

CHAPTER 16

Sustainable Management of Natural Resources

Acknowledgment

- Images & video clips have been taken from various sources on the internet.
- Some images and video clips have been modified according to the syllabus.

Images courtesy: [google.com](https://www.google.com)

Video clips courtesy: [youtube.com](https://www.youtube.com)

Use this presentation for Education purpose only.

Contents

Regulate CO₂

Fossil fuels

Natural resources

Conservation

Stake holders

Chipko Andolan

Conservation of forests

Narmada Andolan

Water Harvesting

(Activity 16.1) Find out about the international norms to regulate the emission of carbon dioxide.

- More than 160 nations met in Kyoto, Japan to negotiate the international norms to regulate the emission of carbon dioxide and other greenhouse gases for the developed nations. The developed nations agreed to limit emission of carbon dioxide and five other greenhouse gases by 5.2% compared to the year 1990.
- The United States agreed to reduce emissions of greenhouse gases from 1990 levels by 7% during the period 2008 to 2012.
- The Kyoto Protocol was agreed upon in Kyoto, Japan in December 11, 1997. However, it came into force on February 16, 2005.

How can we contribute towards meeting those norms?

(i) Taking a bus saves fuel. Using a private vehicle consumes more fuel. Walking and cycling save fuel and also help in exercising while being environmental friendly.

(ii) Using fluorescent tubes helps save energy while giving more light per unit of power consumed. Nowadays Compact Fluorescent Lamps (CFLs) are also available which consume even less power while giving more light.

(iii) Using a heating device would consume energy. It would be beneficial to wear an extra sweater.

(iv) Using metro trains running on electricity rather than automobiles.

How can we contribute towards meeting those norms?

(v) Save electricity in houses, schools and offices. Switch off electricity when light is not in use.

(vi) Walking or cycling than to use a vehicle.

(vii) Keeping engine turned off at red lights.

(viii) Using stairs than lift.

These and other such measures will reduce energy consumption and ultimately reduce emission of CO₂ and other gases by the power houses.

How can we contribute towards meeting those norms?

(v) Save electricity in houses, schools and offices. Switch off electricity when light is not in use.

(vi) Walking or cycling than to use a vehicle.

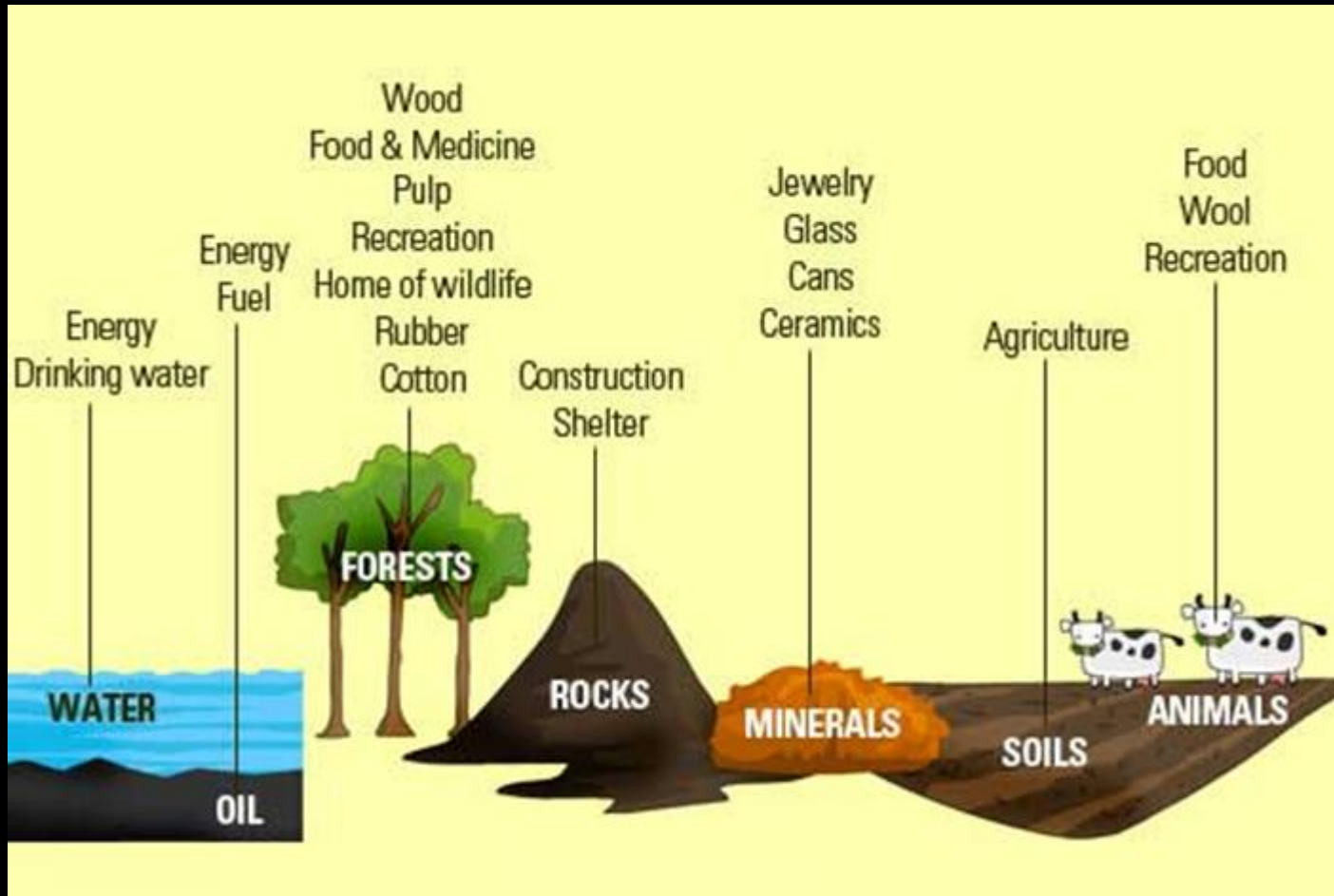
(vii) Keeping engine turned off at red lights.

(viii) Using stairs than lift.

These and other such measures will reduce energy consumption and ultimately reduce emission of CO₂ and other gases by the power houses.

Natural Resources

The resources which provided by nature to satisfy the needs and demands of human beings are called **natural resources**.



(Activity 16.2) There are a number of organisations that seek to spread awareness about our environment and promote activities and attitudes that lead to the conservation of our environment and natural resources. Find out about the organisation(s) active in your neighbourhood/village/town/city.

Karnataka Government, Savegreen, Ecowatch, Environment Support Group, World wildlife fund etc.

Find out how you can contribute towards the same cause.

- a) By gaining membership
- b) By giving voluntary help
- c) By educating people in your locality about the need to protect environment.
- d) By forming groups of students who organise discussions in locality about the need to protect the environment and sustainable use of natural resources.

Ganga Action Plan

Ganga Action Plan is a multi-crore project which was started in 1985 because the quality of the water in the Ganga was very poor. It is a project to clean river Ganga.



Reasons for Ganga Action Plan

- a) The quality of river Ganga is decreased.
- b) The count of disease causing bacteria (coliform) is increased.



Reasons for Pollution of Ganga

Ganga is getting polluted by releasing sewage every day.

The bathing, washing also causes pollution.

Industries add chemicals into the river.

The pollution of river makes it toxic which is very harmful for health.



How can we know about the contamination of water with disease causing germs?

Coliform is a group of bacteria, found in human intestines, whose presence in water indicates contamination by disease-causing microorganisms.

How can water pollution be measured?

Water pollution can be measured by simple factors like pH level, oxygen level in water.

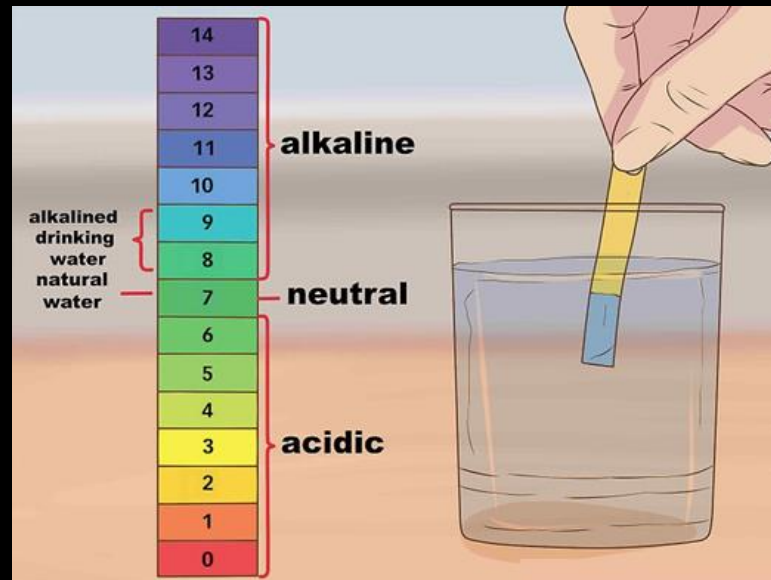
What does the high level of total coliform count in river Ganga indicate?

It indicates that water is contaminated with disease causing microorganisms.



(Activity 16.2) Check the pH of the water supplied to your house using universal indicator or litmus paper.

When pH paper is dipped in water. The changed colour can be matched with the indicator on pH paper to know the pH. The pH of water supplied to house changes due to the presence of chlorine.



3 R's to save the environment

a) Reduce: This means that you use less. Save electricity by switching off unnecessary lights and fans. Save water by repairing leaky taps. Do not waste food. Use a vehicle that gives a better mileage.

b) Recycle: This means that collect plastic, paper, glass and metal items and recycle these materials to make required things instead of synthesising or extracting fresh plastic, paper, glass or metal. In order to recycle, we first need to segregate our wastes so that the material that can be recycled is not dumped along with other wastes.

c) Reuse: This is actually even better than recycling because the process of recycling uses some energy. In the 'reuse' strategy, you simply use things again and again. Instead of throwing away used envelopes, you can reverse it and use it again. The plastic bottles in which you buy various food-items like jam or pickle can be used for storing things in the kitchen. Old newspaper can be used for packing.

How reuse better than recycle?

- a) Recycling uses some energy while reuse requires very less or no energy.
- b) Only segregated wastes can be recycled.
- c) Recycling causes pollution.

Why is sustainable management of natural resources necessary?

Sustainable management of natural resources means judicious use of natural resources so that they fulfil our needs and last for generations to come.

Economic development is linked to environmental conservation. Thus sustainable development implies a change in all aspects of life.

(Activity 16.4) Have you ever visited a town or village after a few years of absence?

If so, have you noticed new roads and houses that have come up since you were there last?

On visiting the town after a few years, one finds new buildings and new roads.

Where do you think the materials for making these roads and buildings have come from?

Construction work needs the use of concrete, water, metals, glass etc. All these are natural resources that come from mines, soil etc.

Try and make a list of the materials and their probable sources.

Cement – mines & industries, Stone/Marble – mines

Try and make a list of the materials and their probable sources.

Cement – mines & industries, Stone/Marble – mines & industries, Iron – Steel industry, Glass – industry, Wood – forest and trees, Water – ground, Bricks – soil,

Discuss the list you have prepared with your classmates.

Can you think of ways in which the use of these materials be reduced?

We can use normal cement flooring instead of wooden or marble. We can use fly-ash bricks instead of regular bricks. We can use CFL for light instead of electric bulbs. We can use bare bricks instead of plastering them.

Need to use resource carefully

Because the resources are not unlimited and with the human population increasing at a tremendous rate due to improvement in health-care, the demand for all resources is increasing at an exponential rate.

Aim of management of resources

The aim of management of natural resources is:

- Long-term perspective so that these will last for the generations to come and will not merely be exploited to the hilt for short term gains.
- To ensure equitable distribution of resources so that all, and not just a handful of rich and powerful people, benefit from the development of these resources.

What changes can you make in your habits to become more environment friendly?

- a) Stop wastage of water.
- b) Switching off unnecessary lights and fans.
- c) Don't waste food. Take as much as you require.
- d) Walking down or use cycle for going to nearby market instead of using vehicle.
- e) Separate wastes into recyclable and non-recyclable.
- f) Reuse carry bags, packing materials, plastic containers and other reusable material.

Advantage of short-term aims

The advantage of exploiting resources with short term aim is to meet the immediate basic human needs.

Advantage of short-term aims over long-term aims

Short term exploitation of natural resources fulfil the current demand.

It is beneficial for the present generation only, whereas, management of resources with long term perspective is aimed to fulfil the needs of future generations.

Long term use of resources can be achieved through its sustainable use.

Equitable distribution of resources

Equitable distribution of resources will ensure benefits to all the sections of the society rich as well as poor. This is necessary for the growth and development of a country. Money force is the main factor which is working against an equitable distribution of resources as rich people and rich nations try to encroach upon the share of the poor people or poor nations.

Factors that work against equitable distribution of resources

- a) Over exploitation of natural resources by some powerful people.
- b) Improper management of these resources.

(Activity 16.5) Make a list of forest produce that you use.

Wood, leaves, paper, rubber, lac, medicines, herbs etc.

What do you think a person living near a forest would use?

Timber for housing, wood for burning/cooking, fruits for food, leaves for house, animal skin for winter clothing, animal meat for food, water for irrigation and drinking.

What do you think a person living in a forest would use?

All the above except water for irrigation.

Discuss with your classmates how these needs differ or do not differ and the reasons for the same.

The need differ only a little bit because both are dependent on the forest for their lifestyles. A person living in the forest would only use as much resource as he would require for living. On the other hand, a person living near the forest can have other ambitions and can be involved in trading of forest products. A person living near a forest can be more exploitive of the resources than a person living inside the forest.

Stakeholders for conservation of forests

1. The people who live in or around forests are dependent on forest produce for various aspects of their life.
2. The Forest Department of the Government which owns the land and controls the resources from forests.
3. The small and big industrialists who use various forest produce, but are not dependent on the forests in any one area.
4. The wild life and nature enthusiasts who want to conserve nature in its pristine form.
5. You and me - because sustainable use of forest would ultimately be of benefit for all.

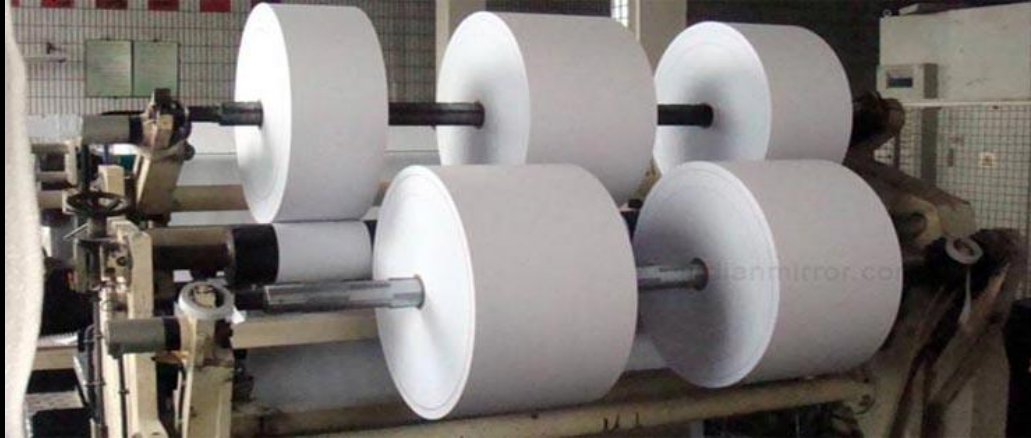
Do you think use of forest resources by local people would lead to the exhaustion of these resources?

People living in and near the forests have developed the practices to ensure that the resources are used in a sustainable manner. In some areas, people even worship forests as deities.

After the British took control of the forests (which they exploited ruthlessly for their own purposes), these people were forced to depend on much smaller areas and forest resources started becoming over-exploited to some extent. The Forest Department in independent India took over from the British is still following the old colonial practice to some extent. There is a need to recognise the knowledge of the local people and to involve them in the conservation of what forests are left. The use of forest resources by local people would not lead to exhaustion of these resources as the people and forests have developed a relation of interdependence.

Industries based on forest produce

Rubber, paper, sports goods, mining, timber, pharmaceutical etc.



Disadvantage of planting only one type of trees

- For planting only one type of trees in forests (monoculture), huge areas are cleared of all vegetation. This will destroy a large amount of biodiversity in the area.
- Local people will not be able to fulfil their needs such as herbs for medicines, fruits and nuts for food, leaves for fodder.

Stakeholders of mono-culture

- Forest department of the government.
- Industrialists.
- These are important sources of revenue for the forest department. They are important for industries to access specific products.

(Activity 16.6) Find out about any two forest produce that are the basis for an industry.

Timber is the basis of timber industry. Forests are good source of wood.

Discuss whether this industry is sustainable in the long run. Or do we need to control our consumption of these products?

Both timber and paper industry involve cutting of trees from the forests. These industries can be sustained if the forests are replenished with trees that are felled. This is possible by cropping of trees. With increase in pressure on forests due to increase in human population, sustainable industries in this sector is not possible. Therefore we need to decrease our dependence on wood and paper to the extent possible. New building materials and new technologies would help in this.

Are forest based industries dependent on a particular area of forest?

Industries consider the forest as merely a source of raw material for its factories. If the raw material in one forest get exhausted, they will get raw material from another forest. For example, after cutting down all the teak trees in one area, they will get their teak from a forest farther away. They do not have any stake in conservation of forest in one particular area.

Chipko Andolan

Chipko Andolan was a mass movement that originated in a village Rani in Garhwal in the Himalayas in which the women folk of the hugged the trees in order to prevent the logging contractor from cutting them down.



Aims of Chipko Andolan

- 1) To stop felling of forest trees and to avoid destruction of them forever.
- 2) To get the forest products yet allowing a natural resource to replenish over time.

People's participation in management of forests.

- 1) In West Bengal, forest officer A.K.Banerjee involved villagers in the protection of 1272 hectares of badly degraded Sal forests.
- 2) Chipko movement started in a small village to protect trees. The women hugged the trees to prevent them from cutting.
- 3) Amrita Devi Bishnoi sacrificed her life along with 363 others for protection of 'Khejri' trees in Khejrli village near Jodhpur in Rajasthan.

**(Activity 16.7) Debate the damage caused to forests by the following –
Building rest houses for tourists in national parks.**

The tourists would create noise, would pollute the surroundings by using plastic; their vehicles would also cause pollution; animals may be disturbed due to the action of tourists; tourists food would be cooked at rest houses; they would also require generators for power generation.

Grazing domestic animals in national parks.

This would take the domestic animals near the carnivores like tigers who would make them their prey which would make the tigers an enemy of the villagers; excessive grazing by livestock on hill slopes may cause soil erosion.

Tourists throwing plastic bottles/covers and other litter in national parks

Plastic is non-biodegradable; it will remain in the forest for long; it may jam some animal's digestive system if mistakenly eaten by them; the litter would destroy the beauty of the national park.

Why should we conserve forest & wildlife?

Wildlife and forests should be conserved for the following reasons:

- 1) To prevent loss of ecological stability
- 2) To preserve biodiversity
- 3) To obtain medicine, wood, fruits, etc., products in a sustainable manner
- 4) To promote social and economic growth.

Conservation of forest

Forests can be conserved by:

1. Preventing the process of deforestation
2. Preventing cattle ranching in the forest
3. Promoting afforestation
4. Preventing the soil erosion
5. Mobilising people's active cooperation

(Activity 16.8) Villages suffering from chronic water shortage surround a water theme park in Maharashtra. Debate whether this is the optimum use of the available water.

Villages in the area are suffering from chronic water shortage which is there since a long time. A water theme park is built in that area by the government is not good. When the people in the village do not have water for their daily living, making a theme Water Park is like ignoring the basic rights of the people. Villagers have the first right over that water.

(Activity 16.9) Study the rainfall patterns in India from an atlas. Identify the regions where water is abundant and the regions of water scarcity.

Areas of rainfall scarcity: Ladakh, Western Rajasthan and Gujarat.

Areas of abundant rainfall: North-Eastern regions and western coastal regions.

Are the regions of water scarcity closely related to regions of acute poverty in India?

Yes. As agriculture is the main occupation of people and water is required for this, regions of water scarcity remain regions with more of poor people.

How was the use of stored water regulated?

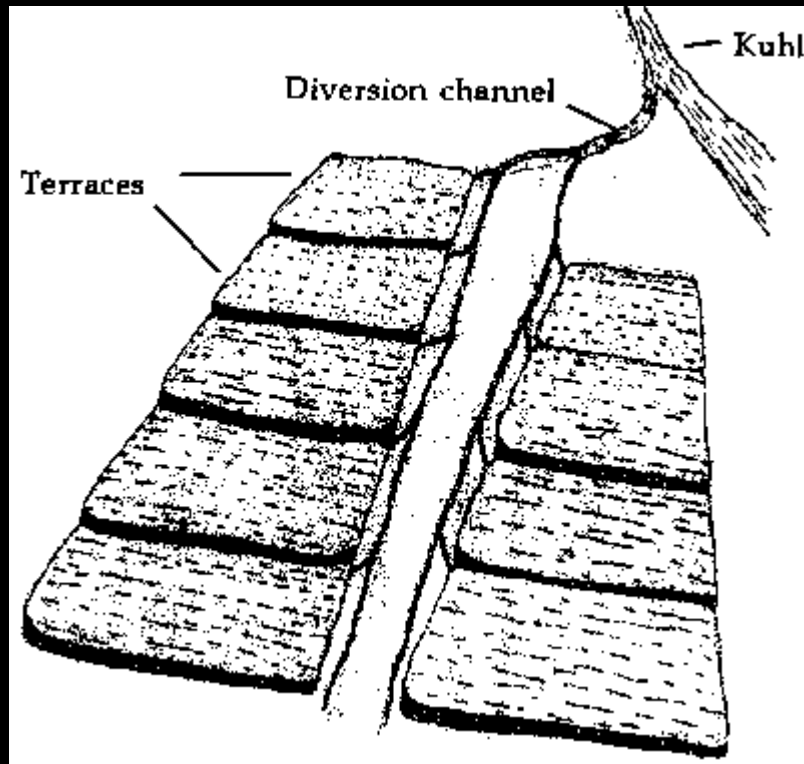
The use of this stored water was strictly regulated and the optimum cropping patterns based on the water availability were arrived at on the basis of decades/centuries of experience.

How did the management of water change after the arrival of the British?

The arrival of the British changed the traditional systems as it changed many other things. The conception of large scale projects – large dams and canals covering large distances were first conceived and implemented by the British and implemented 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.

Kulhs

Parts of Himachal Pradesh had evolved a local system of canal irrigation called kulhs.



Need for building large dams

1. Storage of usable water of rivers for continuous supply of water throughout the year.
2. To make water available for generating electricity.
3. To control floods.
4. For irrigation canal systems leading from these dams to carry large amount of water to great distances.

Narmada Bachao Andolan

Narmada Bachao Andolan (Save the Narmada Movement) about raising the height of the Sardar Sarovar Dam on the river Narmada raised three problems in particular:

1. Economic problems because dams swallow up huge amounts of public money without generation of proportionate benefits.
2. Environmental problems because there is deforestation at a large scale. This causes a lot of loss of biological diversity to displacement of a large number of people.
3. Social problems because they displace a large number of peasants and tribals without adequate compensation or rehabilitation.

Watershed Management

Watershed management is a term used to describe the process of implementing land use practices and water management practices to protect and improve the quality of the water and other natural resources.

Aim of Watershed Management

The aim of watershed management 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.

Advantages of Watershed Management

1. Watershed management increases the production and income of the watershed community.
2. Reduces droughts and floods and increases the life of the downstream dam and reservoirs.

Water harvesting

Water harvesting is an age-old concept of collecting rain water, which can be stored for direct use or can be recharged into the ground water.

Traditional systems of water management

- 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.
- Eris (tanks) in Tamil Nadu,
- Surangams in Kerala
- Kattas in Karnataka are some of the ancient water harvesting.

Advantages of Water harvesting

Water harvesting techniques are highly local, specific and the benefits are also localized.

The advantages are:

1. Water harvesting techniques recharge the ground water level which are drawn through pumps, tube-wells, wells etc.
2. Water harvested in lakes, ponds, nadis help the communities to procure water in most part of the year. It increases production and income of the community.
3. Giving people control over their local water resources ensures that mismanagement and over-exploitation of these resources is reduced/removed.

Advantages of storing water in the ground

1. Water does not evaporate when underground.
2. Water spreads to recharge wells.
3. It also provides moisture for the vegetation to survive during dry periods.
4. As water is not exposed, it cannot become breeding ground for mosquitoes.
5. Ground water is also protected from contamination by humans and animal wastes.

Water conservation in hilly areas

In mountainous areas instead of traditional water harvesting system, check dams are built across the seasonally flooded gullies. In this system running water is stored and diverted to the required places such water does not remain stagnant for long, hence there is less chance of it becoming polluted like that of pond water.



Factors responsible for neglect of local irrigational methods

1. Development of large dams and canals that supply water to large areas.
2. The requirement of water has increased many times due to increase in population, which cannot be fulfilled by local irrigation methods.
3. Local irrigation methods are old and less efficient. They cannot fulfill the need of water for the crops which need more water.

Fossil fuels

Fossil fuels are coal and petroleum. They are the important and major sources of energy.

1. Petroleum is used for automobiles and electricity generation.
2. Coal is a major source for electricity generation in thermal power plants.
3. The energy from these sources are used for manufacture of various goods on which our lives depend.

Management of coal and petroleum

Coal and petroleum have been formed from biomass. Coal and petroleum 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.

Deterioration of environment by fossil fuels

1. Fossil fuels release carbon dioxide, sulphur dioxide, carbon monoxide and other poisonous gases.
2. Carbon dioxide is a greenhouse gas which causes global warming and imbalance in the environment.

(Activity 16.10) 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?

1. Using public transport instead of private vehicles.
2. Using metro trains running on electricity rather than automobiles.
3. Use electric vehicles.
4. Save electricity in houses, schools and offices.
5. Use hybrid and hydrogen powered vehicles.
6. Have good roads.
7. Spread awareness about electricity saving.

Methods of conserving fossil fuels

1. Use more and more renewable fuel.
2. Use CNG more in place of petrol.
3. Avoid wastage of oil and fossil fuels by using more efficient engines.
4. Protect the fossil fuels from accidental fires.

**Think of relative advantages, disadvantages and environment-friendliness of the following:
(i) Taking a bus, using your personal vehicle or walking/cycling.**

Using public transport rather than a personal vehicle reduces the consumption as a bus can carry many passengers than a few people in a personal vehicle. It also reduced the traffic jams caused due to excessive vehicles on road. Using a cycle or walking for short distances will further reduce the consumption of fossil fuels. It is also healthy.

**Think of relative advantages, disadvantages and environment-friendliness of the following:
(ii) Using bulbs or fluorescent tubes in your homes.**

Electric bulbs produce only 40% light and 60% of the energy is wasted as heat. By using fluorescent or LED bulbs we can reduce the consumption of electricity which reduces the consumption of fossil fuels.

**Think of relative advantages, disadvantages and environment-friendliness of the following:
(iii) Using the lift or taking the stairs.**

Using stairs for lower floors can make a person healthy and also reduce the electricity consumption.

**Think of relative advantages, disadvantages and environment-friendliness of the following:
(iv) Wearing an extra sweater or using a heating device on cold days.**

If a person is feeling cold, wearing an extra sweater rather than using a heater will reduce the electricity consumption.

Measures for controlling carbon dioxide levels

1. By reducing consumption of petrol.
2. By using CNG.
3. By treating smoke before discharging it into the atmosphere.
4. By preparing manure instead of burning of animal dung or any other waste.

Advantage of using disposable paper cup over plastic cups.

Disposable paper cups produce less pollution because they are biodegradable while plastic cups are non-biodegradable.

Environment friendliness measures

1. Use bus instead of personal vehicle.
2. Use CFL or LED instead of electric bulbs.
3. Use stairs instead of lift wherever possible.
4. Wear extra clothes in winter instead of heating devices.
5. Switch off appliances when not required.
6. Switch off vehicle engine when waiting in traffic signals.

Environment friendliness measures at home

1. Segregate wastes into recyclable and non-recyclable.
2. Use water and electricity judiciously.
3. Do not waste food.
4. Reuse newspapers and plastic items.
5. Keep windows open to prevent less use of fan.
6. Follow three R's (Reduce, Recycle and Reuse).

Environment friendliness measures in school

1. Grow trees along the boundary wall.
2. Grow shrubs and small plants on the sides of internal road and around the playground.
3. Harvest water from rooftop to be utilised for watering the plants.
4. Arrange awareness programmes among students through poster exhibition and seminars.
5. Avoid wastage of water and paper should be recycled for handicraft purposes.

How can you as an individual contribute or make a difference to the management of

(a) Forests and Wildlife

1. Take part in community activities with focus on conserving forests and wildlife.
2. As a tourist follow all principles of conservation.
3. Help organisations engaged in conservation of forests and wildlife

How can you as an individual contribute or make a difference to the management of

(b) Water resources

1. Save water in domestic use.
2. Install a system for rainwater harvesting.

How can you as an individual contribute or make a difference to the management of

(c) Coal and petroleum

1. Save electricity whenever not required.
2. Install electric gadgets that use less power.
3. Use public transport.

On the basis of the issues raised in this chapter, what changes would you incorporate in your life-style in a move towards a sustainable use of our resources?

Three methods of producing magnetic field are as follows:

1. Will travel in public transport system to conserve petrol.
2. Instead of coal or natural gas, will prefer to use solar energy for cooking.
3. Will use all renewable resources carefully.
4. Take care not to pollute the environment with waste.
5. Should realise that we are living in a community and are not alone

END