation of the people from the administration', resulting in frequent clashes between forest officials and villagers. Forest and land related conflicts in the region were also a major factor in fuelling the militant peasant movements led by the Naxalites.

Accordingly, the Department changed its strategy, making a beginning in the Arabari forest range of Midnapore district. Here, at the insistence of a far-seeing forest officer, A.K. Banerjee, villagers were involved in the protection of 1,272 hectares of badly degraded sal forest. In return for help in protection, villagers were given employment in both silviculture and harvesting operations, 25 per cent of the final harvest, and allowed fuelwood and fodder collection on payment of a nominal fee. With the active and willing participation of the local community, the

sal forests of Arabari underwent a remarkable recovery – by 1983, a previously worthless forest was valued Rs 12.5 crores.

Activity 16.8

- Debate the damage caused to forests by the following —
  (a) Building rest houses for tourists in national parks.
  (b) Grazing domestic animals in national parks.
  (c) Tourists throwing plastic bottles/covers and other litter in national parks.

QUESTIONS

1. Why should we conserve forests and wildlife?
2. Suggest some approaches towards the conservation of forests.

16.3 WATER FOR ALL

Activity 16.9

- Villages suffering from chronic water shortage surround a water theme park in Maharashtra. Debate whether this is the optimum use of the available water.

Water is a basic necessity for all terrestrial forms of life. We studied in Class IX about the importance of water as a resource, the water cycle and how human intervention pollutes waterbodies. However, human intervention also changes the availability of water in various regions.

Activity 16.10

- Study the rainfall patterns in India from an atlas.
- Identify the regions where water is abundant and the regions of water scarcity.

After the above activity, would you be very surprised to learn that regions of water scarcity are closely correlated to the regions of acute poverty?

A study of rainfall patterns does not reveal the whole truth behind the water availability in various regions in India. Rains in India are largely due to the monsoons. This means that most of the rain falls in a few months of the year. Despite nature's monsoon bounty, failure to sustain water availability underground has resulted largely from the loss of vegetation cover, diversion for high water demanding crops, and pollution from industrial effluents and urban wastes. Irrigation methods like dams, tanks and canals have been used in various parts of India since ancient times. These were generally local interventions managed by local people and assured that the basic minimum requirements for both agriculture and daily needs were met throughout the year. The use of this stored

water was strictly regulated and the optimum cropping patterns based on the water availability were arrived at on the basis of decades/centuries of experience, the maintenance of these irrigation systems was also a local affair.

The arrival of the British changed these systems as it changed many other things. The conception of large scale projects – large dams and canals traversing large distances were first conceived and implemented by the British and carried on with no less gusto by our newly formed independent government. These mega-projects led to the neglect of the local irrigation methods, and the government also increasingly took over the administration of these systems leading to the loss of control over the local water sources by the local people.

More to Know!

Kulhs in Himachal Pradesh

Parts of Himachal Pradesh had evolved a local system of canal irrigation called *kulhs* over four hundred years ago. The water flowing in the streams was diverted into man-made channels which took this water to numerous villages down the hillside. The management of the water flowing in these *kulhs* was by common agreement among all the villages. Interestingly, during the planting season, water was first used by the village farthest away from the source of the *kulh*, then by villages progressively higher up. These *kulhs* were managed by two or three people who were paid by the villagers. In addition to irrigation, water from these *kulhs* also percolated into the soil and fed springs at various points. After the *kulhs* were taken over by the Irrigation Department, most of them became defunct and there is no amicable sharing of water as before.

16.3.1 Dams

Why do we seek to build dams? Large dams can ensure the storage of adequate water not just for irrigation, but also for generating electricity, as discussed in the previous chapter. Canal systems leading from these dams can transfer large amounts of water over great distances. For example, the Indira Gandhi Canal has brought greenery to considerable areas of Rajasthan. However, mismanagement of the water has largely led to the benefits being cornered by a few people. There is no equitable distribution of water, thus people close to the source grow water intensive crops like sugarcane and rice while people farther downstream do not get any water. The woes of these people who have been promised benefits which never arrived are added to the discontentment among the people who have been displaced by the building of the dam and its canal network.

In the previous chapter, we mentioned the reasons for opposition to the construction of large dams, such as the Tehri Dam on the river Ganga. You must have read about the protests by the *Narmada Bachao Andolan* ('Save the Narmada Movement') about raising the height of the Sardar Sarovar Dam on the river Narmada. Criticisms about large dams address three problems in particular –

(i) Social problems because they displace large number of peasants and tribals without adequate compensation or rehabilitation,

(ii) Economic problems because they swallow up huge amounts of public money without the generation of proportionate benefits,

(iii) Environmental problems because they contribute enormously to deforestation and the loss of biological diversity.

The people who have been displaced by various development projects are largely poor tribals who do not get any benefits from these projects and are alienated from their lands and forests without adequate compensation. The oustees of the Tawa Dam built in the 1970s are still fighting for the benefits they were promised.

16.3.2 Water Harvesting

A traditional technology is helping India's "waterman" save thousands of parched villages and transform the lives of thousands of villagers in one of India's most arid regions. In "two decades of efforts of Dr. Rajendra Singh, 8,600 *johads* and other structures to collect water have been built in Rajasthan," and "Water had been brought back to a 1,000 villages across the state." In 2015, he won the Stockholm Water Prize. It is the most prestigious award which honours a person who contributes to the conservation and protection of water resources for the well-being of the planet and its inhabitants.

Watershed management emphasises scientific soil and water conservation in order to increase the biomass production. The aim is to develop primary resources of land and water, to produce secondary resources of plants and animals for use in a manner which will not cause ecological imbalance. Watershed management not only increases the production and income of the watershed community, but also mitigates droughts and floods and increases the life of the downstream dam and reservoirs. Various organisations have been working on rejuvenating ancient systems of water harvesting as an alternative to the 'mega-projects' like dams. These communities have used hundreds of indigenous water saving methods to capture every trickle of water that had fallen on their land; dug small pits and lakes, put in place simple watershed systems, built small earthen dams, constructed dykes, sand and limestone reservoirs, set up rooftop water-collecting units. This has recharged groundwater levels and even brought rivers back to life.

Water harvesting is an age-old concept in India. *Khadins*, tanks and *nadis* in Rajasthan, *bandharas* and *tals* in Maharashtra, *bundhis* in Madhya Pradesh and Uttar Pradesh, *ahars* and *pynes* in Bihar, *kulhs* in Himachal Pradesh, ponds in the Kandi belt of Jammu region, and *eris* (tanks) in Tamil Nadu, *surangams* in Kerala, and *kattas* in Karnataka are some of the ancient water harvesting, including water conveyance, structures still in use today (see Fig. 16.4 for an example). Water harvesting techniques are highly locale specific and the benefits are also localised. Giving people control over their local water resources ensures that mismanagement and over-exploitation of these resources is reduced/removed.

In largely level terrain, the water harvesting structures are mainly crescent shaped earthen embankments or low, straight concrete-and-rubble "check dams" built across seasonally flooded gullies. Monsoon rains fill ponds behind the structures. Only the largest structures hold water year round; most dry up six months or less after the monsoons. Their main purpose, however, is not to hold surface water but to recharge the ground water beneath. The advantages of water stored in the ground

are many. It does not evaporate, but spreads out to recharge wells and provides moisture for vegetation over a wide area. In addition, it does not provide breeding grounds for mosquitoes like stagnant water collected in ponds or artificial lakes. The groundwater is also relatively protected from contamination by human and animal waste.

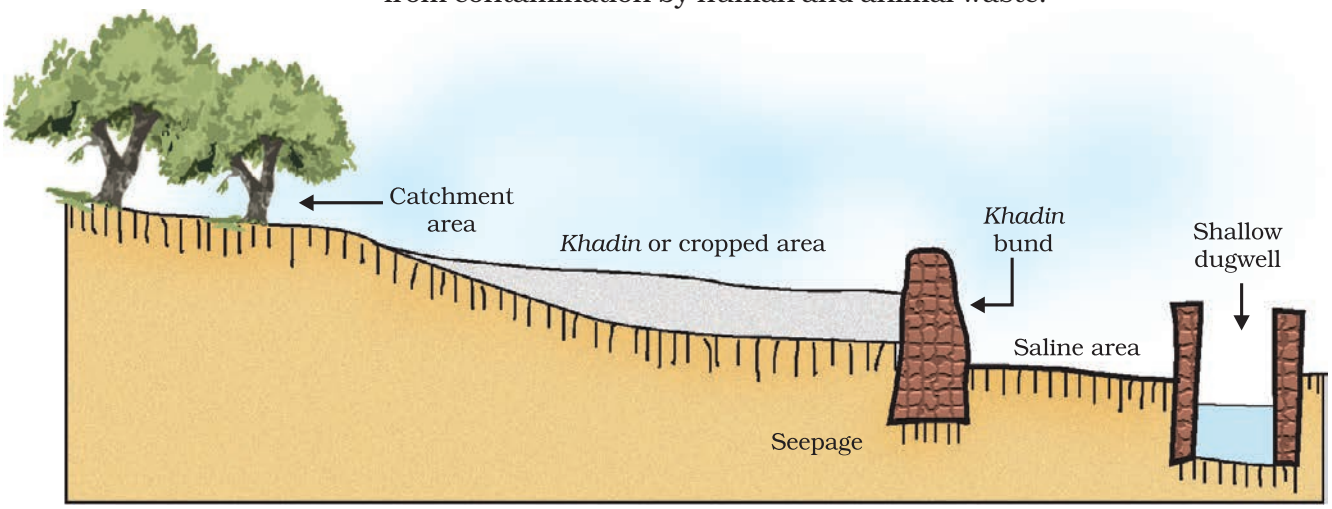

Figure 16.4 *Traditional water harvesting system — an ideal setting of the khadin system*

Q U E S T I O N S

1. Find out about the traditional systems of water harvesting/ management in your region.
2. Compare the above system with the probable systems in hilly/ mountainous areas or plains or plateau regions.
3. Find out the source of water in your region/locality. Is water from this source available to all people living in that area?

16.4 COAL AND PETROLEUM

We have seen some of the issues involved in the conservation and sustainable use of resources like forests, wildlife and water. These can meet our needs perpetually if we were to use them in a sustainable manner. Now we come to yet another important resource – fossil fuels, that is, coal and petroleum, which are important sources of energy for us. Since the industrial revolution, we have been using increasing amounts of energy to meet our basic needs and for the manufacture of a large number of goods upon which our lives depend. These energy needs have been largely met by the reserves of coal and petroleum.

The management of these energy sources involves slightly different perspectives from those resources discussed earlier. Coal and petroleum were formed from the degradation of bio-mass millions of years ago and hence these are resources that will be exhausted in the future no matter how carefully we use them. And then we would need to look for alternative sources of energy. Various estimates exist as to how long these resources

will last if the present rate of usage continues. It is estimated that our known petroleum resources will last us for about forty years and the coal resources will last for another two hundred years.

But looking at other sources of energy is not the only consideration when we look at the consumption of coal and petroleum. Since coal and petroleum have been formed from bio-mass, in addition to carbon, these contain hydrogen, nitrogen and sulphur. When these are burnt, the products are carbon dioxide, water, oxides of nitrogen and oxides of sulphur. When combustion takes place in insufficient air (oxygen), then carbon monoxide is formed instead of carbon dioxide. Of these products, the oxides of sulphur and nitrogen and carbon monoxide are poisonous at high concentrations and carbon dioxide is a greenhouse gas. Another way of looking at coal and petroleum is that they are huge reservoirs of carbon and if all of this carbon is converted to carbon dioxide, then the amount of carbon dioxide in the atmosphere is going to increase, leading to intense global warming. Thus, we need to use these resources judiciously.

Activity 16.11

- Coal is used in thermal power stations and petroleum products like petrol and diesel are used in means of transport like motor vehicles, ships and aeroplanes. We cannot really imagine life without a number of electrical appliances and constant use of transportation. So can you think of ways in which our consumption of coal and petroleum products be reduced?

Some simple choices can make a difference in our energy consumption patterns. Think over the relative advantages, disadvantages and environment-friendliness of the following –

(i) Taking a bus, using your personal vehicle or walking/cycling.
(ii) Using LED bulbs or fluorescent tubes in your homes.
(iii) Using the lift or taking the stairs.
(iv) Wearing an extra sweater or using a heating device (heater or 'sigri') on cold days.

The management of coal and petroleum also addresses the efficiency of our machines. Fuel is most commonly used in internal combustion engines for transportation and recent research in this field concentrates on ensuring complete combustion in these engines in order to increase efficiency and also reduce air pollution.

Activity 16.12

- You must have heard of the Euro I and Euro II norms for emission from vehicles. Find out how these norms work towards reducing air pollution.

16.5 AN OVERVIEW OF NATURAL RESOURCE MANAGEMENT

Sustainable management of natural resources is a difficult task. In addressing this issue, we need to keep an open mind with regard to the interests of various stakeholders. We need to accept that people will act with their own best interests as the priority. But the realisation that such selfish goals will lead to misery for a large number of people and a total destruction of our environment is slowly growing. Going beyond laws, rules and regulations, we need to tailor our requirements, individually and collectively, so that the benefits of development reach everyone now and for all generations to come.

What you have learnt

- Our resources like forests, wildlife, water, coal and petroleum need to be used in a sustainable manner.
- We can reduce pressure on the environment by sincerely applying the maxim of 'Refuse, Reduce, Reuse, Repurpose and Recycle' in our lives.
- Management of forest resources has to take into account the interests of various stakeholders.
- The harnessing of water resources by building dams has social, economic and environmental implications. Alternatives to large dams exist. These are locale-specific and may be developed so as to give local people control over their local resources.
- The fossil fuels, coal and petroleum, will ultimately be exhausted. Because of this and because their combustion pollutes our environment, we need to use these resources judiciously.

EXERCISES

1. What changes would you suggest in your home in order to be environment-friendly?
2. Can you suggest some changes in your school which would make it environment-friendly?
3. We saw in this chapter that there are four main stakeholders when it comes to forests and wildlife. Which among these should have the authority to decide the management of forest produce? Why do you think so?
4. How can you as an individual contribute or make a difference to the management of (a) forests and wildlife, (b) water resources and (c) coal and petroleum?
5. What can you as an individual do to reduce your consumption of the various natural resources?
6. List five things you have done over the last one week to —
   (a) conserve our natural resources.
   (b) increase the pressure on our natural resources.
7. On the basis of the issues raised in this chapter, what changes would you incorporate in your lifestyle in a move towards a sustainable use of our resources?